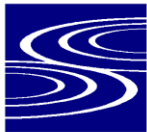


**MAIN SAN GABRIEL BASIN WATERMASTER  
REPORT ON  
PRELIMINARY DETERMINATION OF  
OPERATING SAFE YIELD  
FOR 2016-17 THROUGH 2020-21**

**APRIL 6, 2016**



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**MAIN SAN GABRIEL BASIN WATERMASTER  
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FOR 2016-17 THROUGH 2020-21**

**April 6, 2016**

**INTRODUCTION**

Operating Safe Yield is the quantity of water which the Main San Gabriel Basin Watermaster (Watermaster) determines may be pumped from the Main San Gabriel Basin (Basin) in a fiscal year, free of Replacement Water assessments. In accordance with Section 43 of the amended Main San Gabriel Basin Judgment<sup>1</sup>, Watermaster at its regular meeting in May of each year determines the Operating Safe Yield applicable to the succeeding fiscal year and estimates the Operating Safe Yield for the next succeeding four fiscal years.

A report on the Preliminary Determination of Operating Safe Yield is submitted by its Engineer to Watermaster at its regular meeting in April each year. On acceptance of that report by Watermaster, a copy is distributed to each Pumper and Integrated Producer at least 10 days prior to a hearing, which is held at the regular meeting of Watermaster in May each year. Objections, comments or suggested modifications to the preliminary Operating Safe Yield are considered by Watermaster at that hearing and Watermaster, through vote of its Board members, adopts the final Operating Safe Yield.

**BASIN OPERATING CRITERIA**

Section 42 of the amended Judgment states in part, "**... Watermaster shall recharge Replacement Water in accordance with the Watermaster Operating Criteria and, insofar as practicable, to maintain the water level at the Key Well above Elevation two hundred (200).**" Replacement Water is defined in Section 10 (cc) of the Judgment as "Water purchased by Watermaster to replace: (1) Production in excess of a Pumper's Share of Operating Safe Yield; (2) The consumptive use portion resulting from the exercise of an Overlying Right; and (3) Production in excess of a Diverter's right to Divert for Direct Use". In addition, Producers and Responsible Agencies may deliver Supplemental Water into their respective Cyclic Storage accounts as a pre-delivery of Replacement Water. Delivery of Supplemental Water is the only mechanism specified in the Judgment for management of groundwater levels. The Operating Safe Yield that is established in May of each year results in a Replacement Water requirement (net of any withdrawals from Producer Cyclic Storage accounts) that is delivered (at the earliest) in October of the second fiscal year, a span of about 17

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<sup>1</sup> Upper San Gabriel Valley Municipal Water District vs. City of Alhambra, et al, Case No. 924128, Los Angeles County, as amended June 21, 2012.

months, and possibly not until the following June, a span of 26 months, assuming imported Supplemental Water is available. In that time frame, the actual hydrologic conditions experienced may have had significant impacts on the Basin groundwater elevation. Therefore, it is prudent to conservatively manage the Basin and assure that Replacement Water assessment funds are appropriately collected and available for the purchase of Supplemental Water to provide for Basin replenishment.

Watermaster evaluates numerous factors when determining the Operating Safe Yield. The most critical factors are the provisions of the Judgment and the current and projected groundwater elevation at the Baldwin Park Key Well (Key Well), which represents the water stored in the Basin. Watermaster also reviews historical and current hydrologic conditions within the Basin, such as rainfall, storage of local runoff in surface reservoirs and conservation of local runoff; the availability of Supplemental Water; the quantity of water in Cyclic Storage; Carry-over Rights; and other information. Presented in Table 1 is the history of the annual Operating Safe Yield, Carry-over Rights, Lost Carry-over Rights, Production Rights, Water Production, and Replacement Water Requirement for each year of Watermaster operations beginning with fiscal year 1973-74.

## **GROUNDWATER ELEVATIONS**

Exhibit H, Section 2 of the amended Judgment states in part “Watermaster in determining Operating Safe Yield and the importation of Replacement Water shall be guided by water level elevations in the Basin.” The following describes the groundwater elevation at the Baldwin Park Key Well and at other “key wells” located throughout the Basin. It should be noted that under current conditions, even if rainfall conditions for the balance of fiscal year 2015-16 provide average precipitation, the Key Well, and Basin storage will likely still decline. This is due to the low storage in local reservoirs and minimal local snowpack.

### **Baldwin Park Key Well**

The Key Well is located in the central portion of the Basin, as shown in Plate 1. It has been successfully used to represent basin-wide groundwater elevation trends. A one-foot groundwater elevation change at the Key Well is estimated to represent approximately 8,000 acre-feet of water in storage. Figure 1 is a hydrograph showing the groundwater elevation at the Key Well and annual rainfall at San Gabriel Dam since October 1, 1937. Figure 1 shows the measured groundwater elevation at the Key Well and includes stored Supplemental Water (Cyclic Storage and Water Resource Development Assessment deliveries), which is used for future Replacement Water obligations. The operational groundwater elevation at the Key Well excludes the stored Supplemental Water from the measured Key Well elevation and is used throughout this Report to characterize “natural” groundwater elevations for the purposes of establishing an Operating Safe Yield. The highest operational groundwater elevation at the Key Well, since entry of the Judgment, occurred on July 20, 1983 at 294.1 feet at which time 9,900 acre-feet (about one foot) were in Cyclic Storage. The historical low groundwater

elevation at the Key Well, since entry of the Judgment, occurred on November 13, 2015 at 164.7 feet at which time 74,800 acre-feet (about nine feet) were in Cyclic Storage. On March 25, 2016 the operational groundwater elevation at the Key Well was 170.4 feet (measured at 177.8 feet, as shown on Figure 2), at which time 59,300 acre-feet (about 7 feet) were in Cyclic Storage.

Rainfall in the San Gabriel Valley has been below the long-term annual average of about 18 inches since fiscal year 2010-11, a period of five (5) consecutive years. Rainfall at the end of fiscal year 2010-11 was 19.45 inches, as measured at Puddingstone Dam, and the operational groundwater elevation of the Key Well was 227.9 feet (measured at 233.5 feet) as of June 24, 2011, as shown on Figure 2 and on Table 2. The next five consecutive fiscal years (2011-12, 2012-13, 2013-14, 2014-15, and 2015-16) have been below average rainfall years and resulted in rainfall of 12.06 inches, 7.84 inches, 4.77 inches, 7.90 and 9.58 inches (as of February 29, 2016), respectively, as measured at Puddingstone Dam. (The long-term annual average is 18.10 inches.) As a result of five consecutive years of below average rainfall, the operational groundwater elevation at the Key Well decreased from 227.9 feet (measured at 233.5 feet) on June 24, 2011 to 170.4 feet (measured at 177.8 feet) on March 25, 2016, a decrease of about 58 feet, as shown on Figure 2 and Table 2. This is a loss of about 464,000 acre-feet of water from Basin storage of which about 237,000 acre-feet were withdrawn from storage at a time when the Key Well elevation was below the “low” operating range of 200 feet identified in the Judgment. (One foot of elevation at the Key Well is estimated to represent about 8,000 acre-feet of water in storage). As specified in Section 42 of the amended Judgment, the Watermaster, to the extent practical, shall manage the Basin to maintain the groundwater elevation at the Key Well above 200 feet.

Assuming the Operating Safe Yield is 150,000 AF, supplemental water is available and delivered during FY 2016-17, and based on historical trends, the operational groundwater elevation is projected to remain stable during an average year (about 18 inches of rainfall), and decrease by about 7 feet during a dry year (about 12 inches of rainfall). Thus far during fiscal year 2015-16, rainfall at Puddingstone Dam has been about 9.6 inches (dry year) which is about 73 percent of average, through February 29, 2016. Assuming the below-average rainfall continues in March and April, the operational groundwater elevation at the Key Well could decrease by about seven feet and fall to about 163 feet (measured at about 170 feet) by September 2016, which is 37 feet (about 300,000 acre-feet) below the minimum Operating Criteria of 200 feet.

### **Other “Key Wells”**

While the operational groundwater elevation at the Baldwin Park Key Well has decreased by 58 feet from 227.9 feet on June 24, 2011 to 170.4 feet on March 25, 2016, (the measured groundwater elevation has decreased by 55 feet from 233.5 feet on June 24, 2011 to 177.8 feet on March 25, 2016) the change in groundwater elevations in other parts of the Basin has been less significant. A well location map showing other “Key Wells” is included as Plate 1 and hydrographs of groundwater elevations at four

other wells located throughout the Basin (compared to the measured Baldwin Park Key Well groundwater elevation) are included in Appendix A. San Gabriel County Water District Well 10 is located westerly of the Baldwin Park Key Well, County of Los Angeles Well No. 2947F is located southerly of the Baldwin Park Key Well in the vicinity of Whittier Narrows, Suburban Water Systems Well 155W-2 is located in the vicinity of the Puente Narrows and Valencia Heights Water Company Well No. 5 is located southeasterly of the Baldwin Park Key Well. In general, groundwater elevations at each of the four monitoring wells in the Basin react (both upward and downward) in a comparable but less dramatic manner as the Baldwin Park Key Well. As shown on the hydrographs in Appendix A, the groundwater elevations at these wells generally do not increase as high as the Baldwin Park Key Well during wet periods (with significant groundwater replenishment), but also do not have as significant of a decrease during dry periods with less groundwater replenishment.

## **RAINFALL**

Rainfall in the San Gabriel River watershed provides direct percolation and results in local stormwater runoff which is subsequently percolated in spreading facilities and contributes to Basin replenishment. Precipitation amounts vary throughout the San Gabriel River watershed and typically are highest in the foothills and mountains. Precipitation recorded at San Gabriel Dam, the City of Pasadena and Puddingstone Dam, are described below. The locations of these rainfall stations are shown on Plate 1.

### **San Gabriel Dam - Station 425B-E**

Rainfall at San Gabriel Dam, which is located in the upper watershed and not on the valley floor, was about 15.39 inches for the period July 1, 2015 through February 29, 2016, or about 72 percent of average for that period. Rainfall for the period of July 1, 2015 through March 31, 2016, is estimated to be about 18.3 inches, or about 69 percent of average. Assuming average rainfall for the remainder of the year, the total annual rainfall could be about 21 inches, or total about 71 percent of average. During fiscal year 2011-12, rainfall was 17.16 inches or about 58 percent of average. During fiscal year 2012-13, rainfall was 12.97 inches or about 44 percent of average. During fiscal year 2013-14, rainfall was 13.71 inches or about 46 percent of average. During fiscal year 2014-15, rainfall was 15.20 inches or about 52 percent of average. Figure 3 shows the cumulative rainfall during fiscal years 2011-12, 2012-13, 2013-14, 2014-15, for the period July 2015 through February 2016, and the long-term average rainfall at San Gabriel Dam.

### **Pasadena City Hall - Station 610B**

Rainfall at the Pasadena City Hall was 10.01 inches for the period July 1, 2015 through February 29, 2016, or about 67 percent of average for that period. Rainfall for the period of July 1, 2015 through March 31, 2016, is estimated to be about 12.5 inches, or about 69 percent of average. Assuming average rainfall for the remainder of the year, the total annual rainfall would be about 15 inches, or total about 74 percent of average.



During fiscal year 2011-12, rainfall was 14.47 inches or about 71 percent of average. During fiscal year 2012-13, rainfall was 9.46 inches or about 47 percent of average. During fiscal year 2013-14, rainfall was 8.64 inches or about 43 percent of average. During fiscal year 2014-15, rainfall was 14.66 inches or about 72 percent of average. Figure 4 shows the cumulative rainfall during fiscal years 2011-12, 2012-13, 2013-14, 2014-15, for the period July 2015 through February 2016, and the long-term average rainfall at the Pasadena City Hall.

### **Puddingstone Dam - Station 96C**

Rainfall at Puddingstone Dam was 9.58 inches for the period July 1, 2015 through February 29, 2016, or about 73 percent of average for that period. Rainfall for the period of July 1, 2015 through March 31, 2016, is estimated to be about 11.4 inches, or about 71 percent of average. Assuming average rainfall for the remainder of the year, the total annual rainfall would be about 13 inches, or total about 72 percent of average. During fiscal year 2011-12, rainfall was 12.06 inches or about 67 percent of average. During fiscal year 2012-13, rainfall was 7.84 inches or about 43 percent of average. During fiscal year 2013-14, rainfall was 4.77 inches or about 26 percent of average. During fiscal year 2014-15, rainfall was 7.90 inches or about 44 percent of average. Figure 5 shows the cumulative rainfall during fiscal years 2011-12, 2012-13, 2013-14, 2014-15, for the period July 2015 through February 2016, and the long-term average rainfall at Puddingstone Dam.

Precipitation in the San Gabriel River watershed during fiscal year 2015-16, through the end of February 2016, was about 70 percent of average. Based on precipitation, fiscal year 2015-16 is a below-average year for rainfall. The average annual rainfall at Puddingstone Dam over the past four consecutive years has been about 8 inches which is about 44 percent of the long-term average annual rainfall. This represents the fifth consecutive year where the rainfall in the San Gabriel watershed is below the long-term average annual rainfall, and cumulatively the last five years are about 50 percent of long-term average rainfall.

Fiscal year 2015-16 has been characterized as an “El Niño” condition. An El Niño is characterized by warming of sea surface temperatures across the Central Equatorial Pacific and may result in above-average rainfall in Southern California. According to the National Oceanic and Atmospheric Administration’s (NOAA) El Niño Advisory report issued on March 10, 2016, “seasonal outlooks for March – May indicate an increased likelihood of above-median precipitation across the southern tier of the United States...” Thus far, the El Niño conditions have not resulted in above-average rainfall within Southern California and the San Gabriel Valley.

### **LOCAL WATER IN SURFACE STORAGE RESERVOIRS**

Water in surface reservoirs located on streams tributary to the Basin is stored by the Los Angeles County, Department of Public Works (DPW). This local runoff water is

later released to the San Gabriel River system either for direct delivery to users or for replenishment of the groundwater Basin.

Table 3 shows the maximum reservoir storage capacity and the quantities of water in storage in surface reservoirs tributary to the San Gabriel Valley on March 16, 2015 and on March 21, 2016. Also shown are the current recorded inflow and outflow rates at the reservoirs on March 21, 2016. The total amount of local water stored in surface reservoirs in the San Gabriel Valley as of March 21, 2016, was about 21,500 acre-feet (about 18 percent of capacity), which is a decrease of about 2,700 acre-feet in storage compared to March 16, 2015 (25,200 – 21,500). DPW indicates it maintains a minimum pool in Cogswell, San Gabriel and Morris Reservoirs representing about 10,500 acre-feet. In addition, water in Puddingstone Reservoir (about 7,100 acre-feet) is maintained for recreational purposes. Consequently, of the 22,500 acre-feet in storage, only about 4,900 acre-feet (22,500 – 10,500 – 7,100) are available for direct use or groundwater replenishment. Consequently, no surface water runoff along the San Gabriel River is being diverted for replenishment at this time for the benefit of the Basin, nor is surface water runoff stored in Cogswell, San Gabriel and Morris Reservoirs expected to be available for Basin replenishment through the end of 2016 as a result of the below average rainfall.

