



Integrated Resources Plan Update



JULY 2017

DRAFT REPORT

Report prepared
by
Stetson Engineers



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Section 1: Introduction

San Gabriel Valley Municipal Water District (San Gabriel District) is a wholesale water supplier that provides untreated State Water Project (SWP) water to replenish groundwater supplies in the Main San Gabriel Basin (Main Basin). Its member cities are the cities of Alhambra, Azusa, Monterey Park, and Sierra Madre. San Gabriel District prepared an Integrated Resource Plan (IRP) in 2015, as well as this IRP Update in 2017, to address the reliability of water supply sources for San Gabriel District's groundwater replenishment responsibilities and for its member cities. The IRP Update examines current and future water demands, the projected reliability of water supply sources, portfolio optimization, asset management, and the potential future role of San Gabriel District in Basin Management.

1.1 Background

San Gabriel District was formed in 1959 to meet the supplemental water needs of its member cities which are located within the San Gabriel Valley. In anticipation of its long-term supplemental water needs, San Gabriel District entered into a contract with the State of California on November 3, 1962, for the ultimate delivery of 25,000 acre-feet of water per year from the SWP. A subsequent

amendment to the water supply contract dated September 28, 1964, increased the maximum annual entitlement to 28,800 acre-feet. (This quantity of water is not guaranteed each year and varies based on hydrologic conditions. San Gabriel District will be allocated a portion of its Table A entitlement up to 100 percent, which is discussed further in Section 4.6)

In 1969, voters within San Gabriel District rejected a proposal to annex to the Metropolitan Water District of Southern California (MWD). Consequently, San Gabriel District constructed a pipeline (Devil Canyon-Azusa Pipeline) to deliver untreated SWP water to the Main Basin as supplemental water for any production in excess of Main Basin water rights by its member agencies and to furnish San Gabriel District's portion of the Long Beach Judgment Make-up Water. The Devil Canyon-Azusa Pipeline began delivery of water in mid-1974 at the Beatty Channel with a capacity of 55 cubic feet per second (cfs). In 1981 an additional outlet was added to the Devil Canyon-Azusa Pipeline at San Dimas Wash with a capacity of 40 cfs. On April 10, 1995 San Gabriel District completed an extension of the Devil Canyon-Azusa Pipeline from the Boyd-Kern Operations

Center (in Azusa) to the County of Los Angeles Department of Public Works' (LACDPW) San Gabriel Canyon Spreading Grounds, Basin No. 1 with a capacity of about 50 cfs. The purpose of the San Dimas Outlet and the pipeline extension is to provide San Gabriel District with more flexibility in delivering SWP water to the Main Basin. In 1998 a 6 cfs outlet to Big Dalton Wash was constructed to utilize LACDPW's Citrus Spreading Grounds.

San Gabriel District offers low cost replacement water rates to its member cities by utilizing property tax rates to offset a portion of the cost of the replacement water. For fiscal year 2016-17, the Main Basin Watermaster (Watermaster) set the replacement water rate at \$165 per acre-foot for excess production within San Gabriel District, \$614 per acre-foot less than the replacement water rate within Three Valleys Municipal Water District (\$779 per acre-foot) and \$704 per acre-foot less than the replacement water rate within Upper San Gabriel Valley Municipal Water District (\$869 per acre-foot).

1.2 Service Area Location

San Gabriel District's service area is located in the San Gabriel Valley in Los Angeles County. The majority of the service area overlies the

Main Basin, with a portion (Sierra Madre) overlying the Raymond Basin. The locations of the four member cities, which comprise the San Gabriel District, are shown on Figure 1-1. There are about 17,400 acres (27.2 square miles) in San Gabriel District, ranging in elevation from 250 feet above mean sea level (amsl) to 2,300 feet amsl. The climate is characterized by hot, dry summers and mild winters, with an average annual rainfall of about 16 inches in Alhambra and Monterey Park and slightly more in Azusa and Sierra Madre, which are situated at the foothills of the San Gabriel Mountains.

1.3 Purpose of the Integrated Resources Plan

The purpose of San Gabriel District's IRP Update is to address future water supply issues including both the future reliability of the SWP and the reliability of member city water supply sources. Current drought conditions, along with reduced deliveries from the Sacramento-San Joaquin Delta region due to environmental court rulings have brought the future reliability of the SWP into question. In addition, several member cities have water supply sources which may potentially be drought impacted in the future.

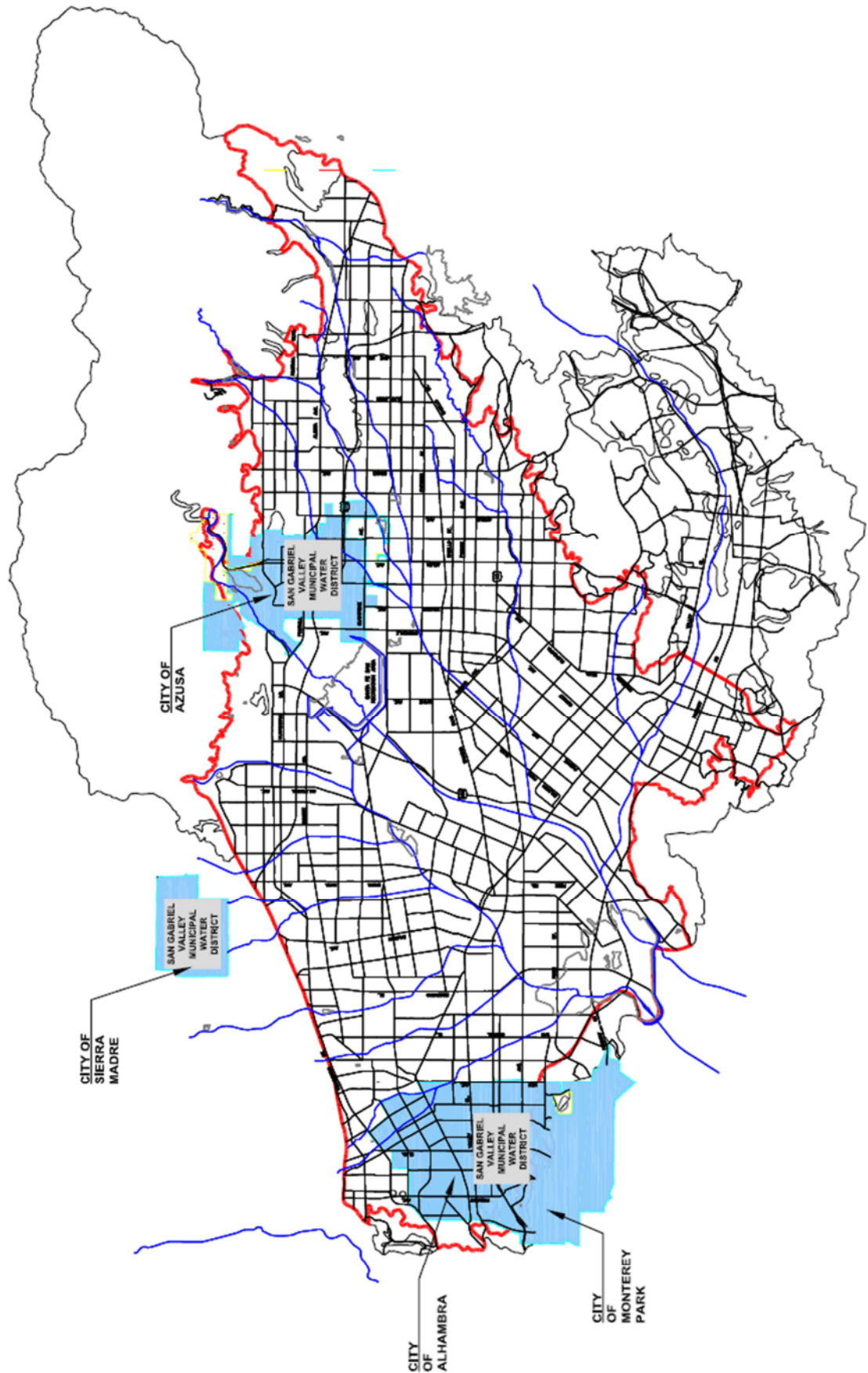


Figure 1-1. Location of San Gabriel District's Service Area.

The primary goal of the IRP Update is to anticipate meeting future customer demand by identifying any future shortfalls in supply and to find the optimal mix of resources to correct the shortfall. The supply shortfall (gap) is the difference between projected water demand and projected water supply. The IRP Update seeks to close the gap by developing long-term alternative supplemental water supply strategies for San Gabriel District and identifying existing and potential sources of water supply available to meet future demands of the member cities and San Gabriel District.

The IRP Update also documents San Gabriel District's assets and provides alternatives and opportunities for asset optimization. San Gabriel District's primary assets include the regional Devil Canyon-Azusa Pipeline, the right of way which runs alongside the pipeline, San Gabriel District's SWP contract, and the San Dimas Hydroelectric Generation Facility.

The IRP is a long-term road map that provides San Gabriel District with a framework for making informed decisions. The IRP is not intended to be a "static" report, but is meant to be continually updated.

1.4 Scope of Work

For the IRP Update, the work tasks included specific focus on San Gabriel District's essential responsibilities and specific focus on the four member cities' Supplemental Water needs, opportunities, and constraints. In many cases, the focus overlapped, and in some cases the focus was only with San Gabriel District or the four cities. The tasks included in the scope of work are described below.

Section 1 is an introduction and includes the background of San Gabriel District, along with the service area and the IRP's purpose. Section 2 describes existing and projected populations and water supply sources. Section 3 evaluates historical and projected water demands for the member cities and San Gabriel District. Section 4 evaluates historical and potential future water supplies for the member cities and San Gabriel District. In addition, Section 4 identifies the reliability of current water supplies for the member cities and San Gabriel District. A gap analysis is conducted in Section 5 to determine the need for additional supply. Section 6 evaluates recycled water supply opportunities for the member cities and San Gabriel District. Section 7 identifies water conservation measures for the member cities and San Gabriel District. Potential projects to increase

water supply for the member cities and San Gabriel District are explored in Section 8. Finally, Section 9 discusses asset management and optimization for San Gabriel District including the Devil-Canyon Azusa Pipeline and the San Dimas Hydroelectric Generation Facility.

The IRP Update provides additional information, including updated population and water demand projections, recycled water opportunities, and water supply reliability projections, that has become available, which may affect the conclusions presented in the IRP Update. This additional information is based on San Gabriel District's 2015 Urban Water Management Plan (UWMP), the individual UWMPs for each of the member cities, the Department of Water Resources (DWR) Final State Water Project (SWP) Delivery Reliability Report 2013, the DWR Final SWP Delivery Capability Report 2015, and updated State Water Project allocation and cost projections. In addition, the City of Azusa has recently and permanently transferred its water rights to Azusa Valley Water Company, which may affect replacement water obligations from San Gabriel District.

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Section 2: Population and Water Supply Sources

2.1 Existing and Projected Populations

San Gabriel District's member cities are located in different areas of the San Gabriel Valley and thus have varying factors contributing to projected population growth. Each member city is briefly described below including location, service area, and population.

Alhambra

The City of Alhambra (Alhambra) is bordered by the Cities of South Pasadena and San Marino to the north, San Gabriel to the east, Monterey Park to the south, and Los Angeles to the west, as shown on Plate 1. Alhambra has an area of approximately seven square miles and is located eight miles east of downtown Los Angeles.

Approximately 54 percent of Alhambra's land use is comprised of residential uses. Between 1916 and 1985, Alhambra experienced rapid growth. Since 1985, growth in Alhambra's population has slowed down as Alhambra reaches "built-out". As a result, new development and growth within Alhambra will largely involve the redevelopment of underutilized parcels and the renovation of existing structures. Existing and projected populations have been provided in Alhambra's 2015 UWMP. Table 2-1 shows

Alhambra's existing and projected population.

Azusa

The City of Azusa (Azusa) is bordered by the Cities of Glendora to the east, Irwindale and Covina to the south, Duarte to the west, and the Angeles National Forest to the north, as shown on Plate 1. Azusa has an area of approximately 9.7 square miles and is located twenty-five miles northeast of downtown Los Angeles.

In 1993, Azusa purchased the Azusa Valley Water Company, which expanded Azusa's service area. Upon integration with the Azusa Valley Water Company, Azusa's water system became known as Azusa Light and Water, or ALW.

ALW is the local water purveyor that serves retail customers within its defined service area which includes the entire City of Azusa and portions of the cities of Glendora, Covina, West Covina, Irwindale, and unincorporated Los Angeles County. ALW, through the City of Azusa (a San Gabriel District member city) and Azusa Valley Water Company (an Upper San Gabriel Valley Municipal Water District (Upper District) member agency), has the legal right to pump groundwater from the

Main San Gabriel Basin and to divert San Gabriel River water from either the San Gabriel or Morris Reservoirs and treat the water at its Joseph F. Hsu Filtration Plant. The Main Basin Watermaster utilizes the following formula to calculate the Main Basin production share attributed to San Gabriel District.

(City of Azusa Production + Azusa Valley Water Company Production) - Miller Brewing Production = Net Production

Net production x 40% = San Gabriel District's Main Basin Share

The remaining balance, or 60 percent of the total Azusa/ALW production, is attributed to Upper District's service area. The information presented in this report is specific to the San Gabriel District's share of ALW's production (Azusa) as calculated by the Main Basin Watermaster.

Existing and projected populations have been provided in ALW's 2015 UWMP. Table 2-1 shows all of ALW's existing and projected population, including the City of Azusa and Azusa Valley Water Company's service area.

Monterey Park

The City of Monterey Park (Monterey Park) is bordered by the Cities of Alhambra and San Gabriel to the north, Rosemead to the east, Montebello to the south, and the City of Los Angeles to the west, as shown on Plate 1. Monterey Park is located seven miles east of downtown Los Angeles in the westerly portion of the San Gabriel Valley.

Monterey Park encompasses an area of approximately seven square miles. Between 1916 and approximately 1985, Monterey Park experienced rapid growth. Since 1985, growth in Monterey Park's population has slowed down as Monterey Park reaches "built-out".

As a result, new development and growth within Monterey Park will largely involve the redevelopment of underutilized parcels and the renovation of existing structures. The population of Monterey Park's water service area is about 95 percent of the total population of the City of Monterey Park.

TABLE 2-1

**SAN GABRIEL DISTRICT SERVICE AREA
POPULATION PROJECTIONS**

Year	Alhambra ⁽¹⁾	Azusa Light & Water ^(1,2)	Monterey Park ⁽¹⁾	Sierra Madre ⁽¹⁾	Total (San Gabriel District)
2015	85,545	106,332	56,063	11,133	259,073
2020	88,001	109,200	58,987	11,345	267,533
2025	90,457	111,600	61,699	11,561	275,317
2030	92,913	114,100	64,543	11,780	283,336
2035	95,369	116,600	67,501	12,004	291,474
2040	97,825	119,200	70,603	12,233	299,861

Notes:

⁽¹⁾ Based on the member cities' service area populations provided in their 2015 Urban Water Management Plans.

⁽²⁾ Includes the City of Azusa and Azusa Valley Water Company.

Existing and projected populations have been provided in Monterey Park's 2015 UWMP. Table 2-1 shows the City of Monterey Park's existing and projected population within its water service area.

Sierra Madre

The City of Sierra Madre (Sierra Madre) is bounded by the Cities of Arcadia to the east and south, Pasadena to the west, and the Angeles National Forest to the north. Sierra Madre is approximately 17 miles northeast of downtown Los Angeles and overlies portions of the Pasadena and Santa Anita Sub-areas of the Raymond Basin. Sierra Madre's service area coincides with the City boundaries. Sierra Madre covers approximately 3 square miles of land and ranges from relatively steep mountain canyon areas to gentle sloping land

near the south edge of the city. Sierra Madre is "built-out" with little or no development expected over the next 20 years.

As a result, new development and growth within Sierra Madre will largely involve the redevelopment of underutilized parcels and the renovation of existing structures. Existing and projected populations have been provided in Sierra Madre's 2015 UWMP. Table 2-1 shows Sierra Madre's existing and projected population.

San Gabriel District

Table 2-1 shows the projected populations through 2040 in five year increments for each member city and the total projected population for San Gabriel District. The projected totals provided in Table 2-1 are

consistent with population projections provided in San Gabriel District's 2015 UWMP.

2.2 San Gabriel District's Water Supply Source

San Gabriel District has not supplied, and does not currently supply, water directly to its member cities. San Gabriel District delivers supplemental imported water to replenish the Main Basin although plans for a connection to Azusa's Joseph F. Hsu Filtration Plant are complete and the project is expected to go out for bid this year (2017). When completed, this connection will allow San Gabriel District to directly deliver water to a member city for the first time. Currently, San Gabriel District's only source of water is from the SWP. San Gabriel District constructed the Devil Canyon-Azusa Pipeline

to convey SWP water to spreading grounds that are owned and operated by the LACDPW. There are five turnouts from the pipeline; two located in the City of Azusa, two in the City of San Dimas, and one in the City of Glendora, as shown below on Figure 2-1. Water is delivered to the spreading grounds based on member city Replacement Water requirements which are discussed further in Section 4.

2.3 Member City Water Supply Sources

San Gabriel District's member cities obtain most of their water through groundwater production. Alhambra, Azusa, Sierra Madre, and Monterey Park have water rights to the Main Basin, and both Alhambra and Sierra Madre have water rights to the Raymond Basin. In addition, Azusa has historically diverted and treated surface flow from the San Gabriel River, Alhambra has received

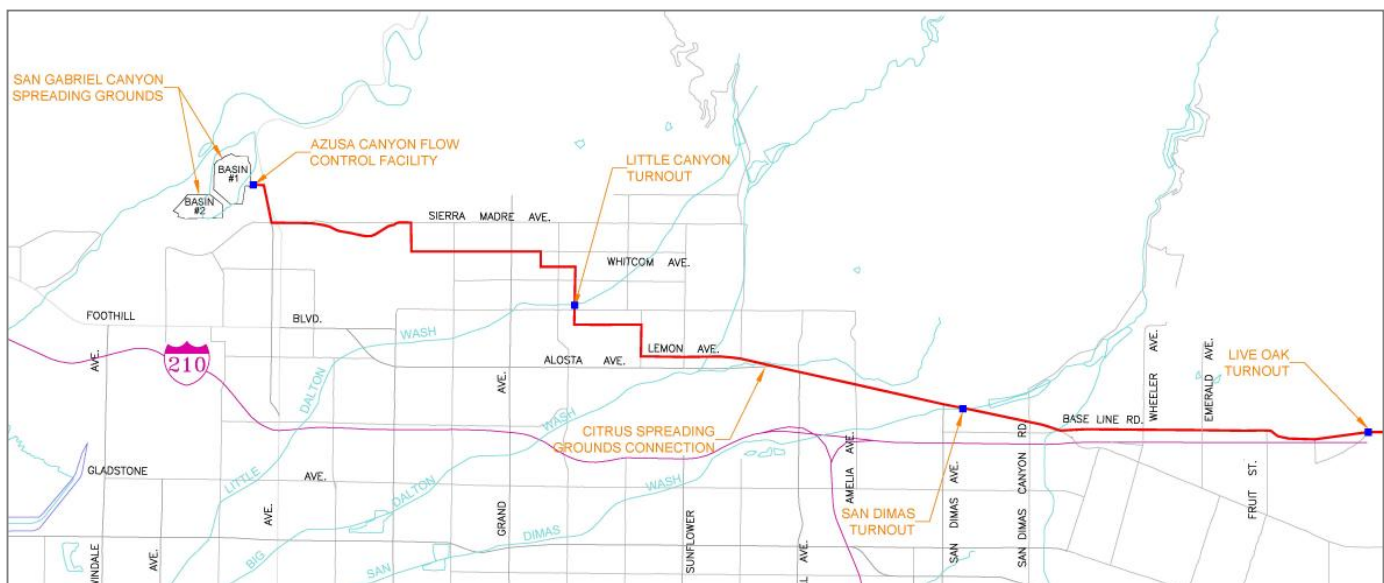


Figure 2-1. Devil Canyon-Azusa Pipeline Turnouts.

direct deliveries of imported water from San Gabriel District through the Metropolitan Water District of Southern California's (MWD) water transmission system through an exchange agreement, and Sierra Madre has obtained some supplies from local springs and currently (2016) receives direct deliveries of imported water from San Gabriel District through MWD's transmission system through an exchange agreement. The historical and current water supply sources for each member city are tabulated below in Table 2-2.

TABLE 2-2
HISTORICAL MEMBER CITY WATER SUPPLY SOURCES

Member Cities	Main Basin		Raymond Basin		Imported/ Purchased Water
	Groundwater	Surface Water	Groundwater	Local Spring Water	
Alhambra	X		X		X
Azusa	X	X			X ⁽¹⁾
Monterey Park	X				X ⁽²⁾
Sierra Madre	X ⁽³⁾		X	X	X

Notes:

⁽¹⁾ Azusa only uses imported water for emergencies, but has access to water from the Colorado River and the State Water Project through San Gabriel District and Upper District according to ALW's 2015 UWMP.

⁽²⁾ Monterey Park purchases groundwater from San Gabriel Valley Water Company and has an emergency connection with the Metropolitan Water District of Southern California (MWD) according to Monterey Park's 2015 UWMP.

⁽³⁾ Groundwater can be pumped by the City of Arcadia and delivered to the City of Sierra Madre through an interconnecting pipeline utilizing Sierra Madre's Main Basin production rights.

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Section 3: Historical and Projected Water Demands

3.1 Historical Water Demands

Historical water demands from fiscal years 2006-07 through 2015-16 were evaluated for both San Gabriel District and its member cities. The historical water demands are discussed further, below.

3.1.1 Member Cities

The historical water demands for San Gabriel District's member cities between fiscal years 2006-07 and 2015-16 were determined using a combination of Main Basin Watermaster Annual Reports, Raymond Basin Annual Reports, and member city UWMPs. The total water demands ranged from 24,424 acre-feet (in fiscal year 2015-16) to 39,142 acre-feet (in fiscal year 2006-07) with an average of 30,970 acre-feet. Historical water demands are summarized in Table 3-1.

Alhambra

Alhambra's total water demands ranged from 8,839 acre-feet (in fiscal year 2015-16) to 13,551 acre-feet (in fiscal year 2006-07) with an average of 11,342 acre-feet. Historical water demands are summarized in Table 3-1.

**TABLE 3-1
HISTORICAL WATER DEMANDS WITHIN DISTRICT
BOUNDARIES
(ACRE-FEET)**

Fiscal Year	Alhambra (1)	Azusa (2)	Monterey Park ⁽³⁾	Sierra Madre (4)	Total Water Demand
2006-2007	13,551	11,339	11,018	3,716	39,624
2007-2008	12,975	7,987	10,063	3,480	34,505
2008-2009	12,276	7,927	9,501	3,162	32,866
2009-2010	11,543	7,463	8,686	2,750	30,442
2010-2011	10,796	7,112	8,497	2,678	29,083
2011-2012	10,879	7,436	8,791	2,691	29,797
2012-2013	11,252	7,810	8,965	2,844	30,871
2013-2014	11,306	7,752	9,094	2,499	30,651
2014-2015	10,004	6,832	8,391	2,202	27,428
2015-2016	8,839	6,126	7,423	2,045	24,432
10-Year Average	11,342	7,778	9,043	2,807	30,970

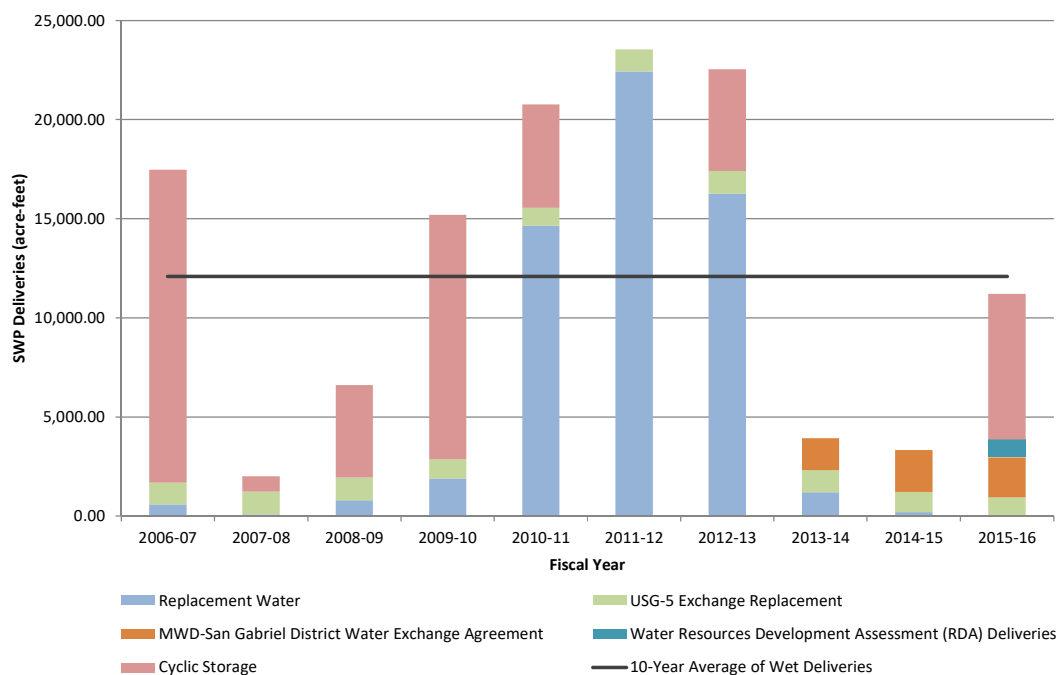
Notes:

(1) Values are from the Main San Gabriel Basin Watermaster annual reports. The demands are calculated based on the Cooperative Water Exchange Agreement.

(2) Local production and USG-8 deliveries were summed. Values are from the Main San Gabriel Basin Watermaster annual reports. For fiscal years 2006-07 and 2007-08, the production totals provided in the annual reports were multiplied by 40 percent.

(3) Values are from Monterey Park's 2015 Urban Water Management Plan.

(4) Values are from the Raymond Basin annual reports and the MWD Meter Summary Reports for SGV-01. For years prior to 2013-2014, water use was calculated as Raymond Basin production plus surface water diversion. For 2013-2014 and after, imported MWD/other water is also included. For fiscal year 2015-16, about an additional 1,020 acre-feet was reflected as treated or imported, but was actually delivered for groundwater replenishment.



Sources: Main San Gabriel Basin Watermaster 2015-16 Annual Report, Appendix E and the Raymond Basin 2015-16 Annual Report, Table 6

Figure 3-1. San Gabriel District's Historical Supplemental Water Wet Deliveries.

Azusa

The total water demands attributed to Azusa (40 percent of ALW demands) for the past 10 years ranged from 6,126 acre-feet (in fiscal year 2015-16) to 11,339 acre-feet (in fiscal year 2006-07) with an average of 7,778 acre-feet. Historical water demands are summarized in Table 3-1.

Monterey Park

Monterey Park's total water demands ranged from 7,423 acre-feet (in fiscal year 2015-16) to 11,018 acre-feet (in fiscal year 2006-07) with an average of 9,043 acre-feet. Historical water demands are summarized in Table 3-1.

