DESERT WATER

(760) 323-4971

POST OFFICE BOX 1710
PALM SPRINGS, CALIFORNIA 92263

1200 GENE AUTRY TRAIL SOUTH
PALM SPRINGS, CALIFORNIA 92264

# ENGINEER'S REPORT

# GROUNDWATER REPLENISHMENT AND ASSESSMENT PROGRAM FOR THE WEST WHITEWATER RIVER SUBBASIN, MISSION CREEK SUBBASIN, AND GARNET HILL SUBBASIN AREAS OF BENEFIT

## DESERT WATER AGENCY 2018/2019

## MAY 2018

Prepared by

KRIEGER & STEWART
Engineering Consultants
3602 UNIVERSITY AVENUE
RIVERSIDE, CALIFORNIA 92501
(951) 684-6900


David F. Scriven
R.C.E. No. 42922

101-33.42
(DFS/blt)
(REPORTS/101-33P42RPT)

**TABLE OF CONTENTS**

# TABLE OF CONTENTS

Page



FIGURES



TABLES

EXHIBITS



APPENDICES

## ABBREVIATIONS

2013-2014 Multi-Year Water Pool ..... MYWP
acre feet per year ..... AF/Yr
Applicable State Water Project Charges ..... Applicable SWP Charges
Area of Benefit ..... AOB
Bay Delta Conservation Plan ..... BDC
California Department of Water Resources ..... CDWR
Coachella Valley Water District ..... CVWD
degrees Fahrenheit ..... °F
Desert Water Agency ..... DWA
Garnet Hill Subbasin ..... GH
Metropolitan Water District of Southern California ..... MWD
Mission Creek/Garnet Hill Water Management Plan ..... MC/GH WMP
Mission Creek Subbasin ..... MC
Mission Springs Water District ..... MSWD
Montgomery Watson Harza ..... MWH
Off-Aqueduct Power Component of the State Water Project Transportation Charge ..... Off-Aqueduct Power Charge
State Water Resources Control Board ..... SWRCB
State Water Project ..... SWP
United States Geological Survey ..... USGS
Variable OMP&R Component of the State Water Project Transportation Charge ..... Variable Transportation Charge
West Whitewater River Subbasin ..... WWR

## DEFINITIONS

| Term | Definition |
|---|---|
| Natural Inflow | Water flowing into a groundwater unit from natural sources such as surface water runoff or subsurface underflow from other groundwater units |
| Natural Outflow | Water flowing out of a groundwater unit by drainage or subsurface underflow into other groundwater units |
| Net Natural Inflow | Natural Inflow minus Natural Outflow |
| Production | Either extraction of groundwater from a Management Area or Area of Benefit (including its upstream tributaries), or diversion of surface water that would otherwise naturally replenish the groundwater within the Management Area or Area of Benefit (including its upstream tributaries) |
| Consumptive Use | Use of groundwater that does not return the water to the groundwater unit from which it was extracted, e.g. evaporation, evapotranspiration, export |

| Term | Definition |
|---|---|
| Non-Consumptive Return | Pumped groundwater that is returned to the groundwater unit after pumping, e.g. irrigation return, wastewater percolation, septic tank percolation |
| Net Production | Production minus Non-Consumptive Return |
| Assessable Production | Production within an Area of Benefit that does not include groundwater extracted by minimal pumpers and minimal diverters |
| Minimal Pumper | A groundwater pumper that extracts 10 AF of water or less in any one year |
| Minimal Diverter | A surface water diverter that diverts 10 AF of water or less in any one year |
| Gross (Groundwater) Overdraft | Total Net Production in excess of Net Natural Inflow |
| Net (Groundwater) Overdraft | Gross Groundwater Overdraft offset by artificial replenishment |
| Cumulative Gross Overdraft | Total Gross Overdraft that has accumulated since the specific year that marks estimated commencement of gross overdraft conditions |
| Cumulative Net Overdraft | Cumulative Gross Overdraft offset by Cumulative Artificial Replenishment |
| Whitewater River Subbasin | The entire Whitewater River Groundwater Subbasin as defined by the United States Geological Survey in *Geological Survey Water-Supply Paper 2027* (1974) |
| Mission Creek Subbasin | The entire Mission Creek Groundwater Subbasin as defined by the United States Geological Survey in *Geological Survey Water-Supply Paper 2027* (1974) |
| Garnet Hill Subbasin | The entire Garnet Hill Groundwater Subbasin as defined by the United States Geological Survey in *Geological Survey Water-Supply Paper 2027* (1974) |
| West Whitewater River Subbasin Management Area or WWR Management Area | The westerly portion of the Whitewater River Subbasin plus that portion of the Garnet Hill Subbasin (GH) that lies within CVWD's service area, as specifically defined in Chapter II |
| West Whitewater River Subbasin Area of Benefit or WWR AOB | The portion of the WWR Management Area that is within DWA's service area and is managed by DWA |
| CVWD's West Whitewater River Subbasin Area of Benefit or CVWD's WWR AOB | The portion of the WWR Management Area that is within CVWD's service area and is managed by CVWD |

| Term | Definition |
|---|---|
| Mission Creek Subbasin Management Area or MC Management Area | The portion of the Mission Creek Subbasin that lies within the service areas of DWA and CVWD, as specifically defined in Chapter II |
| Mission Creek Subbasin Area of Benefit or MC AOB | The portion of the MC Management Area that is within DWA's service area and is managed by DWA |
| CVWD's Mission Creek Subbasin Area of Benefit or CVWD's MC AOB | The portion of the MC Management Area that is within CVWD's service area and is managed by CVWD |
| Garnet Hill Subbasin Management Area or GH Management Area | The portion of the Garnet Hill Subbasin that lies within DWA's service area, as specifically defined in Chapter II |
| Garnet Hill Subbasin Area of Benefit or GH AOB | Since CVWD considers the portion of the Garnet Hill Subbasin within its service area to be a part of CVWD's WWR AOB, the GH AOB is the same as the GH Management Area |

# CHAPTER I
# EXECUTIVE SUMMARY

# CHAPTER I
# EXECUTIVE SUMMARY

Since 1973, Coachella Valley Water District (CVWD) and Desert Water Agency (DWA) have been using Colorado River water exchanged for State Water Project (SWP) water to replenish groundwater in the West Whitewater River Subbasin (WWR) and Mission Creek Subbasin (MC) Management Areas of the Coachella Valley Groundwater Basin.

Through the 2017/2018 Engineer's Reports, the WWR Management Area was referred to simply as the Whitewater River Subbasin. However, the Whitewater River Subbasin includes separate groundwater management areas in both the westerly and easterly portions of the Whitewater River Subbasin. Also, the westerly management area has two areas of benefit (AOBs), one managed by DWA and one managed by CVWD. For these reasons, the following terms and definitions are adopted herein and for future Engineer's Reports:

- "Whitewater River Subbasin" – the entire Whitewater River Groundwater Subbasin as defined by the United States Geological Survey
- "West Whitewater River Subbasin Management Area" or "WWR Management Area" – the westerly portion of the Whitewater River Subbasin plus that portion of the Garnet Hill Subbasin (GH) that lies within CVWD's service area, as specifically defined in Chapter II.
- "West Whitewater River Subbasin Area of Benefit" or "WWR AOB" – the portion of the WWR Management Area that is within DWA's service area and is managed by DWA. The portion of the WWR Management Area that is within CVWD's, DWA's service area and is managed by CVWD will be referred to as "CVWD's West Whitewater River Subbasin Area of Benefit" or "CVWD's WWR AOB".

Through the 2015/2016 Engineer's Reports, each of DWA's AOBs in the Western (Upper) Coachella Valley was described in its own separate report. Beginning with the 2016/2017 Engineer's Report, all of DWA's AOBs (Whitewater River Subbasin (now referred to a West Whitewater River Subbasin or WWR), Mission Creek Subbasin or MC, and Garnet Hill Subbasin or GH) have been included in a single report.

Groundwater production continues to exceed natural groundwater replenishment. If groundwater replenishment with imported water (artificial replenishment) is excluded, gross groundwater overdraft (defined herein as groundwater extractions or water production in excess of natural groundwater

replenishment and/or recharge) within the WWR, MC, and GH Management Areas of the Coachella Valley Groundwater Basin (see **Figure 1**) would continue to increase at a steady rate. The five-year average gross overdraft (total net production minus net natural inflow) in the WWR Management Area is currently estimated to be about 87,000 acre feet per year (AF/Yr), while gross overdraft in the MC Management Area is currently estimated at about 6,000 AF/Yr. Supplementing natural groundwater recharge resulting from rainfall runoff with artificial replenishment using imported water supplies is therefore necessary to offset annual and cumulative gross overdraft.

Increases in cumulative overdraft, without artificial replenishment, will result in declining groundwater levels and increasing pump lifts, thereby increasing energy consumption for groundwater extraction. Extreme cumulative overdraft has the potential of causing ground surface settlement, and could also have an adverse impact upon groundwater quality and storage volume. Artificial replenishment offsets annual groundwater overdraft and the concerns associated therewith and arrests or reduces the effects of cumulative groundwater overdraft.

The AOBs for DWA's portion of the groundwater replenishment program are those portions of the Whitewater River Subbasin, MC, and GH and tributaries--including subbasins (San Gorgonio Pass Subbasin), rivers, or streams--which lie within the boundaries of DWA (**Figure 2**). The costs involved in carrying out DWA's groundwater replenishment program are essentially recovered through water replenishment assessments applied to all groundwater and surface water production within the AOB, aside from specifically exempted production.

Desert Water Agency Law defines *production* as "the extraction of groundwater by pumping or any other method within the boundaries of the agency, or the diversion within the agency of surface supplies which naturally replenish the groundwater supplies within the agency and are used therein." The following producers are specifically exempted from assessment: producers extracting groundwater from all three subbasins and upstream tributaries at rates of 10 AF/Yr or less; and producers diverting surface water without diminishing stream flow and groundwater recharge of the subbasins and upstream tributaries by 10 AF/Yr or less. Therefore, *production*, as used herein, is understood as either extraction of groundwater from a Management Area or Area of Benefit (including its upstream tributaries), or diversion of surface water that would otherwise naturally replenish the groundwater within the Management Area or Area of Benefit (including its upstream tributaries). *Assessable production*, as used herein, is understood as production that does not include water produced by minimal pumpers and minimal diverters at rates of 10 AF/Yr or less.

As a result of the implementation of the Mission Creek Groundwater Replenishment Agreement, dated April 8, 2003, between CVWD and DWA to replenish and jointly manage groundwater in the MC, the Mission Springs Water District (MSWD) filed an action in the Superior Court of California challenging the replenishment assessments levied on MSWD groundwater extractions or production. The three parties settled the dispute as documented in a Settlement Agreement and Addendum in December 2004. The Settlement Agreement stipulated that the three parties would form the Mission Creek/Garnet Hill Subbasin Management Committee to collectively discuss water management in the WWR, MC, and GH Management Areas. The three parties also agreed to investigate whether the GH was in fact benefitting from the artificial recharge programs within the WWR and MC Management Areas and to prepare the MC/GH WMP.

The MC/GH WMP determined that, since artificial recharge activities began, the GH has benefitted from artificial recharge in both the westerly portion of the WWR and the MC: the former by means of infiltration from the Whitewater River channel, from subsurface flow across the Garnet Hill Fault from the westerly portion of the WWR into the upper and central portions of the GH, and by retardation of subsurface outflow from the lower portion of the GH during high groundwater levels resulting from recharge operations within the Whitewater River Replenishment Facility; and the latter by means of subsurface flow across the Banning Fault from the MC resulting from recharge operations at the Mission Creek Replenishment Facility, as evidenced by the groundwater contours observed on either side of the Banning Fault.

The MC/GH WMP did not specifically quantify the recharge contributions to the GH from either the westerly portion of the Whitewater River Subbasin or the MC, and stated that hydrologic data for such a determination is currently lacking and, based on data available, it is unclear and uncertain as to the exact relative contribution from these sources to the replenishment of the GH. Regardless, the GH is dependent on both the westerly portion of the WWR and the MC for its groundwater replenishment, both natural and artificial.

The benefits resulting from artificial groundwater infiltration from the Whitewater River channel and subsurface flow of groundwater from the MC and from the westerly portion of the Whitewater River Subbasin is evidenced by the response observed by groundwater levels in wells within the GH. Historic groundwater levels within the GH and historic quantities of imported water delivered to the Whitewater River and Mission Creek Replenishment Facilities are shown in **Exhibit 3**. The rising groundwater levels

correlate with the large quantities of groundwater recharge, particularly in those groundwater wells located in the westerly and central portions of the GH, especially for the periods 1983 through 1987, 1995 through 2000, and 2009 through 2012.

Since the GH benefits from CVWD's and DWA's recharge programs in the WWR and MC Management Areas, CVWD and DWA have the authority to levy replenishment assessment charges on production within the GH under the provisions set forth in the Settlement Agreement.

Because groundwater production continues to exceed natural groundwater replenishment and cumulative groundwater overdraft persists within each subbasin, continued artificial replenishment in the WWR and MC Management Areas is necessary to either eliminate or reduce the effects of cumulative overdraft, and to reduce the resultant threat to the groundwater supply. There are currently no artificial replenishment facilities within the GH.

DWA has requested its maximum 2018 Table A SWP water allocation of 55,750 AF pursuant to its SWP Contract, which was increased from 38,100 AF in 2004 to 50,000 AF in 2005 and to 55,750 in 2010, for the purpose of groundwater replenishment. CVWD plans to do the same with its maximum 2018 Table A water allocation, which was increased in quantity from 23,100 AF in 2003 to 33,000 AF in 2004, to 121,100 AF in 2005, and to 138,350 AF in 2010.

By virtue of the 2003 Exchange Agreement, The Metropolitan Water District of Southern California (MWD) assigned 11,900 AF of its annual Table A allocation to DWA and 88,100 AF of its annual Table A allocation to CVWD; however, MWD retained the option to call-back or recall the assigned annual Table A water allocations, in accordance with specific conditions, in any year. In implementing the 2003 Exchange Agreement, MWD advised CVWD and DWA that it would probably recall the 100,000 AF assigned to the two Coachella Valley agencies from 2005 through 2009. In fact, MWD did recall 100,000 AF in 2005 but has not recalled any water since then. According to communications with MWD management, it is unlikely that MWD will recall any water in the foreseeable future.

According to current projections for 2018, California Department of Water Resources (CDWR) will deliver 35% of Table A water allocation requests, resulting in deliveries of 67,335 AF of Table A water to the Coachella Valley agencies (based on notification from DWR dated January 29, 2018). For 2018, no SWP surplus water under Pool A or Pool B of the Turn-Back Water Pool Program has been offered. It is not likely that any Article 21 water will be available to DWA via MWD for 2018. Up to approximately

100,000 AF of water under the Yuba River Accord is estimated to be available for 2018, of which DWA and CVWD have requested 692 AF and 1,718 AF, respectively. 97,050 AF of Article 56 water carried over from 2017 has already been delivered to the agencies in 2018. In addition, CVWD is anticipated to receive up to approximately 48,603 AF of non-SWP water deliverable to the Whitewater River Replenishment Facility.

The maximum replenishment assessment rate permitted by Desert Water Agency Law for Table A water for the 2018/2019 fiscal year is $214.32/AF. The $214.32 rate is based on estimated Applicable SWP Charges of $9,488,016 (see **Table 5** for DWA applicable charges for 2018 and 2019) and estimated combined assessable production of 44,270 AF for the WWR, MC, and GH Areas of Benefit (estimated for WWR based on the production for 2013 minus 13% for implementation of permanent conservation measures, and based on 2017 production for MC and GH: 34,550 AF within the WWR AOB, 9,250 AF within the MC AOB, and 470 AF within the GH AOB).

The effective replenishment assessment rate for Table A water is based on DWA's estimated Allocated SWP Charges for the current year (based on CDWR's projections for the assessment period) divided by the estimated assessable production for the assessment period, as set forth in **Table 6**. Historically, the estimated assessable production has been based on the assessable production for the previous year; however, the production during 2015 and 2016 was unusually low due to mandatory water conservation measures imposed as a result of the Governor's April 1, 2015 executive order mandating water restrictions on urban water use statewide, and demanding a 32% reduction in water use within DWA. Only a portion of the effects of these severe water restrictions are anticipated to be permanent; therefore, for 2016/2017, DWA elected to estimate assessable groundwater production based on the 2014 assessable groundwater production minus a factor of 10% to account for the effects of permanent water conservation measures. However, since the State urban water use restrictions were based on water usage in 2013 as a baseline, DWA elected, for 2017/2018 and for 2018/2019, to estimate assessable groundwater production based on the 2013 assessable groundwater production minus a factor of 15% for 2017/2018 to account for the effects of permanent water conservation measures. For 2018/2019, DWA elected to use a conservation factor of 13%, and apply the conservation factor only to producers within WWR. Anticipated production within MC and GH is estimated based on 2017 production.

For the 2012/2013 fiscal year, DWA's effective replenishment assessment rate was based on the actual payments made to the SWP by DWA for the previous calendar year divided by the assessable production for that calendar year. This change was made due to a history of variability in the estimated charge

projections published by CDWR in Appendix B of Bulletin 132, which have occasionally diverged significantly from the amounts actually charged by CDWR. However, due to significant quantities of surplus and carryover water from 2011 delivered in 2012, DWA paid significantly higher SWP charges in 2012 than in 2011. It became clear that the variability in the actual payment of effective replenishment assessment rates was no less than the variability previously observed in CDWR's estimated charge projections. Therefore, beginning in 2013/2014, DWA's estimated effective replenishment assessment rate is based on CDWR's projected charges, since carryover and surplus water quantities cannot be projected.

Pursuant to the terms of the Water Management Agreement between CVWD and DWA, and based on DWA's allocated SWP charges amount of $8,659,340 and estimated assessable production of 44,270 AF for the 2018 calendar year (shown in **Table 6** as the estimated assessable production for the 2018/2019 fiscal year), the effective replenishment assessment rate component for Table A water is $195.60/AF for the 2018/2019 fiscal year. This represents a relatively steep increase from the previous year's effective rate of $158/AF. The effective rate increase is the result of an increase in CDWR's estimated SWP reliability factor from 58% to 62% and the Agency's decision to eliminate the use of a reliability factor to account for potential MWD call-backs in the future.

During the Proposition 218 proceedings held in Fall 2016, DWA elected to adopt anticipated rate ranges for fiscal years 2017/2018 through 2020/2021, based on estimated projections of expenses and revenues at the time of adoption. Since rates are anticipated to increase sharply over the next several years and then stabilize, the rate ranges adopted for the transitional period of fiscal years 2017/2018 through 2019/2020 were calculated to incorporate a diminishing deficit, to be recovered in subsequent years. The rate range adopted for the 2018/2019 fiscal year was $120 to $140. It should be noted that at the time these rate ranges were adopted, the rates were being estimated using a lower SWP reliability factor of 58%; and a factor of 35% was being applied to future MWD transfers to account for potential call-back by MWD. Although Proposition 218 was determined in December 2017 by the California Supreme Court to be inapplicable to groundwater pumping fees such as DWA's replenishment assessment, DWA has elected to comply with the rate ranges adopted in the 2016 Proposition 218 proceedings. Therefore, although the 2018/2019 effective rate exceeds the maximum rate of the specified range for 2018/2019, DWA will levy a rate of $140 AF for FY 2018/2019, which is the maximum of the specified range.

At that rate, DWA's replenishment assessment for the entire Replenishment Program will be about $6,197,800, based on estimated assessable production of 44,270 AF (34,550 AF for the WWR AOB,

9,250 AF for the MC AOB, and 470 AF for the GH AOB). Accordingly, DWA will bill approximately $4,837,000 for the WWR AOB, approximately $1,295,000 for the MC AOB, and approximately $65,800 for the GH AOB.

Due to significant increases in the Delta Water Charge beginning in in 2015 that could result in large future increases in the replenishment assessment rate, DWA elected in 2016 to transfer the existing cumulative deficit in the Replenishment Assessment Account to reserve account(s), rather than continue to attempt to recover past deficits by future increases in the replenishment assessment rate. Deficits that result from the current and future assessments will be recovered by adding surcharges, as shown in the "Other Charges and Costs" column for each subbasin in **Table 7**.

It should be noted that there is currently no independent replenishment program for the GH Management Area. Assessment of the GH Management Area production began in the 2015/2016 fiscal year as a result of the MC/GH WMP findings that the GH benefits from artificial replenishment activities in the WWR and MC Management Areas. The estimated assessable production within the GH AOB for the 2018 calendar year is 470 AF, yielding $65,800 in replenishment assessments.

In summary, gross overdraft persists in the westerly portion of the Coachella Valley Groundwater Basin even though groundwater levels have generally stabilized. Cumulative net overdraft (cumulative gross overdraft offset by artificial replenishment) is currently estimated to be approximately 624,000 AF in the WWR Management Area (since 1956) and 105,000 AF in the MC Management Area (since 1978). Thus, there is a continuing need for groundwater replenishment. Even though DWA has requested of CDWR its full SWP Table A allocation of 55,750 AF, CDWR currently (as of May 21, 2018) expects to deliver 35% of this allocation during the coming year, and DWA has elected to adopt a groundwater replenishment assessment rate for 2018/2019 of $140.00/AF.

# CHAPTER II
# INTRODUCTION

# CHAPTER II
# INTRODUCTION

## A. THE COACHELLA VALLEY AND ITS GROUNDWATER

### 1. The Coachella Valley

The Coachella Valley is a desert valley in Riverside County, California. It extends approximately 45 miles southeast from the San Bernardino Mountains to the northern shore of the Salton Sea. Cities of the Coachella Valley include Cathedral City, Coachella, Desert Hot Springs, Indian Wells, Indio, La Quinta, Palm Desert, Palm Springs, and Rancho Mirage, and the unincorporated communities of Thousand Palms, Thermal, Bermuda Dunes, Oasis, and Mecca. The Coachella Valley is bordered on the north by Mount San Gorgonio of the San Bernardino Mountains, on the west by the San Jacinto and Santa Rosa Mountains, on the east by the Little San Bernardino Mountains, and on the south by the Salton Sea.

The Coachella Valley lies within the northwesterly portion of California's Colorado Desert, an extension of the Sonoran Desert. The San Bernardino, San Jacinto, and Santa Rosa Mountains provide an effective barrier against coastal storms, and greatly reduce the contribution of direct precipitation to replenish the Coachella Valley's groundwater basin, resulting in an arid climate. The bulk of natural groundwater replenishment comes from runoff from the adjacent mountains.

Climate in the Coachella Valley is characterized by low humidity, high summer temperatures, and mild dry winters. Average annual precipitation in the Coachella Valley varies from 4 inches on the Valley floor to more than 30 inches in the surrounding mountains. Most of the precipitation occurs during December through February (except for summer thundershowers). The low rainfall is inadequate to supply sufficient water supply for the valley, thus the need for the importation of Colorado River water. Precipitation data recorded at nine rain gauge stations in the Upper Coachella Valley by Riverside County Flood Control and Water Conservation District is included in **Appendix A**.

Prevailing winds in the area are usually gentle, but occasionally increase to velocities of 30 miles per hour or more. Midsummer temperatures commonly exceed 100 degrees Fahrenheit (°F), frequently reach 110°F, and periodically reach 120°F. The average winter temperature is approximately 60°F.

## 2. The Coachella Valley Groundwater Basin

The Coachella Valley Groundwater Basin, as described in CDWR Bulletins 108 and 118, is bounded on the north and east by non-water-bearing crystalline rocks of the San Bernardino and Little San Bernardino Mountains and on the south and west by the crystalline rocks of the Santa Rosa and San Jacinto Mountains. At the west end of the San Gorgonio Pass, between Beaumont and Banning, the basin boundary is defined by a surface drainage divide separating the Coachella Valley Groundwater Basin from the Beaumont Groundwater Basin of the Upper Santa Ana Drainage Area.

The southern boundary is formed primarily by the watershed of the Mecca Hills and by the northwest shoreline of the Salton Sea running between the Santa Rosa Mountains and Mortmar. Between the Salton Sea and Travertine Rock, at the base of the Santa Rosa Mountains, the lower boundary coincides with the Riverside/Imperial County Line.

Southerly of the southern boundary, at Mortmar and at Travertine Rock, the subsurface materials are predominantly fine grained and low in permeability; although groundwater is present, it is not readily extractable. A zone of transition exists at these boundaries; to the north the subsurface materials are coarser and more readily yield groundwater.

Although there is interflow of groundwater throughout the groundwater basin, fault barriers, constrictions in the basin profile, and areas of low permeability limit and control movement of groundwater. Based on these factors, the groundwater basin has been divided into subbasins and subareas as described by CDWR in 1964 and the United States Geological Survey (USGS) in 1971.

## 3. Subbasins and Subareas

The San Andreas Fault drives a complex pattern of branching fault lines within the Coachella Valley which define the boundaries of the subbasins that make up the Coachella Valley Groundwater Basin (CDWR 2003). There are five subbasins within the Coachella Valley Groundwater Basin: the Whitewater River Subbasin, MC, San Gorgonio Pass Subbasin, Desert Hot Springs Subbasin, and GH (USGS 1974).

The subbasins, with their groundwater storage reservoirs, are defined without regard to water quantity or quality. They delineate areas underlain by formations which readily yield the stored water through water wells and offer natural reservoirs for the regulation of water supplies.

The boundaries between subbasins within the groundwater basin are generally defined by faults that serve as effective barriers to the lateral movement of groundwater. Minor subareas have also been delineated, based on one or more of the following geologic or hydrologic characteristics: type of water bearing formations, water quality, areas of confined groundwater, forebay areas, groundwater divides and surface drainage divides.

The following is a list of the subbasins and associated subareas, based on the CDWR and USGS designations:

- Mission Creek Subbasin (Subbasin 7-21.02 per CDWR Bulletin 118, 2003)
- Desert Hot Springs Subbasin (Subbasin 7-21.03 per CDWR Bulletin 118, 2003)
    - Miracle Hill Subarea
    - Sky Valley Subarea
    - Fargo Canyon Subarea
- Garnet Hill Subbasin (considered a subarea of the Indio Subbasin in CDWR Bulletin 118, 2013)
- San Gorgonio Pass Subbasin (Subbasin 7-21.04 per CDWR Bulletin 118, 2003)

- Whitewater River Subbasin (Subbasin 7-21.01 per CDWR Bulletin 118, 2003, referred to therein as the Indio Subbasin)
    - Palm Springs Subarea
    - Thermal Subarea
    - Thousand Palms Subarea
    - Oasis Subarea

DWA's groundwater replenishment program encompasses portions of four of the five subbasins (Whitewater River, Mission Creek, San Gorgonio Pass, and Garnet Hill). DWA's replenishment program does not include the Desert Hot Springs Subbasin. **Figure 2** illustrates the subbasin boundaries per the MC/GH WMP (Montgomery Watson Harza (MWH) 2003) and DWA's Areas of Benefit of the replenishment program.

The boundaries (based on faults, barriers, constrictions in basin profile, and changes in permeability of water-bearing units), geology, hydrogeology, water supply, and groundwater storage of these subbasins are further described in the following sections.

a. Mission Creek Subbasin (MC)

Water-bearing materials underlying the Mission Creek upland comprise the MC. This subbasin is designated Number 7-21.02 in CDWR's Bulletin 118 (2003). The subbasin is bounded on the south by the Banning Fault and on the north and east by the Mission Creek Fault. The subbasin is bordered on the west by relatively impermeable rocks of the San Bernardino Mountains. The Indio Hills are located in the easterly portion of the subbasin, and consist of the semi-water-bearing Palm Springs Formation. The area within this boundary northwesterly of the Indio Hills reflects the estimated geographic limit of effective storage within the subbasin (CDWR 1964).

Both the Mission Creek Fault and the Banning Fault are partially effective barriers to lateral groundwater movement, as evidenced by offset water levels, fault springs, and changes in vegetation. Water level differences across the Banning Fault, between the MC and the GH, are on the order of 200 feet to 250

feet. Similar water level differences exist across the Mission Creek Fault between the MC and Desert Hot Springs Subbasin (MWH 2013).

This subbasin relies on the same imported SWP/Colorado River Exchange Water source for replenishment, as does the westerly portion of the Whitewater River Subbasin. CVWD, DWA, and MSWD jointly manage this subbasin under the terms of the 2004 Mission Creek Settlement Agreement. This agreement and the 2014 Mission Creek Water Management Agreement between CVWD and DWA specify that the available SWP water will be allocated between the MC and WWR Management Areas in proportion to the amount of water produced or diverted from each subbasin during the preceding year.

b. Desert Hot Springs Subbasin

The Desert Hot Springs Subbasin is designated Number 7-21.03 in CDWR's Bulletin 118 (2003). It is bounded on the north by the Little San Bernardino Mountains and on the southeast by the Mission Creek and San Andreas Faults. The Mission Creek Fault separates the Desert Hot Springs Subbasin from the MC, and the San Andreas Fault separates the Desert Hot Springs Subbasin from the Whitewater River Subbasin. Both faults serve as effective barriers to lateral groundwater flow. The subbasin has been divided into three subareas: Miracle Hill, Sky Valley, and Fargo Canyon (CDWR 1964).

The Desert Hot Springs Subbasin is not extensively developed, except in the Desert Hot Springs area. Relatively poor groundwater quality has limited the use of this subbasin for groundwater supply. The Miracle Hill Subarea underlies portions of the City of Desert Hot Springs and is characterized by hot mineralized groundwater, which supplies a number of spas in that area. The Fargo Canyon Subarea underlies a portion of the planning area along Dillon Road north of Interstate 10. This area is characterized by coarse alluvial fans and stream channels flowing out of Joshua Tree National Park. Based on limited groundwater data for this area, flow is generally to the southeast. Water quality is relatively poor with salinities in the range of 700 milligrams per liter (mg/L) to over 1,000 mg/L (CDWR 1964).

c. Garnet Hill Subbasin (GH)

The area between the Garnet Hill Fault and the Banning Fault, named the Garnet Hill Subarea of the Indio (Whitewater River) Subbasin by CDWR (1964), was considered a distinct subbasin by the USGS because of the partially effective Banning and Garnet Hill Faults as barriers to lateral groundwater movement. This is demonstrated by a difference of 170 feet in groundwater level elevation in a horizontal distance of 3,200 feet across the Garnet Hill Fault, as measured in the spring of 1961. The Garnet Hill Fault does not reach the surface, and is probably effective as a barrier to lateral groundwater movement only below a depth of about 100 feet (MWH 2013).