### **LOCAL AND IMPORTED WATER CONSERVED**

The amount of local water conserved, which is typically the primary component of Basin replenishment, is dependent upon the amount of precipitation on the tributary watershed, resulting runoff, and the subsequent water replenishment activities of DPW. Historically, when the Basin experiences average to above-average precipitation, it results in a larger amount of local water available to replenish the Basin and the groundwater elevation increases. Examples of this relationship are shown on Figure 1 (see 1977-78, 1982-83, and 2004-05). The occurrence and duration of annual rainfall is also an important factor. For example, a large amount of rainfall over a short period of time may result in limited replenishment to the Basin due to surface flows exceeding water spreading capabilities and even flow of local runoff to the ocean. Also, rainfall that follows severe dry periods will often result in lower runoff amounts due to local, dry soil replenishing effects and resulting reduced runoff.

Rainfall in the Basin watershed during fiscal year 2015-16 has been about 70 percent of average through February 29, 2016. Although DPW replenishment records are incomplete this time of year, preliminary data indicate approximately 21,700 acre-feet (only 21 percent of average) of local runoff was replenished in the Basin between October 1, 2015 and February 29, 2016. The average annual local water Basin replenishment is about 103,000 acre-feet. In addition, about 20,200 acre-feet of untreated imported water (Supplemental Water) was replenished in the Basin for a total Basin replenishment of about 41,900 acre-feet.

Table 4 summarizes the annual rainfall, local and imported water replenished, and measured and operational groundwater elevations at the Key Well since the inception of Watermaster operations.

## **SUPPLEMENTAL WATER AVAILABILITY**

Section 10 of the amended Judgment defines Supplemental Water as “Nontributary water imported through a Responsible Agency.” Upper San Gabriel Valley Municipal Water District (Upper District), Three Valleys Municipal Water District (Three Valleys District) and San Gabriel Valley Municipal Water District (San Gabriel District) are the Responsible Agencies which deliver Supplemental Water to the Basin. Upper District and Three Valleys District are member agencies of Metropolitan Water District of Southern California (MWD). The San Gabriel District is a State Water Project contractor. The following describes the availability of Supplemental Water from MWD and San Gabriel District.

### **Metropolitan Water District of Southern California**

MWD primarily receives its water supply from the State Water Project (SWP) and the Colorado River. Below is a description of the availability of water from MWD.

#### **Availability of Imported Water**

An “8-station index” is used by the California Department of Water Resources (DWR) to determine average precipitation in the Sacramento River hydrologic region of northern California, which is the source of much of the imported water supply to the Basin. Through February 29, 2016, the “8-station index” indicated average precipitation of 34.33 inches or about 98 percent of average for that time of year, while rainfall in the San Gabriel Valley was about 70 percent of average (through February 29, 2016).

On December 1, 2015, DWR announced the 2016 initial allocation of SWP water was 10 percent of the contractors’ Table A entitlement. As stated in DWR’s Notice to State Water Project Contractors, at that time “DWR considered several factors including California’s persistent drought and resulting low storage in SWP conservation facilities, SWP operational constraints under its water rights permits, the Biological Opinions for Delta Smelt and Salmon, the Longfin Smelt incidental take permit, and the 2016 Contractor demands”. On January 26, 2016, the SWP allocation was increased to 15 percent of the SWP entitlement; on February 24, 2016 the SWP allocation was increased to 30 percent of the SWP entitlement; and on March 17, 2016, the SWP allocation was increased to 45 percent of the SWP entitlement “...due primarily to recent storms...” In general, every five percent of SWP allocation equates to about 100,000 acre-feet of supply for MWD. With a 45 percent SWP allocation MWD would receive about 900,000 acre-feet.

Based on the Colorado River Compact, the seven basin states receive allocations to Colorado River water. Based on California’s allocation of Colorado River

water, MWD staff has indicated about 960,000 acre-feet of Colorado River water are available to MWD during calendar year 2016. Although Colorado River water may be delivered as Supplemental Water to help replenish the Basin, there are issues which must be addressed prior to delivery. Quagga mussels are in Colorado River water and have the potential to negatively impact the replenishment facilities unless the Colorado River water is isolated and the replenishment facilities are allowed to dry out, which effectively eliminates the Quagga mussels. The conditions which would allow a replenishment area to dry out do not exist on the San Gabriel River when delivering water through USG-3; however, Watermaster is coordinating with Upper District, MWD and DPW to develop a solution to mitigate the Quagga mussel issue in order to deliver Colorado River water through CEN B-48. A second concern is the high Total Dissolved Solids (TDS) concentration in Colorado River water, which would need to be addressed through Watermaster's "Criteria for Delivery of Supplemental Water".

Due to critically dry conditions, MWD has developed a "Water Supply Allocation Plan" (WSAP) whereby available supplies will be equitably allocated to its member agencies. The WSAP establishes ten different shortage levels and a corresponding drought allocation to each member agency. Based on the shortage level established by MWD, the WSAP provides a reduced drought allocation to a member agency for its Municipal and Industrial (M&I) retail demand. The ratio of MWD water supply drought allocation to local water supply will change based on the WSAP stage. In addition, MWD established an allocation specifically for groundwater replenishment based on historic deliveries of groundwater replenishment and cyclic storage. Reduced local demand through conservation, or other means, can result in an increased allocation. MWD's drought allocation can be used to make Full Service water deliveries, including replenishment deliveries, at the Tier 1 rate up to a Tier 1 allocation. Any Full Service water delivered in excess of a Tier 1 allocation but below the drought allocation will be charged at the Tier 2 rate. Any Full Service water delivered in excess of a drought allocation is subject to a penalty rate in addition to the normal rate paid for the water. MWD typically determines the WSAP allocation for the coming fiscal year based on an allocation study which takes into account hydrologic conditions through the end of February. Assuming MWD continues implementation of the Level 3 WSAP, Upper District may have a WSAP allocation of about 28,000 acre-feet during fiscal year 2016-17. MWD is expected to address the WSAP in April or May 2016.

All imported untreated water deliveries by Upper District and Three Valleys District through MWD are delivered under the Full Service Untreated Water Rate. Any imported water delivered beyond the Full Service Tier 1 Allocation would be subject to the more expensive Tier 2 rate or, in the case of fiscal year 2015-16, the WSAP penalty rate. Commencing 2013, the Upper District Full Service Tier 1 Allocation increased to 67,228.0 acre-feet. However, assuming MWD continues its WSAP at a Level 3 during fiscal year 2016-17 about 28,000 acre-feet may be available for the collective Full Service demand (Treated and Untreated). During fiscal year 2016-17, treated imported water deliveries are expected to be about 7,000 acre-feet leaving about 21,000 (28,000 – 7,000) acre-feet available for groundwater replenishment.

## **San Gabriel District**

San Gabriel District has a contract for State Water Project water (see description of State Water Project availability under MWD). San Gabriel District's current 2016 allocation is 45 percent of its State Water Project Table A entitlement of 28,800 acre-feet. Consequently, it is anticipated San Gabriel District will deliver about 12,960 acre-feet to the Basin during calendar year 2016.

## **Deliveries of Supplemental Water**

In addition to replenishment from local sources, the groundwater elevation at the Key Well is impacted by the amount of Supplemental Water delivered for Cyclic Storage accounts and as Replacement Water and Water Resource Development Assessment (RDA) Water. A summary of historical Supplemental Water deliveries is shown on Table 5. The following sections describe Supplemental Water deliveries, as 1) Replacement Water for Upper District, San Gabriel District and Three Valleys District; 2) RDA Water for Upper District, San Gabriel District and Three Valleys District; and 3) for Cyclic Storage accounts.

### **Replacement Water**

Section 42 of the amended Judgment states in part, "... Watermaster shall recharge Replacement Water in accordance with the Watermaster Operating Criteria and, insofar as practicable, to maintain the water level at the Key Well above Elevation two hundred (200)." (As of March 25, 2016 the operational groundwater elevation at the Key Well was 170.4 feet.) Typically, establishing a lower Operating Safe Yield results in decreased water rights, increased Replacement Water obligations and, consequently, increased deliveries of imported water as Replacement Water.

### **Water Resource Development Assessment Water**

Section 45(b)(7) of the amended Judgment allows Watermaster to "...levy an Assessment on all Pumping, as determined through Rules and Regulations ... to support the purchase, financing, and/or development of new or additional Supplemental Water sources, in cooperation with one or more Responsible Agencies as appropriate." Section 45(b)(7) established the "Water Resource Development Assessment" (RDA) for the purchase or development of additional Supplemental Water supplies.

Watermaster has developed a Supplemental Water Reliability Storage Program with a goal to purchase and replenish a Basin-wide total of "at least 40,000 acre-feet per year," collectively from the three Responsible Agencies. Resolution No. 05-14-263 states, "...over a ten-year period Main San Gabriel Basin Watermaster intends to purchase and store 100,000 acre-feet of Supplemental Water in the Basin..." Over the ten-year period, beginning fiscal year 2015-16, the RDA delivery will be divided between the three Responsible Agencies based on historical production in the Main Basin. Of the total Main Basin historical production, Upper District producers produced about 81

percent of the total production, San Gabriel District producers produced about 13 percent of the total production and Three Valleys District producers produced about 6 percent of the total production. This historical percentage will be used to allocate RDA deliveries to each of the Responsible Agencies and remains unchanged each year.

### **Fiscal Year 2015-16 Supplemental Water Deliveries (Replacement Water and Water Resource Development Assessment Water)**

The following discusses Upper District, San Gabriel District and Three Valleys District deliveries during fiscal year 2015-16.

Following the conclusion of fiscal year 2014-15, it was determined Upper District had no Replacement Water requirement to be delivered during 2015-16 through USG-3 and 3,000 acre-feet will be delivered through USG-5. In addition, Upper District had a RDA requirement of 5,622 acre-feet to be delivered during 2015-16. As of February 29, 2016, a total of 1,531.30 acre-feet was delivered through USG-5 leaving a Replacement Water balance of 1,468.70 acre-feet. As of February 29, 2016, the full RDA requirement of 5,622 acre-feet had been delivered.

Following the conclusion of fiscal year 2014-15, it was determined San Gabriel District had a Replacement Water requirement of 9,607.43 acre-feet to be delivered during 2015-16. As of February 29, 2016, San Gabriel District had not delivered imported water to meet its Replacement Water requirement. In addition, San Gabriel District had a RDA requirement of 902 acre-feet to be delivered during 2015-16. As of February 29, 2016, the full RDA requirement of 902 acre-feet had been delivered. Based on a 45 percent SWP allocation (12,960 acre-feet) and an annual obligation to MWD of 5,000 acre-feet, it projected San Gabriel District will have an undelivered Replacement Water balance of about 1,600 (9,600 + 5,000 – 12,960) acre-feet as of June 30, 2016. It is possible the Replacement Water balance can be satisfied by a deduction from water in San Gabriel District's Cyclic Storage account. (San Gabriel District also has a deferred Replacement Water account balance of about 5,200 acre-feet.)

Following the conclusion of fiscal year 2014-15, it was determined Three Valleys District had no Replacement Water requirement to be delivered during 2015-16. Three Valleys District had a RDA requirement of 416 acre-feet to be delivered during 2015-16. As of February 29, 2016, the full RDA requirement of 416 acre-feet had been delivered.

### **Estimated 2016-17 Supplemental Water Delivery Requirements (Replacement Water and Water Resource Development Assessment Water)**

The estimated fiscal year 2015-16 over production in the Basin is about 34,800 acre-feet. It is assumed much of the over production will be satisfied by a deduction from water in Producers' Cyclic Storage accounts.

It is estimated Upper District Producers' over production will be about 24,400 acre-feet. After deductions from Producer's cyclic storage accounts and usage of

Watermaster pre-purchases, it is anticipated there will be about 1,100 acre-feet of Replacement Water to be delivered through USG-3 and about 3,000 acre-feet of Replacement Water to be delivered through USG-5 in 2016-17. In addition, Upper District has an estimated RDA requirement of 5,600 acre-feet to be delivered during 2016-17 for a total estimated Supplemental Water delivery requirement of 9,700 (1,100 + 3,000 + 5,600) acre-feet during 2016-17. (Assuming MWD continues implementation of a Level 3 WSAP, Upper District may have about 21,000 acre-feet of imported water available for groundwater replenishment, which will fulfill the estimated Supplemental Water delivery requirement of 9,700 acre-feet.)

It is estimated San Gabriel District Producers will have over production of about 8,800 acre-feet. After deductions from Producer's cyclic storage accounts, it is anticipated there will be about 6,700 acre-feet of Replacement Water to be delivered in fiscal year 2016-17. In addition, San Gabriel District has an estimated RDA requirement of 900 acre-feet to be delivered during 2016-17, for a total estimated Supplemental Water delivery requirement of 7,600 (6,700 + 900) acre-feet during 2016-17. As previously discussed, San Gabriel District has an annual obligation of 5,000 acre-feet to MWD. Therefore, the total delivery requirement for San Gabriel District during 2016-17 is approximately 12,600 (7,600 + 5,000) acre-feet. The 2016-17 SWP allocation would need to be above 45 percent in order for San Gabriel District to deliver the estimated Supplemental Water requirement in addition to delivery obligations to MWD. (San Gabriel District also has a deferred Replacement Water account balance of about 5,200 acre-feet.)

It is estimated Three Valleys District producers will have over production of about 1,600 acre-feet. After deductions from Producer's cyclic storage accounts, it is anticipated Three Valleys will not have a Replacement Water requirement to be delivered in 2016-17. Three Valleys District has an estimated RDA requirement of 400 acre-feet to be delivered during 2016-17.

### **Cyclic Storage Water**

Cyclic Storage water is a pre-delivery of Replacement Water. Under the terms of Cyclic Storage agreements, the Individual Producers may make deliveries to Watermaster out of their Cyclic Storage accounts to satisfy Replacement Water requirements which are accounted for following June 30 of each year. The Responsible Agencies may make deliveries to Watermaster out of their Cyclic Storage accounts to satisfy Replacement Water requirements as of June 30 of each year.