Sierra Madre

Sierra Madre's total water demands ranged from 3,716 acre-feet (in fiscal year 2006-07) to 2,045 acre-feet (in fiscal year 2015-16) with an average of 2,807 acre-feet. Historical water demands are summarized in Table 3-1.

3.1.2 San Gabriel District

San Gabriel District delivers supplemental water to replenish the Main Basin according to the Main Basin Judgment, which is summarized in Section 4. As previously described, San Gabriel District is a SWP contractor which obtains the imported water used for spreading in the Main Basin to account for the Supplemental Water obligations of each member city. The 10-year

average of San Gabriel District's imported water deliveries, including water to fulfill historical Replacement Water, USG-5 Exchange Agreement, MWD-San Gabriel District Water Exchange Agreement demands, and water delivered into cyclic storage is approximately 12,000 acre-feet, as shown in Figure 3-1. The historical annual imported water deliveries made by San Gabriel District from 2006-07 through 2015-16 have ranged from 1,207 acre-feet to 23,548 acre-feet and are shown on Figure 3-1. Figure 3-1 also shows a comparison between Replacement Water, Cyclic Storage, USG-5 Exchange Replacement deliveries, Water Resources Development Deliveries, and Watermaster Pre-Purchase Deliveries. These demands are discussed further in Section 4.

3.2 Projected Water Demands

Water demands were projected through fiscal year 2039-40 for both San Gabriel District and its member cities. A primary factor utilized to project member city water demands was the implementation of water conservation measures to meet state regulations, which is discussed further in Section 3.2.1. The projection methodology and the projected water demands for San Gabriel District and its member cities are discussed below.

3.2.1 Member Cities

Future water demands for each member agency were determined through the use of

projected water use factors and projected populations. The methodology for determining projected population figures was discussed in Section 2.1. Water use factors for each member city were extracted from each respective 2015 UWMP. Projected water use factors were determined pursuant to California State Senate Bill 7-7 (SBX7-7), which is summarized below.

Projected Water Use Factors

SBX7-7 requires the state of California to "...achieve 20 percent reduction in urban per capita water use in California by December 31, 2020. The state would be required to make incremental progress towards this goal by reducing per capita water use by at least 10 percent on or before December 31, 2015." In addition, SBX7-7 requires Urban Wholesale Water Suppliers to "...include in the urban water management plans...an assessment of their present and proposed future measures, programs, and policies to help achieve the water use reductions required by this part." Alhambra, Sierra Madre, Monterey Park, and ALW have included 2020 per capita water use targets in their respective 2015 UWMPs.

San Gabriel District has implemented water conservation measures that will assist its member cities in reducing per capita water demands to ultimately achieve SBX7-7 goals. Water conservation activities are addressed in

Section 7. Member cities' 2020 water use factors from each member city's 2015 UWMP are summarized in Table 3-2.

TABLE 3-2

**SAN GABRIEL DISTRICT MEMBER CITY
SBX7-7 WATER USAGE GOALS⁽¹⁾**

Year	Alhambra	Azusa	Monterey Park	Sierra Madre ⁽²⁾
2020	131	168	142	200
2025	131	168	142	200
2030	131	168	142	200
2035	131	168	142	200
2040	131	168	142	200

Notes:

⁽¹⁾ Based on 2015 Urban Water Management Plans for member cities.

⁽²⁾ Pursuant to Sierra Madre's 2015 UWMP (page 3-37 in the first paragraph of Section 3.7.3), the GPCD used was based on the current trend in the GPCD and is below the SBX7-7 requirement of 206 GPCD.

GPCD=gallons per capita day

Member City Water Demand Forecast

Future water demands for each member city were projected by multiplying the projected water use factors for each member city by the projected population of each member city for the years 2020 through 2040. The future water demands are summarized in Table 3-2 and 3-3.

The 2015 per capita water use values from the 2015 UWMPs were used in Table 3-2. The 2020 per capita water use targets for each member city were utilized as the projected water use factors for the years 2020 through 2040. As shown on Figure 3-2, projected member city demands are comparable to historical member city demands primarily

because of increased water conservation to meet SBX7-7 requirements.

3.2.2 San Gabriel District

San Gabriel District's member cities' water supplies originate from the Main Basin, Raymond Basin, and treated imported water. Member city water demands were derived from projected water use factors and projected population growth as previously described. Alternately, San Gabriel District's firm demands depend on the amount of supplemental imported water required by the Main Basin Watermaster to replenish the Main Basin each year along with exchange agreements obligations. Deliveries to cyclic storage have contributed to historical SWP total deliveries, as shown in Figure 3-1, however Cyclic Storage is a means of storing surplus SWP water, therefore it is not included as a demand. The amount of supplemental water required annually was estimated based upon member cities' projected Main Basin water use, compared to estimated future annual Main Basin production rights.

**TABLE 3-3
SAN GABRIEL DISTRICT MEMBER CITY
PROJECTED WATER DEMANDS**

Year	Alhambra			Azusa ⁽¹⁾		
	Population	Per Capita Water Use (GPCD)	Water Demand (Acre-feet/year)	Population	Per Capita Water Use (GPCD)	Water Demand (Acre-feet/year)
2020	88,001	131	12,913	109,200	168	8,220
2025	90,457	131	13,274	111,600	168	8,401
2030	92,913	131	13,634	114,100	168	8,589
2035	95,369	131	13,994	116,600	168	8,777
2040	97,825	131	14,355	119,200	168	8,973
Year	Monterey Park			Sierra Madre		
	Population	Per Capita Water Use (GPCD)	Water Demand (Acre-feet/year)	Population	Per Capita Water Use (GPCD) ⁽²⁾	Water Demand (Acre-feet/year)
2020	58,987	142	9,382	11,345	200	2,542
2025	61,699	142	9,814	11,561	200	2,590
2030	64,543	142	10,266	11,780	200	2,639
2035	67,501	142	10,737	12,004	200	2,689
2040	70,603	142	11,230	12,233	200	2,741
			Year	Total Water Demand (Acre-feet/year)		
			2020	33,057		
			2025	34,078		
			2030	35,128		
			2035	36,197		
			2040	37,298		

Notes:

⁽¹⁾ The demand for the City of Azusa was calculated by multiplying ALW's demand (population multiplied by GPCD) by 40 percent.

⁽³⁾ Pursuant to Sierra Madre's 2015 UWMP, the GPCD used was determined based on the current trend in the GPCD and is below the SBx7-7 requirement of 206 GPCD.

Estimated future annual production rights are based upon each member cities share of the Main Basin Operating Safe Yield (OSY), which is described further in Section 4. Where projected Main Basin production exceeds Main Basin production rights, a supplemental water requirement is incurred. San Gabriel

District's projected supplemental water requirements are discussed in detail in Section 4.2.4.

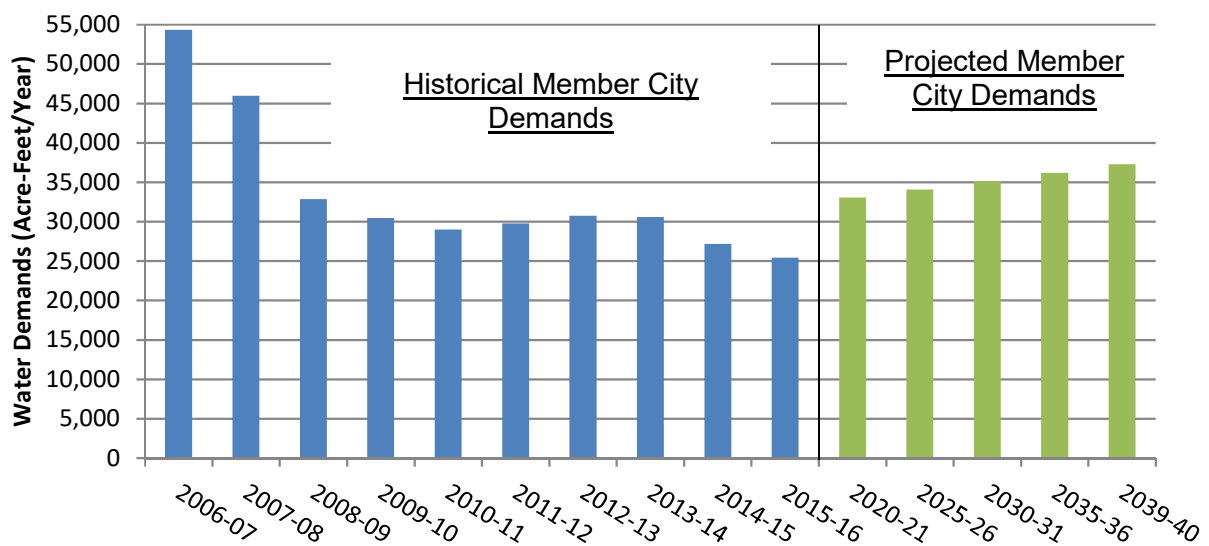


Figure 3-2. Historical and Projected Total Member City Demands.

Section 4: Water Supplies and Reliability

4.1 Historical Water Supplies

Historical water supplies for San Gabriel District and its member cities are discussed below.

4.1.1 San Gabriel District

San Gabriel District's delivery of untreated SWP water is largely a function of the availability (allocation) of SWP water and the collective Replacement Water Obligation of San Gabriel District's member cities as described in Section 3.

As previously described, Figure 3-1 shows historical imported water deliveries for San Gabriel District from fiscal year 2006-07 through fiscal year 2015-16.

**TABLE 4-1
SAN GABRIEL DISTRICT
HISTORICAL SWP ALLOCATIONS**

Calendar Year	SWP Allocation	
	Percent	Volume (Acre-Feet)
2007	60	17,280
2008	35	10,080
2009	40	11,520
2010	50	14,400
2011	80	23,040
2012	65	18,720
2013	35	10,080
2014	5	1,440
2015	20	5,760
2016	60	17,280
10-Year Average	45	12,960

Table 4-1 summarizes San Gabriel District's historical SWP Table A allocations from calendar years 2007 through 2016 with a 10-year average allocation of about 12,960 acre-feet, about 45 percent of San Gabriel District's maximum entitlement of 28,800 acre-feet.

4.1.2 Member Cities

The primary source of water supply for San Gabriel District's member cities is from groundwater production. The historical supplies for each member city are described below.

Alhambra

Alhambra has the right to pump groundwater from both the Main Basin and the Raymond Basin, and can purchase imported water from MWD through the Cooperative Water Exchange Agreement with Upper District. These water supply sources are described further in Sections 4.2 and 4.3. Although Alhambra has relied on Raymond Basin, Main Basin, and imported water supplies in the past, Alhambra has not produced from the Raymond Basin since fiscal year 2001-02. Table 4-2 summarizes Alhambra's historical water supplies.

TABLE 4-2
ALHAMBRA HISTORICAL WATER SUPPLIES⁽¹⁾
(ACRE-FEET)

Fiscal Year	Supply Sources			TOTAL
	Groundwater		USG-5 ⁽²⁾	
	Raymond Basin	Main Basin		
2006-07	0	10,588	2,963	13,551
2007-08	0	9,985	2,990	12,975
2008-09	0	9,211	3,065	12,276
2009-10	0	8,942	2,601	11,543
2010-11	0	8,368	2,428	10,796
2011-12	0	7,880	2,999	10,879
2012-13	0	8,214	3,037	11,252
2013-14	0	8,322	2,984	11,306
2014-15	0	7,292	2,712	10,004
2015-16	0	6,353	2,487	8,839
			10-Year Average	11,782

Notes:

⁽¹⁾ Values from Watermaster's Annual Reports in Appendix H on page H4 for FY 2006-07 to 2013-14 and Appendix I on page I4 for FY 2014-15 and 2015-16.

⁽²⁾ Water delivered through the Cooperative Water Exchange Agreement.

TABLE 4-3
AZUSA LIGHT & WATER HISTORICAL WATER SUPPLIES⁽¹⁾
(ACRE-FEET)

Fiscal Year	Supply Sources			TOTAL (ALW)	TOTAL (Azusa) ⁽²⁾
	Main Basin Supply		USG-8		
	Groundwater	Surface Water			
2006-07	21,513	5,627	1,207	28,348	11,339
2007-08	16,037	3,594	336	19,968	7,987
2008-09	16,695	5,453	179	22,328	7,927
2009-10	14,804	6,036	0	20,842	7,463
2010-11	12,797	6,546	0	19,344	7,112
2011-12	10,430	9,706	0	20,137	7,436
2012-13	14,049	7,008	0	21,057	7,810
2013-14	16,186	4,631	0	20,818	7,752
2014-15	11,906	6,470	0	18,377	6,832
2015-16	12,653	3,919	0	16,573	6,126
10-Year Average				18,321	7,778

Notes:

⁽¹⁾ For FY 2006-07 through 2013-14, the values for the supply sources are from Watermaster's Annual Report in Appendix D and F. For FY 2014-15 and 2015-16, the values for the supply sources are from Watermaster's Annual Report in Appendix E and G.

⁽²⁾ Values are from the Main San Gabriel Basin Watermaster annual reports. For fiscal years 2006-07 and 2007-08, the productions provided in the annual reports plus the USG-8 values were multiplied by 40 percent.

TABLE 4-4
MONTEREY PARK HISTORICAL WATER SUPPLIES⁽¹⁾
(ACRE-FEET)

Fiscal Year	Supply Sources		TOTAL
	Main Basin Groundwater	Purchased/Imported Water ⁽²⁾	
2006-07	10,904	114	11,018
2007-08	9,852	211	10,063
2008-09	9,452	49	9,501
2009-10	8,686	0	8,686
2010-11	8,389	108	8,497
2011-12	8,740	51	8,791
2012-13	8,817	148	8,965
2013-14	9,022	72	9,094
2014-15	8,132	259	8,391
2015-16	7,422	1	7,423
		10-Year Average	9,243

Notes:

⁽¹⁾ Values are from Monterey Park's 2015 Urban Water Management Plan.

⁽²⁾ Monterey Park purchases groundwater from San Gabriel Valley Water Company and has access to imported water from an emergency connection with MWD.

⁽³⁾

Azusa

Azusa has the right to pump groundwater from the Main Basin and to divert San Gabriel River water from either the San Gabriel Reservoir or Morris Reservoir and treat the water at its Joseph F. Hsu Filtration Plant. San Gabriel District, in conjunction with Azusa has finished the plans for a direct connection from the Devil Canyon-Azusa pipeline to Azusa's Joseph F. Hsu Filtration Plant. This connection will enable San Gabriel District to make direct deliveries of SWP water to Azusa when surface water supplies from the San Gabriel River are low. The project is anticipated to be out to bid

to contractors for its construction sometime this year (2017).

Azusa has relied primarily on Main Basin groundwater extraction and surface water diversion in the past to meet demands. Imported water from Azusa's USG-8 connection is available in emergencies and has been used to supplement water needs in the past. Future supplies may be impacted during drought conditions. Table 4-3 summarizes the historical water supplies of ALW. Azusa's historical supplies are calculated as 40 percent of ALW's historical supplies.

Monterey Park

Monterey Park has the right to pump groundwater from the Main Basin, which has historically been the primary source of Monterey Park's water supply. Monterey Park also purchases groundwater from San Gabriel Valley Water Company to meet its water demands and has access to imported water from an emergency connection with MWD. Monterey Park briefly utilized imported water to meet demands from fiscal year 2002-03 to fiscal year 2004-05 during shut down of production wells until treatment facilities were completed to address contamination detected in Monterey Park's wells. Table 4-4

summarizes Monterey Park's historical water supplies.

Sierra Madre

Sierra Madre has the right to pump groundwater from both the Main Basin and the Raymond Basin. Sierra Madre also diverts both tunnel water from Little Santa Anita Canyon and water from the Big Santa Anita Dam to the Sierra Madre spreading grounds for infiltration, which increases Sierra Madre's annual pumping rights. Sierra Madre has relied on Raymond Basin, Main Basin, and tunnel water supplies in the past. However, Sierra Madre has not produced from the Main

**TABLE 4-5
SIERRA MADRE HISTORICAL WATER SUPPLIES
(ACRE-FEET)**

Fiscal Year	Supply Sources				TOTAL
	Groundwater		Tunnel Water ⁽²⁾	Imported Water (SGV-01)	
	Raymond Basin	Main Basin ⁽¹⁾			
2006-07	3,418	0	299	0	3,716
2007-08	3,160	0	320	0	3,480
2008-09	2,954	0	208	0	3,162
2009-10	2,525	0	225	0	2,750
2010-11	2,189	0	489	0	2,678
2011-12	2,408	0	283	0	2,691
2012-13	2,691	0	153	0	2,844
2013-14 ⁽³⁾	866	0	22	1,611	2,499
2014-15	76	0	3	2,123	2,202
2015-16 ⁽⁴⁾	1,023	0	5	1,018	2,045
10-Year Average					2,807

Notes:

⁽¹⁾Groundwater can be pumped by the City of Arcadia and delivered to the City of Sierra Madre through an interconnecting pipeline utilizing Sierra Madre's Main Basin production rights.

⁽²⁾ Tunnel water obtained from Little Santa Anita Canyon.

⁽³⁾ The City of Sierra Madre stopped pumping water from the Raymond Basin in October 2013 and started obtaining imported water from MWD through SGV-01.

⁽⁴⁾ The City of Sierra Madre stopped taking MWD water from SGV-01 directly into their water system and started pumping from the Raymond Basin on December 17, 2015. MWD water from SGV-01 was spread in the Raymond Basin starting on December 17, 2015.

Basin since fiscal year 2005-06. Starting in fiscal year 2013-14, Sierra Madre began

4.2.1 Introduction

The San Gabriel Valley is located in

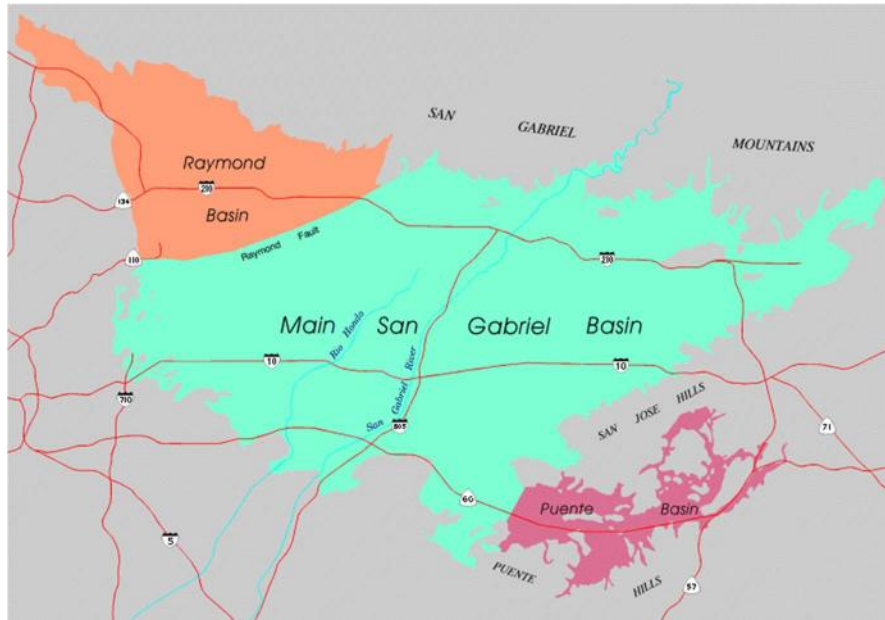


Figure 4-1. Location of the Main San Gabriel Basin.

receiving imported water from MWD via the MWD-San Gabriel District exchange agreement, which is discussed in Section 4.2.3. Table 4-5 summarizes Sierra Madre's historical water supplies.

4.2 Main Basin

As previously described, San Gabriel District member cities Alhambra, Azusa and Monterey Park have historically relied on water supplies from the Main Basin to meet water demands. In addition, Sierra Madre may produce from the Main Basin in the future. The Main Basin is described below including location, management and projected reliability.

southeastern Los Angeles County and is bounded on the north by the San Gabriel Mountains, on the west by the San Rafael and Merced Hills, on the south by the Puente Hills and the San Jose Hills, and on the east by a low divide between the San Gabriel River system and the Upper Santa Ana River system. The San Gabriel River and its distributary, the Rio Hondo, drain an area of about 490 square miles upstream of the Whittier Narrows. The Whittier Narrows is a low gap between the Merced and Puente Hills, just northwest of the City of Whittier, through which the San Gabriel River and the Rio Hondo flow to the coastal plain of Los Angeles County. The Whittier Narrows is a natural topographic divide and a subsurface restriction to the movement of

ground water between the Main Basin and the Coastal Plain. Of the approximate 490 square miles of drainage area upstream of the Whittier Narrows, about 167 square miles are valley lands and about 323 square miles are mountains and foothills.

The Main Basin includes essentially the entire valley floor of the San Gabriel Valley with the exception of the Raymond Basin and Puente Basin, as shown on Figure 4-1. The boundaries of the Main Basin are the Raymond Basin on the northwest, the base of the San Gabriel Mountains on the north, the groundwater divide between San Dimas and La Verne and the lower boundary of the Puente Basin on the east, and the Whittier Narrows on the southwest. The Main Basin is a large groundwater basin replenished by stream runoff from the adjacent mountains and hills, by rainfall directly on the surface of the valley floor, subsurface inflow from Raymond Basin and Puente Basin, and by return flow from water applied for overlying uses. Additionally, the Main Basin is replenished with imported water. The Main Basin serves as a natural storage reservoir, transmission system and filtering medium for wells constructed therein.

There are three municipal water districts overlying and partially overlying the Main

Basin. The three districts are Upper District, San Gabriel District, and Three Valleys Municipal Water District.

4.2.2 Main Basin Judgment

The Main San Gabriel Basin Judgment (Judgment) was entered on January 4, 1973. The Judgment is administered by a nine-member board, with each member serving a 1 year term. Six members are elected by water producers directly, two members are appointed by the Board of Directors of Upper District, and one member is appointed by the San Gabriel District's Board of Directors. The board is called the Main San Gabriel Basin Watermaster (Watermaster). The Watermaster files an annual report on Main Basin operations with the Court. Selected provisions of the Judgment are summarized below.

The adjudication included the relevant watershed of the Main Basin because surface water diversions from tributary streams affect the safe yield of the Main Basin. The rights adjudicated include: (1) Prescriptive Pumping Rights (groundwater only); (2) Base Annual Diversion Rights for surface diversions by those parties who do not also own prescriptive pumping rights; (3) Integrated Production Rights for those producers who hold both Diversion Rights and Prescriptive Pumping

Rights enabling the designation of any portion of the annual combined production as surface diversion or groundwater production; (4) Special Category Rights, for storage of water in Morris and Puddingstone Reservoirs; (5) Non-Consumptive Use Rights mainly for temporary storage of storm flows and for water spreading operations; and (6) Overlying Consumptive Use Rights.

Under the Judgment there are currently five basic annual assessments levied on water production. These assessments are: (1) an Administration Assessment, levied on all water production to pay for the administration of the Judgment; (2) a Make-up Water Assessment, levied on all water production which does not have a Replacement Water Assessment, to pay the cost of the Make-up Obligation under the Long Beach Judgment; (3) an In-Lieu Water Assessment, levied on pumping to pay for In-Lieu water costs; (4) a Water Resource Development Assessment (RDA), levied to support the development of new or additional water sources; and (5) a Replacement Water Assessment, levied on all water produced in excess of each producer's share of the Operating Safe Yield (OSY) and other rights they may have in order to purchase Supplemental Water to replace the excess water produced. In addition, since fiscal year

1989-90, a special administration assessment has been levied to assist Alhambra with provisions of the Cooperative Water Exchange Agreement (see Section 4.2.3). Each producer must report water production to Watermaster at the end of each calendar quarter. Annual production is subject to the assessments described above.

Groundwater Rights

The prescriptive pumping rights in the Main Basin were adjudicated on the basis of mutual prescription resulting in a specific quantity, in acre-feet, for each producer. Such rights were then converted to a pumper's share, expressed in percent of the aggregate of all prescriptive rights. Each year the producer is allowed to extract, free of Replacement Water assessment, the proportional share (pumper's share) of the OSY. Any producer can extract all the water required for beneficial use. If the extraction is less than the producer's pumper's share, the unused portion of the right in a given fiscal year may be carried over for one fiscal year. The first water produced in the succeeding fiscal year is deemed to be such carried over right. The portion of such extraction, which exceeds the sum of the producer's share of the OSY, or any carry over rights or leased water rights, is assessed at a rate (Replacement Water Assessment), which

will purchase one acre-foot of Supplemental Water for each acre-foot of excess production.

The OSY is the annual quantity of groundwater, which can be produced from the Main Basin without obligation for replacement with Supplemental Water (imported water). The quantity of adjudicated water rights of each producer is used to determine each producer's share of the OSY each year.

The ownership or use of any adjudicated water right may be transferred, assigned, licensed or leased by the owner to other parties to the Judgment after appropriate notice to and approval by Watermaster. There are occasional sales of water rights. Leasing of water rights occurs frequently.

San Gabriel River

Some parties to the Judgment elected to be treated as integrated producers. Integrated production rights are comprised of (1) a fixed diversion component based upon historic diversions of the San Gabriel River for direct use; and (2) a prescriptive pumping right component based upon pumping during the period 1953 through 1967 that may vary annually with the OSY. The gross quantity of the total integrated production right in any fiscal year may be exercised at the sole discretion of each integrated producer by

either diversion of surface water or pumping groundwater or any combination thereof. As is the case with prescriptive pumping rights, the prescriptive pumping component and the corresponding pumper's share is affected by the annual determination of the OSY.

Just as with groundwater, there is no institutional limit on the quantity of San Gabriel River water that can be diverted for use. Whenever an integrated producer exceeds its total water rights, it will be levied a Replacement Water Assessment, along with other applicable assessments, similar to groundwater pumpers.

Cyclic Storage

Another unique feature of the Judgment is a provision allowing Cyclic Storage of imported water in the Main Basin. The Watermaster may enter into Cyclic Storage agreements whereby Supplemental Water may be stored in the Main Basin for subsequent recovery by the storing entity as Supplemental Water. Water stored under Cyclic Storage agreements can be utilized only for the purpose of supplying Replacement Water when requested by Watermaster.

RDA

In June 2012, the Main Basin Judgment was amended to include the RDA (base RDA). The

base RDA may be used by Watermaster to purchase Supplemental Water to be stored for future use when Supplemental Water may be unavailable due to emergency water supply conditions. The base RDA is applicable to every acre-foot of production from the Main Basin. The base RDA was developed to provide about 100,000 acre-feet for emergency storage; San Gabriel District's share is about 13,000 acre-feet. The base RDA was first applied in FY 2014-15 at \$20/acre-foot and San Gabriel District's Supplemental Water requirement was about 900 acre-feet. The base RDA was also applied during FY 2015-16 at \$20/acre-foot and San Gabriel District's Supplemental Water requirement was about 900 acre-feet. As of May 2017, Watermaster is managing two separate RDA programs, neither of which place a requirement on San Gabriel District. San Gabriel District may opt out of the RDA program if unable to fulfil the RDA order.