The 2013 MC/GH WMP states groundwater production is low in the GH and is not expected to increase significantly in the future due to relatively low well yields compared to those in the MC. Water levels in the western and central portions of the subbasin show response to large replenishment quantities from the Whitewater River Groundwater Replenishment Facility, while levels are relatively flat in the easterly portion of the subbasin. The lack of wells in the subbasin limits the hydrogeologic understanding of how this subbasin operates relative to the MC and Whitewater River Subbasin.

Although some natural replenishment to this subbasin may come from Mission Creek and other streams that pass through during periods of high flood flows, the chemical character of the groundwater (and its direction of movement) indicate that the main source of replenishment to the subbasin comes from the Whitewater River through the permeable deposits which underlie Whitewater Hill (MWH 2013).

This subbasin is considered part of the Whitewater River (Indio) Subbasin in CDWR's Bulletin 118 (2003) and therefore was not designated with a separate number therein. There are no assessable groundwater pumpers within CVWD's portion of the GH, and CVWD considers the portion of the GH within its boundaries to be a part of their WWR AOB. There are two assessable producers

within DWA's portion of the GH, which together produced a total of 470.46 AF of groundwater from the subbasin in 2017. DWA considers the portion of the GH within its service area to be a separate AOB.

d. San Gorgonio Pass Subbasin

The San Gorgonio Pass Subbasin lies entirely within the San Gorgonio Pass area, bounded by the San Bernardino Mountains on the north and the San Jacinto Mountains on the south (CDWR 2003). This subbasin is designated Number 7 21.04 in CDWR's Bulletin 118 (2003).

The San Gorgonio Pass Subbasin is hydrologically connected to the Whitewater River Subbasin on the east. Groundwater within the San Gorgonio Pass Subbasin moves from west to east and spills out into the Whitewater River Subbasin over the suballuvial bedrock constriction at the east end of the pass (CDWR 1964).

DWA's service area includes three square miles of the San Gorgonio Pass Subbasin.

e. Whitewater River (Indio) Subbasin

The Whitewater River Subbasin, designated the Indio Subbasin (Basin No. 7 21.01) in CDWR Bulletin No. 118 (2003), underlies the major portion of the Coachella Valley floor and encompasses approximately 400 square miles. Beginning approximately one mile west of the junction of State Highway 111 and Interstate 10, the Whitewater River Subbasin extends southeast approximately 70 miles to the Salton Sea.

The Subbasin is bordered on the southwest by the Santa Rosa and San Jacinto Mountains and is separated from the Garnet Hill, Mission Creek, and Desert Hot Springs Subbasins to the north and east by the Garnet Hill and San Andreas Faults (CDWR 1964). The Garnet Hill Fault, which extends southeasterly from the north side of San Gorgonio Pass to the Indio Hills, is a relatively effective

barrier to lateral groundwater movement from the GH into the Whitewater River Subbasin, with some portions in the shallower zones more permeable. The San Andreas Fault, extending southeasterly from the junction of the Mission Creek and Banning Faults in the Indio Hills and continuing out of the basin on the east flank of the Salton Sea, is also an effective barrier to lateral groundwater movement from the northeast (CDWR 1964).

The subbasin underlies the cities of Palm Springs, Cathedral City, Rancho Mirage, Palm Desert, Indian Wells, La Quinta, Indio, and Coachella, and the unincorporated communities of Thousand Palms, Thermal, Bermuda Dunes, Oasis, and Mecca. From about Indio southeasterly to the Salton Sea, the subbasin contains increasingly thick layers of silt and clay, especially in the shallower portions of the subbasin. These silt and clay layers, which are remnants of ancient lake bed deposits, impede the percolation of water applied for irrigation and limit groundwater replenishment opportunities to the westerly fringe of the subbasin (CDWR 1964).

In 1964, CDWR estimated that the five subbasins that make up the Coachella Valley Groundwater Basin contained a total of approximately 39.2 million AF of water in the first 1,000 feet below the ground surface; much of this water originated as runoff from the adjacent mountains. Of this amount, approximately 28.8 million AF of water was stored in the overall Whitewater River Subbasin (CDWR 1964). However, the amount of water in the Whitewater River Subbasin has decreased over the years because it has developed to the point where significant groundwater production occurs (CVWD 2012). The natural supply of water to the northwestern part of the Coachella Valley is not keeping pace with the basin outflow, due mainly to large consumptive uses created by the resort-recreation economy and permanent resident population in the northwestern Whitewater River Subbasin, and large agricultural economy in the southeastern Whitewater River Subbasin. Imported SWP water allocations are exchanged for Colorado River water and utilized for replenishment in the westerly portion of the Whitewater River Subbasin to replace consumptive uses created by the resort recreation economy and permanent resident population.

The Whitewater River Subbasin is not currently adjudicated. From a management perspective, CVWD divides the portion of the subbasin within its service area into two AOBs designated the West Whitewater River Subbasin AOB and the East Whitewater River Subbasin AOB. The dividing line between these two areas is an irregular line trending northeast to southwest between the Indio Hills north of the City of Indio and Point Happy in La Quinta (see paragraph e.5 below for the history of this division). The West Whitewater River Subbasin Management Area is jointly managed by CVWD and DWA under the terms of the 2014 Whitewater Water Management Agreement. The East Whitewater River Subbasin AOB is managed by CVWD (CVWD 2012).

Hydrogeologically, the Whitewater River Subbasin is divided into four subareas: the Palm Springs, Thermal, Thousand Palms, and Oasis Subareas. The Palm Springs Subarea is the forebay or main area of replenishment to the subbasin, and the Thermal Subarea is the pressure or confined area within the basin. The other two subareas are peripheral areas having unconfined groundwater conditions.

1) Palm Springs Subarea

The triangular area between the Garnet Hill Fault and the east slope of the San Jacinto Mountains southeast to Cathedral City is designated the Palm Springs Subarea. Groundwater is unconfined in this area. The Coachella Valley fill materials within the Palm Springs Subarea are essentially heterogeneous alluvial fan deposits with little sorting and little fine grained material content. The thickness of these water-bearing materials is not known; however, it exceeds 1,000 feet. Although no lithologic distinction is apparent from well drillers' logs, the probable thickness of recent deposits suggests that Ocotillo conglomerate underlies recent fanglomerate in the subarea at depths ranging from 300 feet to 400 feet.

Natural replenishment to the aquifer in the Whitewater River Subbasin occurs primarily in the Palm Springs Subarea. The major natural sources include infiltration of stream runoff from the San Jacinto Mountains and

the Whitewater River, and subsurface inflow from the San Gorgonio Pass Subbasin and GH. Deep percolation of direct precipitation on the Palm Springs Subarea is considered negligible as it is consumed by evapotranspiration (CDWR 1964).

2) Thermal Subarea

Groundwater of the Palm Springs Subarea moves southeastward into the interbedded sands, silts, and clays underlying the central portion of the Coachella Valley. The division between the Palm Springs Subarea and the Thermal Subarea is near Cathedral City. The permeabilities parallel to the bedding of the deposits in the Thermal Subarea are several times the permeabilities perpendicular to the bedding and, therefore, movement of groundwater parallel to the bedding predominates. Confined or semi confined groundwater conditions are present in the major portion of the Thermal Subarea. Movement of groundwater under these conditions is present in the major portion of the Thermal Subarea and is caused by differences in piezometric (pressure) level or head. Unconfined or free water conditions are present in the alluvial fans at the base of the Santa Rosa Mountains, such as the fans at the mouth of Deep Canyon and in the La Quinta area.

Sand and gravel lenses underlying this subarea are discontinuous, and clay beds are not extensive. However, two aquifer zones separated by a zone of finer-grained materials were identified from well logs. The fine grained materials within the intervening horizontal plane are not tight enough or persistent enough to completely restrict the vertical interflow of water, or to warrant the use of the term "aquiclude". Therefore, the term "aquitard" is used for this zone of less permeable material that separates the upper and lower aquifer zones in the southeastern part of the Valley.

The lower aquifer zone, composed of part of the Ocotillo conglomerate, consists of silty sands and gravels with interbeds of silt and clay. It

contains the greatest quantity of stored groundwater in the Coachella Valley Groundwater Basin, but serves only that portion of the Valley easterly of Washington Street. The top of the lower aquifer zone is present at a depth ranging from 300 feet to 600 feet below the surface. The thickness of the zone is undetermined, as the deepest wells present in the Coachella Valley have not penetrated it in its entirety. The available data indicate that the zone is at least 500 feet thick and may be in excess of 1,000 feet thick.

The aquitard overlying the lower aquifer zone is generally 100 feet to 200 feet thick, although in small areas on the periphery of the Salton Sea it is more than 500 feet thick. North and west of Indio, in a curved zone approximately one mile wide, the aquitard is apparently lacking and no distinction is made between the upper and lower aquifer zones.

Capping the upper aquifer zone in the Thermal Subarea is a shallow fine grained zone in which semi-perched groundwater is present. This zone consists of recent silts, clays, and fine sands and is relatively persistent southeast of Indio. It ranges from zero to 100 feet thick and is generally an effective barrier to deep percolation. However, north and west of Indio, the zone is composed mainly of clayey sands and silts, and its effect in retarding deep percolation is limited. The low permeability of the materials southeast of Indio has contributed to irrigation drainage problems in the area. Semi-perched groundwater has been maintained by irrigation water applied to agricultural lands south of Point Happy, necessitating the construction of an extensive subsurface tile drain system (CDWR 1964).

The Thermal Subarea contains the division between CVWD's west and east AOBs of the Whitewater River (Indio) Subbasin, which is more fully described in paragraph e.5 below.

The imported Colorado River supply through the Coachella Canal is used mainly for irrigation in the easterly portion of the Whitewater River

Subbasin. Annual deliveries of Colorado River water through the Coachella Canal of approximately 300,000 AF are a significant component of southeastern Coachella Valley hydrology. A smaller portion of the Coachella Canal water supply is used to offset groundwater pumping by golf courses in the westerly portion of the Whitewater River Subbasin.

CVWD recently completed a study to evaluate the entire Coachella Valley Groundwater Basin. This led to the development and adoption of the 2010 CVWMP Update. Using state-of-the-art technology, CVWD developed and calibrated a peer-reviewed, three-dimensional groundwater model (Fogg 2000) that is based on data from over 2,500 wells, and includes an extensive database of well chemistry reports, well completion reports, electric logs, and specific capacity tests. This model improved on previous groundwater models, and incorporates the latest hydrological evaluations from previous studies conducted by CDWR and USGS to gain a better understanding of the hydrogeology in this subbasin and the benefits of water management practices identified in the CVWMP.

3) Thousand Palms Subarea

The small area along the southwest flank of the Indio Hills is named the Thousand Palms Subarea. The southwest boundary of the subarea was determined by tracing the limits of distinctive groundwater chemical characteristics. The major aquifers of the Whitewater River Subbasin are characterized by calcium bicarbonate; but water in the Thousand Palms Subarea is characterized by sodium sulfate (CDWR 1964).

The differences in water quality suggest that replenishment to the Thousand Palms Subarea comes primarily from the Indio Hills and is limited in supply. The relatively sharp boundary between chemical characteristics of water derived from the Indio Hills and groundwater in

the Thermal Subarea suggests there is little intermixing of the two waters.

The configuration of the water table north of the community of Thousand Palms is such that the generally uniform, southeasterly gradient in the Palm Springs Subarea diverges and steepens to the east along the base of Edom Hill. This steepened gradient suggests a barrier to the movement of groundwater: possibly a reduction in permeability of the water-bearing materials, or possibly a southeast extension of the Garnet Hill Fault. However, such an extension of the Garnet Hill Fault is unlikely. There is no surface expression of such a fault, and the gravity measurements taken during the 1964 CDWR investigation do not suggest a subsurface fault. The residual gravity profile across this area supports these observations. The sharp increase in gradient is therefore attributed to lower permeability of the materials to the east.

Most of the Thousand Palms Subarea is located within the westerly portion of the Whitewater River Subbasin. Groundwater levels in this area show similar patterns to those of the adjacent Thermal Subarea, suggesting a hydraulic connectivity (CDWR 1964).

4) Oasis Subarea

Another peripheral zone of unconfined groundwater that is different in chemical characteristics from water in the major aquifers of the Whitewater River Subbasin is found underlying the Oasis Piedmont slope. This zone, named the Oasis Subarea, extends along the base of the Santa Rosa Mountains. Water-bearing materials underlying the subarea consist of highly permeable fan deposits. Although groundwater data suggest that the boundary between the Oasis and Thermal Subareas may be a buried fault extending from Travertine Rock to the community of Oasis, the remainder of the boundary is a lithologic change from the coarse fan deposits of the Oasis Subarea to the interbedded sands, gravel, and silts of the Thermal Subarea. Little information is available as to the

thickness of the water-bearing materials, but it is estimated to be in excess of 1,000 feet. Groundwater levels in the Oasis Subarea have exhibited similar declines as elsewhere in the subbasin due to increased groundwater pumping to meet agricultural demands on the Oasis slope (CDWR 1964).

5) East/West AOB Division

The Thermal Subarea (see paragraph e.2 above) contains the division between the westerly and easterly portions of the Whitewater River Subbasin (CVWD's West Whitewater River Subbasin AOB and East Whitewater River Subbasin AOB). This division constitutes the southern boundary of the management area governed by the Management Agreement between CVWD and DWA.

The boundary between these two Management Areas extends from Point Happy (a promontory of the Santa Rosa Mountains between Indian Wells and La Quinta) northeasterly, generally along Washington Street, to a point on the San Andreas Fault intersecting the northerly prolongation of Jefferson Street in Indio.

The boundary was originally defined primarily on the basis of differing groundwater levels resulting from differences in groundwater use and management northerly and southerly of the boundary. Primarily due to the application of imported water from the Coachella Canal, and an attendant reduction in groundwater pumpage, the water levels in the area southeasterly from Point Happy (the East Whitewater River Subbasin Management Area) rose until the early 1970s, while groundwater levels northwesterly from Point Happy (the WWR Management Area) were dropping due to continued development and pumping. This was stated by Tyley (USGS 1974) as follows:

"The south boundary is an imaginary line extending from Point Happy northeast to the Little San Bernardino Mountains and was chosen for the

following reasons: (1) North of the boundary, water levels have been declining while south of the boundary, water levels have been rising since 1949 and (2) north of the boundary, ground water is the major source of irrigation water while south of the boundary, imported water from the Colorado River is the major source of irrigation water."

In addition, according to CDWR (1964) and as discussed above, the easterly portion of the Thermal Subarea is distinguished from area north and west of Indio within the Thermal Subarea by the presence of several relatively impervious clay layers (aquitards) lying between the ground surface and the main groundwater aquifer, creating confined and semi-confined aquifer conditions (see Figure III-2). These conditions were characterized by Tyley as "artesian conditions" southerly of the south boundary.

Groundwater levels northerly of the boundary have been stable or increasing since the 1970s (per recorded measurements of USGS, DWA, and CVWD wells), except in the greater Palm Desert area, largely due to the commencement of replenishment activities at the Whitewater River Groundwater Replenishment Facility in 1973. Groundwater levels in the greater Palm Desert area continue to decline, but at a reduced rate as a result of the groundwater replenishment program. Differences between the East Whitewater River Subbasin Management Area and WWR Management Area also persist in terms of management of the groundwater replenishment program and by groundwater usage (there is significantly more agricultural use in CVWD's East Whitewater River Subbasin AOB than in the WWR Management Area).

6) Summary

The Whitewater River Subbasin consists of four subareas: the Palm Springs, Thermal, Thousand Palms, and Oasis Subareas. The Palm Springs Subarea is the forebay or main area of replenishment to the subbasin, and the Thermal Subarea includes the pressure or confined area

within the basin. The Thousand Palms and Oasis Subareas are peripheral areas having unconfined groundwater conditions. From a management perspective, the Whitewater River Subbasin is divided into a westerly and easterly portion, with the dividing line extending from Point Happy in La Quinta to the northeast, terminating at the San Andreas Fault and the Indio Hills at Jefferson Street.

Potable groundwater is not readily available within the following areas in the Coachella Valley: Indio Hills, Mecca Hills, Barton Canyon, Bombay Beach, and Salton City. Water service to these areas is derived from groundwater pumped from adjacent basins.

## B. THE GROUNDWATER REPLENISHMENT AND ASSESSMENT PROGRAM

DWA's Groundwater Replenishment and Assessment Program was established to augment groundwater supplies and arrest or retard declining water table conditions within the Coachella Valley Groundwater Basin, specifically within the WWR, MC, and GH AOBs (see **Figure 1**).

### 1. Water Management Areas

Pursuant to the Water Management Agreements between CVWD and DWA, the Water Management Areas encompass the Westerly Portion of the Whitewater River Subbasin, a portion of the San Gorgonio Pass Subbasin, and the entire MC and GH (except three square miles in the Painted Hills area and a small portion that lies within San Bernardino County) within the Coachella Valley Groundwater Basin (see **Figure 1**).

- <u>The West Whitewater River Subbasin (WWR) Management Area</u>

  CVWD and DWA have recognized the need to manage the westerly portion of the Whitewater River Subbasin as a complete unit rather than as individual segments underlying the individual agencies' boundaries. This management area consists of the Palm Springs and Thousand Palms Subareas and the westerly portion of the Thermal Subarea, which is experiencing a significantly declining water table. The management area was established to encompass the area of groundwater overdraft as

evidenced by declining water table conditions, and includes areas within both CVWD and DWA boundaries. The easterly boundary of the WWR Management Area extends from Point Happy (a promontory of the Santa Rosa Mountains between Indian Wells and La Quinta) northeasterly, generally along Washington Street, to a point on the San Andreas Fault intersecting the northerly prolongation of Jefferson Street in Indio.

DWA's WWR AOB is located entirely within the WWR Management Area.

- The Mission Creek Subbasin (MC) Management Area

  CVWD and DWA have recognized the need to manage the MC as a complete unit rather than as individual segments underlying the individual agency's boundaries. This management area consists of the entire MC. DWA's MC AOB is located entirely within the MC Management Area.

- The Garnet Hill Subbasin (GH) Management Area

  CVWD considers the portion of the GH within its boundaries to be a part of its WWR AOB. DWA considers the portion of the GH within its service area to be a separate management area and AOB.

## 2. Areas of Benefit

The Areas of Benefit (AOBs) for DWA's replenishment program consist of the westerly portion of the Coachella Valley Groundwater Basin, including portions of the Whitewater River Subbasin, MC, GH, and tributaries thereto, situated within DWA's service area boundary (see **Figure 2**). DWA has three AOBs within its replenishment program: the West Whitewater River Subbasin (WWR) AOB, the Mission Creek Subbasin (MC) AOB, and the Garnet Hill Subbasin (GH) AOB.

DWA's **WWR AOB** consists of that portion of the WWR Management Area situated within DWA's service area boundary (including a portion of the San Gorgonio Pass Subbasin).

DWA's **MC AOB** consists of that portion of the MC Management Area situated within DWA's service area boundary.

DWA's **GH AOB** consists of that portion of the GH Management Area situated within DWA's service area boundary.

The AOBs for CVWD's replenishment program consist of the portions of the Whitewater River Subbasin, MC, and GH within CVWD's boundary. CVWD has a total of three AOBs within its groundwater replenishment program: the CVWD MC AOB; the CVWD WWR AOB; and the East Whitewater River Subbasin AOB. CVWD's WWR AOB includes the portion of the GH within CVWD's service area (see **Figure 2**).

Within DWA's WWR AOB, there are seven stream diversions on the Whitewater River and its tributaries, five by DWA (two on Chino Creek, one on Snow Creek, one on Falls Creek, and one by the former Whitewater Mutual Water Company, which has been acquired by DWA), one by the Wildlands Conservancy (formerly the Whitewater Trout Farm) which is used for conservation and educational purposes, and one by CVWD at the Whitewater River Replenishment Facility; the latter three being on the Whitewater River itself. There are no stream diversions within the MC or GH Areas of Benefit. DWA's WWR AOB also includes subsurface tributary flows from the San Gorgonio Pass Subbasin located to the west.

While the replenishment assessments outlined on the following pages are based on and limited to water production within DWA's AOBs, available water supply, estimated water requirements, and groundwater replenishment are referenced herein to the entire WWR Management Area, MC Management Area, and GH Management Area. The WWR, MC, and GH Management Areas are replenished jointly by CVWD and DWA for water supply purposes, and the two agencies jointly manage the imported water supplies within said Management Areas.

## 3. Water Management Agreements

The replenishment program was implemented pursuant to a joint Water Management Agreement for the WWR Management Area ("Whitewater River Subbasin Water

Management Agreement", executed July 1, 1976 and amended December 15, 1992 and July 15, 2014) between CVWD and DWA. Later, a similar program was implemented within the MC Management Area pursuant to a similar joint Water Management Agreement ("Mission Creek Subbasin Water Management Agreement", executed April 8, 2003 and amended July 15, 2014). Currently, there is no Water Management Agreement between CVWD and DWA specifically for the GH Management Area because direct artificial groundwater replenishment has not been implemented within the subbasin. However, groundwater in the GH Management Area is managed under the provisions of the Whitewater River and Mission Creek Subbasin Water Management Agreements.

CVWD and DWA entered into a Settlement Agreement with MSWD in December 2004, which affirmed the water allocation procedure that had been established earlier by CVWD and DWA, and which established a Management Committee, consisting of the General Managers of CVWD, DWA, and MSWD, to review production and recharge activities. The Addendum to the Settlement Agreement states that the water available for recharge each year shall be divided between the WWR Management Area and the MC Management Area proportionate to the previous year's production from within each management area (see **Appendix B)**.

Conditions of the Settlement Agreement and Addendum between DWA, CVWD, and MSWD state that DWA and CVWD have the authority to levy replenishment assessments on water produced from subbasins of the Upper (Western) Coachella Valley Groundwater Basin within DWA and CVWD's Areas of Benefit, if found that recharge activities benefit those subbasins.

The Management Committee engaged MWH to prepare the MC/GH WMP, which was completed in January 2013. According to the MC/GH WMP, the GH benefits from the recharge activities in both the MC and Whitewater River Subbasin. It benefits from the recharge activities in the MC via subsurface flow across the Banning Fault, and from the recharge activities in the westerly portion of the Whitewater River Subbasin via: (a) infiltration from the Whitewater River channel, which carries imported water from the Colorado River Aqueduct to the replenishment facilities within the Whitewater River Subbasin, and (b) from subsurface flow across the Garnet Hill Fault at the northerly end of the GH during major recharge events that significantly raise the groundwater level in

the vicinity of the Whitewater River Replenishment Facility. Exact quantities of replenishment benefit from the MC and Whitewater River Subbasin to the GH cannot be ascertained at this time with currently available hydrologic data.

The Water Management Agreements call for maximum importation of SWP Contract Table A water allocations (formerly "entitlements") by CVWD and DWA for replenishment of groundwater basins or subbasins within defined Water Management Areas. The Agreement also requires collection of data necessary for sound management of water resources within these same Water Management Areas.

## 4. Groundwater Overdraft

CDWR Bulletin 160-09 (2009 California Water Plan Update) defines "Groundwater overdraft" as:

> *"…the condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years, during which the water supply conditions approximate average conditions."*

According to CDWR Bulletin 118-80 (Groundwater Basins in California):

> *"Overdraft is characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years. Overdraft can lead to increased extraction costs, land subsidence, water quality degradation, and environmental impacts."*

For purposes of this report, the term "gross overdraft" refers to groundwater extractions or water production in excess of natural groundwater replenishment or recharge, as an annual rate in AF/Yr, and "cumulative overdraft" refers to the cumulative gross overdraft in AF over the recorded history of an aquifer (since 1956 for WWR and since 1978 for MC). The term "net overdraft" refers herein to gross overdraft offset by artificial replenishment.

The initial Water Management Agreement was developed following numerous investigations regarding the groundwater supply within the Coachella Valley; said investigations are addressed in DWA's previous reports (*Engineer's Report on Groundwater Replenishment and Assessment Program for the Whitewater River Subbasin* for the years 1978/1979 through 1983/1984). These investigations all concluded that gross overdraft (groundwater extractions or water production in excess of natural groundwater replenishment and/or recharge) existed within the Coachella Valley Groundwater Basin and its subbasins.

## 5. Groundwater Replenishment

### a. Summary

Since 1973, CVWD and DWA have been using Colorado River water exchanged for SWP water (Table A water allocations and supplemental water as available) to replenish groundwater in the Coachella Valley Groundwater Basin within the WWR Management Area (including a portion of the San Gorgonio Pass Subbasin) and the GH Management Area, and, since 2002, within the MC Management Area. The two agencies are permitted by law to replenish the groundwater basins and to levy and collect water replenishment assessments from any groundwater extractor or surface water diverter (aside from exempt producers) within their jurisdictions who benefits, such as those within the GH and San Gorgonio Pass Subbasin, from replenishment of groundwater.

### b. History

DWA and CVWD completed construction of the Whitewater River Replenishment Facility in 1973 and the Mission Creek Replenishment Facility in 2002, and recharge activities commenced within each respective subbasin upon completion of the facilities. Annual recharge quantities are set forth in **Exhibit 6**.

From 1973 through 2017, CVWD and DWA have replenished the WWR and MC Management Areas with approximately 3,481,276 AF (3,318,182 AF to WWR

Management Area and 159,561 AF to MC Management Area). Of this total, 3,223,627 AF consisted of exchange deliveries (Colorado River water exchanged for SWP water, including advance deliveries) and 3,806,172 AF consisted of exchange deliveries and advance deliveries converted to exchange deliveries, but excluding advance deliveries not yet converted to exchange deliveries. See **Exhibit 6**.

Between October 1984 and December 1986, MWD initially provided about 466,000 AF of advance delivered water for future exchange with CVWD and DWA that was used to replenish the WWR Management Area. This initial quantity of advanced delivered water has been augmented several times since then (with a portion on the augmented supply delivered to the Mission Creek Replenishment Facility), and the total quantity of advance delivered water is currently 1,152,351 AF. During drought conditions, MWD has periodically met exchange delivery obligations with water from its advance delivery account. By December 2017, MWD had converted approximately 827,243 AF of advance delivered water to exchange water deliveries, leaving a balance of approximately 325,108 AF in MWD's advance delivery account (see **Exhibit 6**, included at the end of this report, for an accounting of exchange and advance deliveries).

c. Table A Water Allocations and Deliveries

SWP Table A water allocations are based primarily on hydrologic conditions and legal constraints, and vary considerably from year to year. In 2017, the final allocation was 85% of maximum Table A allocations. However, the Table A water deliveries during 2017 were approximately 34% of maximum Table A allocations, with the remainder delivered in 2018 as Article 56 carry-over water and flexible storage pay-back at Lake Perris. As of the writing of this report, Table A water deliveries in 2018 are projected to be 35% of maximum Table A allocations. Long-term average Table A allocations are currently predicted to be approximately 62% of maximum Table A allocations.

A portion of Table A allocations for a given year are occasionally carried over into the following year under Article 56 of the SWP Contract. In the first three

months of 2018, 97,050 AF of Article 56 water carried over from 2017 has been delivered to CVWD and DWA.

Even though CVWD and DWA have requested and will continue to request their maximum annual Table A allocations, the "Probable Table A Water Allocations" and "Probable Table A Water Deliveries" have been adjusted herein for long-term reliability for estimating purposes. In previous reports, the Probable Table A Water Allocations have been assumed herein to be equal to the maximum Table A Water allocations with the MWD transfer portion reduced by a calculated factor to represent a long-term average transfer quantity with possible recalls by MWD pursuant to the 2003 Exchange Agreement and its implementation. According to communications from MWD management, it is unlikely that MWD will make any recalls for the foreseeable future; therefore, this factor has not been applied to future estimates. "Probable Table A Water Deliveries" are herein assumed to be 62% of the aforementioned Probable Table A Water Allocations, based on estimated SWP reliability.

From 1973 through 2003, CVWD and DWA had SWP maximum annual Table A allocations of 23,100 AF and 38,100 AF, respectively. To meet projected water demands and to alleviate cumulative gross overdraft conditions, CVWD and DWA have secured additional SWP Table A water allocations, increasing their combined maximum Table A water allocations from 61,200 AF/Yr in 2003 to 194,100 AF/Yr beginning in 2010. CVWD and DWA's current Table A allocations are described in additional detail in the following paragraphs.

1) Tulare Lake Purchase

CVWD obtained an additional 9,900 AF/Yr of Table A water allocation from Tulare Lake Basin Water Storage District, another State Water Contractor, thus increasing its annual Table A water allocation to 33,000 AF/Yr, effective January 1, 2004.

2) 2003 Exchange Agreement

In 2003, CVWD and DWA obtained a further 100,000 AF/Yr (88,100 AF/Yr for CVWD and 11,900 AF/Yr for DWA) of Table A water allocation through a new exchange agreement (the 2003 Exchange Agreement) among CVWD, DWA, and MWD (all State Water Contractors). The new exchange agreement, which became effective January 1, 2005, permits MWD to call-back or recall the assigned annual Table A water allocation of 100,000 AF/Yr in 50,000 AF/Yr increments during periods of constrained, limited, or low water supply conditions; however, it gives CVWD and DWA the opportunity to secure increased quantities of surplus water in addition to increased quantities of Table A water during normal or high water supply conditions. MWD must notify CVWD and DWA of its intentions regarding call-back or recall of the 100,000 AF or 50,000 AF increment thereof.

In implementing the 2003 Exchange Agreement, MWD advised CVWD and DWA that it would probably recall the 100,000 AF/Yr assigned to the two Coachella Valley agencies from 2005 through 2009. In fact, it did recall the full 100,000 AF/Yr in 2005, but it has not recalled any water since that time. According to communications with MWD management, it is unlikely that MWD will recall any water in the foreseeable future.