There are Cyclic Storage agreements between Watermaster and each of the Responsible Agencies which provide for the total storage of up to 190,000 acre-feet of Supplemental (Replacement) Water in the Basin. This includes up to 50,000 acre-feet for San Gabriel District, up to 100,000 acre-feet for the MWD and Upper District, and up to 40,000 acre-feet for MWD and Three Valleys District. In addition, there are 21 producer Cyclic Storage agreements in which up to 142,000 acre-feet can be stored. The total amount of water that could be stored in existing Cyclic Storage accounts is up

to 332,000 acre-feet. As of February 29, 2016 there was a total of about 74,000 acre-feet in Basin Cyclic Storage.

Water in Cyclic Storage is available to supply Replacement Water by transfer to Watermaster in-lieu of physically delivering Supplemental Water. This is typically done at the discretion of the storing party. Table 2 is a summary of the monthly Cyclic Storage account balances since July 2010. The storage balance in all of the Basin Cyclic Storage accounts on July 1, 2015, the balance as of February 29, 2016 and the estimated balance as of June 30, 2016, is shown below in acre-feet.

	<b>Cyclic Storage as of July 1, 2015</b>	<b>Estimated Account Balance as of February 29, 2016</b>	<b>Estimated Balance as of June 30, 2016<sup>1/</sup></b>
<b>San Gabriel Valley Municipal Water District</b>	2,958	2,164	0
<b>Upper San Gabriel Valley Municipal Water District</b>	5,032	5,138	0
<b>Three Valleys Municipal Water District</b>	14,348	2,277	2,300
<b>Producers in San Gabriel District</b>	7,552	7,552	5,500
<b>Producers in Upper District</b>	27,657	38,667	22,900
<b>Producers in Three Valleys District</b>	<u>3,103</u>	<u>3,603</u>	<u>2,000</u>
	60,650	74,051	37,500

1/ It is assumed Replacement Water requirements will be deducted from Cyclic Storage accounts by the end of fiscal year 2015-16. It is assumed 2015 SWP water allocation is 45 percent.

## **CARRY-OVER RIGHTS**

In accordance with the Judgment Section 49, "...Any Pumper's Share of the Operating Safe Yield and the Production Right of any Integrated Producer, which is not produced in a given fiscal year, may be carried over and accumulated for one fiscal year..." Establishing high operating safe yields will normally result in increased Carry-over Rights. These Carry-over Rights must be used by the Producer in the next year or can be leased to another Producer for use in that year. The first water produced in the succeeding fiscal year is deemed to be the Carry-over water. Leasing of water rights, including Carry-over Rights, also usually results in a reduction of the amount of water subject to Replacement Water assessments and, thus a decrease in delivery of Replacement Water to the Basin.

The amount of Carry-over Rights is considered when recommending the Operating Safe Yield. The Carry-over Rights at the beginning of fiscal year 2014-15 were approximately 36,800 acre-feet and decreased to 35,200 acre-feet at the beginning of fiscal year 2015-16. It is estimated the Carry-over Rights at the beginning of fiscal year 2016-17 will remain at about 35,200 acre-feet. Historical Carry-over Rights and lost Carry-over Rights are shown on Table 1.



## **ESTIMATED WATER PRODUCTION DURING 2015-16**

Historical water production under the Judgment since July 1, 1973, has been reported and recorded on a quarterly basis, as shown in Table 6. The preliminary total water production for the first two quarters of fiscal year 2015-16 was about 96,000 acre-feet. Figure 6 shows quarterly production in the Basin for the past 10 years (fiscal years 2005-06 through 2014-15) and current fiscal year 2015-16. Anticipated groundwater production for fiscal year 2015-16 has been estimated below.

The reported production for the first two quarters of fiscal year 2015-16 was about 96,000 acre-feet. If production for the last two quarters of fiscal year 2015-16 is similar to the production for the last two quarters of fiscal year 2014-15, which was about 91,000 acre-feet, total fiscal year 2015-16 production will be about 187,000 acre-feet (96,000 + 91,000). Based on this information, it is anticipated groundwater production during fiscal year 2015-16 will be about 190,000 acre-feet. This represents a significant reduction from fiscal year 2014-15 production of 208,000 acre-feet; however, direct treated water deliveries have increased, as described below. In addition, drought conservation activities were implemented beginning the last two quarters of fiscal year 2014-15, which have impacted production. Figure 6 shows production for the past ten years and the estimated groundwater production for fiscal year 2015-16.

The historical total demand in the Basin is met by local water production and direct treated imported water deliveries. During fiscal year 2014-15, direct treated imported water sales, including in-lieu program deliveries, were about 22,500 acre-feet, as shown in Table 7. Total demand during fiscal year 2015-16 is estimated to be about 212,500 acre-feet (190,000 + 22,500) and is about 34,500 acre-feet below the 5-year average total water demand of 247,000 acre-feet, as shown in Table 7.

## **FISCAL YEAR 2015-16 OPERATING SAFE YIELD DETERMINATION**

On May 13, 2015, Watermaster considered the Engineer's recommended Preliminary Operating Safe Yield of 150,000 acre-feet for fiscal year 2015-16. At that time, the total rainfall in the Basin from July 1, 2014 to April 30, 2015, as represented by the Puddingstone Dam station, was 6.86 inches or 39 percent of long-term average for that period. (The total annual rainfall at the Puddingstone Dam station for fiscal year 2014-15 was 7.90 inches, representing about 44 percent of average.) The operational groundwater elevation at the Key Well at the time of the May 2015 Watermaster meeting was at 170 feet (measured at 178 feet) and decreasing at the rate of about 0.1 feet per week. Total water in local storage reservoirs was 25,500 acre-feet of which about 8,400 acre-feet were available for groundwater storage and/or for delivery to surface water treatment plants.

At its May 13, 2015 meeting, Watermaster established the Operating Safe Yield at 150,000 acre-feet for fiscal year 2015-16 and an estimated Operating Safe Yield of 130,000 acre-feet for fiscal years 2016-17, 2017-18, 2018-19, and 2019-20.

## **LOCAL HYDROLOGY AND OPERATING SAFE YIELD**

An extensive evaluation of different criteria for establishing the annual Operating Safe Yield was conducted by the Watermaster Basin Water Management Committee during fiscal year 2011-12. The evaluation examined the impacts to the groundwater elevation at the Key Well assuming the Operating Safe Yield was established at a narrower range around the long-term average of 200,000 acre-feet and to implement modifications to the annual Operating Safe Yield gradually. Since that time the operational elevation at the Key Well (as of April 30) has severely fallen to 213.4 feet (April 2012), 198.3 feet (April 2013), 184.5 feet (April 2014), and 170.6 (April 2015). Over those four years Watermaster established the recommended Operating Safe Yield at 200,000 acre-feet for fiscal year 2012-13, 180,000 acre-feet for fiscal year 2013-14, and 150,000 acre-feet for fiscal years 2014-15 and 2015-16. The decrease in the operational elevation at the Key Well may have warranted even lower Operating Safe Yields, but the Engineer's recommendation also considered stabilizing annual changes. In addition, the Engineer's recommendation considered the need to moderate the Basin's recovery to a Key Well elevation above 200 feet over multiple years.

Fiscal year 2015-16 is the fifth consecutive year of below average rainfall. As a result, the operational groundwater elevation at the Key Well dropped from 227.9 feet on June 24, 2011 to 170.4 feet (measured at 177.8 feet) on March 25, 2016, a decrease of about 58 feet, resulting in the loss of 464,000 acre-feet in Basin storage.

## **CONCLUSIONS**

During water year 2014-15, rainfall was 7.47 inches (41 percent of average), replenishment of local runoff was about 14,500 acre-feet (14 percent of average), untreated imported water deliveries were 41,500 acre-feet and groundwater production was 208,300 acre-feet. These factors brought the operational groundwater elevation at the Key Well to 166.2 feet (measured at about 174 feet) by November 2015.

As of February 29, 2016, rainfall in the San Gabriel River watershed has been about 70 percent of average for that time of year. Local runoff was about 21 percent (about 21,700 acre-feet) of the 42-year average, as shown in Table 4.

Fiscal year 2015-16 is the fifth consecutive year of below average rainfall. The El Niño conditions have not resulted in above-average rainfall for the Basin's watershed.

During fiscal year 2015-16, there have been deliveries to Producers' Cyclic Storage accounts which will reduce future "wet" Replacement Water deliveries. Untreated imported water in Cyclic Storage is a pre-delivery to be used for future Replacement Water obligations. (These Cyclic Storage deliveries raise the measured groundwater elevation at the Key Well, but not the operational elevation.) The SWP allocation is 45 percent of entitlement as of March 17, 2016. MWD is considering implementation of a WSAP allocation for fiscal year 2016-17. If the WSAP is

implemented at a Level 3, similar to fiscal year 2015-16, the allocation for Full Service deliveries to Upper District is expected be about 28,000 acre-feet. Consequently, supplemental (imported) water supplies continue to be restricted.

Based on the evaluation presented in this Report, the Engineer’s recommended Operating Safe Yield should be maintained from fiscal year 2015-16 for fiscal year 2016-17 at 150,000 acre-feet. The Watermaster established the Operating Safe Yield for fiscal year 2015-16 at 150,000 acre-feet. The Engineer also recommends the Watermaster should consider maintaining the Operating Safe Yield at no more than 150,000 acre-feet until such time the operational elevation at the Key Well is significantly above elevation 200 feet, in accordance with the Judgment provisions.

The Judgment requires that on or before the first meeting in April each year, Watermaster makes a Preliminary Determination of the Operating Safe Yield for the Basin for each of the succeeding five fiscal years. Watermaster’s Engineer recommends the following quantities as Operating Safe Yield for consideration by the Watermaster Board members.

<u>Fiscal Year</u>	<b>Operating Safe Yield (Acre-feet)</b>
2016-17	150,000
2017-18	130,000
2018-19	130,000
2019-20	130,000
2020-21	130,000

Attached, as Appendix “B”, is a tabulation showing each Pumper’s Share in percent and the number of acre-feet each Producer can produce from the Basin free of Replacement Water assessments for quantities of Operating Safe Yield 130,000 acre-feet per year to 160,000 acre-feet per year. Those producers shown to have a share less than five acre-feet are Minimal Producers and are allowed to produce up to five acre-feet free of Replacement Water assessments.

TABLE 1

**ANNUAL OPERATING SAFE YIELD,  
PRODUCTION RIGHTS, WATER PRODUCTION  
AND REPLACEMENT WATER REQUIREMENTS  
(ACRE-FEET)**

FISCAL YEAR	RAINFALL AT PUDDINGSTONE STA. NO. 96C-E (INCHES) 1/	MEASURED KEY WELL ELEVATION (FEET) 2/	OPERATING SAFE YIELD	CARRY OVER RIGHTS FROM PREVIOUS YEAR	LOST CARRY OVER RIGHTS	PRODUCTION RIGHTS	WATER PRODUCTION	BASIN OVER PRODUCTION		
								REPLACEMENT WATER REQUIREMENT	PRODUCER CYCLIC STORAGE	TOTAL
1973-74	15.05	238.4	226,800	--	--	238,132.94	235,460.40	14,518.98	0.00	14,518.98
1974-75	14.57	234.8	210,000	17,191.52	203.36	237,913.46	225,221.86	8,421.93	0.00	8,421.93
1975-76	7.77	221.1	200,000	20,908.91	131.06	231,391.95	242,246.36	24,744.88	0.00	24,744.88
1976-77	15.72	211.4	150,000	13,759.41	861.12	174,193.45	172,995.30	48,650.71	0.00	48,650.71
1977-78	40.08	270.4	150,000	9,980.67	1,198.54	170,473.30	198,257.23	36,818.25	0.00	36,818.25
1978-79	24.88	266.6	170,000	8,950.43	78.11	189,439.67	218,405.64	34,404.83	0.00	34,404.83
1979-80	33.76	282.4	220,000	6,745.88	81.54	237,226.13	226,279.89	9,896.39	0.00	9,896.39
1980-81	9.74	252.4	230,000	21,960.87	202.89	262,445.19	233,963.01	5,477.08	0.00	5,477.08
1981-82	19.94	245.5	210,000	35,642.01	380.30	255,281.37	223,245.24	10,582.35	0.00	10,582.35
1982-83	37.80	292.7	200,000	43,261.87	304.02	253,049.93	212,205.73	3,293.23	0.00	3,293.23
1983-84	12.09	267.1	230,000	45,378.26	80.10	287,394.98	238,586.29	2,151.85	1,573.60	3,725.45
1984-85	14.42	245.8	210,000	51,594.26	344.48	272,050.11	244,835.13	12,475.69	0.00	12,475.69
1985-86	23.33	250.8	190,000	40,395.40	198.50	240,319.81	248,824.38	34,774.82	0.00	34,774.82
1986-87	9.61	236.5	200,000	25,403.49	106.93	235,923.93	256,117.22	41,828.86	0.00	41,828.86
1987-88	16.79	224.0	190,000	22,457.73	143.63	222,985.31	251,852.84	51,989.89	0.00	51,989.89
1988-89	14.00	219.8	180,000	21,710.19	61.61	214,810.57	257,421.07	59,384.99	0.00	59,384.99
1989-90	12.11	206.5	180,000	19,741.33	282.28	210,268.35	253,851.86	62,582.49	0.00	62,582.49
1990-91	18.29	200.3	170,000	17,837.99	387.33	199,467.55	234,825.54	41,232.39	13,112.70	54,345.09
1991-92	23.93	236.9	140,000	18,796.02	345.83	169,575.74	223,690.83	31,214.19	35,916.90	67,131.09
1992-93	40.44	267.8	180,000	13,478.79	189.05	204,009.40	239,155.14	15,858.66	50,031.39	65,890.05
1993-94	12.44	248.8	220,000	31,718.29	462.81	262,029.85	246,830.55	8,915.59	25,422.42	34,338.01
1994-95	29.38	269.0	200,000	50,290.41	1,065.79	260,802.71	246,657.49	30,194.77	0.00	30,194.77
1995-96	15.92	248.9	220,000	44,262.41	737.28	274,608.47	272,100.40	32,526.05	0.00	32,526.05
1996-97	18.47	241.3	210,000	35,484.68	863.84	256,011.19	282,785.85	55,236.24	0.00	55,236.24
1997-98	35.84	267.8	220,000	28,965.55	704.70	263,725.27	257,431.98	26,362.42	4,331.64	30,694.06
1998-99	7.93	244.8	230,000	34,016.10	124.28	277,282.73	268,505.37	30,499.32	2,859.66	33,358.98
1999-00	14.65	228.5	220,000	40,633.83	592.51	274,824.14	282,195.44	39,749.83	3,663.84	43,413.67
2000-01	17.04	220.1	220,000	33,774.80	570.83	267,126.29	274,204.43	38,317.35	2,825.02	41,142.37
2001-02	6.41	208.7	210,000	32,015.15	532.59	258,992.70	267,767.07	40,773.50	6,450.10	47,223.60
2002-03	19.99	204.1	190,000	32,833.12	159.50	240,450.90	240,509.16	38,519.29	5,948.75	44,468.04
2003-04	12.77	204.2	170,000	38,370.38	79.24	224,691.75	255,869.80	51,416.73	8,870.23	60,286.96
2004-05	44.08	248.4	170,000	24,549.23	53.76	219,049.64	250,185.00	41,043.83	18,736.93	59,780.76
2005-06	16.82	249.7	240,000	17,402.45	156.28	268,418.02	262,623.02	12,065.12	6,908.92	18,974.04
2006-07	4.55	220.5	240,000	27,862.73	90.80	278,386.20	287,293.69	20,048.99	7,309.89	27,358.88
2007-08	16.17	202.7	210,000	29,374.42	182.17	249,433.95	261,194.03	28,777.98	9,157.53	37,935.51
2008-09	14.59	195.6	180,000	33,902.42	778.21	224,028.56	253,167.52	26,473.24	30,239.02	56,712.26
2009-10	20.04	204.2	170,000	28,729.17	236.31	210,117.25	240,270.06	35,129.38	14,929.92	50,059.30
2010-11	19.45	233.5	170,000	20,695.69	167.70	201,220.31	228,779.73	33,084.38	15,382.66	48,467.04
2011-12	12.06	226.4	210,000	21,657.47	166.96	242,181.86	239,388.04	19,685.04	20,704.45	40,389.49
2012-13	7.84	202.8	200,000	44,143.15	268.13	254,314.47	245,582.04	5,972.15	23,673.25	29,645.40
2013-14	4.77	187.8	180,000	42,864.86	377.39	233,389.45	243,536.31	3,779.32	36,325.98	40,105.30
2014-15	10.01	177.5	150,000	36,753.33	419.84	197,280.18	208,339.16	12,319.13	33,508.84	45,827.97
2015-16	7.47	3/ 177.8	4/ 150,000	35,226.32	--	195,700	5/ 190,000	6/ --	--	--
<b>5-YEAR AVERAGE:</b>	<b>10.83</b>	--	<b>182,000</b>	--	--	--	<b>233,125.06</b>	--	--	--
10-YEAR AVERAGE:	15.49	--	195,000	30,338.57	284.38	235,877.03	247,017.36	19,733.47	19,814.05	39,547.52
42-YEAR AVERAGE:	18.23	--	196,829	28,914.50	350.53	236,779.02	245,063.26	28,099.81	8,997.23	37,125.85