During 2016, Watermaster noted its intention to increase the RDA by at least \$20/acre-foot for the delivery of Supplemental Water for General Benefit and Storm Augmentation (proposed RDA). The proposed RDA is expected to increase the RDA rate (currently \$20/acre-foot) to \$175/acre-foot over the next five years. For every RDA rate increase of \$20/acre-foot, San Gabriel District may be

required to provide an additional 800 acre-feet of Supplemental Water annually, assuming basin-wide production is about 190,000 acre-feet. The Supplemental Water requirement for the proposed RDA is in addition to the 13,000 acre-feet of Supplemental Water needed for the base RDA. This would increase San Gabriel District's annual Supplemental Water requirements for the Main Basin.

4.2.3 San Gabriel District Exchanges, Cyclic Storage, and Transfers

Cooperative Water Exchange Agreement

San Gabriel District, along with Alhambra, Upper District, MWD, and the Main Basin Watermaster participate in a Cooperative Water Exchange Agreement (CWEA). The CWEA mitigates a localized condition that exists in the westerly portion of the Main Basin called the "Alhambra Pumping Hole" (APH). The Alhambra Pumping Hole is located in an area of the Main Basin that typically received insufficient replenishment due to its hydrogeologic characteristics. Seven producers extract water from the Alhambra Pumping Hole, which had resulted in decreasing water level elevation. To mitigate this condition, it was agreed that Alhambra, one of the producers, would receive direct delivery of water from MWD service

connection USG-5 and, in exchange, would reduce its extractions from the pumping hole by about 3,000 acre-feet per year. (All demands in excess of the 3,000 acre-feet will be satisfied by production from the Main Basin.) A provision of the CWEA also provides a mechanism for MWD to utilize unused capacity in San Gabriel District's Devil Canyon-Azusa Pipeline. The CWEA is cooperatively financed by Alhambra, San Gabriel District, Upper District, and the Main Basin Watermaster.

Main Basin Cyclic Storage Agreements

San Gabriel District is also active in the Cyclic Storage of water in the Main Basin. San Gabriel District is able to deliver water for groundwater replenishment purposes in advance of a specific requirement for such water. Water delivered to the Main Basin in advance of its requirement is credited to the Cyclic Storage account with the Main Basin Watermaster, in-lieu of actual delivery of imported water for that purpose, at the discretion of San Gabriel District. Because water is often stored in Cyclic Storage for many years before being required as Replacement Water, the Cyclic Storage program may be considered an exchange program in that it takes advantage of surplus water and stores it in the Main Basin for future use. The Cyclic Storage Agreement between

Watermaster and San Gabriel District permits San Gabriel District to deliver and store up to 50,000 acre-feet of imported water in the Main Basin. As of June 30, 2016, San Gabriel District had about 5,300 acre-feet of water in Cyclic Storage.

In addition, member cities may utilize Cyclic Storage to fulfill future Replacement Water requirements. Alhambra may store up to 10,000 acre-feet of water in the Main Basin, according to the Cyclic Storage Agreement between Watermaster, San Gabriel District and Alhambra. As of June 30, 2016 Alhambra did not have any water in Cyclic Storage. Azusa may store up to 15,000 acre-feet of water in the Main Basin, according to the Cyclic Storage Agreement between Watermaster, San Gabriel District and Azusa, and as of June 30, 2016 had about 4,300 acre-feet of water in Cyclic Storage. Monterey Park may store up to 7,500 acre-feet of water in the Main Basin, according to the Cyclic Storage Agreement between Watermaster, San Gabriel District and Monterey Park, and as of June 30, 2016 had about 2,200 acre-feet of water in Cyclic Storage. Sierra Madre may store up to 4,000 acre-feet of water in the Main Basin, according to the Cyclic Storage Agreement between Watermaster, San Gabriel District and Sierra Madre, and as of June 30, 2016 had about 3,000 acre-feet of water in Cyclic Storage.

MWD-San Gabriel District Water Exchange

A water exchange agreement was developed between the City of Arcadia, Main Basin Watermaster, and San Gabriel District to provide Sierra Madre with an emergency water supply. This agreement consists of a water exchange whereby the City of Arcadia produces water from the Main Basin and sells that water to Sierra Madre. The metered sale is reported by Sierra Madre to the Main Basin Watermaster. However, according to Sierra Madre's 2015 UWMP, the City of Arcadia has indicated to Sierra Madre that the water supply provided through the emergency interconnection is not reliable at all times. In addition, Sierra Madre pays appropriate assessments to the Main Basin Watermaster.

Due to the impact of declining water levels in the Santa Anita Subarea of the Raymond Basin on the reliability of production from Sierra Madre's wells, San Gabriel District entered into an exchange and purchase agreement with MWD (MWD-San Gabriel District exchange agreement) on September 4, 2013 to provide treated imported water to Sierra Madre via a connection designated as SGV-01. The MWD-San Gabriel District exchange agreement stipulates that "For each acre-foot of treated drinking water delivered by Metropolitan to Sierra Madre, San Gabriel

shall deliver two acre-feet of untreated water from San Gabriel's Cyclic Storage account to Metropolitan's Cyclic Storage accounts in the Main San Gabriel Basin or to other locations as agreed." The agreement also specifies that "...Metropolitan shall purchase 5,000 acre-feet minus the exchange acre-feet from San Gabriel." The agreement will last until December 31, 2035 unless the agreement is terminated by either party (San Gabriel District or MWD). To terminate the agreement, one of the parties must provide "one year's notice in writing for any reason."

Installation of the SGV-01 connection was completed in 2013 with a capacity of about 2,500 gpm. The first exchange transfer of 5,000 acre-feet from San Gabriel District to MWD's Cyclic Storage occurred in May 2014. According to staff, Sierra Madre is wholly reliant on imported water supplies through the MWD-San Gabriel District exchange agreement while the Santa Anita Subarea groundwater levels are recovering. A copy of the MWD-San Gabriel District exchange agreement is provided in Appendix A.

Permanent Water Transfer- Azusa

In November 2015, the City of Azusa permanently transferred 3,359.79 acre-feet of its Prescriptive Pumping Rights to Azusa Valley Water Company (AVWC). The

agreement is in Appendix B. The permanent transfer is expected to increase San Gabriel District's replacement water requirements by 3,359.79 acre-feet, assuming a safe yield of 200,000 acre-feet that AVWC uses the pumping rights or leases them to Upper San Gabriel Valley Municipal Water District producers.

Additional Water Exchange Agreements

In March 1995, San Gabriel District entered into a water banking agreement with Dudley Ridge Water District. This agreement enables Dudley Ridge Water District to deliver and store up to 20,000 acre-feet of water into the Main Basin as part of San Gabriel District's Cyclic Storage Account. In 2002, this agreement was amended to limit the amount of water stored by Dudley Ridge Water District to 12,500 acre-feet. In future years, Dudley Ridge Water District will have the ability to exchange water it had previously stored in the Main Basin for a portion of San Gabriel District's annual water allocation from the SWP.

4.2.4 San Gabriel District's Future

Supplemental Water Requirements

Section 10 (dd) of the Amended Judgment defines a Responsible Agency as "the municipal water district which is the named and appropriate source from whom

Watermaster shall purchase Supplemental Water..." and names San Gabriel District as one of those Responsible Agencies. As previously described, San Gabriel District provides untreated SWP water to the Main Basin as Supplemental Water on behalf of its member cities as the result of production in excess of Main Basin water rights and other assessments required by Watermaster. The Main Basin Watermaster annually establishes an OSY for the Main Basin, which is then apportioned to each Main Basin Party based on its proportional share of all adjudicated water rights. The Main Basin pumping rights for each member city are discussed below.

4.2.4.1 Member Cities' Replacement Water Requirements

Alhambra

Alhambra has a Main Basin Prescriptive pumping right of 8,812.05 acre-feet and a Pumper's Share of 4.45876 percent.

Azusa

As discussed previously, the Main Basin Watermaster associates 40 percent of total groundwater production and surface water diversion from ALW (City of Azusa and Azusa Valley Water Company) less the production from Miller Brewing as within San Gabriel District's service area. Azusa has a Main Basin

Prescriptive pumping right of 296.20 acre-feet and a Pumper's Share of 0.14988 percent. Azusa also has a Diversion Component of 363 acre-feet.

Monterey Park

Monterey Park has a Main Basin Prescriptive pumping right of 6,704.08 acre-feet and a Pumper's Share of 3.39216 percent.

Sierra Madre

Although Sierra Madre is a party to the Main Basin Judgment, Sierra Madre does not have Prescriptive pumping rights. Sierra Madre may produce groundwater from the Main Basin; however, all production would be

assessed as Replacement Water. Sierra Madre is a party to the Raymond Basin Judgment as described in Section 4.3.

Future Replacement Water Requirements

In the event a Producer produces water in excess of its water right, it must pay an assessment for Replacement Water which is sufficient to the purchase of one acre-foot of Supplemental Water to be spread in the Main Basin for each acre-foot of excess production.

San Gabriel District may elect to pre-deliver water into its Cyclic Storage account to fulfill each annual Replacement Water requirement, or may make a "wet" delivery to fulfill the obligation.

TABLE 4-6
SAN GABRIEL DISTRICT MEMBER CITIES'
PROJECTED REPLACEMENT WATER OBLIGATIONS SUMMARY
HISTORICAL AVERAGE OPERATING SAFE YIELD OF 200,000 ACRE-FEET
(ACRE-FEET)

Member City	2020	2025	2030	2035	2040
Alhambra⁽¹⁾	2,873	3,234	3,594	3,954	4,315
Azusa	7,557	7,738	7,926	8,114	8,310
Monterey Park	2,598	3,030	3,482	3,953	4,446
Sierra Madre⁽²⁾	0	0	0	0	0
Total⁽³⁾	13,028	14,002	15,002	16,021	17,071

Notes:

⁽¹⁾ Accounts for CWEA demands.

⁽²⁾ Does not include water demands associated with the MWD-San Gabriel District exchange agreement.

⁽³⁾ Does not include Supplemental Water requirements associated with the RDA.

TABLE 4-7
SAN GABRIEL DISTRICT MEMBER CITIES'
PROJECTED REPLACEMENT WATER OBLIGATIONS SUMMARY
WORST-CASE OPERATING SAFE YIELD OF 150,000 ACRE-FEET
(ACRE-FEET)

Member City	2020	2025	2030	2035	2040
Alhambra⁽¹⁾	5,103	5,464	5,824	6,184	6,545
Azusa	7,632	7,813	8,001	8,189	8,385
Monterey Park	4,294	4,726	5,178	5,649	6,142
Sierra Madre⁽²⁾	0	0	0	0	0
Total⁽³⁾	17,029	18,003	19,003	20,022	21,072

Notes:

⁽¹⁾ Accounts for CWEA demands.

⁽²⁾ Does not include water demands associated with the MWD-San Gabriel District exchange agreement.

⁽³⁾ Does not include Supplemental Water requirements associated with the RDA.

TABLE 4-8
SAN GABRIEL DISTRICT MEMBER CITIES'
PROJECTED REPLACEMENT WATER OBLIGATIONS SUMMARY
WET-YEAR OPERATING SAFE YIELD OF 235,000 ACRE-FEET
(ACRE-FEET)⁽¹⁾

Member City	2020	2025	2030	2035	2040
Alhambra⁽²⁾	1,313	1,674	2,034	2,394	2,755
Azusa	7,505	7,686	7,874	8,062	8,258
Monterey Park	1,410	1,842	2,294	2,765	3,258
Sierra Madre⁽³⁾	0	0	0	0	0
Total⁽⁴⁾	10,228	11,202	12,202	13,221	14,271

Notes:

⁽¹⁾ OSY was calculated by taking the average of the three years with the highest OSY in the last twenty years.

⁽²⁾ Accounts for CWEA demands.

⁽³⁾ Does not include water demands associated with the MWD-San Gabriel District exchange agreement.

⁽⁴⁾ Does not include Supplemental Water requirements associated with the RDA.

The long-term average OSY is about 200,000 acre-feet, although the annual OSY has ranged between 140,000 acre-feet and 240,000 acre-feet. Consequently, for the purposes of this report, it is assumed the average future OSY will be 200,000 acre-feet per year. The

assumed average future OSY was used to calculate San Gabriel District member cities' projected groundwater production rights for an average year. The OSY had been established at 150,000 acre-feet for fiscal years 1976-77, 1977-78, 2014-15, and 2015-16. An OSY of

150,000 acre-feet will be used to calculate the projected San Gabriel District member cities' groundwater production rights for a "worst-case" year. San Gabriel District's projected future Replacement Water requirements are based upon member cities' projected water demands, as summarized in Table 3-3, compared to future annual production rights and also accounts for CWEA demands according to a special Main Basin Watermaster calculation (included in Alhambra's projected Replacement Water obligations). Future annual production rights are based upon each member city's share of the OSY. Where projected production exceeds production rights in the Main Basin, a Replacement Water requirement is incurred. Such a comparison was made for 2040 using an OSY of 200,000 acre-feet (historic average) which yielded a total Replacement Water requirement for the member cities of about 17,070 acre-feet. A comparison was also made for 2040 using an OSY of 150,000 acre-feet (worst case), which yielded a total Replacement Water obligation for the member cities of about 21,070 acre-feet, and an OSY of 235,000 acre-feet (wet year case), which yielded a total Replacement Water obligation for the member cities of about 14,271 acre-feet (wet-year case). The detailed calculations are included in Appendix C. The same methodology was used to determine the

member cities' projected replacement water demands for 2020 through 2040. The average year (OSY of 200,000 acre-feet) member cities' projected replacement water demands are summarized in Table 4-6, the "worst case" (OSY of 150,000 acre-feet) member cities' projected replacement water demands are summarized in Table 4-7, and the "wet-year case" (OSY of 235,000 acre-feet) member cities' projected replacement water demands are summarized in Table 4-8.

The total member cities' projected demands for 2020 are about 13,028 acre-feet and the total member cities' projected demands for 2040 are about 17,071 acre-feet, an increase of approximately 4,000 acre-feet.

4.2.4.2 Future RDA Water Requirements

As described in Section 4.2.2, the RDA was "adopted by Watermaster...to support the purchase, financing, and/or development of new or additional Supplemental Water sources." The RDA applies to every acre-foot of production from the Main Basin.

TABLE 4-9
SAN GABRIEL DISTRICT
PROJECTED BASE RDA WATER REQUIREMENTS
HISTORICAL AVERAGE OPERATING SAFE YIELD OF 190,000 ACRE-FEET
(ACRE-FEET)

Year	Base RDA ⁽¹⁾
2014-15	902
2015-16	900
2016-17	900
2017-18	900
2018-19	900
2019-20	900
2020-21	900
2021-22	900
2022-23	900
2023-24	900
2024-25	900
2025-26	900
2026-27	900
2027-28	900
2028-29	398
TOTAL	13,000

Notes:

⁽¹⁾ Base RDA amounts do not include potential additional Supplemental Water requirements from the proposed General Benefit and Storm Augmentation assessment. Although the base RDA for a fiscal year is delivered the following year, the table shows the base RDA for the current fiscal year (for example, the base RDA of 902 acre-feet in FY 2014-15 was delivered in FY 2015-2016).

For the purposes of this report, it was assumed that San Gabriel District's base RDA requirements are going to be 900 acre-feet/year until the end of fiscal year 2027-28 and 400 acre-feet/year for fiscal year 2028-29 (Table 4-9), which marks the year San Gabriel District is estimated to have fulfilled its portion of the base RDA (13,000 acre-feet).

The proposed additional RDA for General

Benefit and Storm Augmentation was not quantified in this report because it is expected to fluctuate. However, as noted in Section 4.2.2, the proposed RDA for General Benefit and Storm Augmentation may be expected to add 800 acre-feet of demand on San Gabriel District for every \$20 increase for the RDA.

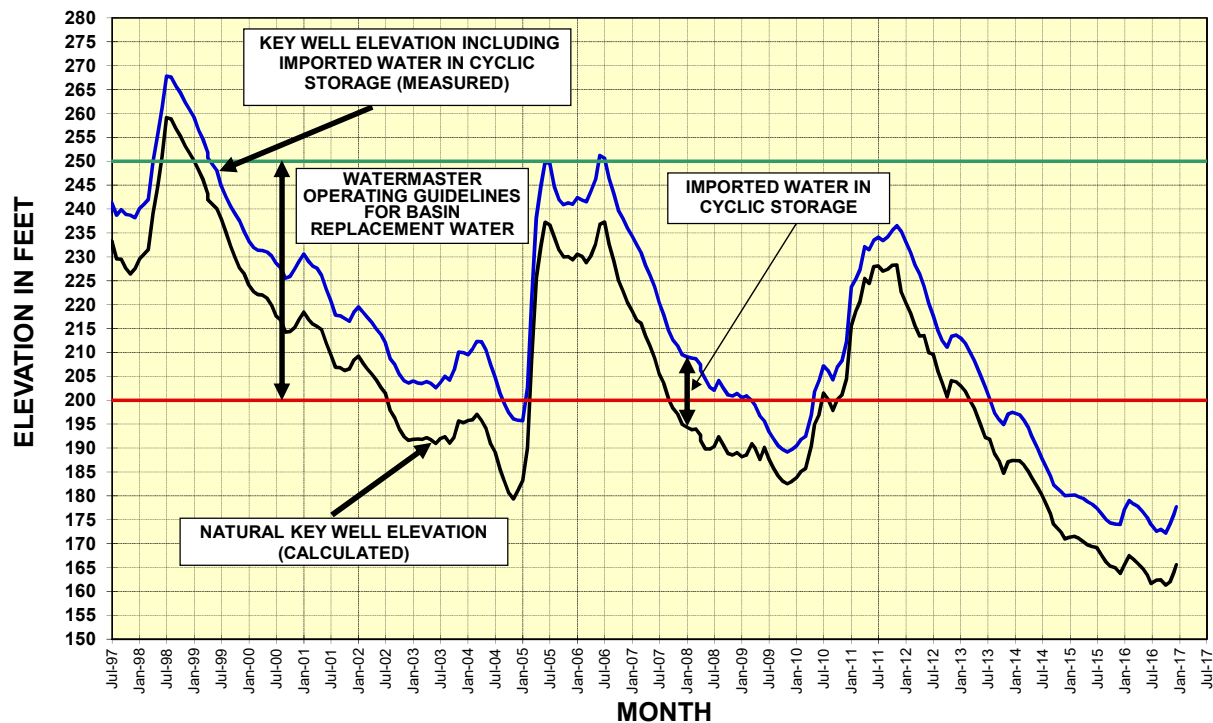


Figure 4-2. Baldwin Park Key Well Historical Groundwater Elevations.

4.2.5 Main Basin Reliability

In May of each year, Watermaster establishes the OSY for the ensuing fiscal year. This is done on the basis of, among other things, groundwater storage conditions, seasonal rainfall and local water recharge, and water stored in local surface reservoirs. In order to provide sufficient storage capacity in the Main Basin to capture as much of the local water as practicable, the Judgment provides that Supplemental Water will not be spread in the main portion of the Basin when the groundwater elevation at the Key Well exceeds 250 feet, and will be spread, insofar as practicable, to maintain that elevation above 200 feet.

If Main Basin storage is low, as indicated by the Key Well elevation, the OSY is usually lowered so that more Replacement Water can be purchased to increase Main Basin storage. If Main Basin storage is relatively high, the OSY is usually increased so that Replacement Water is reduced and Main Basin storage will be beneficially used.

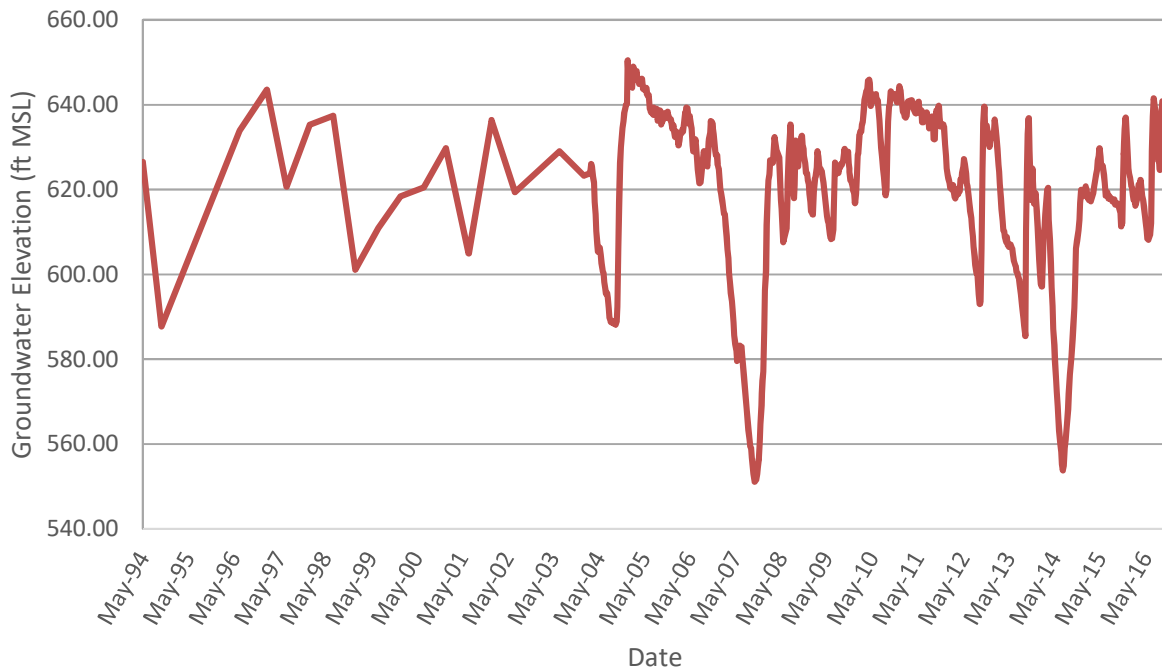


Figure 4-3. Fish Canyon Historical Groundwater Elevations.

The total fresh water storage capacity of the Main Basin is estimated to be about 8.7 million acre-feet. Of that, only the top 125 feet of storage, or about 1,000,000 acre-feet is considered to have been used in historical Basin operations. The change in groundwater elevation at the Baldwin Park Key Well (Key Well) is representative of changes in groundwater storage in the Main Basin. One foot of elevation change of the groundwater surface at the Key Well is roughly the equivalent of about 8,000 acre-feet of storage. The highest groundwater elevation (including Cyclic Storage) was recorded at approximately 294 feet in July 1983, while the groundwater elevation reached a new historical low of 172.2 feet on September 30, 2016. Figure 4-2

shows the historical groundwater elevations at the Key Well.

Groundwater management and access to supplemental imported water have allowed water producers in the Main Basin to historically meet water demands, including during single and multiple dry years. During the period of management under the Judgment, significant drought events have occurred from 1969 to 1977, 1983 to 1991, 1998 to 2004, 2006 to 2007, and 2011 to the present day. The Main Basin water levels have steadily declined since 2011.

San Gabriel District member cities Alhambra, Azusa, and Monterey Park have historically met water demands with water supplies from

the Main Basin. San Gabriel District member cities can rely on increased production from the Main Basin in accordance with the Main Basin Judgment, even during periods of drought. As discussed in Section 4.2.2, limitations have never occurred on groundwater production by water producers with rights in the Main Basin.

San Gabriel Canyon Basin

The San Gabriel Canyon Basin (Canyon Basin) is located north of the Main Basin and is formed by faults belonging to the Sierra Madre fault system. The Sierra Madre fault consists of several distinct faults: the Duarte and Upper Duarte (Lohman Dike) faults and several unnamed faults traceable along the mountain front. The basin north of the Upper Duarte fault is the Upper Canyon Basin and the basin south of the Upper Duarte fault is the Lower Canyon Basin. The Sierra Madre fault system is located generally in an east-west direction along the southerly base of the San Gabriel Mountains. These faults directly influence groundwater movement from the Canyon Basins into the Main Basin (California Department of Water Resources, March 1966).

California American Water Company - Duarte system (CAWC), the City of Glendora and Azusa all produce groundwater from the Canyon Basin area. The majority of Azusa's

water supply comes from the Canyon Basin with ten out of eleven production wells located in the area. The Canyon Basin water levels have historically been sensitive to drought conditions. Figure 4-3 shows the historical groundwater levels of CAWC Fish Canyon well in the Canyon Basin. The graph indicates groundwater levels in the Canyon Basin can fluctuate by more than 95 feet. In addition, there have been times in which monitoring wells in the area have been dry. During calendar years 2007 and 2014, both periods of lower than average rainfall, the graph shows a significant decrease in the groundwater elevation.

The Canyon Basin historically has been replenished by deliveries of untreated imported water and by local runoff. San Gabriel District's Devil Canyon-Azusa Pipeline has a turn-out directly into the San Gabriel Canyon Spreading Grounds. San Gabriel District's SWP allocation was 20 percent (5,760 acre-feet) in 2015 and 60 percent (17,280 acre-feet) in 2016. During the fiscal year 2015-16, San Gabriel District delivered 9,186 acre-feet to replenish the Canyon Basin. In addition, MWD on behalf of Three Valley's Municipal Water District (TVMWD), delivered 6,396 acre-feet of untreated imported water to replenish the Canyon Basin. However, imported water supplies may be significantly

reduced during dry year conditions, limiting the amount of replenishment water delivered. For example, the 2014 SWP water allocation was 5 percent (1,440 acre-feet) for San Gabriel District. The significant groundwater level reductions within the Canyon Basin that occur during drought conditions, coupled with the reduced delivery of Supplemental Water, could adversely impact groundwater production capacity in this area.

San Gabriel River

The San Gabriel River is fed by local runoff and releases from the Morris Reservoir, which means water supplies from the San Gabriel River are largely dependent on local hydrologic conditions. As previously described, a portion of Azusa's water supply is surface water diverted from the San Gabriel River. During drought conditions, supplies from the San Gabriel River may be impacted.

Summary of Main Basin Reliability

The San Gabriel Valley is near buildout; therefore overall water demands are not expected to increase dramatically. Though San Gabriel District member cities have access to the Main Basin water supplies and replacement water, the Main Basin's reliability depends on Replacement Water and RDA requirements for San Gabriel District being

met. Section 5 compares demands versus available supplies to determine the reliability.

Supplies from the San Gabriel Canyon Basin and the San Gabriel River may not be fully reliable during periods of drought due to hydrologic conditions and a decrease in untreated imported water deliveries to the area.

Future projects to increase the water supplies within the Main Basin are discussed in Section 4.8.

4.3 Raymond Basin

4.3.1 Introduction

The Raymond Basin is the primary source of water supply for Sierra Madre. Although Alhambra has rights to pump from the Raymond Basin, it currently does not operate any active wells within the basin.