3) Kern County/Tulare Lake Purchase

In 2010, CVWD and DWA negotiated transfer of an additional 16,000 AF/Yr (12,000 AF/Yr for CVWD and 4,000 AF/Yr for DWA) of Table A water allocation from Kern County Water Agency and an additional 7,000 AF/Yr (5,250 AF/Yr for CVWD and 1,750 AF/Yr for DWA) from Tulare Lake Basin Water Storage District, both State Water Contractors.

d. Supplemental Water

Any surplus water secured by CVWD and DWA is exchanged for a like quantity of Colorado River Water. Charges for surplus water are allocated between CVWD and DWA in accordance with the terms of the Water Management Agreements. DWA secures funds for its allocated charges for surplus water payments from its Reserve for Additional Water Reserve Account.

1) Turn-Back Water Pool Water

From 1996 through 2017, CVWD and DWA jointly obtained 297,841 AF of water under CDWR's Turn-Back Water Pool Program, which was exchanged for a like quantity of Colorado River Water and delivered to the Whitewater River and Mission Creek Replenishment Facilities.

Turn-Back Water Pool water was originally Table A water scheduled for delivery to other State Water Contractors, but those Contractors subsequently determined that the water was surplus to their needs. Surplus water in the Turn-Back Water Pool Program is allocated between two pools based on time: Pool A water must be secured by March 1 of each year and Pool B water must be secured between March 1 and April 1 of each year. The charge for Pool A water is higher than the charge for Pool B water.

Since fiscal year 1999/2000, requests for Turn-Back Water Pool water have exceeded water available. Quantities of Pool A and Pool B water purchased by CVWD and DWA are shown in **Exhibit 6**.

In 2017, DWA and CVWD were allocated 1,131 AF of SWP surplus water under the Turn-Back Water Pool Program. Based on current projections, CVWD and DWA will not receive any Pool A or Pool B water in 2018.

2) Flood Water

In 1997 and 1998, CVWD and DWA jointly obtained 47,286 AF of Kaweah River, Tule River, and Kings River flood flow water, which was also exchanged for a like quantity of Colorado River water delivered to the Whitewater River Replenishment Facility. Currently, the availability of flood water in 2018 is uncertain.

3) Article 21 Surplus Water

From 2000 through 2011, CVWD and DWA obtained 42,272 AF of Article 21 surplus water and, similarly, that water was also exchanged for a like quantity of Colorado River water which was delivered to the Whitewater River Replenishment Facility. No Article 21 water has been delivered to the Coachella Valley since 2011. It is unlikely that DWA and CVWD will receive Article 21 water in 2018.

4) Yuba River Accord and Other Water

In 2008, CVWD and DWA obtained 1,836 AF of water under the terms of the Yuba River Accord (then newly-ratified). In 2009 and 2012, CVWD and DWA obtained 3,482 AF and 1,188 AF, respectively, of water under the Yuba River Accord and other conservation/transfer agreements. No water was obtained in 2010 or 2011 under the Yuba River Accord. In 2014 and 2015, respectively, CVWD and DWA jointly obtained 1,213 AF and 426 AF of water under the Yuba River Accord. Up to approximately 100,000 AF of water under the Yuba River Accord is estimated to be available for 2018, of which DWA and CVWD have requested 692 AF and 1,718 AF, respectively.

5) Multi-Year Water Pool

In 2012, the State Water Contractors began discussions regarding options for expanding the water market within the confines of the existing SWP

Contracts. The Contractors and CDWR developed a demonstration program called the 2013-2014 Multi-Year Water Pool (MYWP) Demonstration Program, whereby participating buyers and sellers would commit to buying water from the pool or selling water into the pool during calendar years 2013 and 2014. This MYWP Demonstration Program was designed to allow water-short State Water Contractors to purchase SWP water from other willing State Water Contractors, for two consecutive years, at a reasonable cost. Price and acre-foot amounts would vary as a function of the June 1 SWP allocation of water available each year.

The MYWP Demonstration Program is separate from the single year Turn-Back Pool program, and was developed to address issues with the single year Turn-Back Pool program resulting from low pricing.

In February 2015, in response to continuing dry conditions statewide, CDWR began administering a 2015-2016 MYWP Demonstration Program.

MWD requested that DWA participate in the 2015-2016 MYWP Demonstration Program on their behalf. They requested that DWA request up to 1,000 AF in 2015 and 5,000 AF in 2016. MWD will accept delivery of this water and DWA will pay CDWR the cost of the water and its delivery (transportation). If MWD chooses to keep this water and not exchange it, they will reimburse DWA the cost of the water and the cost of transportation. If MWD chooses to credit the water against the advanced delivery account balance, or deliver the water to the Replenishment Facility, they will reimburse DWA only the cost of the water, and DWA will be responsible for the typical costs associated with Table A water deliveries.

So far, 633 AF of water (67 AF in 2015 and 566 AF in 2016) have been delivered to MWD under the 2015-2016 MYWP Demonstration Program, and DWA was reimbursed by MWD for same.

e. Past Year Water Deliveries

Total artificial recharge (to both the Whitewater River and Mission Creek Replenishment Facilities) for 2017 was 395,242 AF (including CVWD's MWD Quantitative Settlement Agreement purchases). 385,994 was delivered to the Whitewater River Replenishment Facility and 9,248 AF was delivered to the Mission Creek Replenishment Facility. 35,000 AF were delivered under CVWD's Second Supplemental Agreement to their Delivery and Exchange Agreement for the Delivery of 35,000 AF, dated June 14, 2013 (see **Exhibit 6**).

f. Water Available in Current Year

The estimated quantity of water available for artificial recharge in the Upper Coachella Valley during 2018, based on delivery of 35% of the maximum Table A allocation, is as follows: 67,335 AF of Table A water (35% allocation) plus 97,050 AF of Article 56 carry-over water from 2017. The estimated quantity of supplemental water is as follows: 0 AF of Turn-Back Pool water, 0 AF of Article 21 water, 2,410 AF of Yuba water, 13,603 AF of Rosedale/Glorious Land water (CVWD), and 35,000 AF of CVWD QSA water, for a grand total of approximately 215,398 AF. During the first three months of 2018, a total of 12,607 AF of Colorado River water has already been delivered to the Whitewater River Replenishment Facility, and a total of 383 AF of Colorado River water has already been delivered to the Mission Creek Replenishment Facility.

g. Historic Effects of Artificial Replenishment on Aquifer

Prior to recharge activities in the Whitewater River Subbasin and MC, water levels were declining steadily in those subbasins as well as the GH. As shown in **Exhibits 1, 2, and 3**, after recharge activities commenced in 1973, and specifically after the three large recharge events listed below, groundwater levels in all three subbasins have risen substantially.

- 1985 - 1987: 655,000 AF Recharged
- 1995 - 2000: 609,000 AF Recharged
- 2009 - 2012: 760,000 AF Recharged

**Exhibit 1** includes hydrographs for a collection of groundwater wells within the Whitewater River Subbasin (see **Figure 2** for the locations of the wells) in comparison with the total annual quantities of water delivered to the Whitewater River Replenishment Facility. This comparison clearly indicates that the recharge program has benefitted wells within the subbasin.

MSWD's Wells 25 and 26 are located upstream of the Whitewater River Replenishment Facility overlying the portion of the San Gorgonio Pass Subbasin, a tributary to the Whitewater River Subbasin, within the management area. Similar to other wells in the management area, water levels in these wells were also declining prior to groundwater recharge, and water levels in these wells rose by about 80 feet each after recharge commenced in the 1980s, and also rose following the other significant recharge events.

**Exhibit 2** includes hydrographs for a selection of groundwater wells owned and operated by MSWD and the Mission Creek Monitoring Well located at the Mission Creek Replenishment Facility (see **Figure 2** for the locations of the wells), in comparison with the total annual quantities of water delivered to the Mission Creek Replenishment Facility. The comparison clearly indicates that the recharge program has benefitted the wells within the subbasin, especially the wells near the spreading basins. The magnitude of the response to the

groundwater recharge is inversely proportional to the distance the wells are located from the Replenishment Facility.

**Exhibit 3** includes hydrographs from a collection of groundwater wells within the Garnet Hill Subbasin (see **Figure 2** for the locations of the wells) including one well owned by MSWD in comparison with both the replenishment quantities replenished by the Whitewater River and Mission Creek Replenishment Facilities. Groundwater levels in the Garnet Hill Subbasin responded rapidly when replenishment activities commenced at the Whitewater River Replenishment Facility in the 1970s.

Water levels in the wells closest to the Whitewater River Replenishment Facility rose approximately 400 feet in the late 1980s and nearly 200 feet following each significant recharge event to the WWR Management Area. The most significant response to groundwater recharge in the WWR Management Area is observed in the wells located closest to the Replenishment Facility. The degree of benefit observed from recharge decreases the farther the well is from the Replenishment Facility. Well locations are shown on **Figure 2**.

Although artificial replenishment with imported water, augmenting natural replenishment, has met increasing average annual groundwater demands during the past 30 years, it has not, for all practical purposes, reduced or diminished cumulative gross groundwater overdraft within the Coachella Valley Groundwater Basin, which existed prior to artificial replenishment of the groundwater basin. In effect, the groundwater overdraft condition that existed prior to imported water becoming available for groundwater replenishment has not been significantly altered, but the trend has been arrested. Although current groundwater levels have generally stabilized in the subbasins within the management areas, current cumulative gross overdraft (not yet offset by cumulative artificial recharge) is estimated at roughly 3,876,000 AF in the WWR Management Area (since 1956) and 262,000 AF in the MC Management Area (since 1978). Cumulative net overdraft, (cumulative gross overdraft offset by artificial replenishment) is currently estimated at 624,000 AF in the WWR Management Area and 105,000 AF in the MC Management Area. There is

insufficient data to determine groundwater overdraft in the GH Management Area.

CDWR has been unable to deliver full annual Table A water allocations for the past decade, with the exception of 2006 where 100% was delivered to Contractors. Had CVWD and DWA been able to obtain and exchange their maximum Table A quantities during that time period, cumulative groundwater overdraft would be significantly less and groundwater levels would be correspondingly higher.

h. Meeting Future Water Requirements

Historic and projected water supplies and water requirements for the WWR and MC Management Areas are set forth in **Figures 3 and 4**. Projected water supplies include SWP supplies, estimated natural inflow, and estimated non-consumptive return. Historic and projected water requirements include historic and projected groundwater production, and estimated natural outflow.

The projected water supply curves shown in **Figures 3 and 4**, are based on the estimates for the natural inflow to the WWR and MC Management Areas, continuing artificial recharge, non-consumptive return, and groundwater in storage, if necessary. Artificial recharge is based on the 2013 SWP reliability projections (based on existing conditions) excluding all potential surplus water deliveries which may become available during any particular year.

In contrast to the data presented in past Engineer's Reports, which relied primarily on the linear regression of the previous 10-year period of recorded groundwater production, projected water requirements (demands) through 2035 for the WWR and MC Management Areas (also shown in **Figures 3 and 4**) are based on the water balance model utilized in the 2010 Update to the Coachella Valley Water Management Plan and the 2014 Status Report prepared by MWH (and others), and the Groundwater Flow Model for the Mission Creek and Garnet Hill Subbasins Water Management Plan (MC/GH WMP) prepared by Psomas. As shown in the figures, the projected requirements are largely offset by probable

supplies; however, the cumulative annual change in storage will remain in the negative through at least 2030 under currently projected conditions.

Based on the production relationship between the WWR Management Area and the MC Management Area, in accordance with the Mission Creek Groundwater Replenishment Agreement, about 92% of imported water deliveries in 2018 will be directed to the WWR Management Area and 8% to the MC Management Area based on 2017 production (see **Exhibit 5**). For future years, the percentage of the total production is expected to range from 87% to 81% in the WWR Management Area and 12% to 19% in the MC Management Area through 2035 due to increased production (increased demands) in the MC Management Area due to anticipated population growth (MWH 2011, MWH 2013).

i. Adequacy of Current Supplies, Water Conservation, and Future Prospects

1) State Water Project Improvements

Continuous availability of SWP allocations will require complete development of the SWP, which currently has only about half of the water supply capacity needed to meet maximum Table A obligations during times of drought. Available water supplies are being further threatened by new and increasing constraints on the development of new water supply facilities and on the operation of existing facilities. In particular, the Wanger decisions regarding protection of the Delta smelt, concerns about reliability of the Delta levees, and other concerns led the CDWR to issue a revision in June 2012 of *The State Water Project Reliability Report 2009,* dated August 2010, wherein the long-term reliability of SWP supplies was reduced from an estimated 75% to 85% of maximum Table A allocations to approximately 60% of maximum allocations. The 2013 SWP Final Reliability Report, dated December 2014, further reduced the long-term reliability of SWP supplies to 58%. Without the construction of additional Sacramento-San Joaquin Delta facilities and certain water storage reservoirs, the water supply capability of the SWP will remain limited and State Water Contractors will have to

share reduced quantities of available supplies, especially during droughts.

With continued progress in the completion of California WaterFix (formerly known as the Bay Delta Conservation Plan (BDCP)), the balance between more reliable SWP water supplies and ecosystem restoration will be increased. The BDCP was a long-term conservation strategy designed to set forth actions required for a healthy Delta that will be implemented over the next 50 years, with an estimated cost of about $20 billion. California WaterFix is a refinement of the BDCP that involves a shorter term of implementation and incidental take authorization, and a narrowing of scope: the principal habitat restoration effort of the BDCP has been isolated as a separate program called "California EcoRestore."

California WaterFix itself involves the construction and operation of new water diversion facilities near Courtland to convey water from the Sacramento River through two tunnels to the existing state and federal pumping facilities near Tracy. In addition to other federal, state, and local approvals, California WaterFix requires changes to the water rights permits for the SWP and the federal Central Valley Project to authorize the proposed new points of water diversion and rediversion.

Currently, the capital cost of the full California WaterFix Project is estimated at about $17 billion for two tunnels. On February 6, 2018, due to difficulties in raising funds for the project, DWR announced that the project would initially be reduced in scope to a single tunnel, at cost of $10.7 billion. On April 10, 2018, MWD announced that it would provide the balance of the funds necessary to complete the original two-tunnel project. Eventually, SWP water supply reliability, quality, and delivered quantities and the overall health of the Delta may improve; however, it is unlikely that the costs for Delta improvements will be allocated to the State Water Contractors before 2020.

2) California Drought

In addition to the existing restrictions on water supplies from the SWP, California has just experienced over four consecutive years of severe drought. The four-year period between fall 2011 and fall 2015 was the State's driest since record keeping began in 1895. High temperatures worsened its effects, with 2014 and 2015 being the two hottest years in the State's recorded history. In late 2016 and early 2017, a series of winter storms produced record-level rainfall, resulting in the Governor's declaration ending the statewide drought emergency. Additionally, the US Drought Monitor report for California showed that DWA went from "Exceptional Drought", the most severe categorization, to "Abnormally Dry", the least severe.

During the course of the drought, the state implemented a number of mandatory water conservation measures. On January 17, 2014, Governor Jerry Brown, prompted by record dry conditions in California, proclaimed a drought state of emergency, followed by several executive orders continuing the state of emergency and extending government assistance. On April 25, 2014, the Governor issued a proclamation of a continued state of emergency based on drought conditions. Subsequently, in July 2014, the Office of Administrative Law approved emergency regulations mandating water conservation measures set forth by the State Water Resources Control Board (SWRCB).

On April 1, 2015, Governor Brown issued Executive Order B-29-15, finding that drought conditions persisted, and ordering that the SWRCB impose mandatory water use restrictions in order to achieve a statewide 25% reduction in potable urban water usage (as compared to usage in 2013) from June 2015 through February 2016.

In order to reach the statewide 25% reduction mandate, the SWRCB assigned each urban water supplier a conservation standard that ranged between 4% and 36%, based on the supplier's residential gallons per

capita per day water use for the months of July through September 2014. The SWRCB tasked DWA, CVWD, and MSWD to reduce potable urban water use within their service areas, ultimately by 32%, 32%, and 24%, respectively. Actual cumulative statewide water use reductions generally complied with the Governor's 25% reduction mandate through May 2016. As of May 2016, DWA achieved a 27% cumulative water savings, CVWD a 26% savings, and MSWD a 19% savings.

On May 9, 2016, the Governor issued another executive order establishing a new water use efficiency framework for California. The order established longer-term water conservation measures, including permanent monthly water use reporting, new urban water use targets customized to fit the unique conditions of each water supplier, requirements to reduce system leaks and eliminate clearly wasteful practices, strengthen urban drought contingency plans, and improve agricultural water management and drought plans. The framework was prepared by DWR, SWRCB, California Public Utilities Commission, California Department of Food and Agriculture and California Energy Commission with the assistance of two stakeholder groups: The Urban Advisory Group and the Agricultural Advisory Group.

On May 18, 2016, the SWRCB adopted a statewide water conservation approach (effective from June 2016 through January 2017) that replaced the prior percentage reduction-based water conservation standard with a localized Water Supply Reliability Certification and Data Submission (which was commonly called the "stress test" approach) that mandates urban water suppliers act to ensure at least a three-year supply of water to their customers under drought conditions similar to those experienced from 2012 through 2015. Cumulative, statewide water conservation figures dropped to approximately 18% over the summer of 2016, but began to increase again in the fall.

In response to the "stress test" regulation, DWA, CVWD, and MSWD all self-certified that sufficient water had been identified to meet all

anticipated demands with existing conservation programs and plans in place, effectively placing their local conservation targets at 0%. Despite passing the stress test, DWA elected to retain a 10% to 13% conservation target for its customers for the purposes of long-term sustainability.

Based on reports to the SWRCB, DWA's cumulative water savings (as compared to 2013) through January 2017 was 23.9%, that of CVWD 22.6%, and that of MSWD 16.9%.

The winter storms of late 2016 and early 2017 resulted in the removal of the "exceptional drought" designation from the State's drought monitor. As of March 7, 2017, about 76% of the State was identified as drought-free; and, on April 7, 2017, after 22 months of restrictions, Governor Brown proclaimed an end to the drought state of emergency, with the exception of Fresno, Kings, Tulare, and Tuolumne Counties. Water reporting requirements and prohibitions on wasteful practices remain in place.

During 2017, several pieces of legislation were proposed to implement the Governor's Framework. At the end of the session, two bills, AB 1668 (Friedman) and SB 606 (Hertzberg/Skinner/Friedman) were held, making them two-year bills. CVWD will continue to stay engaged in the regulatory activity related to this legislation in 2018.

The calendar year 2017 turned out to be the third hottest year in the State's recorded history after 2014 and 2015; and it had the hottest summer in the State's recorded history. However, the 2016-2017 water year was the second wettest water year in California history, exceeded in total runoff only by the 1982-1983 water year. DWR's eight-station precipitation index for 2016-2017 (which tracks conditions in the largest Central Valley watersheds important for water supplies) set a new record of nearly 95 inches, as compared to the long-term average of 50 inches. The record precipitation of 2016-2017 led to record deliveries of State Water Project Exchange Water at the Whitewater River Replenishment

Facility during 2017. However, despite a promising beginning to the water year in late 2017, rainfall in the early months of 2018 has been below average; and dry conditions are beginning to resume. According to the National Integrated Drought Information System, as of April 12, 2018, about 66% of the State is experiencing "abnormally dry" conditions, and about 37% of the State is experiencing moderate to severe drought conditions.

3) State Water Project Long-Term Reliability Estimates

The 2013 *SWP Final Reliability Report*, dated December 2014, estimated the long-term reliability of SWP supplies at 58% of maximum Table A Amounts, projected through the year 2033. In July of 2015, DWR issued the 2015 SWP Deliverability Capability Report. Beginning with said Report, DWR stopped making long-term future reliability projections, and instead evaluated the SWP's delivery capability ("deliverability") based on existing and historical conditions. Said report estimated the median deliverability of SWP supplies at approximately 64%, and long-term deliverability (82 year average value) at 62% of maximum Table A Amounts 50% of the time over the historic long-term (based on a computer model simulation of hydrologic conditions from 1922-2003). DWR explicitly stated in the 2015 Report that said report's estimates were based on existing and historical conditions and were not intended as future projections. For this reason, and also because the 2015 Report did not consider the very low water supply allocations that occurred during the drought years of 2013, 2014 and 2015, the long-term SWP reliability figure of 58% was cited in the 2015-2016, 2016-2017, and 2017-2018 Engineer's Reports rather than the 62% long-term deliverability figure presented in DWR's 2015 Delivery Capability Report.

In March of 2018, DWR issued its final 2017 Delivery Capability Report, which includes an evaluation of deliveries through calendar year 2016. The 2017 Report continues to use the same 82-year hydrologic record used for the 2015 Report (1922 through 2003) for its computer

model simulations of potential hydrologic conditions (runoff and precipitation patterns) for long-term average delivery, and deliveries during typical wet years and typical dry years. However, the analysis accounts for land use, upstream flow regulations, and sea levels characteristic of 2017, and DWR judges this 82-year period to be sufficient to provide a reasonable range of potential hydrologic conditions from wet years to critically dry years. The 2017 Report estimates the long-term average deliverability at 62% of maximum Table A Amounts, the same figure as presented in the 2015 Report. Because the 2017 Report incorporates recent drought-related data pertaining to low allocations in the years 2013-2015, the 62% long-term average deliverability figure set forth in said report is used in this Engineer's Report.

4) Conclusion

In conclusion, the Coachella Valley Groundwater Basin (and its subbasins) is in an overdraft condition and will most likely remain so, even with the importation and exchange of available SWP water, until a higher proportion of the maximum SWP Table A allocations becomes available. With maximum Table A allocations, recharge in the WWR and MC Management Areas would offset the current annual overdraft, although overdraft in future years is virtually unpredictable, due to the difficulty of projecting long-term growth and reliability of SWP supplies.

## 6. Replenishment Assessment

For the WWR Management Area, DWA began its groundwater assessment program in fiscal year 1978/1979 and CVWD began its groundwater assessment program in fiscal year 1980/1981. For the MC Management Area, the two agencies initiated their groundwater assessment programs simultaneously in fiscal year 2003/2004. The two agencies are not required to implement the assessment procedure jointly or identically; however, they have each continuously levied an annual assessment on water produced

within their respective jurisdictions since inception of their groundwater assessment programs.

Since the 2013 MC/GH WMP demonstrates that the GH benefits from the groundwater replenishment activities in the two adjacent subbasins, pursuant to the 2004 Settlement Agreement between CVWD, DWA, and MSWD; DWA and CVWD have the authority establish a groundwater assessment program for the GH. DWA's replenishment assessment program was initiated in this subbasin in fiscal year 2015/2016. Currently, there is no assessable production in the Garnet Hill Subbasin within CVWD's WWR AOB.

Desert Water Agency Law requires the filing of an engineer's report regarding the Replenishment Program before DWA can levy and collect groundwater replenishment assessments. The report must address the condition of groundwater supplies, the need for groundwater replenishment, the Areas of Benefit, water production within said Areas of Benefit, and replenishment assessments to be levied upon said water production. It must also contain recommendations regarding the replenishment program. This report has been prepared in accordance with these requirements.

# CHAPTER III
# WHITEWATER RIVER SUBBASIN
# PRODUCTION AND REPLENISHMENT

# CHAPTER III
# WEST WHITEWATER RIVER SUBBASIN MANAGEMENT AREA PRODUCTION AND REPLENISHMENT

## A. GROUNDWATER PRODUCTION

Annual water production (groundwater extractions plus surface water diversions) within the West Whitewater River Subbasin (WWR) Management Area averaged about 93,000 AF from 1965 through 1967, and then increased to approximately 187,000 AF in 1990. It then decreased to approximately 174,000 AF in 1991, coincident with the initiation of significant deliveries of recycled water by CVWD and DWA to irrigation users within the Management Area (which had the effect of temporarily reversing the trend toward steadily increasing production of groundwater therein).

Due to development, production increased sharply to about 187,000 AF in 1997 and to about 208,000 AF in 1999. It then averaged about 211,000 AF during the three-year period 2000 through 2002 and remained relatively stable through 2007, probably as a result of water conservation and increased use of recycled water, and (within CVWD's AOB) conversion of agricultural land to residential development, which leveled off in 2000. Production has decreased following 2007 due to poor economic conditions reducing demands for construction water and water conservation programs implemented by both agencies.

During the past five calendar years (2013 through 2017), average annual water production within the WWR Management Area has been about 162,000 AF/Yr, approximately three-fourths of which took place within CVWD's AOB and approximately one-fourth within DWA's AOB. Current (2017 calendar year) and historic groundwater production and surface water diversion data for the WWR Management Area is set forth in **Table 1**.

## B. NATURAL RECHARGE

Natural recharge includes precipitation, surface water runoff, and subsurface inflow. It is currently estimated that natural inflow into the WWR Management Area is approximately 52,000 AF/Yr, while natural outflow is currently estimated at approximately 22,600 AF/Yr (MWH 2011). Thus, approximately 29,400 AF (natural inflow less natural outflow) of natural, or native, groundwater is available for water supply each year.

## C. NON-CONSUMPTIVE RETURN

Consumptive use of water represents the use of water that is not returned to the aquifer (for example, water that is evapotranspirated into the atmosphere, water that is incorporated into biomass or manufactured products, and water that is exported). Non-consumptive return water is water that is ultimately returned to the aquifer after use (for example, irrigation water percolating beyond the root zone or treated wastewater discharged to percolation ponds or leach fields) or water used for public parks or golf course irrigation (wastewater recycled for irrigation use). Although non-consumptive return in the WWR Management Area has been estimated at approximately 40% (USGS 1974) and 35% (USGS 1992), CVWD's 2010 Update to the Coachella Valley Water Management Plan (and 2014 Status Report to that plan) incorporated groundwater modeling by MWH (now a part of Stantec) which projected that non-consumptive return may decrease from 35% to approximately 30% through 2035 based on the effects of implementing water conservation measures, such as turf removal and more efficient irrigation practices. According to the model, the overall non-consumptive return for 2017 was projected to be approximately 33%. However, MWH and Krieger & Stewart have recently conducted efforts to more accurately characterize non-consumptive return by quantifying water use categories; with estimates made for water percolated via agricultural and landscaping irrigation return, wastewater treatment plant and septic tank discharge, and water recycling activities within each Management Area of the Coachella Valley, and considering such factors as transfers of produced water between subbasins. This effort has resulted in a current estimate for non-consumptive use within the WWR Management Area of approximately 32% of total estimated groundwater production, which percentage is used herein.

## D. ARTIFICIAL REPLENISHMENT

Total artificial replenishment (to both the WWR and MC Management Areas) for 2017 was 395,242 AF (including CVWD's MWD Quantitative Settlement Agreement purchases). Of this quantity, 385,994 AF were delivered to the Whitewater River Replenishment Facility (the largest annual delivery to Whitewater in history), and 9,248 AF were delivered to the Mission Creek Replenishment Facility. 35,000 AF of this quantity were delivered under CVWD's Second Supplemental Agreement to their Delivery and Exchange Agreement for the Delivery of 35,000 AF, dated June 14, 2013. (see **Exhibit 6**).

## E. GROUNDWATER IN STORAGE

Average annual reported production within the WWR Management Area of 162,000 AF for the past five years (including approximately 500 AF of annual production by minimal pumpers) has been met with approximately 29,400 AF of net natural recharge, approximately 49,800 AF of non-consumptive return, and 88,700 AF of net artificial recharge (less evaporative losses), resulting in a net increase in groundwater in storage of about 5,900 AF/Yr over the past five years.

## F. OVERDRAFT STATUS

Based on information contained in USGS Water Resources Investigations 77-29 and 91-4142, average gross annual groundwater overdraft within the WWR Management Area of the Coachella Valley Groundwater Basin began in the 1950s and was estimated to be 30,000 AF/Yr during the late 1960s and early 1970s. It is now estimated to be as much as three times greater. Gross groundwater overdraft within the WWR Management Area (excluding artificial recharge) is now estimated to have averaged approximately 87,000 AF/Yr over the last five years. Since 1956, cumulative gross overdraft (net pumpage minus net natural recharge) is currently estimated at approximately 3,876,000 AF, and cumulative net overdraft (cumulative gross overdraft offset by artificial recharge) is currently estimated to be about 624,000 AF.

# CHAPTER IV
# MISSION CREEK SUBBASIN
# PRODUCTION AND REPLENISHMENT

# CHAPTER IV
# MISSION CREEK SUBBASIN MANAGEMENT AREA
# PRODUCTION AND REPLENISHMENT

## A. GROUNDWATER PRODUCTION

Annual water production (groundwater extractions) within the Mission Creek Subbasin (MC) Management Area increased from an average of approximately 500 AF/Yr in the late 1950s and 1960s to approximately 2,300 AF/Yr in 1978. It increased relatively steadily since then to approximately 17,400 AF/Yr in 2006, then began dropping slightly as a result of declining economic conditions to about 16,400 AF/Yr in 2007, 15,800 AF/Yr in 2008, 15,100 AF/Yr in 2009, 14,300 in 2010, 14,200 in 2011, and 13,000 in 2015. Annual groundwater production within the MC Management Area has resulted in cumulative long-term groundwater overdraft, as evidenced by the steady decline of groundwater levels within the MC prior to commencement of recharge activities.

During the past five calendar years (2013 through 2017), average annual reportable water production within the MC Management Area has been about 14,000 AF/Yr; approximately two-thirds of which took place within DWA's AOB and approximately one-third within CVWD's AOB. Current (2017 calendar year) and historic groundwater production and surface water diversion data for the MC Management Area is set forth in **Table 1**.

## B. NATURAL RECHARGE

Natural recharge includes precipitation, surface water runoff, and subsurface inflow. As discussed in past reports, it is currently estimated that natural inflow and surface recharge of the MC has averaged approximately 3,500 to 10,800 AF/Yr over the long term. Most estimates of natural outflow from the MC equal or exceed the corresponding estimates of natural inflow.

The most recent estimate for natural inflow into the MC was prepared by Psomas for the MC/GH WMP prepared by MWH in January 2013. Psomas estimated said natural inflow at approximately 9,340 AF/Yr, consisting of approximately 7,500 AF/Yr from mountain front runoff and precipitation under average conditions and approximately 1,840 AF/Yr from flows across the Mission Creek Fault from the Desert Hot Springs Subbasin. This estimate falls within the range of average natural inflow previously cited herein.

