

**MAIN SAN GABRIEL BASIN WATERMASTER  
REPORT ON  
FINAL DETERMINATION OF  
OPERATING SAFE YIELD  
FOR 2017-18 THROUGH 2021-22**

**MAY 3, 2017**



861 Village Oaks Drive, Suite 100  
Covina, California, 91724  
Phone (626) 967-6202  
Fax (626) 331-7065  
[www.stetsonengineers.com](http://www.stetsonengineers.com)

**SAN RAFAEL, CA**

**STETSON ENGINEERS INC.**  
**COVINA, CA**

**MESA, AZ**

**CENTENNIAL, CO**

## TABLE OF CONTENTS

	<u>Page No.</u>
Introduction .....	1
Basin Operating Criteria .....	1
Impacts/Response to (Unprecedented) Five-Year Drought.....	2
Conditons During Five-Year Drought.....	2
Overview of Watermaster and Producer Actions .....	3
Judgment Amendments .....	3
Storm Water Capture .....	3
Cyclic Storage.....	3
Conservation.....	3
Recycled Water for Replenishment .....	4
Basinwide Low Water Vulnerability Assessment .....	4
In-Lieu Program .....	4
Assist Drought Impacted Purveyors.....	4
Stormwater Augmentation Program.....	4
Basin Conditions - Groundwater Elevations .....	5
Baldwin Park Key Well .....	5
Other “Key Wells” .....	5
Basin Conditions - Rainfall .....	6
San Gabriel Dam – Station 425B-E .....	6
Pasadena City Hall – Station 610B.....	6
Puddingstone Dam – Station 96C .....	7
Basin Conditions - Local Water in Surface Storage Reservoirs .....	7
Basin Conditions - Local and Imported Water Conserved.....	7
Basin Conditions - Supplemental Water Availability .....	8
Metropolitan Water District of Southern California.....	8
Availability of Imported Water .....	8

San Gabriel District.....	9
Deliveries of Supplemental Water .....	9
Replacement Water .....	9
Water Resource Development Assessment Water .....	10
Fiscal Year 2016-17 Supplemental Water Deliveries.....	10
Estimated 2017-18 Supplemental Water Delivery Requirements ...	11
Stormwater Augmentation Program.....	12
Cyclic Storage Water .....	12
Basin Conditions - Carry-over Rights .....	13
Basin Conditions - Estimated Water Production During 2016-17 .....	13
Fiscal Year 2016-17 Operating Safe Yield Determination .....	14
Conclusions .....	15
Adopted Operating Safe Yield .....	16

## LIST OF TABLES

Table 1	Annual Operating Safe Yield, Production Rights, Water Production and Replacement Water Requirements
Table 2	Monthly Cyclic Storage Accounts and Effect on Key Well
Table 3	Local Water in Storage in Surface Reservoirs
Table 4	Rainfall and Water Replenishment of Main San Gabriel Basin
Table 5	Supplemental Water Deliveries to the Main San Gabriel Basin for Groundwater Replenishment
Table 6	Historical Water Production
Table 7	Total Historical Demand in Basin

## **LIST OF PLATES**

Plate 1      Well Location Map

## **LIST OF FIGURES**

Figure 1      Baldwin Park Key Well Groundwater Elevation

Figure 2      San Gabriel Dam Rainfall and Baldwin Park Key Well Elevation

Figure 3      Accumulated Rainfall at San Gabriel Dam Rainfall Station No. 425B-E

Figure 4      Accumulated Rainfall at Pasadena City Hall Rainfall Station No. 610B

Figure 5      Accumulated Rainfall at Puddingstone Dam Rainfall Station No. 96-C

Figure 6      Production in Main San Gabriel Basin

## **LIST OF APPENDICIES**

Appendix A      Hydrographs for Baldwin Park Key Well and Other “Key Wells”

Appendix B      Range of Operating Safe Yields and Pumper’s Shares Thereof

**MAIN SAN GABRIEL BASIN WATERMASTER  
REPORT ON FINAL DETERMINATION OF  
OPERATING SAFE YIELD  
FOR 2017-18 THROUGH 2021-22**

**May 3, 2017**

**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

---

<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. 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.

## **IMPACTS/RESPONSE TO (UNPRECEDENTED) FIVE-YEAR DROUGHT**

### **Conditions During Five-Year Drought**

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 (which excludes the impacts of untreated imported water held in Cyclic Storage) 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 significantly below average rainfall years and resulted in rainfall of 12.06 inches, 7.84 inches, 4.77 inches, 10.01 and 10.04 inches, respectively, as measured at Puddingstone Dam. (The long-term annual average is 18.10 inches.) Local runoff during these same five years of drought averaged annually only 27,000 AF (long-term annual average is 101,000 AF). As a result of these five consecutive years of below average rainfall, local runoff and replenishment, the operational groundwater elevation at the Key Well decreased from 227.9 feet (measured at 233.5 feet) on June 24, 2011 to 161.7 feet (measured at 174.0 feet) on June 24, 2016, a decrease of about

66 feet, as shown on Figure 1 and Table 2. Without the actions of the Watermaster and the Producers, Basin water supply conditions would have been much worse.

## **Overview of Watermaster and Producer Actions**

### **Judgment Amendments**

Since the start of this 5-year drought, the Watermaster has become more proactive by implementing provisions of the Judgment, and developing and instituting new studies, programs and plans to address the drought conditions as they progressively worsened. As a direct result of the recent drought (calendar year 2006 to end of calendar year 2009, where the historical low was 189.2 feet on November 30, 2009), the 2012 Judgment Amendments provided Watermaster with increased management flexibility and adaptability; and provided more discretion in making Basin management decisions. A key component of the Judgment Amendments was the new Water Resource Development Assessment (RDA) to be levied on all production. The RDA was designed to help address the potential future unavailability of imported replenishment water supplies, by allowing the Watermaster to collect RDA funds and purchase replenishment water for storage in the Basin to offset a future Replacement Water obligation that cannot be met by a Responsible Agency.

### **Storm Water Capture**

During fiscal year 2011-12, the Watermaster convened an Ad Hoc Committee on storm water capture to help address the local drought conditions that resulted in the historic low Key Well elevation in 2009. The Ad Hoc Committee performed extensive research and coordinated closely with the Los Angeles County, Department of Public Works (DPW) to identify and prioritize several potential new and enhanced storm water capture projects.

### **Cyclic Storage**

Cyclic Storage allows a producer who anticipates a Replacement Water obligation to also pre-purchase imported water and store it in the Main Basin to meet its future Replacement Water obligation. The use of Cyclic Storage helps increase water levels, but defers wet Replacement Water deliveries. Consequently, Cyclic Storage water will be applied to Replacement Water obligations for the short-term (one to three years), significantly reducing actual deliveries of Replacement Water. Therefore, with significant amounts of water stored in Cyclic Storage, setting “lower” Operating Safe Yields will have almost no short-term impacts on Basin water levels/supplies.

### **Conservation**

Due to the five-year drought, the Watermaster passed Resolution No. 03-14-260 declaring “drought conditions” and encouraged all Basin water producers to adopt

reduced pumping and water conservation activities at the retail level. Due to conservation efforts in the Main Basin, production decreased from 245,600 AF in FY 2012-13 to 182,800 AF in FY 2015-16, a total of 62,800 AF. With less water being pumped from the Main Basin, this has helped keep water levels from further dropping.

### **Recycled Water for Replenishment**

During fiscal year 2012-13, the Watermaster declared its support for a new recycled water supply project for Basin replenishment. When completed, the project could supply about 25 percent of the overall imported replenishment water.

### **Basinwide Low Water Vulnerability Assessment**

During fiscal year 2013-14, the Watermaster initiated an evaluation of the potential impacts to production wells and local potable water supplies, if the current local drought continues and the groundwater level at the Key Well lowered to 170 feet. The Watermaster also updated the basinwide information on water purveyor inter-connections in the event water supply from groundwater wells are reduced.

### **In-Lieu Program**

During fiscal year 2014-15, Watermaster re-instated the In-Lieu Program, where Watermaster funded a Producer's cost difference to take direct delivery of MWD imported water "in-lieu" of pumping from its groundwater wells. The In-Lieu Program provided imported water to the Basin, and preserved groundwater supply in the Basin.

### **Assist Drought Impacted Purveyors**

In the upper portion of the Basin (Canyon Basin), the extreme local drought conditions resulted in some water purveyor wells potentially running out of groundwater supply. The Watermaster, along with the Responsible Agency, coordinated the special delivery of imported water to the Upper Canyon replenishment basins, and thereby helped keep these impacted wells in service.

### **Stormwater Augmentation Program**

During fiscal year 2015-16, the Watermaster evaluated other ways to help manage the Basin water supplies. While southern California remains in extreme drought, northern California received above-average precipitation. As a result, replenishment water was being made available. The Watermaster determined that during the last four to five years, nearly 400,000 acre-feet had been pumped from the Basin and not replaced by local rainfall and runoff replenishment. The Watermaster developed a conceptual "Stormwater/Replenishment Augmentation Program," whereby the RDA would be repurposed to purchase available imported water to supplement the shortage of local stormwater replenishment.



## **BASIN CONDITIONS - 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.

### **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 2 is a hydrograph showing the groundwater elevation at the Key Well and annual rainfall at San Gabriel Dam since October 1, 1937. 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 September 30, 2016 at 161.3 feet at which time 87,000 acre-feet (about 11 feet) were in Cyclic Storage. On April 28, 2017 the operational groundwater elevation at the Key Well was 165.6 feet (measured at 182.8 feet, as shown on Figure 1), at which time 137,000 acre-feet (about 17 feet) were in Cyclic Storage.

Assuming the Operating Safe Yield is 150,000 AF, supplemental water is available and delivered during FY 2017-18, and based on historical trends, the operational groundwater elevation is projected to remain stable during an average year (about 18 inches of rainfall), and increase by about 13 feet during a wet year (about 20 inches of rainfall). Thus far during fiscal year 2016-17, rainfall at Puddingstone Dam has been about 20.5 inches (wet year) which is about 117 percent of average, through April 30, 2017. Assuming average rainfall continues the rest of the year, the operational groundwater elevation at the Key Well could increase by about 3 feet and rise from 162 feet (measured at 174 feet on July 1, 2016) to about 165 feet (measured at about 183 feet) by June 30, 2017, which is 35 feet (about 200,000 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 increased by about 4 feet from 162 feet on July 1, 2016 to 165.6 feet on April 28, 2017, (the measured groundwater elevation has increased by 9 feet from 173.6 feet on July 1, 2016 to 182.8 feet on April 28, 2017) 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.

