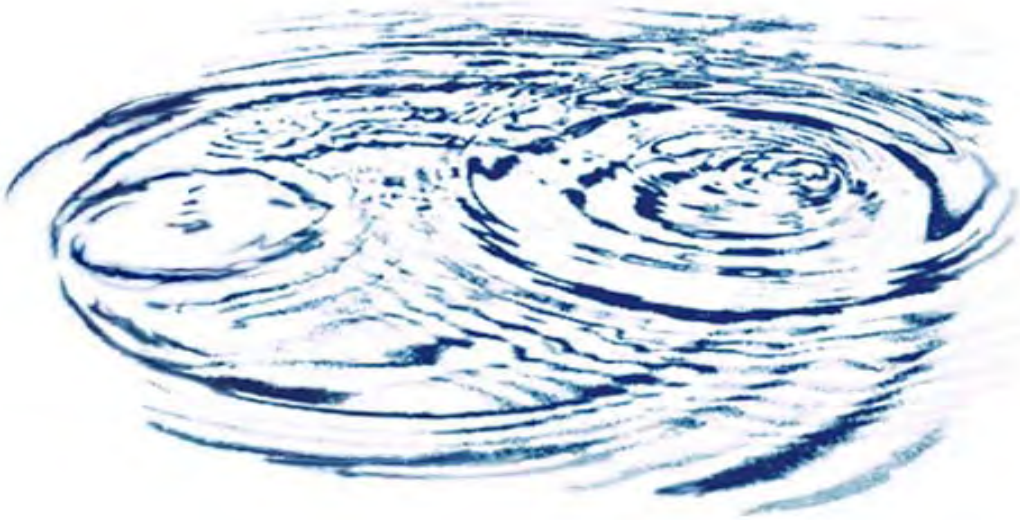
CITY OF SIERRA MADRE

Final
2010 Urban Water Management Plan



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Chapter 1

PLAN PREPARATION

1.1 BACKGROUND

Section 10617. "Urban Water Supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers.

Section 10620.

(a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).

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

(c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.

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

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

(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.

This Urban Water Management Plan (Plan) was prepared in accordance with the California Urban Water Management Planning Act (Act)[1] which became effective on January 1, 1985. The Act requires every "urban water supplier" to prepare and adopt a Plan, to periodically review its Plan at least once every five years and make any amendments or changes which are indicated by the review. An "Urban Water Supplier" is defined as a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more

[1] Water Code Sections 10610 through 10656

than 3,000 acre-feet of water annually. The primary objective of the Act is to direct urban water suppliers to evaluate their existing water conservation efforts and, to the extent practicable, review and implement alternative and supplemental water conservation measures. **The Act is directed primarily at retail water purveyors where programs can be immediately affected upon the consumer.** Sections 10610 through 10656 of the California Water Code, Urban Water Management Planning Act, were enacted in 1983. The Act, originally known as Assembly Bill (AB) 797, is included in Appendix A.

There have been many new amendments added to the Plan and some reorganization of the California Water Code sections since the City's 2005 Plan update. The additions and changes follow:

- Senate Bill (SB) 1087 – Requires reporting of water use projections for lower income households
- AB 1376 – Requires 60 days notice of a public hearing on a Plan
- AB 1420 – Conditions state funding
- SB 7 – Requires 20 percent reduction in urban per capita water use by 2020 (see Appendix B).

Section 10621(a) of the California Water Code states, "Each water supplier shall update its plan at least once every five years on or before December 31, in years ending in five and zero." This 2010 Plan is an update to the City's 2005 Plan.

1.2 COORDINATION

1.2.1 COORDINATION WITH APPROPRIATE AGENCIES

Section 10620.
(d) (2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a

common source, water management agencies, and relevant public agencies, to the extent practicable.

The City of Sierra Madre water system (hereinafter referred to as the City) is a retail water supplier that serves all the residents within the City of Sierra Madre. The City has coordinated the preparation of the Plan with the City of Sierra Madre City Clerk, City of Arcadia, Raymond Basin Management Board, County of Los Angeles, Main San Gabriel Basin Watermaster (Main Basin Watermaster), and San Gabriel Valley Municipal Water District (SGVMWD) (see Table 1). The City notified these agencies of the preparation of the 2010 Plan and invited them to participate in the development of the 2010 Plan. The City did not receive any comments from any of these agencies. A copy of the notification memoranda sent to these agencies is located in Appendix C.

1.2.2 NOTICE OF PUBLIC HEARING

Section 10621
(b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notices pursuant to this subdivision.

The City provides water service to customers in only the City of Sierra Madre. Therefore, the City provided a 60-day notice of a public hearing of its 2010 draft Plan to the City of Sierra Madre City Clerk and County of Los Angeles. A copy of the notice of the public hearing is provided in Appendix D.

1.2.3 PLAN DISTRIBUTION

Section 10635(b)
The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after submission of its urban water management plan.

The City provides water service to customers in only the City of Sierra Madre. Therefore, the City will provide a copy of the 2010 Plan to the City of Sierra Madre City Clerk and County of Los Angeles no later than 60 days after submission of the 2010 Plan to the State of California, Department of Water Resources (DWR).

1.2.4 PUBLIC PARTICIPATION

Section 10642
Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

The City provided a 60-day notice of a public hearing of its 2010 draft Plan. The City made the draft 2010 Plan update available for public review at the City of Sierra Madre City Hall (232 West Sierra Madre Boulevard), City of Sierra Madre Public Library (440 West Sierra Madre Boulevard), and on the City internet website at www.cityofsierramadre.com; and published a notice of the public review in the City of Sierra Madre City Clerk's office, the City's internet website and in a local newspaper, as shown in Appendix D. Public notification of the hearing was made pursuant to Section 6066 of the Government Code. The notice of public hearing was published and distributed to allow involvement of social, cultural, and economic community groups. A copy of the notice of the public hearing is provided in Appendix D.

The City held a public hearing in the City Hall Council Chamber, 232 West Sierra Madre Boulevard, Sierra Madre, California on May 10, 2011 at 6:30 p.m. The public attended the public hearing and no comments were received from the public.

1.3 PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

1.3.1 SUBMITTAL OF AMENDED PLAN

Section 10621
c) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

If DWR requires significant changes to the Plan before it determines the Plan to be "complete," the City will submit an amendment or a revised Plan. The amendment or revised Plan will undergo adoption by the City's governing board prior to submittal to DWR.

1.3.2 PLAN ADOPTION

Section 10642
After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

Because no comments were received during the public hearing, no modifications were made to the draft Plan, except to update information relative to the public hearing. Following the public hearing, the City adopted the draft Plan on May 10, 2011, as its Plan. A copy of the resolution adopting the Plan is provided in Appendix E.

1.3.3 PLAN IMPLEMENTATION

Section 10643
An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

The City is committed to the implementation of this 2010 Plan in accordance with Section 10643 of the Act, including the water demand management measures (DMMs) (see Chapter 6) and water conservation requirements of SB 7 (see Chapter 3). The City continues to be committed to the concept of good water management practice and

intends to expand its water conservation program as budgets and staffing allow. The City's water conservation program will periodically be re-evaluated and modified to effect better methods or techniques as the need arises. The City reviewed implementation of its 2005 Plan.

1.3.4 PLAN SUBMITTAL

Section 10644(a)
An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

Within 30 days of adoption of the Plan by the City, a copy of the Plan will be filed with the DWR, the State of California Library, the County of Los Angeles and the City of Sierra Madre. Copies of the letters to DWR, State Library, City of Sierra Madre, and County of Los Angeles will be maintained in the City's file.

1.3.5 PUBLIC REVIEW

Section 10645
Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

Within 30 days after submittal of the 2010 Plan to DWR, the City will make the 2010 Plan available for public review at its office during normal business hours.

Chapter 2
SYSTEM DESCRIPTION

2.1 BACKGROUND

2.1.1 CITY OF SIERRA MADRE FORMATION AND LOCATION

The City of Sierra Madre was founded in 1907. It is located in the San Gabriel Valley region of Los Angeles County. The City of Sierra Madre is located approximately 17 miles northeast of downtown Los Angeles at the base of the San Gabriel Mountains (see Plate 1). The City of Sierra Madre covers approximately 3.06 square miles of land and ranges from relatively steep mountain canyon areas to gentle sloping land near the south edge of the City of Sierra Madre. The City of Sierra Madre is one of the older cities in Los Angeles County, bounded by the cities of Arcadia to the east and south, Pasadena to the west, and the Angeles National Forest to the north. As indicated in the City of Sierra Madre's General Plan, the City of Sierra Madre is one of the few cities in the region which has fully been able to retain its village quality despite pressures for growth, modernization and diversification. The nearest major transportation corridor to the City of Sierra Madre is the 210 Freeway which runs east and west a mile south of the city limits. Because of this distance from the freeway and the fact that the City of Sierra Madre has been built out since the 1940s, it has been protected from the pressure of large-scale, commercial, residential and industrial development which normally occurs along such corridors.

2.1.2 CITY OF SIERRA MADRE MANAGEMENT

The City of Sierra Madre has a five member City Council. Council members are elected at-large and serve four-year terms. The City of Sierra Madre Mayor is determined each year by a vote of the City Council. The City of Sierra Madre City Manager is appointed by the City of Sierra Madre Council. Other City of Sierra Madre

managerial positions are filled by the City of Sierra Madre City Manager. The Public Works Director is responsible for the operation and management of the City's water system.

2.1.3 CITY WATER SYSTEM

In 1881, Nathaniel Carter purchased 1,103 acres of land from Elijah J. “Lucky” Baldwin, John Richardson and the Southern Pacific Railroad. The land now comprises the urbanized area of the City of Sierra Madre. Eventually, Carter subdivided the land and sold to other families. A schoolhouse was built in 1882 and a library in 1886. At the time, businesses were also being established in Sierra Madre. This development created the need for a water system to service the public.

When Carter purchased land from Baldwin, one half of the rights to the water in Little Santa Anita Canyon were included in the purchase. Carter, in turn, sold water rights along with the property. Because of the subsequent complications of this water ownership arrangement, the Sierra Madre Water Company was incorporated in 1882. There was a growing demand for water as the area became more and more populated, so the Sierra Madre Water Company, with Baldwin's concurrence, built a tunnel into the mountain.

When a second tunnel was needed, Baldwin refused to participate. Baldwin subsequently and unsuccessfully sued the Sierra Madre Water Company when he determined that the tunnels were impacting his own water supply. Baldwin's response to this defeat was to incorporate the City of Arcadia on the south and east, thus limiting the growth potential of Sierra Madre forever. (Water system history excerpted from the City’s General Plan.)

The City's primary source of water supply is groundwater, which is delivered to the system by four wells, Wells No. 3, No. 4, No. 5, and No. 6 (see Plate 2). The City's

groundwater is from the Santa Anita Sub-area (or Eastern Unit) of the Raymond Basin. Through adjudication, the City has the rights to pump 1,764 acre-feet per year from the basin. The City also has the right to obtain credit for "salvage water." Salvage water is surface water percolated into the Santa Anita Sub-area minus losses for natural percolation and subsurface outflow. Salvage water credits allow the City to (annually) extract more than 1,764 acre-feet from the Santa Anita Sub-area.

The City also owns two tunnels located in the Little Santa Anita Canyon in the mountains above the City of Sierra Madre, one on either side of the Sierra Madre Dam (see Plate 2). These tunnels act as horizontal wells and produce water by gravity flow. The City's wells and tunnels have traditionally supplied water to the City for the last 80 years.

Currently, water is only taken directly into the City's distribution system from the West Tunnel, which has a maximum capacity of approximately 500 gallons per minute (gpm). The East Tunnel water is being diverted to the spreading grounds due to high fluoride concentrations. As indicated earlier, the tunnels were constructed (in the 1920s or earlier) and predate the adjudication of the Raymond Basin. The adjudication did not address this source of water and the City maintains the full right to the water produced from these tunnels.

Since the production of water from these tunnels is dependent on the hydrologic cycle, production rates decline after several consecutive years of dry conditions. Thus, in multiple dry years, these tunnels would not provide a significant source of supply.

The City has five water storage reservoirs for a total storage volume of 6.7 million gallons. Each reservoir has a minimum of two boosters to pump water into the system.

The City has one water system inter-connection with the City of Arcadia and two with the City of Pasadena for emergency purposes. Water from these sources is

available at a prevailing rate in time of need, contingent upon sufficient supplies or delivery system capabilities.

The purchases were made through an inter-connecting pipeline that was completed in 2002 using federal grant funds. The City's groundwater supply began experiencing Volatile Organic Compound (VOC) contamination in 2003. On several occasions, the levels of tetrachloroethylene (PCE) and trichloroethylene (TCE) in the groundwater have exceeded state and federal regulatory levels. The rising levels of VOCs and nitrate in the City's well water supply necessitated the purchase of water from Arcadia during portions of fiscal year 2004-05 and 2005-06, as shown on Table 9. The City currently operates a liquid-phase granular activated carbon treatment system at the City Maintenance Yard to treat VOCs in the well water making the water supply reliable from a water quality standpoint.

The City has no physical connection to SGVMWD because SGVMWD's pipelines are a considerable distance from the City. However, the City can access SGVMWD water indirectly by purchasing water under an agreement with the City of Arcadia and receiving water through the City's inter-connecting pipeline with the City of Arcadia. The water from the City of Arcadia is groundwater pumped from the Main San Gabriel Basin (Main Basin), where the City is a party to the Main Basin Judgment but does not have wells in the Main Basin. Under the Main Basin Adjudication, the City does not have pumping rights but can pump from the Main Basin. Although there is no limit on the quantity of water that may be extracted by Parties to the Main Basin Adjudication, including the City, groundwater production in excess of a Party's water right, or its proportional share (pumper's share) of the Operating Safe Yield,[2] requires purchase of untreated imported water to recharge the Main Basin. If the City obtains any water from the Main Basin (through the City of Arcadia), replacement water may be purchased from SGVMWD to recharge the Main Basin. Any water pumped from City of Arcadia wells on

[2] Operating Safe Yield is set by Watermaster to allocate to each Party its portion of groundwater that can be produced from the Main Basin free of a Replacement Water Assessment.

behalf of the City will be counted toward the City. The City has a Cyclic Storage account in the Main Basin and is allowed to store a maximum of 4,000 acre-feet at any given time. As of June 30, 2010 the City had 3,932.54 acre-feet in its Cyclic Storage account.

2.1.4 SAN GABRIEL VALLEY MUNICIPAL WATER DISTRICT

The City is a member of SGVMWD, which was created to provide supplemental water to its member agencies. SGVMWD is a wholesale water supplier. SGVMWD is entitled to 28,800 acre-feet of water per year from the State Water Project (SWP). SGVMWD uses untreated SWP water as replacement water to the Main Basin for any excess production of water from the Basin by its member agencies, and to furnish their portion of the Long Beach Judgment Make-Up water.

SGVMWD, formed in 1959, is comprised of the cities of Alhambra, Azusa, Monterey Park and Sierra Madre in the San Gabriel Valley. SGVMWD does not supply water directly to its member cities; rather it provides water as replacement water to replenish the Main Basin. SGVMWD's only source of water for this purpose is the SWP. SGVMWD's Devil Canyon-Azusa Pipeline (Azusa Pipeline) conveys the SWP water to spreading grounds that are owned and operated by the Los Angeles County Department of Public Works (DPW). The four member cities obtain most of their water by pumping groundwater and each city directly serves water to its residents.

2.2 SERVICE AREA PHYSICAL DESCRIPTION

Section 10631.
A plan shall be adopted in accordance with this chapter and shall do the following:
a) Describe the service area of the supplier; including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

2.2.1 SERVICE AREA

The City's service area is located within the Pasadena and Santa Anita Sub-areas of the Raymond Basin, approximately 17 miles northeast of the City of Los Angeles, as shown on Plate 1. The City's service area coincides with the City of Sierra Madre boundary. The City's service area is bounded by the City of Pasadena to the west; San Gabriel Mountains to the north; and the City of Arcadia to the east and south. Plate 2 shows the boundaries of the City's service area.

The City is a retail water agency that serves all of the residents within the City of Sierra Madre. Currently, the City has 3,868 service connections serving a population of approximately 11,100 people. The primary service connections are residential with some commercial/institutional, industrial and landscape irrigation users. Since the City of Sierra Madre is virtually built out, it is anticipated that there will be a limited increase in population and number of service connections through 2030. It is estimated that the population in 2030 will be 11,099 (see Chapter 2.3 below). The projected water demand and number of service connections by user category are discussed in Chapter 3.

2.2.2 CLIMATE

Table 2 shows historical rainfall in the City of Sierra Madre. Table 3 shows the monthly average rainfall in the City of Sierra Madre; and monthly average temperature and monthly average evapotranspiration in the San Gabriel Valley. Table 3 shows the average annual rainfall in the City of Sierra Madre is 23.03 inches; and the average daily temperature is 63.8 degrees Fahrenheit (^{o}F) and the average annual evapotranspiration is 55.1 inches in the San Gabriel Valley. The climate is characterized by hot, dry summers and mild winters.

2.3 SERVICE AREA POPULATION

Section 10631.
A plan shall be adopted in accordance with this chapter and shall do the following:
a) Describe the service area of the supplier; including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

2.3.1 POPULATION

Currently, the City serves all the residents of the City of Sierra Madre. The current population of the City of Sierra Madre is approximately 11,100. The City of Sierra Madre is virtually built-out with little or no development expected over the next 20 years. Table 4 presents the current and projected population for the City of Sierra Madre, which is also the City's service area, from 2010 to 2030. The projections were obtained from the Southern California Association of Governments (SCAG).

2.3.2 OTHER DEMOGRAPHIC FACTORS

There are no other demographic factors affecting the City's water management planning.

Chapter 3
SYSTEM DEMANDS

3.1 WATER DEMANDS

3.1.1 PAST, CURRENT, AND PROJECTED WATER DEMAND

Section 10631(e)

(1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses:

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

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

The City's water demands are provided by groundwater pumped from the Raymond Basin and Main Basin, and tunnel water from Santa Anita Canyon. The City's water demands do not include recycled water. The City provides water service to the following water use sectors:

- Single-Family Residential
- Multi-Family Residential
- Commercial/Institutional
- Industrial
- Landscape Irrigation.