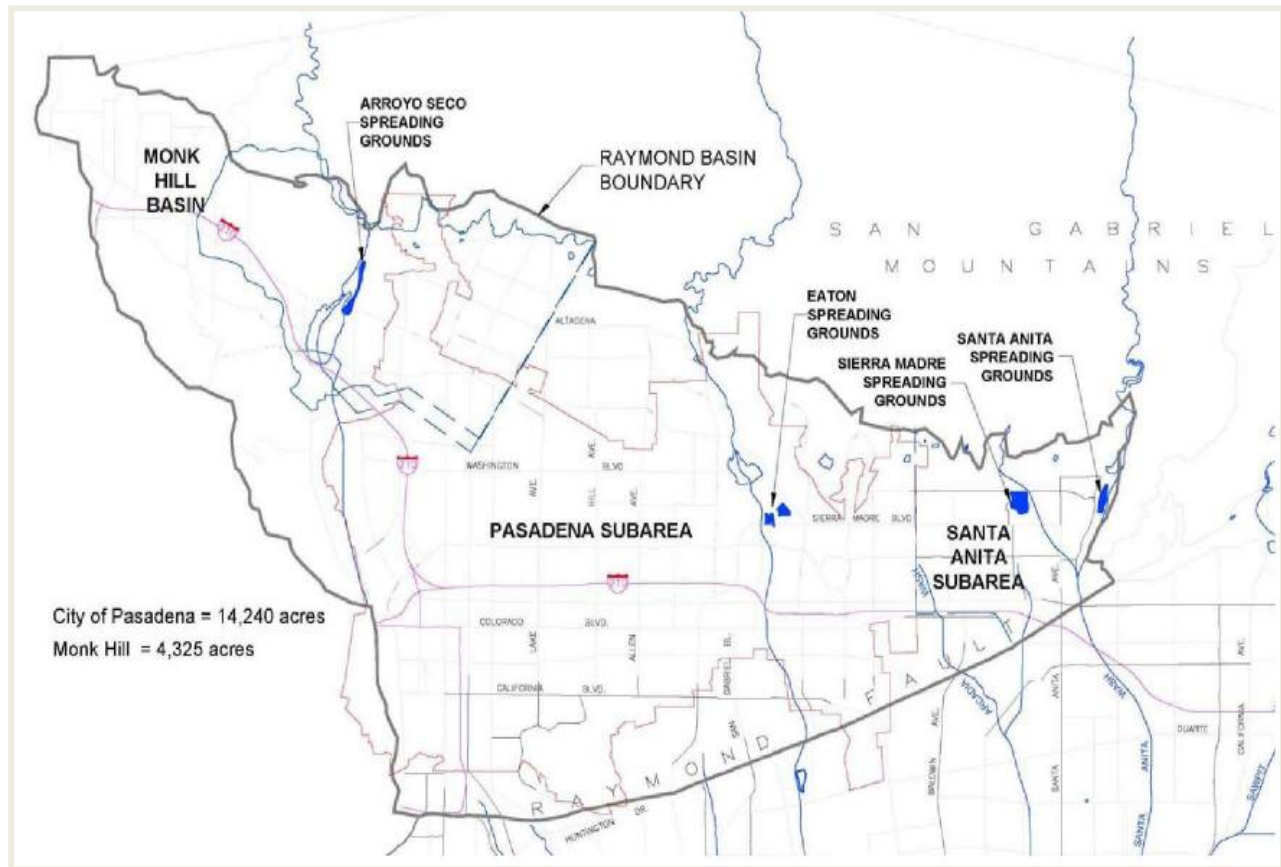


Figure 4-4. Raymond Basin Boundary.

The Raymond Basin is located in the northwesterly portion of the San Gabriel Valley and is bounded on the north by the Angeles National Forest, on the west by the San Rafael Hills and is separated from the Main Basin on the southeast by the Raymond Fault. The Raymond Basin is divided into an eastern unit, which is the Santa Anita Subarea, and the Western unit, which is the Pasadena Subarea and Monk Hill Basin, as shown on Figure 4-4. The area of the Raymond Basin is approximately 40.9 square miles. The principal streams in the Raymond Basin are the Arroyo Seco, Eaton Wash, and Santa Anita

Wash. The Arroyo Seco drains to the Los Angeles River, while Eaton Wash and Santa Anita Wash drain to the Rio Hondo.

Water levels in the Raymond Basin have varied over time, but are managed to stay within limits of a long-term mean elevation. No estimate of available groundwater storage has been provided since 1971, when a DWR study estimated the available stored water to be 1,000,000 acre-feet, leaving approximately 450,000 acre-feet of storage space available (DWR, 1971).

4.3.2 Raymond Basin Judgment

In 1937, the City of Pasadena filed suit to adjudicate water rights of the Raymond Basin. The DWR was retained to prepare a Report of Referee which described the geology and hydrogeology of the Raymond Basin and identified the Safe Yield of the Raymond Basin as 21,900 acre-feet. In 1950, the City of Pasadena requested the Safe Yield of the Raymond Basin to be re-determined. Subsequently, the Court issued a Modification of Judgment on April 29, 1955 increasing the Safe Yield of the Raymond Basin to 30,622 acre-feet. This is referred to as the "Decreed Right of 1955." On January 17, 1974, the second modification of the Raymond Basin Judgment was signed allowing Parties credit

for spreading of canyon diversions in spreading grounds in the vicinity of the Arroyo Seco, Eaton Wash, and Santa Anita Creek Canyon.

As a result of the Raymond Basin Judgment, participating Parties were allowed to exceed their water right by no more than 10 percent. (That exceedance is deducted from the following year's water right.) The water rights are fixed each year and do not vary. Water demands in excess of a Party's water right must be met by purchasing imported water or using other water sources. Producers may not lease water rights between Subareas. Also, producers may not lease or acquire water rights from other Raymond Basin purveyors

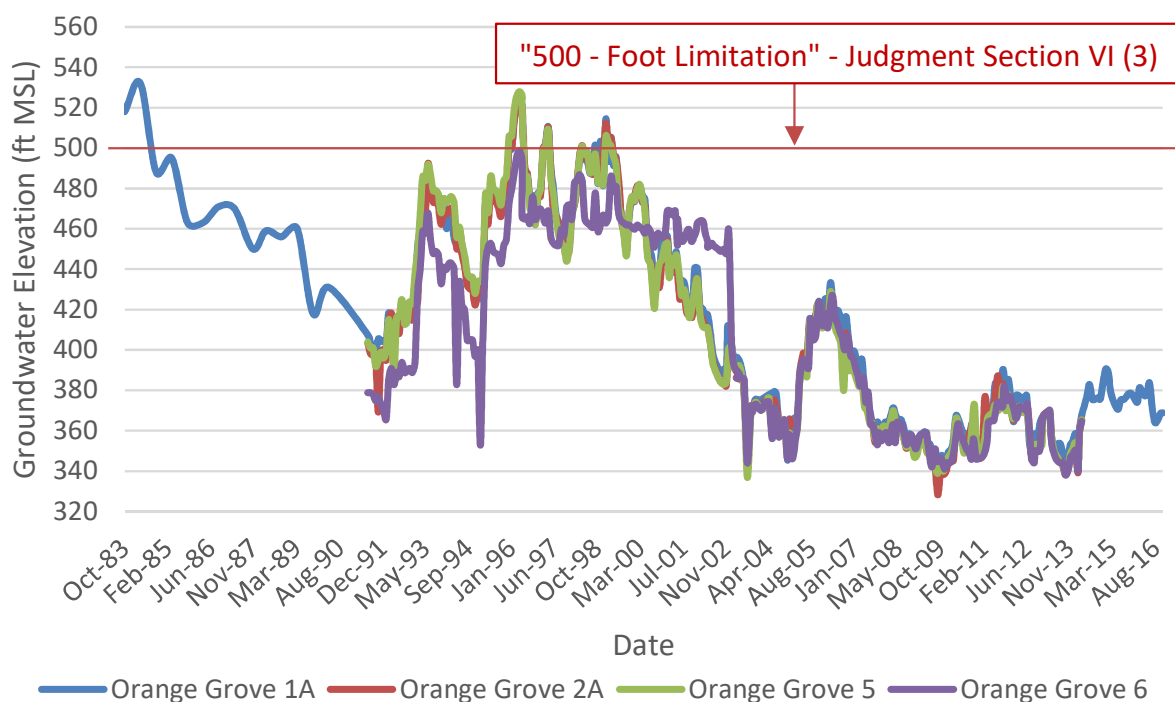


Figure 4-5. Orange Grove Wells Historical Groundwater Elevations.

between subareas. The Raymond Basin Judgment is administered by the Raymond Basin Management Board.

4.3.3 Raymond Basin Reliability

As previously discussed, the Raymond Basin has been adjudicated and is managed. Sierra Madre and Alhambra both hold water rights in the Raymond Basin in the Santa Anita and Pasadena Subareas, respectively. The Raymond Basin reliability to meet future demands is discussed below for the Santa Anita and Pasadena Subareas.

Sierra Madre

Sierra Madre holds groundwater pumping rights in the Santa Anita Subarea of the Raymond Basin. During the period of management under the Raymond Basin Judgment, significant drought events have occurred from 1969 to 1977, 1983 to 1991, 1998 to 2004, 2006 to 2007, and 2014 to the present day. In general, in each drought cycle, Sierra Madre was able to obtain sufficient supplies from the Raymond Basin to meet its demands. However groundwater levels have declined over 100 feet in the past 10 years, impacting the collective pumping capacity of Sierra Madre's wells. The Raymond Basin Management Board has implemented limitations on groundwater production when the groundwater levels at the City of Arcadia's

Orange Grove Wells located in the Santa Anita Subarea fall below 500 feet. These limitations reduce Sierra Madre's allowable extraction to 940 acre-feet per year (not including salvage credit). Figure 4-5 shows the historical elevations at the Orange Grove Wells. As of November 2, 2016, the groundwater elevation at Orange Grove Well 1A was recorded as 368.84 feet. Although the Raymond Basin has been managed for about 70 years under the adjudication, water levels continue to decline. Therefore, based on historical and ongoing water levels, the groundwater supply in the Santa Anita Subarea of the Raymond Basin is not deemed reliable at all times.

In an effort to improve groundwater elevations in the Santa Anita Subarea, on October 9, 2013, Sierra Madre significantly reduced the pumping of their wells and relied more heavily on treated imported water to meet demands. Although Sierra Madre will be able to rely on the Raymond Basin for a portion of its water supply over the next 20 years under single year and multiple year droughts, it should pursue short-term and long-term sources of emergency supplies.

Alhambra

Alhambra holds groundwater pumping rights in the Pasadena Subarea of the Raymond Basin. In January 2008, the Raymond Basin

Management Board adopted Resolution 42-01 09 after recognizing declining water levels and impacts on supply in the Pasadena Subarea. Resolution 42-01 09 puts in place self-imposed pumping reductions of 30 percent implemented over five years from July 1, 2009 to July 1, 2014 in the Pasadena Subarea. This resolution was adopted with the goal to reduce total water production to 1955 Decreed Rights (from 17,843 acre-feet per year to 12,493 acre-feet per year), dissolve the remaining Long-Term Storage accounts, and increase groundwater levels. In order to meet this goal, water production reductions for the Pasadena Subarea have been implemented incrementally at a rate of 1,070 acre-feet per year for five years until a 30 percent reduction has been achieved. As of July 1, 2014, Alhambra's pumping right decreased to 722 acre-feet per year. Alhambra currently does not produce from the Raymond Basin and the Pasadena Subarea of the Raymond Basin is assumed to not be a reliable source of water for Alhambra to meet future demands.

4.3.4 Existing Groundwater Supplies

Alhambra

Pursuant to the Decreed Right of 1955, Alhambra's Decreed Right was established at 1,031 acre-feet per year. However, as a result of pumping reductions imposed in the

Pasadena Subarea, Alhambra's annual pumping right decreased to 722 acre-feet per year as of July 1, 2014. Although Alhambra has the right to produce from the Raymond Basin, it currently does not operate any active wells within the basin.

Sierra Madre

Pursuant to the Decreed Right of 1955, Sierra Madre's Decreed Right was established at 1,764 acre-feet per year. Sierra Madre's main source of water supply historically has been groundwater pumped from the Santa Anita Subarea of the Raymond Basin through Sierra Madre's four active wells. Wells No. 3, 4, 5, and 6 are located within the Santa Anita Subarea of the Raymond Basin and have a combined capacity of about 4,500 gpm. Historically, Sierra Madre has pumped all of its adjudicated water right of 1,764 acre-feet per year from Raymond Basin. Sierra Madre has also historically produced water in excess of the "Decreed Right from 1955" based on prior year credit for "salvage water." Salvage water is surface water percolated into the Santa Anita Subarea minus losses from natural percolation and subsurface outflow.

Currently, the groundwater levels in the Santa Anita Subarea are severely reduced. The water level elevation at the Orange Grove Well 1A (which is considered to be representative,

along with the other Orange Grove wells, of groundwater levels in the basin) was about 369 feet median sea level (msl) as of November 2016, well below the “500 foot” pumping restriction described in the Raymond Basin Judgment. Consequently, according to Section VI (3) of the Judgment, Sierra Madre’s pumping is restricted to 940 acre-feet per year. Sierra Madre staff have indicated that Sierra Madre prefers to utilize either 100 percent imported water or 100 percent groundwater into the City’s water system at any given time, based on water chemistry and disinfection concerns when mixing imported water with local groundwater supplies. Sierra Madre staff has indicated that a consultant is reviewing the feasibility of blending imported water and groundwater, however, for the purposes of this report, it is assumed that Sierra Madre will rely on imported water (through the MWD-San Gabriel District exchange agreement) to meet total projected future water demands while groundwater production in the Santa Anita Subarea is restricted.

Long Term Storage Accounts

Alhambra

Alhambra has the right to store up to 3,600 acre-feet in the Pasadena Subarea of the Raymond Basin. Alhambra currently has 3,564

acre-feet in its long-term storage account, according to the Raymond Basin 2015-16 Annual Report.

Sierra Madre

Sierra Madre has the right to store up to 5,300 acre-feet in the Pasadena Subarea of the Raymond Basin. However, Sierra Madre has been unable to use this storage right because it has no water rights in the Pasadena Subarea to provide for such storage and no wells in the Pasadena Subarea to produce such water.

4.3.5 Future Supplies

Future projects to increase water supplies within the Main Basin are discussed in Section 4.8.

4.4 Metropolitan Water District of Southern California

4.4.1 Introduction

MWD is a wholesale water retailer serving 27 water districts and cities in Southern California. MWD imports and delivers water from the Feather River via the SWP and the Colorado River via the Colorado River aqueduct to its various member agencies. San Gabriel District is not an MWD member agency; however Upper District, the municipal water district bordering San Gabriel District is an MWD member. San Gabriel District’s

member cities have access to MWD imported water, generally for emergency purposes, through various agreements with Upper District as described below.

4.4.2 Existing Supplies

Alhambra

Alhambra currently receives imported water through the Upper District USG-5 connection. Although Alhambra is not an Upper District member agency, Alhambra may purchase water according to the CWEA. As previously described in Section 4.2.3, the CWEA is an agreement between Alhambra, San Gabriel District, Upper District, MWD and the Main Basin Watermaster to reduce a condition in the western portion of the Main Basin known as the Alhambra Pumping Hole. Alhambra agreed to reduce pumping from the Main Basin by 3,000 acre-feet per year in exchange for 3,000 acre-feet of imported water. Alhambra may purchase additional supplies of imported water for emergency purposes.

Azusa

ALW, the water purveyor which serves the City of Azusa, is a member of both San Gabriel District and Upper District, as discussed in Section 2.1. As an Upper District member agency, ALW may purchase imported water from MWD. The imported water supply is delivered via ALW's Upper District connection

to MWD designated as USG-8. The capacity of the connection is 3,300 gpm and is utilized on an emergency basis to supplement existing water supplies. In addition, San Gabriel District may potentially wheel water through this connection to serve Azusa in the future if an alternative water source was required.

Sierra Madre

Due to the impact of declining water levels in the Santa Anita Subarea of the Raymond Basin on the reliability of production from Sierra Madre's wells, San Gabriel District entered into an exchange and purchase agreement with MWD on September 4, 2013 to provide treated imported water to Sierra Madre via a connection designated as SGV-01. The exchange and purchase agreement stipulates that "For each acre-foot of treated drinking water delivered by Metropolitan to Sierra Madre, San Gabriel shall deliver two acre-feet of untreated water from San Gabriel's Cyclic Storage account to Metropolitan's Cyclic Storage accounts in the Main San Gabriel Basin or to other locations as agreed." The agreement also specifies that "...Metropolitan shall purchase 5,000 acre-feet minus the exchange acre-feet from San Gabriel."

As discussed in Section 4.2.3, installation of the SGV-01 connection was completed in 2013 with a capacity of about 2,500 gpm. The first

exchange transfer of 5,000 acre-feet from San Gabriel District to MWD's Cyclic Storage occurred in May 2014. The treated imported water supply is currently used to supplement Sierra Madre's water supply while the Santa Anita Subarea groundwater levels are recovering.

Monterey Park

Monterey Park has an existing 18-inch MWD connection (MP-01) with a capacity of 7,000 gpm. Monterey Park has access to imported water through the connection in the event of an emergency; however there is no agreement in place with MWD to purchase water. Monterey Park has not utilized the MWD connection since 2004-05. San Gabriel District may potentially wheel water through this connection to serve Monterey Park in the future if an alternative water source was required.

4.5 State Water Project

4.5.1 Introduction

In 1947, the California State Legislature funded a water resources investigation that led to the development of the SWP. This investigation resulted in the publication of the California Water Plan, which presented preliminary plans to meet the State's ultimate water needs, including those facility works

required for transferring surplus water from northern California to water deficient southern California.

Financing for the construction of SWP facilities was authorized in 1959, when the State Legislature enacted the California Water Resources Development Act (known as the Burns-Porter Act). The initial works included Oroville Dam and Lake Oroville, B.F. Sisk San Luis Dam and San Luis Reservoir, the South Bay Aqueduct, the North Bay Aqueduct, and the California Aqueduct. The first SWP water deliveries were made in 1962, two years after construction began.

DWR and MWD signed the first water supply contract in 1960. Today 29 water entities have long-term water supply contracts with DWR. The service areas of these long-term water supply contractors vary widely in size, location, climate, and population. The contractors' uses for SWP water also differ. In the San Joaquin Valley, SWP water is used primarily for agriculture; in the Feather River area, San Francisco South Bay, the North Bay areas, and in Southern California, SWP water

is used primarily for urban and industrial needs. According to State sources, the SWP has a contracted annual yield of 4,172,786 acre-feet (as of January 7, 2016) based upon the SWP's original design annual yield. Existing contracts call for SWP water deliveries to eventually total 4,172,786 acre-feet per year. DWR continues to plan and construct new facilities for the SWP.

4.5.2 Table A

SWP contractors receive specified amounts of water each year known as "annual allocations." The annual allocations are based upon each contractor's maximum SWP entitlements, which are summarized in the SWP's Table A. The combined maximum Table

A amount available for delivery is 4,172,786 acre-feet per year. The annual allocation is a percent of each contractors SWP entitlement and is based upon hydrologic and environmental conditions in the San Joaquin Delta (Delta). San Gabriel District's maximum annual entitlement is 28,800 acre-feet, as previously noted. The existing SWP contract term ends in 2035. According to the Water Supply Contract Extension Project, negotiations are currently underway to extend the Water Supply contracts to the end of 2085.

Future Table A Allocation

San Gabriel District provides untreated imported SWP water for replenishment of the Main Basin. There is no requirement to

TABLE 4-10
FUTURE SWP SUPPLY RELIABILITY AND PROJECTED ALLOCATIONS
FOR SAN GABRIEL DISTRICT UNDER VARIOUS HYDROLOGIC CONDITIONS⁽¹⁾

	Average/Normal Water Year	Single Dry Water Year	Multiple Dry Water Years			Single Wet Water Year	Multiple Wet Water Years			
			2-Years	4-Years	6-Years ⁽²⁾		2-Years	4-Years	6-Years	10-Years
San Gabriel District's Projected Allocation (Acre-Feet/Year)	16,704	3,168	6,912	8,928	8,064	28,224	27,360	23,328	22,176	20,160
Projected SWP Reliability (% of Total Entitlement)	58%	11%	24%	31%	28%	98%	95%	81%	77%	70%

Source: 2013 SWP Delivery Report

Note:

⁽¹⁾ According to preliminary findings from DWR, projected SWP Reliability in 2040 will be 61% because of the California WaterFix project (see Section 4.6.3).

⁽²⁾ The 6-year drought SWP reliability is the average of two 6-year droughts: 1929-1934 and 1987-1992.

provide water in a specific time frame, only that the Main Basin ultimately be replenished. San Gabriel District maintains a Cyclic Storage account in the Main Basin that may be used to satisfy groundwater replenishment requirements in the event of reduced availability from the SWP due to single or multiple dry years.

DWR (Bay-Delta office) issues a Delivery Reliability Report periodically which discusses the projected reliability of the SWP during average and dry years. The “State Water Project Final Delivery Reliability Report 2013” (2013 SWP Delivery Report) was released in December 2013. The 2013 SWP Delivery Report and the State Water Project Final Delivery Capability Report 2015 (2015 SWP Delivery Report) estimate the current (2015) and future (2033) water delivery reliability of the SWP, if no actions for improvement are taken. The 2013 and 2015 SWP Delivery Reports are in Appendix D and E. The 2013 SWP Delivery Report notes that “...its focus is narrowed to the SWP’s delivery capability from the Delta, given current Delta regulatory restrictions, expected future climate change, and projected changes in land use in the Sacramento River basin.”

Table 4-10 shows projected future SWP supply reliability (as a percentage of annual

allocation) and San Gabriel District’s projected annual allocations from the 2013 SWP Delivery Report for various hydrologic conditions. These projections are based on San Gabriel District’s SWP Table A entitlement of 28,800 acre-feet and the percentage yield for various hydrologic conditions from Table 6-3 and 6-4 of the 2013 SWP Delivery Reliability Report.

The 2013 SWP Delivery Report identifies projected availability of supplies for an average water year, single dry water year, multiple dry water years, single wet water year, and multiple wet water years based on historical trends. In addition, the 2013 SWP Delivery Report projects that, under future conditions, by 2033 at least 58 percent of entitlement would be available for an average year. Preliminary information provided to San Gabriel District by DWR in late 2016 indicates the projected reliability will increase to 61% by 2040. Fifty-eight and 61 percent of San Gabriel District’s entitlement are 16,704 and 17,568 acre-feet respectively. It is assumed for the purpose of this IRP that the current and planned average year supply of SWP water will be 16,704 acre-feet per year each year through 2035 and 17,568 acre-feet per year by 2040.

It should be noted that annual SWP supplies may be greater than or less than the assumed SWP average supply of 16,704 or 17,568 acre-feet based on the current hydrologic conditions. For example, the final SWP allocation for calendar year 2016 was 60 percent of Table A amounts and the final SWP allocation was 20 percent in 2015.

4.6 Bay Delta Conservation Plan (BDCP) and California WaterFix

Currently, SWP and the Central Valley Project (CVP) water travels through the Delta and is pumped to the SWP and CVP aqueducts. However, the current system is vulnerable to salt water intrusion due to old levee infrastructure. Additionally, the pumps in the Delta have been shown to have adverse environmental impacts on fish and wildlife. Because of the environmental regulations, the reliability of the SWP and the CVP has decreased.

In 2006, a Steering Committee was formed to help develop the Bay Delta Conservation Plan (BDCP), which was intended to increase the average reliability of the SWP through the construction of a new water conveyance system to divert flow around the Delta. By diverting the flow, environmental issues are mitigated and risks associated with a major earthquake in the area are avoided. In April of

2015, Alternative 4A or California WaterFix (Cal WaterFix) was proposed. Instead of diverting water around the Delta as with BDCP, WaterFix will place two 40-foot diameter pipelines 150 feet under the Delta. Cal WaterFix will protect water supplies from natural disasters and levee failures as well as minimize the environmental impacts of the SWP and the CVP. The project is expected to cost \$17.1 billion, including cost of the tunnel design and construction, the operations and maintenance, and the mitigation and associated actions. A preliminary finding by DWR indicates that by 2040, the average-year SWP allocation will be 58% without Cal WaterFix while with Cal WaterFix it will be 61%, increasing the SWP reliability by 3%.

4.7 Total Supplemental Water Demands for San Gabriel District

Tables 4-11, 4-12, and 4-13 show the projected total water demand for San Gabriel District, including Replacement Water, the MWD-San Gabriel District exchange agreement described in Section 4.2.3, and the base RDA described in Section 4.2.2, for 2020 through 2040 for an average year, a dry year, and a wet year.

TABLE 4-11
SAN GABRIEL DISTRICT
PROJECTED TOTAL SUPPLEMENTAL WATER DEMANDS
HISTORICAL AVERAGE OPERATING SAFE YIELD OF 200,000 ACRE-FEET⁽¹⁾
(ACRE-FEET)

Member City	2020	2025	2030	2035	2040
Member Cities' Replacement Water Requirements	13,028	14,002	15,002	16,021	17,071
MWD-San Gabriel District Water Exchange Agreement	5,000	5,000	5,000	5,000	5,000
RDA ^{(2),(3)}	900	900	398	0	0
Total	18,928	19,902	20,400	21,021	22,071

Notes:

⁽¹⁾ Cyclic Storage is not considered.

⁽²⁾ From Table 4-9. The additional Supplemental Water requirement from the RDA for General Benefit and Storm Augmentation is not included.

⁽³⁾ The projected FY 2028-29 base RDA obligation of 398 acre-feet will be delivered in FY 2029-30 (Table 4-9). It is assumed all 398 acre-feet will be delivered during calendar year 2030.

TABLE 4-12
SAN GABRIEL DISTRICT
PROJECTED TOTAL SUPPLEMENTAL WATER DEMANDS
WORST-CASE OPERATING SAFE YIELD OF 150,000 ACRE-FEET⁽¹⁾
(ACRE-FEET)

Member City	2020	2025	2030	2035	2040
Member Cities' Replacement Water Requirements	17,029	18,003	19,003	20,022	21,072
MWD-San Gabriel District Water Exchange Agreement ⁽²⁾	5,000	5,000	5,000	5,000	5,000
RDA ^{(2),(3)}	900	900	398	0	0
Total	22,929	23,903	24,401	25,022	26,072

Notes:

⁽¹⁾ Cyclic Storage is not considered.

⁽²⁾ From Table 4-9. The additional Supplemental Water requirement from the RDA for General Benefit and Storm Augmentation is not included.

⁽³⁾ The projected FY 2028-29 base RDA obligation of 398 acre-feet will be delivered in FY 2029-30 (Table 4-9). It is assumed all 398 acre-feet will be delivered during calendar year 2030.

The projected demand calculations presented in Figure 4-11, Table 4-12, and Table 4-13 do not take into account the new proposed RDA the Main Basin Watermaster is implementing, which may increase San Gabriel District's

water supply. Potential water supplies for San Gabriel District and the member cities include non-potable water to be used for irrigation purposes and recycled water for direct and indirect reuse. A current application of non-

TABLE 4-13
SAN GABRIEL DISTRICT
PROJECTED TOTAL SUPPLEMENTAL WATER DEMANDS
WET-YEAR OPERATING SAFE YIELD OF 235,000 ACRE-FEET⁽¹⁾
(ACRE-FEET)

Member City	2020	2025	2030	2035	2040
Member Cities' Replacement Water Requirements	10,228	11,202	12,202	13,221	14,271
MWD-San Gabriel District Water Exchange Agreement	5,000	5,000	5,000	5,000	5,000
RDA ^{(2),(3)}	900	900	398	0	0
Total	16,128	17,102	17,600	18,221	19,271

Notes:

⁽¹⁾ Cyclic Storage is not considered.