### **BASIN CONDITIONS - 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 32.54 inches for the period July 1, 2016 through April 30, 2017, or about 114 percent of average for that period. Assuming average rainfall for the remainder of the year, the total annual rainfall could be about 33.5 inches, or total about 114 percent of average. Figure 3 shows the cumulative rainfall for 1) fiscal years 2011-12, 2012-13, 2013-14, 2014-15, 2015-16, 2) the period July 2016 through April 2017, and 3) the long-term average rainfall at San Gabriel Dam.

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

Rainfall at the Pasadena City Hall was 20.06 inches for the period July 1, 2016 through March 31, 2017, or about 111 percent of average for that period. Rainfall for the period of July 1, 2016 through April 30, 2017, is estimated to be about 20.10 inches, or about 102 percent of average. Assuming average rainfall for the remainder of the year, the total annual rainfall would be about 20.6 inches, or total about 102 percent of average. Figure 4 shows the cumulative rainfall for 1) fiscal years 2011-12, 2012-13, 2013-14, 2014-15, 2015-16, 2) the period July 2016 through April 2017, and 3) the long-term average rainfall at the Pasadena City Hall.

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

Rainfall at Puddingstone Dam was 20.48 inches for the period July 1, 2016 through April 30, 2017, or about 117 percent of average for that period. Assuming average rainfall for the remainder of the year, the total annual rainfall would be about 21 inches, or total about 116 percent of average. Figure 5 shows the cumulative rainfall for 1) fiscal years 2011-12, 2012-13, 2013-14, 2014-15, 2015-16, 2) the period July 2016 through April 2017, and 3) the long-term average rainfall at Puddingstone Dam.

Precipitation in the San Gabriel River watershed during fiscal year 2016-17, through the end of April 2017, was about 110 percent of average.

### **BASIN CONDITIONS - LOCAL WATER IN SURFACE STORAGE RESERVOIRS**

Water in surface reservoirs located on streams tributary to the Basin is stored by the 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 May 2, 2016 and on May 1, 2017. Also shown are the current recorded inflow and outflow rates at the reservoirs on May 12017. The total amount of local water stored in surface reservoirs in the San Gabriel Valley as of May 1, 2017, was about 64,700 acre-feet (about 78 percent of capacity), which is an increase of about 42,100 acre-feet in storage compared to May 2, 2016 (64,700 – 22,600). 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 64,700 acre-feet in storage, about 47,100 acre-feet (64,700 – 10,500 – 7,100) are available for direct use or groundwater replenishment. If entirely replenished in the Main Basin, the groundwater elevation at the Key Well might increase by about six feet solely from local water in storage.

### **BASIN CONDITIONS - 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 2 (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 2016-17 has been about 120 percent of average through March 31, 2017. Although DPW replenishment records are incomplete this time of year, preliminary data indicate approximately 49,000 acre-feet (only 49 percent of average) of local runoff was replenished in the Basin between October 1, 2016 and March 31, 2017. The average annual local water Basin replenishment is about 101,000 acre-feet. In addition, about 46,900 acre-feet of untreated imported water (Supplemental Water) was replenished in the Basin for a total Basin replenishment of about 95,900 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.

### **BASIN CONDITIONS - 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 April 30, 2017, the “8-station index” indicated average precipitation of 88.31 inches or about 193 percent of average for that time of year, while rainfall in the San Gabriel Valley was about 110 percent of average (through April 30, 2017).

On November 28, 2016, DWR announced the 2017 initial allocation of SWP water was 20 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 existing storage in SWP conservation reservoirs, SWP operational constraints such as conditions of the recent Biological Opinions for delta smelt and salmonids, and the longfin smelt incidental take permit, and 2017 contractor demands”. On December

21, 2016, the SWP allocation was increased to 45 percent of the SWP entitlement; on January 18, 2017, the SWP allocation was increased to 60 percent of the SWP entitlement; and on April 14, 2017, the SWP allocation was increased to 85 percent of the SWP entitlement. In general, every five percent of SWP allocation equates to about 100,000 acre-feet of supply for MWD. With a 85 percent SWP allocation MWD would receive about 1,625,000 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 1,000,000 acre-feet of Colorado River water are available to MWD during calendar year 2017. 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. 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".

### **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 2017 allocation is 85 percent of its State Water Project Table A entitlement of 28,800 acre-feet. Consequently, it is anticipated San Gabriel District will deliver about 24,480 acre-feet to the Basin during calendar year 2017. In addition, San Gabriel District has already delivered 1,487 acre-feet on behalf of Dudley Ridge Water District and 1,517 acre-feet of "Article 21" water before Article 21 water was suspended.

### **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 as Replacement Water and RDA Water and for Cyclic Storage accounts. 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; 3) for Cyclic Storage accounts and 4) Future Deliveries.

#### **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 April 28, 2017 the operational groundwater elevation at the

Key Well was about 165.6 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. However, thus far, there is a lot of Cyclic Storage water in accounts, which can be deducted to meet Replacement Water obligations instead of delivering water to the Basin. Thus, lowering the Operating Safe Yield would have little or no impacts on the Basin water levels.

### **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 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 2016-17 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 2016-17.

Following the conclusion of fiscal year 2015-16, it was determined Upper District had no Replacement Water requirement to be delivered during 2016-17 through USG-3 and 3,000 acre-feet will be delivered through USG-5. In addition, Upper District had a RDA requirement of 4,713 acre-feet to be delivered during 2016-17. As of March 31, 2017, a total of 2,112.80 acre-feet was delivered through USG-5 leaving a Replacement Water balance of 887.20 acre-feet. As of March 31, 2017, the full RDA requirement of 4,713 acre-feet had been delivered.

Following the conclusion of fiscal year 2015-16, it was determined San Gabriel District had a Replacement Water requirement of 14,030.13 acre-feet to be delivered

during 2016-17. As of March 31, 2017, San Gabriel District delivered 9,607.00 acre-feet of imported water leaving a Replacement Water balance of 4,423.13 acre-feet. In addition, San Gabriel District had a RDA requirement of 761 acre-feet to be delivered during 2016-17. As of March 31, 2017, San Gabriel District had not delivered the full RDA requirement of 761 acre-feet. (San Gabriel District also has a deferred Replacement Water account balance of about 7,500 acre-feet.)

Following the conclusion of fiscal year 2015-16, it was determined Three Valleys District had no Replacement Water requirement to be delivered during 2016-17. Three Valleys District had a RDA requirement of 342 acre-feet to be delivered during 2016-17. As of March 31, 2017, Three Valleys District did not deliver the full RDA requirement of 342 acre-feet.

### **Estimated 2017-18 Supplemental Water Delivery Requirements (Replacement Water and Water Resource Development Assessment Water)**

The estimated fiscal year 2016-17 over production in the Basin is about 31,300 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 21,100 acre-feet. After deductions from Producer's cyclic storage accounts and usage of Watermaster pre-purchases, it is anticipated there will be about 5,300 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 2017-18. In addition, Upper District has an estimated RDA requirement of 5,000 acre-feet to be delivered during 2017-18 for a total estimated Supplemental Water delivery requirement of 13,300 (5,300 + 3,000 + 5,000) acre-feet during 2017-18.

It is estimated San Gabriel District Producers will have over production of about 8,900 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 2017-18. In addition, San Gabriel District has an estimated RDA requirement of 800 acre-feet to be delivered during 2017-18, for a total estimated Supplemental Water delivery requirement of 7,500 (6,700 + 800) acre-feet during 2017-18. 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 2017-18 is approximately 12,500 (7,500 + 5,000) acre-feet. (San Gabriel District also has a deferred Replacement Water account balance of about 7,500 acre-feet.)

It is estimated Three Valleys District producers will have over production of about 1,400 acre-feet. After deductions from Producer's cyclic storage accounts, it is anticipated Three Valleys will have a Replacement Water requirement of 100 acre-feet to be delivered in 2017-18. Three Valleys District has an estimated RDA requirement of 300 acre-feet to be delivered during 2017-18.

## **Stormwater Augmentation Program**

As previously discussed, the Watermaster developed a conceptual “Stormwater/Replenishment Augmentation Program,” whereby the RDA would be repurposed to purchase available imported water to supplement the shortage of local stormwater replenishment. The new RDA (new RDA II) will be on all production and the purchased water would be added to the natural Basin water supply, with no specific rights to recover the water. Production during fiscal year 2016-17 will be the first year RDA II is to be implemented. At \$40/AF and an estimated 9,000 acre-feet will be purchased in the first year. The new RDA II is intended to increase to \$175/AF within no more than five years and an estimated 34,000 acre-feet may be purchased by the fifth year. The new RDA II was adopted at Watermaster’s May 2017 meeting.

## **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 April 30, 2017 there was a total of about 137,000 acre-feet in Basin Cyclic Storage (represents about 17 feet at the Key Well).

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 1, 2011. The storage balance in all of the Basin Cyclic Storage accounts on July 1, 2016, the balance as of April 30, 2017 and the estimated balance as of June 30, 2017, is shown below in acre-feet.



	<b>Cyclic Storage as of July 1, 2016</b>	<b>Estimated Account Balance as of April 30, 2017</b>	<b>Estimated Balance as of June 30, 2017<sup>1/</sup></b>
<b>San Gabriel Valley Municipal Water District</b>	5,312	6,408	10,000
<b>Upper San Gabriel Valley Municipal Water District</b>	7,539	7,225	7,200
<b>Three Valleys Municipal Water District</b>	2,277	14,395	14,400
<b>Producers in San Gabriel District</b>	5,218	5,218	3,300
<b>Producers in Upper District</b>	24,436	64,536	51,700
<b>Producers in Three Valleys District</b>	2,606	3,106	1,800
<b>Watermaster Pre-purchases</b>	10,123	10,123	10,100
<b>RDA</b>	6,940	11,653	12,800
<b>Puente Basin Agency Storage and Export</b>	<u>14,578</u>	<u>14,578</u>	<u>14,600</u>
	79,029	137,242	123,900

1/ It is assumed Replacement Water requirements will be deducted from Cyclic Storage accounts by the end of fiscal year 2016-17. It is assumed 2017 SWP water allocation is 85 percent.