The City does not regularly provide water sales to other agencies and does not have any additional water uses. Table 5 shows the past, current, and projected water deliveries among water use sectors within the City's service area. Table 6 shows the calculation of projected water demands. The projected water demand is calculated based on the urban per capita water use target developed per SB 7 (see Chapter 3.2 below) and population projections. Table 7 shows the past, current, and projected total water demand and unaccounted water losses. Based on the projected water uses, the City does not anticipate any problem meeting the water demands through future operation of its wells, its emergency interconnection and the planned interconnection with the Metropolitan Water District of Southern California (MWD).

3.1.2 PROJECTED WATER DEMAND FOR LOWER INCOME HOUSEHOLDS

Section 10631.1(a)

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

The projected water demand for lower income households is 94.25 million gallons per year or about 289 acre-feet per year, as shown on Table 7.

3.2 BASELINES AND TARGETS

Section 10608.20 (e)

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

Methodologies for calculating baseline and compliance urban per capita water use for the consistent implementation of the Water Conservation Bill of 2009 have been

published by DWR in its October 2010 guidance document.[3] DWR's guidance document was used by the City to determine the required water use parameters which are discussed below. The City developed the baselines and targets individually and not regionally.

3.2.1 BASELINE DAILY PER CAPITA WATER USE

The Baseline Daily Per Capita Water Use is defined as the average water use, expressed in gallons per capita per day (GPCD), for a continuous, multi-year baseline period. There are two different baseline periods for calculating Baseline Daily Per Capita Water Use, as follows (CWC Sections 10608.20 and 10608.22):

- *The first baseline period is a continuous 10- to 15-year period, and is used to calculate Baseline Per Capita Water Use per CWC Section 10608.20. The first baseline period is determined as follows:*

    - *If recycled water makes up less than 10 percent of 2008 retail water delivery, use a continuous 10-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.*
    - *If recycled water makes up 10 percent or more of 2008 retail water delivery, use a continuous 10- to 15-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.*

    The City does not have any recycled water use. Consequently, the first baseline period will consist of a continuous 10-year period that can be selected between 1995-96 and 2008-09.

[3] California Department of Water Resources, Division of Statewide Integrated Water Management, Water Use and Efficiency Branch. *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use*. October 1, 2010.

- *The second baseline period is a continuous five-year period, and is used to determine whether the 2020 per capita water use target meets the minimum water use reduction per CWC Section 10608.22. The continuous five-year period shall end no earlier than December 31, 2007, and no later than December 31, 2010.*

  The second baseline period consisting of a continuous five-year period can be selected between 2003-04 and 2008-09.

Unless the urban water retailer's five-year Baseline Daily Per Capita Water Use per CWC Section 10608.12(b)(3) is 100 GPCD or less, Baseline Daily Per Capita Water Use must be calculated for both baseline periods.

The calculation of the Baseline Daily Per Capita Water Use entails the following four steps:

Step 1 *Calculate gross water use for each year in the baseline period using Methodology 1 in DWR's guidance document. According to Methodology 1, gross water use is a measure of water supplied to the distribution system over 12 months and adjusted for changes in distribution system storage and deliveries to other water suppliers that pass through the distribution system. Recycled water deliveries are to be excluded from the calculation of gross water use. Water delivered through the distribution system for agricultural use may be deducted from the calculation of gross water use. Under certain conditions, industrial process water use also may be deducted from gross water use.*

The calculated gross water use, based on recorded groundwater use (Raymond Basin and Main Basin) and tunnel water use, for each year in the baseline period is shown on Table 8.

Step 2 *Estimate service area population for each year in the baseline period using Methodology 2 in DWR's guidance document. To obtain an accurate estimate of GPCD, water suppliers must estimate population of the areas that they actually serve, which may or may not coincide with either their jurisdictional boundaries or with the boundaries of cities. According to Methodology 2, data published by the California Department of Finance (DOF) or the U.S. Census Bureau must serve as the foundational building block for population estimates. In some instances, data published by these two sources may be directly applicable. In other instances, additional refinements may be necessary. For example, to account for distribution areas that do not match city boundaries, customers with private sources of supply, or other unique local circumstances, water suppliers may have to supplement the above sources of data with additional local data sources such as county assessor data, building permits data, and traffic analysis zone data. These refinements are acceptable as long as they are consistently applied over time, and as long as they build upon population data sources of the DOF or the U.S Census Bureau.*

The City's service area population for each year in the baseline period is based on DOF data (see Table 8).

Step 3 *Calculate daily per capita water use for each year in the baseline period. Divide gross water use (determined in Step 1) by service area population (determined in Step 2).*

The calculated daily per capita water use for each year in the baseline period is shown on Table 8.

Step 4 *Calculate Baseline Daily Per Capita Water Use. Calculate average per capita water use by summing the values calculated in Step 3 and dividing by the number of years in the baseline period. The result is Baseline Daily Per Capita Water Use for the selected baseline period.*

The average per capita water use calculated for a continuous 10-year baseline period (first baseline period) is shown on Table 8, with the highest value of 262 GPCD.

The Baseline Daily Per Capita Water Use for the City was determined to be **262 GPCD**, based on the highest value calculated for a continuous 10-year period (first baseline period) between 1995-96 and 2008-09 (see Table 8).

3.2.2 URBAN WATER USE TARGET

Section 10608.20 (b)

An urban retail water supplier shall adopt one of the following methods for determining its urban water use target pursuant to subdivision (a):

(1) *Eighty percent of the urban retail water supplier's baseline per capita daily water use.*

(2) *The per capita daily water use that is estimated using the sum of the following performance standards:*

(A) For indoor residential water use, 55 gallons per capita daily water use as a provisional standard. Upon completion of the department's 2016 report to the Legislature pursuant to Section 10608.42, this standard may be adjusted by the Legislature by statute.

(B) For landscape irrigated through dedicated or residential meters or connections, water efficiency equivalent to the standards of the Model Water Efficient Landscape Ordinance set forth in Chapter 2.7 (commencing with Section 490) of Division 2 of Title 23 of the California Code of Regulations, as in effect the later of the year of the landscape's installation or 1992. An urban retail water supplier using the approach specified in this subparagraph shall use satellite imagery, site visits, or other best available technology to develop an accurate estimate of landscaped areas.

(C) For commercial, industrial, and institutional uses, a 10-percent reduction in water use from the baseline commercial, industrial, and institutional water use by 2020.

(3) *Ninety-five percent of the applicable state hydrologic region target, as set forth in the state's draft 20x2020 Water Conservation Plan (dated April 30, 2009). If the service area of an urban water supplier includes more than one hydrologic region, the supplier shall apportion its service area to each region based on population or area.*

> ***(4)*** *A method that shall be identified and developed by the department, through a public process, and reported to the Legislature no later than December 31, 2010. The method developed by the department shall identify per capita targets that cumulatively result in a statewide 20-percent reduction in urban daily per capita water use by December 31, 2020. In developing urban daily per capita water use targets, the department shall do all of the following:*
> *(A) Consider climatic differences within the state.*
> *(B) Consider population density differences within the state.*
> *(C) Provide flexibility to communities and regions in meeting the targets.*
> *(D) Consider different levels of per capita water use according to plant water needs in different regions.*
> *(E) Consider different levels of commercial, industrial, and institutional water use in different regions of the state.*
> *(F) Avoid placing an undue hardship on communities that have implemented conservation measures or taken actions to keep per capita water use low.*

The Urban Water Use Target is determined using one of the following methods:

Method 1: *Eighty percent of the urban retail water supplier's Baseline Per Capita Daily Water Use.*

Using this method, the Urban Water Use Target for the City was calculated as **210 GPCD**, based on the City's Baseline Per Capita Daily Water Use of 262 GPCD.

Method 2: *Estimate using the sum of the specified three performance standards.*

Due to insufficient data, this method was not considered.

Method 3: *Ninety-five percent of the applicable state hydrologic region target, as set forth in the state's 20x2020 Water Conservation Plan.*[4]

Based on the 20x2020 Water Conservation Plan, the City's service area lies in DWR Hydrologic Region 4 (South Coast), with an

[4] California Department of Water Resources, State Water Resources Control Board, California Bay-Delta Authority, California Energy Commission, California Department of Public Health, California Public Utilities Commission, and California Air Resources Board. *20x2020 Water Conservation Plan*. February 2010.

established Baseline Per Capita Daily Water Use of 180 GPCD and a Target Per Capita Daily Water Use of 149 GPCD. Using this method, the Urban Water Use Target for the City was calculated as **142 GPCD**.

Method 4: *Water Savings.*

Due to insufficient data, this method was not considered.

The City's Urban Water Use Target was determined to be **210 GPCD** for 2020, based on Method 1 above.

3.2.3 INTERIM URBAN WATER USE TARGET

Based on the City's Baseline Daily Per Capita Water Use of 262 GPCD and Urban Water Use Target of 210 GPCD, the City's Interim Urban Water Use Target for 2015 was calculated as **236 GPCD** (as determined in Chapter 3.2.5 below).

3.2.4 COMPLIANCE DAILY PER CAPITA WATER USE

Compliance Daily Per Capita Water Use is defined as the Gross Water Use during the final year of the reporting period, and reported in GPCD. The Compliance Daily Per Capita Water Use will be reported in the City's 2015 Plan (interim compliance) and 2020 Plan (final compliance).

3.2.5 MINIMUM WATER USE REDUCTION REQUIREMENT

Section10608.22

Notwithstanding the method adopted by an urban retail water supplier pursuant to Section 10608.20, an urban retail water supplier's per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use as defined in paragraph (3) of subdivision (b) of Section 10608.12. This section does not apply to an urban retail water supplier with a base daily per capita water use at or below 100 gallons per capita per day.

The following calculation is made because the five-year Baseline Per Capita Water Use per CWC Section 10608.12(b)(3) is greater than 100 GPCD. The calculation is used to determine whether the water supplier's 2015 and 2020 per capita water use targets meet the minimum water use reduction requirement per CWC Section 10608.22. The calculation entails three steps:

Step 1: *Calculate Baseline Daily Per Capita Water Use using a continuous five-year period ending no earlier than December 31, 2007, and no later than December 31, 2010.*

This value was calculated as **268 GPCD** (see Table 8).

Step 2: *Multiply the result from Step 1 by 0.95. The 2020 per capita water use target cannot exceed this value (unless the water supplier's five-year Baseline Per Capita Water Use is 100 GPCD or less). If the 2020 target is greater than this value, reduce the target to this value.*

This value was calculated as **255 GPCD**. The City's 2020 Urban Water Use Target was determined using Method 1 above to be 210 GPCD, which is lower than the value calculated in this step. Therefore, no adjustment is needed for the City's 2020 Urban Water Use Target of 210 GPCD.

Step 3: *Set the 2015 target to mid-point between the 10- or 15-year Baseline Per Capita Water Use and the 2020 target determined in Step 2.*

The City's 2015 Interim Urban Water Use Target is therefore set at **236 GPCD**, which is equivalent to a 10 percent reduction from **262 GPCD.**

Therefore, the City's 2015 Interim Urban Water Use Target of 236 GPCD and 2020 Urban Water Use Target of 210 GPCD meet the legislation's minimum water use reduction requirement per CWC Section 10608.22.

3.3 WATER DEMAND PROJECTIONS

Section 10631(k)

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

The City's projected water demand shown on Table 7 can include water from the Main Basin that is obtained through the City of Arcadia, and which requires purchase of an equal amount of untreated imported water from SGVMWD to recharge the Main Basin. SGVMWD is a wholesale agency. The City notified SGVMWD of the development of its 2010 Plan and made a copy of the draft Plan available to SGVMWD.

3.4 WATER USE REDUCTION PLAN

10608.36.

Urban wholesale water suppliers shall include in the urban water management plans required pursuant to Part 2.6 (commencing with Section 10610) an assessment of their present and proposed future measures, programs, and policies to help achieve the water use reductions required by this part.

10608.26

Urban retail water suppliers are to prepare a plan for implementing the Water Conservation Bill of 2009 requirements and conduct a public meeting which includes consideration of economic impacts.

The City is not an urban wholesale water supplier. Therefore, the requirement for an urban wholesale water supplier to provide an assessment of its present and proposed future measures, programs, and policies to help achieve the water use reductions required by the Water Conservation Bill of 2009 is not applicable to the City.

As an urban retail water supplier, the City's tiered commodity water rate structure will assist the City in implementing its water use reduction plan, to address the requirements of the Water Conservation Bill of 2009. The City may review its tiered commodity water rate structure in the future, if necessary, to further promote water conservation. The City will encourage its customers to participate in water conservation programs offered by SGVMWD (see Chapter 6, DMMs). A potential economic impact from the water use reduction plan includes increased expense for the City in promoting water conservation. The public hearing conducted by the City to discuss the draft Plan included discussion of the City's urban water use targets, the need for water conservation to meet those targets, and consideration of economic impacts (see notice of public hearing in Appendix D).

3.5 PROGRESS REPORT

10608.40.

Urban water retail suppliers shall report to the department on their progress in meeting their urban water use targets as part of their urban water management plans submitted pursuant to Section 10631. The data shall be reported using a standardized form developed pursuant to Section 10608.52.

The City will report to the DWR on its progress in meeting its urban water use targets, using a standardized form to be developed by the DWR, when the form becomes available.

Chapter 4
SYSTEM SUPPLIES

4.1 WATER SOURCES

Section 10631
A plan shall be adopted in accordance with this chapter and shall do the following:
b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a).

The City's water supply sources include water pumped from local groundwater basins (Raymond Basin and Main Basin) and tunnel water from Little Santa Anita Canyon. The City's main source of water supply, groundwater, is pumped from the Santa Anita Sub-area of the Raymond Basin.

The City pumps groundwater from the Santa Anita Sub-area of the Raymond Basin via the City's four active wells. Wells No. 3, 4, 5, and 6 are located within the Raymond Basin as shown on Plate 2 and have a combined capacity of about 4,500 gpm. The City pumps all of its adjudicated water right from Raymond Basin. The City's past and projected water supply from the Raymond Basin is shown on Table 9.

As previously discussed, the City is a Party to the Main Basin Judgment but has no water rights in the Main Basin. In addition, the City does not own or operate any wells in the Main Basin. Instead, the City historically has coordinated with the City of Arcadia to purchase water from an emergency interconnection. The City of Arcadia has wells located in the Main Basin, which can pump groundwater for delivery to the City through an interconnection during periods when insufficient groundwater is available from the City wells. If the City obtains any water from the Main Basin (through the City of Arcadia), replacement water may be purchased from SGVMWD to recharge the Main Basin. Any water pumped from City of Arcadia's wells on behalf of the City will be counted toward the City. The City only uses groundwater from the Main Basin when the

City needs additional water supply when groundwater supplies from the Raymond Basin are insufficient. However, the City of Arcadia has indicated water supplies provided to the City are not reliable at all times.

The City has two tunnel sources, the West Tunnel and the East Tunnel, located in Little Santa Anita Canyon. The West Tunnel is active and the East Tunnel is currently inactive because of the influence of surface water on its north branch. The maximum capacity of the West Tunnel is approximately 500 gpm.

In addition, the City is in the process of constructing an emergency connection to the MWD treated water system. This connection was necessitated as the result of historical insufficient groundwater supplies from Raymond Basin and unreliable future supplies from the emergency connection with the City of Arcadia. This MWD connection is discussed in greater detail in Section 4.3 of this Plan.

4.2 GROUNDWATER

Section 10631(b)

If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

The City obtains its groundwater from the Raymond Basin through its four wells. The City can also obtain groundwater from the Main Basin, if needed, through the City of Arcadia where the water is supplied to the City through an interconnecting pipeline. As indicated in Chapter 2.1.3, the City is a Party to the Main Basin Judgment and any water pumped from the City of Arcadia wells on behalf of the City will be counted toward the City. The City purchases replacement water from SGVMWD to recharge the Main Basin for groundwater production in the Main Basin.

4.2.1 GROUNDWATER MANAGEMENT

Section 10631(b)
If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:
1) A copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management.

4.2.1.1 RAYMOND BASIN GROUNDWATER MANAGEMENT

Management of the water resources of the Raymond Basin is based on the Raymond Basin Judgment.[5] The City is a Party to the Raymond Basin Judgment.

RAYMOND BASIN JUDGMENT

In 1937, the City of Pasadena filed suit to adjudicate water rights of the Raymond Basin. A copy of the Raymond Basin adjudication is located in Appendix F. 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" and water rights for all parties are shown in Appendix F. 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.

[5] City of Pasadena vs. City of Alhambra, et al, Los Angeles County Case No. Pasadena C-1323, Judgment entered December 23, 1944, modified April 29, 1955.

As a result of the Raymond Basin Judgment, participating Parties, including the City, 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. The Raymond Basin Judgment is administered by the Raymond Basin Management Board. The City's "Decreed Right of 1955" is 1,764 acre-feet. The City's allowable extraction includes its "Decreed Right of 1955" and prior years' spreading credit for "salvage water." Salvage water is surface water percolated into the Santa Anita Sub-area minus losses from natural percolation and subsurface outflow. The City's prior years' spreading credit was reported as 5,133.2 acre-feet in the Raymond Basin Annual Report of 2009-10.[6]

4.2.1.2 MAIN BASIN GROUNDWATER MANAGEMENT

The City is a Party to the Main Basin Judgment, but has no water rights and does not produce groundwater. The City historically has purchased water from the City of Arcadia only when yield from the City's wells were insufficient to meet demands or due to VOC contamination in its wells. Consequently, reference to the Main Basin Judgment and hydrogeology is brief.

Management of the water resources in the San Gabriel Valley is based upon Watermaster Services under two Court Judgments: San Gabriel River Watermaster (River Watermaster)[7] and Main Basin Watermaster.[8] The City was a Party to the Main Basin Judgment and as such had participation. The City also participates in the Main Basin management described in the Main Basin Watermaster document entitled "Five-

[6] Raymond Basin Management Board (as Watermaster), 2009. *Watermaster Service in the Raymond Basin, July 1, 2009 – June 30, 2010*. September 2010.
[7] Board of Water Commissioners of the City of Long Beach et al, v. San Gabriel Valley Water Company, et al, Los Angeles County Case No. 722647, Judgment entered September 24, 1965.
[8] Upper San Gabriel Valley Municipal Water District v. City of Alhambra, et al, 924128, Judgment entered January 4, 1973.

Year Water Quality and Supply Plan." These basin management documents are described in the following chapters.