Psomas estimated natural outflow at approximately 6,000 AF/Yr, consisting of 4,000 AF/Yr of subsurface flow from the Banning Fault to the GH, 900 AF/Yr of evapotranspiration, and 1,100 AF/Yr of flow through semi-water bearing rocks, known as the Indio Hills, at the southeastern end of the MC.

## C. NON-CONSUMPTIVE RETURN

Consumptive use and non-consumptive return are discussed in **Chapter III, Section C**. Within the MC Management Area, non-consumptive return is currently estimated at approximately 32% of total estimated production, or about 5,000 AF/Yr (average for the past five years).

## D. ARTIFICIAL REPLENISHMENT

Total artificial replenishment (to both the WWR and MC Management Areas) for 2017 was 395,242 AF (including CVWD's MWD Quantitative Settlement Agreement purchases). Of this quantity, 9,248 AF were delivered to the Mission Creek Replenishment Facility. (see **Exhibit 6**).

Based on the production relationship between the Whitewater River Subbasin and the MC, in accordance with the Mission Creek Groundwater Replenishment Agreement, about 92% of imported water deliveries in 2018 will be directed to the WWR Management Area and 8% to the MC Management Area based on 2017 production (see **Exhibit 5**). For future years, the percentage of the total production is expected to range from 87% to 81% in the WWR Management Area and 12% to 19% in the MC Management Area through 2035 due to increased production (increased demands) in the MC Management Area due to anticipated population growth (MWH 2011, MWH 2013).

## E. GROUNDWATER IN STORAGE

Average annual reported production within the entire MC Management Area of 14,000 AF for the past five years (including approximately 500 AF of annual production by minimal pumpers) has been met with approximately 3,300 AF of net natural recharge, approximately 5,000 AF of non-consumptive return, and 3,100 AF of net artificial recharge (less evaporative losses),

resulting in a net decrease in groundwater in storage of about 2,600 AF/Yr over the past five years.

The change in groundwater storage within DWA's MC AOB has also been estimated using changes in measured static water levels in wells within the AOB. Using the average static water levels in the wells in DWA's AOB, the average annual reduction in stored groundwater was 3,600 AF/Yr from 1955 through 2017, and 2,400 AF/Yr from 1998 through 2017 (see **Exhibit 4**).

## F. OVERDRAFT STATUS

Gross groundwater overdraft within the MC (excluding artificial recharge) is now estimated at approximately 6,000 AF/Yr during the last five years. Since 1978, cumulative gross overdraft (net pumpage minus net natural recharge) is currently estimated at approximately 262,000 AF, and cumulative net overdraft (cumulative gross overdraft offset by artificial recharge) is currently estimated to be about 105,000 AF.

# CHAPTER V
# GARNET HILL SUBBASIN
# PRODUCTION AND REPLENISHMENT

# CHAPTER V
# GARNET HILL SUBBASIN MANAGEMENT AREA
# PRODUCTION AND REPLENISHMENT

## A. GROUNDWATER PRODUCTION

During the past five calendar years (2013 through 2017), average annual water production within the Garnet Hill Subbasin (GH) Management Area has been about 310 AF/Yr; most, if not all, of which took place within DWA's GH AOB. There are no reporting groundwater pumpers within CVWD's service area in the GH, which is within CVWD's WWR AOB. Current (2017 calendar year) and historic groundwater production and surface water diversion data for the GH Management Area (DWA's GH AOB) are set forth in **Table 1**.

## B. NATURAL RECHARGE

Natural recharge includes precipitation, surface water runoff, and subsurface inflow. The GH is separated from the Whitewater River Subbasin to the south by the Garnet Hill Fault and from the MC to the north by the Banning Fault.

As stated in the MC/GH WMP, the principle form of natural recharge within the GH comes from mountain-front runoff derived from precipitation and snow melt, as well as return flow from water use.

The GH receives no direct artificial recharge; however, it does receive artificial recharge via infiltration from the Whitewater River channel on the west end of the subbasin, subsurface flows from the MC, and subsurface flows from the Whitewater River Subbasin when water levels are high due to large volumes of artificial recharge at the Whitewater River Replenishment Facility (MWH 2013).

The estimated flow across the Banning Fault from the MC to the GH ranges from approximately 2,000 AF/Yr (Tyley 1974) to 8,250 AF/Yr (Psomas, 2010, based on pre-development, steady-state conditions). The outflow to the Whitewater River Subbasin is estimated to be approximately 4,000 AF/Yr (Psomas 2012, based on then current conditions).

## C. NON-CONSUMPTIVE RETURN

Consumptive use and non-consumptive return are discussed in **Chapter III, Section C**. Within the GH Management Area, non-consumptive return is currently estimated at approximately 20% of production, or about 62 AF/Yr.

## D. ARTIFICIAL REPLENISHMENT

Direct artificial groundwater replenishment has not yet been implemented within the GH. However, the 2013 MC/GH WMP has shown that the GH benefits from replenishment activities within both the Whitewater River Subbasin and the MC.

## E. GROUNDWATER IN STORAGE

The quantity of groundwater in storage within the GH in 1974 was estimated to be approximately 1,520,000 AF (USGS 1974). Production in the subbasin has been limited, so groundwater in storage has not decreased significantly.

With minimal pumping occurring within the subbasin, cumulative groundwater storage in the GH was generally based on wet and dry periods and the introduction of imported water to the Coachella Valley. Changes in storage can be attributed to the rise and fall in the recorded groundwater levels observed in wells throughout the GH.

The recharge program in the WWR Management Area began in 1973, which resulted in rising water levels within the GH in rough proportion to the quantities recharged. Higher water levels in the WWR Management Area reduce the outflow from the GH across the Garnet Hill Fault, increasing storage volume in the GH.

## F. OVERDRAFT STATUS

As part of the Coachella Valley Groundwater Basin, the GH is presumed to be in a state of overdraft since it is reliant on flows from the Whitewater River Subbasin and the MC for replenishment, in accordance with the conclusions set forth in the MC/GH WMP.

# CHAPTER VI
# REPLENISHMENT ASSESSMENT

# CHAPTER VI
# REPLENISHMENT ASSESSMENT

Desert Water Agency Law, in addition to empowering DWA to replenish groundwater basins and to levy and collect water replenishment assessments within its areas of jurisdiction, defines production and producers for groundwater replenishment purposes as follows:

> Production: The extraction of groundwater by pumping or any other method within the Agency, or the diversion within the Agency of surface supplies which naturally replenish the groundwater supplies within the Agency and are used therein.
>
> Producer: Any individual, partnership, association, group, lessee, firm, private corporation, public corporation, or public agency including, but not limited to, the DWA, that extracts or diverts water as defined above.

Producers that extract or divert 10 AF of water or less in any one year are considered minimal pumpers or minimal diverters, and their production is exempt from assessment.

Desert Water Agency Law also states that assessments may be levied upon all water production within an AOB, provided assessment rates are uniform throughout. Pursuant to Desert Water Agency Law, the amount of any replenishment assessment cannot exceed the sum of certain SWP charges, specifically, the Delta Water Charge, the Variable OMP&R Component of the SWP Transportation Charge (Variable Transportation Charge), and the Off-Aqueduct Power Component of the SWP Transportation Charge (Off-Aqueduct Power Charge), pursuant to the Contract between DWA and the State of California. The aforesaid charges are set forth in each year's CDWR *Bulletin on the State Water Project* (CDWR Series 132, Appendix B, Tables B-16B, B-18, and B-21).

Prior to 2002, groundwater replenishment with Colorado River Water (exchanged for SWP water) had been limited to recharge of the West Whitewater River Subbasin (WWR) Management Area. In 2002, DWA and CVWD commenced recharge activities in the Mission Creek Subbasin (MC) Management Area, in addition to continuing their ongoing activities in the WWR Management Area. The Areas of Benefit for Groundwater Replenishment and Assessment herein consist of those portions of the West Whitewater River Subbasin Management Area (including a portion of the San Gorgonio Pass Subbasin

and tributaries thereto), the MC Management Area, and the Garnet Hill Subbasin (GH) Management Area, situated within DWA's service area boundary (**Figure 2**).

The groundwater replenishment assessment and replenishment assessment rate for 2018/2019 is based on the following:

1. All groundwater production within DWA and MSWD, with certain exceptions, is metered, and all assessable surface water diversions within DWA are metered or measured. There are no surface water diversions within the MC AOB or GH AOB.

2. The Delta Water Charge, the Variable Transportation Charge, and the Off-Aqueduct Power Charge, as set forth in Appendix B of the most recent CDWR Bulletin Series 132 and hereafter referred to as Applicable SWP Charges.

3. The proportionate share of the Applicable SWP Charges allocable to CVWD and DWA in accordance with the Water Management Agreements between CVWD and DWA (Water Management Agreement for the Whitewater River Subbasin executed July 1, 1976 and amended December 15, 1992, and the Water Management Agreement for the Mission Creek Subbasin executed April 8, 2003; both amended July 15, 2014), hereafter referred to as Allocated SWP Charges. (The applicable charges are essentially apportioned between CVWD and DWA in accordance with relative water production within those portions of each entity lying within the applicable Water Management Areas, either the Whitewater River Subbasin, the Mission Creek Subbasin, the Garnet Hill Subbasin, and a portion of the San Gorgonio Pass Subbasin.)

4. Certain charges or costs other than those derived pursuant to items 1, 2, and 3 above. Such additional charges may be offset from time to time by discretionary reductions.

The replenishment assessment rate comprises two components: (1) the Allocated SWP Charges attributable to the estimated annual Table A allocation, and (2) certain other charges or costs related to groundwater recharge, such as those for reimbursement of past surplus water charges for which assessments had not been levied.

The replenishment assessment rate, when applied to estimated assessable production (all production, excluding that which is exempt, within the AOB), results in a replenishment assessment which must not

exceed the maximum permitted by Desert Water Agency Law (the Applicable SWP Charges). Due to the interdependent nature of the imported water supply for the WWR Management Area (including a portion of the San Gorgonio Pass Subbasin), MC Management Area, and GH Management Area, the Allocated SWP Charges component of the replenishment assessment rate is uniform throughout the WWR Subbasin AOB, MC AOB, and GH AOB; however, due to the independent and separate nature of various other aspects of the groundwater replenishment program within the WWR AOB (including a portion of the San Gorgonio Pass Subbasins), MC AOB, and GH AOB, the other charges and costs component need not be uniform; they are specific to each AOB.

## A. ACTUAL 2017 WATER PRODUCTION AND ESTIMATED 2018/2019 ASSESSABLE WATER PRODUCTION

Estimated assessable production within DWA's WWR AOB (including a portion of the San Gorgonio Pass Subbasin), MC AOB, and GH AOB consist of groundwater extractions from the groundwater subbasins and diversions from streams (Snow, Falls, and Chino Creeks) in the tributary watersheds. Estimated assessable groundwater production is based on water production which, with the exception of Bel Air Greens, whose well has not been metered or measured nor assessed, and Whitewater Ranch, whose wells are metered and measured but not assessed. Bel Air Greens and Whitewater Ranch wells are located within the Agua Caliente Band of Cahuilla Indian Reservation. DWA staff read and record metered water production quantities with the exception of the wells owned by MSWD and the Indigo Power Plant, which are reported to DWA. As discussed in previous reports, the past water production for Bel Air Greens has been estimated at 127 AF/yr. The Bel Air Greens golf course is now closed, and the property is currently being sold for residential and hotel development.

The effective replenishment assessment rate for Table A water is based on DWA's estimated Allocated SWP Charges for the current year (based on CDWR's projections for the assessment period) divided by the estimated assessable production for the assessment period, as set forth in **Table 6**. Historically, the estimated assessable production has been based on the assessable production for the previous year; however, production during 2015 and 2016 was unusually low due to mandatory water conservation measures imposed as a result of the Governor's April 1, 2015 executive order mandating water restrictions on urban water use statewide, and demanding a 32% reduction in water use within DWA. Only a portion of the effects of these severe water restrictions are anticipated to be permanent; therefore, for 2016/2017, DWA elected

to estimate assessable groundwater production based on the 2014 assessable groundwater production minus a factor of 10% to account for the effects of permanent water conservation measures. However, since the State urban water use restrictions were based on water usage in 2013 as a baseline, DWA elected, for 2017/2018 and 2018/2019, to estimate assessable groundwater production based on the 2013 assessable groundwater production minus a factor to account for the effects of permanent water conservation measures. For 2017/2018, the factor was 15%; for 2018/2019 the factor is 13%, and is applied only to producers within the West Whitewater River Subbasin AOB. Anticipated production within MC and GH is estimated based on 2017 production.

Estimated assessable water production is set forth in **Table 2**.

In 2017, actual reported production within CVWD's AOB within the WWR Management Area was about 3.5 times that within DWA's AOB, 120,383 AF versus 34,689 AF, whereas actual production within DWA's AOB within the MC Management Area was about 2.2 times that within CVWD's AOB, 9,250 AF versus 4,281 AF. Production within DWA's GH AOB accounts for 100% of the total production, at 471 AF. DWA's 2017 actual production accounts for approximately 26.3% of the 169,074 AF combined total of water produced within the Management Areas that year.

## B. WATER REPLENISHMENT ASSESSMENT RATES

The water replenishment assessment rates consist of two components, one being attributable to SWP annual Table A water allocations, and the other being attributable to other charges or costs necessary for groundwater replenishment. Each component is discussed below.

### 1. Component Attributable to SWP Table A Water Allocation Charges

In accordance with the current 2014 Water Management Agreement, CVWD and DWA combine their SWP Table A water allocations, exchange them for Colorado River water, and replenish the WWR and MC Management Areas with exchanged Colorado River water. CVWD and DWA each assume the full burden for portions of their respective Fixed State Water Project Charges (Capital Cost Component and Minimum Operating Component of Transportation Charge); however, the two agencies share their Applicable

SWP Charges (Delta Water, Variable Transportation, and Off-Aqueduct Power Charges) on the basis of relative production.

Although DWA could base its replenishment assessment rate on its Applicable SWP Charges, it only needs to recover its share (based on relative production) of the combined Applicable SWP Charges for both CVWD and DWA (i.e. its Allocated SWP Charges). CVWD makes up the difference in accordance with the Water Management Agreement.

The Applicable SWP Charges for CVWD and DWA for Table A water are set forth in **Tables 3 and 4**, respectively. Unit Charges for Delta Water, Variable Transportation, and Off-Aqueduct Power Charges are based on estimates presented in Appendix B of CDWR Bulletin 132-17.

Since CDWR has been unable to deliver maximum Table A allocations for 17 of the past 18 years, the amounts of the Applicable SWP Charges for 2018/2019 and future years are computed based on a long-term SWP reliability factor applied to the maximum SWP allocations. From 2013 through 2017, a factor of 58% was applied; a factor of 62% is being applied in 2018.

Since the 2003 Exchange Agreement allows MWD to call-back or recall the 100,000 AF of Table A allocation it transferred to CVWD and DWA, the amounts of the Applicable SWP Charges from 2004/2005 through 2017/2018 and future years have been computed with the MWD transfer portion being further reduced by another long-term reliability factor to account for possible future recalls pursuant to the 2003 Exchange Agreement (typically 35%). However, according to MWD management, it is unlikely that MWD will recall any water for the foreseeable future. Therefore, commencing with this report, it is assumed that MWD will not recall any of its transfer portion. This change has the effect of increasing the estimated delivery of State Project water for future years, including the 2018/2019 fiscal year, thus raising the replenishment assessment rate necessary to cover anticipated importation costs.

The derivations of the Applicable SWP Charges are set forth in **Tables 3 and 4**. The "Maximum Table A Water Allocation" shown in **Tables 3 and 4** is the currently existing Table A Water Allocation per CDWR Bulletin 132-17, Appendix B, Table B-4

(contractual quantities based on requests for same by CVWD and DWA) with no reliability factors being applied. The "Probable Table A Water Allocation" is the currently existing Table A Water Allocation. The MWD reliability factor was formerly applied to the Probable Table A Allocation column to reflect the long-term average with probable recalls by MWD, pursuant to the remaining years of the 2003 Exchange Agreement and its implementation. The "Probable Table A Water Delivery" is based on 62% reliability of the probable Table A Water allocation.

It should be noted that the increase of the SWP reliability factor from 58% to 62% and the elimination of the MWD reliability factor will result in higher estimates for future deliveries--including for 2018/2019--than previously projected during the Proposition 218 proceedings; and, consequently, higher estimates for effective Table A assessment rates.

Applicable SWP Charges proportioned in accordance with the Water Management Agreement, more particularly in accordance with relative production within CVWD and DWA, yield Allocated SWP Charges. Over the past five years, 2013 through 2017, DWA has been responsible for approximately 21.9% of the water produced within the WWR Management Area, and 68.6% of water produced from the MC Management Area.

In the past, Allocated SWP Charges have been apportioned to CVWD and DWA based on production from the WWR Management Area. Since 2003/2004, Allocated SWP Charges have been apportioned to CVWD and DWA based on production from the combined WWR and MC Management Areas. In 2017, DWA was responsible for approximately 26.3% of the combined water production within the Management Areas. On the assumption that DWA's relative production for 2018 and thereafter will be about the same as for 2017, DWA's share of the combined Applicable SWP Charges (i.e. Allocated Charges) for the next 18 years will be as set forth in **Table 5**.

**Table 5** shows that DWA's estimated Allocated Charges (its share of combined Applicable Charges for Table A water) are anticipated to increase by about 42% between 2017 and 2018, decrease by about 3% between 2018 and 2019 and increase by about 5% between 2019 and 2020. DWA's estimated Allocated Charges will change as estimates presented in future annual editions of CDWR Bulletin 132 change.

**Table 5** also shows that DWA's estimated 2018 Allocated Charges are about 91% of DWA's estimated Applicable Charges. Since water replenishment assessments must be used for groundwater replenishment purposes only, implementation of the maximum permissible replenishment assessment rate based on DWA's Applicable Charges would result in the collection of excess funds that would have to be applied to replenishment charges during subsequent years.

Rather than collect excess funds one year and apply the excess funds to replenishment charges in subsequent years, DWA attempts to establish from year to year the replenishment assessment rate that will result in collection of essentially the funds necessary to meet its annual groundwater replenishment charges. DWA therefore bases the Table A portion of its replenishment assessment on estimated Allocated Charges, rather than estimated Applicable Charges.

Pursuant to current Desert Water Agency Law, the maximum permissible replenishment assessment rate that can be established for fiscal year 2018/2019 is $214.32/AF, based on DWA's estimated Applicable Charges (Delta Water Charge, Variable Transportation Charge, and Off-Aqueduct Power Charge) of $9,488,016 (average of estimated 2018 and 2019 Applicable Charges) and estimated 2018/2019 combined assessable production of 44,270 AF within the WWR, MC, and GH AOBs.

The effective replenishment rate is based on DWA's estimated Allocated SWP Charges for the current year, as computed using CDWR's projected Applicable SWP Charges, divided by the estimated assessable production for the assessment period (based on the assessable production for the previous calendar year), as set for in **Table 6**.

According to the terms of the Water Management Agreement between DWA and CVWD, and based on DWA's estimated 2018/2019 Allocated Charges of $8,659,340 and estimated 2018 calendar year assessable production (shown in **Table 6** as estimated 2018/2019 assessable production) of 44,270 AF within the Whitewater River, MC, and GH, the effective replenishment assessment rate component for Table A water for the 2018/2019 fiscal year is $196/AF. **Table 7** includes DWA's historical estimated, actual effective, and estimated projected replenishment assessment rates.

**Tables 3 through 7** include future projections through 2035. These projections are based on a number of assumptions regarding factors that can be highly variable and difficult to predict, such as development, conservation, and, as mentioned, State Water Project reliability and cost factors. Actual values in the future may be substantially different than as shown in these tables.

## 2. Component Attributable to Other Charges and Costs Necessary for Groundwater Replenishment

Charges and costs necessary for groundwater replenishment could include the costs for reimbursement for past SWP Table A water allocations and surplus water allocations for which insufficient assessments had been levied, acquisition or purchases of water from sources other than the SWP, the cost of importing and recharging water from sources other than the SWP, and the cost of treatment and distribution of reclaimed water.

Currently, other charges and costs are being limited to past SWP water payments for which assessments have not been levied. Due to increases in SWP costs, DWA elected last year to transfer the deficit resulting from past payments for which assessments have not been levied to reserve account(s).

Since 1996, CVWD and DWA have obtained surplus SWP water, when available, to supplement deliveries of Table A water (see **Chapter II, Section B.5.d**). DWA currently pays charges for surplus water with funds from its Unscheduled State Water Project Deliveries Reserve Account, rather than from funds raised directly through replenishment assessment levies.

The charges levied on the producers within the GH AOB are assessed as part of the replenishment programs for the WWR and MC Management Areas based on the proportional production, in accordance with the Mission Creek Subbasin Settlement Agreement discussed in **Chapter II, Section B.3**. As shown in **Exhibit 5**, the portion of total production within the Whitewater River Subbasin and MC was approximately 92% and 8% respectively for 2017. Therefore, since there is no direct replenishment program for the GH, and since it benefits from both replenishment programs, the total production

within the GH will be assessed as a proportion of the total production within those subbasins. For example, the total assessable production within the GH was 470 AF in 2017. Of that 470 AF, 92% (432 AF) is assessed as part of the Whitewater River Subbasin, and 8% (38 AF) as part of the MC.

### 3. Proposition 218 Proceedings

DWA held Proposition 218 proceedings in the winter of 2016, including a public hearing on December 15, 2016. During the public hearing, DWA received comments and tallied protests regarding the proposed replenishment assessment rate ranges for the next five years, as shown in the table below.

| Fiscal Year | Anticipated Adoption Date | Rate Range ($/AF) |
|---|---|---|
| 2017/2018 | July 1, 2017 | $110.00 to $130.00 |
| **2018/2019** | **July 1, 2018** | **$120.00 to $140.00** |
| 2019/2020 | July 1, 2019 | $125.00 to $155.00 |
| 2020/2021 | July 1, 2020 | $130.00 to $165.00 |
| 2021/2022 | July 1, 2021 | $130.00 to $175.00 |

Protests were received from less than 50% of the affected parcels.

On December 4, 2017, the California Supreme Court held, in the case of *City of San Buenaventura v. United Water Conservation District,* that groundwater pumping charges are not property-related charges subject to Proposition 218. However, current regulations developed to codify the Sustainable Groundwater Management Act (SGMA) still state that a Groundwater Sustainability Agency that adopts a groundwater sustainability plan may impose fees to fund the costs of groundwater management, but such fees "shall be adopted" in accordance with Proposition 218. If the SGMA regulations are amended to remove this requirement, future Proposition 218 proceedings for DWA's groundwater replenishment assessment may not be necessary.

### 4. Proposed 2018/2019 Replenishment Assessment Rates

As shown in **Table 6**, the estimated effective Table A Assessment Rate is $196/AF, which includes consideration of an increase of the SWP reliability factor from 58% to 62%, and the elimination of the separate MWD reliability factor (MWD reliability factor effectively set to 100%, but still subject to the 62% SWP reliability factor). However, this rate exceeds the maximum rate of $140/AF established in the Proposition 218 proceedings for 2018/2019. Therefore, as shown in **Table 7**, the recommended replenishment assessment rates proposed for 2018/2019 are:

- **$140.00/AF** for the West Whitewater River Subbasin (WWR) AOB,
- **$140.00/AF** for the Mission Creek Subbasin (MC) AOB, and
- **$140.00/AF** for the Garnet Hill Subbasin (GH) AOB.

Historic replenishment assessment rates for both DWA and CVWD within the Whitewater River Subbasin are included in **Exhibit 7**.

## C. ESTIMATED WATER REPLENISHMENT ASSESSMENTS FOR 2018/2019

The maximum replenishment assessment that can be levied by DWA for combined estimated production of 44,270 AF (see **Table 2**) within the WWR, MC, and GH AOBs based on a replenishment assessment rate of $140.00/AF is approximately $6,197,800 ($4,837,000 in the WWR AOB, $1,295,000 in the MC AOB, and $65,800 in the GH AOB).

DWA will continue to be the major producer within the WWR AOB, with assessable production of approximately 33,060 AF; seven other producers will be responsible for the remaining 1,490 AF of estimated assessable production. DWA will also be the major assessee with an estimated replenishment assessment of $4,628,400. The seven other producers will be responsible for the remaining $208,600. DWA will therefore be responsible for approximately 96% of both the estimated assessable water production and the estimated replenishment assessment for the WWR AOB; the other seven producers will be responsible for the remaining 4%.

MSWD will be the major producer within the MC AOB, with assessable production of approximately 7,210 AF; four other producers will be responsible for the remaining 2,040 AF of estimated assessable production. MSWD will also be the major assessee with an estimated replenishment assessment of $1,009,400. The four other producers will be responsible for the remaining $285,600. MSWD will be responsible for approximately 78% of both the estimated assessable water production and the estimated replenishment assessment in the MC AOB; the other four producers will be responsible for the remaining 22%.

MSWD and the Indigo Power Plant are the major producers in the GH AOB, with assessable production of approximately 450 AF and 20 AF, respectively. MSWD will also be the major assessee with an estimated replenishment assessment of $63,000, while the Indigo Power Plant is responsible for the remaining $2,800. MSWD will be responsible for approximately 96% of both the estimated assessable water production and the estimated replenishment in the GH AOB; Indigo Power Plant will be responsible for the remaining 4%.

# CHAPTER VII
# BIBLIOGRAPHY

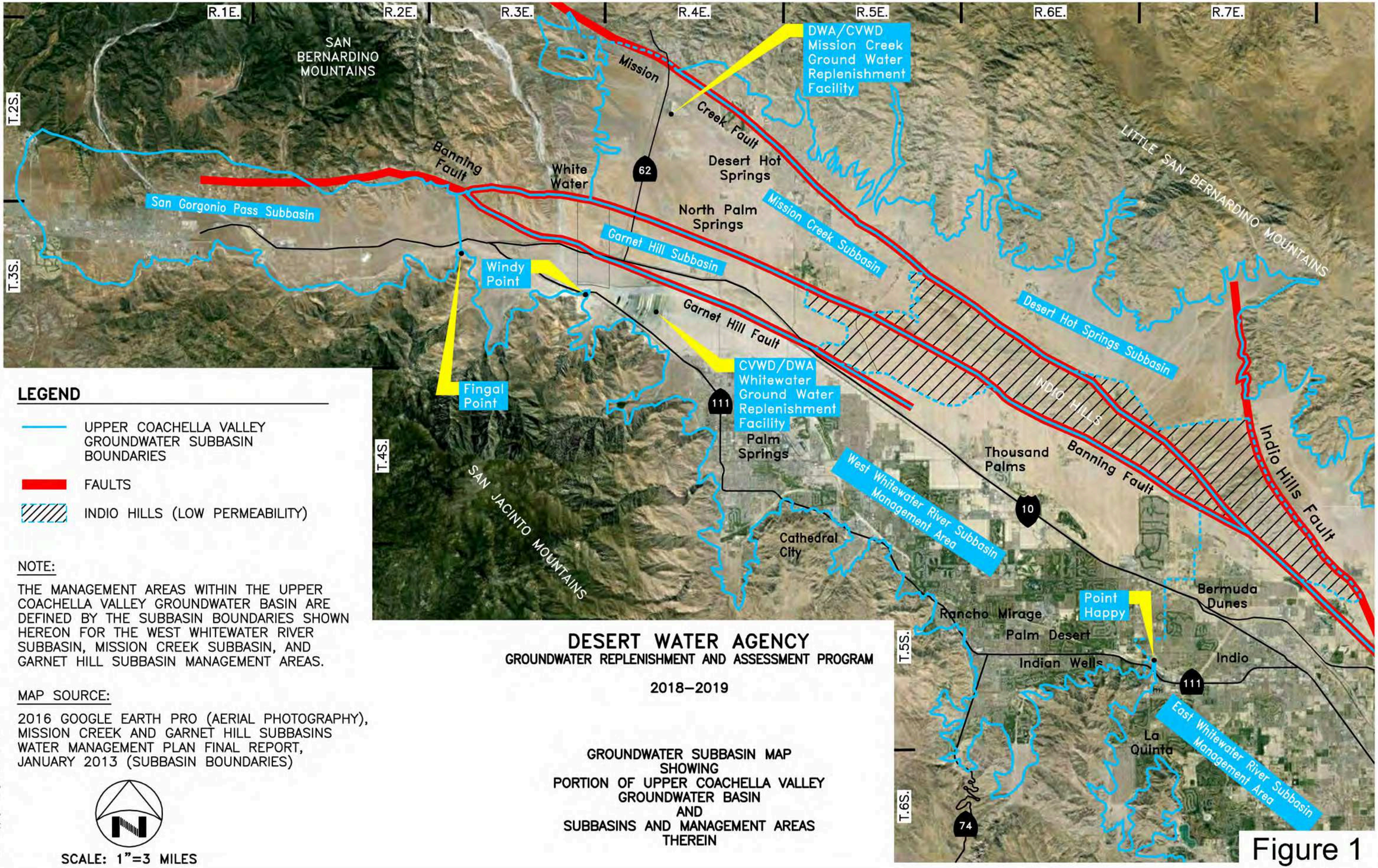
# CHAPTER VII
# BIBLIOGRAPHY


- Coachella Valley Regional Water Management Group (City of Coachella, Coachella Valley Water District, Desert Water Agency, Indio Water Authority, and Mission Springs Water District), *Final Coachella Valley Integrated Regional Water Management Plan*, prepared by Coachella Valley Regional Water Management Group in collaboration with the Planning Partners, with support from RMC Water and Environment and Integrated Planning and Management Inc., December 2010
- Coachella Valley Water District, *Coachella Valley Water Management Plan,* November 2002
- Coachella Valley Water District, *Final Program Environmental Impact Report for the Coachella Valley Water Management Plan and State Water Project Entitlement Transfer*, prepared by MWH, 2002
- Coachella Valley Water District, *Coachella Valley Water Management Plan Update*, prepared by MWH, 2010
- Coachella Valley Water District, *2014 Status Report for the 2010 Coachella Valley Water Management Plan Update*, prepared by MWH, 2014
- Coachella Valley Water District, *Engineer's Report on Water Supply and Replenishment Assessment, Mission Creek Subbasin Area of Benefit, West Whitewater River Subbasin Area of Benefit, and East Whitewater River Subbasin Area of Benefit, 2017-2018*, April 2017
- Coachella Valley Water District, *Engineer's Report on Water Supply and Replenishment Assessment, Mission Creek Subbasin Area of Benefit, West Whitewater River Subbasin Area of Benefit, and East Whitewater River Subbasin Area of Benefit, 2018-2019*, April 2018
- Desert Water Agency, *Domestic Water System General Plan, 2008*, prepared by Krieger & Stewart, May, 2009
- Desert Water Agency, *Engineer's Report on Basin Water Supply and Water Replenishment Program*, prepared by Krieger & Stewart, May 1978, Revised June 1978
- Desert Water Agency, *Ground Water Recharge Potential within Mission Creek Subbasin,* prepared by Krieger & Stewart, November 1980
- Desert Water Agency, *Engineer's Report: Groundwater Replenishment and Assessment Program for the Whitewater River, Mission Creek, and Garnet Hill Subbasins 2016/2017*, prepared by Krieger & Stewart, May 2016
- Desert Water Agency, *Engineer's Report: Groundwater Replenishment and Assessment Program for the Whitewater River, Mission Creek, and Garnet Hill Subbasins 2017/2018*, prepared by Krieger & Stewart, May 2017