## **BASIN CONDITIONS - 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 2015-16 were approximately 35,200 acre-feet and increased to 39,300 acre-feet at the beginning of fiscal year 2016-17. It is estimated the Carry-over Rights at the beginning of fiscal year 2017-18 will be about 38,200 acre-feet. Historical Carry-over Rights and lost Carry-over Rights are shown on Table 1.

## **BASIN CONDITIONS - ESTIMATED WATER PRODUCTION DURING 2016-17**

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 2016-17 was about 106,000 acre-feet. Figure 6 shows quarterly production in the Basin for the past 10 years (fiscal years 2006-07 through 2015-16) and current fiscal year 2016-17. Anticipated groundwater production for fiscal year 2016-17 has been estimated below.

The reported production for the first two quarters of fiscal year 2016-17 was about 106,000 acre-feet. If production for the last two quarters of fiscal year 2016-17 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 2016-17 production will be about 197,000 acre-feet (106,000 + 91,000). Based on this information, it is anticipated groundwater production during fiscal year 2016-17 will be about 200,000 acre-feet. This represents an increase from fiscal year 2015-16 production of 183,000 acre-feet; however, direct treated water deliveries have remained the same, as described below. In addition, drought conservation activities have continued but rainfall in the San Gabriel Valley was about 150 percent of average, which also have impacted production. Figure 6 shows production for the past ten years and the estimated groundwater production for fiscal year 2016-17.

The historical total demand in the Basin is met by local water production and direct treated imported water deliveries. During fiscal year 2015-16, direct treated imported water sales were about 12,700 acre-feet, as shown in Table 7. Estimated direct treated imported water sales for fiscal year 2016-17 is about 12,400 acre-feet. Total demand during fiscal year 2016-17 is estimated to be about 212,400 acre-feet (200,000 + 12,400) and is about 26,400 acre-feet below the 5-year average total water demand of 238,800 acre-feet, as shown in Table 7.

### **FISCAL YEAR 2016-17 OPERATING SAFE YIELD DETERMINATION**

On May 11, 2016, Watermaster considered the Engineer's recommended Preliminary Operating Safe Yield of 150,000 acre-feet for fiscal year 2016-17. At that time, the total rainfall in the Basin from July 1, 2015 to April 30, 2016, as represented by the Puddingstone Dam station, was 12.03 inches or 69 percent of long-term average for that period. (The total annual rainfall at the Puddingstone Dam station for fiscal year 2015-16 was 12.15 inches, representing about 67 percent of average.) The operational groundwater elevation at the Key Well at the time of the May 2016 Watermaster meeting was at 164 feet (measured at 176 feet) and decreasing at the rate of about 0.3 feet per week. Total water in local storage reservoirs was 22,600 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 11, 2016 meeting, Watermaster established the Operating Safe Yield at 150,000 acre-feet for fiscal year 2016-17 and an estimated Operating Safe Yield of 130,000 acre-feet for fiscal years 2017-18, 2018-19, 2019-20, and 2020-21.

## **CONCLUSIONS**

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. Since the start of this 5-year drought, the Watermaster has become more pro-active by implementing provisions of the Judgment, and developing and instituting new studies, programs and plans to address the drought conditions as they progressively worsened. The 2012 Judgment Amendments provided Watermaster with increased management flexibility and adaptability; and broad discretion in the making of Basin management decisions. Without the actions of the Watermaster and the Producers, Basin water supply conditions would have been much worse. The following are Watermaster and Producer Actions: RDA, Storm Water Capture, Cyclic Storage, Conservation, Recycled Water for Replenishment, Basinwide Low Water Vulnerability Assessment, In-Lieu Program, Assist Drought Impacted Purveyors, and Stormwater Augmentation Program.

On April 28, 2017 the operational groundwater elevation at the Key Well was 165.6 feet (measured at 182.8 feet), at which time 137,000 acre-feet (about 17 feet) were in Cyclic Storage. The use of Cyclic Storage helps increase water levels, but defers wet Replacement Water deliveries. Consequently, Cyclic Storage water will be applied to Replacement Water obligations for the short-term (one to three years), and there will be reduced Replacement Water deliveries. Therefore setting “lower” Operating Safe Yields will have almost no short-term impacts on Basin water levels/supplies.

Thus far during fiscal year 2016-17, rainfall at Puddingstone Dam has been about 20.5 inches (wet year) which is about 117 percent of average, through April 30, 2017. Assuming average rainfall continues the rest of the year, the operational groundwater elevation at the Key Well could increase by about 3 feet and rise from 162 feet (measured at 174 feet on July 1, 2016) to about 165 feet (measured at about 183 feet) by June 30, 2017.

As of April 30, 2017, rainfall in the San Gabriel River watershed has been about 110 percent of average for that time of year. Local runoff was about 49 percent (about 49,000 acre-feet) of the 43-year average, as shown in Table 4.

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 85 percent of entitlement as of April 14, 2017.

The Watermaster developed a conceptual “Stormwater/Replenishment Augmentation Program,” whereby the RDA would be repurposed to purchase available imported water to supplement the shortage of local stormwater replenishment. The new RDA (new RDA II) will be on all production and the purchased water would be added to

the natural Basin water supply, with no specific rights to recover the water. Production during fiscal year 2016-17 will be the first year RDA II will be implemented at \$40/AF and an estimated 9,000 acre-feet will be purchased in the first year.

Based on the evaluation presented in this Report, the Engineer's recommended Operating Safe Yield should be maintained from fiscal year 2016-17 for fiscal year 2017-18 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. Setting the Operating Safe Yield lower than 150,000 acre-feet will not have a short-term material impact on Basin water levels, due to the significant amount of water in Cyclic Storage to meet Replacement Water Obligations. The recommended Operating Safe Yield is not impacted by the potential "new RDA II" for stormwater augmentation. The new RDA II program is specifically to help buffer the impacts of another potential drought year.

### **ADOPTED OPERATING SAFE YIELD**

On May 3, 2017, Watermaster held a hearing on the preliminary determination of Operating Safe Yield, which was submitted to Watermaster on April 5, 2017, in accordance with Section 43(a) of the Judgment. After review by its Engineer and comments received by those at the hearing, Watermaster approved the establishment of the Operating Safe Yield of the Main San Gabriel Basin at 150,000 acre-feet for fiscal year 2017-18, as shown below.

<b><u>Fiscal Year</u></b>	<b><u>Operating Safe Yield (Acre-feet)</u></b>
2017-18	150,000
2018-19	130,000
2019-20	130,000
2020-21	130,000
2021-22	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	210,340.40	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	195,275.53	36,818.25	0.00	36,818.25
1978-79	24.88	266.6	170,000	8,950.43	78.11	189,439.67	214,919.54	34,404.83	0.00	34,404.83
1979-80	33.76	282.4	220,000	6,745.88	81.54	237,226.13	223,088.89	9,896.39	0.00	9,896.39
1980-81	9.74	252.4	230,000	21,960.87	202.89	262,445.19	230,832.31	5,477.08	0.00	5,477.08
1981-82	19.94	245.5	210,000	35,642.01	380.30	255,281.37	220,391.54	10,582.35	0.00	10,582.35
1982-83	37.80	292.7	200,000	43,261.87	304.02	253,049.93	209,949.43	3,293.23	0.00	3,293.23
1983-84	12.09	267.1	230,000	45,378.26	80.10	287,394.98	236,679.19	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	242,439.63	12,475.69	0.00	12,475.69
1985-86	23.33	250.8	190,000	40,395.40	198.50	240,319.81	246,223.58	33,774.82	0.00	34,774.82
1986-87	9.61	236.5	200,000	25,403.49	106.93	235,923.93	253,633.02	41,828.86	0.00	41,828.86
1987-88	16.79	224.0	190,000	22,457.73	143.63	222,985.31	248,101.54	51,989.89	0.00	51,989.89
1988-89	14.00	219.8	180,000	21,710.19	61.61	214,810.57	253,694.47	59,384.99	0.00	59,384.99
1989-90	12.11	206.5	180,000	19,741.33	282.28	210,268.35	252,135.76	62,582.49	0.00	62,582.49
1990-91	18.29	200.3	170,000	17,837.99	387.33	199,467.55	232,091.44	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	221,476.83	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	236,677.04	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	243,616.55	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	243,479.39	30,194.77	0.00	30,194.77
1995-96	15.92	248.9	220,000	44,262.41	737.28	274,608.47	268,950.50	32,526.05	0.00	32,526.05
1996-97	18.47	241.3	210,000	35,484.68	863.84	256,011.19	279,481.35	55,236.24	0.00	55,236.24
1997-98	35.84	267.8	220,000	28,965.55	704.70	263,725.27	253,921.28	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	265,151.97	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	278,687.14	39,749.83	3,663.84	43,625.83
2000-01	17.04	220.1	220,000	33,774.80	570.83	267,126.29	270,919.13	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	264,328.17	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	237,490.86	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	252,811.50	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	247,187.00	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	259,807.52	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	284,328.04	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	258,167.00	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	250,102.62	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	237,846.31	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	227,657.15	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	237,028.57	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	242,913.84	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	240,552.41	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	10.04	174.0	150,000	35,226.32	284.47	195,752.95	182,826.49	6,909.20	19,510.99	26,420.19
2016-17	20.48	3/ 182.8 4/	150,000	39,299.44	--	199,800 5/	200,000 6/	--	--	--
5-YEAR DROUGHT AVERAGE:	8.94	--	178,000	--	--	--	222,332	--	--	--
10-YEAR AVERAGE:	12.39	--	186,000	32,120.96	297.20	228,610.52	236,976.16	19,217.88	21,074.25	40,291.90
43-YEAR AVERAGE:	18.04	--	195,740	29,064.79	348.95	235,824.93	241,080.76	27,607.01	9,241.74	36,876.88