LONG BEACH JUDGMENT

Stipulation for Judgment was filed on February 10, 1965, and Judgment (Long Beach Judgment) was entered on September 24, 1965. Under the terms of the Long Beach Judgment, the water supply of the San Gabriel River system was divided at Whittier Narrows, the boundary between San Gabriel Valley upstream and the coastal plain of Los Angeles County downstream. A copy of the Long Beach Judgment is located in Appendix G.

The River Watermaster meets periodically during the year to adopt a budget, to review activities affecting water supply in the San Gabriel River system area, to compile and review data, to make its determinations of usable water received by the Lower Area, and to prepare an annual report to the Court and to the Parties. The River Watermaster has rendered annual reports for the water years 1963-64 through 2008-09 and operations of the river system under the Long Beach Judgment and through the administration by the River Watermaster have been very satisfactory since its inception.

One major result of the Long Beach Judgment was to leave the Main Basin free to manage its water resources so long as it meets its downstream obligation to the Lower Area under the terms of the Long Beach Judgment.

MAIN BASIN JUDGMENT

Following the Long Beach Judgment, the Upper Area turned to the task of developing a water resources management plan to optimize the conservation of the natural water supplies of the area. Studies were made of various methods of management of the Main Basin as an adjudicated area and a report thereon was

prepared for the Upper San Gabriel Valley Water Association, an association of water producers in the Main Basin, including the City. After consideration by the Association membership, USGVMWD was requested to file as plaintiff, and did file, an action on January 2, 1968, seeking an adjudication of the water rights of the Main Basin and its Relevant Watershed. In this Judgment, the City was included as a Party. After several years of study (including verification of annual water production) and negotiations, a stipulation for entry of Judgment was approved by a majority of the Parties, by both the number of parties and the quantity of rights to be adjudicated. Trial was held in late 1972 and Judgment (Main Basin Judgment) was entered on January 4, 1973. A copy of the Main Basin Judgment is located in Appendix H.

There are three municipal water districts overlying and partially overlying the Main Basin. The three districts are the USGVMWD, SGVMWD and Three Valleys Municipal Water District (TVMWD). The location of these districts is shown on Plate 3. The City is a member of SGVMWD. In the Main Basin, the City obtains groundwater through the City of Arcadia.

The Main Basin Judgment does not restrict the quantity of water, which Parties may extract from the Main Basin. Rather, it provides a means for replacing all annual extractions in excess of a Party's annual right to extract water with Supplemental Water. The Main Basin Watermaster annually establishes an Operating Safe Yield for the Main Basin which is then used to allocate to each Party its portion of the Operating Safe Yield which can be produced free of a Replacement Water Assessment.

As indicated in Chapter 4.1 above, the City has no water rights in the Main Basin but can pump from the Main Basin. If the City extracts water from the Main Basin (currently through the City of Arcadia), it must pay an assessment for Replacement Water, which is sufficient to purchase one acre-foot of Supplemental Water to be spread in the Main Basin for each acre-foot of production.

Water rights under the Main Basin Judgment are transferable by lease or purchase so long as such transfers meet the requirements of the Main Basin Judgment. There is also provision for Cyclic Storage Agreements by which Parties and Non-Parties may store imported Supplemental Water in the Main Basin under such agreements with the Main Basin Watermaster pursuant to uniform rules and conditions and Court approval.

The Main Basin Watermaster has entered into a Cyclic Storage Agreement with each of the three municipal water districts. One is with the MWD and USGVMWD, which permits MWD to deliver and store imported water in the Main Basin in an amount not to exceed 100,000 acre-feet for future Replacement Water use. The second Cyclic Storage Agreement is with TVMWD and permits MWD to deliver and store 40,000 acre-feet for future Replacement Water use. The third is with SGVMWD and contains generally the same conditions as the agreement with MWD except that the stored quantity is not to exceed 40,000 acre-feet. The City has a Cyclic Storage account and is allowed to store a maximum of 4,000 acre-feet at any given time. As of June 30, 2010, the City had 3,932.54 acre-feet in its Cyclic Storage account.

The Main Basin Judgment provides that the Main Basin Watermaster will not allow imported water to be spread in the main part of the Main Basin when the groundwater elevation at the Baldwin Park Key Well[9] (Key Well) exceeds 250 feet; and that the Main Basin Watermaster will, insofar as practicable, spread imported water in the Main Basin to maintain the groundwater elevation at the Key Well above 200 feet. One of the principal reasons for the limitation on spreading imported water when the Key Well elevation exceeds 250 feet is to reserve ample storage space in the Main Basin to capture native surface water runoff when it occurs and to optimize the conservation of such local water. Under the terms of the Long Beach Judgment, any excess surface flows that pass through the Main Basin at Whittier Narrows to the Lower

[9] The Baldwin Park Key Well is a water level monitoring well located in the City of Baldwin Park used to determine when imported water may or may not be spread in the Basin.

Area (which is then conserved in the Lower Area through percolation to groundwater storage) is credited to the Upper Area as Usable Surface Flow.

4.2.2 DESCRIPTION OF GROUNDWATER BASIN

Section 10631(b)(2)

A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

4.2.2.1 RAYMOND BASIN

The Raymond Basin is located in Los Angeles County about 10 miles north-easterly of downtown Los Angeles. Raymond Basin is a wedge in the northwesterly portion of the San Gabriel Valley and is bounded on the north by the San Gabriel Mountains, 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 the Eastern Unit, which is the Santa Anita Sub-area, and the Western Unit which is the Pasadena Sub-area and the Monk Hill Sub-area. The location of the Raymond Basin and the subareas is shown on Plate 4. The surface area of Raymond Basin is about 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, a distributary of the San Gabriel River.

Adjudication of water rights in the Raymond Basin is discussed in Chapter 4.2.1.1 above, including a description of the amount of groundwater the City has the legal right to pump.

GEOLOGY

The geology of the Raymond Basin is described in details in the "Report of Referee" prepared in 1943 by the DWR and is summarized below.

The Raymond Basin is roughly triangular in shape. Its northern boundary, about 12 miles in length, is formed by a portion of the southerly front of the San Gabriel Mountains. The western boundary of the Raymond Basin is about 8 miles long and is also composed chiefly of the same Basement Complex rocks which form the mountains and which are continuous at depth, together with a small area of marine Tertiary sediment at the southern end. The Raymond Fault, which is the southern boundary of the triangle, crosses the Valley floor for a distance of about 9 miles, connecting a granitic spur from the mountains at the eastern end of the Raymond Basin with Tertiary sediments outcropping in its southwestern corner.

The Raymond Fault separates Raymond Basin from the Main Basin. The fault zone is not impervious and groundwater can flow across this boundary into the Main Basin. The source of natural groundwater supply to the Raymond Basin is direct rainfall, percolation from surface runoff from the northern and western sides, and presumably some underground percolation of water from the mountain mass to the alluvium.

HYDROGEOLOGY

DWR describes the hydrogeology of the Raymond Basin in its Bulletin 118. According to the report, the water-bearing materials of the Raymond Basin are

dominated by unconsolidated Quaternary alluvial gravel, sand, and silt deposited by streams flowing out of the San Gabriel Mountains. Younger alluvium typically follows active streambeds and reaches a maximum thickness of about 150 feet. Older alluvium generally thickens southward from the mountain front, reaching a maximum of about 1,140 feet near Pasadena, then thins to about 200 feet near the Raymond Fault. However, confined groundwater conditions have existed locally in the Raymond Basin, particularly along the Raymond Fault near Raymond Hill where layers of finer grained sediments become more abundant.

The Raymond Fault trends east-northeast and acts as a groundwater barrier along the southern boundary of the Raymond Basin. This fault acts as a complete barrier along its western end and becomes a less effective barrier eastward. East of Santa Anita Wash, this fault ceases to be an effective barrier and the flow of groundwater southward into the Main Basin becomes essentially unrestricted. A north-trending divide paralleling the Eaton Wash separates both surface and subsurface water flow in the eastern portion of the Raymond Basin. The water level is higher on the eastern side of this divide, ranging from 300 feet higher in the north to about 50 feet higher in the south. Groundwater contour maps for the Raymond Basin (prepared for the Raymond Basin Annual Report) are included in Appendix I.

Natural recharge to the Raymond Basin is mainly from direct percolation of precipitation and percolation of ephemeral stream flow from the San Gabriel Mountains in the north. The principal streams bringing surface inflow are the Arroyo Seco, Eaton Creek, Little Santa Anita Creek (Sierra Madre Wash), and Santa Anita Creek. Some stream runoff is diverted into spreading grounds and some is impounded behind small dams allowing the water to infiltrate and contribute to groundwater recharge of the Raymond Basin. An unknown amount of underflow enters the Raymond Basin from the San Gabriel Mountains through fracture systems.

The Santa Anita Sub-area is replenished only by local storm runoff that is percolated in the Santa Anita and Sierra Madre Spreading Grounds. Currently, there is no means of delivering untreated imported water into the Santa Anita Sub-area. Consequently, water levels in the Santa Anita Sub-area of Raymond Basin have declined by over 100 feet in the past 10 years. Hydrographs from the Raymond Basin Annual Report of 2009-10 show the water levels in the Santa Anita Sub-area have decreased (see Appendix J, Figure 11). Consequently, the yield from the City's wells has also fluctuated and have demonstrated a concurrent decrease. It is possible that during a period of significant demand, the City may not be able to satisfy that demand from its wells alone and may need to use its emergency interconnections. Purchases through the City's interconnection have occurred over the past 15 years, as shown on Table 9.

WATER QUALITY MONITORING

According to the Raymond Basin Annual Report of 2009-10, in general water in the Basin continues to be of good quality regarding most constituents, except for a few sources with high fluoride concentrations in the foothills and high nitrate concentrations in the Monk Hill Sub-area and Pasadena Sub-area. VOC contaminants have been detected in several areas. In June 1997, perchlorate was detected in several Basin wells and several monitoring wells at the Jet Propulsion Laboratory (JPL) Superfund site.

The City's groundwater supply began experiencing VOC contamination in 2003. On several occasions, the levels of PCE and TCE in the groundwater have exceeded state and federal regulatory levels. In response to the VOC contamination in the groundwater supply, the City has installed a liquid-phase granular activated carbon treatment system in the vicinity of the City's wellfield for VOC treatment.

As indicated in Chapter 2.1.3 above, the City's tunnel water supply from the East Tunnel experienced high fluoride concentrations and is being diverted to the spreading grounds. The water supply from the City's West Tunnel did not experience any water quality problem. The City's 2009 water quality report indicated fluoride concentrations in the City's distribution system as between 0.9 mg/l and 1.7 mg/l. The Maximum Contaminant Level (MCL) for fluoride is 2 mg/l. The City has been granted a Fluoride Variance from the California Department of Public Health (CDPH).

4.2.2.2 MAIN SAN GABRIEL BASIN

The Main Basin is located within the San Gabriel Valley in 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 the San Jose and Puente Hills, as shown on Plate 5.

The San Gabriel River and its distributary, the Rio Hondo, drain an area of about 490 square miles upstream of Whittier Narrows. 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. Whittier Narrows is a natural topographic divide and a subsurface restriction to the movement of groundwater between the Main Basin and the Coastal Plain. Of the approximately 490 square miles of drainage area upstream of Whittier Narrows, about 167 square miles are valley lands, and about 323 square miles are mountains and foothills.

GEOLOGY

The Main Basin consists of a roughly bowl-shaped depression in the bedrock, filled over millions of years with alluvial deposits. This bowl-shaped depression is relatively deep; the elevation of the base of the groundwater reservoir declines from

about 800 feet above the mean sea level (MSL) in the vicinity of San Dimas at the northeast corner of the Main Basin to about 2,200 feet below MSL in the vicinity of South El Monte (*DWR, 1966*).[10]

Most of the alluvium deposited within this depression is debris from the San Gabriel Mountains, washed and blown from the side of the mountains over time. This process has also resulted in the materials within the Main Basin varying in size from relatively coarse gravel nearer the mountains to fine and medium-grained sand containing silt and clay as the distance from the mountains increases. The principal water-bearing formations of the Main Basin are unconsolidated and semi-consolidated sediments, which vary in size from coarse gravel to fine-grained sands. The interstices between these alluvial particles throughout the Main Basin fill with water and transmit water readily to wells. The thickness of the water-bearing materials in the Main Basin ranges from 200 feet to 300 feet in the northeastern portion of the Main Basin near the mountains to nearly 4,000 feet in the South El Monte area (*DWR, 1966*).

HYDROGEOLOGY

The total fresh water storage capacity of the Main Basin is estimated to be about 9.5 million acre-feet. Of that, about 1,000,000 acre-feet have been used historically in Main Basin operations. The change in groundwater elevation at the Key Well is representative of changes in groundwater in the Main Basin. One foot of elevation change at the Key Well is roughly the equivalent of about 8,000 acre-feet of water storage. The location of the Key Well is shown on Plate 5 and hydrograph of the Key Well is shown on Figure 1. The historical high groundwater elevation was recorded at over 329.1 feet in April 1916, at which time Main Basin storage was estimated to be about 8,700,000 acre-feet. The historical low was recorded in November 2009 at 189.2 feet, at which time Main Basin storage was estimated to be about 7,600,000 acre-feet.

[10] DWR, 1966. *Bulletin No. 104-2, Planned Utilization of Ground Water Basins, San Gabriel Valley, Appendix A: Geohydrology*. March 1966.

The Key Well hydrograph shown on Figure 1 illustrates the cyclic nature of Main Basin recharge and depletion. The hydrograph also illustrates the dramatic recharge capability of the Main Basin during wet periods.

HYDROLOGY

The major sources of recharge to the Main Basin are direct penetration of rainfall on the San Gabriel Valley floor, percolation of runoff from the mountains, percolation of imported water and return flow from applied water. Rainfall occurs predominantly in the winter months and is more intense at higher elevations and closer to the San Gabriel Mountains. Rainfall is also highly variable from year to year.

The magnitude of annual recharges from direct penetration of local rainfall and return flow from applied water is not easily quantifiable. Percolation of runoff from the mountains and valley floor along with percolation of imported water has been estimated by River Watermaster. DPW maintains records on the amount of local and imported water conserved in water spreading facilities and stream channels.

WATER QUALITY MONITORING

As detailed in Chapter 4.2.1.2 above, the Main Basin Watermaster prepares and annually updates the Five-Year Water Quality and Supply Plan that discusses water quality management in the Main Basin.

4.2.3 LOCATION, AMOUNT AND SUFFICIENCY OF GROUNDWATER PUMPED FOR THE PAST FIVE YEARS

Section 10631(b)(3)

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

4.2.3.1 GROUNDWATER SOURCES IN RAYMOND BASIN

The City produces groundwater through its four active wells (Wells No. 3, 4, 5, and 6) in the Raymond Basin, as shown on Plate 2. The groundwater supply from the Raymond Basin is pumped to a reservoir at the City Maintenance Yard and then delivered to other City reservoirs prior to delivery to the City's customers.

The City's past groundwater supply pumped from the Raymond Basin over the past five years is shown on Table 9. According to the Raymond Basin Judgment, the City can produce up to 1,764 acre-feet each year ("Decreed Right from 1955") from the Raymond Basin plus prior year credit for "salvage water." Salvage water is surface water percolated into the Santa Anita Sub-area minus losses from natural percolation and subsurface outflow. In regards to "sufficiency" of groundwater pumped, the City was able to rely on the Raymond Basin to meet its groundwater demand.

4.2.3.2 GROUNDWATER SOURCES IN MAIN BASIN

The City does not own or operate any well in the Main basin. However, the City occasionally receives groundwater from the Main Basin that is pumped by the City of Arcadia and which is supplied through an interconnecting pipeline to the City.

4.2.4 LOCATION, AMOUNT AND SUFFICIENCY OF GROUNDWATER PROJECTED TO BE PUMPED

Section 10631(b)(4)

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

4.2.4.1 GROUNDWATER SOURCES IN RAYMOND BASIN

As discussed in Chapter 4.2.1.1, the Raymond Basin has been adjudicated and is managed. 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, and 2006-07 to 2008-09. In general, in each drought cycle, the City was able to obtain sufficient supplies from the Raymond Basin to meet its demands, as shown on Table 9. However groundwater levels, as shown in Appendix J, have declined over 100 feet in the past 10 years impacting the collective pumping capacity of the City's wells. Although the Raymond Basin has been managed for about 70 years under the adjudication, water levels continue to decrease. Therefore, based on historical and ongoing water levels, the groundwater supply in the Santa Anita Sub-area of the Raymond Basin is not deemed reliable at all times. Although the City will be able to rely on the Raymond Basin for the majority 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. The groundwater projected to be pumped by the City from the Raymond Basin is shown on Table 9. Details on any changes or expansion planned for the groundwater supply is provided in Chapter 4.6 below.

4.2.4.2 GROUNDWATER SOURCES IN MAIN BASIN

The City's emergency groundwater supply can include water from the Main Basin that is obtained through the City of Arcadia, and which requires purchase of an equal amount of untreated imported water from SGVMWD to recharge the Main Basin. Based on SGVMWD's draft 2010 Plan, the untreated imported water supply from SGVMWD is deemed reliable for the next 20 years. However, the City of Arcadia has indicated its emergency connection may not be able to reliably provide water to the City during extreme weather conditions. Furthermore, the City has no production facilities of its own in the Main Basin. Therefore, the City will not be able to rely on the Main Basin for adequate supply over the next 20 years under single year and multiple year droughts.

Details on any changes or expansion planned for the groundwater supply is provided in Chapter 4.6 below.

4.3 TRANSFER OPPORTUNITIES

Section 10631(d)
Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

4.3.1 SHORT-TERM

The City has two 4-inch interconnections with the City of Pasadena that serve as short-term emergency exchange opportunities. Since these are emergency exchange opportunities, no estimates of volumes are provided. The City did not have to use these emergency interconnections during the past five years. The City has one one-way connection through which the City can receive a minimal amount of water into the City's lowest pressure zone. The other one-way connection is to supply replacement water back to the City of Pasadena.