1/ Water Year

2/ End of Fiscal Year, July to June

3/ As of February 29, 2016

4/ As of March 25, 2016

5/ Estimated value including Carry-over Rights and Diversion Rights

6/ Estimated value

TABLE 2

**MONTHLY CYCLIC STORAGE ACCOUNTS  
AND EFFECT ON KEY WELL**

END OF MONTH	ACCUMULATED CYCLIC STORAGE ACCOUNTS (acre-feet)					ESTIMATED KEY WELL ELEVATION INCREASE DUE TO CYCLIC STORAGE (FT) 1/	OPERATIONAL KEY WELL ELEVATION (WITHOUT CYCLIC STORAGE) (FT)	MEASURED KEY WELL ELEVATION (FT)
	MWD/UD	SGVMWD	MWD/TV	PRODUCER	TOTAL			
Jul-10	0.00	25,005.23	5,562.9	14,899.25	45,467.4	5.68	201.5	207.2
Aug-10	0.00	28,137.89	5,562.9	14,899.25	48,600.0	6.08	200.1	206.2
Sep-10	0.00	31,206.17	5,505.3	14,899.25	51,610.7	6.45	197.8	204.3
Oct-10	0.00	33,691.50	5,505.3	15,351.45	54,548.3	6.82	200.2	207.0
Nov-10	0.00	34,947.71	5,505.3	16,430.55	56,883.6	7.11	201.2	208.3
Dec-10	0.00	35,890.61	3,705.3	22,028.95	61,624.9	7.70	204.5	212.2
Jan-11	0.00	35,849.47	3,705.3	24,274.05	63,828.8	7.98	215.6	223.6
Feb-11	0.00	21,116.68	3,705.3	28,598.15	53,420.1	6.68	218.7	225.4
Mar-11	0.00	21,050.37	3,705.3	28,598.15	53,353.8	6.67	220.6	227.3
Apr-11	0.00	20,967.68	3,705.3	28,598.15	53,271.1	6.66	225.5	232.1
May-11	0.00	16,542.55	3,959.7	36,098.15	56,600.4	7.08	224.4	231.5
Jun-11	0.00	19,754.25	1,978.1	22,866.09	44,598.4	5.57	227.9	233.5
Jul-11	0.00	23,038.22	1,978.1	22,964.89	47,981.2	6.00	228.1	234.1
Aug-11	0.00	26,351.61	1,978.1	22,979.99	51,309.7	6.41	227.0	233.4
Sep-11	0.00	29,517.40	1,978.1	23,035.59	54,531.1	6.82	227.4	234.2
Oct-11	0.00	32,870.77	1,978.1	23,289.29	58,138.2	7.27	228.2	235.5
Nov-11	0.00	35,864.96	4,981.2	24,815.49	65,661.7	8.21	228.3	236.5
Dec-11	0.00	36,260.75	10,900.0	54,631.09	101,791.8	12.72	222.6	235.3
Jan-12	0.00	36,170.24	10,900.0	54,631.09	101,701.3	12.71	220.4	233.1
Feb-12	0.00	36,091.66	10,900.0	54,631.09	101,622.8	12.70	218.2	230.9
Mar-12	0.00	36,001.41	10,900.0	54,735.59	101,637.0	12.70	215.6	228.3
Apr-12	0.00	36,091.14	10,900.0	56,631.19	103,622.3	12.95	213.4	226.4
May-12	0.00	14,768.19	10,900.0	56,631.19	82,299.4	10.29	213.5	223.8
Jun-12	0.00	17,544.27	8,600.3	56,631.19	82,775.8	10.35	210.0	220.3
Jul-12	0.00	20,356.14	8,600.3	35,926.74	64,883.2	8.11	209.6	217.7
Aug-12	0.00	23,164.06	8,600.3	35,926.74	67,691.1	8.46	206.0	214.5
Sep-12	0.00	25,908.32	8,600.3	35,926.74	70,435.4	8.80	203.6	212.4
Oct-12	0.00	29,265.59	8,716.3	45,495.74	83,477.6	10.43	200.7	211.1
Nov-12	0.00	7,641.19	11,371.2	55,495.74	74,508.1	9.31	204.1	213.4
Dec-12	0.00	9,273.89	13,348.6	55,495.74	78,118.2	9.76	203.8	213.6
Jan-13	0.00	11,303.77	13,348.6	55,495.74	80,148.1	10.02	203.0	213.0
Feb-13	0.00	11,226.13	13,348.6	55,495.74	80,070.5	10.01	201.9	211.9
Mar-13	0.00	11,143.18	13,828.5	55,495.74	80,467.4	10.06	200.1	210.2
Apr-13	0.00	11,064.94	13,411.50	55,495.74	79,972.18	10.00	198.3	208.3
May-13	0.00	13,399.46	13,545.80	55,495.74	82,441.00	10.31	194.9	205.2
Jun-13	0.00	15,683.07	13,545.80	55,495.74	84,724.61	10.59	192.2	202.8
Jul-13	0.00	17,890.48	13,655.80	31,464.49	63,010.77	7.88	192.4	200.3
Aug-13	0.00	17,801.32	14,491.60	31,464.49	63,757.41	7.97	189.4	197.4
Sep-13	0.00	17,714.22	14,189.60	32,464.49	64,368.31	8.05	188.0	196.0
Oct-13	0.00	17,622.55	14,147.40	44,821.46	76,591.41	9.57	185.3	194.9
Nov-13	0.00	14,984.50	14,391.40	48,454.61	77,830.51	9.73	187.4	197.1
Dec-13	0.00	14,903.04	14,546.40	49,206.58	78,656.02	9.83	187.7	197.5
Jan-14	0.00	14,817.43	14,807.70	45,169.74	74,794.87	9.35	187.6	196.9
Feb-14	0.00	14,744.65	14,820.90	43,448.81	73,014.36	9.13	186.6	195.7
Mar-14	0.00	14,659.90	14,876.90	42,132.17	71,668.97	8.96	185.3	194.3
Apr-14	5,000.00	6,811.13	14,876.90	38,344.74	65,032.77	8.13	184.5	192.6
May-14	5,000.00	6,719.84	14,876.90	34,307.90	60,904.64	7.61	182.3	189.9
Jun-14	5,000.00	6,601.88	14,876.90	30,271.07	56,749.85	7.09	180.7	187.8
Jul-14	5,000.00	6,513.62	14,876.90	30,724.60	57,115.12	7.14	178.8	185.9
Aug-14	5,000.00	6,720.99	14,876.90	32,229.60	58,827.49	7.35	176.8	184.2
Sep-14	5,000.00	7,550.15	14,876.90	33,734.60	61,161.65	7.65	174.6	182.3
Oct-14	0.00	7,469.52	14,876.90	40,738.30	63,084.72	7.89	173.0	180.9
Nov-14	1,000.00	7,394.79	14,876.90	45,467.20	68,738.89	8.59	171.4	180.0
Dec-14	1,000.00	7,314.16	14,876.90	48,678.80	71,869.86	8.98	171.1	180.1
Jan-15	1,000.00	7,232.81	14,876.90	52,562.20	75,671.91	9.46	170.7	180.2
Feb-15	1,000.00	7,159.95	14,876.90	58,167.20	81,204.05	10.15	169.7	179.8
Mar-15	0.00	3,242.63	14,876.90	67,197.70	85,317.23	10.66	168.8	179.5
Apr-15	1,068.00	3,166.58	14,876.90	69,697.70	88,809.18	11.10	167.7	178.8
May-15	4,699.00	3,071.50	14,876.90	69,697.70	92,345.10	11.54	166.7	178.2
Jun-15	5,032.00	2,957.99	14,347.90	71,819.96	94,157.85	11.77	165.7	177.5
Jul-15	5,031.54	4,324.67	14,347.90	38,311.12	62,015.23	7.75	168.4	176.1
Aug-15	5,031.54	6,140.39	14,347.90	38,311.12	63,830.95	7.98	167.1	175.0
Sep-15	10,031.54	2,925.85	14,347.90	38,311.12	65,616.41	8.20	166.2	174.4
Oct-15	10,031.54	3,378.95	14,347.90	38,311.12	66,069.51	8.26	165.8	174.1
Nov-15	10,031.54	3,300.07	15,216.30	46,295.82	74,843.73	9.36	164.7	174.0
Dec-15	9,637.64	2,316.72	16,855.30	49,821.12	78,630.78	9.83	167.2	177.0
Jan-16	5,137.64	2,236.27	16,855.30	49,821.12	74,050.33	9.26	169.8	179.0
Feb-16	5,137.64	2,163.71	2,277.00	49,821.12	59,399.47	7.42	170.9	178.3
Mar-16	2/ 5,137.64	2,083.71	2,277.00	49,821.12	59,319.47	7.41	170.4	177.8

1/ ASSUMES 8,000 ACRE-FEET OF CYCLIC STORAGE EQUALS 1 VERTICAL FOOT AT THE BALDWIN PARK KEY WELL.

2/ ESTIMATED CYCLIC STORAGE AND KEY WELL ELEVATION AS OF MARCH 25, 2016.

**TABLE 3**

**LOCAL WATER IN STORAGE  
IN SURFACE RESERVOIRS**

<u>RESERVOIR</u>	<u>March 16, 2015</u>	<u>March 21, 2016</u>				
	<u>STORAGE (ACRE-FEET)</u>	<u>STORAGE (ACRE-FEET)</u>	<u>INFLOW (CFS)</u>	<u>OUTFLOW (CFS)</u>	<u>RESERVOIR CAPACITY (ACRE-FEET)</u>	<u>RESERVOIR STORAGE IN PERCENT</u>
Cogswell Dam	1,309	1,442	6	5	11,136	13%
San Gabriel Dam	8,628	7,514	37	0	43,646	17%
Morris Dam	8,431	6,287	0	0	28,696	22%
<b>Sub-Total:</b>	<b>18,368</b>	<b>15,244</b>			<b>83,478</b>	<b>18%</b>
Santa Fe Dam <sup>1/</sup>	0	0	--	--	--	--
Big Dalton Dam	0	0	0	0	--	--
San Dimas Dam	214	201	1	0	--	--
Puddingstone Dam <sup>2/</sup>	6,593	7,065	0	0	--	--
<b>TOTALS:</b>	<b>25,175</b>	<b>22,510</b>				

1/ Storage is typically zero. Reservoir used for Flood Control purposes only, not storage for water conservation purposes.

2/ Storage is typically about 6,600 acre-feet. Used for recreational purposes, not water conservation purposes.

**TABLE 4**

**RAINFALL AND WATER REPLENISHMENT OF  
MAIN SAN GABRIEL BASIN**

WATER YEAR 1/	RAINFALL AT PUDDINGSTONE	WATER REPLENISHED IN THE MAIN SAN GABRIEL BASIN			MEASURED BALDWIN PARK KEY	OPERATIONAL BALDWIN PARK KEY	
	STA. NO. 96C-E (INCHES)	LOCAL RUNOFF (AF)	IMPORTED (AF) 2/	TOTAL (AF)	WELL ELEV. AT END OF WATER YEAR (FT)	WELL ELEV. AT END OF WATER YEAR (FT)	
1973-74	15.05	92,000	8,835	100,835	234	234	
1974-75	14.57	62,000	14,564	76,564	226	226	
1975-76	7.77	22,400	28,018	50,418	214	212	
1976-77	15.72	21,000	18,335	39,335	206	203	
1977-78	40.08	262,400	20,549	282,949	259	258	
1978-79	24.88	160,000	30,968	190,968	254	253	
1979-80	33.76	227,700	5,805	233,505	269	268	
1980-81	9.74	49,100	0	49,100	243	242	
1981-82	19.94	92,200	42,623	134,823	240	239	
1982-83	37.80	298,800	28,345	327,145	284	283	
1983-84	12.09	70,000	3,326	73,326	256	255	
1984-85	14.42	32,700	66	32,766	240	239	
1985-86	23.33	70,200	55,862	126,062	241	234	
1986-87	9.61	26,700	55,943	82,643	238	228	
1987-88	16.79	48,500	43,989	92,489	218	208	
1988-89	14.00	33,000	45,925	78,925	211	201	
1989-90	12.11	37,700	47,504	85,204	201	193	
1990-91	18.29	95,500	54,153	149,653	205	199	
1991-92	23.93	222,100	68,304	290,404	237	230	
1992-93	40.44	220,000	62,632	282,632	268	265	
1993-94	12.44	43,000	38,296	81,296	250	247	
1994-95	29.38	210,500	22,354	232,854	266	261	
1995-96	15.92	105,900	32,480	138,380	248	238	
1996-97	18.47	34,700	55,075	89,775	239	228	
1997-98	35.84	171,600	62,887	234,487	264	255	
1998-99	7.93	48,200	13,346	61,546	239	230	
1999-00	14.65	66,500	59,559	126,059	226	214	
2000-01	17.04	84,900	34,998	119,898	217	206	
2001-02	6.41	55,900	60,543	116,443	205	194	
2002-03	19.99	55,200	63,508	118,708	203	189	
2003-04	12.77	45,600	67,533	113,133	197	180	
2004-05	44.08	398,000	19,921	417,921	248	237	
2005-06	16.82	138,600	88,014	226,614	240	225	
2006-07	4.50	47,800	24,780	72,580	213	199	
2007-08	16.25	85,400	7,727	93,127	203	191	
2008-09	14.82	73,800	6,607	80,407	191	185	
2009-10	20.04	157,400	32,708	190,108	204	198	
2010-11	19.45	241,500	68,424	309,924	234	227	
2011-12	12.06	39,100	57,846	96,946	212	203	
2012-13	7.84	24,600	44,678	69,278	196	188	
2013-14	4.77	21,900	36,717	58,617	182	174	
2014-15	10.01	14,500	41,519	56,019	174	166	
2015-16	7.47	3/ 21,700	4/ 20,196	5/ 41,898	178	6/ 170	6/
5-Year Average	8.43	24,360	40,191	64,552	--	--	
10-Year Average	12.66	84,460	40,902	125,362	--	--	
42-Year Average	18.23	102,586	37,506	140,092	--	--	

1/ October 1 to September 30

2/ July 1 to June 30

3/ As of February 29, 2016.