⁽²⁾ From Table 4-9. The additional Supplemental Water requirement from the RDA for General Benefit and Storm Augmentation is not included.

⁽³⁾ The projected FY 2028-29 base RDA obligation of 398 acre-feet will be delivered in FY 2029-30 (Table 4-9). It is assumed all 398 acre-feet will be delivered during calendar year 2030.

Supplemental Water demands. More comparison between projected water supply and demand for the individual member cities is provided in Section 5.

4.8 Potential Additional Water Supplies

Existing member city's water supply projections (based on member city UWMPs and generally a function of projected well capacities) are summarized in Table 4-14.

As a result, San Gabriel District and its member cities have been researching potential projects that may increase San Gabriel District's local

potable water usage is the Alhambra Golf Course which is located within Alhambra and utilizes groundwater from a non-potable well for irrigation. Alhambra delivers such water to the Golf Course within its service area to minimize the need for potable water supplies which can be used elsewhere within the City. Member cities may be able to utilize non-potable water for large scale irrigation applications such as schools and parks within each city. Recycled water opportunities are discussed further in Section 6.

Other potential projects to increase the reliability of member city existing water supplies include expanding San Gabriel District's ability to replenish the groundwater supply. Alhambra's future projects include moving groundwater pumping away from the Alhambra Pumping Hole to another area in the Main Basin and implementing a water blending plan in order to produce 500 acre-feet more per year from the Raymond Basin. Monterey Park is currently working on a recycled water project that is anticipated to provide 800 acre-feet per year of water. ALW's potential projects include upgrading groundwater pumping facilities and

reactivating inactive wells. Sierra Madre has multiple projects planned due to their heavy dependence on imported water. These projects include constructing another well in the Raymond Basin and a well in the Main Basin and renovating a few of their inactive wells, the Santa Anita Creek Diversion Pipeline and Headworks, the Sierra Madre-San Gabriel Division Pipeline, and the Santa Anita Debris Basin. These additional water supply options are discussed further in Section 8.

4.9 Summary

The primary water supply source for San Gabriel District member cities Alhambra,

TABLE 4-14
MEMBER CITY PROJECTED WATER SUPPLIES
(ACRE-FEET)

Year	City	Main Basin		Raymond Basin		Sub-Total	Imported/ Purchased Water	Recycled Water	Total
		Groundwater	Surface Water	Groundwater	Tunnel Water				
2020	Alhambra ⁽¹⁾	9,913	--	0	--	9,913	3,000	--	12,913
	ALW ⁽²⁾	24,350	10,100	--	--	34,450	4,000	--	38,450
	Monterey Park ⁽³⁾	8,982	--	--	--	8,982	0	800	9,782
	Sierra Madre ⁽⁴⁾	--	--	940	392	1,332	2,500	--	3,832
2025	Alhambra ⁽¹⁾	10,273	--	0	--	10,273	3,000	--	13,273
	ALW ⁽²⁾	24,350	10,100	--	--	34,450	4,000	--	38,450
	Monterey Park ⁽³⁾	9,014	--	--	--	9,014	0	800	9,814
	Sierra Madre ⁽⁴⁾	--	--	940	392	1,332	2,500	--	3,832
2030	Alhambra ⁽¹⁾	10,634	--	0	--	10,634	3,000	--	13,634
	ALW ⁽²⁾	24,350	10,100	--	--	34,450	4,000	--	38,450
	Monterey Park ⁽³⁾	9,465	--	--	--	9,465	0	800	10,265
	Sierra Madre ⁽⁴⁾	--	--	940	392	1,332	2,500	--	3,832
2035	Alhambra ⁽¹⁾	10,995	--	0	--	10,995	3,000	--	13,995
	ALW ⁽²⁾	24,350	10,100	--	--	34,450	4,000	--	38,450
	Monterey Park ⁽³⁾	9,937	--	--	--	9,937	0	800	10,737
	Sierra Madre ⁽⁴⁾	--	--	940	392	1,332	2,500	--	3,832
2040	Alhambra ⁽¹⁾	11,354	--	0	--	11,354	3,000	--	14,354
	ALW ⁽²⁾	24,350	10,100	--	--	34,450	4,000	--	38,450
	Monterey Park ⁽³⁾	10,430	--	--	--	10,430	0	800	11,230
	Sierra Madre ⁽⁴⁾	--	--	940	392	1,332	2,500	--	3,832

Notes:

⁽¹⁾ From Table 4-7 in Alhambra's 2015 UWMP.

⁽²⁾ From Table 5-4 in ALW's 2015 UWMP.

⁽³⁾ From Table 6-9 in Monterey Park's 2015 UWMP.

⁽⁴⁾ From Table 3-15 in Sierra Madre's 2015 UWMP.

Azusa, and Monterey Park is groundwater produced from the Main Basin. Supplemental Water supply sources include Main Basin surface water and imported water. The primary water supply source for San Gabriel District member city Sierra Madre historically has been groundwater production from the Santa Anita Subarea of the Raymond Basin and tunnel water, however due to decreased groundwater levels in the Santa Anita Subarea, as of October 2013, Sierra Madre also uses imported water to meet total water demands on for groundwater recharge. Projected

member city water supplies from 2020 to 2040 are shown in Table 4-14.

San Gabriel District imports water from the SWP to fulfill member city Replacement Water requirements in the Main Basin and to fulfill exchange agreement obligations. San Gabriel District also provides SWP imported water for Main Basin Cyclic Storage accounts when surplus water is available. Projected SWP supplies during average, dry, and wet years from 2020 to 2040 are summarized in Table 4-15.

**TABLE 4-15
SAN GABRIEL DISTRICT
PROJECTED WATER SUPPLY
(ACRE-FEET)**

Year	Average Year Supply ⁽¹⁾	Single Dry Year Supply ⁽²⁾	Multiple Dry Year Supply ⁽³⁾	Single Wet Year Supply ⁽⁴⁾	Multiple Wet Year Supply ⁽⁵⁾
2020	16,704	3,168	8,064	28,224	22,176
2025	16,704	3,168	8,064	28,224	22,176
2030	16,704	3,168	8,064	28,224	22,176
2035	16,704	3,168	8,064	28,224	22,176
2040	17,568	3,168	8,064	28,224	22,176

Notes:

⁽¹⁾ 58% of maximum Table A entitlement from State Water Project Draft Delivery Reliability Report 2013 used from 2020 through 2035. By 2040, 61% of the maximum SWP allocation is expected to be delivered in an average year because the California WaterFix is estimated to be completed (DWR Preliminary Findings).

⁽²⁾ 11% of maximum Table A entitlement from State Water Project Draft Delivery Reliability Report 2013 used.

⁽³⁾ 28% of maximum Table A entitlement from State Water Project Draft Delivery Reliability Report 2013 used, which is the average of projected allocations during a 6-year dry period.

⁽⁴⁾ 98% of maximum Table A entitlement from State Water Project Draft Delivery Reliability Report 2013 used.

⁽⁵⁾ 34% of maximum Table A entitlement from State Water Project Draft Delivery Reliability Report 2013 used, which is the projected allocation during a 6-year wet period.

Section 5: Gap Analysis

5.1 Introduction

In order to determine if existing water supplies are adequate to meet future demands or if additional water supplies are required, existing water supplies were compared to projected water demands for San Gabriel District and each member city. The analysis highlighted potential gaps between projected water supplies and demands. The following assumptions were used for the water supply and demand gap analysis:

State Water Project Imported Water Supply: A 58 percent allocation is available during an average year through 2035. Preliminary findings by DWR indicate that the average year percent allocation will increase to 61% by 2040. The SWP allocations used in the Gap Analysis for dry and wet periods are provided in Table 4-10.

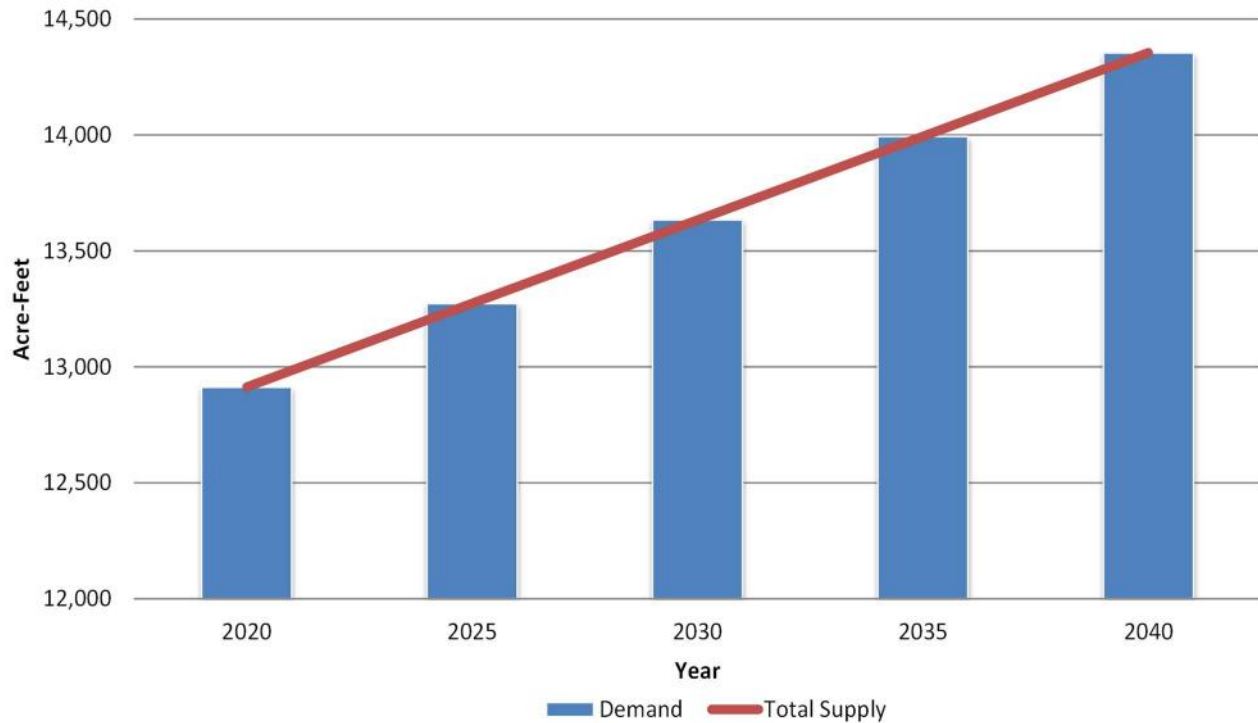
Main Basin Water Supply: Supplies equal the planned capacity of groundwater wells based on Main Basin reliability, as discussed in Section 4.2.6.

Raymond Basin Water Supply: Groundwater levels in the Santa Anita Sub-area are below the 500 foot limitation established in the

Raymond Basin Judgment. Consequently, Sierra Madre's annual production is limited to 940 acre-feet, as discussed in Section 4.3.3.

Imported Water Supply: 3,000 acre-feet per year delivered to Alhambra per the CWEA as discussed in Section 4.2.3 and about 2,500 acre-feet per year delivered to Sierra Madre per the water exchange agreement with MWD which was also discussed in Section 4.2.3

San Gabriel District Demands: Total demands were assumed to include the total Replacement Water projections (including CWEA obligations), and about 5,000 acre-feet per year according to the exchange agreement with MWD (about 2,500 acre-feet of treated imported water is delivered annually to Sierra Madre in exchange for 5,000 acre-feet of SWP water).



Sources: Alhambra's 2015 UWMP and 7 **Figure 5-1. Alhambra's Projected Water Supplies and Demands.**

The primary sources of water supplies available to member cities are local groundwater and surface water from the Main Basin and the Raymond Basin and imported water. Any gaps in supply may potentially be reliably met with recycled water and non-potable/irrigation water which is discussed further in Section 6. Monterey Park is assumed to have 800 acre-feet of recycled water in projected water supply calculations. Any remaining water demands may be met through potential water supply projects as discussed in Section 8.

5.2 Member Cities

The gap analysis for each member city is discussed below. A breakdown of their supply sources is provided in Table 4-15. Results of the gap analysis have been tabulated and are included in Appendix F.

5.2.1 Alhambra

Average Year

Alhambra's primary supply is groundwater from the Main Basin. This supply is supplemented with 3,000 acre-feet annually of treated imported water, as discussed in Section 4.1.2. Figure 5-1 illustrates the projected existing supply of local and

imported water sources compared with the projected demands during an average year from the 2015 UWMP. The comparison shows that Alhambra will be able to meet projected average year water demands with existing supplies for the next 20 years.

Dry Year Considerations

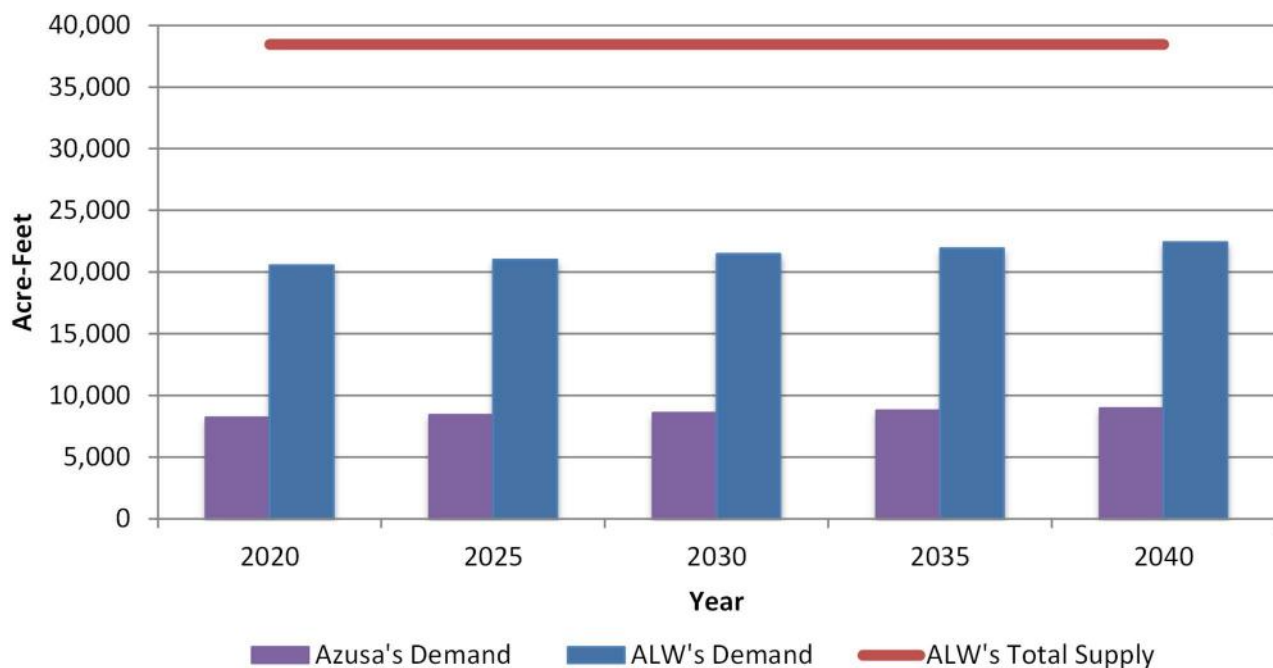
Alhambra's groundwater wells are located in the APH portion of the Main Basin. During periods of drought groundwater levels in the vicinity of the APH may decrease, possibly leading to a decrease in supply, however Alhambra has historically been able to meet demands with a combination of groundwater

and imported water supplies (CWEA) even through periods of drought. Imported water supplies through the CWEA are reliable and will meet up to 3,000 acre-feet of Alhambra's demand. Potential additional water supplies are discussed in Section 8.

5.2.2 Azusa

Average Year

Azusa's primary supply is groundwater from the Main Basin. Figure 5-2 illustrates ALW's projected existing supply of groundwater, imported water, and surface water sources compared with the projected demands of Azusa and ALW during an average year.



Sources: ALW's 2015 UWMP and Table 3-3 from Section 3 of this report.

Figure 5-2. Azusa's Projected Water Supplies and Demands.

The comparison below shows that ALW's available supplies exceed demands from 2020 through 2040. Therefore, Azusa will be able to meet demands until 2040 during average conditions.

Dry Year Considerations

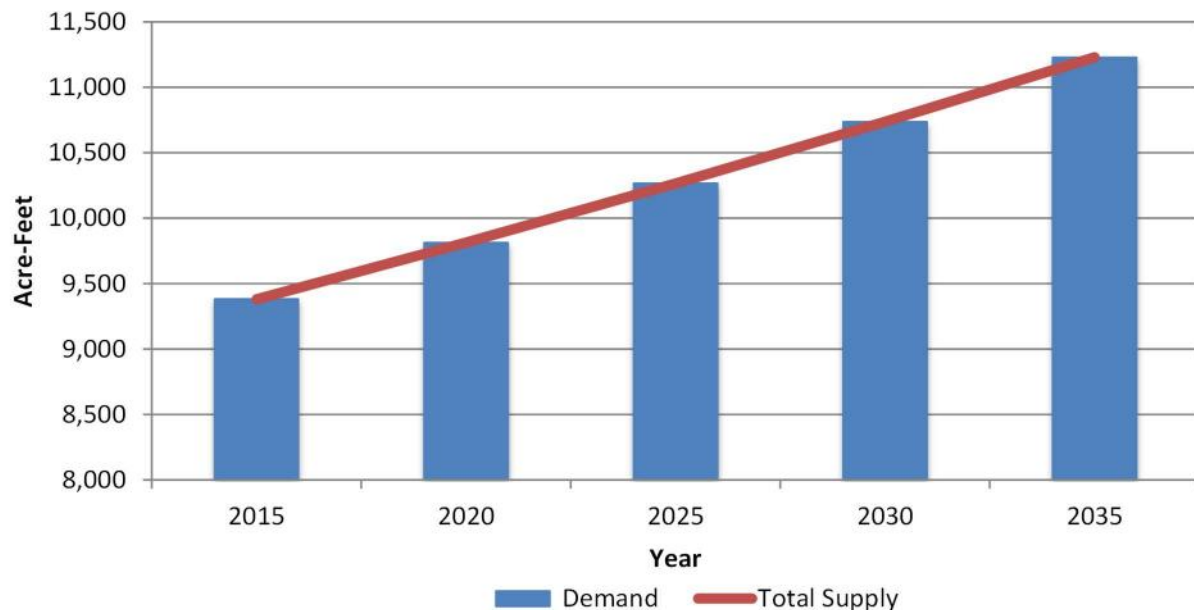
Groundwater levels in the Canyon Basin, where the majority of ALW's production wells are located, decrease significantly during periods of drought as previously discussed in Section 4.2.6. Projected supplies may not meet demands during these periods; therefore, alternate water supplies should be

supplies. ALW's 2015 UWMP indicated access to 4,000 AF of imported water (through USG-8). Potential additional water supplies are discussed in Section 8.

5.2.3 Monterey Park

Average Year

Monterey Park's primary supply is groundwater from the Main Basin. Monterey Park is also projected to have 800 acre-feet of recycled water by 2020 and through 2040. Figure 5-3 illustrates the projected existing supply of local water sources compared with the projected demands during an average



Sources: Monterey Park's 2015 UWMP and Table 3-3 from Section 3 of this report.

Figure 5-3. Monterey Park's Projected Water Supplies and Demands.

investigated to "firm up" available water year.

The comparison below shows that Monterey Park's available supplies are sufficient for meeting demands from 2020 through 2040.

Dry Year Considerations

Monterey Park's existing water supplies are reliable and will meet projected demands even during periods of drought.

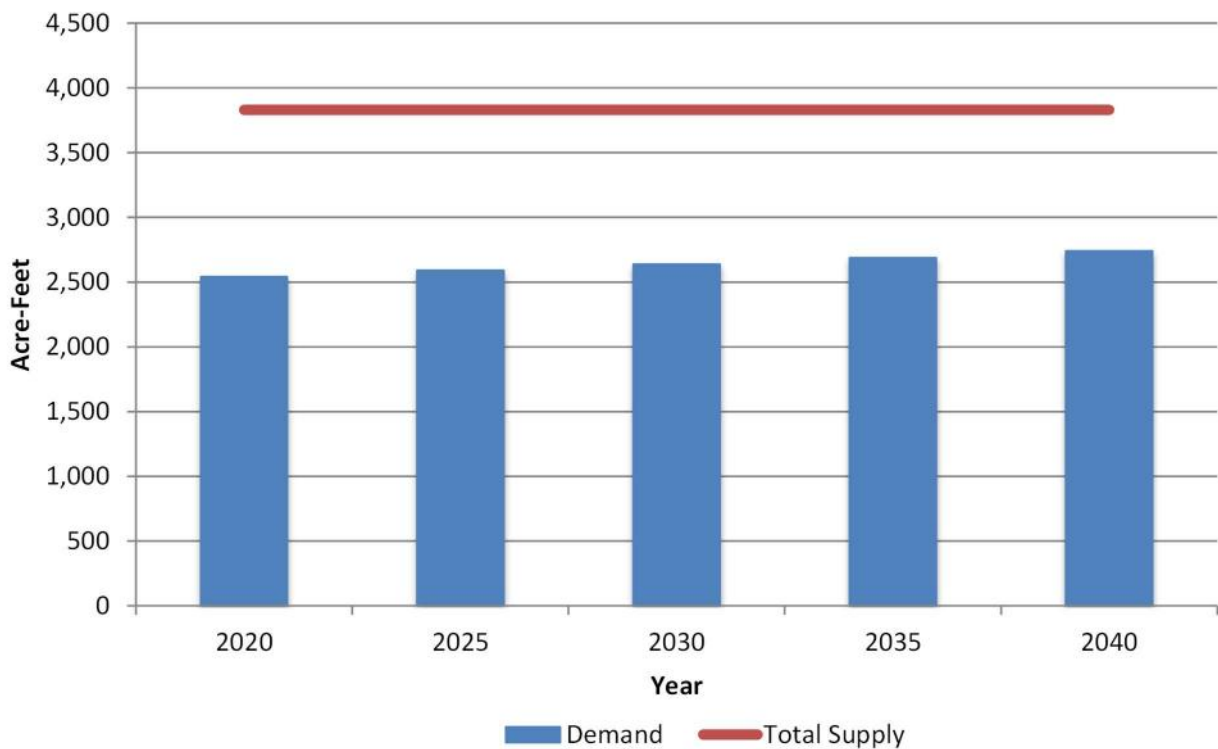
5.2.4 Sierra Madre

Historically, Sierra Madre has met demands with groundwater and surface water supplies from the Santa Anita Sub-area of the Raymond

Basin. As previously discussed, groundwater levels in the Santa Anita Sub-area are significantly depressed and pumping restrictions have been imposed. According to the September 4, 2013 agreement between MWD, Upper District, and San Gabriel District, up to 2,500 acre-feet of treated imported water will be delivered to Sierra Madre annually in exchange for 5,000 acre-feet of SWP water from San Gabriel District.

Average Year

Figure 5-4 illustrates the projected existing supply of treated imported water and local



Sources: Sierra Madre's 2015 UWMP and Table 3-3 from Section 3 of this report.

Figure 5-4. Sierra Madre's Projected Water Supplies and Demands.

Raymond Basin sources compared with the projected demands during an average year.

The comparison shows that Sierra Madre will meet projected average year water demands if both imported supplies and local supplies are considered. However, it should be noted that Sierra Madre staff have indicated that the current water conveyance system may only accept 100 percent groundwater or 100 percent treated imported water and not a blend of groundwater and treated imported water. Sierra Madre staff have also indicated they are currently studying the feasibility of blending treated imported water and groundwater. Alternate sources of water should be investigated to reduce reliance on imported water and to firm up the existing Raymond Basin supplies. Additional sources of water to meet future demands are discussed further in Section 8.

Dry Year Considerations

Raymond Basin Tunnel water supplies (local surface water supply) will be impacted during periods of drought and groundwater levels in the Santa Anita Sub-area will continue to decline due to a lack of groundwater replenishment. Groundwater pumping limitations are expected to remain in effect until groundwater elevation levels have

recovered to above 500 feet msl, as discussed in Section 4.3.4. Additional sources of water to meet future dry year demands are discussed further in Section 8.

5.3 San Gabriel District

The gap analysis for San Gabriel District during average, single dry and multiple dry years is discussed below and is shown in Figure 5-5.

Average Year

San Gabriel District's water supply source is untreated imported water from the SWP. According to the 2013 SWP Delivery Reliability Report, a 58 percent allocation of the maximum Table A entitlement is expected to be available during an average year for 2020 through 2035. As discussed in Section 4, Cal WaterFix is expected to be finished and is estimated to increase the SWP allocation to 61 percent by 2040.

Figure 5-5 illustrates the projected SWP imported water supply compared with the projected Supplemental Water (Replacement Water, MWD-San Gabriel District's water exchange agreement, and base RDA demands), as described in the assumptions stated in Section 5.1. Table 5-1 shows the required amount of San Gabriel District's SWP

allocation needed to meet San Gabriel District's demands for average years.

The Gap Analysis illustrated in Figure 5-5 and Table 5-1 shows that for average years between 2020 and 2040, demands are expected to be between approximately 2,200 and 4,500 acre-feet greater than the projected SWP allocation supply to San Gabriel District. Therefore, San Gabriel District is not projected to be able to meet projected average year Replacement Water demands plus additional exchange agreement obligations from 2020 through 2040.

Single Wet Year and Multiple Wet Years Gap Analysis

According to Table 4-10, a 98 percent allocation of the maximum Table A entitlement is expected to be available during a single wet year. A 98 percent allocation equates to 28,224 acre-feet, which would meet San Gabriel District's projected Replacement Water exchange agreement and RDA demands. For multiple wet years, an SWP allocation between 70% and 95% (20,160-27,360 acre-feet) is expected, which will meet the projected Supplemental Water requirements from 2020 to 2040 for San Gabriel District. Also, during wet years, the Main Basin is expected to have a higher OSY

during wet conditions and San Gabriel District will have a lower replacement water obligation. The SWP allocation to San Gabriel District would also increase. During wet years, San Gabriel District can store excess water into its Main Basin Cyclic Storage account. Water placed in Cyclic Storage can be used later during dry periods.