- Desert Water Agency, *Engineer's Report: Groundwater Replenishment and Assessment Program for the Mission Creek Subbasin*, reports prepared annually by Krieger & Stewart for Fiscal Years 2003/2004 through and including 2015/2016
- Desert Water Agency, *Engineer's Report: Groundwater Replenishment and Assessment Program for the Whitewater River Subbasin*, reports prepared annually by Krieger & Stewart for Fiscal Years 1978/1979 through and including 2015/2016
- Desert Water Agency, *2015 Urban Water Management Plan*, prepared by Krieger & Stewart, June 2016
- Fogg, Graham E., Gerald T. O'Neill, Eric M. LaBolle, David J. Ringel, *Groundwater Flow Model of Coachella Valley, California: An Overview*, November 2002
- Desert Water Agency, Inc., *Hydrogeologic Investigation of Groundwater Basin Serving Palm Springs*, prepared by Geotechnical Consultants, October 1978
- Geotechnical Consultants, Inc., *Hydrogeologic Investigation: Mission Creek Subbasin Within the Desert Hot Springs County Water District,* prepared for Desert Water Agency, November 1979
- Huberty, M.R. and A.F. Pillsbury, *Hydrologic Studies in Coachella Valley, California*, University of California, Berkeley 1948
- Krieger & Stewart, *Coachella Valley Groundwater Management Plan for the Coachella Valley Planning Area of the West Colorado River Basin*, 1979
- Mission Springs Water District, *Mathematical Modeling of Proposed Artificial Recharge for the Mission Creek Subbasin,* prepared by Mayer, Alex S. and Wesley L. May, Michigan Technological University Department of Geological Engineering and Sciences, March 1998
- Mission Springs Water District, *Hydrogeologic Conditions near Mission Springs Water District Well Nos. 25 and 26, Cabazon Area, Riverside County,* prepared by Richard C. Slade and Associates, LLC, September 2001
- MWH, Groundwater Model Simulations for *Coachella Valley Water Management Plan Update*, for Draft Subsequent Program Environmental Impact Report, July 2011
- MWH*, Mission Creek and Garnet Hill Subbasins Water Management Plan, Final Report*, January 2013
- Psomas, *Groundwater Flow Model of the Mission Creek and Garnet Hill Subbasins and Palm Springs Subarea, Riverside, California*, January 2013
- Richard C. Slade and Associates, LLC, *Final Hydrogeologic Evaluation, Well Siting, And Recharge Potential Feasibility Study Mission Creek Groundwater Subbasin, Riverside County, California,* May 2000

- San Gorgonio Pass Water Agency, *Water Resources Investigation – Groundwater Dependable Yield*, prepared by Boyle Engineering Corporation, 1998
- State of California, The Resources Agency, Department of Conservation, Division of Mines and Geology, *Geologic Map of California, Santa Ana Sheet,* 1966
- State of California, The Resources Agency of California, Department of Water Resources, *Bulletin No. 108, Coachella Valley Investigation,* July 1964
- State of California, The Resources Agency, Department of Water Resources, *Coachella Valley Area Well Standards Investigation*, 1979
- State of California, The Resources Agency, Department of Water Resources, *Management of the California State Water Project, Bulletin 132-17*, August 2017
- State of California, The Resources Agency, Department of Water Resources, *California's Groundwater, Bulletin 118*, October 2003
- State of California, The Resources Agency, Department of Water Resources; *State Water Project Final Reliability Report 2013*, December 2014
- State of California, The Resources Agency, Department of Water Resources; *2015 State Water Project Deliverability Capability Repor*t, July 2015
- State of California, The Resources Agency, Department of Water Resources; *2017 State Water Project Deliverability Capability Repor*t, March 2018
- United States Department of the Interior, Geological Survey; Artificial Recharge in the Whitewater River Area, Palm Springs, California, 1973
- United States Department of the Interior, Geological Survey Water-Supply Paper 2027; *Analog Model Study of the Ground-Water Basin of the Upper Coachella Valley, California,* 1974
- United States Department of the Interior, Geological Survey; *Water Resources Investigation 77-29: Predicted Water-Level and Water-Quality Effects of Artificial Recharge in the Upper Coachella Valley, California, Using a Finite-Element Digital Model*, April 1978
- United States Department of the Interior, Geological Survey; *Water Resources Investigation 91-4142: Evaluation of a Ground-Water Flow and Transport Model of the Upper Coachella Valley, California*, 1992

**FIGURES**




## LEGEND

- UPPER COACHELLA VALLEY GROUNDWATER SUBBASIN BOUNDARIES
- FAULTS
- INDIO HILLS (LOW PERMEABILITY)

NOTE:

THE MANAGEMENT AREAS WITHIN THE UPPER COACHELLA VALLEY GROUNDWATER BASIN ARE DEFINED BY THE SUBBASIN BOUNDARIES SHOWN HEREON FOR THE WEST WHITEWATER RIVER SUBBASIN, MISSION CREEK SUBBASIN, AND GARNET HILL SUBBASIN MANAGEMENT AREAS.

MAP SOURCE:

2016 GOOGLE EARTH PRO (AERIAL PHOTOGRAPHY), MISSION CREEK AND GARNET HILL SUBBASINS WATER MANAGEMENT PLAN FINAL REPORT, JANUARY 2013 (SUBBASIN BOUNDARIES)

SCALE: 1"=3 MILES

# DESERT WATER AGENCY

## GROUNDWATER REPLENISHMENT AND ASSESSMENT PROGRAM

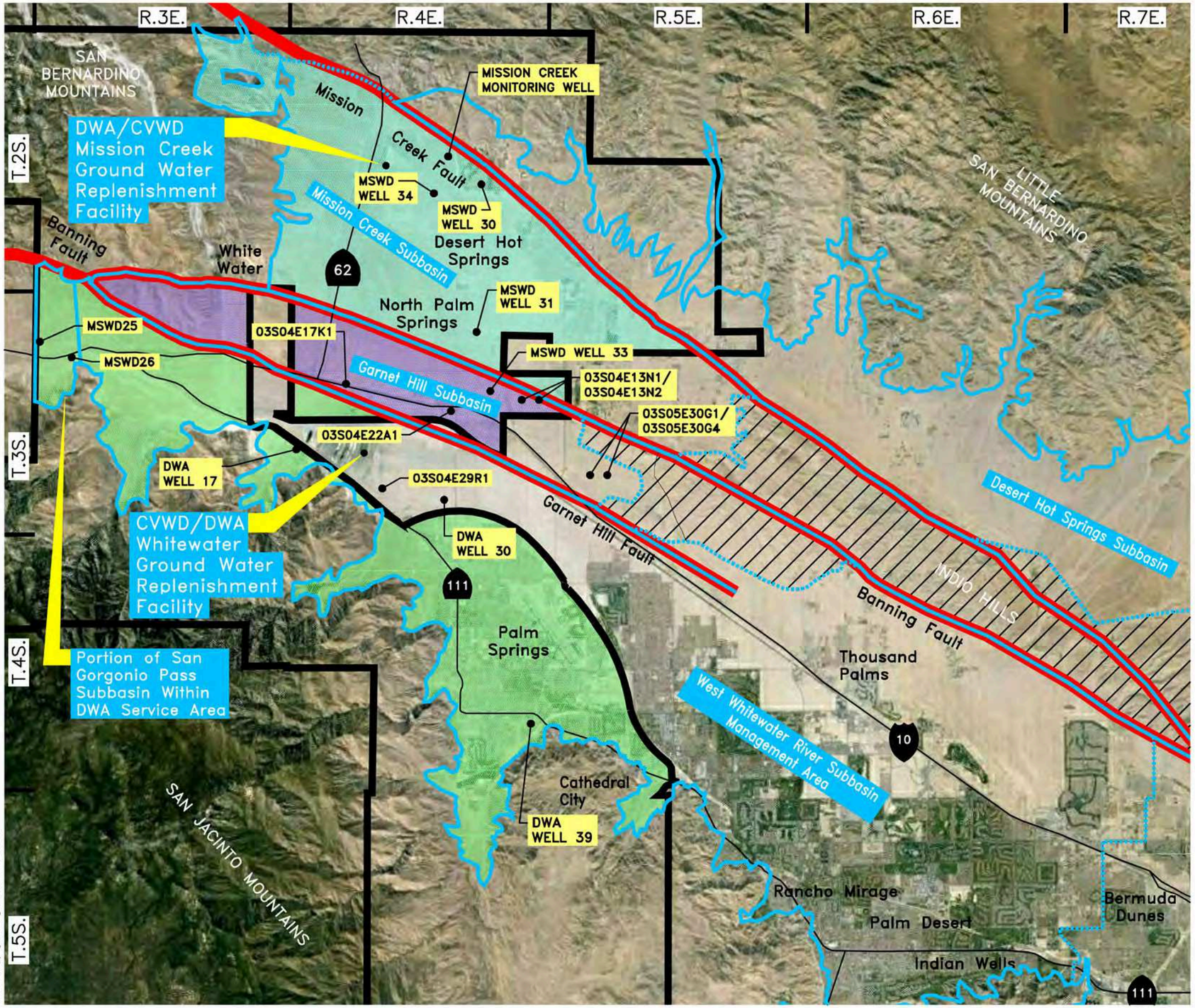
2018–2019

GROUNDWATER SUBBASIN MAP
SHOWING
PORTION OF UPPER COACHELLA VALLEY
GROUNDWATER BASIN
AND
SUBBASINS AND MANAGEMENT AREAS
THEREIN

Figure 1

# DESERT WATER AGENCY
## GROUNDWATER REPLENISHMENT AND ASSESSMENT PROGRAM

2018–2019




GROUNDWATER SUBBASIN MAP
SHOWING
GROUNDWATER RECHARGE AREAS OF BENEFIT
(EITHER DIRECT OR INDIRECT)
AND
SELECTED GROUNDWATER WELLS

### LEGEND

- DWA BOUNDARY
- UPPER COACHELLA VALLEY GROUNDWATER SUBBASIN BOUNDARIES
- FAULTS

UPPER COACHELLA VALLEY GROUNDWATER SUBBASIN AREAS OF BENEFIT WITHIN DWA

- DWA WHITEWATER RIVER SUBBASIN AREA OF BENEFIT
- DWA MISSION CREEK SUBBASIN AREA OF BENEFIT
- DWA GARNET HILL SUBBASIN AREA OF BENEFIT
- INDIO HILLS (LOW PERMEABILITY)
- GROUNDWATER WELL

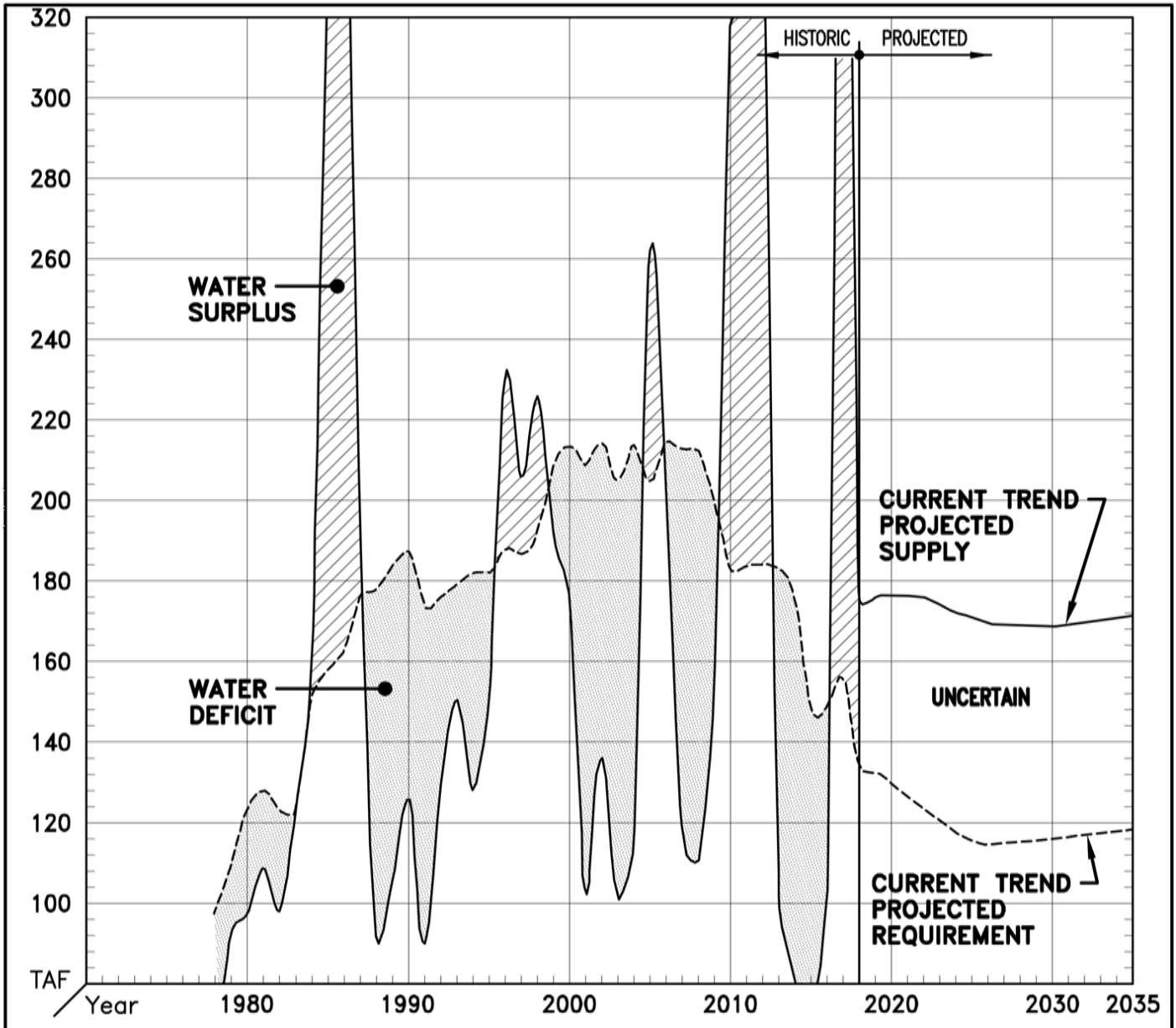
MAP SOURCE:

2016 GOOGLE EARTH PRO (AERIAL PHOTOGRAPHY), MISSION CREEK AND GARNET HILL SUBBASINS WATER MANAGEMENT PLAN FINAL REPORT, JANUARY 2013 (SUBBASIN BOUNDARIES)

SCALE: 1"=2.5 MILES

Figure 2

\101\33p42\Drawings\Figures\101-33p42f2.dwg




| YEARS | 1980 | 1990 | 2000 | 2010 | 2020 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|
| NET INFLOW (ACRE FEET) | 98,000 | 125,800 | 174,500 | 317,100 | 176,739 | 1687,609 | 171,683 |
| NONCONSUMPTIVE RETURN | 43,200 | 65,700 | 74,500 | 64,300 | 42,000 | 37,000 | 38,000 |
| NET ARTIFICIAL RECHARGE | 25,800 | 31,100 | 71,000 | 223,800 | 101,100 | 95,900 | 95,100 |
| NET NATURAL INFLOW | 29,000 | 29,000 | 29,000 | 29,000 | 33,639 | 35,709 | 38,583 |

NOTES:

1. PROJECTED WATER REQUIREMENTS ARE BASED ON THE PROJECTIONS SET FORTH IN THE 2010 UPDATE TO THE COACHELLA VALLEY WATER MANAGEMENT PLAN, AND THE 2014 STATUS UPDATE (CVWD & MWH).
2. PROJECTED ARTIFICIAL RECHARGE IS BASED ON PROBABLE DELIVERIES ESTIMATED USING 62% RELIABILITY OF STATE WATER PROJECT WATER BASED ON 2013 STATE WATER PROJECT RELIABILITY REPORT AND 100% LONG-TERM AVERAGE OF MWD TRANSFERS PURSUANT TO THE 2003 EXCHANGE AGREEMENT AND ITS IMPLEMENTATION.
3. WATER SUPPLY IS BASED ON NON-CONSUMPTIVE RETURN, NATURAL INFLOW AND PROBABLE DELIVERIES DESCRIBED ABOVE.

KRIEGER & STEWART
Engineering Consultants
3602 University Avenue • Riverside, CA 92501
www.kriegerandstewart.com • 951 • 684 • 6900

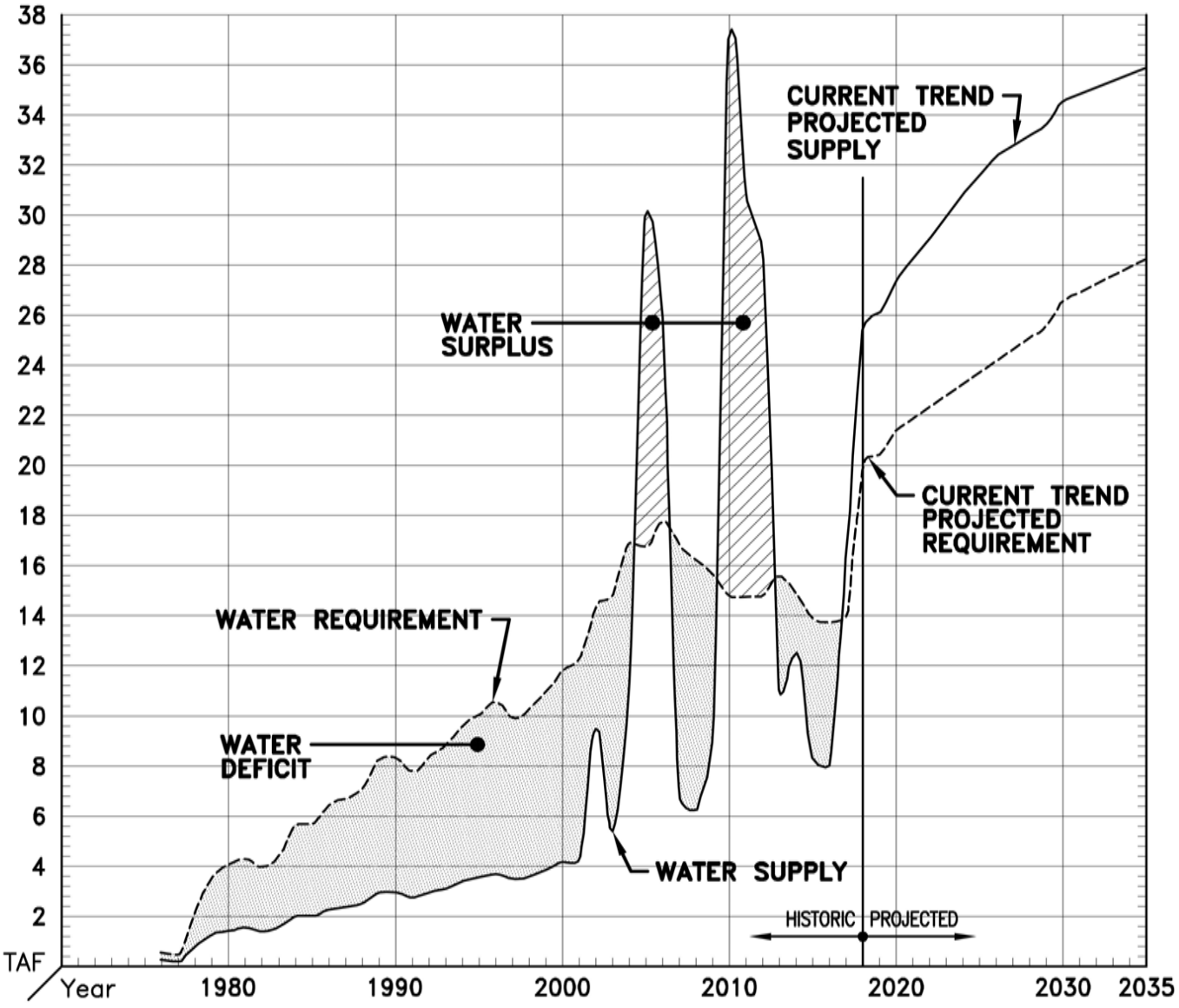
# DESERT WATER AGENCY

## HISTORIC AND PROJECTED WATER REQUIREMENTS AND WATER SUPPLIES FOR THE WEST WHITEWATER RIVER SUBBASIN MANAGEMENT AREA

FIGURE 3

SCALE: N/A DATE: 04/04/18 DRAWN BY: MRN CHECKED BY: DFS W.O.: 101-33.42

101-33p42f3.dwg




| YEARS | 1980 | 1990 | 2000 | 2010 | 2020 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|
| NET INFLOW (ACRE FEET) | 1,400 | 2,900 | 4,100 | 37,700 | 27,400 | 34,500 | 35,900 |
| NONCONSUMPTIVE RETURN | 1,400 | 2,900 | 4,100 | 5,200 | 6,600 | 8,200 | 8,800 |
| NET ARTIFICIAL RECHARGE | 0 | 0 | 0 | 32,500 | 16,800 | 22,000 | 22,800 |
| NET NATURAL INFLOW | – | – | – | – | 4,000 | 4,300 | 4,300 |

NOTES:

1. PROJECTED WATER REQUIREMENTS ARE BASED ON PROJECTIONS PER THE 2013 MISSION CREEK/GARNET HILL SUBBASIN WATER MANAGEMENT PLAN BY MWH.
2. PROJECTED ARTIFICIAL RECHARGE IS BASED ON PROBABLE DELIVERIES ESTIMATED USING 62% RELIABILITY OF STATE WATER PROJECT WATER BASED ON 2013 STATE WATER PROJECT RELIABILITY REPORT AND 100% LONG–TERM AVERAGE OF MWD TRANSFERS PURSUANT TO THE 2003 EXCHANGE AGREEMENT AND ITS IMPLEMENTATION.
3. WATER SUPPLY IS BASED ON NON–CONSUMPTIVE RETURN, NATURAL INFLOW AND PROBABLE DELIVERIES DESCRIBED ABOVE.

KRIEGER & STEWART
Engineering Consultants
3602 University Avenue • Riverside, CA 92501
www.kriegerandstewart.com • 951 • 684 • 6900

# DESERT WATER AGENCY

## HISTORIC AND PROJECTED WATER REQUIREMENTS AND WATER SUPPLIES FOR THE MISSION CREEK SUBBASIN MANAGEMENT AREA

FIGURE 4

SCALE: N/A DATE: 04/04/18 DRAWN BY: MRN CHECKED BY: DFS W.O.: 101–33.42

101–33p42f4.dwg

**TABLES**

**TABLE 1**
**DESERT WATER AGENCY**
**HISTORIC REPORTED WATER PRODUCTION FOR REPLENISHMENT ASSESSMENT FOR**
**DESERT WATER AGENCY AND COACHELLA VALLEY WATER DISTRICT**
**WEST WHITEWATER RIVER SUBBASIN (WWR) AND MISSION CREEK SUBBASIN (MC) , AND GARNET HILL SUBBASIN (GH) MANAGEMENT AREAS**

| | CVWD PRODUCTION | | DWA PRODUCTION | | | | | | COMBINED CVWD & DWA PRODUCTION | | | | | | WWR PRODUCTION PERCENTAGES | | COMBINED WWR, MC, GH PRODUCTION PERCENTAGES | | MC PRODUCTION PERCENTAGES | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | GWE | | GWE | | | SWD | TOTAL | TOTAL | WWR | | | MC | GH | | | | | | | |
| | WWR | MC | WWR | MC | GH | WWR | WWR | COMB | GWE | SWD | TOTAL | TOTAL | TOTAL | COMB | | | | | | |
| YEAR | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | CVWD | DWA | CVWD | DWA | CVWD | DWA |
| 1978 | 61,172 | | 28,100 | | | 8,530 | 36,630 | 36,630 | 89,272 | 8,530 | 97,802 | | | 97,802 | 62.55% | 37.45% | | | | |
| 1979 | 72,733 | | 29,393 | | | 7,801 | 37,194 | 37,194 | 102,126 | 7,801 | 109,927 | | | 109,927 | 66.16% | 33.84% | | | | |
| 1980 | 84,142 | | 32,092 | | | 7,303 | 39,395 | 39,395 | 116,234 | 7,303 | 123,537 | | | 123,537 | 68.11% | 31.89% | | | | |
| 1981 | 86,973 | | 33,660 | | | 7,822 | 41,482 | 41,482 | 120,633 | 7,822 | 128,455 | | | 128,455 | 67.71% | 32.29% | | | | |
| 1982 | 83,050 | | 33,382 | | | 6,512 | 39,894 | 39,894 | 116,432 | 6,512 | 122,944 | | | 122,944 | 67.55% | 32.45% | | | | |
| 1983 | 84,770 | | 33,279 | | | 6,467 | 39,746 | 39,746 | 118,049 | 6,467 | 124,516 | | | 124,516 | 68.08% | 31.92% | | | | |
| 1984 | 104,477 | | 38,121 | | | 7,603 | 45,724 | 45,724 | 142,598 | 7,603 | 150,201 | | | 150,201 | 69.56% | 30.44% | | | | |
| 1985 | 111,635 | | 39,732 | | | 7,143 | 46,875 | 46,875 | 151,367 | 7,143 | 158,510 | | | 158,510 | 70.43% | 29.57% | | | | |
| 1986 | 115,185 | | 40,965 | | | 6,704 | 47,669 | 47,669 | 156,150 | 6,704 | 162,854 | | | 162,854 | 70.73% | 29.27% | | | | |
| 1987 | 125,229 | | 44,800 | | | 5,644 | 50,444 | 50,444 | 170,029 | 5,644 | 175,673 | | | 175,673 | 71.29% | 28.71% | | | | |
| 1988 | 125,122 | | 47,593 | | | 5,246 | 52,839 | 52,839 | 172,715 | 5,246 | 177,961 | | | 177,961 | 70.31% | 29.69% | | | | |
| 1989 | 129,957 | | 47,125 | | | 5,936 | 53,061 | 53,061 | 177,082 | 5,936 | 183,018 | | | 183,018 | 71.01% | 28.99% | | | | |
| 1990 | 136,869 | | 45,396 | | | 5,213 | 50,609 | 50,609 | 182,265 | 5,213 | 187,478 | | | 187,478 | 73.01% | 26.99% | | | | |
| 1991 | 126,360 | | 42,729 | | | 4,917 | 47,646 | 47,646 | 169,089 | 4,917 | 174,006 | | | 174,006 | 72.62% | 27.38% | | | | |
| 1992 | 128,390 | | 42,493 | | | 4,712 | 47,205 | 47,205 | 170,883 | 4,712 | 175,595 | | | 175,595 | 73.12% | 26.88% | | | | |
| 1993 | 131,314 | | 41,188 | | | 6,363 | 47,551 | 47,551 | 172,502 | 6,363 | 178,865 | | | 178,865 | 73.42% | 26.58% | | | | |
| 1994 | 134,223 | | 42,115 | | | 5,831 | 47,946 | 47,946 | 176,338 | 5,831 | 182,169 | | | 182,169 | 73.68% | 26.32% | | | | |
| 1995 | 134,580 | | 41,728 | | | 5,809 | 47,537 | 47,537 | 176,308 | 5,809 | 182,117 | | | 182,117 | 73.90% | 26.10% | | | | |
| 1996 | 137,410 | | 45,342 | | | 5,865 | 51,207 | 51,207 | 182,752 | 5,865 | 188,617 | | | 188,617 | 72.85% | 27.15% | | | | |
| 1997 | 137,406 | | 43,658 | | | 5,626 | 49,284 | 49,284 | 181,064 | 5,626 | 186,690 | | | 186,690 | 73.60% | 26.40% | | | | |
| 1998 | 142,620 | | 41,385 | | | 7,545 | 48,930 | 48,930 | 184,005 | 7,545 | 191,550 | | | 191,550 | 74.46% | 25.54% | | | | |
| 1999 | 157,148 | | 44,350 | | | 6,941 | 51,291 | 51,291 | 201,498 | 6,941 | 208,439 | | | 208,439 | 75.39% | 24.61% | | | | |
| 2000 | 161,834 | | 44,458 | | | 6,297 | 50,755 | 50,755 | 206,292 | 6,297 | 212,589 | | | 212,589 | 76.13% | 23.87% | | | | |
| 2001 | 159,767 | | 44,112 | | | 4,928 | 49,040 | 49,040 | 203,879 | 4,928 | 208,807 | | | 208,807 | 76.51% | 23.49% | | | | |
| 2002 | 163,185 | 4,371 | 46,004 | 9,597 | | 4,221 | 50,225 | 59,822 | 209,189 | 4,221 | 213,410 | 13,968 | | 227,378 | 76.47% | 23.53% | 73.69% | 26.31% | 31.29% | 68.71% |
| 2003 | 156,185 | 4,425 | 43,463 | 10,073 | | 4,627 | 48,090 | 58,163 | 199,648 | 4,627 | 204,275 | 14,498 | | 218,773 | 76.46% | 23.54% | 73.41% | 26.59% | 30.52% | 69.48% |
| 2004 | 159,849 | 4,628 | 48,093 | 11,920 | | 4,758 | 52,851 | 64,771 | 207,942 | 4,758 | 212,700 | 16,548 | | 229,248 | 75.15% | 24.85% | 71.75% | 28.25% | 27.97% | 72.03% |
| 2005 | 153,462 | 4,247 | 46,080 | 12,080 | | 4,799 | 50,879 | 62,959 | 199,542 | 4,799 | 204,341 | 16,327 | | 220,668 | 75.10% | 24.90% | 71.47% | 28.53% | 26.01% | 73.99% |
| 2006 | 160,239 | 4,757 | 48,967 | 12,608 | | 4,644 | 53,611 | 66,219 | 209,206 | 4,644 | 213,850 | 17,365 | | 231,215 | 74.93% | 25.07% | 71.36% | 28.64% | 27.39% | 72.61% |
| 2007 | 157,487 | 4,547 | 50,037 | 11,862 | 516 | 3,490 | 53,527 | 65,905 | 207,524 | 3,490 | 211,014 | 16,409 | 516 | 227,423 | 74.63% | 25.37% | 71.25% | 28.98% | 27.71% | 72.29% |
| 2008 | 161,695 | 4,543 | 45,405 | 11,232 | 330 | 3,593 | 48,998 | 60,560 | 207,100 | 3,593 | 210,693 | 15,775 | 330 | 226,468 | 76.74% | 23.26% | 73.40% | 26.74% | 28.80% | 71.20% |
| 2009 | 155,793 | 4,813 | 41,913 | 10,295 | 357 | 1,443 | 43,356 | 54,008 | 197,706 | 1,443 | 199,149 | 15,108 | 357 | 214,257 | 78.23% | 21.77% | 74.96% | 25.21% | 31.86% | 68.14% |
| 2010 | 141,481 | 4,484 | 39,352 | 9,820 | 288 | 1,582 | 40,934 | 51,042 | 180,833 | 1,582 | 182,415 | 14,304 | 288 | 196,719 | 77.56% | 22.44% | 74.20% | 25.95% | 31.35% | 68.65% |
| 2011 | 141,028 | 4,653 | 40,071 | 9,607 | 497 | 1,724 | 41,795 | 51,899 | 181,099 | 1,724 | 182,823 | 14,260 | 497 | 197,083 | 77.14% | 22.86% | 73.92% | 26.33% | 32.63% | 67.37% |
| 2012 | 141,379 | 4,582 | 39,507 | 9,634 | 177 | 2,222 | 41,729 | 51,540 | 180,886 | 2,222 | 183,108 | 14,216 | 177 | 197,324 | 77.21% | 22.79% | 73.97% | 26.12% | 32.23% | 67.77% |
| 2013 | 143,108 | 4,415 | 37,730 | 10,341 | 202 | 1,802 | 39,532 | 50,075 | 180,838 | 1,802 | 182,640 | 14,756 | 202 | 197,396 | 78.36% | 21.64% | 74.73% | 25.37% | 29.92% | 67.34% |
| 2014 | 136,027 | 4,154 | 36,372 | 9,937 | 239 | 1,787 | 38,159 | 48,335 | 172,399 | 1,787 | 174,186 | 14,091 | 239 | 188,516 | 78.09% | 21.91% | 74.36% | 25.64% | 29.48% | 70.52% |
| 2015 | 115,558 | 4,090 | 30,332 | 8,927 | 334 | 1,539 | 31,871 | 41,132 | 145,890 | 1,539 | 147,429 | 13,017 | 334 | 160,780 | 78.38% | 21.62% | 74.42% | 25.58% | 31.42% | 68.58% |
| 2016 | 115,659 | 4,175 | 30,408 | 9,044 | 297 | 2,031 | 32,439 | 41,780 | 146,067 | 2,031 | 148,098 | 13,219 | 297 | 161,614 | 78.10% | 21.90% | 74.15% | 25.85% | 31.58% | 68.42% |
| 2017 | 120,383 | 4,281 | 32,693 | 9,250 | 471 | 1,996 | 34,689 | 44,410 | 153,076 | 1,996 | 155,072 | 13,531 | 471 | 169,074 | 77.63% | 22.37% | 73.73% | 26.27% | 31.64% | 68.36% |