4/ Preliminary data as of February 29, 2016.

5/ As of February 29, 2016. Excludes deliveries through USG-5.

6/ As of March 25, 2016.

TABLE 5

SUPPLEMENTAL WATER DELIVERIES  
TO THE MAIN SAN GABRIEL BASIN  
FOR GROUNDWATER REPLENISHMENT  
(ACRE-FEET)

FISCAL YEAR	UPPER DISTRICT						THREE VALLEYS DISTRICT					SAN GABRIEL DISTRICT						TOTALS
	REPLACEMENT WATER		CYCLIC STORAGE	WATERMASTER PRE-PURCHASES	RESOURCE DEVELOPMENT	PRODUCER CYCLIC STORAGE	REPLACEMENT WATER	CYCLIC STORAGE	WATERMASTER PRE-PURCHASES	RESOURCE DEVELOPMENT	PRODUCER CYCLIC STORAGE	REPLACEMENT WATER	USG-5 EXCHANGE REPLACEMENT	CYCLIC STORAGE	WATERMASTER PRE-PURCHASES	TRANSFERS TO MWD CYCLIC STORAGE	RESOURCE DEVELOPMENT	
	USG-3	USG-5 2/																
1974-75	13,731.90	--	--	--	--	--	--	--	--	--	--	787.10	--	44.90	--	--	14,563.90	
1975-76	7,121.40	--	12,621.10	--	--	--	--	--	--	--	--	1,302.90	--	6,972.10	--	--	28,017.50	
1976-77	10,752.60	2,654.90	52.40	--	--	--	--	--	--	--	--	3,814.95	992.93	2,722.12	--	--	20,989.90	
1977-78	14,962.50	2,981.70	0.00	--	--	--	--	--	--	--	--	4,470.85	1,115.15	0.00	--	--	23,530.20	
1978-79	24,000.00	3,486.10	0.00	--	--	--	--	--	--	--	--	4,112.25	1,303.79	1,551.96	--	--	34,454.10	
1979-80	4,740.60	3,191.00	0.00	--	--	--	--	--	--	--	--	0.00	1,064.00	0.00	--	--	8,995.60	
1980-81	0.00	3,130.70	0.00	--	--	--	--	--	--	--	--	0.00	0.00	0.00	--	--	3,130.70	
1981-82	40,824.70	2,853.70	0.00	--	--	--	--	--	--	--	--	81.84	1,067.28	648.88	--	--	45,476.40	
1982-83	22,934.40	2,256.30	3,189.30	--	--	--	--	--	--	--	--	0.00	843.87	1,377.13	--	--	30,601.00	
1983-84	0.00	1,907.10	3,246.70	--	--	0.00	--	--	--	--	--	0.00	79.00	0.00	--	--	5,232.80	
1984-85	0.00	2,395.50	0.00	--	--	0.00	--	--	--	--	--	0.00	66.00	0.00	--	--	2,461.50	
1985-86	3,000.00	2,600.80	47,405.40	--	--	0.00	--	--	--	--	--	4,484.30	972.70	0.00	--	--	58,463.20	
1986-87	19,354.30	2,484.20	23,991.10	--	--	0.00	--	--	--	--	--	4,368.59	929.09	7,300.32	--	--	58,427.60	
1987-88	28,187.30	3,751.30	5,975.00	--	--	0.00	--	--	--	--	--	7,763.11	1,402.99	660.90	--	--	47,740.60	
1988-89	39,100.00	3,726.60	110.70	--	--	0.00	--	--	--	--	--	5,320.25	1,393.75	0.00	--	--	49,651.30	
1989-90	32,740.20	1,716.10	0.00	--	--	0.00	--	--	--	--	--	11,296.63	641.82	2,825.55	--	--	49,220.30	
1990-91	16,078.60	2,734.10	14,453.50	--	--	13,112.70	--	--	--	--	--	9,485.43	1,022.57	0.00	--	--	56,886.90	
1991-92	7,491.90	2,214.00	23,525.90	--	--	3,305.90	0.00	25,077.10	--	--	--	8,074.96	828.04	0.00	--	--	70,517.80	
1992-93	16,077.97	2,478.10	10,214.60	--	--	18,916.73	0.00	3,737.50	--	--	--	11,418.17	1,202.03	1,064.80	--	--	65,109.90	
1993-94	0.00	3,214.00	0.00	--	--	23,050.80	0.00	0.00	--	--	--	8,620.14	1,205.80	5,419.06	--	--	41,509.80	
1994-95	0.00	3,178.10	6,177.10	--	--	0.00	0.00	5,738.60	--	--	--	5,691.49	1,188.61	3,557.90	--	--	25,531.80	
1995-96	15,467.80	3,149.90	85.20	--	--	0.00	0.00	3,832.00	--	--	--	8,484.59	1,178.05	3,432.36	--	--	35,629.90	
1996-97	3,934.10	3,304.50	32,229.90	--	--	0.00	0.00	1,451.10	--	--	--	14,525.94	1,235.89	1,698.17	--	--	58,379.60	
1997-98	21,409.60	3,392.70	24,870.20	--	--	0.00	0.00	953.10	--	--	--	14,061.60	1,268.85	323.55	--	--	66,279.60	
1998-99	0.00	3,353.40	0.00	--	--	0.00	3,311.70	0.00	--	--	--	6,158.61	1,254.19	2,621.20	--	--	16,699.10	
1999-00	13,645.60	3,508.30	24,416.20	--	--	0.00	4,418.60	0.00	--	--	--	9,286.01	1,312.09	8,605.90	--	--	65,192.70	
2000-01	10,412.80	3,285.30	14,624.30	--	--	0.00	5,583.70	675.20	--	--	--	10,464.30	1,228.70	0.00	--	--	46,274.30	
2001-02	25,246.02	3,438.90	1,944.90	--	--	0.00	4,944.10	570.20	--	--	--	10,929.17	1,286.13	1,172.70	--	--	49,532.12	
2002-03	33,551.42	3,018.30	0.00	--	--	0.00	2,791.00	0.00	--	--	--	3,938.39	1,128.84	15,027.77	--	--	59,455.72	
2003-04	14,166.20	3,058.30	23,603.00	--	--	10,000.00	1,920.40	0.00	--	--	--	672.60	1,143.80	16,815.60	--	--	71,379.90	
2004-05	5,744.20	2,998.00	0.00	--	--	0.00	1,714.50	0.00	--	--	1,800.00	500.66	1,121.25	10,840.09	--	--	24,718.70	
2005-06	48,069.20	2,815.50	9,400.80	--	--	7,500.00	357.10	0.00	--	--	0.00	0.00	1,052.99	12,658.01	--	--	81,853.60	
2006-07	0.00	2,963.30	4,159.20	--	--	0.00	166.70	2,978.00	--	--	--	573.59	1,108.29	15,794.12	--	--	27,743.20	
2007-08	0.00	3,027.20	5,724.40	--	--	0.00	0.00	0.00	--	--	0.00	91.76	1,132.17	779.07	--	--	10,754.60	
2008-09	0.00	3,064.90	0.00	--	--	0.00	0.00	0.00	--	--	0.00	788.73	1,146.29	4,671.98	--	--	9,671.90	
2009-10	16,076.40	2,611.50	0.00	--	--	0.00	0.00	1,427.80	--	--	0.00	1,886.58	976.70	12,340.72	--	--	35,319.70	
2010-11	23,737.90	2,428.20	0.00	--	--	11,646.50	0.00	12,264.60	--	--	0.00	14,655.86	908.13	5,211.01	--	--	70,852.20	
2011-12	3,257.20	2,999.40	0.00	--	--	18,169.10	0.00	12,871.40	--	--	0.00	22,426.22	1,121.78	0.00	--	--	60,845.10	
2012-13	2,034.70	3,037.40	0.00	--	--	10,000.00	0.00	10,098.80	--	--	0.00	16,269.22	1,135.98	5,138.80	--	--	47,714.90	
2013-14	0.00	2,983.90	0.00	--	--	31,288.90	0.00	3,110.10	--	--	0.00	1,202.03	1,115.97	0.00	--	--	39,700.90	
2014-15	0.00	2,711.70	4,031.54	5,000.00	--	29,809.36	0.00	471.00	--	--	1,000.00	192.83	1,014.17	0.00	--	--	44,230.60	
2015-16	1/ 0.00	1,725.30	106.10	0.00	5,622.00	10,510.00	0.00	2,507.40	0.00	416.00	500.00	0.00	572.71	0.00	0.00	4,851.00	902.00	27,712.51

1/ Estimated as of February 29, 2016.  
2/ In-Lieu replenishment through CWEA.



**TABLE 6**

**HISTORICAL WATER PRODUCTION  
(ACRE-FEET)**

<b><u>FISCAL YEAR</u></b>	<b><u>FIRST QUARTER</u></b>	<b><u>SECOND QUARTER</u></b>	<b><u>THIRD QUARTER</u></b>	<b><u>FOURTH QUARTER</u></b>	<b><u>TOTAL</u></b>
1973-74	76,455	52,082	40,945	65,904	235,386
1974-75	78,099	48,846	41,069	57,207	225,221
1975-76	78,514	51,680	48,147	63,964	242,305
1976-77	67,128	53,721	42,800	49,346	212,995
1977-78	60,696	47,985	33,894	55,682	198,257
1978-79	70,583	47,487	36,888	63,448	218,406
1979-80	76,119	52,642	38,317	59,221	226,299
1980-81	74,255	55,014	41,003	63,691	233,963
1981-82	78,600	51,682	39,670	52,393	222,345
1982-83	71,902	47,264	38,555	54,485	212,206
1983-84	70,020	44,938	51,594	70,034	236,586
1984-85	78,296	51,643	45,785	69,111	244,835
1985-86	78,048	54,539	46,482	69,755	248,824
1986-87	78,220	56,281	49,763	71,853	256,117
1987-88	77,030	52,581	54,012	68,239	251,862
1988-89	78,926	58,264	50,169	70,062	257,421
1989-90	78,469	60,387	50,941	64,037	253,834
1990-91	74,542	59,973	44,053	56,239	234,807
1991-92	66,545	54,724	41,168	61,254	223,691
1992-93	74,939	54,857	42,328	67,229	239,353
1993-94	77,436	58,198	48,448	62,749	246,831
1994-95	81,306	58,590	43,990	62,771	246,657
1995-96	82,201	64,224	51,680	73,995	272,100
1996-97	85,432	61,594	57,232	78,528	282,786
1997-98	85,517	61,422	47,766	62,727	257,432
1998-99	84,474	63,194	54,828	66,010	268,505
1999-00	83,375	69,981	54,574	74,265	282,195
2000-01	84,306	65,723	52,359	71,817	274,204
2001-02	83,305	62,304	56,637	65,521	267,767
2002-03	70,540	56,364	50,408	58,497	235,809
2003-04	72,162	57,558	55,545	70,642	255,908
2004-05	78,039	55,998	47,195	69,032	250,264
2005-06	80,129	63,577	54,428	64,620	262,755
2006-07	83,945	67,260	62,519	73,568	287,292
2007-08	76,162	58,530	53,862	72,639	261,194
2008-09	77,180	59,664	49,895	66,874	253,612
2009-10	75,655	56,991	43,866	63,223	239,734
2010-11	71,987	50,362	45,374	61,645	229,367
2011-12	75,176	52,702	49,033	62,378	239,289
2012-13	77,222	53,988	47,075	67,297	245,582
2013-14	73,898	55,406	49,007	65,226	243,536
2014-15	66,954	50,046	43,168	48,171	208,339
2015-16	53,985	42,185	--	--	190,000 1/
5-Year Average	73,047	52,501	46,731	60,943	233,223
10-Year Average	75,831	56,853	49,823	64,564	247,070
42-Year Average	76,519	56,197	47,535	64,651	244,902