Single Dry Year and Multiple Dry Years Gap Analysis

According to Table 4-10, an 11 percent allocation of the maximum Table A entitlement is expected to be available during a single dry year. An 11 percent allocation equates to 3,168 acre-feet, which would not meet San Gabriel District's projected Replacement Water, exchange agreement, and RDA demands. For multiple dry years, an SWP allocation between 24% and 31% (6,912-8,928 acre-feet) is expected, which

**TABLE 5-1
MINIMUM PERCENTAGE OF THE MAXIMUM
SWP ALLOCATION
(28,800 ACRE-FEET/YR) REQUIRED TO
MEET PROJECTED
WATER DEMANDS⁽¹⁾**

Type of Year	2020	2025	2030	2035	2040
Average Year	66%	69%	71%	73%	77%
Dry Year	80%	83%	85%	87%	91%
Wet Year	56%	59%	61%	63%	67%

Notes:

⁽¹⁾ Includes water demands associated with MWD-San Gabriel District's exchange agreement and the base RDA.

would also fail to meet projected Supplemental Water requirements for San Gabriel District.

District's ability to reliably meet projected demands are discussed in Sections 8, 9 and 10.

Summary

San Gabriel District may not be able to provide SWP water to fulfill demands in an average year, a dry year, or multiple dry years from 2020 through 2040 with current water supplies under existing contractual obligations. As previously discussed, Replacement Water is not required to be delivered immediately. SWP water in excess of San Gabriel District's demands that will be available in wet years may be placed into Cyclic Storage and additional water banking opportunities may be utilized to at least partially fulfill demands during average and dry years. As previously stated, per Watermaster's Rules and Regulations as adopted March 2017, there is no obligation on San Gabriel District to fulfill an RDA order. San Gabriel District may "decline" delivery, allowing Watermaster to purchase from either Upper District or TVMWD. It appears that SWP water available during wet periods will not be enough to completely compensate for the lack of available SWP water in average and dry years. Options available to provide additional water to close the gap and increase San Gabriel



Figure 5-5. San Gabriel District's Projected Average Water Demands (Top: Average Year, Middle: Dry Year, Bottom: Wet Year)

(1) The RDA does not include the proposed RDA for General Benefit and Storm Augmentation (only the base RDA). Taken from Table 4-9.

(2) The projected future SWP allocation before 2040 is 58% of the maximum SWP allocation (2013 DWR Reliability Report). By 2040, 61% of the maximum SWP allocation is expected to be delivered because the California WaterFix, a project that will increase the reliability of the SWP and the amount of water delivered, is estimated to be completed (Preliminary Findings).

(3) From the 2013 DWR Reliability Report.

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Section 6: Recycled Water Opportunities

6.1 Background

There are two primary recycled water opportunities which exist in the Main Basin, opportunities for direct non-potable use (irrigation) and opportunities for indirect potable use (groundwater recharge). Generally, individual member cities may benefit from direct non-potable use water supply projects for irrigation purposes while indirect potable use water supply projects would benefit San Gabriel District with the addition of a reliable water supply source to meet supplemental water requirements in the Main Basin.

Direct Non-Potable Use

Direct non-potable usage has been studied for application in the Main Basin and has been implemented within portions of Upper District's service area. Current recycled water users in Upper District's service area include parks, schools, nurseries, golf courses and several corporate offices and shopping centers which utilize the recycled water for landscape irrigation. Use of recycled water allows Upper District's member agencies to reduce both groundwater production from the Main Basin and reliance on imported water.

San Gabriel District's member cities currently do not have access to recycled water supplies, however, in 2005, San Gabriel District entered into a Memorandum of Understanding (MOU) with Upper District and Central Municipal to identify the potential to expand use of recycled water. In 2008, Central Basin Municipal Water District (CBMWD) in conjunction with Upper District and San Gabriel District prepared the Recycled Water Master Plan Update (Master Plan) which provided details of a Capital Improvement Program which could potentially expand CBMWD's existing recycled water pipeline. The study identified potential recycled water users and preliminary recycled water pipeline alignments in Alhambra, Monterey Park, and Sierra Madre. The study included costs and a ranking of the various legs of the pipeline. Information presented in the Master Plan is discussed further in Section 6.6. San Gabriel District also received a Recycled Water Grant (\$75,000) in early 2016 from the State Water Resources Control Board (SWRCB) to fund a Recycled Water Study.

Indirect Potable Use

Reclamation of wastewater to replenish the Main Basin has been extensively reviewed in

both local and regional studies. In 1976 San Gabriel District and Upper District completed a study entitled “Potential Use of Reclaimed Water for Ground-Water replenishment in the Main San Gabriel Basin.” This study was updated at the request of the Main Basin Watermaster in 1980 and again in 1987. This study along with others concluded water reuse in the Main Basin could be feasible.

The Main Basin Judgment originally did not allow the use of recycled water for groundwater recharge without court approval, but did permit the Main Basin Watermaster to study the feasibility of using such water. In April 1991, an amendment to the Main Basin Judgment was passed allowing a maximum of 30,000 acre-feet per year of recycled water, for replenishment, Replacement Water, and Cyclic Storage purposes in the Main Basin.

6.2 San Gabriel District – Historical Recycled Water Project Participation

Indirect Potable Use

In 1992, Upper District and San Gabriel District, in cooperation with the Los Angeles County Sanitation District (CSD) and MWD, initiated the San Gabriel Valley Water Reclamation Program (Reclamation Program) to provide a maximum of about 31,200 acre-feet per year of tertiary treated recycled

water for beneficial use, specifically 25,000 acre-feet per year of recycled water for groundwater recharge and about 6,200 acre-feet per year of recycled water for direct non-potable use. The Reclamation Program was ultimately not implemented.

In 1995, Upper District and San Gabriel District in conjunction with the CSD, MWD, and the Main Basin Watermaster, proposed to implement a recycled water groundwater recharge program referred to as the San Gabriel Valley Recycled Water Demonstration Project (Demonstration Project). The project goals were similar to the Reclamation Program; however the amount of recycled water for groundwater recharge was reduced from a maximum of 25,000 acre-feet per year to a maximum of 10,000 acre-feet per year. San Gabriel District was a 20 percent partner in the Demonstration Project and had a contract with the CSD for 2,000 acre-feet per year of tertiary treated recycled water. The Demonstration Project was not implemented based on permitting issues.

In 2008, the Demonstration Project was renamed the Groundwater Reliability Improvement Program (GRIP) which was proposed by Upper District, San Gabriel District and the Water Replenishment District of Southern California (WRD) in conjunction with the CSD. Phase I of the GRIP proposed to

implement an advanced treatment plant to produce up to 18,000 acre-feet per year for groundwater recharge in both the Main and Central Basins (up to 10,000 acre-feet per year in the Main Basin and up to 8,000 acre-feet per year in the Central Basin). The source of the water was the San Jose Creek Reclamation Plant (SJCWRP) operated by the CSD. Although the maximum amount of recycled water that would be recharged into the Main Basin in any year was 10,000 acre-feet, in some years this amount was anticipated to be less due to Key Well limitations on groundwater recharge and other constraints. Recycled water recharge over the long term was anticipated to average about 8,000 acre feet per year. San Gabriel District was a 20 percent partner in the GRIP and had elected to participate in the construction of the project. In 2011, San Gabriel District along with Upper District decided not to continue with the project due to shifting replenishment needs and cost concerns. The WRD along with the CSD have moved forward with the GRIP which now focuses on replenishment of the Montebello Forebay portion of the Central Basin.

In 2014, Upper District proposed a project similar to the Demonstration Project, the Indirect Reuse Replenishment Project (IRRPP) which would offset current interruptible imported supplies with 10,000 acre-feet per

year of recycled water. San Gabriel District is not currently participating in the project. The proposed IRRP will convey an average of 10,000 acre-feet per year of tertiary treated recycled water in a new pipeline which runs from the SJCWRP to the Santa Fe Spreading Grounds to ultimately replenish the Main Basin, as shown on Figure 6-1.



Figure 6-1. IRRP Proposed Pipeline Alignment.

Direct Non-Potable Use

San Gabriel District participated in a study in conjunction with Upper District and CBMWD to explore recycled water opportunities available to San Gabriel District member cities through an interconnection with CBMWD's Southeast Water Reliability Project (SWRP). The study identified potential recycled water users and preliminary recycled water pipeline alignments, primarily for member cities Alhambra and Monterey

Park, based on their proximity to the SWRP recycled water pipeline. According to Alhambra's and Monterey Park's 2015 UWMPs, Alhambra currently has no plans to use recycled water directly and Monterey Park is anticipated to receive approximately 800 AF of recycled water from CBMWD's SWRP by 2020.

6.3 San Gabriel District – Future Recycled Water Opportunities

MWD partnered with the Sanitation Districts of Los Angeles County (Sanitation Districts) in 2015 to perform a feasibility study for a Regional Recycled Water Program.

In this Regional Recycled Water Program, wastewater effluent from the Sanitation District's Joint Water Pollution Control Plant in Carson, California will be fed to aerobic and anoxic tanks for nitrification and denitrification and then fed to one of two parallel membrane bioreactors (MBRs) before undergoing reverse osmosis and disinfection and oxidation via ultraviolet (UV) and advanced oxidation process (AOP) treatment. This water will be spread onto groundwater basins in Los Angeles County, including the Main Basin, and Orange County, pumped out, and treated again before being fed into the drinking water distribution systems. MWD is designing a demonstration-scale plant while the feasibility studies are

reviewed. San Gabriel District may be able to work in conjunction with MWD to obtain recycled water from the Regional Recycled Water Program.

6.4 Recycled Water Benefits for Indirect Potable Use

Recycled water would be a reliable source of water for groundwater recharge during drought periods when SWP water may be limited. This would benefit San Gabriel District's member cities that produce water from the Main Basin (excluding Sierra Madre which does not currently produce groundwater from the Main Basin) by improving overall Main Basin reliability; however the reliability of the Canyon Basin (to meet Azusa's demands during droughts) would not be directly improved because the IRRP pipeline is not currently planned to extend to the San Gabriel Canyon Spreading Basins, which are used to recharge the Canyon Basin. The addition of a source of recycled water to replenish the Main Basin would "firm up" San Gabriel District's overall water supply.

6.5 San Gabriel District – Feasibility of Recycled Water Projects for Indirect Potable Use

The feasibility of delivering recycled water to the Main Basin as Replacement Water largely depends on the cost to do so. Upper District has indicated that costs for Replacement

Water through the IRRP would be approximately \$700 per acre-foot. As previously described, costs for SWP water may double with the implementation of the BDCP. A cost comparison of recycled water versus current and future SWP costs is shown below in Table 6-1.

TABLE 6-1

COST COMPARISON BETWEEN SWP AND IRRP

	Current SWP Cost	Average Future SWP Cost with BDCP	Recycled Water Cost
Annual Amount of Water Delivered (AF)	28,800	28,800	2,000
Average Annual Cost	\$10,000,000 ⁽¹⁾	\$20,000,000 ⁽¹⁾	\$1,400,000
Cost/AF	\$350	\$690	\$700 ⁽²⁾

⁽¹⁾ Cost information is from the Kennedy/Jenks Report

⁽²⁾ Cost information is from the Upper District 2014/15 Budget and Long Range Finance Plan, Producer Update June 12, 2014

6.6 Feasibility of Recycled Water Projects for Direct Non-Potable Use to Benefit Member Cities

Member cities may benefit from non-potable water for direct use including recycled water utilized for irrigations purposes. Previous studies as well as the feasibility of utilizing recycled water in each member cities' service area is discussed below.

6.6.1 Alhambra

Alhambra does not currently utilize recycled water. There currently is not a wastewater treatment plant or any recycled water distribution pipeline in the area which would make it feasible for Alhambra to utilize this type of water supply. However, as discussed in Section 6.1, CBMWD in conjunction with Upper District and San Gabriel District prepared a Master Plan in 2008 which provided details of a Capital Improvement Program which could potentially expand CBMWD's existing recycled water pipeline.

Approximately 22 potential recycled water customers have been identified that collectively would have a demand of approximately 1,700 AFY for recycled water for direct non-potable use. These potential customers include the Alhambra Municipal Golf Course and parks, schools, and various other irrigation customers.

The estimated cost for recycled water to Alhambra is \$600 per acre-foot per year, according to the Master Plan; however, two legs of the recycled water transmission pipeline would need to be completed prior to completion of the Alhambra leg. These legs include the Garfield/Coral View leg which would serve the southeastern portion of Monterey Park at a cost of \$1,200 per acre foot and the Orange/New leg which would serve the northeastern portion of Monterey

Park and the southeastern portion of Alhambra at a cost of \$1,200 per acre foot.

6.6.2 Azusa

Azusa currently does not use recycled water and is unable to directly benefit from a large scale recycling project due to its distance from the source of supply and because infrastructure is currently not available to use this type of water supply. However, approximately 13 potential recycled water customers have been identified that collectively would have a demand of approximately 400 AFY for recycled water for direct non-potable use.

6.6.3 Monterey Park

Monterey Park does not currently utilize recycled water because the infrastructure is not currently available in order to use this type of water supply. However, as discussed in Section 6.1, CBMWD in conjunction with Upper District and San Gabriel District prepared the Master Plan in 2008 which provided details of a proposed Capital Improvement Program to potentially expand CBMWD's existing recycled water pipeline. Based on Monterey Park's proximity to the existing CBMWD recycled water pipeline, approximately 23 potential recycled water customers have been identified that collectively would have a demand of approximately 1,200 AFY for recycled water

for direct non-potable use. The potential customers include the Monterey Park Golf Course, parks, schools, and various irrigation customers which may be served from an extension of CBMWD's recycled water pipeline. The estimated cost to deliver recycled water to these water users in the western portion of Monterey Park is \$700 per acre-foot per year, according to the Master Plan.

Monterey Park is currently coordinating with San Gabriel District and CBMWD to extend CBMWD's SWRP recycled water pipeline to serve customers within the City's service area.

6.6.4 Sierra Madre

Sierra Madre does not currently utilize recycled water because the infrastructure is not currently available make recycled water available to Sierra Madre. However, the City of Arcadia (although not a San Gabriel District member agency) has initiated a potential recycled water use study. Sierra Madre is northerly of and adjacent to Arcadia. In the event Arcadia's study indicates recycled water use is feasible and introduces a recycled water transmission pipeline, there may be future potential for Sierra Madre. In addition, Sierra Madre was included as a potential recycled water user in the 2008 CBMWD Master Plan; however the conveyance of the recycled water from the

existing CBMWD pipeline to Sierra Madre was cost prohibitive at \$3,500 per acre-feet per year. Sierra Madre's 2015 UWMP indicates that Sierra Madre is not currently implementing any direct use recycled water projects, but will continue assessing the potential to implement recycled water projects in the future.

6.7 Additional Recycled Water Projects for Direct Non-Potable Use

Generally, recycled water for direct non-potable use is delivered to users through transmission pipelines originating from a regional wastewater treatment plant. This can be cost-prohibitive for potential recycled water users located too far from a regional wastewater facility due to pumping and pipeline costs to distribute the recycle water. An alternative approach is the construction of satellite wastewater treatment plants (SWWTP) near potential users that are too far from a regional wastewater treatment plant to economically be served. SWWTPs are small wastewater treatment facilities which divert raw wastewater from a wastewater collection system, treat it to the appropriate level of quality for reuse, and subsequently return the residual solids to the collection system. SWWTPs may provide lower capital and operating cost recycled water options for users who are located at a prohibitive distance and elevation from a regional

wastewater treatment plant. San Gabriel District member cities could potentially benefit from this alternative.

Foothill Municipal Water District conducted a Recycled Water Feasibility Report (Feasibility Report) in 2012 which investigated the feasibility of developing three SWWTPs to be located in the Raymond Basin. According to the Feasibility Report, a 0.25 million gallon per day SWWTP costs approximately \$2,000,000. SWWTPs located in the vicinity of Monterey Park and/or Sierra Madre (possibly in conjunction with the City of Arcadia) could potentially be an economical source of recycled water. In addition, the SWWTPs may potentially produce recycled water for groundwater recharge.

6.8 Summary

Table 6-2 summarizes the potential recycled water demands for San Gabriel District's member cities. Alhambra has a potential recycled water demand of 1,700 AFY; Azusa has a potential recycled water demand of 400 AFY; and Monterey Park has a potential recycled water demand of 1,200 AFY. Alhambra, Azusa, Monterey Park, and Sierra Madre should continue to investigate the feasibility of utilizing recycled water.

TABLE 6-2

APPROXIMATE POTENTIAL RECYCLED WATER DEMANDS FOR MEMBER CITIES

Member City	Year					
	2015	2020	2025	2030	2035	2040
Alhambra	0	1,700	1,700	1,700	1,700	1,700
Azusa	0	400	400	400	400	400
Monterey Park	0	1,200	1,200	1,200	1,200	1,200
Sierra Madre	0	0	0	0	0	0

Section 7: Water Conservation Measures

7.1 Introduction

Water conservation is an important resource for managing future water usage. Water conservation may be either passive or active. Passive water conservation occurs because of California plumbing codes which require the installation of ultra-low flush toilets and low flow showerheads/faucets on all newly built homes. Water conservation programs, incentives, and city ordinances are examples of active water conservation. The discussion in this report will focus on active water conservation measures.

New and existing water conservation programs and incentives are essential to achieve the SBX7-7 requirement of a 20 percent reduction in per capita water use by the year 2020. Although the SBX7-7 requirements do not apply directly to San Gabriel District, current and future water conservation programs conducted by San Gabriel District will support efforts to reduce total water usage for each member city. In addition, water conservation measures contribute to a reduction in the use of costly imported water.

The following sections discuss current water conservation measures employed by San

Gabriel District member cities, as well as water conservation measures currently employed by San Gabriel District to support the member cities.

7.2 San Gabriel District

Although San Gabriel District supports and encourages its member cities to implement Demand Management Measures (DMM) to the extent possible, as a wholesale water provider San Gabriel District has no legal authority to implement most of the DMMs. However, San Gabriel District does assist its member cities in implementing DMMs. Those water conservation programs and incentives are described below.

7.2.1 Water Conservation Pilot Projects

During fiscal year 2009-10 San Gabriel District began a pilot program which provides grants to its member agencies to fund projects relating to water conservation. The objectives of the pilot program are to conserve water and to provide teaching examples of technology, materials, and procedures which conserve water. The pilot program provides grants in

excess of \$50,000 per project to member cities. After project implementation, the member agencies must report back to San Gabriel District the actual water savings. In 2010, San Gabriel District provided \$383,000 in grants for various pilot projects to reduce water consumption. Table 7-1 lists the various projects funded to promote water savings in the member cities. More information on a few

**TABLE 7-1
PILOT PROJECTS PROMOTING WATER SAVINGS**

Member City	Pilot Project	Years of Implementation	Water Saving Features		
			Irrigation	Landscape	Technology
Alhambra	Gateway Plaza ⁽¹⁾	2009-2010	X	X	
	<i>The Alhambra</i> Urban Community	2011-2012	X	X	X
	West San Gabriel Valley YMCA	2013-2014	X	X	X
	Fire Station	2014-2015	X	X	
	City Hall ⁽²⁾	2015-2016	X	X	
Azusa	Azusa Chamber of Commerce ⁽¹⁾	2009-2010	X	X	
	Memorial Park, North Recreation Center ⁽¹⁾	2009-2010	X	X	
	Department of Light and Water ⁽¹⁾	2009-2010	X	X	
	San Gabriel Canyon Gateway Center ⁽¹⁾	2009-2010	X	X	
	Azusa Pacific University ⁽¹⁾	2010-2011	X	X	X
	Paramount Elementary School ⁽²⁾	2014-2016	X	X	
	Mountain View Elementary School ⁽²⁾	2014-2016	X	X	
	Median Water and Tree Saving Project ⁽²⁾	2016	X	X	
Monterey Park	City Hall Planters and Smart Controller ⁽¹⁾	2009-2010	X	X	X
	Automated Meter Reader (AMR)	2009-2010	X		X
	California Native Median Project ⁽¹⁾	2011-2012	X	X	
	Brightwood Elementary School	2014-2015	X	X	
	Macy Intermediate School	2014-2015	X	X	
	Demonstration Gardens ⁽²⁾	2015-2016	X	X	X
Sierra Madre	Miramonte Reservoir/Mt. Wilson Trailhead ⁽¹⁾	2009-2010	X	X	
	Sturtevant Street Flood Control Right of Way ⁽¹⁾	2009-2010	X	X	
	Sierra Vista Park ⁽¹⁾	2009-2010	X	X	X
	Sierra Madre School ⁽¹⁾	2011-2012	X	X	
	City Hall	2014-2015	X	X	X

Source: San Gabriel District's 2015-2016 Annual Report

Notes:

⁽¹⁾ Pilot projects discussed later in Section 7.2.1.

⁽²⁾ Still in the planning and execution stages.

of the pilot projects listed in Table 7-1 is discussed below.

Alhambra

Alhambra Gateway Plaza

Objectives:

- Conserve water at the site by transforming it from a water-intensive turf lot to a water-efficient garden and demonstration project
- Create an attractive park, garden and monument near the entrance to the City, replacing a vacant grass covered lot
- Remove an old, leaking irrigation system
- Install a water-efficient irrigation system



Figure 7-1. Water Efficient Garden at Alhambra Gateway Plaza.

- Remove a large expanse of turf
- Plant water-efficient vegetation

Azusa

Azusa Chamber of Commerce Water Conservation Project

Objectives:

- Create a water conservation project for business, government and residential audiences at a prominent and frequently visited business “address” in Azusa.
- Transform the “park-like, grassy” landscape appearance to a water-efficient landscape appearance.
- Replace the old irrigation system and install new, water-efficient irrigation equipment.
- Plant water-efficient vegetation, including California Native trees and plants.
- Utilize educational signage, markers and tags on plants to create a “walking library” for Chamber visitors.
- Installed a subterranean irrigation system to deliver water directly to the root system of water-wise vegetation.

Memorial Park, North Recreation Center Water Conservation Project



Objectives:

Figure 7-2 . Water Efficient Vegetation at Memorial Park.

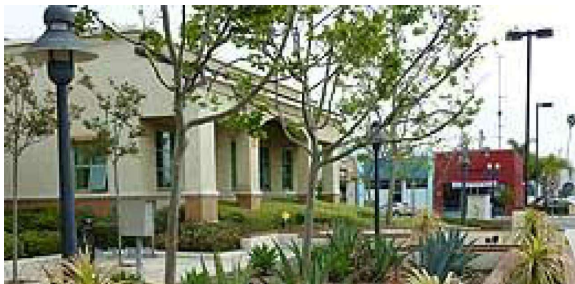


Figure 7-3. Water Efficient Vegetation at the Azusa Department of Light and Water.



- Create a water conservation project at a prominent government/public facility in Azusa.
- Remove the old irrigation system and install new, water-efficient irrigation equipment.
- Remove grass turf and replace with water-efficient vegetation, including California Native plants, as shown in Figure 7-2.

- Utilize educational signage at the Park and Recreation Center to inform residents about the project and the importance of water conservation.

Azusa Department of Light and Water

Objectives:

- Create a water conservation project at a prominent and highly-trafficked government/public facility in Azusa
- Remove the old irrigation system and install new, water-efficient irrigation equipment in “planters.”
- Plant water-efficient vegetation, including California Native trees and plants, as shown in Figure 7-3.
- Provide educational signage, markers and tags on plants that are easily viewable by Department of Light and Water visitors.

San Gabriel Canyon Gateway Center

Objectives:

- Assist in modernizing and upgrading the irrigation system, adding new water-wise plants, and enhancing educational signage

Azusa Pacific University

Objectives:

- Assist the University in its water and energy conservation efforts overall
- Save water by installing water-saving flow restrictors in university dormitories, offices and maintenance facilities
- Install weather-based, "smart" water controllers proximate to several external locations on campus including residence halls, the University Soccer Field, the University track and football field, and other athletic fields and
- Inform students and university employees about water conservation techniques and technology, as well as water-efficient vegetation

In addition, during 2005, San Gabriel District provided a \$62,000 grant to Azusa for installation of a water recirculation system for a newly constructed splash park. It is estimated that the water recirculation system will conserve about 16.5 acre-feet of water each year.

Monterey Park

Public Facility and Park Water Conservation Project

Objectives:

City Hall

- Re-irrigate planters in front of City Hall with water-efficient equipment such as sprinkler heads and nozzles, as well as weather-based, "smart" water controllers, as shown in Figure 7-4. The planters have been re-vegetated as well to include more water-efficient species of plants.

Garvey Park

- Install water-efficient equipment featuring weather-based. "smart" water controllers

Medians

Objectives:

- Planning recently began to re-irrigate and re-vegetate medians throughout the City with water-efficient irrigation equipment and California Native vegetation
- Future objectives include expanding the California Native plant "palette"

concept to other City facilities as well as large, private employers



Figure 7-4. Water Efficient Vegetation at the Monterey Park Street Median.

Sierra Madre

Miramonte Reservoir and Mt. Wilson Trailhead Water Conservation Project

Objectives:

- Construct a new pump house
- Re-irrigate the grounds around the reservoir, pump house and Park facilities with water-efficient equipment and technology
- Plant water-efficient vegetation in garden areas throughout the Park and Reservoir complex
- Install public education signage in the Park near the heavily trafficked Mt. Wilson Trailhead.

Sturtevant Street Flood Control Right of Way

Objectives:

- Irrigation
- Landscaping water conservation

Sierra Vista Park Water Conservation Project

Objectives:

- Create a water conservation project in the City's most prominent and visible park
- Replace the old irrigation system, which included manual controls and timers
- Install new, water-efficient irrigation equipment including satellite-based water controllers/timers to save water on all turf areas within the Park
- Utilize educational signage at the Park to inform residents about the project and the importance of water conservation

Sierra Madre School Water Conservation and California Native Plant Project

Objectives:

- Transform the highly visible campus from turf and water-intensive vegetation to California Native water-

efficient vegetation. The campus serves hundreds of students and parents on a daily basis, is an historical landmark and is a focal point of this tightly-knit community.

- Remove the old, leaking irrigation system and re-irrigate the elementary school campus with modern, water-efficient equipment to conserve water
- Remove portions of turf grass to save water and to enable planting of California Native vegetation
- Plant California Native Plants, as well as an “edible garden” of citrus trees on campus
- Involve students, teachers and parent volunteers in all aspects of the project – planning, planting and maintenance
- Create an educational curriculum with assistance from the Theodore Payne Foundation
- Utilize educational signage, markers and tags on trails and in garden areas to create a “walking library” about the California Native gardens



Figure 7-5. Front of Sierra Madre School After Implementation of the Water Conservation and California Native Plant Project.

Future implementation of this program will be based on results of the pilot project.

7.2.2 Water Conservation Materials

San Gabriel District has an annual budget to purchase water conservation materials such as low flow shower heads, water nozzles for garden hoses, residential water meters for use on showers and hoses, and educational materials for children. In 2014, San Gabriel District obtained a grant for approximately \$230,000 from DWR to fund their Water and Energy Conservation Rebate Programs for high-efficiency washing machines, waterless urinals, and irrigation controllers. In addition, San Gabriel District also provides rebate programs for high efficiency toilets and rain barrels. San Gabriel District does not track the installation of the devices but does track its expenditures on rebates.

7.2.2.1 High-Efficiency Washing Machine Rebate Program

San Gabriel District began implementation of a rebate program for high-efficiency washing machines in 2013. A \$150 rebate for designated water efficient washing machines has been offered to residents of Alhambra, Sierra Madre, and Monterey Park. Generally, 15 gallons of water is saved per wash with a high-efficiency washing machine according to a water conservation study conducted by the Texas Water Development Board. A cost-benefit analysis for San Gabriel District has not yet been performed.