1/ Water Year

2/ End of Fiscal Year, July to June

3/ As of April 30, 2017

4/ As of April 28, 2017

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

6/ Estimated value

TABLE 2

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

END OF MONTH	ACCUMULATED CYCLIC STORAGE ACCOUNTS (acre-feet)					ADDITIONAL STORAGE ACCOUNTS			TOTAL	ESTIMATED KEY WELL ELEVATION INCREASE DUE TO STORAGE ACCOUNTS (FT) 1/	OPERATIONAL KEY WELL ELEVATION (WITHOUT STORAGE ACCOUNTS) (FT)	MEASURED KEY WELL ELEVATION (FT)
	MWD/UD	SGVMWD	MWD/TV	PRODUCER	TOTAL CYCLIC STORAGE	WATERMASTER PRE- PURCHASES	PUEANTE BASIN WATER AGENCY	RESOURCE DEVELOPMENT				
Jun-11	0.00	19,754.25	1,978.1	22,866.09	44,598.4	--	--	--	44,598.44	5.57	227.9	233.5
Jul-11	0.00	23,038.22	1,978.1	22,964.89	47,981.2	--	--	--	47,981.21	6.00	228.1	234.1
Aug-11	0.00	26,351.61	1,978.1	22,979.99	51,309.7	--	--	--	51,309.70	6.41	227.0	233.4
Sep-11	0.00	29,517.40	1,978.1	23,035.59	54,531.1	--	--	--	54,531.09	6.82	227.4	234.2
Oct-11	0.00	32,870.77	1,978.1	23,289.29	58,138.2	--	--	--	58,138.16	7.27	228.2	235.5
Nov-11	0.00	35,864.96	4,981.2	24,815.49	65,661.7	--	--	--	65,661.65	8.21	228.3	236.5
Dec-11	0.00	36,260.75	10,900.0	54,631.09	101,791.8	--	--	--	101,791.84	12.72	222.6	235.3
Jan-12	0.00	36,170.24	10,900.0	54,631.09	101,701.3	--	--	--	101,701.33	12.71	220.4	233.1
Feb-12	0.00	36,091.66	10,900.0	54,631.09	101,622.8	--	--	--	101,622.75	12.70	218.2	230.9
Mar-12	0.00	36,001.41	10,900.0	54,735.59	101,637.0	--	--	--	101,637.00	12.70	215.6	228.3
Apr-12	0.00	36,091.14	10,900.0	56,631.19	103,622.3	--	--	--	103,622.33	12.95	213.4	226.4
May-12	0.00	14,768.19	10,900.0	56,631.19	82,299.4	--	--	--	82,299.38	10.29	213.5	223.8
Jun-12	0.00	17,544.27	8,600.3	56,631.19	82,775.8	--	--	--	82,775.76	10.35	210.0	220.3
Jul-12	0.00	20,356.14	8,600.3	35,926.74	64,883.2	--	--	--	64,883.18	8.11	209.6	217.7
Aug-12	0.00	23,164.06	8,600.3	35,926.74	67,691.1	--	--	--	67,691.10	8.46	206.0	214.5
Sep-12	0.00	25,908.32	8,600.3	35,926.74	70,435.4	--	--	--	70,435.36	8.80	203.6	212.4
Oct-12	0.00	29,265.59	8,716.3	45,495.74	83,477.6	--	--	--	83,477.63	10.43	200.7	211.1
Nov-12	0.00	7,641.19	11,371.2	55,495.74	74,508.1	--	--	--	74,508.13	9.31	204.1	213.4
Dec-12	0.00	9,273.89	13,348.6	55,495.74	78,118.2	--	--	--	78,118.23	9.76	203.8	213.6
Jan-13	0.00	11,303.77	13,348.6	55,495.74	80,148.1	--	--	--	80,148.11	10.02	203.0	213.0
Feb-13	0.00	11,226.13	13,348.6	55,495.74	80,070.5	--	--	--	80,070.47	10.01	201.9	211.9
Mar-13	0.00	11,143.18	13,828.5	55,495.74	80,467.4	--	--	--	80,467.42	10.06	200.1	210.2
Apr-13	0.00	11,064.94	13,411.50	55,495.74	79,972.18	--	--	--	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	--	--	--	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	--	--	--	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	4,555.70	--	--	67,566.47	8.45	191.9	200.3
Aug-13	0.00	17,801.32	14,491.60	31,464.49	63,757.41	5,034.70	--	--	68,792.11	8.60	188.8	197.4
Sep-13	0.00	17,714.22	14,189.60	32,464.49	64,368.31	4,672.74	--	--	69,041.05	8.63	187.4	196.0
Oct-13	0.00	17,622.55	14,147.40	44,821.46	76,591.41	4,672.74	--	--	81,264.15	10.16	184.7	194.9
Nov-13	0.00	14,984.50	14,391.40	48,454.61	77,830.51	4,672.74	--	--	82,503.25	10.31	186.8	197.1
Dec-13	0.00	14,903.04	14,546.40	49,206.58	78,656.02	4,672.74	--	--	83,328.76	10.42	187.1	197.5
Jan-14	0.00	14,817.43	14,807.70	45,169.74	74,794.87	4,672.74	--	--	79,467.61	9.93	187.0	196.9
Feb-14	0.00	14,744.65	14,820.90	43,448.81	73,014.36	4,672.74	--	--	77,687.10	9.71	186.0	195.7
Mar-14	0.00	14,659.90	14,876.90	42,132.17	71,668.97	4,672.74	--	--	76,341.71	9.54	184.7	194.3
Apr-14	5,000.00	6,811.13	14,876.90	38,344.74	65,032.77	4,672.74	--	--	69,705.51	8.71	183.9	192.6
May-14	5,000.00	6,719.84	14,876.90	34,307.90	60,904.64	4,672.74	--	--	65,577.38	8.20	181.7	189.9
Jun-14	5,000.00	6,601.88	14,876.90	30,271.07	56,749.85	4,672.74	--	--	61,422.59	7.68	180.1	187.8
Jul-14	5,000.00	6,513.62	14,876.90	30,724.60	57,115.12	4,672.74	--	--	61,787.86	7.72	178.2	185.9
Aug-14	5,000.00	6,720.99	14,876.90	32,229.60	58,827.49	4,672.74	--	--	63,500.23	7.94	176.2	184.2
Sep-14	5,000.00	7,550.15	14,876.90	33,734.60	61,161.65	4,672.74	--	--	65,834.39	8.23	174.0	182.3
Oct-14	0.00	7,469.52	14,876.90	40,738.30	63,084.72	4,672.74	--	--	67,757.46	8.47	172.4	180.9
Nov-14	1,000.00	7,394.79	14,876.90	45,467.20	68,738.89	3,572.74	--	--	72,311.63	9.04	171.0	180.0
Dec-14	1,000.00	7,314.16	14,876.90	48,678.80	71,869.86	3,572.74	--	--	75,442.60	9.43	170.7	180.1
Jan-15	1,000.00	7,232.81	14,876.90	52,562.20	75,671.91	3,572.74	--	--	79,244.65	9.91	170.3	180.2
Feb-15	1,000.00	7,159.95	14,876.90	58,167.20	81,204.05	3,572.74	--	--	84,776.79	10.60	169.2	179.8
Mar-15	0.00	3,242.63	14,876.90	67,197.70	85,317.23	6,562.74	--	--	91,879.97	11.48	168.0	179.5
Apr-15	1,068.00	3,166.58	14,876.90	69,697.70	88,809.18	8,572.74	--	--	97,381.92	12.17	166.6	178.8
May-15	4,699.00	3,071.50	14,876.90	69,697.70	92,345.10	8,572.74	--	--	100,917.84	12.61	165.6	178.2
Jun-15	5,032.00	2,957.99	14,347.90	71,819.96	94,157.85	6,972.74	--	--	101,130.59	12.64	164.8	177.5
Jul-15	5,031.54	4,324.67	14,347.90	38,311.12	62,015.23	6,972.74	--	--	68,987.97	8.62	167.5	176.1
Aug-15	5,031.54	6,140.39	14,347.90	38,311.12	63,830.95	6,972.74	--	--	70,803.69	8.85	166.2	175.0
Sep-15	10,031.54	2,925.85	14,347.90	38,311.12	65,616.41	6,972.74	--	--	72,589.15	9.07	165.3	174.4
Oct-15	10,031.54	3,378.95	14,347.90	38,311.12	66,069.51	6,972.74	--	--	73,042.25	9.13	164.9	174.1
Nov-15	10,031.54	3,300.07	15,216.30	46,295.82	74,843.73	6,972.74	--	413.00	82,229.47	10.28	163.7	174.0
Dec-15	9,637.64	2,316.72	16,855.30	49,821.12	78,630.78	6,972.74	--	6,940.00	92,543.52	11.57	165.4	177.0
Jan-16	5,137.64	2,236.27	16,855.30	49,821.12	74,050.33	11,472.74	--	6,940.00	92,463.07	11.56	167.5	179.0
Feb-16	5,138	2,163.72	2,277.00	49,821.12	59,399.48	11,472.74	14,578.30	6,940.00	92,390.52	11.55	166.8	178.3
Mar-16	8,139	2,115.36	2,277.00	49,821.12	62,352.02	11,472.74	14,578.30	6,940.00	95,343.06	11.92	165.9	177.8
Apr-16	8,139	2,037.46	2,277.00	49,821.12	62,274.12	11,472.74	14,578.30	6,940.00	95,265.16	11.91	164.8	176.7
May-16	8,139	2,661.68	2,277.00	49,821.12	62,898.34	11,472.74	14,578.30	6,940.00	95,889.38	11.99	163.5	175.5
Jun-16	7,539	5,312.04	2,277.00	51,771.12	66,898.70	10,122.74	14,578.30	6,940.00	98,539.74	12.32	161.7	174.0
Jul-16	7,539	8,050.89	2,277.00	32,260.13	50,126.56	10,122.74	14,578.30	6,940.00	81,767.60	10.22	162.4	172.6
Aug-16	7,539	10,692.05	2,277.00	32,260.13	52,767.72	10,122.74	14,578.30	6,940.00	84,408.76	10.55	162.4	173.0
Sep-16	7,539	13,277.84	2,277.00	32,260.13	55,353.51	10,122.74	14,578.30	6,940.00	86,994.55	10.87	161.3	172.2
Oct-16	7,539	4,635.99	2,277.00	50,681.63	65,133.16	10,122.74	14,578.30	6,940.00	96,774.20	12.10	162.0	174.1
Nov-16	7,539	7,279.09	4,265.90	63,345.63	82,429.16	10,122.74	14,578.30	11,653.00	118,783.20	14.85	161.3	176.1
Dec-16	7,225	2,811.24	14,395.10	72,860.13	97,291.61	10,122.74	14,578.30	11,653.00	133,645.65	16.71	163.1	179.8
Jan-17	7,225	2,739.22	14,395.10	72,860.13	97,219.59	10,122.74	14,578.30	11,653.00	133,573.63	16.70	164.1	180.8
Feb-17	7,225	4,127.60	14,395.10	72,860.13	98,607.97	10,122.74	14,578.30	11,653.00	134,962.01	16.87	164.8	181.7
Mar-17	7,225	6,407.86	14,395.10	72,860.13	100,888.23	10,122.74	14,578.30	11,653.00	137,242.27	17.16	165.9	183.1
Apr-17	2/ 7,225	6,407.86	14,395.10	72,860.13	100,888.23	10,122.74	14,578.30	11,653.00	137,242.27	17.16	165.6	182.8

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 APRIL 30, 2017.