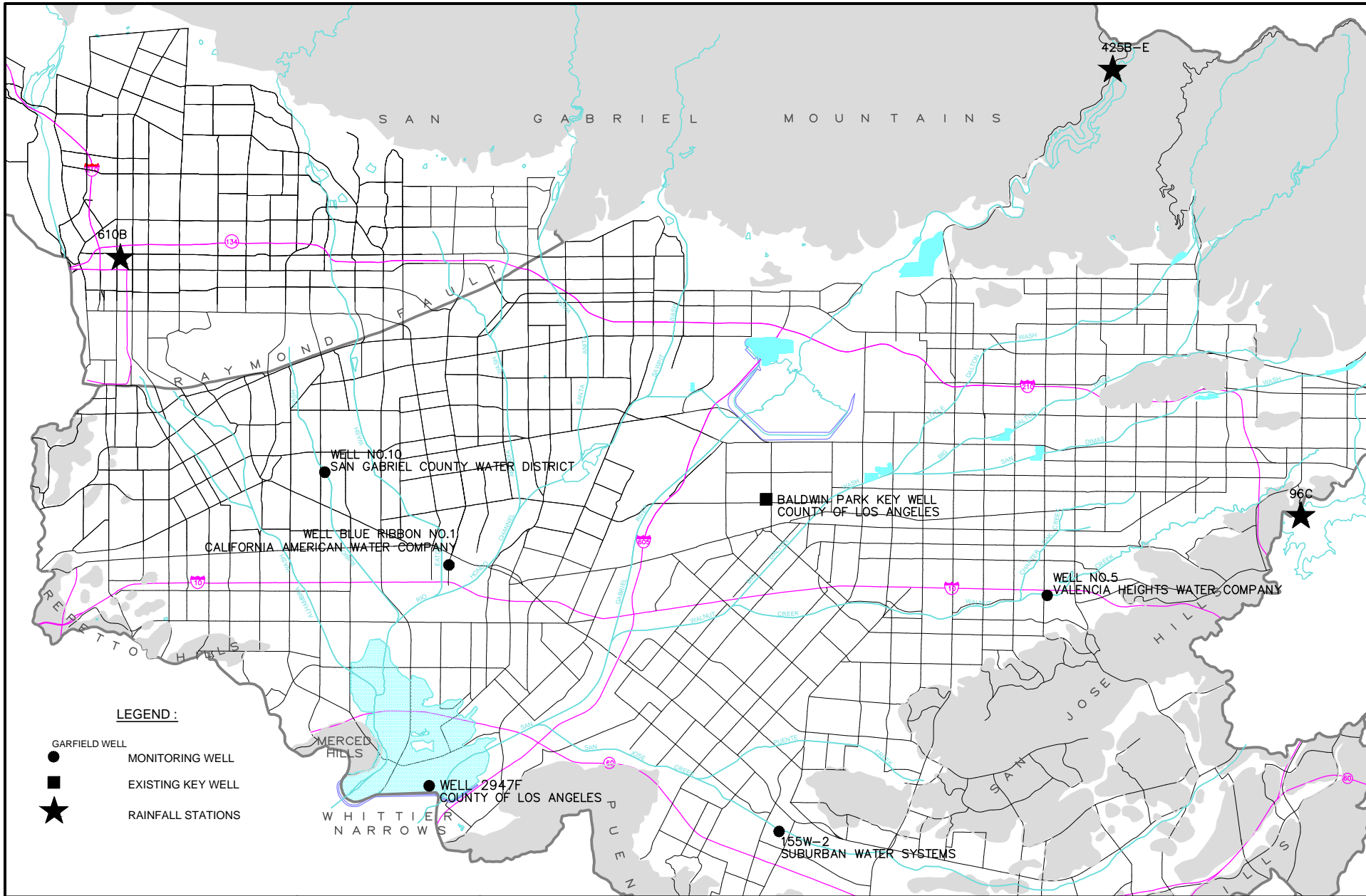
1/ ESTIMATED

TABLE 7

**TOTAL HISTORICAL WATER DEMAND IN BASIN  
(ACRE-FEET)**

<u>FISCAL YEAR</u>	<u>TREATED IMPORTED WATER</u>	<u>TOTAL PRODUCTION</u>	<u>TOTAL DEMAND</u>
1973-74	630	235,460	236,090
1974-75	1,036	225,222	226,258
1975-76	3,539	242,246	245,785
1976-77	9,471	210,340	219,811
1977-78	11,427	195,276	206,702
1978-79	11,724	214,920	226,643
1979-80	13,032	223,089	236,121
1980-81	16,799	230,832	247,631
1981-82	17,402	220,392	237,793
1982-83	14,208	209,949	224,158
1983-84	18,298	236,679	254,977
1984-85	21,676	242,440	264,116
1985-86	20,872	246,224	267,095
1986-87	22,575	253,633	276,208
1987-88	28,537	248,102	276,638
1988-89	25,799	253,694	279,494
1989-90	31,478	252,136	283,614
1990-91	29,922	232,091	262,014
1991-92	18,606	221,477	240,083
1992-93	18,948	236,677	255,625
1993-94	18,412	243,617	262,029
1994-95	19,517	243,479	262,996
1995-96	16,931	268,951	285,881
1996-97	17,205	279,481	296,686
1997-98	14,208	253,921	268,129
1998-99	13,846	265,152	278,998
1999-00	21,062	278,687	299,749
2000-01	19,971	270,919	290,890
2001-02	35,153	264,328	299,481
2002-03	40,982	237,491	278,472
2003-04	50,758	252,812	303,570
2004-05	35,979	247,187	283,166
2005-06	23,125	259,808	282,932
2006-07	25,904	284,328	310,232
2007-08	30,174	258,167	288,341
2008-09	21,683	250,103	271,785
2009-10	16,329	237,846	254,176
2010-11	10,316	227,657	237,973
2011-12	10,561	237,029	247,590
2012-13	14,344	242,914	257,258
2013-14	22,216	240,552	262,768
2014-15	22,517	208,339	230,856
2015-16	<sup>1/</sup> 22,500	190,000	212,500
Most Recent			
5-Year Average	15,991	231,298	247,289
10-Year Average	19,717	244,674	264,391
42-Year Average	19,933	242,468	262,400

1/ Estimated



**LEGEND :**

- GARFIELD WELL
- MONITORING WELL
- EXISTING KEY WELL
- ★ RAINFALL STATIONS



861 VILLAGE OAKS DRIVE, SUITE 100  
 COVINA, CALIFORNIA 91724  
 TEL: (626) 967-6202  
 FAX: (626) 331-7065

2171 E Francisco Blvd., Suite K  
 San Rafael California 94901

2651 W Guadalupe Rd., Suite A209  
 Mesa Arizona 85202

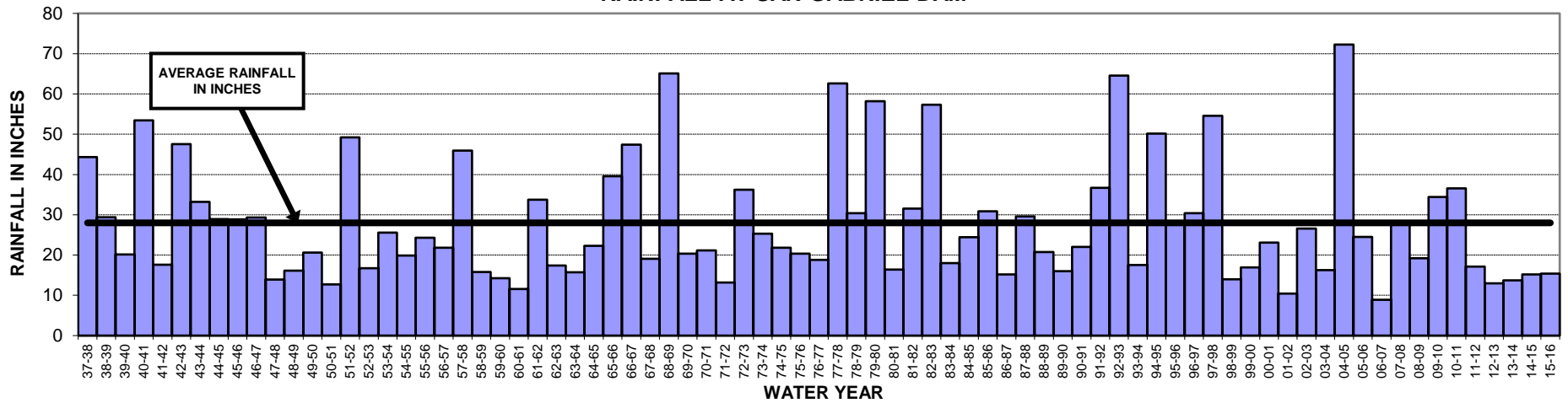


APPROXIMATE SCALE  
 1" = 12,000'