4.3.2 LONG-TERM

Although the City has no adjudicated water rights (legal pumping rights) in the Main Basin, it is a Party to the Main Basin Judgment and can pump from the Main Basin. The Main Basin Judgment does not restrict the quantity of groundwater that can be produced, but provides for a Replacement Water assessment for production in excess of water rights. The City has entered into a Cyclic Storage agreement, described in Chapter 4.2.1.2, with the Main Basin Watermaster to store imported water in the Main Basin for a period of up to five years to be used to offset a future Replacement Water requirement. The Cyclic Storage agreement allows the City to store a maximum of 4,000 acre-feet at any given time. As of June 30, 2010, the City had 3,932.54 acre-feet in its Cyclic Storage account. The City's current Cyclic Storage

agreement expires on December 5, 2012. Cyclic Storage agreements may be extended through the Main Basin Watermaster for additional terms not to exceed five years each.

Due to potential unreliable groundwater supplies from the Raymond Basin and the unreliability of the emergency connection with the City of Arcadia, SGVMWD is coordinating with MWD to construct an emergency interconnection that will allow the City access to treated imported water from MWD. The proposed emergency connection will have a capacity of up to five cubic feet per second (cfs). Such water will be available under emergency conditions when the City's wells cannot produce sufficient groundwater from the Raymond Basin and emergency supplies are not available from the City of Arcadia.

4.4 DESALINATED WATER OPPORTUNITIES

Section 10631(i)

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

The City pumps groundwater from the Raymond Basin which is low in Total Dissolved Solids (TDS) and does not require desalination. According to the City's 2009 Consumer Confidence Report, the average TDS value for the City's groundwater sources is about 216 milligrams per liter (mg/l) and ranges from 192 mg/l to 242 mg/l. The CDPH recommended level of TDS is 500 mg/l and water can be provided for long-term domestic use with TDS concentrations of up to 1,000 mg/l. Due to the low TDS concentration of the groundwater, the City does not need to investigate the use of desalination as a long-term supply. However, there may be opportunities for use of desalinated ocean water as a potential water supply source in the future, through coordination with other agencies that have ocean desalination programs.

4.5 RECYCLED WATER OPPORTUNITIES

4.5.1 RECYCLED WATER AND POTENTIAL FOR USE

Section 10633

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

The City does not have access to recycled water due to the lack of infrastructure to convey recycled water to the City. The City would have to construct costly transmission facilities to bring recycled water to the City before it could deliver recycled water within its service area. The City has very limited uses for recycled water because there are no large irrigated areas within the City's service area or industries requiring large water use. The largest potential use of recycled water would be for landscape irrigation, primarily at City of Sierra Madre Parks and Recreation facilities, but these facilities used only about 28 acre-feet in 2009 (see Table 5).

The City has assessed the use of recycled water and determined that use of recycled water is not cost effective at this time. The City assessed the use of recycled water considering these essential factors:

- The cost of transmission and distribution facilities
- The cost of retrofitting existing irrigation systems
- The cost of installation of meters
- The cost of operation and maintenance of a separate system
- The cost of administering user agreements
- Water quality issues
- Difference in revenue from recycled water versus domestic water usage
- Potential funding sources
- Potential number of users

- Potential usage volume.

Although an exhaustive cost/benefit analysis has not been conducted, it is evident that use of recycled water is not cost effective at this time due to the unavailability of a nearby source of supply and a very low demand. The City will continue to assess the potential for use of recycled water and work with local and regional agencies on this matter.

4.5.2 WASTEWATER COLLECTION, TREATMENT, AND DISPOSAL

Section 10633
(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.
(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

The City's sewer collection system, primarily comprised of pipelines eight inches in diameter or less, is owned by the City of Sierra Madre and is managed, operated and maintained by the City of Sierra Madre Public Works Department. The sewer pipeline system operates on gravity and inter-connects with the County Sanitation Districts of Los Angeles County (CSD) trunk pipelines within the City's service area. Under contract with the City of Sierra Madre, CSD provides treatment and disposal of wastewater in accordance with State of California requirements. The wastewater from the City's service area primarily flows to the Whittier Narrows Water Reclamation Plant (WNWRP) located in South EI Monte, California. The wastewater receives tertiary treatment at this facility.

The wastewater flow from the City to the CSD's treatment facilities is estimated at approximately one million gallons per day (MGD) or 365 million gallons annually. CSD is also responsible for monitoring industrial waste discharges into the wastewater system.

4.5.2.1 WHITTIER NARROWS WATER RECLAMATION PLANT

The WNWRP, which began operation in 1962, was the first reclamation plant built by the CSD. It has a treatment capacity of about 15 MGD and provides coagulated, filtered and disinfected tertiary effluent. The WNWRP serves a population of approximately 150,000 people. The WNWRP produced 6.04 MGD (6,769 acre-feet per year) of coagulated, filtered, disinfected tertiary recycled water in fiscal year 2008-09. The volume of wastewater collected and treated is shown on Table 10. An average of 5.901 MGD (6,613 acre-feet per year), or 97.7 percent of the recycled water produced during fiscal year 2008-09 at the WNWRP was re-used for landscape/plant irrigation and groundwater replenishment. The method of disposal when treated recycled water is not used (non-recycled) is discharge to the San Gabriel River/Rio Hondo and eventually flows to the ocean (see Table 11).

4.5.2.2 SAN JOSE CREEK WATER RECLAMATION PLANT

The SJCWRP, which began operation in 1971, currently has a treatment capacity of about 100 MGD. The treatment level is coagulation, filtration and disinfection tertiary effluent. The SJCWRP has room for an expansion of an additional 25 MGD, although there is no schedule for such an expansion. The SJCWRP plant serves a population of approximately 1 million people, largely a residential population. The SJCWRP produced 71.05 MGD (79,615 acre-feet per year) of coagulated, filtered, disinfected tertiary recycled water in fiscal year 2008-09. The volume of wastewater collected and treated is shown on Table 10. An average of 26.23 MGD (29,392 acre-feet per year), or 36.9 percent of the recycled water produced during fiscal year 2008-09 at the SJCWRP was re-used for landscape irrigation, agricultural irrigation, industrial use, impoundment, and groundwater replenishment. The method of disposal when treated recycled water is not used (non-recycled) is discharge to the San Gabriel River/Rio Hondo and eventually flows to the ocean (see Table 11).

4.5.3 CURRENT RECYCLED WATER USE

Section 10633
(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use

The City currently does not have any recycled water use within its service area. Therefore, this requirement is currently not applicable to the City.

4.5.4 POTENTIAL USES OF RECYCLED WATER

Section 10633
(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

The City does not have any existing recycled water use or planned recycled water projects. Therefore, this requirement is currently not applicable to the City.

4.5.5 PROJECTED RECYCLED WATER USE

Section 10633
(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15 and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision

The City does not have any existing or planned recycled water use within its service area. Therefore, this requirement is currently not applicable to the City.

4.5.6 ENCOURAGING USE OF RECYCLED WATER

Section 10633
(f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

As indicated above, the City does not have access to recycled water due to the lack of infrastructure to convey recycled water to the City. Therefore, this requirement is currently not applicable to the City.

4.5.7 PLAN FOR OPTIMIZING USE OF RECYCLED WATER

Section 10633
(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

As indicated above, the City does not have access to recycled water due to the lack of infrastructure to convey recycled water to the City. Therefore, this requirement is currently not applicable to the City.

4.6 FUTURE WATER PROJECTS

Section 10631
(h) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water uses as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

The following is a list of the City's future water supply projects:

- **Construction of Water Supply Well**. A new water supply well will provide an additional water supply source, because imported water supplies cannot be purchased directly from regional suppliers due to lack of water delivery infrastructure. This well will provide essential water supplies in the event of earthquake-related fires and naturally occurring wild fires in the region; increase water system reliability and provide the City with additional water supply options; and provide a backup well supply for the City's water system from the Santa Anita Sub-area of the Raymond Basin. The City is currently conducting studies to determine the most suitable location for the well.
- **Rehabilitation of Two Water Supply Wells**. Rehabilitation of Wells No. 4 and No. 6 will extend the life of the wells, provide higher efficiency, control sanding issues, and generally improve the water quality. Rehabilitation of the wells may include inspecting and ensuring proper sanitary seals, raising existing pedestal heights, instituting proper slab slope for adequate water drainage, and eliminating oil lubricated shafts by replacing them with water lubrication.
- **Replacement of Water Transmission and Distribution Pipelines**. This project in necessary in order to update the City's existing aging water infrastructure. Pipeline replacement includes upgrading to current standards which includes increasing pipeline sizes, upgrading the quality of materials, and installing applicable appurtenances, as needed. The project includes replacement of pipelines in Mountain Trail Avenue, East Mira Monte Avenue, North Canyon Avenue, Algeria Avenue, Santa Anita Court, San Gabriel Court, and Sierra Madre Place, as well as other streets where immediate repairs may suddenly occur due to emergency failures.
- **Santa Anita Creek Diversion Pipeline and Headworks Rehabilitation.** This project is in conjunction with Los Angeles County Flood Control to improve flow for the City's spreading grounds.

- **Sierra Madre Creek Diversion Structure**. This project allows improvement to seismic reliability and maximizes local spreading operation.
- **Santa Anita Spreading Ground Booster Pump Station**. This project allows improvement to seismic reliability.
- **Emergency Water Exchange Project** (see Chapter 4.3.2 above). This project provides for a connection to MWD for emergency water supply.
- **Main Spreading Basin Maintenance Program**. This project allows the spreading efficiency to be maintained.
- **Santa Anita Debris Basin Rehabilitation**. This project is in conjunction with the Los Angeles County Flood Control and allows improvement in supply reliability of the salvage water from the dam.
- **Sierra Madre San Gabriel Diversion Pipeline Inspection and Rehabilitation**. This project allows for improvement in supply reliability.

The City does not have a timeline for these projects at this time.

Chapter 5
WATER SUPPLY RELIABILITY AND WATER SHORTAGE CONTINGENCY PLANNING

5.1 WATER SUPPLY RELIABILITY

5.1.1 WATER MANAGEMENT TOOLS

Section 10620(f)
An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

This Plan describes water management tools and options used by the City to maximize local resources and minimize the need to import water. These include Groundwater Basin Management Structure (Chapter 4.2), Future Water Projects (Chapter 4.6), and DMMs (Chapter 6).

5.1.2 SUPPLY INCONSISTENCY

Section 10631(c)(2)
For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.

As indicated in Chapter 4.3.2, due to potential unreliable groundwater supplies from the Raymond Basin and the unreliability of the emergency connection with the City of Arcadia, SGVMWD is coordinating with MWD to construct an emergency interconnection that will allow the City access to treated imported water from MWD. The proposed emergency connection will have a capacity of up to five cfs. Such water will be available under emergency conditions when the City's wells cannot produce

sufficient groundwater from the Raymond Basin and emergency supplies are not available from the City of Arcadia.

The project components discussed in the East Raymond Basin Water Resources Plan (ERBWRP) include possible rehabilitation of the Santa Anita Dam, the Santa Anita Headworks, the Santa Anita Debris Dam, the Santa Anita Spreading Grounds, the Sierra Madre Diversion Structure, and the Sierra Madre Spreading Grounds. It also includes the construction of a transmission pipeline from the Santa Anita Headworks to the Sierra Madre Spreading Grounds and a pipeline extension from the City of Azusa to the East Raymond Basin which could provide a source of imported replenishment water for East Raymond Basin. The amount of additional credit that could be realized by Sierra Madre in the future will depend on the benefits from each project as they are implemented.

5.2 WATER SHORTAGE CONTINGENCY PLANNING

The City has developed a program to aid the City in coping with a water shortage emergency, whether the supply interruption is caused by a fire, weather condition, power loss or earthquake. It includes the development of infrastructure upgrade programs to offset a catastrophic water supply interruption, and the adoption of a mandatory water conservation ordinance.

In 1991, the City of Sierra Madre adopted the City of Sierra Madre City Council (City Council) Ordinance No. 1073 (see Appendix K) to add a Mandatory Water Conservation Plan and Water Conservation Phases I through VI to the City of Sierra Madre Code of Ordinances (see Appendix L). The water conservation phases are as follows:

- Phase I – prohibited water use applicable to all customers
- Phase II – customer water curtailment by ten percent

- Phase III – customer water curtailment by fifteen percent
- Phase IV – customer water curtailment by twenty percent
- Phase V – customer curtailment based on 2,064 acre-feet of water available
- Phase VI – customer curtailment based on 1,764 acre-feet of water available.

The implementation of Phases II through IV does not apply to customers utilizing less than 2,000 cubic feet of water per billing cycle. This is approximately equal to 250 gallons per day, based on an approximate 60-day billing cycle.

Ordinance No. 1073 established a staged approach to water conservation and enforcement. Rationing stages may be triggered by a shortage in one source or combination of sources, and shortages may trigger a specific stage at any time. Specific criteria for triggering the City's rationing stages are discussed below. The Ordinance authorizes the City to declare a water shortage emergency condition thus implementing the Mandatory Water Conservation Plan. The purpose of the Mandatory Water Conservation Plan is to minimize the effects of a water shortage to the water customers of the City and to significantly reduce the delivery and consumption of water. In doing so, it extends the period of available water supplies. The Ordinance applies to all customers, users, and property served by the City.

In 1992, the City prepared the Water Shortage Contingency Plan. Among the topics discussed in the Water Shortage Contingency Plan (Appendix M) are the following topics that are relevant to this Plan:

- Coordinated Planning
- Worst Case Water Supply Availability
- Stages of Action for Water Conservation
- Mandatory Prohibitions on Water Use

- Consumption Limits
- Penalties and Charges for Excessive Use
- Analysis of Revenue and Expenditure Impacts
- Water Use Monitoring Procedures.

In October 2004, the City Council passed Resolution No. 04-086 (see Appendix N) to implement Phase I water conservation measures as described in the Mandatory Water Conservation Plan. Phase I of the Mandatory Water Conservation Plan has remained in effect since that time.

5.2.1 CATASTROPIC INTERRUPTION OF WATER SUPPLIES

Section 10632
(c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

The City has replaced its major water storage reservoirs (Grove Street Reservoir, and Mira Monte Reservoirs No. 1 and No. 2) and upgraded them to higher engineering standards for seismic reliability. The City has also replaced a booster pump station for greater seismic reliability.

To offset the impact in the event of a regional power loss, standby electric power (provided by a diesel turbine) is provided at the Main Pumping Plant at the City Maintenance Yard facility. The booster pumping facility and the reservoirs at Mira Monte have a permanent diesel back-up power supply and storage of fuel at that site.

The City has constructed inter-connections with other water suppliers for use in the event of an emergency. These interconnections are with the cities of Arcadia and Pasadena (direct inter-connections). In addition, the City is in the process of designing a connection to supply treated imported water to the City through MWD for emergency purposes. The water transmission pipeline in Sturtevant Drive has been replaced to

allow for greater pressure at the upper ends of the pipeline. These projects provide greater assurance of water supplies in a major seismic event, including other emergencies, such as wild fires.

The City has a Disaster Response Plan and Emergency Preparedness that will be implemented whenever an emergency situation occurs, such as an earthquake, fire, rain storm, wind storm, etc.

5.2.2 MANDATORY PROHIBITIONS

Section 10632
(d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

The City has mandatory prohibitions on water use that were enacted by City Council Ordinance 1073 (see Appendix K). These mandatory prohibitions are codified in the City of Sierra Madre Code of Ordinances, Title 13, Chapter 13.24, Mandatory Water Conservation Plan (see Appendix L). As indicated above, the City Council passed Resolution No. 04-086 in 2004 to implement Phase I water conservation measures that include mandatory prohibitions on water use which are listed below (see Table 12):

- There shall be no washing of sidewalks, walkways, patios, driveways, or parking areas using a water hose.
- No water shall be used to clean, fill or maintain water levels in decorative fountains unless such water is part of a recycling system.
- No restaurant, café, deli, or other public places where food is sold, served or offered for sale, shall serve drinking water to any customer unless expressly requested by the customer.
- No customer of the water department shall permit water to leak from any facility on the premises.

- No lawn, landscaping, or other turf area shall be watered or irrigated between the hours of 10 a.m. and 4 p.m.
- No lawn, landscape, or turf area shall be watered in a wasteful manner, nor shall any water be wasted if the existing conditions may be corrected or reasonably modified.

These Phase I water use prohibitions do not apply to use of water for public health, safety, or for essential governmental services such as fire, police, public works, or similar emergency services.

5.2.3 CONSUMPTION REDUCTION METHODS

Section 10632
(e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

The City's consumption reduction methods are discussed in Phases II through VI of the Mandatory Water Conservation Plan, as described above. Table 13 lists these consumption reduction methods in the most restrictive stages. These consumption reduction methods have a projected reduction of up to 36 percent.

As noted above, implementation of Phases II through IV does not apply to customers utilizing less than 2,000 cubic feet per billing cycle or 250 gallons per day of water.

5.2.4 PENALTIES OR CHARGES FOR EXCESSIVE USE

Section 10632
(f) Penalties or charges for excessive use, where applicable.

City of Sierra Madre Code of Ordinances, Title 13, Chapter 13.24 (see Appendix L) imposes civil penalties for failure to comply with provisions of the Mandatory Water Conservation Plan. These penalties are listed as follows (see Table 14):

- First Violation – a surcharge penalty is imposed in an amount of twice the current water rate per 100 cubic feet of water.
- Second Violation – a penalty equal to 100 percent of the penalty for the First Violation is imposed.
- Third Violation – a water restrictor shall be installed behind the water meter, after due notice and due process in regards to usage, needs, and/or the installation of a fire sprinkler system at the site. The unavailability of adequate water supply may require the site to be unoccupied. The City of Sierra Madre City Council shall authorize the fee schedule for any cost of installation and removal of the flow restrictor(s) devices.

In addition, there is a provision in the Mandatory Conservation Plan for any violation by willful misrepresentation that shall be punishable by a fine not to exceed $500, or by imprisonment in the county jail for a period not to exceed six months, or by both such fine and imprisonment.

5.2.5 REVENUE AND EXPENDITURE IMPACTS

Section 10632
(g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

In 1992, the City performed an analysis of the projected fiscal impacts of reduced costs and reduced sales due to shortages, as part of its Water Shortage Contingency Plan (see Appendix M). The analysis included predictions of the City's revenues and expenditures with reduced sales, increased rates, and increased or reduced costs associated with shortages. The objective of the analysis was to show two conditions:

1. The impacts of a shortage on operating revenues and expenditures if the deficiency was not addressed by methods to increase revenue, and
2. The impacts of a shortage on operating revenues and expenditures if the deficiencies created by the shortage were reduced.