TABLE 3

**LOCAL WATER IN STORAGE  
IN SURFACE RESERVOIRS**

<u>RESERVOIR</u>	<u>May 2, 2016</u>	<u>May 1, 2017</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	1,436	6,274	6	17	11,136	56%
San Gabriel Dam	7,804	38,072	68	65	43,646	87%
Morris Dam	6,242	12,904	63	40	28,696	45%
<b>Sub-Total:</b>	<b>15,482</b>	<b>57,250</b>			<b>83,478</b>	<b>69%</b>
Santa Fe Dam <sup>1/</sup>	0	0	--	--	--	--
Big Dalton Dam	0	591	0	0	--	--
San Dimas Dam	147	650	0	8	--	--
Puddingstone Dam <sup>2/</sup>	6,956	6,200	0	0	--	--
<b>TOTALS:</b>	<b>22,585</b>	<b>64,691</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 STA. NO. 96C-E (INCHES)	WATER REPLENISHED IN THE MAIN SAN GABRIEL BASIN			MEASURED BALDWIN PARK KEY WELL ELEV. AT END OF WATER YEAR (FT)	OPERATIONAL BALDWIN PARK KEY WELL ELEV. AT END OF WATER YEAR (FT)
		LOCAL RUNOFF (AF)	IMPORTED (AF) 2/	TOTAL (AF)		
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	20.02	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	165
2015-16	10.04	35,200	60,092 1/	95,292	172	161
2016-17	20.48 3/	49,000 4/	46,857 5/	95,857 5/	183 6/	166 6/
5-Year Drought Average	8.94	27,060	48,170	75,230	--	--
10-Year Average	11.98	74,120	38,110	112,230	--	--
43-Year Average	18.04	101,019	38,032	139,050	--	--

1/ October 1 to September 30

2/ July 1 to June 30

3/ As of April 30, 2017.

4/ Preliminary data as of March 31, 2017.

5/ October 1, 2016 to March 31, 2017. Excludes deliveries through USG-5.

6/ As of April 28, 2017.



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		CYCLIC STORAGE	WATERMASTER PRE-PURCHASES	TRANSFERS TO		
	USG-3	USG-5 2/											EXCHANGE REPLACEMENT	MWD CYCLIC STORAGE			RESOURCE DEVELOPMENT		
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	--	--	0.00	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	0.00	2,486.50	3,107.00	0.00	5,622.00	10,510.00	0.00	2,507.40	0.00	416.00	500.00	0.00	929.95	7,354.05	--	--	--	902.00	34,334.90
2016-17	1/ 0.00	2,112.80	0.00	0.00	4,713.00	41,100.00	0.00	12,118.10	0.00	0.00	500.00	9,607.00	790.18	0.00	--	--	2,427.18	0.00	73,368.26

1/ Estimated as of March 31, 2017.

2/ In-Lieu replenishment through CWEA.

**TABLE 6**  
**HISTORICAL WATER PRODUCTION**  
**(ACRE-FEET)**

<b><u>FISCAL</u> <u>YEAR</u></b>	<b><u>FIRST</u> <u>QUARTER</u></b>	<b><u>SECOND</u> <u>QUARTER</u></b>	<b><u>THIRD</u> <u>QUARTER</u></b>	<b><u>FOURTH</u> <u>QUARTER</u></b>	<b><u>TOTAL</u></b>
1973-74	76,455	51,809	40,649	65,397	234,310
1974-75	77,392	48,530	40,887	56,644	223,454
1975-76	77,811	51,274	47,542	63,439	240,066
1976-77	66,731	52,977	41,987	48,645	210,340
1977-78	59,996	47,251	33,189	54,839	195,275
1978-79	69,708	46,610	36,010	62,593	214,920
1979-80	75,291	51,799	37,496	58,522	223,108
1980-81	73,516	54,159	40,262	62,896	230,832
1981-82	77,656	50,996	39,071	51,819	219,541
1982-83	71,346	46,704	37,995	53,904	209,950
1983-84	69,443	44,463	51,157	69,616	234,679
1984-85	77,766	50,832	45,153	68,689	242,440
1985-86	77,193	53,773	46,083	69,175	246,223
1986-87	77,425	55,643	49,330	71,235	253,633
1987-88	76,057	51,642	53,093	67,319	248,111
1988-89	77,997	57,325	49,245	69,127	253,694
1989-90	77,509	60,257	50,941	63,412	252,118
1990-91	73,887	59,330	43,472	55,384	232,073
1991-92	65,688	54,633	40,696	60,461	221,477
1992-93	74,132	54,047	41,534	66,427	236,139
1993-94	76,624	57,381	47,652	61,949	243,606
1994-95	80,506	57,787	43,202	61,984	243,479
1995-96	81,408	63,428	50,931	73,184	268,950
1996-97	84,588	60,760	56,428	77,705	279,481
1997-98	84,624	60,585	46,940	61,890	254,039
1998-99	83,626	62,349	54,000	65,176	265,152
1999-00	82,395	69,076	53,697	73,519	278,687
2000-01	83,293	65,227	51,776	70,623	270,919
2001-02	82,434	61,691	55,724	64,480	264,328
2002-03	69,276	55,906	49,811	57,797	232,791
2003-04	71,337	56,815	54,740	69,957	252,850
2004-05	77,021	55,480	46,456	68,310	247,266
2005-06	79,323	62,977	53,745	63,894	259,940
2006-07	83,160	66,532	61,808	72,828	284,329
2007-08	75,251	57,898	53,327	71,691	258,167
2008-09	76,053	59,007	49,458	66,029	250,547
2009-10	74,867	56,356	43,456	62,445	237,123
2010-11	71,179	50,002	44,881	60,877	226,939
2011-12	74,369	51,922	48,340	61,659	236,290
2012-13	76,217	53,359	46,418	66,550	242,545
2013-14	73,131	54,706	48,357	64,359	240,552
2014-15	66,954	50,046	43,168	48,171	208,339
2015-16	54,430	42,182	37,364	48,850	182,826
2016-17	59,384	46,219	--	--	200,000 <sup>1/</sup>
5-Year Drought Average	69,020	50,443	44,729	57,918	222,110
10-Year Average	72,561	54,201	47,658	62,346	236,766
43-Year Average	75,234	55,245	46,685	63,569	240,733

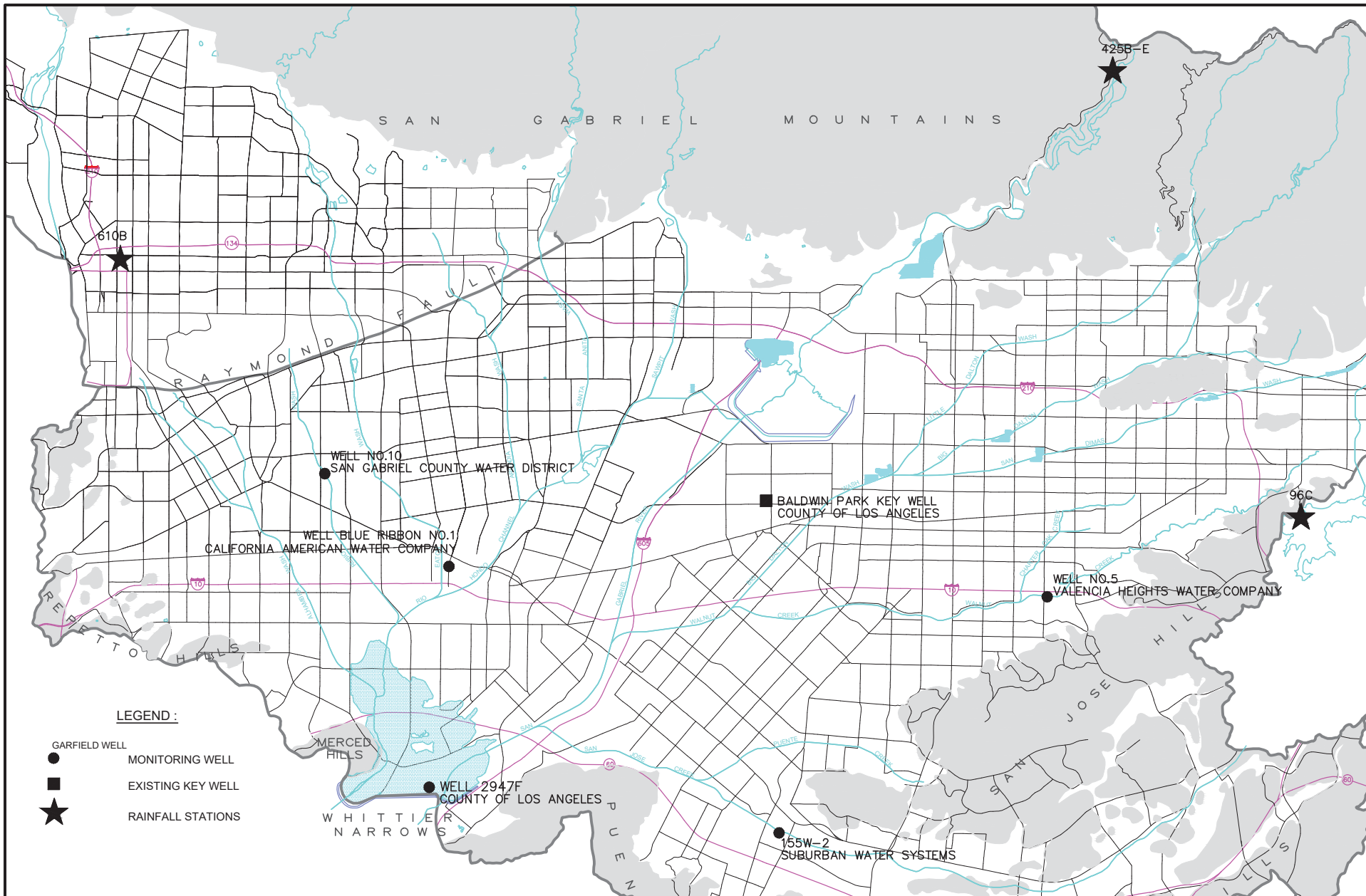
<sup>1/</sup> ESTIMATED

TABLE 7

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

<b><u>FISCAL YEAR</u></b>	<b><u>TREATED IMPORTED WATER</u></b>	<b><u>TOTAL PRODUCTION</u></b>	<b><u>TOTAL DEMAND</u></b>
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	12,740	182,826	195,566
2016-17	1/ 12,400	200,000	212,400
Most Recent			
5-Year Drought Average	16,476	222,332	238,808
10-Year Average			
	18,678	236,976	255,654
43-Year Average			
	19,765	241,081	260,846