**MAIN SAN GABRIEL BASIN WATERMASTER**

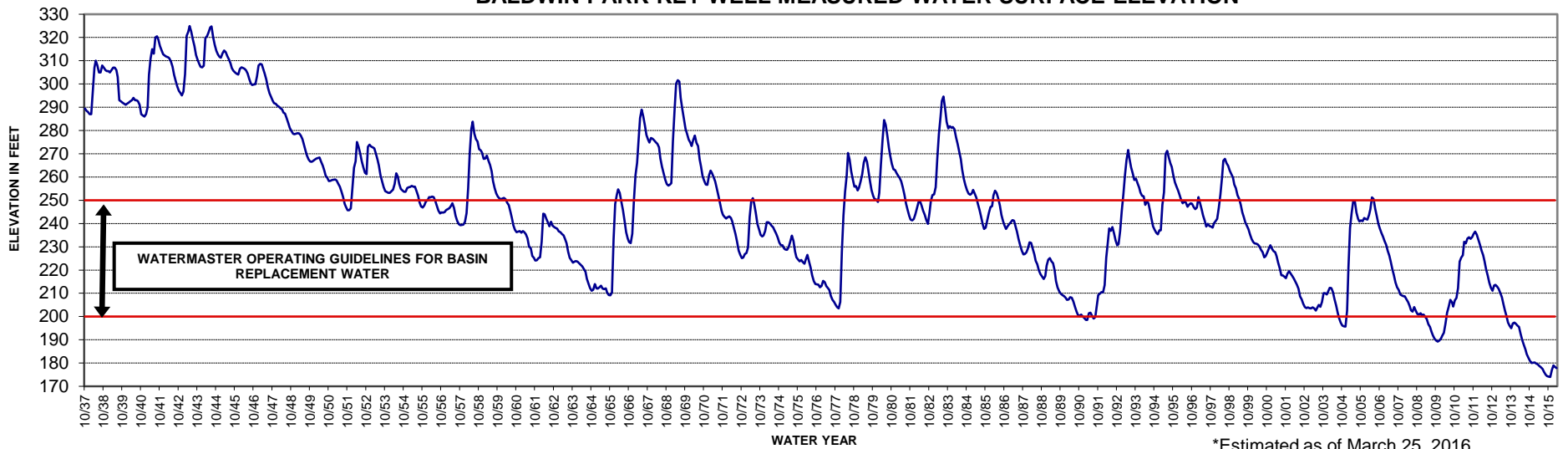
**WELL LOCATION MAP**

### RAINFALL AT SAN GABRIEL DAM



\*Estimated as of February 29, 2016

### BALDWIN PARK KEY WELL MEASURED WATER SURFACE ELEVATION



\*Estimated as of March 25, 2016



**STETSON ENGINEERS INC.**

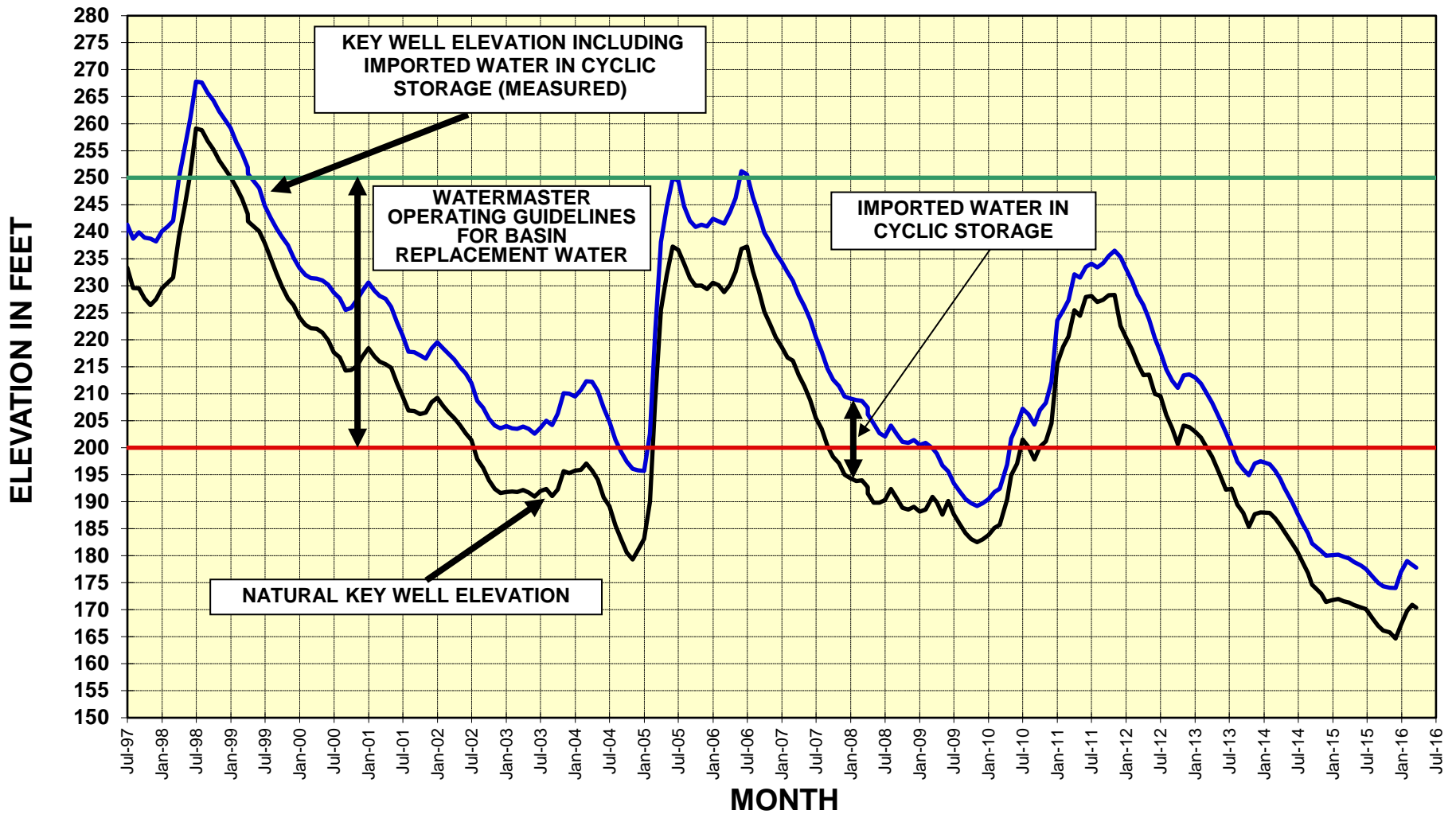
Covina San Rafael Mesa, Arizona

WATER RESOURCE ENGINEERS

### MAIN SAN GABRIEL BASIN WATERMASTER

### SAN GABRIEL DAM RAINFALL AND BALDWIN PARK KEY WELL ELEVATION

FIGURE 1



**STETSON ENGINEERS INC.**

Covina San Rafael Mesa, Arizona

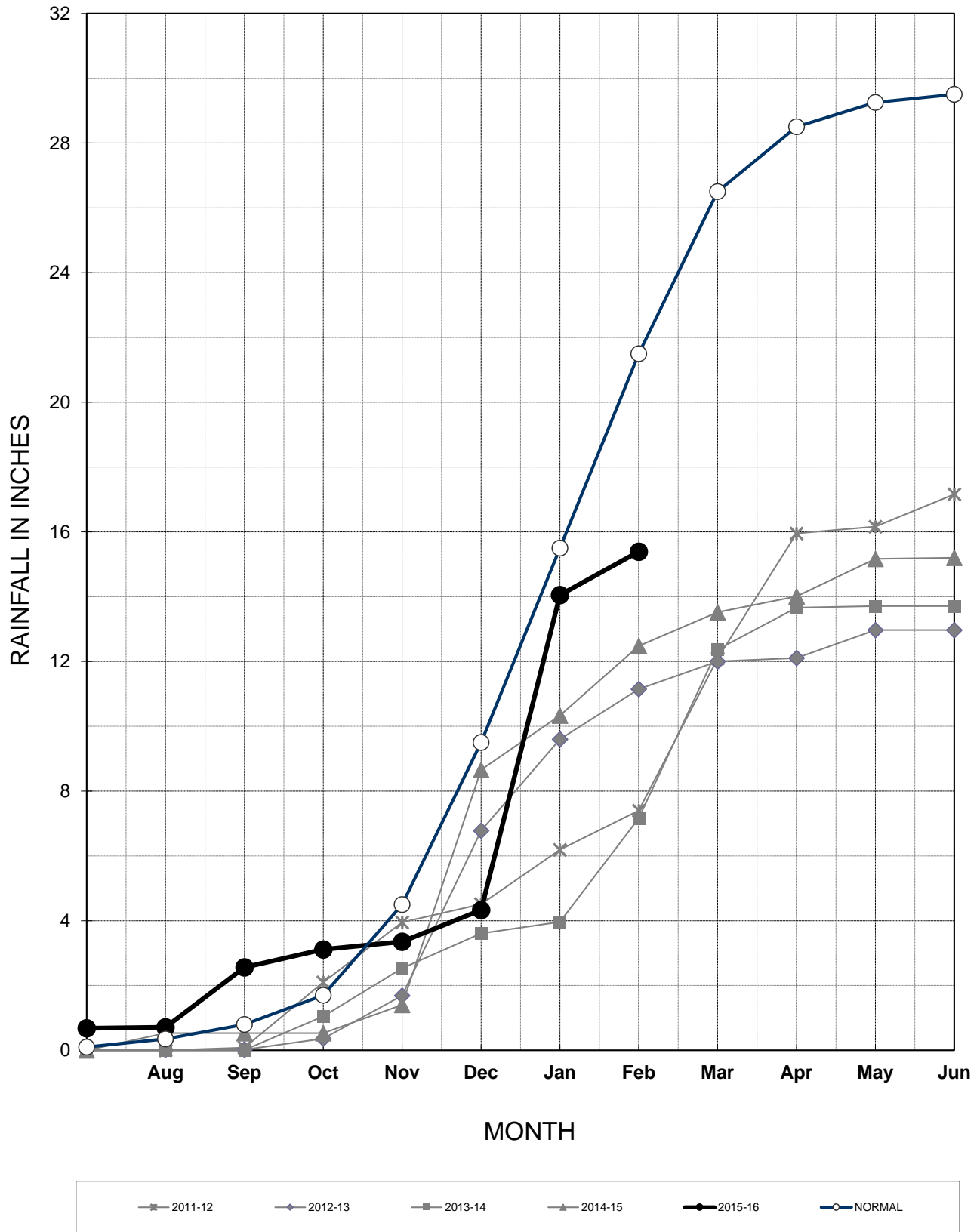
WATER RESOURCE ENGINEERS

**MAIN SAN GABRIEL BASIN WATERMASTER**

**BALDWIN PARK KEY WELL  
GROUNDWATER ELEVATION**

**FIGURE 2**

**FIGURE 3**

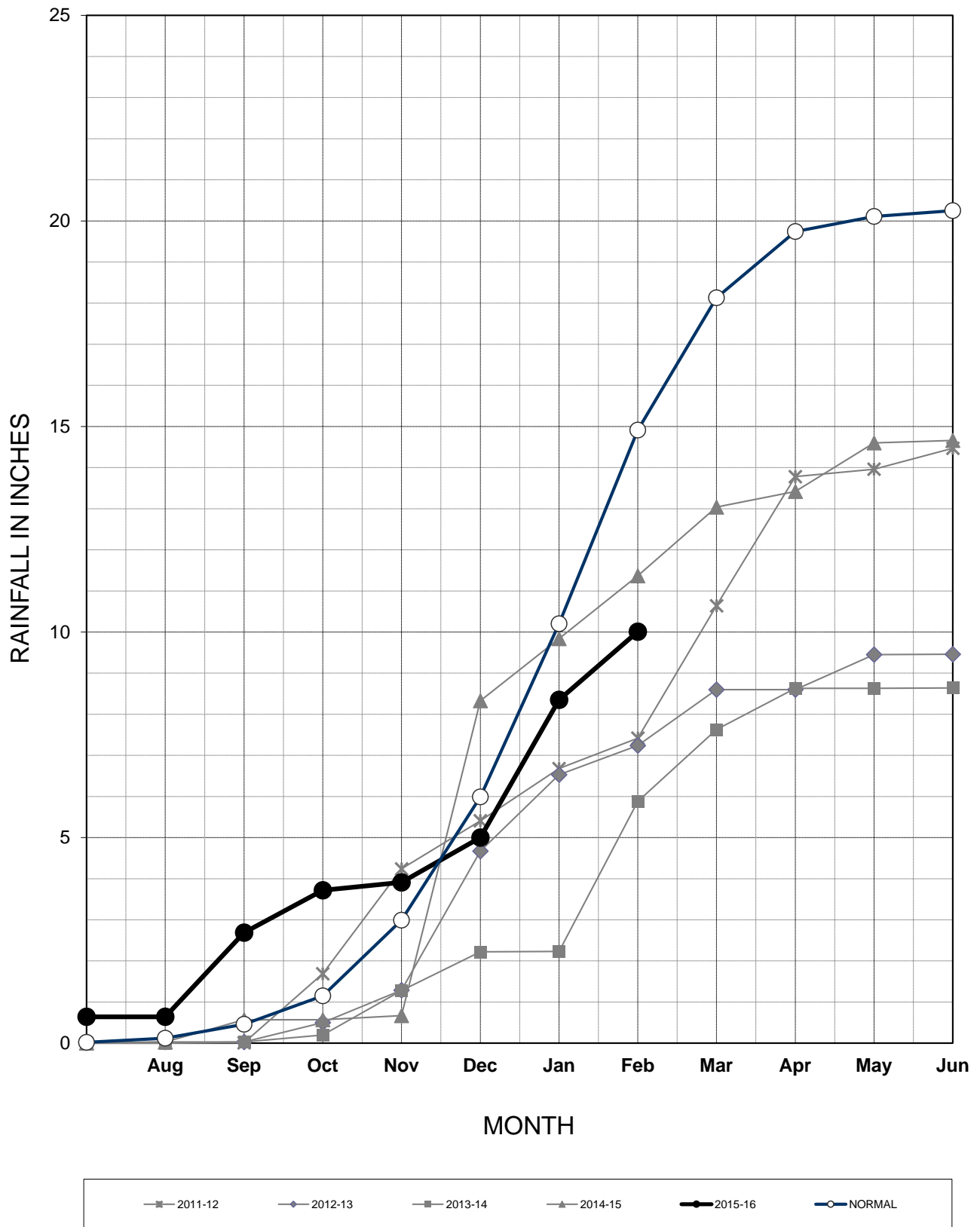


**STETSON ENGINEERS INC.**  
 Covina San Rafael Mesa, Arizona  
 WATER RESOURCE ENGINEERS

**MAIN SAN GABRIEL BASIN WATERMASTER**

**ACCUMULATED RAINFALL AT SAN GABRIEL DAM  
 RAINFALL STATION NO. 425B-E**

FIGURE 4

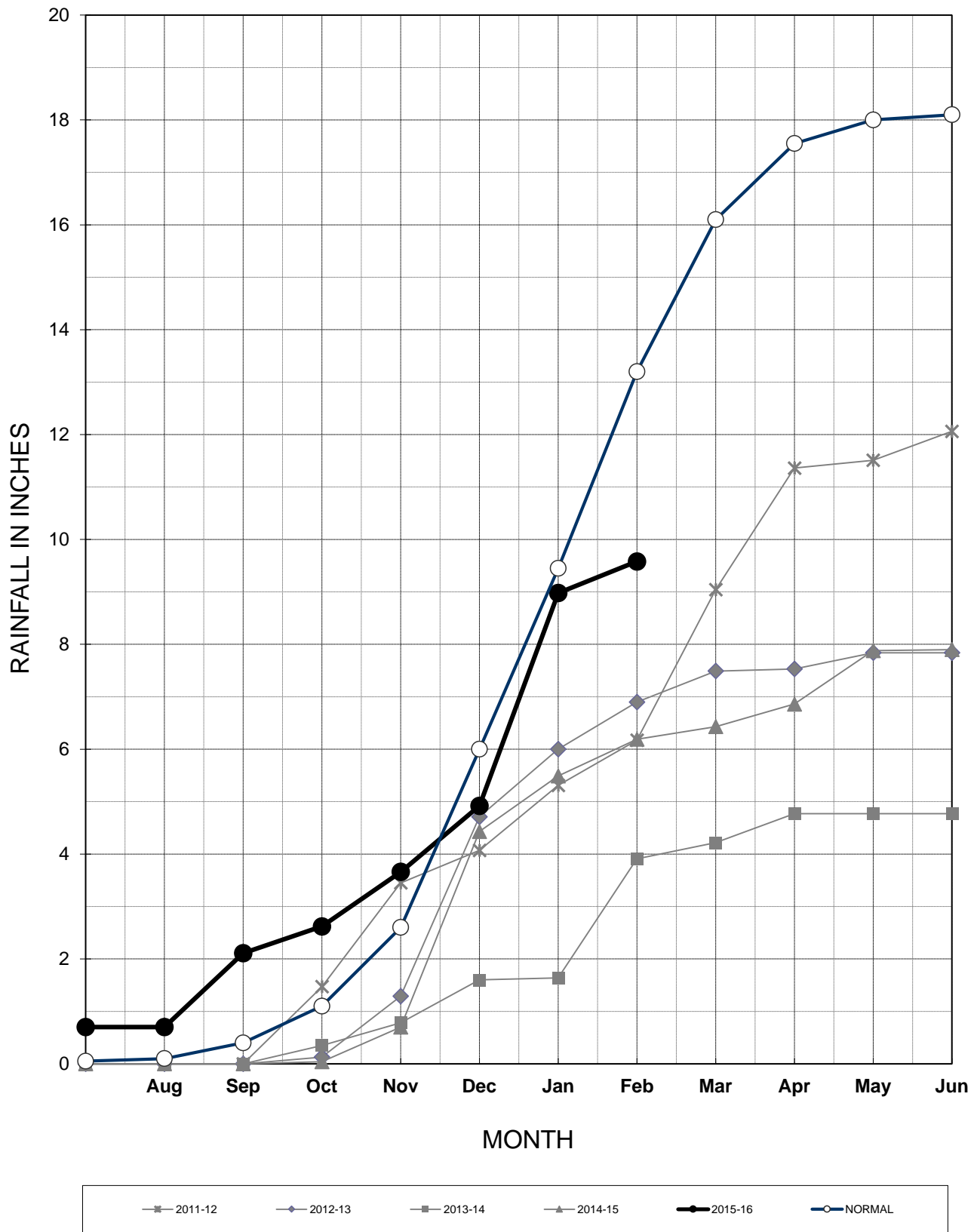


**STETSON ENGINEERS INC.**  
 Covina San Rafael Mesa, Arizona  
 WATER RESOURCE ENGINEERS

**MAIN SAN GABRIEL BASIN WATERMASTER**

**ACCUMULATED RAINFALL AT PASADENA CITY HALL  
 RAINFALL STATION NO. 610B**

FIGURE 5

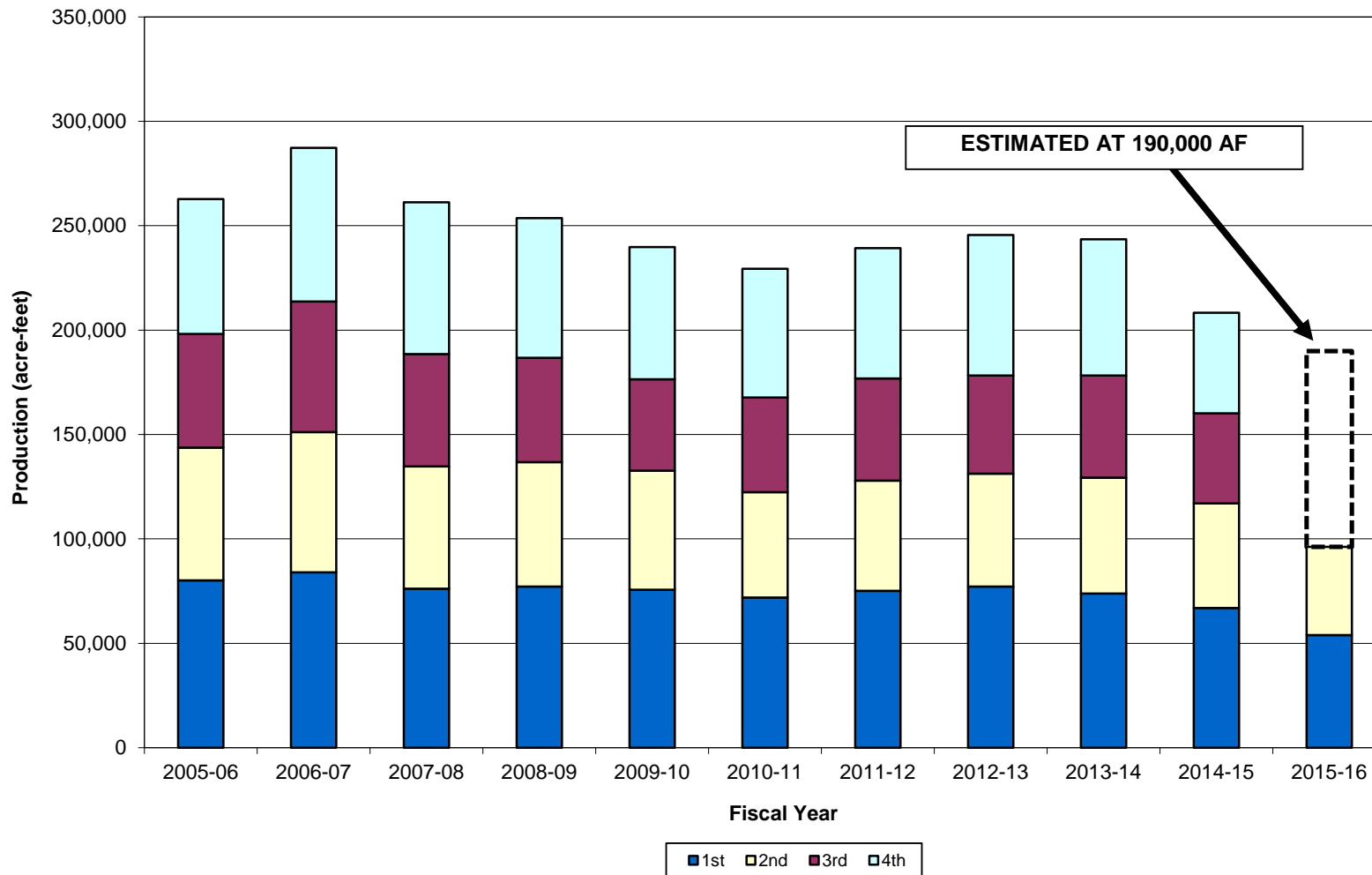


**STETSON ENGINEERS INC.**  
 Covina San Rafael Mesa, Arizona  
 WATER RESOURCE ENGINEERS

**MAIN SAN GABRIEL BASIN WATERMASTER**

**ACCUMULATED RAINFALL AT PUDDINGSTONE DAM  
 RAINFALL STATION NO. 96-C**





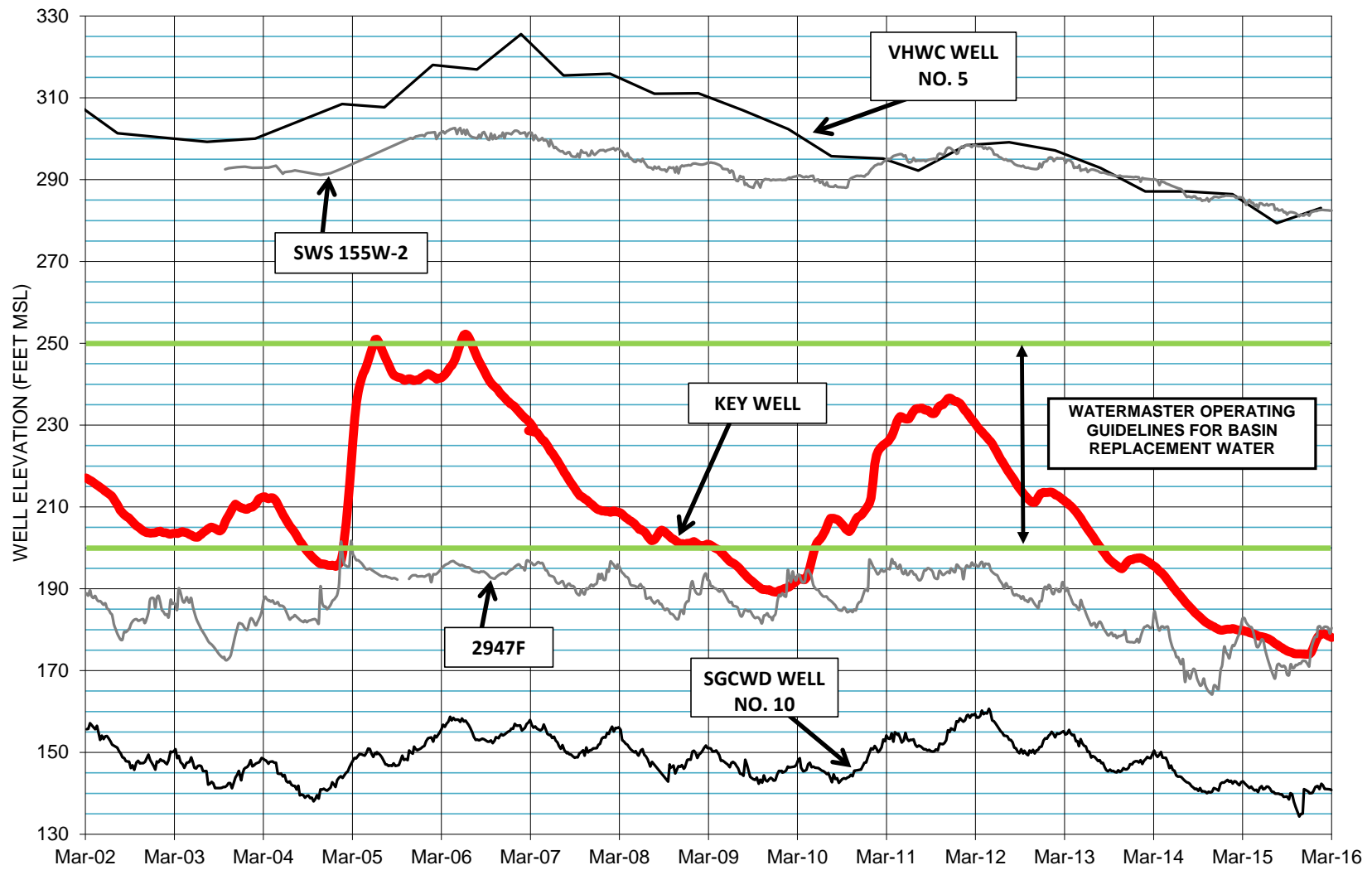
**STETSON ENGINEERS INC.**  
 Covina San Rafael Mesa, Arizona  
 WATER RESOURCE ENGINEERS

**MAIN SAN GABRIEL BASIN WATERMASTER**

**PRODUCTION IN  
 MAIN SAN GABRIEL BASIN**

**FIGURE 6**

# **APPENDIX A**



**STETSON ENGINEERS INC.**  
 West Covina San Rafael Mesa, Arizona  
 WATER RESOURCE ENGINEERS

**MAIN SAN GABRIEL BASIN WATERMASTER**

**HYDROGRAPHS FOR BALDWIN PARK KEY WELL AND OTHER "KEY WELLS"  
 BETWEEN MARCH 2002 AND MARCH 2016**

# **APPENDIX B**

**APPENDIX B**

**RANGE OF OPERATING SAFE YIELDS  
AND PUMPER'S SHARES THEREOF  
(Acre-feet)**

**Quantities which may be pumped free of Replacement Water Assessment**

<b>Pumper</b>	<b>Pumper's Share %</b>	<b>OSY of 130,000</b>	<b>OSY of 140,000</b>	<b>OSY of 150,000</b>	<b>OSY of 160,000</b>
Adams Ranch Mutual	0.05060	65.78	70.84	75.90	80.96
Alhambra, City of	4.45876	5,796.39	6,242.26	6,688.14	7,134.02
Amarillo Mutual	0.35874	466.36	502.24	538.11	573.98
Andrade, Susan	0.00423	5.50	5.92	6.35	6.77
Arcadia, City of	4.23099	5,500.29	5,923.39	6,346.49	6,769.58
Bandel Family Trust	0.00845	10.99	11.83	12.68	13.52
Banks, Gale C.	0.02530	32.89	35.42	37.95	40.48
Brea, City of	0.76035	988.46	1,064.49	1,140.53	1,216.56
Brondino, Jeanne	0.01269	16.50	17.77	19.04	20.30
Cadway, Inc.	0.32545	423.09	455.63	488.18	520.72
Calif. American-San Marino	3.98144	5,175.87	5,574.02	5,972.16	6,370.30
California Domestic	6.22093	8,087.21	8,709.30	9,331.40	9,953.49
Canyon Water Company	0.00051	0.66	0.71	0.77	0.82
Champion Mutual	0.00000	0.00	0.00	0.00	0.00
Chevron	0.00101	1.31	1.41	1.52	1.62
County Sanitation Dist.18	0.00228	2.96	3.19	3.42	3.65
Covina, City of	0.23979	311.73	335.71	359.69	383.66
Crevolin, A.J.	0.00114	1.48	1.60	1.71	1.82
Dawes, Mary Kay	0.22359	290.67	313.03	335.39	357.74
Del Rio Mutual	0.10069	130.90	140.97	151.04	161.10
East Pasadena Water Co.	0.71227	925.95	997.18	1,068.41	1,139.63
El Monte, City of	1.40888	1,831.54	1,972.43	2,113.32	2,254.21
El Monte Cemetery	0.00936	12.17	13.10	14.04	14.98
Fox Family Trust Michael Edward Fox and Crystal Marie Fox, Trustees	0.07378	95.91	103.29	110.67	118.05
Garnier, Anton and Anita	0.10843	140.96	151.80	162.65	173.49
Garnier, Ruth Elaine Ailor	0.02110	27.43	29.54	31.65	33.76
Goedert, Lillian	0.00114	1.48	1.60	1.71	1.82
Golden State Water-S.G.V. Dist.	2.92105	3,797.37	4,089.47	4,381.58	4,673.68
Green, Walter	0.03628	47.16	50.79	54.42	58.05
Hansen, Alice	0.00038	0.49	0.53	0.57	0.61
Hanson Aggregates West, Inc.	1.17094	1,522.22	1,639.32	1,756.41	1,873.50
Heinrich, Carolyn	0.01269	16.50	17.77	19.04	20.30