The analysis indicated an increase in meter charges and varying increases in commodity rate were necessary to maintain the pre-shortage level of service, depending upon the percent reduction in water sales. The analysis assumed capital programs would suffer and most likely be delayed in order to maintain sufficient operation and maintenance levels.

The City's proposed measures to overcome these impacts include monitoring the reserve funds and rate adjustments. On January 11, 2011, the City completed its process of adjusting the water rates, including the introduction of a tiered water rate structure.

5.2.6 DRAFT WATER SHORTAGE CONTINGENCY RESOLUTION OR ORDINANCE

Section 10632
(h) A draft water shortage contingency resolution or ordinance.

As indicated above, in 1991, the City of Sierra Madre adopted City Council Ordinance No. 1073 (see Appendix K) to add a Mandatory Water Conservation Plan and Water Conservation Phases I through VI to the City of Sierra Madre Code of

Ordinances (see Appendix L). In 2004, the City Council passed Resolution No. 04-086 (see Appendix N) to implement Phase I water conservation measures as described in the Mandatory Water Conservation Plan.

5.3 WATER QUALITY

Section 10634

The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

The City's groundwater supply began experiencing VOC contamination in 2003. On several occasions, the levels of PCE and TCE in the groundwater have exceeded state and federal regulatory levels. In response to the VOC contamination in the groundwater supply, the City has installed a liquid-phase granular activated carbon treatment system in the vicinity of the City's wellfield for VOC treatment. The VOC treatment system has a treatment capacity of about 5,000 gpm. With the VOC treatment system, the City will be able to reliably treat groundwater as a supply source over the next 20 years.

As indicated in Chapter 2.1.3 above, the City's tunnel water supply from the East Tunnel experienced high fluoride concentrations and is being diverted to the spreading grounds. The water supply from the City's West Tunnel did not experience any water quality problem. The City's 2009 water quality report indicated fluoride concentrations in the City's distribution system as between 0.9 mg/l and 1.7 mg/l. The MCL for fluoride is 2 mg/l. The City has been granted a Fluoride Variance from CDPH. Therefore, the City will be able to use this tunnel water as a supply source over the next 20 years.

5.4 DROUGHT PLANNING

5.4.1 RELIABILITY OF SUPPLY AND VULNERABILITY TO SEASONAL OR CLIMATIC SHORTAGE

Section 10631(c)(1)
Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:
(A) An average water year.
(B) A single dry water year.
(C) Multiple dry water years.

Information regarding the reliability of the groundwater supplies from Raymond Basin is based on the 50-year rainfall data for the City of Sierra Madre (Table 2), and past data on the availability of water supply to meet demands during seasonal or climatic shortage. Table 2 summarizes the rainfall in the City of Sierra Madre from 1960-61 through 2009-10. According to the rainfall data for the City of Sierra Madre, the annual average rainfall is 23.03 inches. Therefore, 2005-06 represents an average water year for the City in which the total amount of rainfall was about 24.76 inches. A single dry year for the City was represented in 2006-07 in which the total amount of rainfall was about 8.08 inches. A multiple dry year sequence for the City is represented from 2006-07 to 2008-09, where the total amount of rainfall was about 8.08 inches, 25.95 inches, and 14.54 inches, respectively. Table 15 shows production during an average year, single dry year and multiple dry years. A dry year or multiple dry years did not compromise the City's ability to provide a reliable supply of water to its customers. However, groundwater levels, as shown in Appendix J, have declined over 100 feet in the past 10 years impacting the collective pumping capacity of the City's wells. Therefore, based on historical and ongoing water levels, the groundwater supply in the Raymond Basin is not deemed reliable at all times. Although the City will be able to rely on the Raymond Basin for the majority of its 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.

As indicated in Chapter 4.2.4.2 above, the City's emergency groundwater supply can include water from the Main Basin that is obtained through the City of Arcadia, and which requires purchase of an equal amount of untreated imported water from SGVMWD to recharge the Main Basin. Based on SGVMWD's draft 2010 Plan, the untreated imported water supply from SGVMWD is deemed reliable for the next 20 years. However, the City of Arcadia has indicated its emergency connection may not be able to reliably provide water to the City during extreme weather conditions. Furthermore, the City has no production facilities of its own in the Main Basin. Therefore, the City will not be able to rely on the Main Basin for adequate supply over the next 20 years under single year and multiple year droughts. Consequently, the City is pursuing an emergency interconnection with MWD and other water supply/groundwater replenishment projects. Collectively, the City should have a reliable source of supply over the next 20 years under single year and multiple year droughts.

5.4.2 STAGES OF ACTION IN RESPONSE TO WATER SUPPLY SHORTAGES

Section 10632
(a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.

Stages of action to be undertaken by the City in response to water supply shortages are outlined in the Mandatory Water Conservation Plan (Appendix L), which are as follows (see Table 16):

- **Phase I**: Prohibited Use Applicable to All Customers – **Voluntary** Rationing

  The prohibited uses include:
  - Washing of sidewalks, walkways, patios, driveways, or parking areas using a water hose.
  - Cleaning, filling or maintaining water levels in decorative fountains unless such water is part of a recycling system.

- Serving drinking water to any customer unless expressly requested by the customer in any restaurant, cafe, deli, or other public places where food is sold, served or offered for sale.
- Permitting water to leak from any facility on the premises.
- Watering of lawns and landscape between the hours of 10:00am and 4:00pm
- Watering or irrigating of lawns, landscape, or turf area in a wasteful manner, nor wasting of water if the existing conditions may be corrected or reasonably modified.

- **Phase II**: Customer Water Curtailment by 10 Percent – **Mandatory** Rationing

  This restricts the customer from using water for any purpose in excess of 90 percent of the amount used during the base period. The base period is defined as 1989 consumption data.

- **Phase III**: Customer Water Curtailment by 15 Percent – **Mandatory** Rationing

  This restricts the customer from using water for any purpose in excess of 85 percent of the amount used during the base period.

- **Phase IV**: Customer Water Curtailment by 20 Percent – **Mandatory** Rationing

  This restricts the customer from using water for any purpose in excess of 80 percent of the amount used during the base period.

- **Phase V**: Customer Water Curtailment Based on 2,064 Acre-feet of Water Available – **Mandatory** Rationing

  This restricts the customer from using water for any purpose in excess of the base period allocation which may be approximately 24 percent, or as specifically determined for each property or site.

- **Phase VI**: Customer Water Curtailment Based on 1,764 Acre-feet of Water Available – **Mandatory** Rationing

  This restricts the customer from using water for any purpose in excess of the base period allocation which may be approximately 36 percent, or as specifically determined for each property or site.

5.4.3 THREE YEAR MINIMUM WATER SUPPLY

Section 10632
(b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

As shown on Table 15, the City experienced multiple dry years during fiscal years 2006-07, 2007-08 and 2008-09. The ratio between the normal water year in 2005-06 and multiple dry years were estimated for the City's supply, as shown on Table 15. This ratio from Table 15 was used to estimate the minimum water supply available during each of the next three water years based on the driest three-year historical sequence for the City's water supply (see Table 17).

5.4.4 WATER USE REDUCTION MEASURING MECHANISM

Section 10632
(i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

In accordance with the Water Shortage Contingency Plan (Appendix M), reporting requirements will be modified depending upon the phase of shortage declared. Under normal water supply conditions, potable water production amounts are recorded daily. Total potable water production is generally reported to the City Water Superintendent on a weekly basis.

During a declared Phase I, II, III, IV, V or VI water shortage, daily water production amounts will be reported to the Director of Public Works. The City Water Superintendent will compare the weekly production to the target weekly production to verify the reduction goal is being met. In the event the targets are not being met, the Director of Public Works will report that information to the City of Sierra Madre City Manager. A monthly summary will be furnished to the City Council.

These modified procedures will keep all levels of the City of Sierra Madre government informed of the water use during critical emergency times. This is done to assure swift and decisive action if the data so requires, in order to protect public safety and provide water service to essential services.

5.4.5 ASSESSMENT OF THE RELIABILITY OF WATER SERVICE

Section 10635

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

As previously discussed in Chapter 3.2, the City applied SB 7 to estimate the City's 2015 Interim Urban Water Use Target of 236 GPCD and the City's 2020 Urban Water Use Target of 210 GPCD. These Urban Water Use Targets were then applied to estimate the City's projected normal year demands in 2015, 2020, 2025 and 2030, as shown on Table 7. The City will continue to use groundwater and tunnel water as its future water supplies over the next 20 years. The following sections discuss the City's water service reliability assessment, which compares the City's supply and demand over the next 20 years during normal, dry and multiple dry years.

5.4.5.1 NORMAL WATER YEAR

As previously discussed, the City's projected normal water year demand over the next 20 years in five-year increments was based on the City's 2015 and 2020 Urban Water Use Targets of 236 GPCD and 210 GPCD, respectively. The City's projected supply was based on the projected demand, as shown on Table 9. The comparison of the City's projected supply and demand during a normal water year is shown on Table 18. As shown on Table 18, the City's supply can meet demands during a normal water year for the next 20 years.

5.4.5.2 SINGLE-DRY YEAR

As shown on Table 15, the City experienced a single-dry year during fiscal year 2006-07 and a normal water year during fiscal year 2005-06. The ratio between the normal water year and single-dry year was estimated for the City's supply and demand, as shown on Table 15. This ratio and the projected supply and demand during a normal water year from Table 18 was used to estimate the City's projected supply and demand during a single-dry year over the next 20 years in five-year increments. The comparison of the City's projected supply and demand during a single-dry year is shown on Table 19. As shown on Table 19, the City's supply can meet demands during a single-dry year for the next 20 years. However, groundwater levels, as shown in Appendix J, have declined over 100 feet in the past 10 years impacting the collective pumping capacity of the City's wells. Although the City will be able to rely on the Raymond Basin for the majority of its supply over the next 20 years under single year year droughts, it should pursue short-term and long-term sources of emergency supplies.

5.4.5.3 MULTIPLE DRY YEARS

As shown on Table 15, the City experienced multiple dry years during fiscal years 2006-07, 2007-08 and 2008-09. The ratio between the normal water year in

2005-06 and multiple dry years were estimated for the City's supply and demand, as shown on Table 15. This ratio and the projected supply and demand during a normal water year from Table 18 was used to estimate the City's projected supply and demand during multiple dry years over the next 20 years in five-year increments. The comparison of the City's projected supply and demand during multiple dry years is shown on Table 20. As shown on Table 20, the City's supply can meet demands during multiple dry years for the next 20 years. However, groundwater levels, as shown in Appendix J, have declined over 100 feet in the past 10 years impacting the collective pumping capacity of the City's wells. Although the City will be able to rely on the Raymond Basin for the majority of its supply over the next 20 years under multiple year droughts, it should pursue short-term and long-term sources of emergency supplies.

5.4.5.4 GROUNDWATER RELIABILITY

The City obtains its water supply from groundwater wells located in Santa Anita Sub-area of the Raymond Basin, tunnel water from Little Santa Anita Canyon, and purchased water from the City of Arcadia (Main Basin groundwater). Chapter 4 provides a description of the management of water resources in the Raymond Basin and Main Basin, as well as information on basin management.

As discussed in Chapter 4.2.1.1, the Raymond Basin has been adjudicated and is managed. 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, and 2006-07 to 2008-09. In general, in each drought cycle, the City was able to obtain sufficient supplies from the Raymond Basin to meet its demands, as shown on Table 9. However groundwater levels, as shown in Appendix L, have declined over 100 feet in the past 10 years impacting the collective pumping capacity of the City's wells. In each drought cycle, the Raymond Basin was managed to maintain its water levels. Although the Raymond Basin has been managed for about 70 years under the adjudication, water levels continue to decrease. Following a drought, natural recharge

may not be sufficient to restore water levels to pre-drought levels. Therefore, based on historical and ongoing water levels, the groundwater supply in the Raymond Basin is not deemed reliable at all times. Although the City will be able to rely on the Raymond Basin for the majority of its 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. As indicated in Chapter 4.3.2, due to potential unreliable groundwater supplies from the Raymond Basin and the unreliability of the emergency connection with the City of Arcadia, SGVMWD is coordinating with MWD to construct an emergency interconnection that will allow the City access to treated imported water from MWD. The proposed emergency connection will have a capacity of up to five cfs. Such water will be available under emergency conditions when the City's wells cannot produce sufficient groundwater from the Raymond Basin and emergency supplies are not available from the City of Arcadia.

The City's emergency groundwater supply can include water from the Main Basin that is obtained through the City of Arcadia, and which requires purchase of an equal amount of untreated imported water from SGVMWD to recharge the Main Basin. Based on SGVMWD's draft 2010 Plan, the untreated imported water supply from SGVMWD is deemed reliable for the next 20 years. However, the City of Arcadia has indicated its emergency connection may not be able to reliably provide water to the City during extreme weather conditions. Furthermore, the City has no production facilities of its own in the Main Basin. Therefore, the City will not be able to rely on the Main Basin for adequate supply over the next 20 years under single year and multiple year droughts.

Chapter 6
DEMAND MANAGEMENT MEASURES

The City supports water conservation planning and implementation of water conservation measures. Historically, the City has employed numerous conservation measures to discourage water waste and over-use. The City participates in the promotion of water conservation programs developed and implemented by SGVMWD, a regional agency of which the City is a member. Water conservation programs offered by SGVMWD are available to residents of the City.

6.1 DEMAND MANAGEMENT MEASURES BEING IMPLEMENTED

Section 10631

(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:

(A) Water survey programs for single-family residential and multifamily residential customers.
(B) Residential plumbing retrofit.
(C) System water audits, leak detection, and repair.
(D) Metering with commodity rates for all new connections and retrofit of existing connections.
(E) Large landscape conservation programs and incentives.
(F) High-efficiency washing machine rebate programs.
(G) Public information programs.
(H) School education programs.
(I) Conservation programs for commercial, industrial, and institutional accounts.
(J) Wholesale agency programs.
(K) Conservation pricing.
(L) Water conservation coordinator.
(M) Water waste prohibition.
(N) Residential ultra-low-flush toilet replacement programs.

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.

6.1.1 WATER SURVEY PROGRAMS FOR SINGLE-FAMILY RESIDENTIAL AND MULTIFAMILY RESIDENTIAL CUSTOMERS [10631(F)(1)(**A**)]

The City's system is comprised mainly of single and multi-family dwellings. Available data indicates the overall system water loss to be about five percent. The City has water conservation literature that alerts customers to be on the lookout for water system leaks and to correct them promptly. The City is available to assist customers in answering questions regarding system leaks or higher than expected water usage.

The City operates a software program for water billing purposes that monitors water usage in each water use category. This program began more than five years ago. Because approximately 95 percent of the City's customers are in the single-family residential and multi-family residential categories, any changes in water use patterns can be readily identified. Through the use of this monitoring system, the City is able to monitor customer water use and recognize abnormal water usage, as follows:

1. Water billing staff directs any accounts that show 100 percent or greater than normal water use to the City for follow-up.
2. City staff will re-read the meter to verify the meter reading is correct. If the reading is correct and the reading is high, City staff will observe the meter for up to 10 minutes to check for movement of the leak indicator dial. City staff will also survey the property for any signs of water leak. City staff will then leave a note at the door of the residence informing the resident of the results of the visit and any recommendation for the resident to inspect for leaks.
3. The meter re-read information and the leak inspection will be provided to the water billing staff for review. If necessary, City staff is available to assist residents by appointment to review any concerns regarding the high water usage.

No evaluation of the effectiveness of this DMM has been performed because the system has not flagged any inordinate water use. No estimate of water savings has been made.

6.1.2 RESIDENTIAL PLUMBING RETROFIT [10631(F)(1)(**B**)]

The City has a water conservation kit distribution program in place. The program started more than five years ago. The kit includes dye tablets, shower flow restrictor and a toilet displacement bag. Kits are available free of charge. City residents are made aware of the availability of the kits through the City's quarterly newsletter and local cable television station.

This program is conducted in cooperation with SGVMWD. SGVMWD provides funds each year in its budget for the purchase of showerheads, low flow hose nozzles, water meters and other water conservation items. Each year the City receives an allotment from SGVMWD. Specific records on the number of items distributed per year are unavailable.

No evaluation of the effectiveness of this DMM has been performed, and no estimate of water savings has been made.

6.1.3 SYSTEM WATER AUDITS, LEAK DETECTION, AND REPAIR [10631(F)(1)(**C**)]

As a part of normal operation and maintenance of the water system, City staff does preventive maintenance. This includes regular checks on valves and meters, and pipeline maintenance. If leaks are encountered or suspected during routine inspection of the system, further evaluation is conducted. If leaks are found, they are repaired.

In 1997, a leak detection audit was performed on selected large diameter pipes in the distribution system to determine if there were any leaks large enough to warrant

water system repairs, and to help quantify the current unaccounted for water use within the City's service area. Approximately seven miles of pipe were surveyed out of the approximately 40 miles of pipe in the City's service area. There were a total of three leaks located with an estimated total water loss rate of approximately 0.3 gpm. Based in the survey, it was determined the City has a relatively low percentage of water loss overall. When projected over the City's 40 miles of system piping, the percent water loss was estimated at 2.4 percent. The City has replaced over 5,000 feet of water system pipeline, which may have further reduced the already low water loss percentage within the system.

The City monitors the water system for loss by comparing water production to water sales. The City will continue to monitor the water system for water loss, and if a trend develops to indicate that further analyses are required, the City will provide the necessary funds to institute another leak detection program.

No evaluation of the effectiveness of this DMM has been performed, and no estimate of water savings has been made.

6.1.4 METERING WITH COMMODITY RATES FOR ALL NEW CONNECTIONS AND RETROFIT OF EXISTING CONNECTIONS
[10631(F)(1)(**D**)]

The City meters all customer connections, including separate metering for single-family residential, commercial, industrial, large landscape and institutional/governmental facilities. The program started more than five years ago.