1/ Estimated



**LEGEND :**

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

**MAIN SAN GABRIEL BASIN WATERMASTER**

**WELL LOCATION MAP**



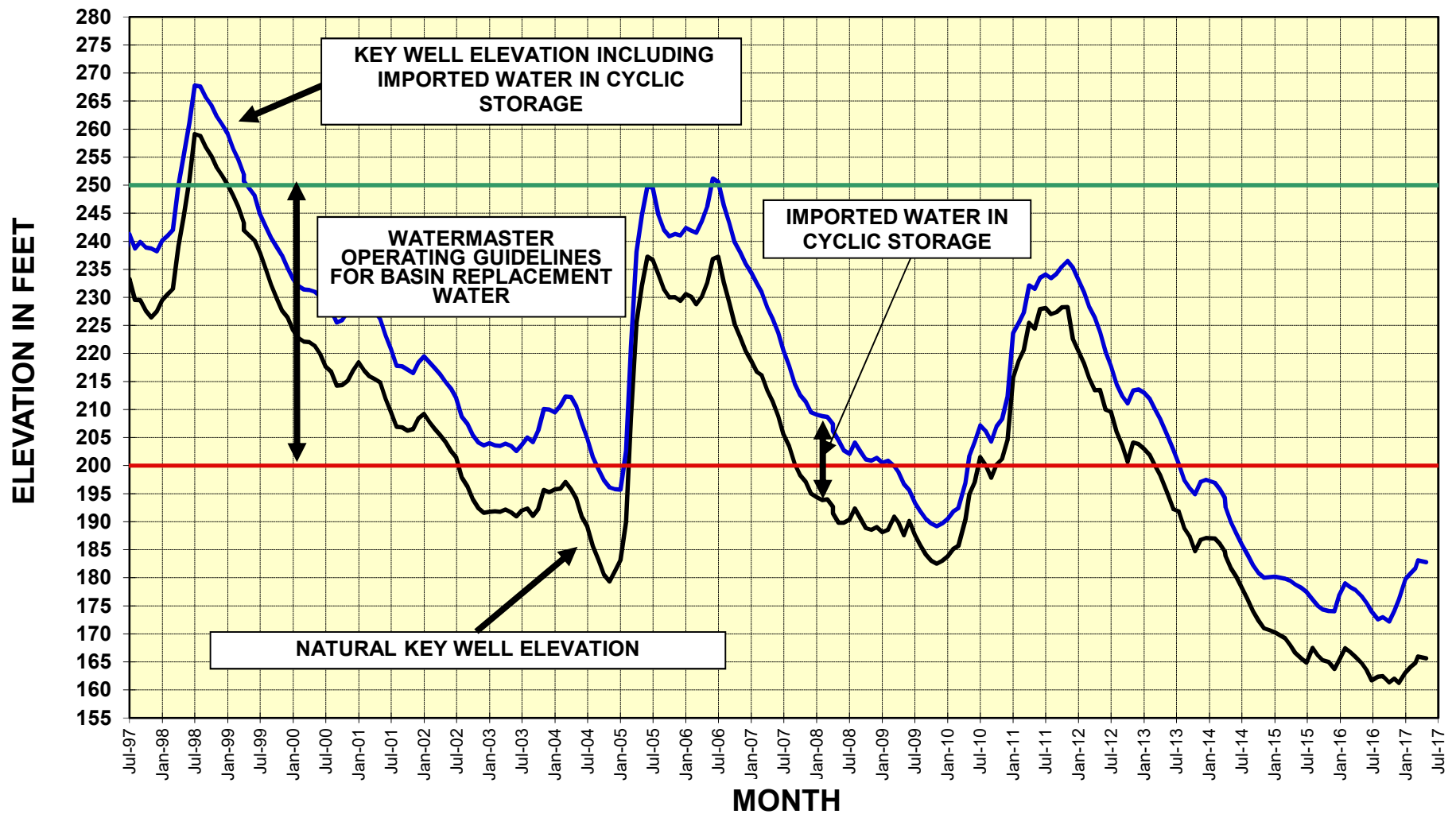
861 VILLAGE OAKS DRIVE, SUITE 100  
COVINA, CALIFORNIA 91724  
TEL: (626) 967-6202  
FAX: (626) 331-7065

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

2651 W Guadalupe Rd., Suite A209  
Mesa Arizona 85202



APPROXIMATE SCALE  
1" = 12,000'