7.2.2.2 High Efficiency Toilet Replacement Rebate Program

San Gabriel District's previous High Efficiency Toilet Replacement Program was replaced in 2016 with a rebate program. A rebate up to \$100 is offered to residents of Alhambra, Sierra Madre, and Monterey Park or those who pay their water bill to San Gabriel District for the purchase of a premium high-efficiency toilet that uses 1.1 gallons per flush or less. High efficiency toilets can provide an annual house water savings of 20,000 gallons.

7.2.2.3 Waterless Urinal Rebate Program

A Waterless Urinal Rebate Program was started by San Gabriel District in October of 2014. Waterless urinals use no water and are

expected to save around 20,000 to 45,000 gallons of water per year. Businesses within Alhambra, Sierra Madre, Monterey Park, and ALW (for residents in zip code 91702) can get a rebate of up to \$150 for each waterless urinal the businesses replace. Each business is limited to rebates on a maximum of 20 urinals.

7.2.2.4 Rain Barrel Rebate Program

San Gabriel District has a Rain Barrel Rebate Program for residents of Alhambra, Monterey Park, Sierra Madre, and ALW (for residents in zip code 91702). Rain barrels are containers, usually about 50 to 60 gallons, designed to collect and store rainwater from gutters. Collected rainwater is then used for household purposes such as landscape irrigation. Rain barrels can help reduce residential water demands and decrease stormwater runoff.

The rebate is up to \$100 on purchased rain barrels and is limited to four barrels per residence.

7.2.2.5 Irrigation Controller Rebate Program

San Gabriel District started a rebate program for irrigation controllers in September 2014 for residents of Alhambra, Sierra Madre, Monterey Park, and ALW (for residents in zip code 91702). The rebate is for up to \$150. Irrigation controllers use information about

the irrigation site (i.e. soil moisture) to determine how much to water. Irrigation controllers can reduce water use, prevent overwatering of plants, and limit violations of drought restrictions.

7.2.3 Public Information Programs

San Gabriel District started its public information program in 2003 and has expanded it in subsequent years. San Gabriel District currently has an ongoing public information program regarding water conservation and the current drought. San Gabriel District has held public workshops to address its Public Information/School Education programs and has sponsored the San Gabriel Valley Water Forums held biennially which address current water supply issues in the San Gabriel Valley. In addition, San Gabriel District produces a newsletter called “The Pipeline” which includes water conservation information, has prepared a video presentation on water conservation, among other activities. San Gabriel District’s water conservation mascot, H2Owl (shown below on Figure 7-6), teaches wise water use to younger members of the community through special events.

Figure 7-6. Former San Gabriel District Director John Leung, H2Owl and California Assemblyman Ed Chau attend Monterey Park’s Earth Day Festival on April 30, 2013.



San Gabriel District provides information brochures to member cities which promotes and explains water conservation and can be used as water bill inserts to educate residents. San Gabriel District officers and board members are available for speaking engagements regarding water conservation. In addition, San Gabriel District’s web site has video links addressing water conservation. San Gabriel District employs an external affairs specialist and retains a consultant to increase the district’s capacity to carry out components of the public information program. San Gabriel District does not track spending on individual items of their public information program.

7.2.4 Member Cities

Member cities utilize the programs listed above through San Gabriel District. In addition to the above water conservation programs, member cities employ tiered water rates which is an effective means by which to encourage residents to save water, as they will

pay less the more they conserve. Details on the specific water conservation programs employed through the member cities may be referenced in each member cities' respective UWMP.

Section 8: Potential Sources of Additional Water Supplies

8.1. Introduction

San Gabriel District and San Gabriel District's member cities have several water supply opportunities available, in addition to recycled water, which would improve the reliability of water supplies during periods of drought. These opportunities include previously proposed projects in the Main Basin and the Raymond Basin as well as SWP transfers and exchanges.

8.2. Member Cities – Potential Water Supply Projects

The following section identifies potential

water supply projects for each member city.

8.2.1. Alhambra

Production Well Field Outside of the APH

A new wellfield outside the APH could enable Alhambra to permanently shut off wells in the APH and eliminate reliance on treated MWD water. Several factors, such as availability of land for a wellfield, recharge capability, and water quality would need to be considered. As an example, a 10,000-gpm well field consisting of four new wells constructed in the vicinity of the Santa Fe Dam, along with a dedicated transmission pipeline (shown on

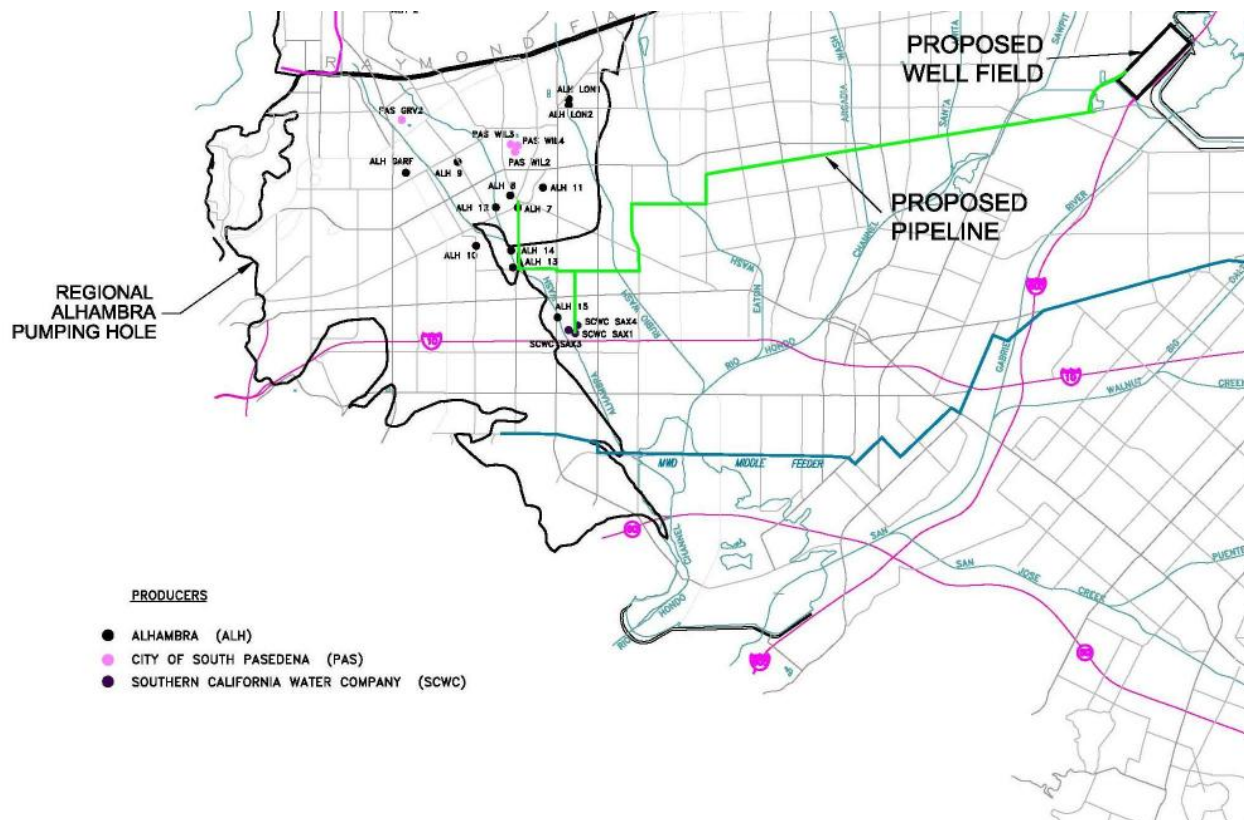


Figure 8-1. Alhambra – Proposed Well Field and Transmission Pipeline.

Figure 8-1) would cost about \$12,000,000 (\$4,000,000 wells + \$8,000,000 pipeline) to construct, according to the 2006 Main Basin Watermaster Technical Advisory Committee – Alhambra Pumping Hole White Paper (ALH TAC). Utilizing the ENR construction cost index, the 2016 capital cost estimate for the well field is about \$15,840,000 (does not include land cost). Assuming a delivery of 10,000 acre-feet per year from the new wellfield, 6 percent interest and a 30-year repayment period the cost would be about \$115 per acre-foot for capital repayment. Pumping costs are estimated to be about \$100 per acre-foot for a total unit cost of about \$215 per acre-foot.

Blending Water

Alhambra is also assessing the cost and practicality of blending the water from its Well No. 2 in the Raymond Basin, which is high in nitrates, in order to produce 500 AFY using its groundwater rights in the Raymond Basin. This will help reduce the Replacement Water assessment on Alhambra in the Main Basin.

8.2.2. Azusa

Infrastructure Improvement and Conservation

According to ALW's 2015 UWMP, ALW aims to increase its water supply by focusing on renovating existing infrastructure and,

therefore, increasing its local water supply. For instance, ALW plans to upgrade its groundwater facilities and reactivate some of its inactive wells, including its Aspan Well and Well No. 9.

ALW is also promoting conservation practices such as rainwater harvesting and evaluating the potential for recycled water use to increase its local water supply. According to ALW's 2015 UWMP, Upper District has evaluated the potential for using recycled water in ALW's service area and may be a potential future water source for Azusa, but no plans have been currently implemented.

Production Well Outside of the Canyon Basin

ALW is currently investigating locations to construct a well outside of the Canyon Basin. A new well outside the Canyon Basin would enable Azusa to reliably produce water during periods of drought. Several factors such as availability of land for a well, yield of the well, and water quality would need to be considered. Azusa is currently conducting reconnaissance level investigations of potential well sites.

8.2.3 Monterey Park

Recycled Water

As discussed in Section 6, Monterey Park is in close proximity to the existing Central Basin

recycled water transmission pipeline. The CBMWP Master Plan, as discussed in Section 6.6.3, identified over 10 potential recycled water customers in Monterey Park (the Monterey Hills leg of the proposed recycled water pipeline) including the Monterey Park Golf Course, parks, schools, and various irrigation customers which may be served from an extension of CBMWD's recycled water pipeline. The estimated cost to deliver recycled water to these water users in the western portion of Monterey Park is \$700 per acre-foot per year, according to the Master Plan. Monterey Park's 2015 UWMP projects that recycled water will provide 800 acre-feet per year (about 10%) of its water supply by 2020.

8.2.4 Sierra Madre

Sierra Madre is currently dependent on imported water from MWD to meet its water demands and has many planned projects to increase its local water supply and improve its existing infrastructure.

New Raymond Basin Well

According to Sierra Madre's 2015 UWMP, Sierra Madre is planning to rehabilitate two existing wells and construct a new well in the Raymond Basin to provide a backup water supply if a water emergency occurs.

Main Basin Well

Sierra Madre also has the right to produce water from the Main Basin, although all production will be subject to a Replacement Water Assessment. Sierra Madre's 2015 UWMP states the city is planning to build a well in the Main Basin to meet Sierra Madre's future demands. Groundwater would be pumped to Sierra Madre's wellfield/distribution facility through a new transmission pipeline. The facilities would be operated solely by Sierra Madre or jointly between Sierra Madre and Arcadia. The estimated cost of a new well and the transmission pipeline is estimated to be \$6,441,065 according to Sierra Madre's 2015 UWMP. Assuming delivery of 2,000 acre-feet per year, an interest rate of 6 percent and a repayment period of 30 years, the estimated unit capital cost of the water is approximately \$234 per acre-foot. In addition, the cost to pump water is estimated to be approximately \$100 per acre-foot plus the cost of Replacement Water (expected to be \$200 per acre-foot by 2018-19 according to San Gabriel District's 2015-16 Annual Report) for Sierra Madre, which totals \$534 per acre-foot. If the well is operated jointly between Sierra Madre and Arcadia, the transmission pipeline would not be necessary. This would reduce the total unit cost of the water. Sierra Madre staff is considering the feasibility of this project in conjunction with the City of Arcadia.

Infrastructure Improvement

Sierra Madre also plans to build new structures and rehabilitate conveyance systems to improve spreading water efficiency at its spreading grounds (more in Section 8.2.5 and the Sierra Madre's 2015 UWMP).

8.2.5 San Gabriel District

Devil Canyon-Azusa Pipeline Extension

Water purveyors, including Sierra Madre, that

recovery rates in the APH area of the Main Basin. Shifting groundwater production away from impacted areas and/or providing supplemental sources for groundwater recharge will enhance basin management and reduce impacts on the APH.

This could be accomplished by extending the DCAP, which currently terminates in Azusa, into the Santa Anita Sub-area of the Raymond Basin.

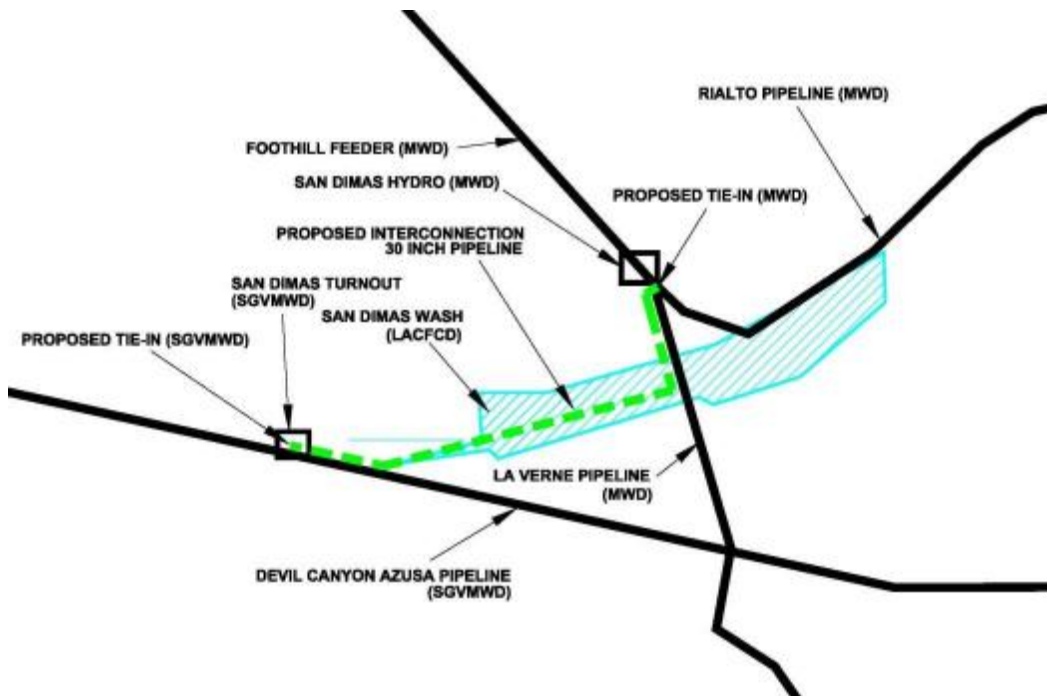


Figure 8-2. Proposed Alosta Connection.

border the Main Basin and the Raymond Basin are experiencing declining groundwater levels and are investigating alternative means to replenish the Raymond Basin. In addition, declining water levels in the Raymond Basin result in reduced outflow from the Raymond Basin into the Main Basin which is generally thought to compound declining levels and slow

Water could be delivered to existing recharge facilities to replenish the groundwater basin. To ensure both MWD and San Gabriel District could make deliveries through the proposed pipeline throughout the year (even during periods when the San Dimas Hydroelectric Generation Facility is utilized), an interconnection between MWD's raw water

pipeline and San Gabriel District's pipeline would be required. The Alostia Connection, described below, is an essential element of any plan to extend the San Gabriel District pipeline, if the San Dimas Hydroelectric Generation Facility remains in place.

Construction of the Alostia Connection

San Gabriel District's untreated imported water facilities are used to deliver water to generate power about 4 to 6 months of each year, primarily in the summer. During those times, little or no water can be delivered to the westerly terminus of the pipeline in Azusa or to other areas in the Raymond Basin in the event an extension was constructed. Consequently, a new pipeline joining MWD's Rialto Feeder to the San Gabriel District pipeline in San Dimas has previously been proposed and is shown on Figure 8-2. The proposed interconnection (or Alostia Connection) would allow San Gabriel District or MWD to deliver water to Azusa and/or into Raymond Basin year round without impacting San Gabriel District's ability to generate power. Connections could be made both on the pressurized Rialto Feeder and the gravity flow La Verne Pipeline. According to the 2008 Main Basin Watermaster Technical Advisory Committee – Eastside White Paper (Eastside TAC), the cost estimate for the Alostia Connection was about \$2,300,000. Utilizing the ENR construction cost index, the 2016 capital cost estimate for the Alostia Connection is about

\$2,790,000 and the annualized capital cost at a repayment rate of 6 percent over 30 years is about \$203,000 per year. The Devil Canyon-Azusa Pipeline extension is discussed below.

Raymond Basin Feeder Extension

San Gabriel District's Devil Canyon-Azusa Pipeline could be extended into the Raymond Basin to provide replenishment water to the Santa Anita and Sierra Madre Spreading Grounds. It should be noted that the San Gabriel District/Raymond Basin Feeder is not practical without the Alostia Connection (assuming the San Dimas Hydroelectric Generation Facility remains in place). According to the Eastside TAC White Paper, the cost estimate for the Raymond Basin Feeder Extension was about \$16,700,000, including the Alostia Connection. Utilizing the ENR construction cost index, the 2016 capital cost of the Raymond Basin Feeder Extension is about \$20,270,000, including the Alostia Connection. The annualized cost over 30 years at 6 percent interest is about \$1,470,000 per year.

8.2.6 Stormwater Projects

There have been several studies conducted identifying potential stormwater recharge locations in the Main Basin. In a report entitled "Potential Effective Replenishment Capabilities" (PERC), dated June 17, 1992, Upper District identified the replenishment capabilities of existing facilities within the Main Basin and the

potential for enhancement of replenishment. That report identified sand and gravel pits as viable locations of future replenishment facilities, although no new facilities have been developed.

Subsequently, several water agencies, including San Gabriel District, sponsored a second study to coordinate future demand for supplemental water with available replenishment and to identify actions that could be taken to ensure adequate replenishment capability. The “PERC II Study,” dated March 1995 identified replenishment capabilities of existing spreading facilities and examined the availability of those facilities for supplemental water after local water had been replenished. The study also considered the impacts of the Main Basin Judgment, particularly supplemental water replenishment limitations that must be followed when the groundwater level at the Baldwin Park Key Well exceeds an elevation of 250 feet above mean sea level. The “PERC III Study” dated February 2007 was an update to the PERC II report and identified three gravel pits as potential recharge sites: Miller Pit, United Rock Pit 3, and Hanson Pit. Miller Pit, United Rock Pit 3, and Hanson Pit were identified as the most appropriate for recharge utilization based on their proximity to the San Gabriel River and their inactive status. Each also has a buffer between the bottom of the pit and the water table to provide natural filtration.

In the Santa Anita Sub-area of the Raymond Basin, Sierra Madre, in conjunction with the City of Arcadia, the Los Angeles County Department of Public Works, and the Raymond Basin Management Board with partial funding by a State Proposition 1E grant, has begun work on several stormwater capture projects which would increase the amount of local water conserved. The projects include rehabilitation of the Santa Anita Dam, improvements to the Santa Anita headworks and diversion to the Sierra Madre spreading grounds, and rehabilitation of the Santa Anita Debris Dam. The Santa Anita Dam was built in 1927 by the Los Angeles County Flood Control District and requires rehabilitation to meet current seismic regulations. Improvements to the above mentioned facilities will improve stormwater capture, ultimately leading to increased groundwater levels in the Santa Anita Sub-area.

8.3 Member City Water Supply Project Recommendations for Short-Term Implementation

The water supply projects described above were primarily ranked according to the reliability of the supply during drought years, potential cost of the water, and the member cities’ need for an additional water supply according to the gap analysis. Azusa’s direct connection from the DCAP to the surface water filtration plant and the Sierra Madre stormwater project were not

included in the ranking as the projects have already been approved. The top two ranked projects for implementation in the short-term are shown in Table 8-1.

These projects address water supply concerns for member cities with drought sensitive supplies. The Main Basin is a reliable supply, even during periods of drought. Therefore, facilities which allow Azusa and Sierra Madre access to groundwater in the Main Basin would significantly improve the reliability of their supplies.

Sierra Madre has replaced all of its groundwater production out of the Santa Anita Sub-area with treated imported water to assist in groundwater elevation recovery in the area. Sierra Madre is currently wholly reliant on imported water through the MWD-San Gabriel District exchange agreement, which is spread to recharge the Raymond Basin. The MWD-San Gabriel District exchange agreement increases San Gabriel District's projected annual SWP demand by about 5,000 acre-feet (Sierra Madre's projected water demand of 2,500 acre-feet x 2). Although Sierra Madre would incur Replacement Water requirements equal to production with a well located in the Main Basin (Sierra Madre does not have prescriptive pumping rights in the Main Basin), the demands on San Gabriel District may ultimately be reduced by about 2,500 acre-feet per year (assuming all demands are met through

Main Basin production). San Gabriel District demands may be further reduced if Raymond Basin groundwater supplies are utilized to meet Sierra Madre's future demands.

8.4 Member City Water Supply Project Recommendations for Potential Long-Term Implementation

TABLE 8-1
SHORT-TERM IMPLEMENTATION PROJECT RANKING

Rank	Project
1	Sierra Madre – Well in the Main Basin
2	Azusa – Well in the Main Basin

The following projects may be recommended for long-term implementation based on the reliability of existing supplies. If the water supply reliability were to decrease, these projects may become a priority.

The production well field outside of the APH to benefit Alhambra has not been recommended for implementation in the short-term because the CWEA, which provides 3,000 acre-feet per year of treated imported water to Alhambra to decrease production from the APH, has thus far been successful. Water purveyors in the vicinity of the APH have been able to meet historical demands through periods of drought. In addition, the CWEA distributes the cost of the

treated imported water among Alhambra (\$77 per acre-foot of treated imported water) and purveyors in the Main Basin who are charged an in-lieu assessment based on annual production (which varies each year depending on total production and the increased cost of treated imported water). Therefore, because costs are shared and demands are met, there currently are not significant incentives to implement the project; however, the project may be recommended for implementation in the long-term if the terms of the CWEA change or groundwater conditions in the APH change. Alhambra is not currently pursuing this water supply project.

Additional projects which may be recommended for implementation in the long-term, along with possible criteria for implementation, are shown in Table 8-2.

8.5 San Gabriel District SWP Opportunities

The gap analysis discussed in Section 5 showed that San Gabriel District may have a potential gap between average year supplies and demands following calendar year 2020 through 2040. The gap is expected to be approximately 2200 acre-feet in 2020 and up to 4,500 acre-feet by 2040. Closing the gap may be dealt with in a variety of ways; however the most practical methods include some combination of utilizing the Cyclic Storage account in the Main Basin by purchasing

the full available yearly allocation of Table A water and Article 21 water, building a well in the Main Basin to meet Sierra Madre's demands, and/or utilizing additional water banking opportunities, purchase of additional water rights, or transfers (discussed more in Section 9).

Implementation of some of the water supply projects for the member cities previously discussed could reduce exchange agreement demands. Specifically, construction of a well in the Main Basin to meet Sierra Madre's water demands (thereby reducing reliance on imported water through the MWD-San Gabriel District exchange agreement) may ultimately reduce San Gabriel District's SWP demands by about 2,500 acre-feet per year (assuming all water demands are met through Main Basin production). San Gabriel District demands may be further reduced if Raymond Basin groundwater supplies are utilized to meet Sierra Madre's future demands.

San Gabriel District may have an additional opportunity to reduce reliance on imported water through the MWD-San Gabriel District exchange agreement by renegotiating the agreement to allow San Gabriel District to deliver the equivalent acre-feet of Sierra Madre's demands to Metropolitan's Cyclic Storage account.

In addition, storage of SWP water outside of the Main Basin during wet years to be accessed during periods of drought may be beneficial to member cities. Specifically, Azusa's water supplies have been severely impacted during dry years and could benefit from deliveries of wet water when groundwater levels in the Canyon Basin are low.

TABLE 8-2
POTENTIAL LONG-TERM PROJECTS AND IMPLEMENTATION CRITERIA

Project	Criteria for Implementation
Alhambra – Well Field Outside of the ALH	CWEA terms change, or if treated imported water is cost prohibitive or unavailable
Monterey Park – Recycled Water Pipeline	Additional potential users are identified, additional funding available
Sierra Madre – Devil Canyon-Azusa Raymond Basin Pipeline Extension	May be beneficial if a Sierra Madre production well is not constructed in the Main Basin and if additional Raymond Basin water purveyors participate in the project
Stormwater Project – Miller Pit	Benefits overall Main Basin management, may be implemented jointly with other Main Basin Responsible Agencies

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Section 9: San Gabriel District Asset Management and Long-Term Basin Wide Opportunities

9.1. Introduction

San Gabriel District has several potential future opportunities to utilize its assets, including the Devil Canyon-Azusa Pipeline, the San Dimas Hydroelectric Generation Facility, and San Gabriel District's SWP water entitlement, to further support basin wide water management. Some of the opportunities discussed in this chapter may require legislative and/or contractual changes to current restraints in managing and delivering water, however, the current unprecedented drought conditions, and predictions that such droughts may be more common in the future, may bring about those changes.

San Gabriel District, along with MWD member agencies Upper District and Three Valleys Municipal Water District, are the Responsible Agencies serving the Main Basin. While San Gabriel District primarily serves the Main Basin, MWD has a much larger service area and is not always able to focus on delivering untreated imported water through its member agencies for replenishment of the Main Basin. In addition, the cost for untreated imported water through MWD continues to rise and is currently over six times the cost of untreated imported water purchased through

San Gabriel District. In the future, San Gabriel District may serve a larger role in Main Basin management by obtaining additional SWP water during wet years. This section will document San Gabriel District's current asset opportunities and will explore San Gabriel District's long-term Basin wide opportunities.

9.2. San Gabriel District's Current Assets

San Gabriel District's current assets include the Devil Canyon-Azusa Pipeline, the San Dimas Hydroelectric Generation Facility, and the SWP contractual water entitlement. These assets are described in detail below.

9.2.1. Devil Canyon-Azusa Pipeline

San Gabriel District's Devil Canyon-Azusa Pipeline (DCAP) is the backbone of San Gabriel District's operations and is critical to the delivery of SWP water to replenish the Main Basin. The DCAP has been in operation for over forty years. In 1972, San Gabriel District constructed the DCAP to deliver water from the SWP for its member cities needs. San Gabriel District's DCAP extends from the Devil Canyon Power Plant Afterbay located at the foot of the San Gabriel Mountains in the City of San Bernardino to the San Gabriel Canyon Spreading Grounds in Azusa. Imported water from the SWP powers

turbines at the Devil Canyon Power Plant near Lake Silverwood, enters San Gabriel District's pipeline through a slide-gate at the Devil Canyon Power Plant Afterbay, and flows by gravity throughout the DCAP. In 1982 San Gabriel District added the San Dimas Turnout, in 1985 San Gabriel District installed the San Dimas Hydroelectric Power Plant to generate electricity, in 1995 the DCAP was extended to the San Gabriel Canyon Spreading Grounds (shown in Figure 9-1), and in 1998 another outlet was constructed at Big Dalton Wash for delivery of water to the Citrus Spreading Grounds.