NOTES:

Cumulative CVWD and DWA West Whitewater River Subbasin Management Area production 2013 through 2017: 807,425 AF
Cumulative CVWD and DWA Mission Creek Subbasin Management Area production 2013 through 2017: 68,614 AF
Average annual CVWD and DWA West Whitewater River Subbasin Management Area production 2013 through 2017 (rounded): 161,490 AF
Average annual CVWD and DWA Mission Creek Subbasin Management Area production 2013 through 2017 (rounded): 13,720 AF
Average annual DWA West Whitewater River Subbasin Area of Benefit production 2013 through 2017 (rounded): 35,340 AF
Average annual DWA Mission Creek Subbasin Area of Benefit production 2013 through 2017(rounded): 9,500 AF
Average DWA West Whitewater River Subbasin Area of Benefit production percentage 2013 through 2017: 21.89%
Average DWA Mission Creek Subbasin Area of Benefit production percentage 2013 through 2017: 68.64%

ABBREVIATIONS:

GWE = Groundwater Extractions
SWD = Surface Water Diversions
COMB = Combined

**TABLE 2**
**DESERT WATER AGENCY**
**GROUNDWATER REPLENISHMENT AND ASSESSMENT PROGRAM**
**ESTIMATED WEST WHITEWATER RIVER SUBBASIN, MISSION CREEK SUBBASIN, AND GARNET HILL SUBBASIN AREAS OF BENEFIT**
**WATER PRODUCTION AND ESTIMATED WATER REPLENISHMENT ASSESSMENTS**
**2018/2019**

**ESTIMATED COMBINED AREA OF BENEFIT**
**ASSESSABLE WATER PRODUCTION AND WATER REPLENISHMENT ASSESSMENTS**

| Area of Benefit | Estimated Assessable Water Production AF | Water Replenishment Assessment Rate $/AF | Water Replenishment Assessment $ | Percent |
|---|---|---|---|---|
| West Whitewater River Subbasin AOB | 34,550 | $140.00 | $4,837,000 | 78% |
| Mission Creek Subbasin AOB | 9,250 | $140.00 | $1,295,000 | 21% |
| Garnet Hill Subbasin AOB | 470 | $140.00 | $65,800 | 1% |
| Combined AOBs | 44,270 | | $6,197,800 | 100% |

**ESTIMATED WEST WHITEWATER RIVER SUBBASIN, MISSION CREEK SUBBASIN, AND GARNET HILL SUBBASIN AREAS OF BENEFIT**
**WATER PRODUCTION AND WATER REPLENISHMENT ASSESSMENTS**

| Producer | 2017 Water Production (1) Groundwater Extraction AF | Surface Water Diversion AF | Combined Water Production AF | Estimated 2018/2019 Assessable Water Production AF[3] | Estimated Water Replenishment Assessment @ $140/AF $ | Percent |
|---|---|---|---|---|---|---|
| **West Whitewater River Subbasin AOB** | | | | | | |
| Desert Water Agency (Chino, Falls, Snow Creeks) | 31,330.14 | 1,396 | 32,726 | 32,460 | $4,544,400 | 93.95% |
| Desert Water Agency (Whitewater) | 0.00 | 601 | 601 | 600 | $84,000 | 1.74% |
| Caltrans Rest Stop | 39.22 | 0 | 39 | 40 | $5,600 | 0.12% |
| Canyon Country Club | 0.00 | 0 | 0 | 0 | $0 | 0.00% |
| Palm Springs Country Club | 0.00 | 0 | 0 | 0 | $0 | 0.00% |
| Desert Oasis Golf Management - Welk Resort | 344.07 | 0 | 344 | 340 | $47,600 | 0.98% |
| Los Compadres | 40.24 | 0 | 40 | 40 | $5,600 | 0.12% |
| Mission Springs Water District (Wells 25 & 25A and 26 &26A) | 155.72 | 0 | 156 | 150 | $21,000 | 0.43% |
| Seven Lakes Country Club | 174.59 | 0 | 175 | 170 | $23,800 | 0.49% |
| Bel Air Greens | 0.00 [2] | 0 | 0 | 150 [2] | $21,000 | 0.43% |
| Escena | 609.24 | 0 | 609 | 600 | $84,000 | 1.74% |
| Palm Springs Village | 0.00 | 0 | 0 | 0 | $0 | 0.00% |
| Palm Springs West | 0.00 | 0 | 0 | 0 | $0 | 0.00% |
| **Subtotal** | 32,693.22 | 1,996 | 34,689 | 34,550 | $4,837,000 | 100.00% |
| **Mission Creek Subbasin AOB** | | | | | | |
| Mission Springs Water District | 7,207 | 0 | 7,207 | 7,210 | $1,009,400 | 77.95% |
| Hidden Springs Country Club | 402 | 0 | 402 | 400 | $56,000 | 4.32% |
| Mission Lakes Country Club | 1,006 | 0 | 1,006 | 1,010 | $141,400 | 10.92% |
| Sands RV Resort | 364 | 0 | 364 | 360 | $50,400 | 3.89% |
| CPV-Sentinel | 271 | 0 | 271 | 270 | $37,800 | 2.92% |
| **Subtotal** | 9,250.19 | - | 9,250 | 9,250 | $1,295,000 | 100.00% |
| **Garnet Hill Subbasin AOB** | | | | | | |
| Mission Springs Water District | 449 | 0 | 449 | 450 | $63,000 | 95.74% |
| Indigo Power Plant | 22 | 0 | 22 | 20 | $2,800 | 4.26% |
| **Subtotal** | 470 | 0 | 471 | 470 | $65,800 | 100.00% |
| **Total** | 42,414 | 1,996 | 44,410 | 44,270 | $6,197,800 | |

[1] 2017 Metered water production, except for Exempt Production and Estimated Production.
[2] Bel Air Greens is closed, but is currently in the planning process for conversion to a hotel and residential development. In 2018, approximately 150 AF of water from the well is anticipated to be used for construction and landscape irrigation.
[3] WWR Proportioned to 2013 Production minus 13% conservation; MC and GH based on 2017 Production, all rounded to nearest 10 AF.

**TABLE 3**
**COACHELLA VALLEY WATER DISTRICT**
**APPLICABLE STATE WATER PROJECT CHARGES[1]**

| | Table A Water Allocation | | Probable Table A Water Delivery[3] | Delta Water Charge | | Variable Transportation Charge | | Off-Aqueduct Power Charge | | CVWD Applicable Table A Charges | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Maximum AF | Probable[2] AF | AF | Amount[4] $ | Unit $/AF | Amount[5] $ | Unit $/AF | Amount[6] $ | Unit $/AF | Amount $ | Unit[7] $/AF |
| 2017 | 138,350 | 88,124 | 88,124 | 6,069,981 | 68.88 | 11,047,030 | 125.36 | 137,794 | 1.56 | 17,254,805 | 195.80 |
| 2018 | 138,350 | 138,350 | 85,777 | 9,611,175 | 69.47 | 14,095,734 | 164.33 | 131,239 | 1.53 | 23,838,148 | 277.91 |
| 2019 | 138,350 | 138,350 | 85,777 | 9,279,115 | 67.07 | 13,417,238 | 156.42 | 415,161 | 4.84 | 23,111,514 | 269.44 |
| 2020 | 138,350 | 138,350 | 85,777 | 8,975,854 | 64.88 | 15,265,733 | 177.97 | 11,151 | 0.13 | 24,252,738 | 282.74 |
| 2021 | 138,350 | 138,350 | 85,777 | 9,389,537 | 67.87 | 14,812,830 | 172.69 | 11,151 | 0.13 | 24,213,518 | 282.28 |
| 2022 | 138,350 | 138,350 | 85,777 | 8,933,879 | 64.57 | 15,800,981 | 184.21 | 11,151 | 0.13 | 24,746,012 | 288.49 |
| 2023 | 138,350 | 138,350 | 85,777 | 9,167,261 | 66.26 | 15,506,766 | 180.78 | 11,151 | 0.13 | 24,685,178 | 287.78 |
| 2024 | 138,350 | 138,350 | 85,777 | 9,200,420 | 66.50 | 14,894,318 | 173.64 | 11,151 | 0.13 | 24,105,889 | 281.03 |
| 2025 | 138,350 | 138,350 | 85,777 | 9,207,859 | 66.55 | 15,460,446 | 180.24 | 11,151 | 0.13 | 24,679,457 | 287.72 |
| 2026 | 138,350 | 138,350 | 85,777 | 9,209,135 | 66.56 | 14,734,773 | 171.78 | 11,151 | 0.13 | 23,955,059 | 279.27 |
| 2027 | 138,350 | 138,350 | 85,777 | 9,628,302 | 69.59 | 15,340,359 | 178.84 | 11,151 | 0.13 | 24,979,811 | 291.22 |
| 2028 | 138,350 | 138,350 | 85,777 | 9,664,328 | 69.85 | 14,925,198 | 174.00 | 11,151 | 0.13 | 24,600,677 | 286.80 |
| 2029 | 138,350 | 138,350 | 85,777 | 9,702,372 | 70.13 | 15,260,586 | 177.91 | 11,151 | 0.13 | 24,974,109 | 291.15 |
| 2030 | 138,350 | 138,350 | 85,777 | 9,588,608 | 69.31 | 14,827,412 | 172.86 | 11,151 | 0.13 | 24,427,172 | 284.78 |
| 2031 | 138,350 | 138,350 | 85,777 | 9,743,996 | 70.43 | 16,461,464 | 191.91 | 11,151 | 0.13 | 26,216,611 | 305.64 |
| 2032 | 138,350 | 138,350 | 85,777 | 9,941,825 | 71.86 | 14,137,765 | 164.82 | 11,151 | 0.13 | 24,090,741 | 280.85 |
| 2033 | 138,350 | 138,350 | 85,777 | 10,086,241 | 72.90 | 16,358,532 | 190.71 | 11,151 | 0.13 | 26,455,924 | 308.43 |
| 2034 | 138,350 | 138,350 | 85,777 | 10,338,546 | 74.73 | 14,373,652 | 167.57 | 11,151 | 0.13 | 24,723,349 | 288.23 |
| 2035 | 138,350 | 138,350 | 85,777 | 10,405,738 | 75.21 | 18,229,328 | 212.52 | 11,151 | 0.13 | 28,646,217 | 333.96 |

(1) As set forth in CDWR Bulletin 132-17, Appendix B (Appendix B).

(2) Probable Table A water allocation is based on currently existing CVWD allocation augmented by TLBWSD, KCWA, and MWD transfers,

(3) Probable Table A water delivery is based on 0.62 reliability of CVWD allocation augmented by TLBWSD, KCWA, and MWD transfers

(4) Amount is based on probable Table A water allocation and Delta Water Charge per Table B-20 (A & B) of Appendix B. From 2018 through 2035, amount is based on State Water Contractors estimates.

(5) Amount is based on probable Table A water delivery and applicable Variable Transportation Unit Charge per Table B-17 of Appendix B.

(6) Amount is based on probable Table A water delivery and Off-Aqueduct Power Unit Charge derived by dividing data in Table B-16B by data in Table B-5B of Appendix B.

(7) Amount of applicable Table A charges divided by probable Table A water delivery.

**TABLE 4**
**DESERT WATER AGENCY**
**APPLICABLE STATE WATER PROJECT CHARGES[1]**

| | Table A Water Allocation | | Probable Table A Water Delivery[3] | Delta Water Charge | | Variable Transportation Charge | | Off-Aqueduct Power Charge | | DWA Applicable Table A Charges | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Maximum AF | Probable[2] AF | AF | Amount[4] $ | Unit $/AF | Amount[5] $ | Unit $/AF | Amount[6] $ | Unit $/AF | Amount $ | Unit[7] $/AF |
| 2017 | 55,750 | 31,681 | 31,681 | 2,182,187 | 68.88 | 3,971,460 | 125.36 | 118,209 | 3.73 | 6,271,856 | 197.97 |
| 2018 | 55,750 | 55,750 | 34,565 | 3,872,953 | 69.47 | 5,680,066 | 164.33 | 109,917 | 3.18 | 9,662,936 | 279.56 |
| 2019 | 55,750 | 55,750 | 34,565 | 3,739,145 | 67.07 | 5,406,657 | 156.42 | 167,295 | 4.84 | 9,313,096 | 269.44 |
| 2020 | 55,750 | 55,750 | 34,565 | 3,616,942 | 64.88 | 6,151,533 | 177.97 | 4,493 | 0.13 | 9,772,968 | 282.74 |
| 2021 | 55,750 | 55,750 | 34,565 | 3,783,641 | 67.87 | 5,969,030 | 172.69 | 4,493 | 0.13 | 9,757,164 | 282.28 |
| 2022 | 55,750 | 55,750 | 34,565 | 3,600,027 | 64.57 | 6,367,219 | 184.21 | 4,493 | 0.13 | 9,971,739 | 288.49 |
| 2023 | 55,750 | 55,750 | 34,565 | 3,694,072 | 66.26 | 6,248,661 | 180.78 | 4,493 | 0.13 | 9,947,226 | 287.78 |
| 2024 | 55,750 | 55,750 | 34,565 | 3,707,433 | 66.50 | 6,001,867 | 173.64 | 4,493 | 0.13 | 9,713,793 | 281.03 |
| 2025 | 55,750 | 55,750 | 34,565 | 3,710,431 | 66.55 | 6,229,996 | 180.24 | 4,493 | 0.13 | 9,944,920 | 287.72 |
| 2026 | 55,750 | 55,750 | 34,565 | 3,710,945 | 66.56 | 5,937,576 | 171.78 | 4,493 | 0.13 | 9,653,015 | 279.27 |
| 2027 | 55,750 | 55,750 | 34,565 | 3,879,854 | 69.59 | 6,181,605 | 178.84 | 4,493 | 0.13 | 10,065,952 | 291.22 |
| 2028 | 55,750 | 55,750 | 34,565 | 3,894,371 | 69.85 | 6,014,310 | 174.00 | 4,493 | 0.13 | 9,913,175 | 286.80 |
| 2029 | 55,750 | 55,750 | 34,565 | 3,909,702 | 70.13 | 6,149,459 | 177.91 | 4,493 | 0.13 | 10,063,654 | 291.15 |
| 2030 | 55,750 | 55,750 | 34,565 | 3,863,859 | 69.31 | 5,974,906 | 172.86 | 4,493 | 0.13 | 9,843,259 | 284.78 |
| 2031 | 55,750 | 55,750 | 34,565 | 3,926,475 | 70.43 | 6,633,369 | 191.91 | 4,493 | 0.13 | 10,564,337 | 305.64 |
| 2032 | 55,750 | 55,750 | 34,565 | 4,006,193 | 71.86 | 5,697,003 | 164.82 | 4,493 | 0.13 | 9,707,689 | 280.85 |
| 2033 | 55,750 | 55,750 | 34,565 | 4,064,387 | 72.90 | 6,591,891 | 190.71 | 4,493 | 0.13 | 10,660,772 | 308.43 |
| 2034 | 55,750 | 55,750 | 34,565 | 4,166,057 | 74.73 | 5,792,057 | 167.57 | 4,493 | 0.13 | 9,962,607 | 288.23 |
| 2035 | 55,750 | 55,750 | 34,565 | 4,193,132 | 75.21 | 7,345,754 | 212.52 | 4,493 | 0.13 | 11,543,380 | 333.96 |

(1) As set forth in CDWR Bulletin 132-17, Appendix B (Appendix B).

(2) Probable Table A water allocation is based on currently existing DWA allocation augmented by TLBWSD, KCWA, and MWD transfers

(3) Probable Table A water delivery is based on 0.62 reliability of DWA allocation augmented by TLBWSD, KCWA, and MWD transfers

(4) Amount is based on probable Table A water allocation and Delta Water Charge per Table B-20 (A & B) of Appendix B. From 2018 through 2035, amount is based on State Water Contractors estimates.

(5) Amount is based on probable Table A water delivery and applicable Variable Transportation Unit Charge per Table B-17 of Appendix B.

(6) Amount is based on probable Table A water delivery and Off-Aqueduct Power Unit Charge derived by dividing data in Table B-16B by data in Table B-5B of Appendix B.

(7) Amount of applicable Table A charges divided by probable Table A water delivery.

**TABLE 5**
**DESERT WATER AGENCY**
**ESTIMATED ALLOCATED STATE WATER PROJECT CHARGES FOR TABLE A WATER**
**(PROPORTIONED APPLICABLE CHARGES)[1]**

| Year | CVWD Applicable Table A Charges[2] $ | DWA Applicable Table A Charges[3] $ | Combined Applicable Table A Charges $ | CVWD Allocated Table A Charges $ | DWA Allocated Table A Charges $ | DWA Incremental Increase/(Decrease) $ | DWA Incremental Increase/(Decrease) % |
|---|---|---|---|---|---|---|---|
| 2016 | 16,266,406 | 5,310,606 | 21,577,012 | 15,908,731 | 5,668,281 | | |
| | | | | | | 512,173 | 9 |
| 2017 | 17,254,805 | 6,271,856 | 23,526,661 | 17,346,207 | 6,180,454 | | |
| | | | | | | 2,620,281 | 42 |
| 2018 | 23,838,148 | 9,662,936 | 33,501,083 | 24,700,349 | 8,800,735 | | |
| | | | | | | (282,790) | (3) |
| 2019 | 23,111,514 | 9,313,096 | 32,424,610 | 23,906,665 | 8,517,945 | | |
| | | | | | | 420,608 | 5 |
| 2020 | 24,252,738 | 9,772,968 | 34,025,706 | 25,087,153 | 8,938,553 | | |
| | | | | | | (14,455) | 0 |
| 2021 | 24,213,518 | 9,757,164 | 33,970,683 | 25,046,584 | 8,924,098 | | |
| | | | | | | 196,255 | 2 |
| 2022 | 24,746,012 | 9,971,739 | 34,717,751 | 25,597,398 | 9,120,353 | | |
| | | | | | | (22,420) | 0 |
| 2023 | 24,685,178 | 9,947,226 | 34,632,404 | 25,534,471 | 9,097,933 | | |
| | | | | | | (213,502) | (2) |
| 2024 | 24,105,889 | 9,713,793 | 33,819,683 | 24,935,252 | 8,884,431 | | |
| | | | | | | 211,393 | 2 |
| 2025 | 24,679,457 | 9,944,920 | 34,624,377 | 25,528,553 | 9,095,824 | | |
| | | | | | | (266,983) | (3) |
| 2026 | 23,955,059 | 9,653,015 | 33,608,074 | 24,779,233 | 8,828,841 | | |
| | | | | | | 377,681 | 4 |
| 2027 | 24,979,811 | 10,065,952 | 35,045,764 | 25,839,242 | 9,206,522 | | |
| | | | | | | (139,733) | (2) |
| 2028 | 24,600,677 | 9,913,175 | 34,513,852 | 25,447,063 | 9,066,789 | | |
| | | | | | | 137,631 | 2 |
| 2029 | 24,974,109 | 10,063,654 | 35,037,763 | 25,833,343 | 9,204,420 | | |
| | | | | | | (201,578) | (2) |
| 2030 | 24,427,172 | 9,843,259 | 34,270,430 | 25,267,588 | 9,002,842 | | |
| | | | | | | 659,513 | 7 |
| 2031 | 26,216,611 | 10,564,337 | 36,780,948 | 27,118,593 | 9,662,355 | | |
| | | | | | | (783,507) | (8) |
| 2032 | 24,090,741 | 9,707,689 | 33,798,430 | 24,919,583 | 8,878,848 | | |
| | | | | | | 871,708 | 10 |
| 2033 | 26,455,924 | 10,660,772 | 37,116,695 | 27,366,139 | 9,750,556 | | |
| | | | | | | (638,555) | (7) |
| 2034 | 24,723,349 | 9,962,607 | 34,685,956 | 25,573,955 | 9,112,001 | | |
| | | | | | | 1,445,806 | 16 |
| 2035 | 28,646,217 | 11,543,380 | 40,189,596 | 29,631,789 | 10,557,807 | | |

(1) Proportioned in accordance with 2017 Water Management Area production percentages; CVWD is responsible for 73.73% and DWA is responsible for 26.27% of total combined production for the Whitewater River, Mission Creek, and Garnet Hill Subbasins (see **Table 1**).
(2) From Table 3.
(3) From Table 4.

**TABLE 6**
**DESERT WATER AGENCY**
**PROJECTED EFFECTIVE REPLENISHMENT ASSESSMENT RATES**
**PURSUANT TO WATER MANAGEMENT AGREEMENTS BETWEEN**
**COACHELLA VALLEY WATER DISTRICT AND DESERT WATER AGENCY**

| Year | | DWA Allocated Table A Charges [1] $ | Estimated Assessable Production[2] AF | Estimated Effective Table A Assessment Rate[3] Fiscal Year $/AF | Table A Assessment Rate $/AF |
|---|---|---|---|---|---|
| 2018/2019 | [4] | 8,659,340 | 44,270 | 195.60 | 196.00 |
| 2019/2020 | [4] | 8,728,249 | 45,973 | 189.86 | 190.00 |
| 2020/2021 | [4] | 8,931,326 | 45,900 | 194.58 | 195.00 |
| 2021/2022 | [4] | 9,022,226 | 45,595 | 197.88 | 198.00 |
| 2022/2023 | [4] | 9,109,143 | 45,291 | 201.12 | 201.00 |
| 2023/2024 | [4] | 8,991,182 | 44,986 | 199.87 | 200.00 |
| 2024/2025 | [4] | 8,990,128 | 44,812 | 200.62 | 201.00 |
| 2025/2026 | [4] | 9,151,173 | 44,774 | 204.39 | 204.00 |
| 2026/2027 | [4] | 9,017,682 | 44,999 | 200.40 | 200.00 |
| 2027/2028 | [4] | 9,136,656 | 45,482 | 200.89 | 201.00 |
| 2028/2029 | [4] | 9,135,605 | 45,965 | 198.75 | 199.00 |
| 2029/2030 | [4] | 9,103,631 | 46,661 | 195.10 | 195.00 |
| 2030/2031 | [4] | 9,332,599 | 47,305 | 197.29 | 197.00 |
| 2031/2032 | [4] | 9,270,602 | 47,684 | 194.42 | 194.00 |
| 2032/2033 | [4] | 9,314,702 | 48,062 | 193.81 | 194.00 |
| 2033/2034 | [4] | 9,431,279 | 48,438 | 194.71 | 195.00 |
| 2034/2035 | [4] | 9,834,904 | 48,814 | 201.48 | 201.00 |

(1) From Table 5.
(2) Projections based on model runs for Coachella Valley 2010 Water Management Plan and 2014 Water Management Plan Status Update.
(3) Necessary to pay DWA's estimated (projected) Allocated Table A Charges.
(4) Projected