**STETSON ENGINEERS INC.**

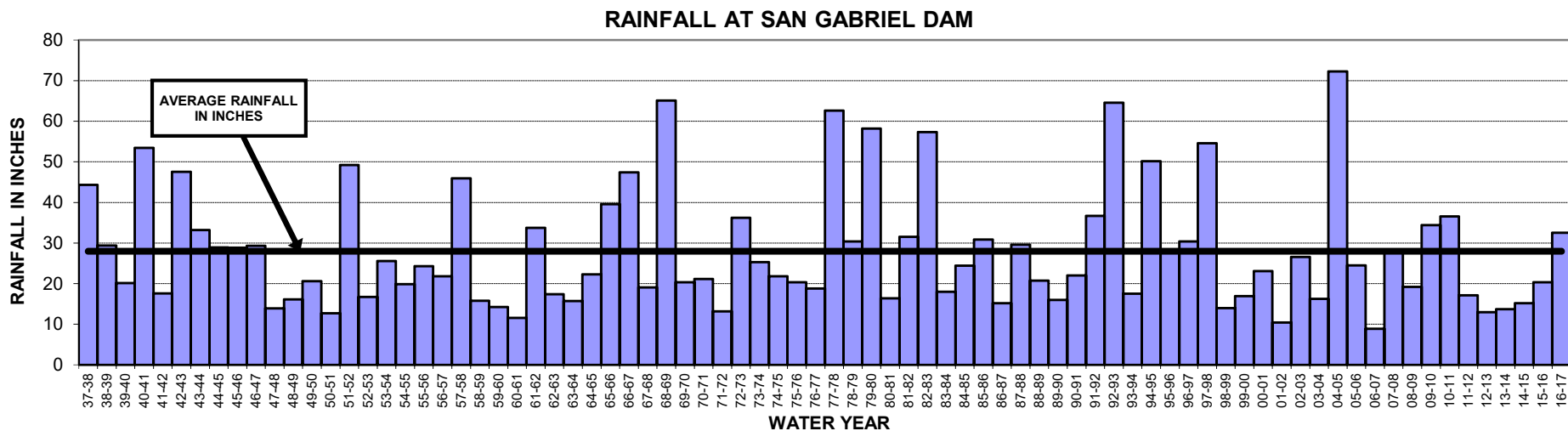
Covina San Rafael Mesa, Arizona

WATER RESOURCE ENGINEERS

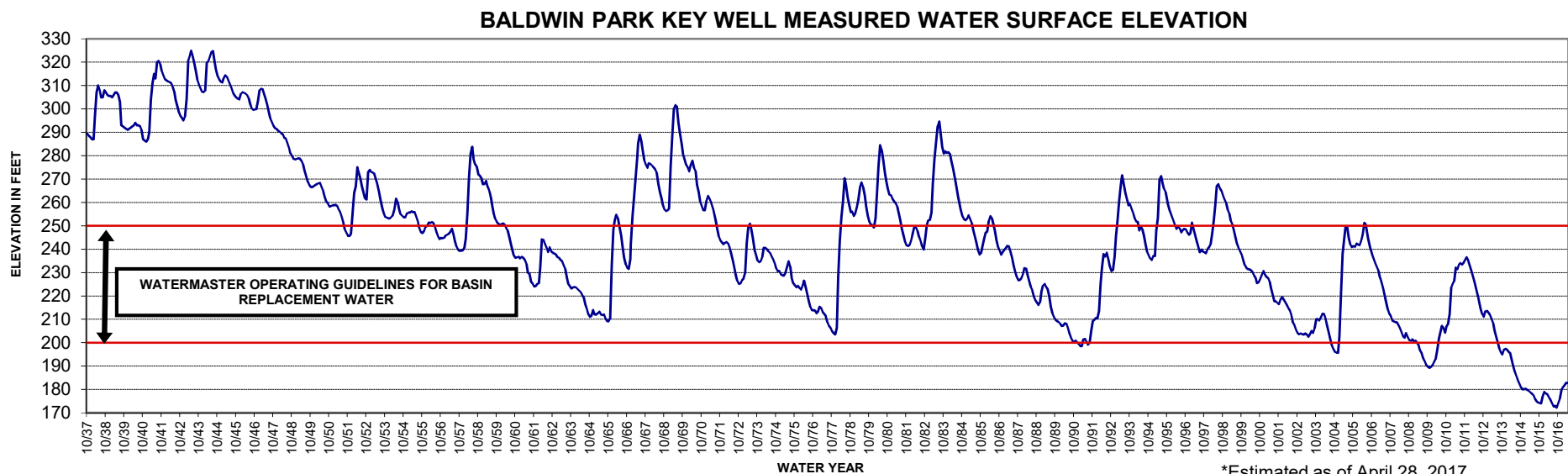
**MAIN SAN GABRIEL BASIN WATERMASTER**

**BALDWIN PARK KEY WELL  
GROUNDWATER ELEVATION**

**FIGURE 1**



\*Estimated as of April 30, 2017



\*Estimated as of April 28, 2017



**STETSON ENGINEERS INC.**

Covina San Rafael Mesa, Arizona

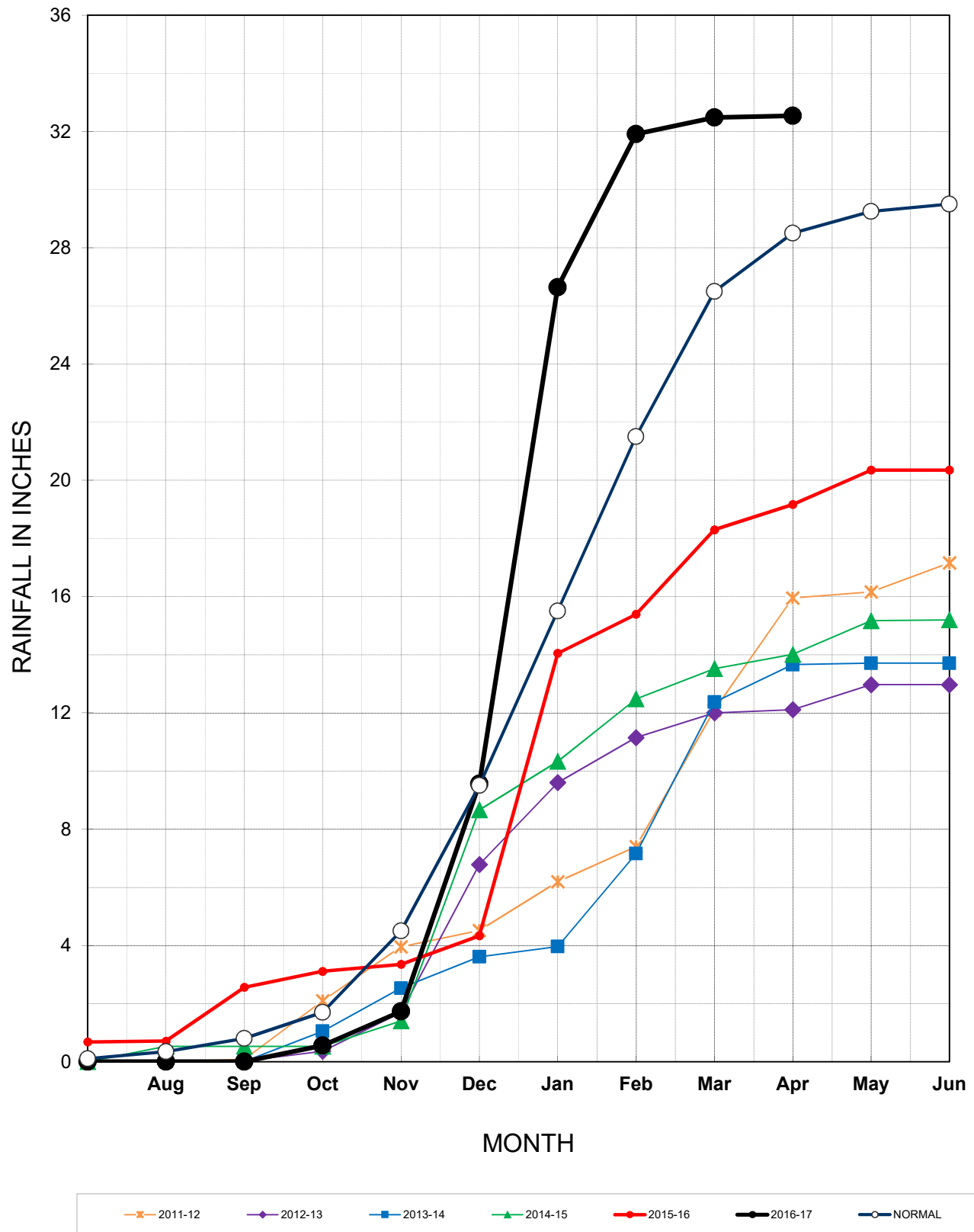
WATER RESOURCE ENGINEERS

## MAIN SAN GABRIEL BASIN WATERMASTER

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

**FIGURE 2**

FIGURE 3

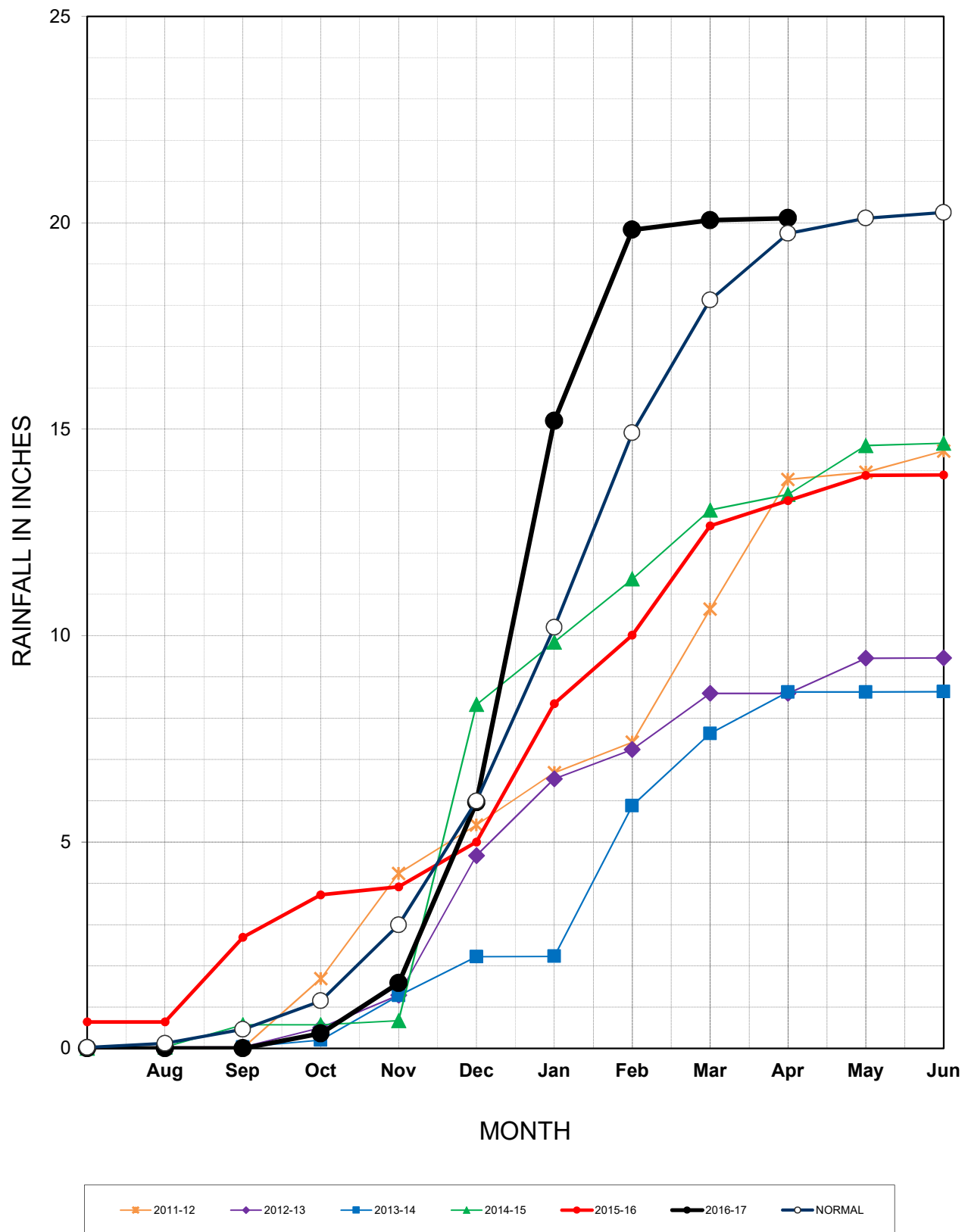


**STETSON ENGINEERS INC.**  
Covina San Rafael Mesa, Arizona  
WATER RESOURCE ENGINEERS

**MAIN SAN GABRIEL BASIN WATERMASTER**

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

FIGURE 4



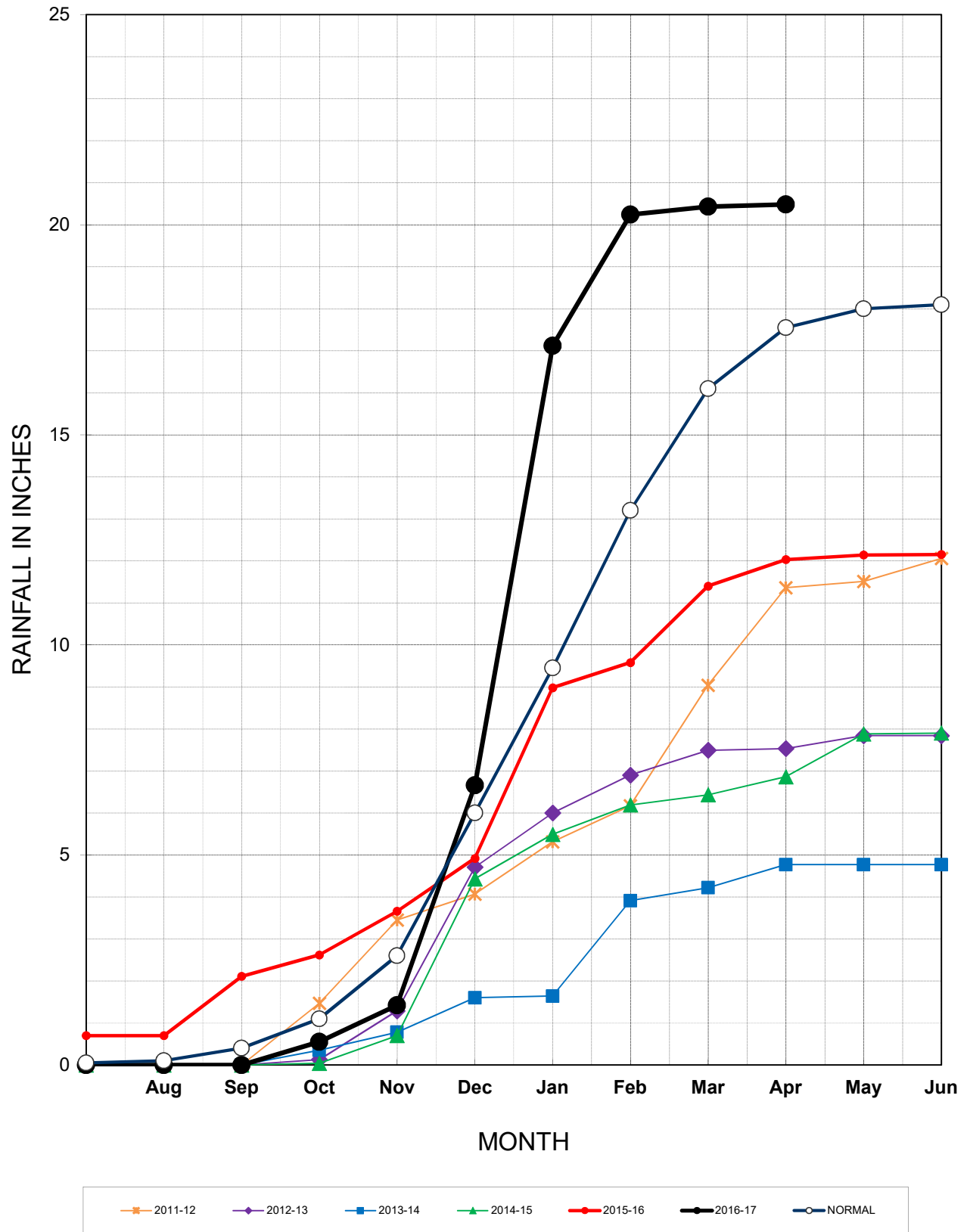
**STETSON ENGINEERS INC.**  
Covina San Rafael Mesa, Arizona  
WATER RESOURCE ENGINEERS