Figure 9-1. San Gabriel Canyon Spreading Grounds.

Pressure reducing stations (PRS) and valve structures are located along the DCAP to control the flow of water and reduce water pressures in the pipeline as the pipeline drops in elevation. Figure 9-2 provides an overall view of the 38 mile long pipeline and associated facilities.

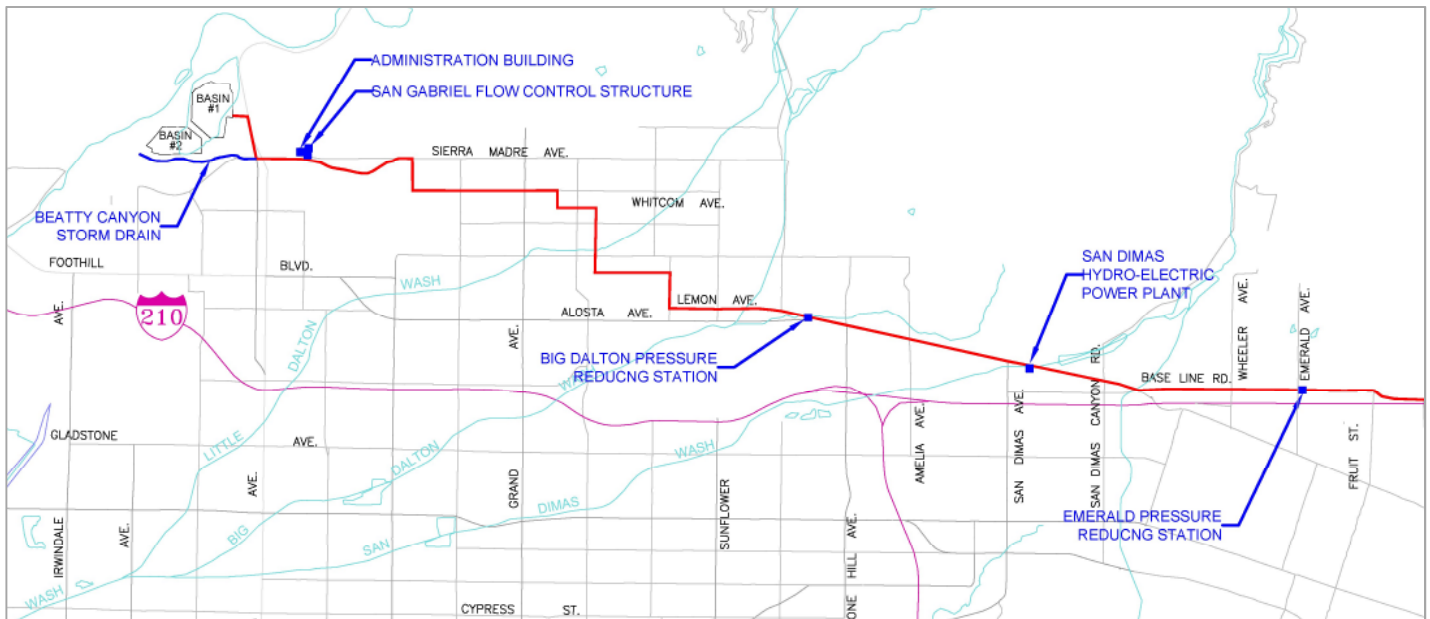


Figure 9-2. Map of the Devil Canyon-Azusa Pipeline.

9.2.2. San Dimas Hydroelectric Generation Facility

In the 1980's, San Gabriel District built a 1.05 megawatt hydroelectric generation facility at the San Dimas turnout of the DCAP to take advantage of excess pressure at that particular location. The location of the San Dimas hydroelectric generation facility is shown on Figure 9-2. While the hydroelectric power plant is currently in good operating condition, staff have expressed concern with the ability to obtain replacement parts for the plant in the event of a necessary repair or replacement. Custom fabrication of replacement parts may be necessary, however, if the cost of custom repairs and replacements is no longer feasible, abandonment or replacement of the plant may be considered. The hydroelectric facility's turbine and generator are shown in Figure 9-3.

9.2.3. SWP Water Entitlement

SWP contractors receive specified amounts of water each year known as "annual allocations." The annual allocations are based upon each contractor's maximum SWP entitlements, which are summarized in the SWP's Table A. The combined maximum contractual Table A amount is 4,133 thousand acre-feet per year. The annual allocation is a percent of each contractors SWP entitlement and is based upon hydrologic and



Figure 9-3. San Dimas Hydroelectric Plant Turbine and Generator.

environmental conditions in the Delta. San Gabriel District's maximum annual entitlement is 28,800 acre-feet, as previously noted. It was assumed for the purpose of this IRP (as discussed in Section 4.6.3) that the future average annual supply of SWP water will be 16,704 acre-feet per year each year through 2035 and 17,568 acre-feet per year by year 2040. It should be noted that annual SWP supplies may be greater than or less than the assumed SWP average supply of 16,704 acre-feet based on the current hydrologic conditions. For example, the final SWP allocation for calendar year 2016 was 60 percent of Table A amounts, the final SWP allocation was 20 percent in 2015 and 5 percent in 2014. DWR established the 2017 SWP allocations at 45 percent in December

2016. The existing SWP contract term ends in 2035 and negotiations are currently underway to extend the Water Supply contracts to 2085. The Water Supply contract extension to 2085 would include the same annual entitlement as the current contract (28,800 acre-feet per year).

9.3. San Gabriel District's Asset Management Opportunities

There are several ways in which San Gabriel District may optimize its assets in the future. These opportunities are discussed below.

9.3.1. Devil Canyon-Azusa Pipeline

In 2013 an Inventory and Management Plan was prepared by San Gabriel District to look ahead at how to best manage the DCAP facilities as they continue to operate into later years of the design service life. An inventory was completed of San Gabriel District's DCAP facilities including their existing condition, the remaining service life, and estimated replacement costs. The conclusions of the Inventory and Management Plan are listed below.

1. Based on a review of the information currently available (2013) regarding condition of the DCAP facilities, the DCAP is in very good operating condition with no areas of immediate concern, with the

exception of ongoing cathodic protection investigations.

2. The estimated remaining life of the majority of the DCAP is approximately 18 years.
3. The estimated replacement cost of the DCAP facilities, in year 2013 dollars is approximately \$124 million.

According to the Inventory and Management Plan, San Gabriel District has been diligent to inspect, maintain, and understand the condition of the DCAP facilities. It is possible the DCAP will serve San Gabriel District for many years beyond the estimated remaining life of the existing facilities. The following are recommendations to assist San Gabriel District in taking steps to insure the long-term reliability of San Gabriel District's water delivery system and to create a systematic approach to ongoing evaluation of the condition of the facilities that would be the basis for identifying when facilities will need to be rehabilitated or replaced:

1. San Gabriel District currently conducts a combination of routine and test case inspections and tests to monitor the condition of the facilities. It is recommended that San Gabriel District expand the inspection and testing activities and develop a Condition Assessment Program to provide

additional information on the condition of the facilities on a routine basis. The program could include expanded visual inspections, possibly including closed circuit television inspection of the interior of the pipeline, non-destructive testing such as acoustic leak detection, stray current studies, sonic/ultrasonic thickness testing, infrared testing, electromagnetic testing, and additional investigations that may be recommended by San Gabriel District's corrosion engineer. The initial results of these additional tests would establish a baseline against which future test results could be compared. A log of repairs to the facilities should be kept. The results of the tests, inspections, and repair logs should be reviewed to identify any trends that indicate changes in the conditions of the facilities, such as an increase in leaks or a decrease in the thickness of the steel cylinders in the pipes. The results of the ongoing review of the information should be periodically documented in a report presenting the change in conditions from the baseline. These changes could be the basis for an updated estimate of the remaining service life of the facilities. These additional inspections, tests, and review might initially only need to be conducted every two or three years or on a frequency that is deemed reasonable

given the condition and level of effort to conduct them. As the facilities continue to age, or if deterioration of the facilities is detected through the Program, the frequency of the activities should be increased. Changes detected in the condition of the facilities could be the trigger for more detailed studies to determine the specific repair, rehabilitation, and replacement action needed.

2. Determine anticipated long-term water and power requirements for San Gabriel District's facilities and consider how the DCAP may need to be reconfigured to allow these demands to be met.
3. Develop a preliminary plan to identify options to fund potential large scale capital improvements or replacements of the existing DCAP. This preliminary plan could be refined in the future as information from the Condition Assessment Program and the determination of long term water and power requirements for the facilities allow a more detailed estimate of the timing and amount of needed capital improvements.

9.3.2. Hydroelectric Generation

San Gabriel District conducted a Devil Canyon-Azusa Pipeline Hydroelectric Power Generation Feasibility Study in 2013 to evaluate options for hydropower generation and has discussed with Azusa the possibility of changing operations to deliver more water and generate power at a proposed new hydroelectric plant at the San Gabriel Canyon Spreading Grounds. San Gabriel District is considering evaluating different options for power generation at the San Dimas site. Those options include remodeling the existing power plant with in-kind facilities (water discharged to the San Dimas Wash) and installing new equipment that would allow water to pass through the station and be delivered to points downstream in the pipeline at the same time power is being generated.

9.4. Long-Term Basin Wide Opportunities

A recurring theme throughout this IRP has been ways to provide a reliable water supply during periods of drought. Currently, drought conditions have caused significantly reduced deliveries of imported water to replenish the Main Basin which, in turn, have led to water supply concerns for member cities with drought sensitive supplies. Conditions such as these may lead to changes in SWP policy concerning responsible agency boundaries. If changes were to occur, San Gabriel District

would have the opportunity to maximize existing assets, including the SWP water entitlement, to benefit the management of the Main Basin. These unique, long-term basin wide opportunities are expanded on below.

9.4.1. SWP Contractor Opportunities

As a SWP contractor, San Gabriel District has a specific Table A entitlement of 28,800 acre-feet per year. In addition to the Table A entitlement, San Gabriel District has the opportunity to obtain and store additional water, in the event that additional water is required to manage the Main Basin, fulfill exchange agreement obligations and/or provide wet water deliveries to member cities.

Permanent Water Transfers/Exchanges

San Gabriel District could acquire some of San Bernardino Valley Municipal Water District's Table A water for the long term (total SWP allocation is 102,600 acre-feet/year). The water is subject to the amount of water allocated by the SWP in each given year. San Gabriel District would not need to pay for energy, commodity or wheeling costs, but a price would need to be negotiated.

More permanent SWP water transfers are available to San Gabriel District and are discussed further in Kennedy/Jenks'

“Historical Review of Water Transactions” Memorandum (provided in Appendix G).

Temporary Water Transfers/Exchanges

During a drought, San Gabriel District has some options to obtain more SWP water. One option is purchasing available water from DWR’s State Drought Water Bank, which is offered during dry years as declared by the Governor. The cost in 2009 was \$275/acre-foot to buyers above the Delta and excludes conveyance costs. The SWP Contractors Dry-year Water Purchase Program is another program used to provide water to SWP contractors during dry years and/or years with less than 50% SWP allocation. Water is available at \$125/acre-foot (2016 price) before April 1 of the given year. The SWP also provides Single-Year and Multiple-Year Turnback Pools where contractors with excess water can sell their water to other contractors who need it. For the Single-Year Turnback Pool, Pool “A” water, which must be purchased by March 1 of the given year, is 50 percent of the Delta Water Rate (\$35.76/acre-foot) while Pool “B” water, which must be purchased by April 1 of the given year, is 25 percent of the Delta Water Rate (\$17.88/acre-foot). The Multiple-Year Turnback Pool is distinguished from the Single-Year Turnback Pool and allows contractors to sell their water at higher prices and have access to the water supplies provided by the Multiple-Year

Turnback Pool. Lastly, SWP contractors can choose to store some of their SWP water allocation with DWR to be delivered and used the next calendar year (Carryover Water Program).

During wet years, DWR has Article 21 water, which is water that is delivered to contractors during the short window excess water is available. Article 21 water is usually stored for use in dry years. Though this water is available to San Gabriel District, it is mostly delivered to contractors in the Central Valley. The price of water per acre-foot is not fixed. Table 9-1 shows the projected Article 21 water available until 2040 taken from the 2013 Delivery Report. Based on the projections from Table 9-1 and San Gabriel District’s SWP Table A allocation, San Gabriel District may be able to obtain an average of approximately 1,060 acre-feet per year of Article 21 supply, which could be delivered to Cyclic Storage in the Main Basin or delivered to a storage bank outside of the Main Basin.

San Gabriel District may also be able to work directly with other SWP contractors to obtain unused allocations. These water deliveries may be utilized to increase San Gabriel District’s role in the overall management of the Main Basin and to meet Supplemental Water demands in the future.

TABLE 9-1
FUTURE ARTICLE 21 WATER
FOR ALL SWP CONTRACTORS UNDER VARIOUS HYDROLOGIC CONDITIONS
(THOUSANDS OF ACRE-FEET/YEAR)

	Long-Term Average	Single Dry Water Year	Multiple Dry Water Years			Single Wet Water Year	Multiple Wet Water Years			
			2-Years	4-Years	6-Years ⁽¹⁾		2-Years	4-Years	6-Years	10-Years
Projected Article 21 Water	62	9	13	41	23	227	211	183	126	146

Source: 2013 SWP Delivery Report

Note:

⁽¹⁾ The 6-year drought SWP reliability is the average of two 6-year droughts: 1929-1934 and 1987-1992.

SECTION 10: IRP SUMMARY AND RECOMMENDATIONS

This Section summarizes the key findings and water supply project recommendations and opportunities available to San Gabriel District and its member cities.

As previously discussed, the goal of this IRP is to develop long-term water supply strategies for both San Gabriel District and its member cities and to provide recommendations for short-term and long-term asset management and optimization to benefit the member cities and the overall management of the Main Basin.

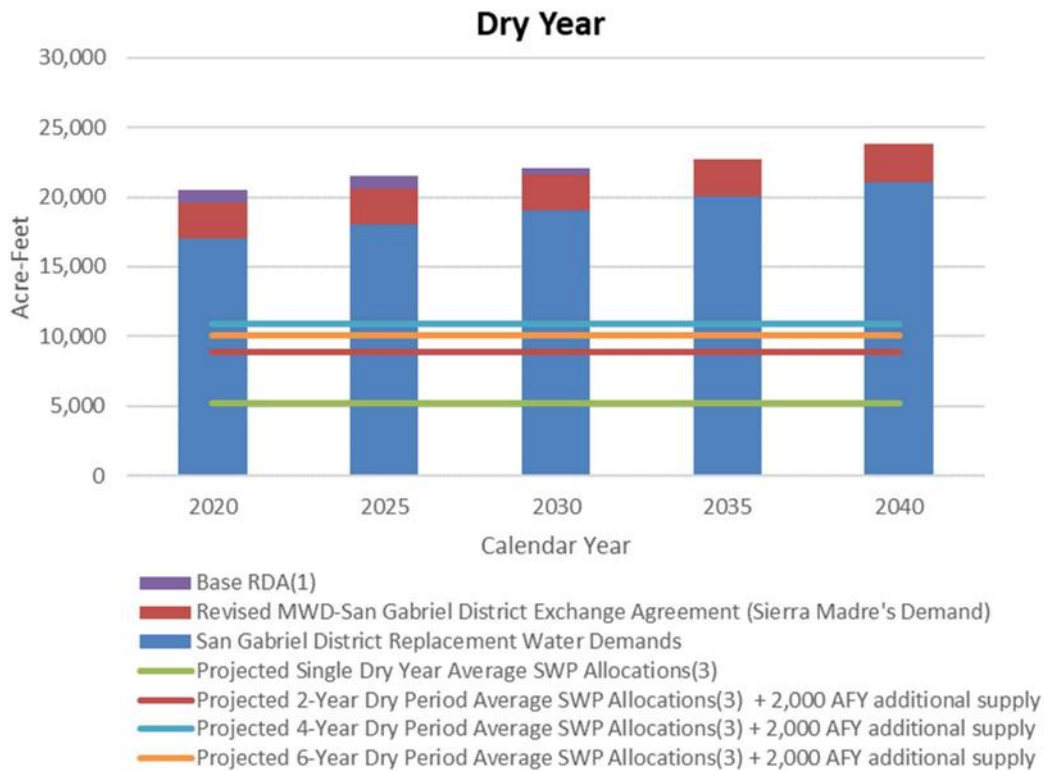
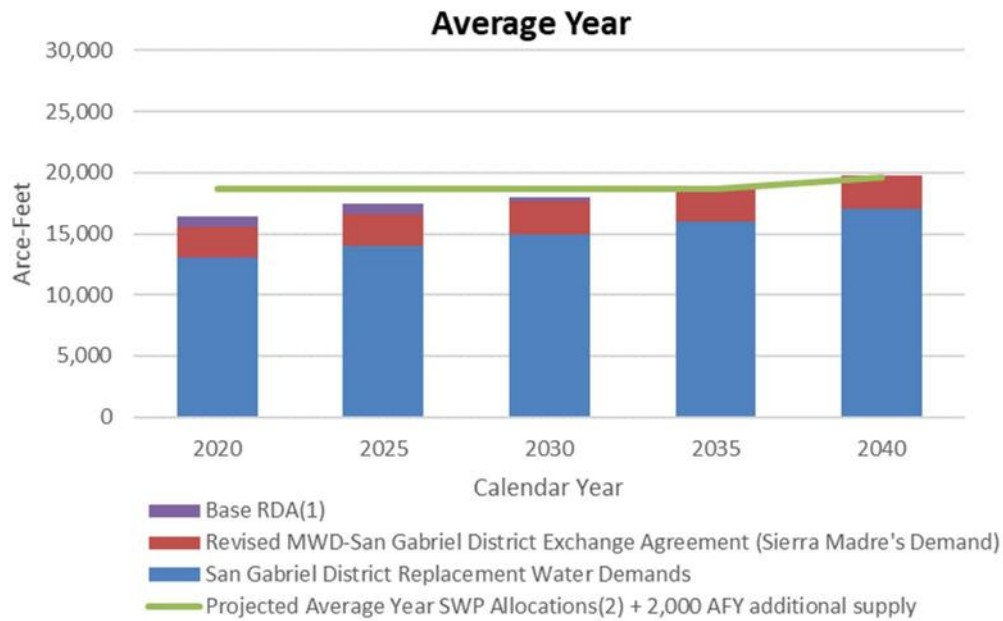
The tasks to accomplish the goals stated above included an identification of the supply shortfall (gap) which is the difference between projected water demand and projected water supply. To determine any potential gaps, historical and projected populations, existing water supply sources, historical and projected demands, and water supply reliability data was collected for both San Gabriel District and its member cities, as discussed in Sections 2, 3 and 4. This information was used to conduct a gap analysis which compared projected demands to projected supplies, as discussed in Section 5. All member cities are expected to meet projected demands with current supplies for the next 20 years during an

average year; however, Azusa and Sierra Madre have less reliable water supply sources during dry years. In addition, San Gabriel District may not be able to meet future Supplemental Water requirements during average years beginning in 2020 and all dry years.

San Gabriel District's current gap between projected water supplies and demand is illustrated in Figure 5-5. The recommended action plan to close the gap includes the following action items:

- 1) Acquire additional water supplies through temporary SWP water transfers and exchanges from other SWP contractors of up to 2,000 AFY. (See Section 9.4.1.)
- 2) Renegotiate the MWD-San Gabriel District exchange agreement to reduce Supplemental Water demands. (See Section 8.5.)

Figure 10-1 illustrates the projected imported water supply compared with the projected Supplemental Water demands with implementation of the action plan. Under these conditions, the projected water supplies meet demands during the average year and supplies greatly exceed demands in wet years.



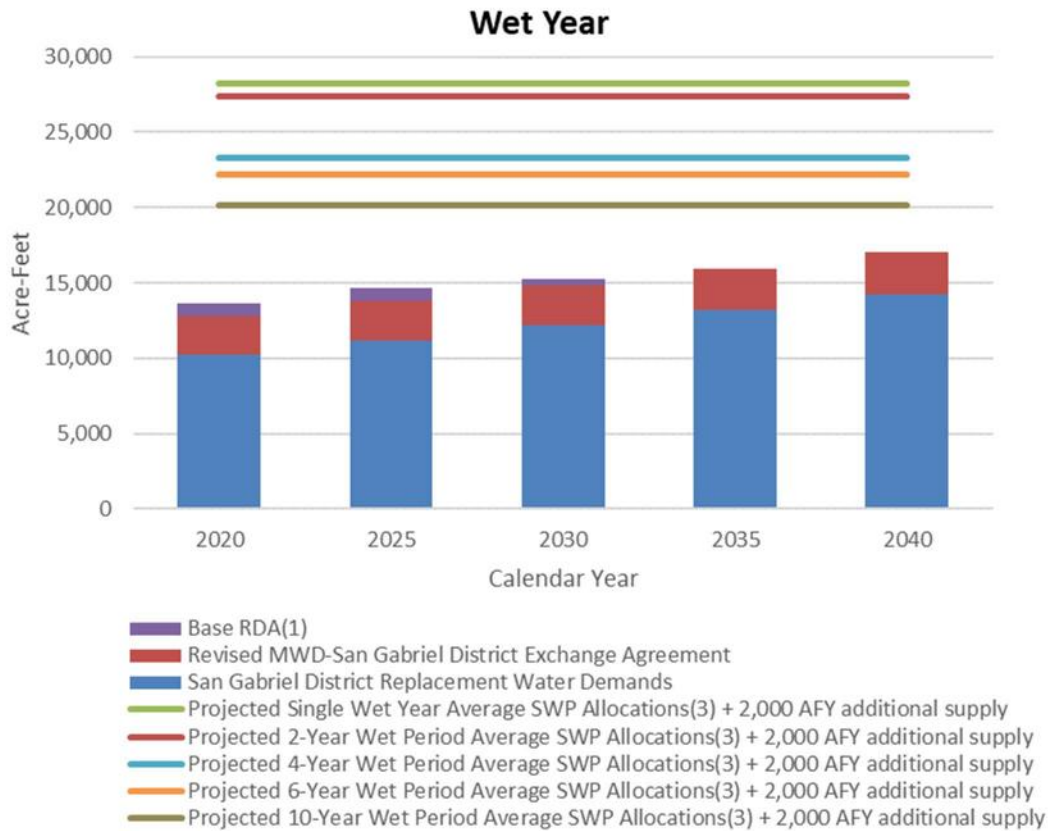


Figure 10-1 San Gabriel District's Projected Average Water Demands: Action Plan Conditions (Top: Average Year, Middle: Dry Year, Bottom: Wet Year)

- (1) The RDA does not include the proposed RDA for General Benefit and Storm Augmentation (only the base RDA). Taken from Table 4-9.
- (2) The projected future SWP allocation before 2040 is 58% of the maximum SWP allocation (2013 DWR Reliability Report). By 2040, 61% of the maximum SWP allocation is expected to be delivered because the California WaterFix, a project that will increase the reliability of the SWP and the amount of water delivered, is estimated to be completed (Preliminary Findings).
- (3) From the 2013 DWR Reliability Report.

Additional Supplemental Water supply strategies for San Gabriel District identified in Sections 6, 7 and 8 include:

- 1) continuing existing water conservation programs for its member cities,
- 2) utilizing cyclic storage to store water during wet years to meet future Supplemental Water demands during dry years when SWP allocations are low,
- 3) acquiring more imported water by applying for all of San Gabriel District's SWP water allocation, available Article 21 water, water from the Turnback Pool, permanent or temporary transfers, and/or banking,
- 4) utilizing available local groundwater supplies (i.e. new well in the Main Basin to fulfill Sierra Madre's demands).

Recommended water supply strategies for San Gabriel District's member cities in the short-term include the addition of production wells in the Main Basin for both Azusa and Sierra Madre which would shift production away from drought impacted areas (the Canyon Basin and the Santa Anita Sub-area of the Raymond Basin, respectively) to increase water supply reliability, reduce reliance on treated imported water and decrease annual demands on San Gabriel District's SWP supply. Additional water supply projects which may be considered for the long-term, or if current water supply conditions change, include a

recycled water pipeline serving the western portion of Monterey Park, a wellfield outside of the APH to serve Alhambra and to reduce its reliance on treated imported water, and the rehabilitation of Miller Pit to serve as a replenishment facility. The water supply projects recommended for the short-term and long-term are summarized in Table 10-1.

TABLE 10-1

SUMMARY OF WATER SUPPLY PROJECTS RECOMMENDED FOR SHORT-TERM AND LONG-TERM IMPLEMENTATION

Member City	Project	Criteria for Implementation	Capital Cost
Recommended Implementation – Short-Term			
Sierra Madre	Well In the Main Basin	Improve water supply reliability during dry years	\$6,441,065
Azusa	Well in the Main Basin	Improve water supply reliability during dry years	Location has not been determined
Recommended Implementation – Long-Term			
Alhambra	Well Field Outside of the ALH	CWEA terms change, or if treated imported water is cost prohibitive or unavailable	\$15,840,000
Monterey Park	Recycled Water Pipeline	Additional potential users are identified, additional funding available	\$41,791,092
Sierra Madre	Devil Canyon-Azusa Raymond Basin Pipeline Extension (including the Alostia Connection)	May be beneficial if a Sierra Madre production well is not constructed in the Main Basin and if additional Raymond Basin water purveyors participate in the project	\$20,270,000
Basin-Wide	Stormwater Project – Miller Pit	Benefits overall Main Basin management, may be implemented jointly with other Main Basin Responsible Agencies	Cost has not been developed

In addition, this IRP documented San Gabriel District's assets and provided opportunities for asset optimization for both the short-term and long-term. San Gabriel District possesses several assets unique to the Main Basin which may be utilized to benefit the management of the Main Basin in the future, as discussed in Section 9.

As discussed in Section 9, the DCAP has been well maintained by San Gabriel District and will continue to deliver water reliably with continued maintenance and a systematic evaluation program to determine when specific facilities should be rehabilitated or replaced. The San Dimas Hydroelectric Generation Facility is aging and currently restricts flow to downstream portions of the DCAP when it is in use. The Hydroelectric Generation Facility may be retrofitted to allow flow downstream while it is in use, or other locations may be considered for hydroelectric generation.

A recurring theme throughout this IRP has been ways to provide a reliable water supply during periods of drought. Recently, drought conditions caused significantly reduced deliveries of imported water to replenish the Main Basin which, in turn, led to water supply concerns for member cities with drought sensitive supplies. Conditions such as these may lead to changes in SWP policy concerning water deliveries outside of responsible agency boundaries. If changes were to occur, San Gabriel District would have the opportunity to maximize existing assets, including the SWP water entitlement, to benefit the management of the Main Basin. These opportunities were described in Section 9 and include the opportunity to obtain and store additional SWP water, in the event that additional water is required to manage the Main Basin, fulfill exchange agreement obligations and/or provide wet water deliveries to member cities.

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