The City's tiered commodity rate for water will become effective on July 1, 2011 (see Appendix O). For example, the tiered water rates for fiscal year 2011-12 are $1.92 per hundred cubic feet (CCF) of water under Tier 1 (less than 36 CCF), $1.97 per CCF of water under Tier 2 (36 to 66 CCF), and $2.00 per CCF of water under Tier 3 (greater than 66 CCF). Water connection fees are added to the tiered commodity rate to

comprise the total water bill. The water connection fees are based on the size of the meter and range from $27.96 per month for a 5/8-inch and 3/4-inch meter (low income rate) to $250.94 per month for a 4-inch meter, for fiscal year 2011-12. Reduced water connection fees are available to low income families who are typically low water users. Water bills are sent out bi-monthly. The tiered water rate structure results in higher water rates for those customers using higher amounts of water. This applies to all water-use sectors (e.g., single family residential, multifamily residential, industrial, institutional, etc.). Therefore, there is a financial benefit to conserving water.

No evaluation of the effectiveness of this DMM has been performed, and no estimate of water savings has been made.

6.1.5 PUBLIC INFORMATION PROGRAMS [10631(F)(1)(**G**)]

The City has developed a public information program to educate the public to the benefits of water conservation. The program started more than five years ago. The program involves the dissemination of information through literature provided at City of Sierra Madre City Hall and other City of Sierra Madre facilities, articles in the City of Sierra Madre newsletter and local cable television. The City periodically includes informational flyers with the water bills to address water conservation and other important matters.

The City holds public meetings to inform residents of major water system infrastructure improvements and any changes to the water rates. The City also has public meetings on the need for water conservation during times of drought.

The City has also provided speakers at civic and community group meetings. The City will continue to use these forums to provide knowledge on water conservation matters. The City would step-up these activities in low rainfall years and during times of drought to reinforce the concept of practicing daily water conservation. The City may

consider expanding the public education program on water conservation as the need arises and budget funding allows.

The City also participates in water conservation programs with SGVMWD, including such programs as water conservation kit distribution and the toilet replacement program. SGVMWD has created a water education and conservation program in partnership with its member cities and participating youth groups. As part of the water education and conservation program, SGVMWD has distributed conservation tips at Environmental Fair and ultra-low-flush toilet giveaway at Sierra Vista Park, organized a presentation at City Council meeting on Water Awareness Month, provided literature distribution and school education program, distributed conservation tips at Sierra Madre Art Fair, and distributed conservation tips at various public events.

No evaluation of the effectiveness of this DMM has been performed, and no estimate of water savings has been made.

6.1.6 SCHOOL EDUCATION PROGRAMS [10631(F)(1)(**H**)]

As indicated above, City representatives have visited schools to discuss water conservation. This discussion is usually included as part of an overall presentation on the water system and how it works. The City provides coloring books, entitled "Our World of Water Activity Book," that have water conservation as their theme to children in an effort to reach even the youngest children. The coloring book is provided in cooperation with SGVMWD. Water conservation stickers are also given out to children. This program started more than five years ago.

The City will continue the school education programs to promote water conservation to that sector of the community. This will be done as a part of normal operation and administrative duties.

No evaluation of the effectiveness of this DMM has been performed, and no estimate of water savings has been made.

6.1.7 CONSERVATION PRICING [10631(F)(1)(**K**)]

The City's tiered commodity rate for water will become effective on July 1, 2011 (see Appendix O). The tiered water rate structure encourages water conservation by imposing higher water rates for those customers using higher amounts of water.

The City provides sewer service to customers in its service area. The sewer rate schedule does not include conservation pricing at this time (see Appendix P).

No evaluation of the effectiveness of this DMM has been performed, and no estimate of water savings has been made.

6.1.8 WATER CONSERVATION COORDINATOR [10631(F)(1)(**L**)]

The City's Water Superintendent serves as the water conservation coordinator. The City began coordinating water conservation activities more than five years ago. The Water Superintendent's water conservation coordinator duties include conducting matters pertaining to the City's water conservation program and implementation of DMMs. In addition, other City staff are involved in the water conservation program, including maintenance and operations personnel, and administrative staff who answer billing and usage questions and serve at the front counter at City of Sierra Madre City Hall. The staff serve as part-time water conservation coordinators by nature of their duties and responsibilities in performing their job functions.

The Director of Public Works oversees all water conservation activities. The Director is responsible for water system infrastructure, water quality, water planning, and water conservation. The Director is responsible for recommending water

conservation programs and water conservation ordinance stage provisions to the City Council.

No evaluation of the effectiveness of this DMM has been performed, and no estimate of water savings has been made.

6.1.9 WATER WASTE PROHIBITION [10631(F)(1)(**M**)]

As discussed above, the City adopted a Mandatory Water Conservation Ordinance (Ordinance No. 1073; see Appendix K) in 1991. Ordinance No. 1073 established a staged approach to water conservation and enforcement. The Ordinance authorizes the City to declare a water shortage emergency condition thus implementing the Mandatory Water Conservation Plan. In 2004, the City Council passed Resolution No. 04-086 (see Appendix N) to implement Phase I water conservation measures as described in the Mandatory Water Conservation Plan.

Resolution No. 04-086 resulted in the following prohibited water uses under Phase I of the Mandatory Water Conservation Plan:

- Washing of sidewalks, walkways, patios, driveways, or parking areas using a water hose.
- Cleaning, filling or maintaining water levels in decorative fountains unless such water is part of a recycling system.
- Serving drinking water to any customer unless expressly requested by the customer in any restaurant, cafe, deli, or other public places where food is sold, served or offered for sale.
- Permitting water to leak from any facility on the premises.
- Watering of lawns and landscape between the hours of 10:00am and 4:00pm

- Watering or irrigating of lawns, landscape, or turf area in a wasteful manner, nor wasting of water if the existing conditions may be corrected or reasonably modified.

No evaluation of the effectiveness of this DMM has been performed, and no estimate of water savings has been made.

6.1.10 RESIDENTIAL ULTRA-LOW FLUSH TOILET REPLACEMENT PROGRAMS [10631(F)(1)(**N**)]

As indicated above, the City participated in a program with SGVMWD to distribute ultra-low-flush toilets. The program started more than five years ago. As part of the program, the City shared the cost of providing the toilets to customers with SGVMWD. This program provided an incentive for customers to change out their existing toilet for a new low-flow type toilet. Table 21 shows the number of ultra-low-flush toilets distributed to residents of the City's service area through SGVMWD's program.

The Uniform Building Code requires the installation of low flow toilets in new construction as of 1992. Even though this does not affect older facilities, it has aided in the overall water conservation effort

No evaluation of the effectiveness of this DMM has been performed, and no estimate of water savings has been made.

6.2 DEMAND MANAGEMENT MEASURES NOT IMPLEMENTED

Section 10631
(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower

incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and non-economic factors, including environmental, social, health, customer impact, and technological factors.
(2) Include a cost-benefit analysis, identifying total benefits and total costs.
(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.
(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

6.2.1 LARGE LANDSCAPE CONSERVATION PROGRAMS AND INCENTIVES [10631(F)(1)(**E**)]

There are no large landscape irrigation sites within the City of Sierra Madre. The number of meters for landscape sites constitute about 0.7 percent of the total number of water meters, based on data for 2009 (see Table 5). The water usage in the City's service area for landscape constitutes less than one percent of the water used in the City's service area, based on data for 2009 (see Table 5). Primarily, the landscape sites are City of Sierra Madre-owned parks and recreation areas.

Because landscape irrigation is such a small percentage of water usage in the City's service area, it is not prudent for the City to develop and implement a formal program for large landscape water audits at this time. The City of Sierra Madre is able to monitor its own usage of water for landscape purposes and can modify it as needed during lean water times. Therefore, a large landscape conservation program is not applicable to the City. A cost-benefit analysis has not been conducted. The City was not able to perform an evaluation of this DMM in terms of funding available and legal authority.

Notwithstanding, the City provides educational material on landscape water conservation through literature at City Hall and articles in the City's newsletter. The literature promotes water conservation in all aspects of everyday life. The City supports the use of drought tolerant landscaping throughout the City's service area in an effort to

reduce water requirements for gardens. The City continues to promote and support the use of drought tolerant landscaping throughout the City's service area.

In 2010, through SGVMWD, the City was involved in re-landscaping and installing an irrigation system in one local school. In addition, through SGVMWD, the City was involved in a landscape survey of City of Sierra Madre parks and schools.

6.2.2 HIGH-EFFICIENCY WASHING MACHINE REBATE PROGRAMS [10631(F)(1)(**F**)]

The City does not have a high-efficiency washing machine rebate program in place at this time. The City relies on manufacturers and retail sales outlets to inform customers of the benefits of purchasing a high-efficiency washing machine, and any rebates that may be available to them through the manufacturer. The City can educate customers to the water-wise use of laundering, but it would not be cost effective to develop and implement a high-efficiency washing machine rebate program at this time. A cost-benefit analysis has not been conducted. The City was not able to perform an evaluation of this DMM in terms of funding available and legal authority.

6.2.3 CONSERVATION PROGRAMS FOR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL ACCOUNTS [10631(F)(1)(**I**)]

The City has a very small commercial, industrial and institutional component. This sector of the community constitutes about four percent of all water service connections and approximately four percent of the City's yearly water demand. There are no large-scale manufacturing or industrial plants within the City's service area. There are no large scale water use industries in the City's service area. Most of the water consumed by this sector is for personal consumption by employees.

Standard procedure is for the City to review plans and specifications for new commercial and industrial facilities before construction. The review consists of

evaluating the water usage and wastewater discharge for the new facility, particularly to determine if there are sufficient water supplies and sewer capacities. For existing facilities with new or revised operations, the City will review the proposed requirements prior to issuance of permits.

This sector is not expected to grow significantly in the City's service area, nor is water usage from existing facilities expected to rise to any great degree. The general public education program is applicable to educating this sector on water conservation. Because this sector is small, and the water use can be monitored easily by viewing the monthly billing records, it is not cost effective to develop a formal education program for this sector. However, the City will continue to coordinate with this sector of the community regarding water use and conservation through public education and the review process described above.

A cost-benefit analysis has not been conducted. The City was not able to perform an evaluation of this DMM in terms of funding available and legal authority.

6.2.4 WHOLESALE AGENCY PROGRAMS [10631(F)(1)(**J**)]

The City is a retail water supplier. Therefore wholesale agency programs are not applicable to the City. However, as a member of SGVMWD, the City participates in SGVMWD's wholesale agency programs. SGVMWD's 2010 Plan is incorporated by reference.

Chapter 7

COMPLETED URBAN WATER MANAGEMENT PLAN CHECKLIST

A completed Plan checklist, with page information indicating where the required element can be found within the Plan, is provided in Appendix Q.

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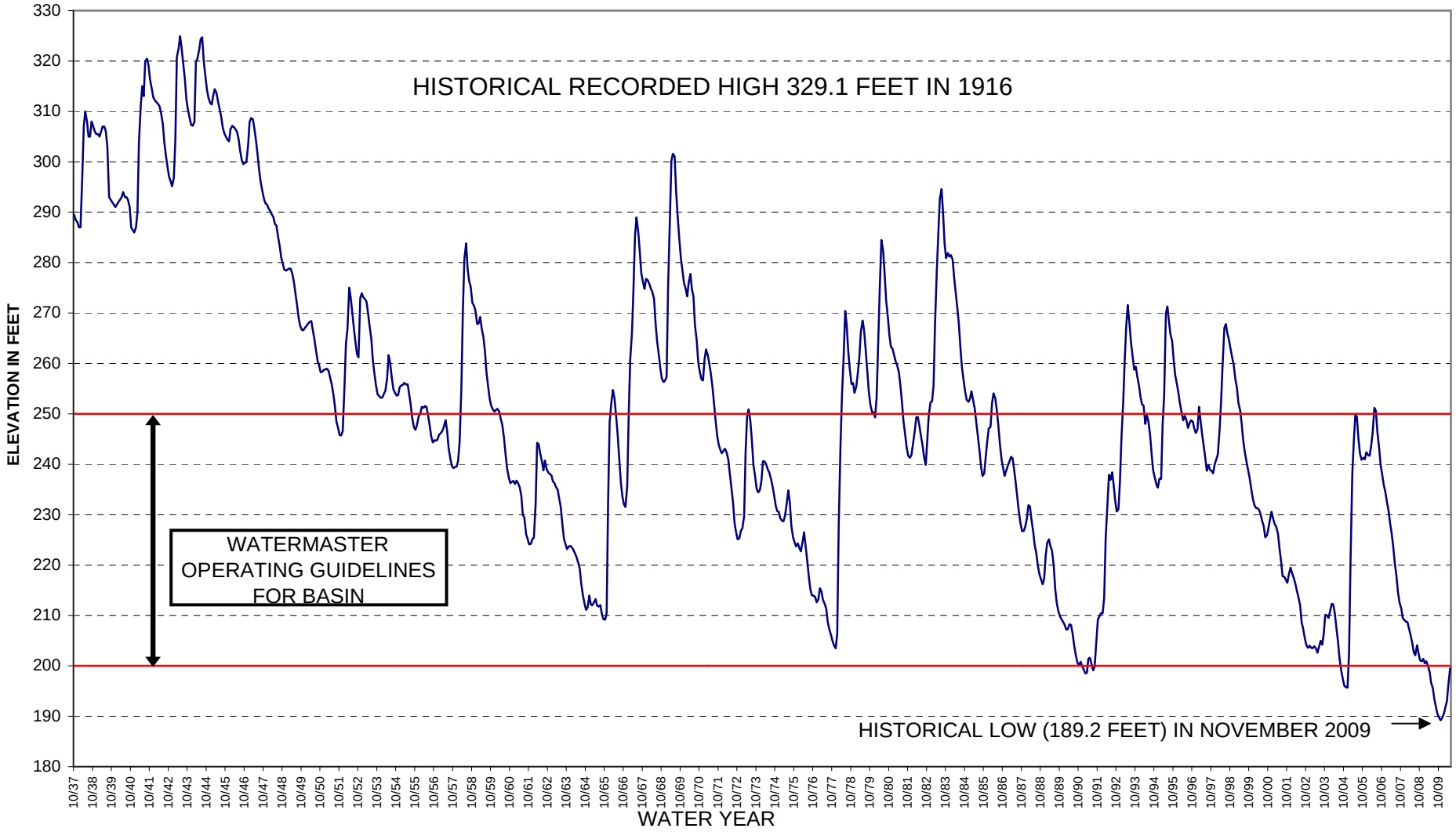
FIGURES



STETSON ENGINEERS INC.

Covina, California

WATER RESOURCE ENGINEERS

CITY OF SIERRA MADRE

HISTORICAL BALDWIN PARK KEY WELL ELEVATION

FIGURE 1

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TABLES

TABLE 1
COORDINATION WITH APPROPRIATE AGENCIES

Agencies	Participated in Developing the Plan	Commented on the Draft	Attended Public Meetings	Was Contacted for Assistance	Was Sent a Copy of the Draft Plan	Was Sent a Notice of Intent to Adopt	Not Involved/ No Information
1. City of Sierra Madre City Clerk			x			x	
2. Raymond Basin Management Board							
3. County of Los Angeles						x	
4. Main San Gabriel Basin Watermaster							
5. San Gabriel Valley Municipal Water District							

TABLE 2
ANNUAL RAINFALL AT THE SIERRA MADRE PUMPING PLANT STATION
FROM 1960-61 THROUGH 2009-10*

WATER YEAR	RAINFALL IN INCHES
1960-61	7.23
1961-62	27.24
1962-63	14.37
1963-64	13.57
1964-65	20.23
1965-66	27.32
1966-67	29.85
1967-68	13.86
1968-69	46.88
1969-70	15.31
1970-71	17.07
1971-72	9.02
1972-73	27.95
1973-74	19.77
1974-75	16.37
1975-76	17.00
1976-77	16.03
1977-78	47.15
1978-79	23.57
1979-80	40.89
1980-81	11.31
1981-82	22.49
1982-83	49.11
1983-84	14.31
1984-85	16.51
1985-86	25.04
1986-87	11.01
1987-88	21.92
1988-89	13.94
1989-90	13.58
1990-91	20.90
1991-92	29.96
1992-93	45.88
1993-94	15.48
1994-95	41.47
1995-96	24.71
1996-97	23.84
1997-98	41.41
1998-99	11.87
1999-00	14.23
2000-01	19.26
2001-02	8.69
2002-03	27.86
2003-04	16.42
2004-05	59.01
2005-06	24.76
2006-07	8.08
2007-08	25.95
2008-09	14.54
2009-10	27.45
50-YEAR AVERAGE	**23.03**

*Station 169Z; data from Los Angeles County Department of Public Works

TABLE 3
CLIMATE

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Average Rainfall (in.)	4.93	5.55	3.77	1.61	0.54	0.25	0.0	0.1	0.46	0.8	2.18	2.78	23.03
Average Temperature (^{o}F)	54	54	56	59	61	69	72	77	76	70	61	57	63.8
Evapotranspiration (in.)	2.2	2.8	4.0	5.1	5.9	6.6	7.4	6.8	5.7	4.0	2.7	1.9	55.1

Source: Rainfall data from Los Angeles County Department of Public Works rainfall station 169Z (Sierra Madre Pumping Plant). Temperature data from www.city-data.com for San Gabriel Valley. Evapotranspiration data from California Irrigation Management Information System.