**MAIN SAN GABRIEL BASIN WATERMASTER**

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



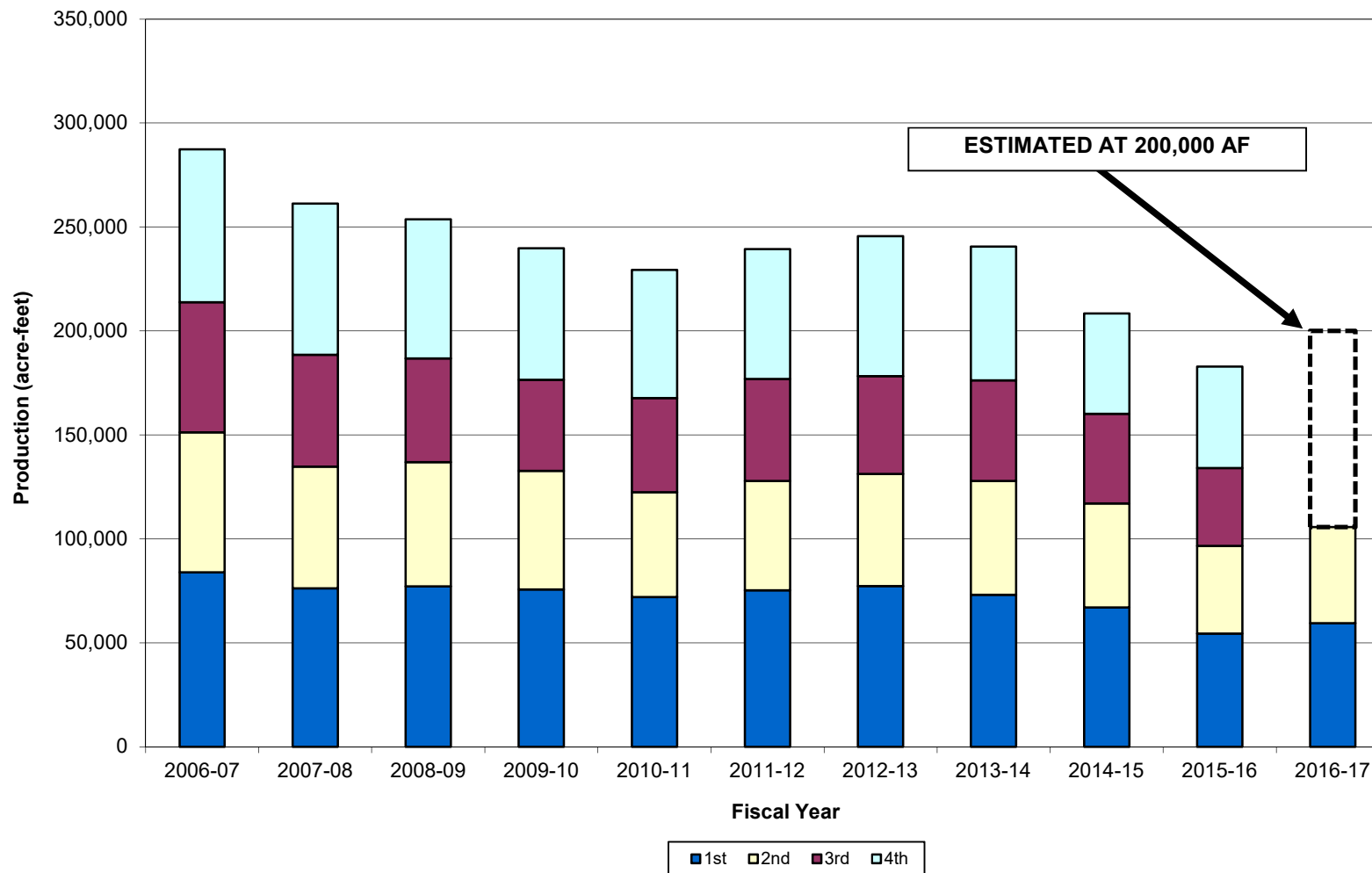
**FIGURE 5**



**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

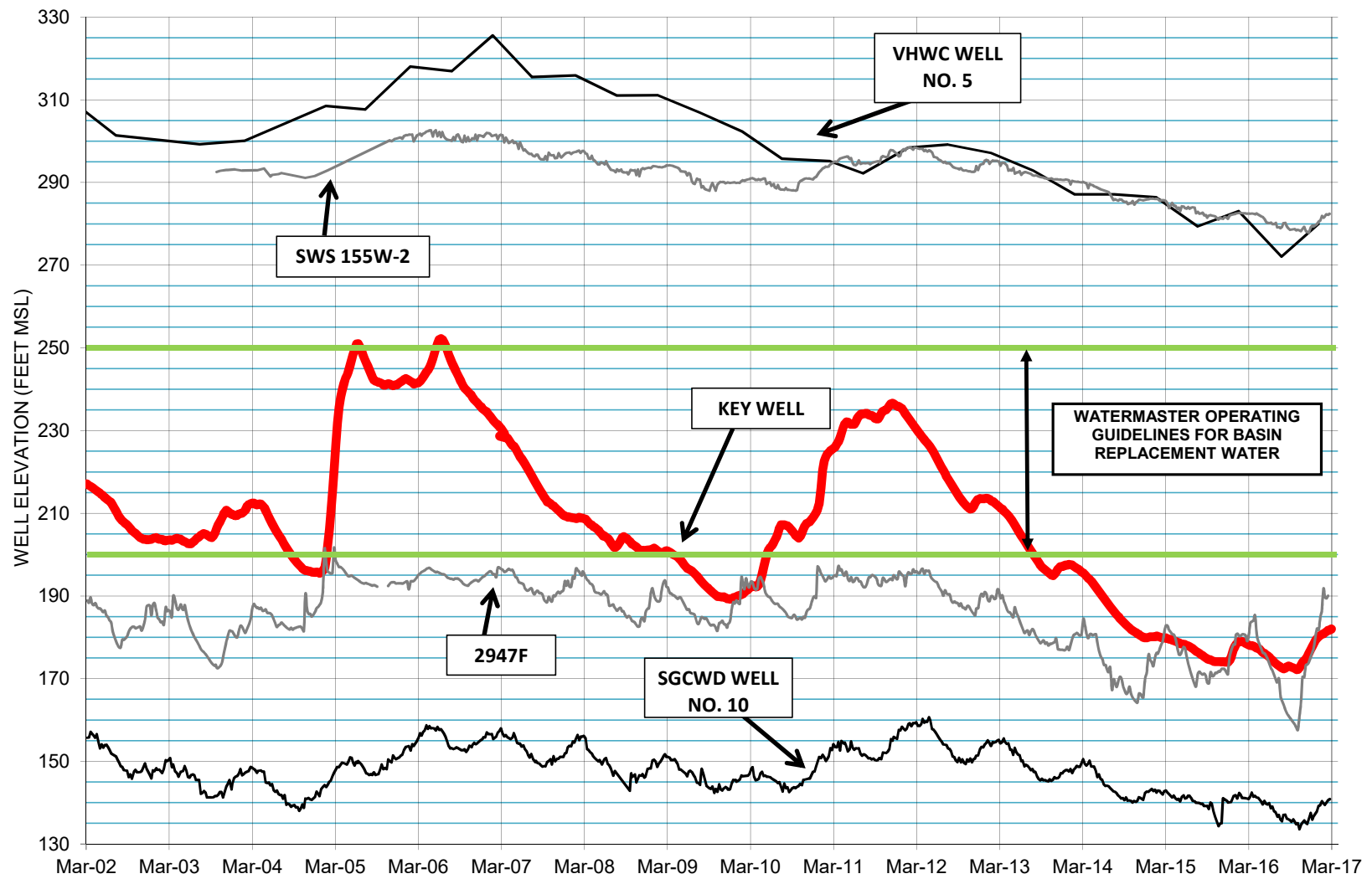
WATER RESOURCE ENGINEERS

**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 2017**

## **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	0.00000	0.00	0.00	0.00	0.00
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	4.03204	5,241.65	5,644.86	6,048.06	6,451.26
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	0.00000	0.00	0.00	0.00	0.00
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

## 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>
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
The Maggiore Family Trust	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 al	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	10.31388	13,408.04	14,439.43	15,470.82	16,502.21
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 Pumps</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>

## 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>
Azusa, City of	0.14988	194.84	209.83	224.82	239.81
Azusa Agric. Water Co.	0.00000	0.00	0.00	0.00	0.00
Azusa Valley Water Co.	6.76299	8,791.89	9,468.19	10,144.49	10,820.78
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>