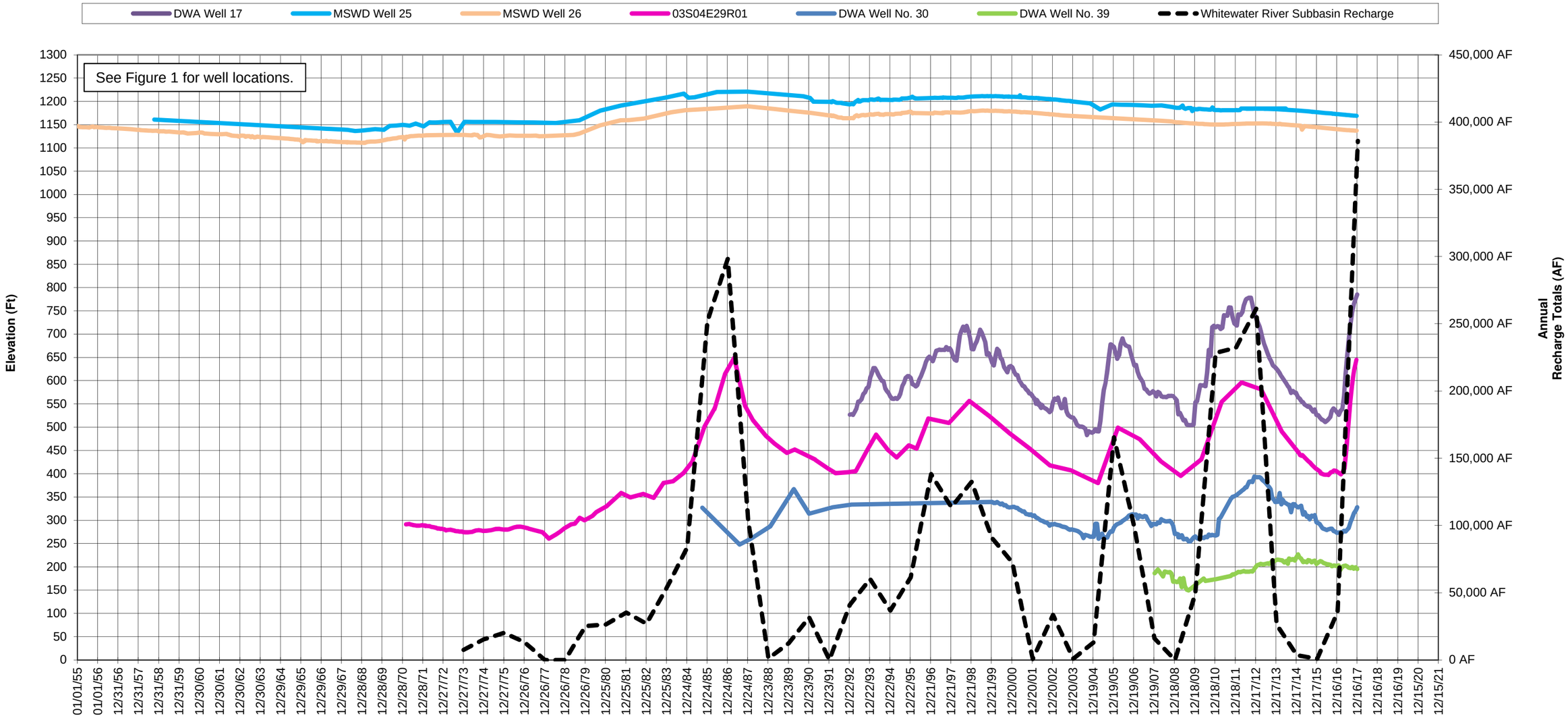
**TABLE 7**
**DESERT WATER AGENCY**
**WEST WHITEWATER RIVER SUBBASIN, MISSION CREEK SUBBASIN, AND GARNET HILL SUBBASIN AREAS OF BENEFIT**
**HISTORIC AND PROPOSED REPLENISHMENT ASSESSMENT RATES**

| | Assessment Rate | | | | | | | Assessments | | | | | | | | | | Payments Made | Surplus (Deficit) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | WWR | | MC | | GH | | Estimated[4] $ | | | Levied[5] $ | | | Collected[6] $ | | | | Delinquent[7] $ | | | | | |
| Fiscal Year | Table A Allocation [1] $/AF | Other Charges or Costs[2] $/AF | Total[3] $/AF | Other Charges or Costs[2] $/AF | Total[3] $/AF | Other Charges or Costs[2] $/AF | Total[3] $/AF | WWR | MC | GH | WWR | MC | GH | WWR | MC | GH | TOTAL | WWR | MC | GH | Table A $ | Annual $ | Cumulative[8] $ |
| 78/79 | 6.81 | 0.00 | 6.81 | | | | | 226,245 | | | 199,004 | | | 199,004 | | | 199,004 | 0 | | | 267,193 | (68,189) | (68,189) |
| 79/80 | 9.00 | 0.00 | 9.00 | | | | | 282,405 | | | 309,225 | | | 309,225 | | | 309,225 | 0 | | | 267,125 | 42,100 | (26,089) |
| 80/81 | 9.50 | 0.00 | 9.50 | | | | | 317,482 | | | 355,925 | | | 355,925 | | | 355,925 | 0 | | | 347,491 | 8,434 | (17,655) |
| 81/82 | 10.50 | 0.00 | 10.50 | | | | | 378,838 | | | 406,160 | | | 406,160 | | | 406,160 | 0 | | | 414,086 | (7,926) | (25,581) |
| 82/83 | 21.00 | 0.00 | 21.00 | | | | | 800,499 | | | 770,871 | | | 770,871 | | | 770,871 | 0 | | | 891,544 | (120,673) | (146,254) |
| 83/84 | 36.50 | 0.00 | 36.50 | | | | | 1,331,374 | | | 1,452,317 | | | 1,452,317 | | | 1,452,317 | 0 | | | 492,329 | 959,988 | 813,734 |
| 84/85 | 37.50 | 0.00 | 37.50 | | | | | 1,375,762 | | | 1,577,125 | | | 1,577,125 | | | 1,577,125 | 0 | | | 381,713 | 1,195,412 | 2,009,146 |
| 85/86 | 31.00 | 0.00 | 31.00 | | | | | 1,309,750 | | | 1,363,239 | | | 1,363,239 | | | 1,363,239 | 0 | | | 637,841 | 725,398 | 2,734,544 |
| 86/87 | 21.00 | 0.00 | 21.00 | | | | | 911,673 | | | 912,583 | | | 912,583 | | | 912,583 | 0 | | | 876,544 | 36,039 | 2,770,583 |
| 87/88 | 22.50 | 0.00 | 22.50 | | | | | 994,749 | | | 1,099,130 | | | 1,099,130 | | | 1,099,130 | 0 | | | 934,920 | 164,210 | 2,934,793 |
| 88/89 | 20.00 | 0.00 | 20.00 | | | | | 970,000 | | | 965,811 | | | 965,811 | | | 965,811 | 0 | | | 748,195 | 217,616 | 3,152,409 |
| 89/90 | 23.50 | 0.00 | 23.50 | | | | | 1,175,002 | | | 1,105,446 | | | 1,105,446 | | | 1,105,446 | 0 | | | 888,979 | 216,467 | 3,368,876 |
| 90/91 | 26.00 | 0.00 | 26.00 | | | | | 1,313,000 | | | 1,207,593 | | | 1,207,593 | | | 1,207,593 | 0 | | | 784,369 | 423,224 | 3,792,100 |
| 91/92 | 31.75 | 0.00 | 31.75 | | | | | 1,524,000 | | | 1,408,108 | | | 1,408,108 | | | 1,408,108 | 0 | | | 439,549 | 968,559 | 4,760,659 |
| 92/93 | 31.75 | 0.00 | 31.75 | | | | | 1,412,875 | | | 1,389,641 | | | 1,389,641 | | | 1,389,641 | 0 | | | 902,273 | 487,368 | 5,248,027 |
| 93/94 | 31.75 | 0.00 | 31.75 | | | | | 1,397,000 | | | 1,411,406 | | | 1,411,406 | | | 1,411,406 | 0 | | | 1,508,408 | (97,002) | 5,151,025 |
| 94/95 | 31.75 | 0.00 | 31.75 | | | | | 1,412,875 | | | 1,384,996 | | | 1,384,996 | | | 1,384,996 | 0 | | | 2,291,661 | (906,665) | 4,244,360 |
| 95/96 | 31.75 | 0.00 | 31.75 | | | | | 1,425,575 | | | 1,434,798 | | | 1,434,798 | | | 1,434,798 | 0 | | | 2,282,379 | (847,581) | 3,396,779 |
| 96/97 | 31.75 | 0.00 | 31.75 | | | | | 1,409,700 | | | 1,517,690 | | | 1,517,690 | | | 1,517,690 | 0 | | | 1,153,620 | 364,070 | 3,760,849 |
| 97/98 | 31.75 | 0.00 | 31.75 | | | | | 1,527,175 | | | 1,368,789 | | | 1,368,789 | | | 1,368,789 | 0 | | | 1,560,592 | (191,803) | 3,569,046 |
| 98/99 | 31.75 | 0.00 | 31.75 | | | | | 1,463,675 | | | 1,510,078 | | | 1,510,078 | | | 1,510,078 | 0 | | | 2,663,096 | (1,153,018) | 2,416,028 |
| 99/00 | 31.75 | 0.00 | 31.75 | | | | | 1,436,370 | | | 1,530,344 | | | 1,530,344 | | | 1,530,344 | 0 | | | 2,137,145 | (606,801) | 1,809,227 |
| 00/01 | 33.00 | 0.00 | 33.00 | | | | | 1,576,080 | | | 1,506,011 | | | 1,506,011 | | | 1,506,011 | 0 | | | 1,993,058 | (487,047) | 1,322,180 |
| 01/02 | 33.00 | 0.00 | 33.00 | | | | | 1,563,870 | | | 1,559,325 | | | 1,559,325 | | | 1,559,325 | 0 | | | 273,679 | 1,285,646 | 2,607,826 |
| 02/03 | 35.00 | 0.00 | 35.00 | | | | | 1,627,500 | | | 1,636,783 | | | 1,636,783 | | | 1,636,783 | 0 | | | 1,226,335 | 410,448 | 3,018,274 |
| 03/04 | 35.00 | 0.00 | 35.00 | 0.00 | 35.00 | | | 1,679,300 | 336,000 | | 1,719,646 | 397,708 | | 1,719,646 | 397,708 | | 2,117,354 | 0 | 0 | | 4,199,358 | (2,082,004) | 936,270 |
| 04/05 | 34.00 | 11.00 | 45.00 | 12.00 | 46.00 | | | 2,069,100 | 464,140 | | 2,160,536 | 529,108 | | 2,160,536 | 529,108 | | 2,689,644 | 0 | 0 | | 3,813,947 | (1,124,303) | (188,033) |
| 05/06 | 38.00 | 12.00 | 50.00 | 12.00 | 50.00 | | | 2,527,500 | 596,000 | | 2,463,500 | 635,562 | | 2,463,500 | 635,562 | | 3,099,062 | 0 | 0 | | 5,791,887 | (2,692,825) | (2,880,858) |
| 06/07 | 51.00 | 12.00 | 63.00 | 12.00 | 63.00 | | | 3,058,020 | 761,040 | | 3,350,191 | 789,471 | | 3,343,330 | 789,471 | | 4,132,801 | 6,861 | 0 | | 6,087,627 | (1,954,826) | (4,835,684) |
| 07/08 | 83.00 | (34.00) | 63.00 | (34.00) | 49.00 | | | 3,230,010 | 794,430 | | 3,049,824 | 720,025 | | 3,043,745 | 720,025 | | 3,763,770 | 6,079 | 0 | | 9,131,044 | (5,367,274) | (10,202,958) |
| 08/09 | 65.00 | (6.00) | 72.00 | (6.00) | 59.00 | | | 3,682,800 | 876,240 | | 3,074,133 | 778,029 | | 3,040,146 | 778,029 | | 3,818,175 | 33,987 | 0 | | 6,936,896 | (3,118,721) | (13,321,679) |
| 09/10 | 72.00 | 0.00 | 72.00 | 0.00 | 72.00 | | | 3,605,140 | 802,800 | | 3,007,319 | 718,452 | | 2,932,949 | 718,452 | | 3,651,401 | 74,370 | 0 | | 6,236,894 | (2,585,493) | (15,907,172) |
| 10/11 | 99.00 | (17.00) | 82.00 | (17.00) | 82.00 | | | 3,527,640 | 828,200 | | 3,376,216 | 616,632 | | 3,297,080 | 616,632 | | 3,913,712 | 79,136 | 0 | | 4,174,012 | (260,300) | (16,167,472) |
| 11/12 | 115.00 | (33.00) | 82.00 | (33.00) | 82.00 | | | 3,302,140 | 805,240 | | 3,347,596 | 820,179 | | 3,275,308 | 820,179 | | 4,095,487 | 72,288 | 0 | | 7,005,049 | (2,909,562) | (19,077,034) |
| 12/13 | 117.00 | (25.00) | 92.00 | (25.00) | 92.00 | | | 3,788,326 | 878,600 | | 3,690,594 | 888,405 | | 3,689,937 | 888,405 | | 4,578,342 | 656 | 0 | | 8,169,744 | (3,591,402) | (22,668,436) |
| 13/14 | 111.00 | (19.00) | 92.00 | (19.00) | 92.00 | | | 3,779,360 | 785,587 | | 3,809,930 | 785,587 | | 3,809,930 | 785,587 | | 4,595,517 | 0 | 0 | | 6,078,542 | (1,483,025) | (24,151,461) |
| 14/15 | 106.00 | (4.00) | 102.00 | (4.00) | 102.00 | | | 3,684,919 | 756,041 | | 3,684,919 | 561,213 | | 3,684,919 | 561,213 | | 4,246,132 | 0 | 0 | | 3,798,705 | 447,427 | (23,704,034) |
| 15/16 | 112.00 | (10.00) | 102.00 | (10.00) | 102.00 | (10.00) | 102.00 | 3,846,970 | 989,318 | 24,480 | 3,243,582 | 711,876 | 0 | 3,243,582 | 711,876 | 0 | 3,955,458 | 0 | 0 | 0 | 7,304,465 | (3,349,007) | (27,053,041) |
| 16/17 | 144.00 | (42.00) | 102.00 | (42.00) | 102.00 | (42.00) | 102.00 | 3,443,112 | 892,273 | 31,235 | 3,443,112 | 892,273 | 31,235 | 3,577,041 | 748,643 | 0 | 4,325,684 | 0 | 0 | 0 | 3,782,326 | 543,358 | 543,358 |
| 17/18 | 158.00 | (38.00) | 120.00 | (38.00) | 120.00 | (38.00) | 120.00 | 3,410,450 [9] | 1,583,978 | 34,771 | 3,410,450 | 1,583,978 | 34,771 | 2,407,364 [10] | 506,457 | 34,771 | 2,948,592 | 0 [11] | 0 | 0 | 7,490,595 [12] | (4,542,002) | (3,998,644) |
| 18/19 | 196.00 | (56.00) | 140.00 | (56.00) | 140.00 | (56.00) | 140.00 | 4,004,471 | 2,147,467 | 45,862 | 4,004,471 | 2,147,467 | 45,862 | 4,004,471 | 2,147,467 | 45,862 | 6,197,800 | 0 | | | 8,659,340 | (2,461,540) | (6,460,184) |
| 19/20 | 190.00 | (35.00) | 155.00 | (35.00) | 155.00 | (35.00) | 155.00 | 4,521,661 | 2,551,420 | 52,700 | 4,521,661 | 2,551,420 | 52,700 | 4,521,661 | 2,551,420 | 52,700 | 7,125,781 | 0 | | | 8,728,249 | (1,602,468) | (8,062,652) |
| 20/21 | 195.00 | (30.00) | 165.00 | (30.00) | 165.00 | (30.00) | 165.00 | 4,709,800 | 2,807,562 | 56,100 | 4,709,800 | 2,807,562 | 56,100 | 4,709,800 | 2,807,562 | 56,100 | 7,573,462 | 0 | | | 8,931,326 | (1,357,863) | (9,420,515) |
| 21/22 | 198.00 | (23.00) | 175.00 | 12.63 | 175.00 | 12.63 | 175.00 | 4,880,123 | 3,039,568 | 59,500 | 4,880,123 | 3,039,568 | 59,500 | 4,880,123 | 3,039,568 | 59,500 | 7,979,191 | 0 | | | 9,022,226 | (1,043,035) | (10,463,550) |
| 22/23 | 201.00 | 12.63 | 213.63 | 12.63 | 213.63 | 12.63 | 213.63 | 5,816,910 | 3,786,003 | 72,635 | 5,816,910 | 3,786,003 | 72,635 | 5,816,910 | 3,786,003 | 72,635 | 9,675,549 | 0 | | | 9,109,143 | 566,406 | (9,897,144) |
| 23/24 | 201.00 | 12.63 | 213.63 | 12.63 | 213.63 | 12.63 | 213.63 | 5,676,336 | 3,861,434 | 72,635 | 5,676,336 | 3,861,434 | 72,635 | 5,676,336 | 3,861,434 | 72,635 | 9,610,405 | 0 | | | 8,991,182 | 619,223 | (9,277,921) |
| 24/25 | 201.00 | 12.63 | 213.63 | 12.63 | 213.63 | 12.63 | 213.63 | 5,563,681 | 3,936,938 | 72,635 | 5,563,681 | 3,936,938 | 72,635 | 5,563,681 | 3,936,938 | 72,635 | 9,573,255 | 0 | | | 8,990,128 | 583,127 | (8,694,794) |
| 25/26 | 204.00 | 12.63 | 216.63 | 12.63 | 216.63 | 12.63 | 216.63 | 5,555,146 | 4,070,639 | 73,655 | 5,555,146 | 4,070,639 | 73,655 | 5,555,146 | 4,070,639 | 73,655 | 9,699,440 | 0 | | | 9,151,173 | 548,267 | (8,146,526) |
| 26/27 | 204.00 | 12.63 | 216.63 | 12.63 | 216.63 | 12.63 | 216.63 | 5,523,627 | 4,150,906 | 73,655 | 5,523,627 | 4,150,906 | 73,655 | 5,523,627 | 4,150,906 | 73,655 | 9,748,187 | 0 | | | 9,017,682 | 730,506 | (7,416,020) |
| 27/28 | 204.00 | 12.63 | 216.63 | 12.63 | 216.63 | 12.63 | 216.63 | 5,548,013 | 4,231,172 | 73,655 | 5,548,013 | 4,231,172 | 73,655 | 5,548,013 | 4,231,172 | 73,655 | 9,852,840 | 0 | | | 9,136,656 | 716,185 | (6,699,835) |
| 28/29 | 204.00 | 12.63 | 216.63 | 12.63 | 216.63 | 12.63 | 216.63 | 5,572,315 | 4,311,439 | 73,655 | 5,572,315 | 4,311,439 | 73,655 | 5,572,315 | 4,311,439 | 73,655 | 9,957,409 | 0 | | | 9,135,605 | 821,805 | (5,878,031) |
| 29/30 | 204.00 | 12.63 | 216.63 | 12.63 | 216.63 | 12.63 | 216.63 | 5,596,259 | 4,438,355 | 73,655 | 5,596,259 | 4,438,355 | 73,655 | 5,596,259 | 4,438,355 | 73,655 | 10,108,269 | 0 | | | 9,103,631 | 1,004,638 | (4,873,393) |
| 30/31 | 204.00 | 12.63 | 216.63 | 12.63 | 216.63 | 12.63 | 216.63 | 5,619,843 | 4,554,386 | 73,655 | 5,619,843 | 4,554,386 | 73,655 | 5,619,843 | 4,554,386 | 73,655 | 10,247,884 | 0 | | | 9,332,599 | 915,285 | (3,958,108) |
| 31/32 | 204.00 | 12.63 | 216.63 | 12.63 | 216.63 | 12.63 | 216.63 | 5,643,320 | 4,612,883 | 73,655 | 5,643,320 | 4,612,883 | 73,655 | 5,643,320 | 4,612,883 | 73,655 | 10,329,858 | 0 | | | 9,270,602 | 1,059,257 | (2,898,851) |
| 32/33 | 204.00 | 12.63 | 216.63 | 12.63 | 216.63 | 12.63 | 216.63 | 5,666,714 | 4,671,379 | 73,655 | 5,666,714 | 4,671,379 | 73,655 | 5,666,714 | 4,671,379 | 73,655 | 10,411,748 | 0 | | | 9,314,702 | 1,097,046 | (1,801,805) |
| 33/34 | 204.00 | 12.63 | 216.63 | 12.63 | 216.63 | 12.63 | 216.63 | 5,689,791 | 4,729,876 | 73,655 | 5,689,791 | 4,729,876 | 73,655 | 5,689,791 | 4,729,876 | 73,655 | 10,493,323 | 0 | | | 9,431,279 | 1,062,044 | (739,760) |
| 34/35 | 204.00 | 12.63 | 216.63 | 12.63 | 216.63 | 12.63 | 216.63 | 5,712,636 | 4,788,373 | 73,655 | 5,712,636 | 4,788,373 | 73,655 | 5,712,636 | 4,788,373 | 73,655 | 10,574,664 | 0 | | | 9,834,904 | 739,760 | (0) |

(1) Effective rate necessary to pay DWA's estimated (projected) Allocated Table A Charges.
(2) Includes discretionary reductions and charges for recovery of past shortfalls.
(3) Recommended assessment rate based on two components: 1) State Water Project Table A water Allocation, and 2) Other Charges or Costs.
(4) Assessments Estimated are based on applicable assessment rate and estimated assessable production from annual report for that year.
(5) Assessments Levied are based on applicable assessment rate and actual assessable production, except for the previous year, current year, and subsequent years where amounts remain estimated.
(6) Assessments Collected are based on payments made for Assessments Levied, except for the previous year, current year, and subsequent years where amounts remain estimated.
(7) Assessments Delinquent are based on Assessments Levied less payments made.
(8) Cumulative assessment balance to be used for future Delta improvements. Estimates of future assessment rates may need to be adjusted in the future to accommodate unknown charges for expanded State Water Project Facilities.
(9) For 2017/2018 and beyond, Assessments Estimated are based on Proposed Assessment Rate and Estimated Assessable Production.
(10) Assessments Collected are estimated based on first, second and third quarters of assessment period.
(11) Delinquent assessment is estimated based on first, second and third quarters of assessment period.
(12) For 2017/2018 and beyond, Payments Made are estimated based on estimated allocated Table A charges.

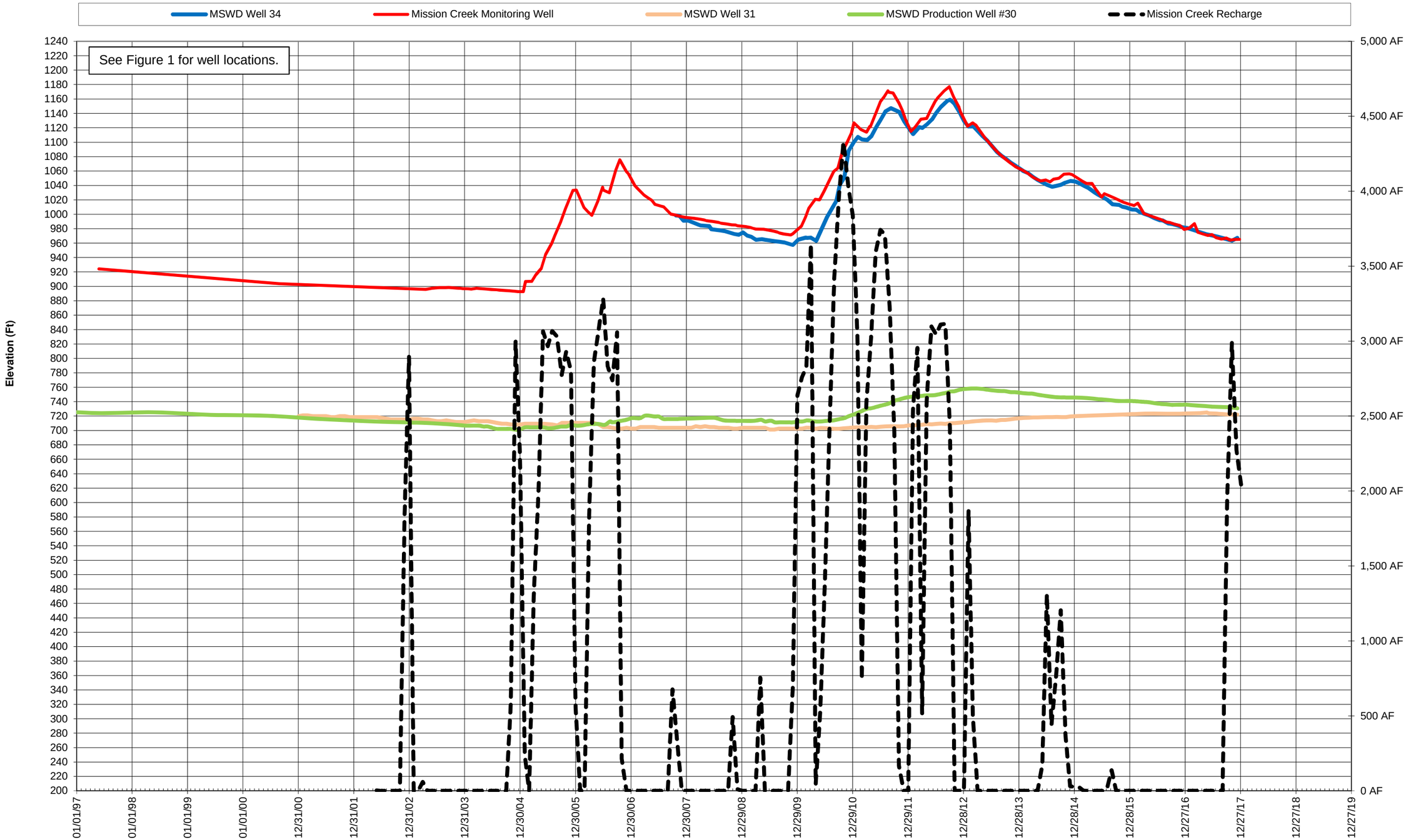
**EXHIBITS**

**EXHIBIT 1**
**DESERT WATER AGENCY**
**WEST WHITEWATER RIVER SUBBASIN MANAGEMENT AREA**
**RECHARGE QUANTITIES AND GROUNDWATER WELL HYDROGRAPHS**



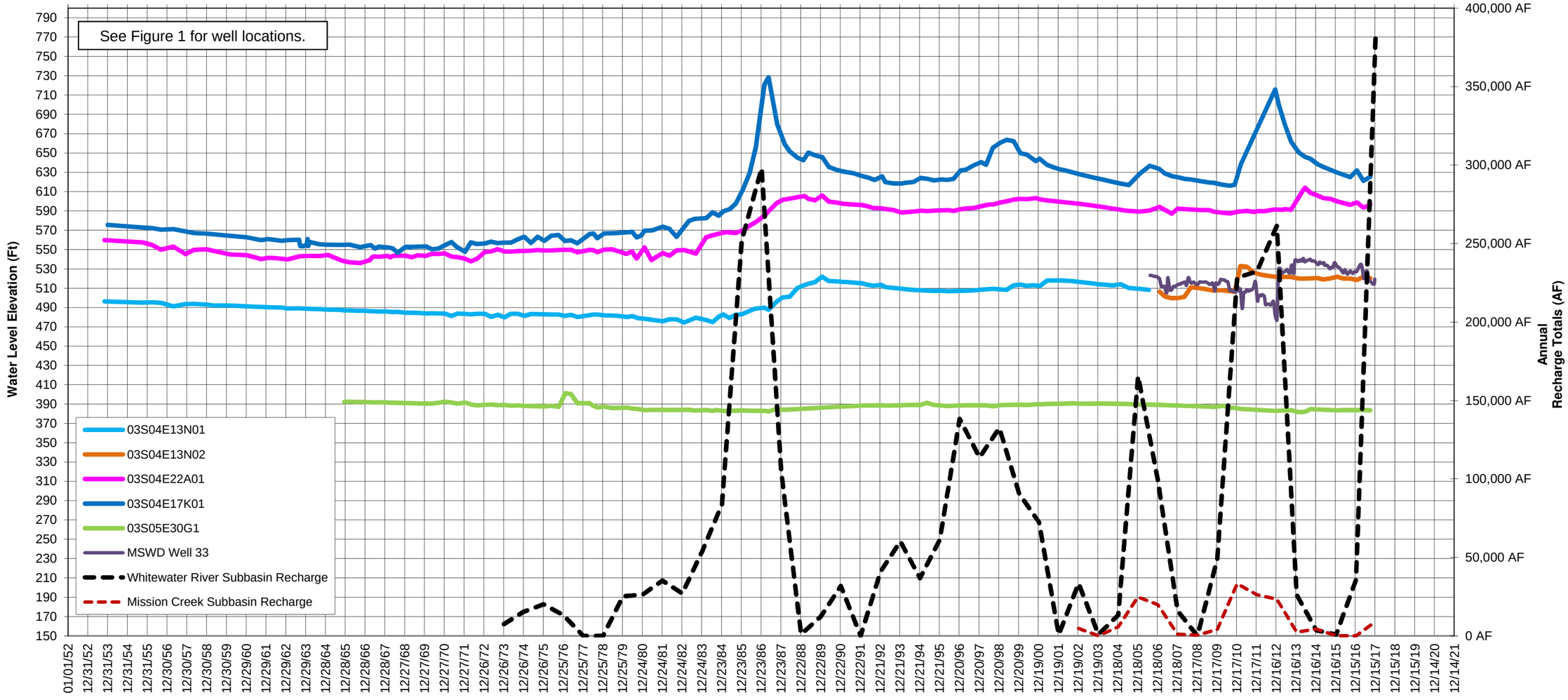

/DFS
101-33P42-HYDROGRAPHS.xlsx/Exhibit1 (5/29/2018)

**EXHIBIT 2**
**DESERT WATER AGENCY**
**MISSION CREEK SUBBASIN MANAGEMENT AREA**
**RECHARGE QUANTITIES AND GROUNDWATER WELL HYDROGRAPHS**




/DFS
101-33P42-HYDROGRAPHS.xlsx/Exhibit2 (5/29/2018)

**EXHIBIT 3**
**GARNET HILL SUBBASIN MANAGEMENT AREA GROUNDWATER WELL HYDROGRAPHS AND**
**GROUNDWATER RECHARGE QUANTITIES AT WHITEWATER RIVER AND MISSION CREEK REPLENISHMENT FACILITIES**




/DFS
101-33P42-HYDROGRAPHS.xlsx/Exhibit3 (5/29/2018)

**EXHIBIT 4**
**DESERT WATER AGENCY**
**MISSION CREEK SUBBASIN AREA OF BENEFIT[1]**
**HISTORIC VOLUME OF GROUNDWATER IN STORAGE[2]**

| TIME PERIOD | PRE-1955 | 1955 - 1978 | 1979 - 1997 | 1998 - 2017 | **1955 - 2017** |
|---|---|---|---|---|---|
| Number of Years | | 24 | 19 | 19 | **62** |
| Water Level Decline, FT[3] | | 20 | 30 | 13 | **63** |
| Period Reduction in Storage, AF | | 71,200 | 106,800 | 46,280 | **224,280** |
| Annual Reduction in Storage, AF/Yr | | 3,000 | 5,600 | 2,400 | **3,600** |
| Change in Storage | | 0.047 | 0.074 | 0.035 | **0.148** |
| Remaining Storage, AF | 1,511,800 | 1,440,600 | 1,333,800 | 1,287,520 | **1,287,520** |

(1) Northwest three-quarters of subbasin: GTC (1979) & SLADE (2000)
(2) Storage loss of 3,560 AF/FT of water level decline: GTC (1979) & SLADE (2000)
(3) Mission Springs Water District Data

**EXHIBIT 5**
**DESERT WATER AGENCY**
**COMPARISON OF WATER PRODUCTION AND GROUNDWATER REPLENISHMENT**
**WEST WHITEWATER RIVER SUBBASIN (WWR) AND MISSION CREEK SUBBASIN (MC) MANAGEMENT AREAS**