TABLE 4
CURRENT AND PROJECTED POPULATION

Year	Population of the City of Sierra Madre	Percent Average Annual Increase of the Population of the City's Service Area
2010	11,063	--
2015	11,084	0.04
2020	11,089	0.01
2025	11,094	0.01
2030	11,099	0.01

Source: Southern California Association of Governments (SCAG)

TABLE 5
PAST, CURRENT, AND PROJECTED WATER DELIVERIES

Year	Description	Water Use Sectors						Total
		Single Family Residential	Multi Family Residential	Commercial/Institutional	Industrial	Landscape Irrigation	Other	
2005	No. of Metered Accounts	3,318	354	155	12	28	0	3,867
	Metered Deliveries (AFY)	2,523	262	116	9	2	0	2,912
	No. of Unmetered Accounts	0	0	0	0	0	0	0
2009	No. of Metered Accounts	3,319	354	155	12	28	0	3,868
	Metered Deliveries (AFY)	1,818	284	142	568	28	0	2,841
	No. of Unmetered Accounts	0	0	0	0	0	0	0
2010	No. of Metered Accounts [1]	3,319	354	155	12	28	0	3,868
	Metered Deliveries (AFY) [2]	1,690	264	132	528	26	0	2,640
	No. of Unmetered Accounts	0	0	0	0	0	0	0
2015	No. of Metered Accounts [1]	3,345	354	155	12	28	0	3,894
	Metered Deliveries (AFY) [2]	1,800	281	141	563	28	0	2,813
	No. of Unmetered Accounts	0	0	0	0	0	0	0
2020	No. of Metered Accounts [1]	3,370	354	155	12	28	0	3,919
	Metered Deliveries (AFY) [2]	1,603	250	125	501	25	0	2,504
	No. of Unmetered Accounts	0	0	0	0	0	0	0
2025	No. of Metered Accounts [1]	3,370	354	155	12	28	0	3,919
	Metered Deliveries (AFY) [2]	1,603	251	125	501	25	0	2,505
	No. of Unmetered Accounts	0	0	0	0	0	0	0
2030	No. of Metered Accounts [1]	3,370	354	155	12	28	0	3,919
	Metered Deliveries (AFY) [2]	1,604	251	125	501	25	0	2,507
	No. of Unmetered Accounts	0	0	0	0	0	0	0

[1] Projected
[2] Projected total metered delivery from Table 7
AFY = acre-feet per year

TABLE 6
CALCULATION OF PROJECTED WATER DEMAND
(ACRE-FEET)

Fiscal Year	Projected Population [(1)]	Urban Water Use Target (GPCD) [(2)]	Projected Water Demand [(3)]
2014-15	11,084	236	2,930
2019-20	11,089	210	2,609
2024-25	11,094	210	2,610
2029-30	11,099	210	2,611

[(1)] See Table 4
[(2)] See Chapter 3.2 for urban water use target
[(3)] (Projected population) x (Urban Water Use Target)

GPCD = gallons per capita per day

TABLE 7
WATER DEMANDS – PAST, CURRENT, AND PROJECTED
(ACRE-FEET)

Fiscal Year	TOTAL DEMAND [1]	Delivery	Unaccounted Use [2]	Projected Water Demand for Lower Income Households [3]
2005-06	3,122	2,929	192	--
2006-07	3,716	3,568	149	--
2007-08	3,480	3,341	139	--
2008-09	3,162	3,100	61	--
2009-10	2,750	2,640	110	--
2014-15 [4]	2,930	2,813	117	289
2019-20 [4]	2,609	2,504	104	289
2024-25 [4]	2,610	2,505	104	289
2029-30 [4]	2,611	2,507	104	289

[1] See Table 9
[2] Historical unaccounted use = demand minus delivery
[3] Included in "Total Demand"
[4] Projected water demand from Table 6

TABLE 8
CALCULATION OF BASELINE DAILY PER CAPITA WATER USE

Water Use			Service Area Population		Per Capita Water Use		
						Average Per Capita Water Use	
Fiscal Year	Recorded Groundwater (Raymond Basin and Main Basin) and Tunnel Water Supply (acre-feet) [1]	Calculated Gross Water Use (gallons per day) [1]	Calendar Year	Population of City of Sierra Madre [2]	Calculated Daily Per Capita Water Use	10-Year Continuous [3]	5-Year Continuous [4]
1995-96	2,781	2,482,191	1996	10,450	238		
1996-97	3,013	2,689,650	1997	10,419	258		
1997-98	2,621	2,339,719	1998	10,447	224		
1998-99	2,901	2,589,937	1999	10,484	247		
1999-00	3,226	2,879,702	2000	10,578	272		
2000-01	3,050	2,722,947	2001	10,697	255		
2001-02	3,161	2,821,677	2002	10,846	260		
2002-03	2,966	2,647,962	2003	10,953	242		
2003-04	3,314	2,958,079	2004	11,034	268		
2004-05	2,903	2,591,098	2005	11,072	234	250	
2005-06	3,122	2,786,774	2006	10,975	254	251	
2006-07	3,716	3,317,562	2007	10,946	303	256	
2007-08	3,480	3,106,800	2008	11,051	281	262	268
2008-09	3,162	2,822,392	2009	11,083	255	262	265

10-Year Baseline Daily Per Capita Water Use = 262 gallons per capita per day. [5]
5-Year Baseline Daily Per Capita Water Use = 268 gallons per capita per day. [6]

[1] See Table 9.
[2] Source: California Department of Finance.
[3] Average per capita water use for first base period of 10-year continuous, ending no earlier than December 31, 2004 and no later than December 31, 2010.
[4] Average per capita water use for second base period of 5-year continuous, ending no earlier than December 31, 2007 and no later than December 31, 2010.
[5] Highest value calculated for a 10-year continuous period between 1995-96 and 2008-09.
[6] Highest value calculated for a 5-year continuous period between 2003-04 and 2008-09.

TABLE 9
WATER SUPPLIES – PAST, CURRENT, AND PROJECTED
(ACRE-FEET)

Fiscal Year	Supply Sources					TOTAL
	Groundwater				Tunnel Water [2]	
	Raymond Basin	Main Basin [1]	Raymond Basin and Main Basin Subtotal	Percent of Total Supply		
1995-96	2,269	0	2,269	82	512	2,781
1996-97	2,553	0	2,553	85	460	3,013
1997-98	2,244	0	2,244	86	377	2,621
1998-99	2,302	0	2,302	79	599	2,901
1999-00	2,897	0	2,897	90	329	3,226
2000-01	2,756	0	2,756	90	295	3,050
2001-02	2,969	0	2,969	94	192	3,161
2002-03	2,763	0	2,763	93	204	2,966
2003-04	3,230	0	3,230	97	84	3,314
2004-05	2,043	247	2,290	79	612	2,903
2005-06	2,402	54	2,456	79	666	3,122
2006-07	3,418	0	3,418	92	299	3,716
2007-08	3,160	0	3,160	91	320	3,480
2008-09	2,954	0	2,954	93	208	3,162
2009-10	2,525	0	2,525	92	225	2,750
2014-15 [3]	2,579	0	2,579	88	352	2,930
2019-20 [3]	2,296	0	2,296	88	313	2,609
2024-25 [3]	2,297	0	2,297	88	313	2,610
2029-30 [3]	2,298	0	2,298	88	313	2,611

[1] Groundwater pumped by the City of Arcadia and delivered to the City of Sierra Madre through an interconnecting pipeline; no projected water supply from Main Basin

[2] Tunnel water from Santa Anita Canyon

[3] See Table 7 for total projected supply; projected Raymond Basin and Main Basin Subtotal, and Tunnel Water supply based on average historical supply for Raymond Basin and Main Basin Subtotal, and Tunnel Water, which are as follows:

Raymond Basin and Main Basin Subtotal:	88 %
Tunnel Water:	12 %
TOTAL	100 %

TABLE 10
RECYCLED WATER – WASTEWATER COLECTION AND TREATMENT

Type of Wastewater	2004-05	2009-10 [1]	2014-15 [2]	2019-20 [2]	2024-25 [2]	2029-30 [2]
San Jose Creek Water Reclamation Plant						
Wastewater Collected and Treated	90,886	79,615	85,000	85,000	85,000	85,000
Volume that Meets Recycled Water Standards	90,886	79,615	85,000	85,000	85,000	85,000
Whittier Narrows Water Reclamation Plant						
Wastewater Collected and Treated	8,555	6,769	8,000	8,000	8,000	8,000
Volume that Meets Recycled Water Standards	8,555	6,769	8,000	8,000	8,000	8,000

[1] 2009-10 is represented by fiscal year 2008-09.
[2] Projected – based on average of 2004-05 and 2009-10.
Source: Sanitation Districts of Los Angeles County's fiscal year "Status Report on Recycled Water."

TABLE 11
RECYCLED WATER – NON-RECYCLED WASTEWATER DISPOSAL

Method of Disposal	Treatment Level	Volume (acre-feet)					
		2004-05	2009-10 [1]	2014-15 [2]	2019-20 [2]	2024-25 [2]	2029-30 [2]
San Jose Creek Water Reclamation Plant							
Discharge to San Gabriel River/Rio Hondo	Disinfected Tertiary	66,378	50,223	58,000	58,000	58,000	58,000
Whittier Narrows Water Reclamation Plant							
Discharge to San Gabriel River/Rio Hondo	Disinfected Tertiary	1,784	156	1,000	1,000	1,000	1,000

[1] 2009-10 is represented by fiscal year 2008-09.
[2] Projected – based on average of 2004-05 and 2009-10.
Source: Sanitation Districts of Los Angeles County's fiscal year "Status Report on Recycled Water."

TABLE 12
WATER SHORTAGE CONTINGENCY – MANDATORY PROHIBITIONS

Prohibition	Water Shortage Stage
No washing of sidewalks, walkways, patios, driveways, or parking areas using a water hose.	I through VI
No water shall be used to clean, fill or maintain water levels in decorative fountains unless such water is part of a recycling system.	I through VI
No restaurant, café, deli, or other public place where food is sold, served or offered for sale, shall serve drinking water to any customer unless expressly requested by the customer.	I through VI
No customer of the water department shall permit water to leak from any facilities on the premises.	I through VI
No lawn, landscaping, or othe turf area shall be watered or irrigated between the hours of ten a.m. and four p.m.	I through VI
No lawn landscape, or turf area shall be watered in a wasteful manner, nor shall any water be wasted if the existing conditions may be corrected or reasonably modified.	I through VI

TABLE 13
WATER SHORTAGE CONTINGENCY – CONSUMPTION REDUCTION METHODS

Consumption Reduction Method	Water Shortage Stage	Projected Reduction
Customer Water Curtailment	II [1]	10 percent
Customer Water Curtailment	III [2]	15 percent
Customer Water Curtailment	IV [3]	20 percent
Customer Water Curtailment	V [4]	24 percent
Customer Water Curtailment	VI [5]	36 percent

[1] Phase II, Customer Water Curtailment by 10 Percent – Mandatory Rationing: This restricts the customer from using water for any purpose in excess of 90 percent of the amount used during the base period. The base period is defined as 1989 consumption data.

[2] Phase III, Customer Water Curtailment by 15 Percent – Mandatory Rationing: This restricts the customer from using water for any purpose in excess of 85 percent of the amount used during the base period.

[3] Phase IV, Customer Water Curtailment by 20 Percent – Mandatory Rationing: This restricts the customer from using water for any purpose in excess of 80 percent of the amount used during the base period.

[4] Phase V, Customer Water Curtailment Based on 2,064 Acre-feet of Water Available – Mandatory Rationing: This restricts the customer from using water for any purpose in excess of the base period allocation which may be approximately 24 percent, or as specifically determined for each property or site.

[5] Phase VI, Customer Water Curtailment Based on 1,764 Acre-feet of Water Available – Mandatory Rationing: This restricts the customer from using water for any purpose in excess of the base period allocation which may be approximately 36 percent, or as specifically determined for each property or site.

TABLE 14
WATER SHORTAGE CONTINGENCY – PENALTIES AND CHARGES

Penalties or Charges	Stage When Penalty Takes Effect
First Violation – surchage penalty in the amount of twice the current water rate per one hundred cubic feet of water or billing units	Phases I through VI
Second Violation – penalty equal to 100 percent of the penalty set for First Violation	Phases I through VI
Third Violation – water restrictor to be installed behind water meter, with the fee schedule for any cost of installation and removal of the flow restrictor(s) devices	Phases I through VI
Violation by Willful Misrepresentation – punishable by a fine not to exceed $500, or by imprisonment in the county jail for a period not to exceed six months, or by both such fine and imprisonment.	Phases I through VI

TABLE 15
SUPPLY RELIABILITY – HISTORICAL CONDITIONS
(ACRE-FEET)

	Average/ Normal Water Year (2005-06)	Single Dry Water Year (2006-07)	Multiple Dry Water Years		
			Year 1 (2006-07)	Year 2 (2007-08)	Year 3 (2008-09)
Supply [1]	3,122	3,716	3,716	3,480	3,162
Percent of Normal Year Supply	--	119.05	119.05	111.48	101.28
Demand [2]	3,122	3,716	3,716	3,480	3,162
Percent of Normal Year Demand	--	119.05	119.05	111.48	101.28

[1] See Table 9
[2] See Table 7

TABLE 16
WATER SHORTAGE CONTINGENCY –
RATIONING STAGES TO ADDRESS WATER SUPPLY SHORTAGES

Stage No.	Water Supply Condition	Percent Shortage
Phase I	Voluntary Rationing	Up to 10%
Phase II	Mandatory Rationing	10 - 15%
Phase III	Mandatory Rationing	15 - 20%
Phase IV	Mandatory Rationing	20 - 24%
Phase V	Mandatory Rationing	24 - 36%
Phase VI	Mandatory Rationing	$\geq$ 36%

TABLE 17
SUPPLY RELIABILITY – CURRENT WATER SOURCES
(ACRE-FEET)

Sources of Supply	Normal Year (2005-06[1])	Multiple Dry Year Supply		
		Year 2011 [2]	Year 2012 [2]	Year 2013 [2]
Raymond Basin	2,402	3,418	3,160	2,954
Main Basin	54	0	0	0
Tunnel Water	666	299	320	208
Total Supply	3,122	3,716	3,480	3,162

[1] See Table 9

[2] See Table 15 for percent of normal year applicable to total supply;
percent of normal year for individual sources of supply calculated in a similar manner

TABLE 18
SUPPLY AND DEMAND COMPARISON – NORMAL YEAR
(ACRE-FEET)

	2015	2020	2025	2030
Supply Total [1]	2,930	2,609	2,610	2,611
Demand Total [2]	2,930	2,609	2,610	2,611
Difference (Supply minus Demand)	0	0	0	0
Difference as Percent of Supply	0	0	0	0
Difference as Percent of Demand	0	0	0	0

[1] See Table 9, last column

[2] Based on Urban Water Use Targets of 236 gallons per capita per day (GPCD) in 2015 and 210 GPCD in 2020. See Table 7

TABLE 19
SUPPLY AND DEMAND COMPARISON – SINGLE DRY YEAR
(ACRE-FEET)

	2015	2020	2025	2030
Supply Total [1]	3,488	3,106	3,107	3,108
Demand Total [2]	3,488	3,106	3,107	3,108
Difference (Supply minus Demand)	0	0	0	0
Difference as Percent of Supply	0	0	0	0
Difference as Percent of Demand	0	0	0	0

[1] Based on ratio between Normal Water Year with Single-Dry Year. See Tables 9 and 15
[2] Based on ratio between Normal Water Year with Single-Dry Year. See Tables 7 and 15

TABLE 20
SUPPLY AND DEMAND COMPARISON – MULTIPLE DRY-YEAR EVENTS
(ACRE-FEET)

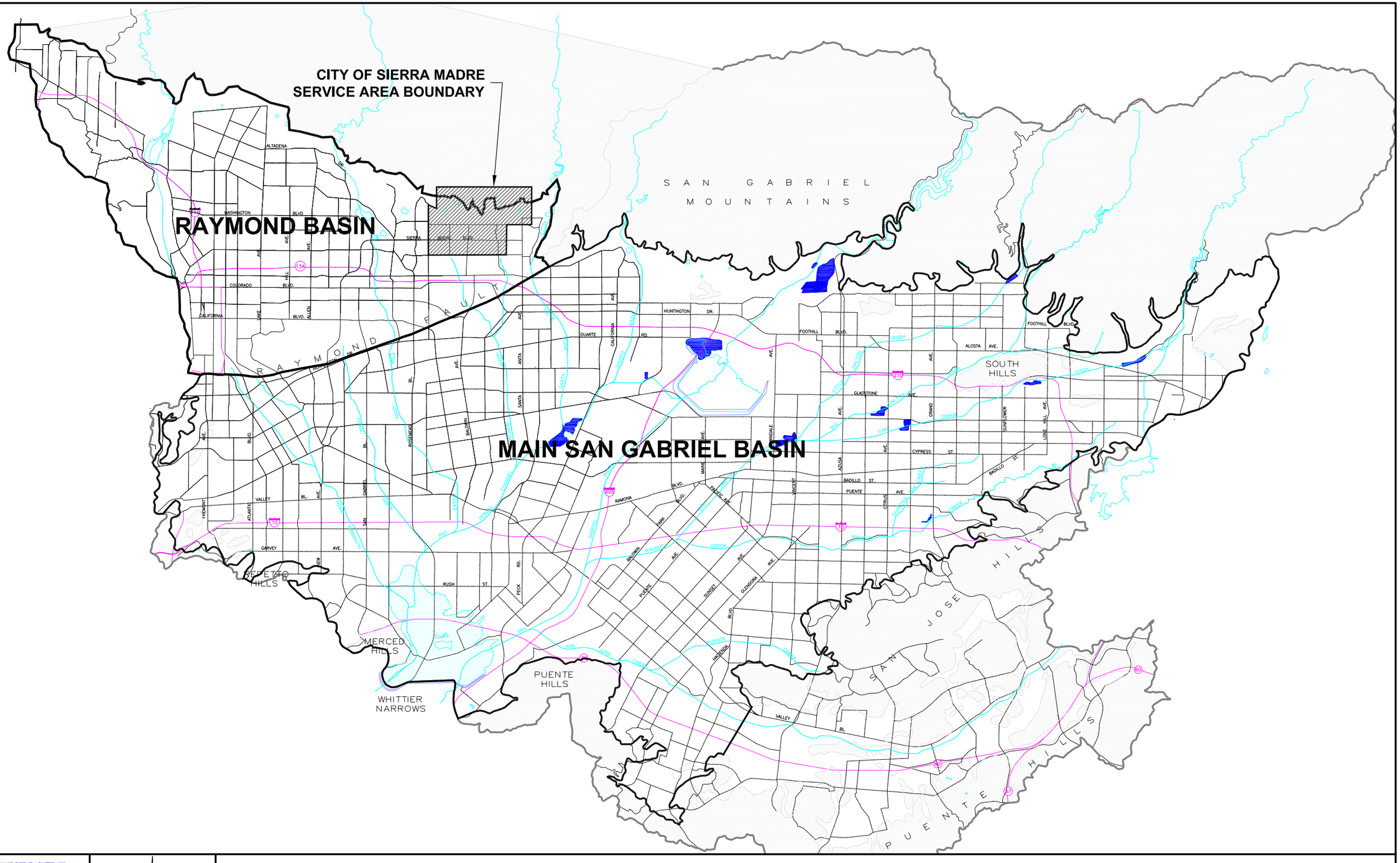
		2015	2020	2025	2030
Multiple-Dry Year First Year Supply	Supply Total [1]	3,274	3,488	3,106	3,107
	Demand Total [2]	3,274	3,488	3,106	3,107
	Difference (Supply minus Demand)	0	0	0	0
	Difference as Percent of Supply	0	0	0	0
	Difference as Percent of Demand	0	0	0	0
Multiple-Dry Year Second Year Supply	Supply Total [1]	3,066	3,267	2,908	2,910
	Demand Total [2]	3,066	3,267	2,908	2,910
	Difference (Supply minus Demand)	0	0	0	0
	Difference as Percent of Supply	0	0	0	0
	Difference as Percent of Demand	0	0	0	0
Multiple-Dry Year Third Year Supply	Supply Total [1]	2,785	2,968	2,642	2,643
	Demand Total [2]	2,785	2,968	2,642	2,643
	Difference (Supply minus Demand)	0	0	0	0
	Difference as Percent of Supply	0	0	0	0
	Difference as Percent of Demand	0	0	0	0

[1] Based on ratio between Normal Water Year with Multiple Dry Years. See Tables 9 and 15
[2] Based on ratio between Normal Water Year with Multiple Dry Years. See Tables 7 and 15

TABLE 21
DISTRIBUTION OF ULTRA-LOW-FLUSH TOILETS

Year	Number of Ultra-Low-Flush Toilets Distributed
2000	84
2001	92
2002	75
2003	66
2004	81
2005	60
2006	47
2007	36
2008	36
2009	49
2010	46
TOTAL	672

PLATES



STETSON ENGINEERS INC.