Hemlock Mutual	0.08399	109.19	117.59	125.99	134.38
Industry, City of	0.55810	725.53	781.34	837.15	892.96
Irwindale, City of	0.19025	247.33	266.35	285.38	304.40
Kirklen, Jeffery	0.07379	95.93	103.31	110.69	118.06
Knight, William J., Living Trust	0.11530	149.89	161.42	172.95	184.48

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(Acre-feet)**

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<b>Pumper</b>	<b>Pumper's Share %</b>	<b>OSY of 130,000</b>	<b>OSY of 140,000</b>	<b>OSY of 150,000</b>	<b>OSY of 160,000</b>
Landeros, John	0.00038	0.49	0.53	0.57	0.61
La Puente Valley CWD	0.57197	743.56	800.76	857.96	915.15
Loucks, David	0.00152	1.98	2.13	2.28	2.43
Lovelady, June G.	0.09386	122.02	131.40	140.79	150.18
Maggiore, Valarie	0.07379	95.93	103.31	110.69	118.06
Martinez, Frances	0.00038	0.49	0.53	0.57	0.61
McIntyre, William	0.01467	19.07	20.54	22.01	23.47
Miller Coors LLC	1.20047	1,560.61	1,680.66	1,800.71	1,920.75
Monterey Park, City of	3.39216	4,409.81	4,749.02	5,088.24	5,427.46
Nick Tomovich	0.00001	0.01	0.01	0.02	0.02
Nicholson Trust	0.01215	15.80	17.01	18.23	19.44
Nicholson Family Trust	0.00354	4.60	4.96	5.31	5.66
Pellissier Irrevocable QTIP Trust, et c	3.28384	4,268.99	4,597.38	4,925.76	5,254.14
Pico County Water Dist.	0.00038	0.49	0.53	0.57	0.61
Polopolus, et al	0.01138	14.79	15.93	17.07	18.21
Rados, Alexander	0.02176	28.29	30.46	32.64	34.82
Rosemead Development Ltd.	0.00051	0.66	0.71	0.77	0.82
Rurban Homes Mutual	0.11018	143.23	154.25	165.27	176.29
Ruth, Roy	0.00038	0.49	0.53	0.57	0.61
San Gabriel Country Club	0.14476	188.19	202.66	217.14	231.62
San Gabriel County WD	2.73019	3,549.25	3,822.27	4,095.29	4,368.30
San Gabriel Valley WC	10.31274	13,406.56	14,437.84	15,469.11	16,500.38
Sonoco Products	0.15766	204.96	220.72	236.49	252.26
So. Calif. Edison Co.	0.08690	112.97	121.66	130.35	139.04
South Pasadena, City of	1.80520	2,346.76	2,527.28	2,707.80	2,888.32
Southwest Water Company	0.05996	77.95	83.94	89.94	95.94
Sterling Mutual	0.06072	78.94	85.01	91.08	97.15
Suburban Water Systems	12.57888	16,352.54	17,610.43	18,868.32	20,126.21
Sunny Slope Water Co.	1.12770	1,466.01	1,578.78	1,691.55	1,804.32
Tate, Phillip P. & Sieglinde A., et al	0.02926	38.04	40.96	43.89	46.82
Tyler Nursery	0.00162	2.11	2.27	2.43	2.59
United Rock Products	0.23253	302.29	325.54	348.80	372.05
Valencia Heights Water Co.	0.53685	697.91	751.59	805.28	858.96
Valley County Water District	3.01517	3,919.72	4,221.24	4,522.76	4,824.27
Valley View Mutual	0.31169	405.20	436.37	467.54	498.70
Vulcan Materials Company	0.90740	1,179.62	1,270.36	1,361.10	1,451.84
Whittier, City of	4.18519	5,440.75	5,859.27	6,277.79	6,696.30
Wilmott, Erma	0.00038	0.49	0.53	0.57	0.61
Workman Mill Invest. Comp.	0.87839	1,141.91	1,229.75	1,317.59	1,405.42
<b>Total of Pumpers</b>	<b>76.46119</b>	<b>99,399.55</b>	<b>107,045.67</b>	<b>114,691.79</b>	<b>122,337.90</b>

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(Acre-feet)**

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<b>Pumper</b>	<b>Pumper's Share %</b>	<b>OSY of 130,000</b>	<b>OSY of 140,000</b>	<b>OSY of 150,000</b>	<b>OSY of 160,000</b>
Azusa, City of	1.84988	2,404.84	2,589.83	2,774.82	2,959.81
Azusa Agric. Water Co.	0.00000	0.00	0.00	0.00	0.00
Azusa Valley Water Co.	5.06299	6,581.89	7,088.19	7,594.49	8,100.78
Calif. American (Duarte)	1.84634	2,400.24	2,584.88	2,769.51	2,954.14
Covina Irrigating Co.	3.22577	4,193.50	4,516.08	4,838.66	5,161.23
Glendora, City of	4.75261	6,178.39	6,653.65	7,128.92	7,604.18
Golden State Water Co. - San Dimas District	1.73984	2,261.79	2,435.78	2,609.76	2,783.74
Los Angeles, County of	1.88292	2,447.80	2,636.09	2,824.38	3,012.67
Metropolitan Water Dist.	0.08349	108.54	116.89	125.24	133.58
Monrovia, City of	3.09472	4,023.14	4,332.61	4,642.08	4,951.55
Phillips, Alice B., et al	0.00025	0.33	0.35	0.37	0.40
Total of Intergrated Producers	23.53881	30,600.45	32,954.33	35,308.21	37,662.10
Total of Pumpers	76.46119	99,399.55	107,045.67	114,691.79	122,337.90
<b>TOTAL</b>	<b>100.00000</b>	<b>130,000.00</b>	<b>140,000.00</b>	<b>150,000.00</b>	<b>160,000.00</b>