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FAX: (626) 331-7065

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San Rafael California 94901

2651 W Guadalupe Rd., Sulte A209
Mesa Arizona 85202

N

APPROXIMATE SCALE
0 5,500' 11,000'

CITY OF SIERRA MADRE

LOCATION MAP

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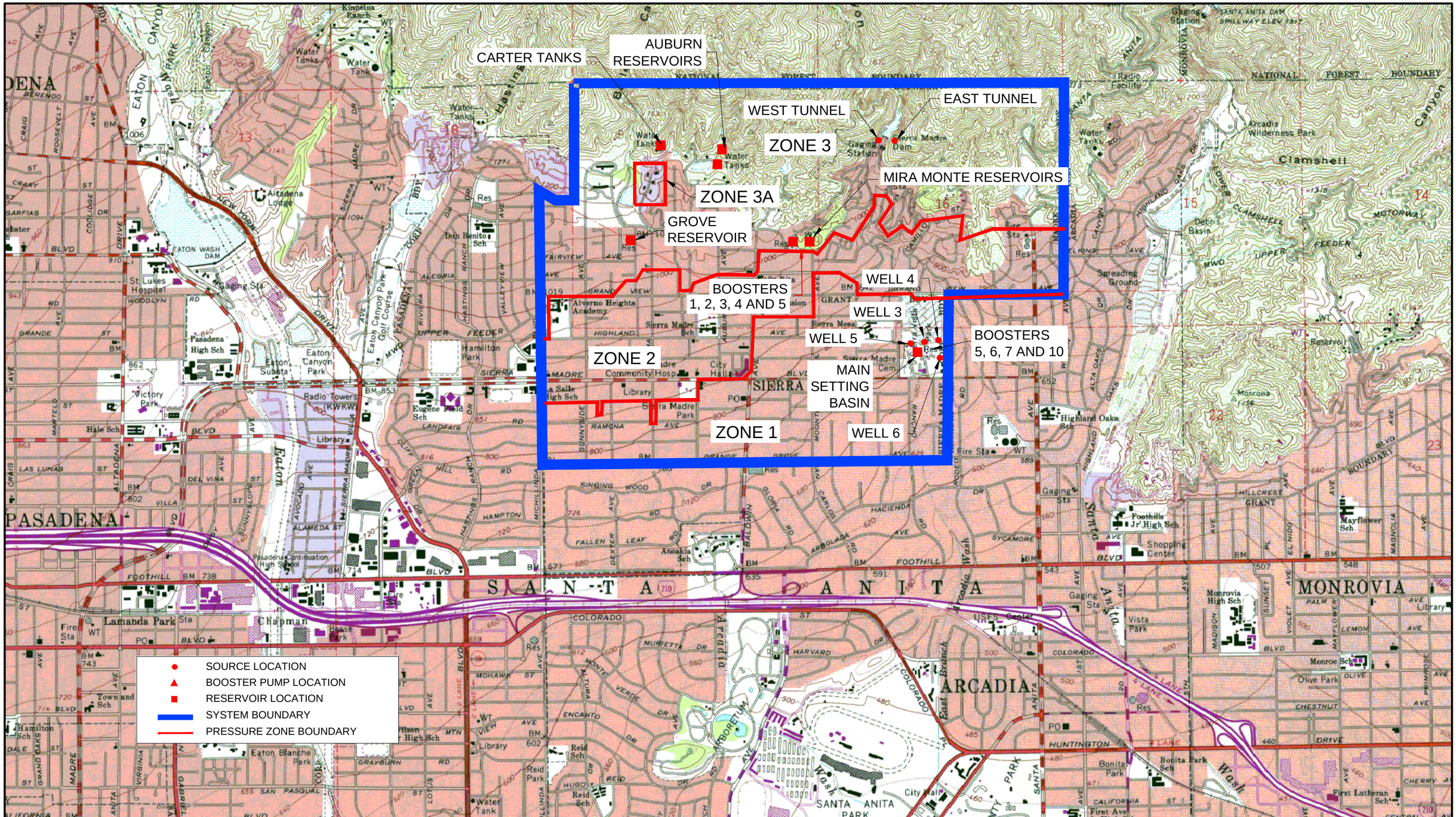

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2651 W Guadalupe Rd., Suite A209
Mesa Arizona 85202

N

APPROXIMATE SCALE
0 1,000' 2,000'

CITY OF SIERRA MADRE

WATER SYSTEM MAP

F:\JOBS\2370\Plates\PLATE 2.DWG
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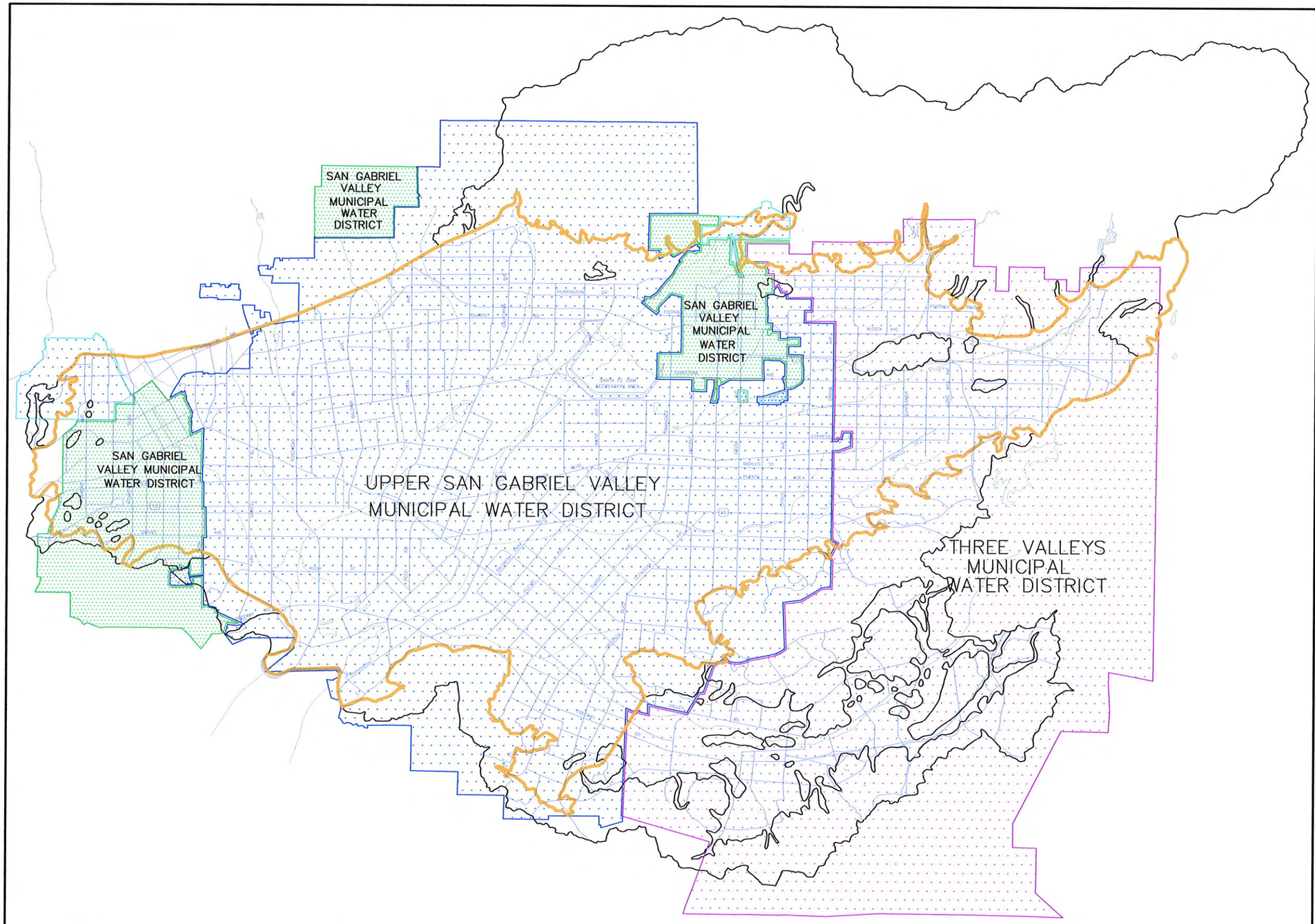

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APPROXIMATE SCALE

0 6,000' 12,000'

LEGEND

- SAN GABRIEL VALLEY MUNICIPAL WATER DISTRICT
- THREE VALLEYS MUNICIPAL WATER DISTRICT
- UPPER SAN GABRIEL VALLEY MUNICIPAL WATER DISTRICT
- MAIN SAN GABRIEL BASIN BOUNDARY

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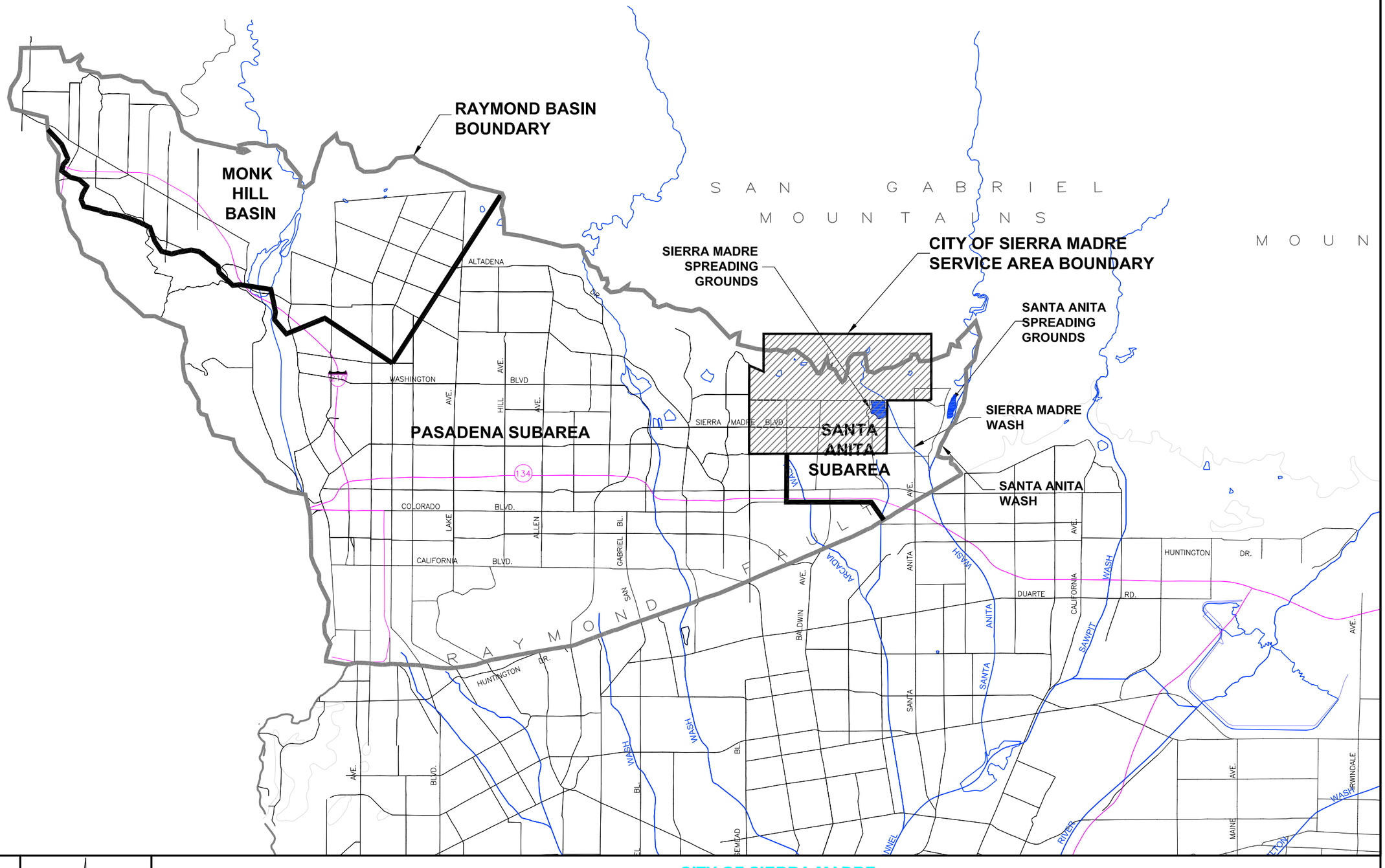
CITY OF SIERRA MADRE

WATER DISTRICT BOUNDARIES
MAIN SAN GABRIEL BASIN

F:\JOBS\2370\Plates\PLATE 3.DWG
F:\JOBS\1046\1046-17\PLATE 1.PC2



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N

APPROXIMATE SCALE
0 3,250' 6,500'

CITY OF SIERRA MADRE

RAYMOND BASIN

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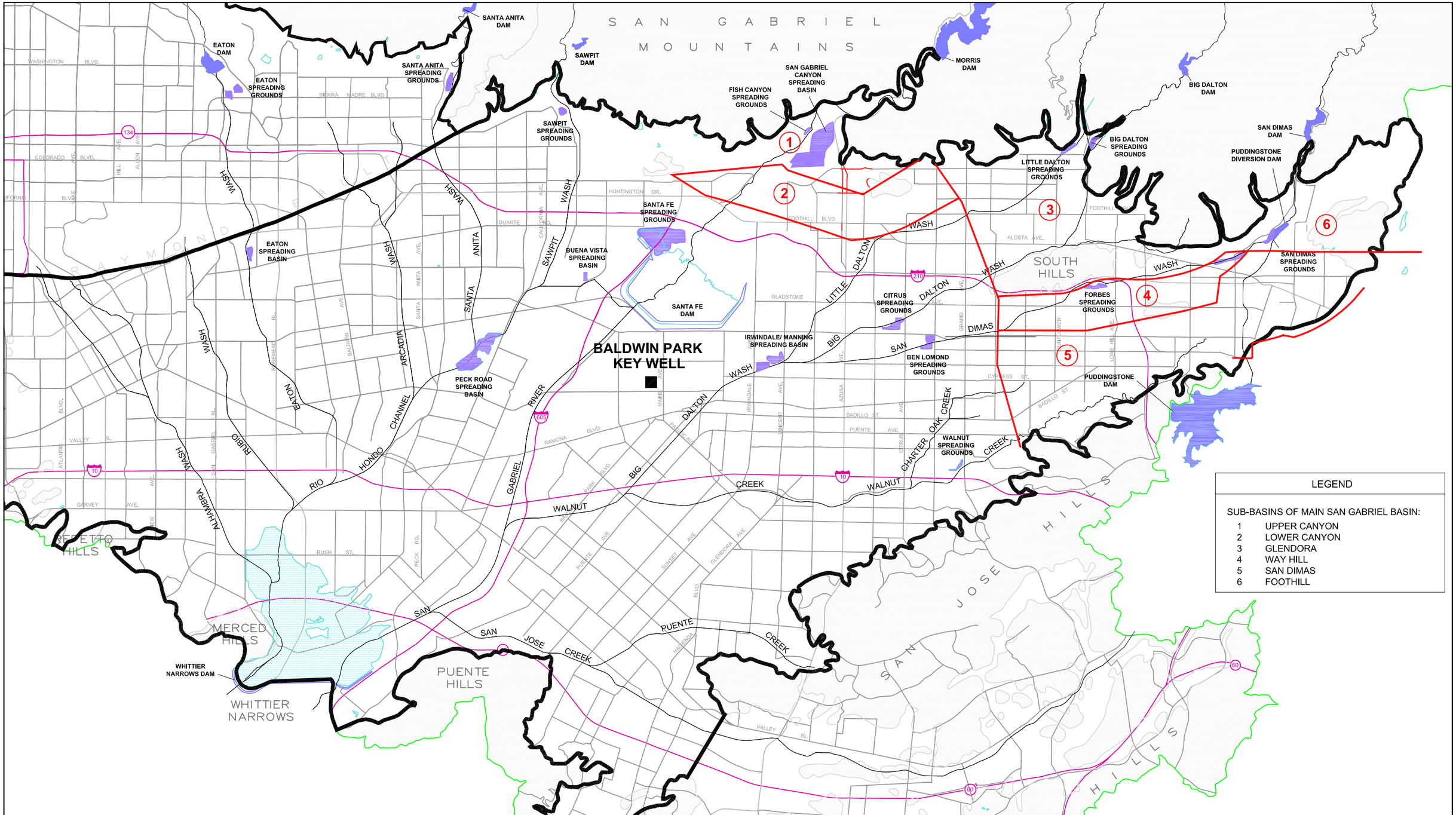

LEGEND	
SUB-BASINS OF MAIN SAN GABRIEL BASIN:	
1	UPPER CANYON
2	LOWER CANYON
3	GLENDORA
4	WAY HILL
5	SAN DIMAS
6	FOOTHILL

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N

APPROXIMATE SCALE
0 4,000' 8,000'

CITY OF SIERRA MADRE

LOCATION OF SUB-BASINS, SPREADING GROUNDS AND WATER CHANNELS MAIN SAN GABRIEL BASIN

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