PRODUCTION[1]

| | WWR AF | | MC AF | | TOTAL AF | | RATIO OF PRODUCTION | |
|---|---|---|---|---|---|---|---|---|
| YEAR | ANNUAL | CUMULATIVE | ANNUAL | CUMULATIVE | ANNUAL | CUMULATIVE | WWR/TOTAL | MC /TOTAL |
| 2002 | 213,410 | 213,410 | 13,968 | 13,968 | 227,378 | 227,378 | 93.9% | 6.1% |
| 2003 | 204,275 | 417,685 | 14,498 | 28,466 | 218,773 | 446,151 | 93.4% | 6.6% |
| 2004 | 212,700 | 630,385 | 16,548 | 45,014 | 229,248 | 675,399 | 92.8% | 7.2% |
| 2005 | 204,341 | 834,726 | 16,327 | 61,341 | 220,668 | 896,067 | 92.6% | 7.4% |
| 2006 | 213,850 | 1,048,576 | 17,365 | 78,706 | 231,215 | 1,127,282 | 92.5% | 7.5% |
| 2007 | 211,014 | 1,259,590 | 16,409 | 95,115 | 227,423 | 1,354,705 | 92.8% | 7.2% |
| 2008 | 210,693 | 1,470,283 | 15,775 | 110,890 | 226,468 | 1,581,173 | 93.0% | 7.0% |
| 2009 | 199,149 | 1,669,432 | 15,108 | 125,998 | 214,257 | 1,795,430 | 92.9% | 7.1% |
| 2010 | 182,415 | 1,851,847 | 14,304 | 140,302 | 196,719 | 1,992,149 | 92.7% | 7.3% |
| 2011 | 182,823 | 2,034,670 | 14,260 | 154,562 | 197,083 | 2,189,232 | 92.8% | 7.2% |
| 2012 | 183,108 | 2,217,778 | 14,216 | 168,778 | 197,324 | 2,386,556 | 92.8% | 7.2% |
| 2013 | 182,640 | 2,400,418 | 14,756 | 183,534 | 197,396 | 2,583,952 | 92.5% | 7.5% |
| 2014 | 174,186 | 2,574,604 | 14,091 | 197,625 | 188,277 | 2,772,229 | 92.5% | 7.5% |
| 2015 | 147,429 | 2,722,033 | 13,017 | 210,642 | 160,446 | 2,932,675 | 91.9% | 8.1% |
| 2016 | 148,098 | 2,870,131 | 13,219 | 223,861 | 161,317 | 3,093,992 | 91.8% | 8.2% |
| 2017 | 155,072 | 3,025,203 | 13,531 | 237,392 | 168,603 | 3,262,595 | 92.0% | 8.0% |

RECHARGE (TOTAL)

| | WWR AF | | MC AF | | TOTAL AF | | RATIO OF RECHARGE | |
|---|---|---|---|---|---|---|---|---|
| YEAR | ANNUAL | CUMULATIVE | ANNUAL | CUMULATIVE | ANNUAL | CUMULATIVE | WWR/TOTAL | MC/TOTAL |
| 2002 | 33,435 | 33,435 | 4,733 | 4,733 | 38,168 | 38,168 | 14.2% | 14.2% |
| 2003 | 902 | 34,337 | 59 | 4,792 | 961 | 39,129 | 14.0% | 6.5% |
| 2004 | 13,224 | 47,561 | 5,564 | 10,356 | 18,788 | 57,917 | 70.4% | 29.6% |
| 2005 | 165,554 | 213,115 | 24,723 | 35,079 | 190,277 | 248,194 | 87.0% | 13.0% |
| 2006 | 98,959 | 312,074 | 19,901 | 54,980 | 118,860 | 367,054 | 83.3% | 16.7% |
| 2007 | 16,009 | 328,083 | 1,011 | 55,991 | 17,020 | 384,074 | 94.1% | 5.9% |
| 2008 | 8,008 | 336,091 | 503 | 56,494 | 8,511 | 392,585 | 94.1% | 5.9% |
| 2009 | 57,024 | 393,115 | 4,090 | 60,584 | 61,114 | 453,699 | 93.3% | 6.7% |
| 2010 | 228,330 | 621,445 | 33,210 | 93,794 | 261,540 | 715,239 | 87.3% | 12.7% |
| 2011 | 232,214 | 853,659 | 26,238 | 120,032 | 258,452 | 973,691 | 89.8% | 10.2% |
| 2012 | 257,267 | 1,110,926 | 23,406 | 143,438 | 280,673 | 1,254,364 | 91.7% | 8.3% |
| 2013 | 26,620 | 1,137,546 | 2,379 | 145,817 | 28,999 | 1,283,363 | 91.8% | 8.2% |
| 2014 | 3,533 | 1,141,079 | 4,325 | 150,142 | 7,858 | 1,291,221 | 45.0% | 55.0% |
| 2015 | 865 | 1,141,944 | 171 | 150,313 | 1,036 | 1,292,257 | 83.5% | 16.5% |
| 2016 | 35,699 | 1,177,643 | 0 | 150,313 | 35,699 | 1,327,956 | 100.0% | 0.0% |
| 2017 | 385,994 | 1,563,637 | 9,248 | 159,561 | 395,242 | 1,723,198 | 97.7% | 2.3% |

RECHARGE (SWP EXCHANGE ONLY) [2]

| | WWR AF | | MC AF | | TOTAL AF | | RATIO OF RECHARGE | |
|---|---|---|---|---|---|---|---|---|
| YEAR | ANNUAL | CUMULATIVE | ANNUAL | CUMULATIVE | ANNUAL | CUMULATIVE | WWR/TOTAL | MC/TOTAL |
| 2002 | 33,435 | 33,435 | 4,733 | 4,733 | 38,168 | 38,168 | 14.2% | 14.2% |
| 2003 | 902 | 34,337 | 59 | 4,792 | 961 | 39,129 | 14.0% | 6.5% |
| 2004 | 13,224 | 47,561 | 5,564 | 10,356 | 18,788 | 57,917 | 70.4% | 29.6% |
| 2005 | 165,554 | 213,115 | 24,723 | 35,079 | 190,277 | 248,194 | 87.0% | 13.0% |
| 2006 | 98,959 | 312,074 | 19,901 | 54,980 | 118,860 | 367,054 | 83.3% | 16.7% |
| 2007 | 9 | 312,083 | 1,011 | 55,991 | 1,020 | 368,074 | 0.9% | 99.1% |
| 2008 | 0 | 312,083 | 0 | 55,991 | 0 | 368,074 | n/a | n/a |
| 2009 | 46,032 | 358,115 | 3,336 | 59,327 | 49,368 | 417,442 | 93.2% | 6.8% |
| 2010 | 209,937 | 568,052 | 31,467 | 90,794 | 241,404 | 658,846 | 87.0% | 13.0% |
| 2011 | 127,214 | 695,266 | 20,888 | 111,682 | 148,102 | 806,948 | 85.9% | 14.1% |
| 2012 | 253,267 | 948,533 | 23,406 | 135,088 | 276,673 | 1,083,621 | 91.5% | 8.5% |
| 2013 | 24,112 | 972,645 | 2,379 | 137,467 | 26,491 | 1,110,112 | 91.0% | 9.0% |
| 2014 | 0 | 972,645 | 4,325 | 141,792 | 4,325 | 1,114,437 | 0.0% | 100.0% |
| 2015 | 0 | 972,645 | 171 | 141,963 | 171 | 1,114,608 | 0.0% | 100.0% |
| 2016 | 699 | 973,344 | 0 | 141,963 | 699 | 1,115,307 | 100.0% | 0.0% |
| 2017 | 350,994 | 1,324,338 | 9,248 | 151,211 | 360,242 | 1,475,549 | 97.4% | 2.6% |

(1) Production in both DWA and CVWD service areas.
(2) This table excludes all non-SWP supplemental water deliveries such as those made for CPV Sentinel.

**EXHIBIT 6**
**DESERT WATER AGENCY**
**SUMMARY OF DELIVERIES TO METROPOLITAN WATER DISTRICT (MWD)**
**AND TO GROUNDWATER REPLENISHMENT FACILITIES (AF)[1]**

**BEFORE EXCHANGE AGREEMENT (JULY 1973 - JUNE 1984)**

| | | Delivery to MWD | | | | | | | | | | | | | | | | | | | Delivery to DWA/CVWD Recharge Facilities | | | | | | | | MWD Delivery Surplus/(Deficit) Prior to Exchange and Delivery Agreement | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | SWP Contract Water | | | | | | | | | Non-SWP Contract Water | | | | | | | | | | | | | | | |
| | | | | | SWP Surplus Water | | | | | | | | | CVWD | | | | | | DWA | | From SWP Exchange Account | | | From Other Accounts | | | | | |
| Year | Table A DWA/CVWD Combined Allocation | Table A Allocation Delivered to MWD | % Delivery to MWD | Carry-Over | Pool A | Pool B | Multi-Year Pool | Article 21 | Flood | Yuba | Other | Total | SWP Total | DMB Pacific | Glorious Land Rosedale | Colorado River Credit | Needles | MWD QSA | CPV-Sentinel | Total | WRRF[2] | MCRF[3] | Total | WRRF[2] | MCRF[3] | Total | Total WRRF | Total MCRF | Grand Total | Annual | Cumulative |
| 1973 (Jul-Dec) | 14,800 | 14,800 | 100% | | | | | | | | | | 14,800 | | | | | | | 14,800 | 7,475 | | 7,475 | | | | 7,475 | | 7,475 | (7,325) | (7,325) |
| 1974 | 16,400 | 16,400 | 100% | | | | | | | | | | 16,400 | | | | | | | 16,400 | 15,396 | | 15,396 | | | | 15,396 | | 15,396 | (1,004) | (8,329) |
| 1975 | 18,000 | 18,000 | 100% | | | | | | | | | | 18,000 | | | | | | | 18,000 | 20,126 | | 20,126 | | | | 20,126 | | 20,126 | 2,126 | (6,203) |
| 1976 | 19,600 | 19,600 | 100% | | | | | | | | | | 19,600 | | | | | | | 19,600 | 13,206 | | 13,206 | | | | 13,206 | | 13,206 | (6,394) | (12,597) |
| 1977 | 21,421 | 0 | 0% | | | | | | | | | | 0 | | | | | | | 0 | 0 | | 0 | | | | 0 | | 0 | 0 | (12,597) |
| 1978 | 23,242 | 25,384 | 109% | | | | | | | | | | 25,384 | | | | | | | 25,384 | 0 | | 0 | | | | 0 | | 0 | (25,384) | (37,981) |
| 1979 | 25,063 | 25,063 | 100% | | | | | | | | | | 25,063 | | | | | | | 25,063 | 25,192 | | 25,192 | | | | 25,192 | | 25,192 | 129 | (37,852) |
| 1980 | 27,884 | 27,884 | 100% | | | | | | | | | | 27,884 | | | | | | | 27,884 | 26,341 | | 26,341 | | | | 26,341 | | 26,341 | (1,543) | (39,395) |
| 1981 | 31,105 | 31,105 | 100% | | | | | | | | | | 31,105 | | | | | | | 31,105 | 35,251 | | 35,251 | | | | 35,251 | | 35,251 | 4,146 | (35,249) |
| 1982 | 34,326 | 34,326 | 100% | | | | | | | | | | 34,326 | | | | | | | 34,326 | 27,020 | | 27,020 | | | | 27,020 | | 27,020 | (7,306) | (42,555) |
| 1983 | 37,547 | 37,547 | 100% | | | | | | | | | | 37,547 | | | | | | | 37,547 | 53,732 | | 53,732 | | | | 53,732 | | 53,732 | 16,185 | (26,370) |
| *1984 (Jan-Jun)*[4] | N/A | 25,849 | N/A | | | | | | | | | | *25,849* | | | | | | | *25,849* | *50,912* | | *50,912* | | | | *50,912* | | *50,912* | 25,063 | (1,307) |
| *1984 Total* | 40,768 | 40,768 | 100% | | | | | | | | | | 40,768 | | | | | | | 40,768 | 83,708 | | 83,708 | | | | 83,708 | | 83,708 | | |

**WITH EXCHANGE AGREEMENT (JULY 1984 - 2016)**

| | | Delivery to MWD | | | | | | | | | | | | | | | | | | | Delivery to DWA/CVWD Replenishment Facilities | | | | | | | | MWD Exchange and Advance Deliveries | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | SWP Contract Water | | | | | | | | | Non-SWP Contract Water | | | | | | | | | | | | | | | | | | |
| | | | | | SWP Surplus Water | | | | | | | | | CVWD | | | | | | DWA | | From SWP Exchange Account | | | From Other Accounts | | | | | | | |
| Year | Table A DWA/CVWD Combined Allocation | Table A Allocation Delivered to MWD | % Delivery to MWD | Carry-Over | Pool A | Pool B | Multi-Year Pool | Article 21 | Flood | Yuba | Other | Total | SWP Total | DMB Pacific | Glorious Land Rosedale | Colorado River Credit | Needles | MWD QSA | CPV-Sentinel | Total | WRRF[2] | MCRF[3] | Total | WRRF[2] | MCRF[3] | Total | Total WRRF | Total MCRF | Grand Total | Exchange Deliveries | Advance Deliveries | Advance Deliveries Converted to Exchange Deliveries | Advance Delivery Account[5] Credit/(Debit) Annual | Advance Delivery Account[5] Credit/(Debit) Balance |
| *1984 (Jul-Dec)*[5] | N/A | 14,919 | N/A | | | | | | | | | | *14,919* | | | | | | | *14,919* | *32,796* | | *32,796* | | | | *32,796* | | *32,796* | | | | 16,570 [6] | 16,570 |
| 1985 | 43,989 | 43,989 | 100% | | | | | | | | | | 43,989 | | | | | | | 43,989 | 251,994 | | 251,994 | | | | 251,994 | | 251,994 | 251,994 | 208,005 | | 208,005 | 224,575 |
| 1986 | 47,210 | 47,210 | 100% | | | | | | | | | | 47,210 | | | | 10,000 [7] | | | 57,210 | 288,201 | | 288,201 | 10,000 [7] | | 10,000 | 298,201 | | 298,201 | 288,201 | 240,991 | | 240,991 | 465,566 |
| 1987 | 50,931 | 50,931 | 100% | | | | | | | | | | 50,931 | | | | | | | 50,931 | 104,334 | | 104,334 | | | | 104,334 | | 104,334 | 104,334 | 53,403 | | 53,403 | 518,969 |
| 1988 | 54,652 | 54,652 | 100% | | | | | | | | | | 54,652 | | | | | | | 54,652 | 1,096 | | 1,096 | | | | 1,096 | | 1,096 | 1,096 | | 53,556 | (53,556) | 465,413 |
| 1989 | 58,373 | 58,373 | 100% | | | | | | | | | | 58,373 | | | | | | | 58,373 | 12,478 | | 12,478 | | | | 12,478 | | 12,478 | 12,478 | | 45,895 | (45,895) | 419,518 |
| 1990 | 61,200 | 61,200 | 100% | | | | | | | | | | 61,200 | | | | | | | 61,200 | 31,721 | | 31,721 | | | | 31,721 | | 31,721 | 31,721 | | 29,479 | (29,479) | 390,039 |
| 1991 | 61,200 | 18,360 | 30% | | | | | | | | | | 18,360 | | | | | | | 18,360 | 14 | | 14 | | | | 14 | | 14 | 14 | | 18,346 | (18,346) | 371,693 |
| 1992 | 61,200 | 27,624 | 45% | | | | | | | | | | 27,624 | | | | | | | 27,624 | 40,870 | | 40,870 | | | | 40,870 | | 40,870 | 40,870 | 13,246 | | 13,246 | 384,939 |
| 1993 | 61,200 | 61,200 | 100% | | | | | | | | | | 61,200 | | | | | | | 61,200 | 60,153 | | 60,153 | | | | 60,153 | | 60,153 | 60,153 | | 1,047 | (1,047) | 383,892 |
| 1994 | 61,200 | 37,359 | 61% | | | | | | | | | | 37,359 | | | | | | | 37,359 | 36,763 | | 36,763 | | | | 36,763 | | 36,763 | 36,763 | | 596 | (596) | 383,296 |
| 1995 | 61,200 | 61,200 | 100% | | | | | | | | | | 61,200 | | | | | | | 61,200 | 61,318 | | 61,318 | | | | 61,318 | | 61,318 | 61,318 | 118 | | 118 | 383,414 |
| 1996 | 61,200 | 61,200 | 100% | | | 103,641 | | | | | 103,641 | 164,841 | | | | | | | | 164,841 | 138,266 | | 138,266 | | | | 138,266 | | 138,266 | 138,266 | | 26,575 | (26,575) | 356,839 |
| 1997 | 61,200 | 61,200 | 100% | | | 50,000 | | | 27,130 | | 77,130 | 138,330 | | | | | | | | 138,330 | 113,677 | | 113,677 | | | | 113,677 | | 113,677 | 113,677 | | 24,653 | (24,653) | 332,186 |
| 1998 | 61,200 | 61,200 | 100% | | | 75,000 | | | 20,156 | | 95,156 | 156,356 | | | | | | | | 156,356 | 132,455 | | 132,455 | | | | 132,455 | | 132,455 | 132,455 | | 23,901 | (23,901) | 308,285 |
| 1999 | 61,200 | 61,200 | 100% | | | 47,380 | | | | | 47,380 | 108,580 | | | | | | | | 108,580 | 90,601 | | 90,601 | | | | 90,601 | | 90,601 | 90,601 | | 17,979 | (17,979) | 290,306 |
| 2000 | 61,200 | 55,080 | 90% | | | 9,837 | | 35,640 | | | 1 [8] | 45,478 | 100,558 | | | | | | | | 100,558 | 72,450 | | 72,450 | | | | 72,450 | | 72,450 | 72,450 | | 28,108 | (28,108) | 262,198 |
| 2001 | 61,200 | 23,868 | 39% | | | 242 | | | | | | 242 | 24,110 | | | | | | | | 24,110 | 707 | | 707 | | | | 707 | | 707 | 707 | | 23,403 | (23,403) | 238,795 |
| 2002 | 61,200 | 42,840 | 70% | | 436 | 819 | | 300 | | | | 1,555 | 44,395 | | | | | | | | 44,395 | 33,435 | 4,733 | 38,168 | | | | 33,435 | 4,733 | 38,168 | 38,168 | | 6,227 | (6,227) | 232,568 |
| 2003 | 61,200 | 55,080 | 90% | (17,867) | 457 | 58 | | 532 | | | 2 [8] | 1,049 | 38,262 | | | | | | | | 38,262 | 902 | 59 | 961 | | | | 902 | 59 | 961 | 961 | | 37,301 | (37,301) | 195,267 |
| 2004 | 61,200 | 18,597 | 30% | 17,867 | | 191 | | | | | | 191 | 36,655 | | | | | | | | 36,655 | 13,224 | 5,564 | 18,788 | | | | 13,224 | 5,564 | 18,788 | 18,788 | | 17,867 | (17,867) | 177,400 |
| 2005 | 171,100 | 60,152 | 35% | 27,618 | 585 | 3,253 | | | | | | 3,838 | 91,608 | | | | | | | | 91,608 | 165,554 | 24,723 | 190,277 | | | | 165,554 | 24,723 | 190,277 | 190,277 | 98,669 | | 98,669 | 276,069 |
| 2006 | 171,100 | 171,100 | 100% | | | | | | | | | 0 | 171,100 | | | | | | | | 171,100 | 98,959 | 19,901 | 118,860 | | | | 98,959 | 19,901 | 118,860 | 118,860 | | 52,240 | (52,240) | 223,829 |
| 2007 | 171,100 | 102,660 | 60% | | 802 | | | | | | | 802 | 103,462 | | | 16,000 [9] * | | | | | 119,453 | 9 | 1,011 | 1,020 | 16,000 | | 16,000 | 16,009 | 1,011 | 17,020 | 1,020 | | 102,442 | (102,442) | 121,387 |
| 2008 | 171,100 | 59,885 | 35% | | 151 | | | | | 1,833 | | 1,984 | 61,869 | | 3,000 | 8,008 [9] * | | | | 8,350 * | 81,218 | 0 | 0 | 0 | 8,008 | 503 [13] | 8,511 | 8,008 | 503 | 8,511 | 0 | | 64,869 | (64,869) | 56,518 |
| 2009 | 171,100 | 57,710 | 34% | | 35 | 58 | | | | 2,982 | 500 [10] | 3,575 | 61,285 | | 3,000 * | 7,992 [9] * | | | | | 72,268 | 46,032 | 3,336 | 49,368 | 10,992 | 754 [13] | 11,746 | 57,024 | 4,090 | 61,114 | 49,368 | | 11,917 | (11,917) | 44,601 |
| 2010 | 194,100 | 97,050 | 50% | 10,730 | 66 | 536 | | | | | | 602 | 108,382 | 8,393 * | | | | 10,000 * | | | 126,775 | 209,937 | 31,467 | 241,404 | 18,393 | 1,743 [13] | 20,136 | 228,330 | 33,210 | 261,540 | 241,404 | 133,022 | | 133,022 | 177,623 |
| 2011 | 194,100 | 124,156 | 64% | | 836 | 1,666 | | 5,800 | | | | 8,302 | 132,458 | | | | | 105,000 * | | | 237,458 | 127,214 | 20,888 | 148,102 | 105,000 | 5,350 [13] | 110,350 | 232,214 | 26,238 | 258,452 | 148,102 | 25,644 [7] | | 25,644 | 203,267 |
| 2012 | 194,100 | 126,166 | 65% | 31,124 | 431 | | | | | 967 | | 1,398 | 158,688 | | 4,000 * | | | | | | 162,688 | 253,267 | 23,406 | 276,673 | 4,000 | | 4,000 | 257,267 | 23,406 | 280,673 | 276,673 | 117,985 | | 117,985 | 321,252 |
| 2013 | 194,100 | 67,936 | 35% | | 230 | | | | | 2,664 | | 2,894 | 70,830 | | 16,500 | | | 2,508 * | | | 89,838 | 24,112 | 2,379 | 26,491 | 2,508 | | 2,508 | 26,620 | 2,379 | 28,999 | 26,491 | | 60,839 | (60,839) | 260,413 |
| 2014 | 194,100 | 9,706 | 5% | | | | | | | 1,213 | | 1,213 | 10,919 | | 5,000 | | | 3,549 | | | 19,468 | 0 | 4,325 | 7,858 | 3,533 | | 3,533 | 3,533 | 4,325 | 11,391 | 7,858 | | 11,610 | (11,610) | 248,803 |
| 2015 | 194,100 | 38,820 | 20% | | | | 67 | | | 426 | | 493 | 39,313 | | 9,500 | | | 865 * | | | 49,678 | 0 | 171 | 171 | 865 | | 865 | 865 | 171 | 1,036 | 171 | | 48,642 | (48,642) | 200,161 |
| 2016 | 194,100 | 74,249 | 38% | | | | 566 | | | | | 566 | 74,815 | | 16,500 | | | 64,135 | | | 155,450 | 699 | 0 | 699 | 35,000 ** | | 35,000 | 35,699 | 0 | 35,699 | 699 | | 119,751 | (119,751) | 80,410 |
| 2017 | 194,100 | 66,805 | 34% | 25,435 | 1,131 | | | | | | 16,776 [11] | 17,907 | 110,147 | | 5,397 | | | 35,000 | | | 150,544 | 350,994 | 9,248 | 360,242 | 35,000 ** | | 35,000 | 385,994 | 9,248 | 395,242 | 360,242 | 244,698 | | 244,698 | 325,108 |
| TOTALS[12]: | 3,891,611 | 2,309,635 | --- | 94,907 | 5,160 | 292,681 | 633 | 42,272 | 47,286 | 10,085 | 17,279 | 415,396 | 2,819,938 | 8,393 | 62,897 | 32,000 | 10,000 | 221,057 | 8,350 | 3,162,608 | 2,717,889 | 151,211 | 3,223,627 | 249,299 | 8,350 | 257,649 | 3,318,182 | 159,561 | 3,481,276 | 3,223,627 | 1,152,351 | 827,243 | --- | --- |

NOTES:

(1) As reported by Metropolitan Water District in its monthly "Exchange Water Delivery in Acre-Feet" reports.
(2) Whitewater River Replenishment Facility
(3) Mission Creek Replenishment Facility
(4) The Advance Delivery Agreement between MWD and CVWD/DWA became effective on 7/1/84; discrepancies in exchange deliveries between MWD and CVWD/DWA after 7/1/84 are adjusted per said agreement.
(5) The effective date of the Advance Delivery Agreement between MWD and CVWD/DWA was 7/1/84.
(6) The first advance delivery figure of 16,570 AF is equal to 32,796 AF of deliveries to CVWD/DWA from 7/84 - 12/84, minus 14,919 AF of deliveries to MWD from 7/84 - 12/84, minus cumulative MWD delivery deficiency of 1,307 AF as of 7/1/84.
(7) 10,000 AF of Needles Water delivered to CVWD in 1986 was credited to the Advance Delivery Account in 2011.
(8) Adjustment for rounding error to reconcile MWD Advance Delivery Account Balance
(9) CVWD's PVID credit
(10) Drought Water Bank
(11) Flexible Storage Payback at Lake Perris
(12) Since 1973
(13) CPV Sentinel
* Not deducted from the Advance Delivery Account
** Added to the Advance Delivery Account
Not included in DWR Bulletin 132-17 Appendix B Table B-5B

/DFS
101-33P42TBLS.xlsx/Exhibit6
(5/29/2018)

**EXHIBIT 7**
**DESERT WATER AGENCY AND COACHELLA VALLEY WATER DISTRICT**
**COMPARISON OF HISTORIC AND PROPOSED GROUNDWATER REPLENISHMENT**
**ASSESSMENT RATE FOR THE WEST WHITEWATER RIVER AND MISSION CREEK SUBBASIN AOBS**

| | DWA | | CVWD WEST WHITEWATER | | CVWD MISSION CREEK | |
|---|---|---|---|---|---|---|
| YEAR | $/AF | % INCREASE | $/AF | % INCREASE | $/AF | % INCREASE |
| 78/79 | $6.81 | --- | No Assessment | --- | No Assessment | --- |
| 79/80 | $9.00 | 32% | No Assessment | --- | No Assessment | --- |
| 80/81 | $9.50 | 6% | $5.66 | --- | No Assessment | --- |
| 81/82 | $10.50 | 11% | $7.43 | 31% | No Assessment | --- |
| 82/83 | $21.00 | 100% | $19.82 | 167% | No Assessment | --- |
| 83/84 | $36.50 | 74% | $33.23 | 68% | No Assessment | --- |
| 84/85 | $37.50 | 3% | $34.24 | 3% | No Assessment | --- |
| 85/86 | $31.00 | -17% | $21.81 | -36% | No Assessment | --- |
| 86/87 | $21.00 | -32% | $19.02 | -13% | No Assessment | --- |
| 87/88 | $22.50 | 7% | $19.55 | 3% | No Assessment | --- |
| 88/89 | $20.00 | -11% | $15.96 | -18% | No Assessment | --- |
| 89/90 | $23.50 | 18% | $19.66 | 23% | No Assessment | --- |
| 90/91 | $26.00 | 11% | $23.64 | 20% | No Assessment | --- |
| 91/92 | $31.75 | 22% | $25.66 | 9% | No Assessment | --- |
| 92/93 | $31.75 | 0% | $28.23 | 10% | No Assessment | --- |
| 93/94 | $31.75 | 0% | $31.05 | 10% | No Assessment | --- |
| 94/95 | $31.75 | 0% | $34.16 | 10% | No Assessment | --- |
| 95/96 | $31.75 | 0% | $37.58 | 10% | No Assessment | --- |
| 96/97 | $31.75 | 0% | $37.58 | 0% | No Assessment | --- |
| 97/98 | $31.75 | 0% | $42.09 | 12% | No Assessment | --- |
| 98/99 | $31.75 | 0% | $47.14 | 12% | No Assessment | --- |
| 99/00 | $31.75 | 0% | $52.80 | 12% | No Assessment | --- |
| 00/01 | $33.00 | 4% | $59.14 | 12% | No Assessment | --- |
| 01/02 | $33.00 | 0% | $66.24 | 12% | No Assessment | --- |
| 02/03 | $35.00 | 6% | $72.86 | 10% | $59.80 | --- |
| 03/04 | $35.00 | 0% | $72.86 | 0% | $59.80 | 0% |
| 04/05 | $45.00 | 29% | $78.86 | 8% | $59.80 | 0% |
| 05/06 | $50.00 | 11% | $78.86 | 0% | $59.80 | 0% |
| 06/07 | $63.00 | 26% | $83.34 | 6% | $65.78 | 10% |
| 07/08 | $63.00 | 0% | $91.67 | 10% | $72.36 | 10% |
| 08/09 | $72.00 | 14% | $93.78 | 2% | $76.60 | 6% |
| 09/10 | $72.00 | 0% | $102.45 | 9% | $87.56 | 14% |
| 10/11 | $82.00 | 14% | $102.45 | 0% | $89.75 | 3% |
| 11/12 | $82.00 | 0% | $107.57 | 5% | $98.73 | 10% |
| 12/13 | $92.00 | 12% | $110.26 | 3% | $98.73 | 0% |
| 13/14 | $92.00 | 0% | $110.26 | 0% | $98.73 | 0% |
| 14/15 | $102.00 | 11% | $110.26 | 0% | $98.73 | 0% |
| 15/16 | $102.00 | 0% | $112.00 | 2% | $112.00 | 13% |
| 16/17 | $102.00 | 0% | $128.80 | 15% | $123.20 | 10% |
| 17/18 | $120.00 | 18% | $143.80 | 12% | $135.52 | 10% |
| 18/19 | $140.00 * | 17% | $143.80 * | 0% | $135.52 * | 0% |

* Proposed replenishment assessment rate

# APPENDIX A

**APPENDIX A**
**UPPER COACHELLA VALLEY**
**MONTHLY AND ANNUAL RECORDED PRECIPITATION DATA**
**(INCHES)**
**2017**

| STATION NAME | WHITEWATER NORTH | SNOW CREEK | DESERT HOT SPRINGS | TACHEVAH DAM | TRAM VALLEY | CATHEDRAL CITY | THOUSAND PALMS | PALM SPRINGS SUNRISE | EDOM HILL | OASIS | MECCA LANDFILL III | THERMAL AIRPORT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LOCATION** | **WWR** | **WWR** | **MC** | **WWR** | **WWR** | **WWR** | **WWR** | **WWR** | **MC** | **EWR** | **EWR** | **EWR** |
| **STATION NUMBER** | **233** | **207** | **57** | **216** | **224** | **34** | **222** | **442** | **436** | **431** | **432** | **443** |
| JANUARY | 10.40 | 11.30 | 3.51 | 4.73 | 8.81 | 2.57 | 2.12 | 4.27 | 2.49 | 1.41 | 0.94 | 1.39 |
| FEBRUARY | 2.89 | 3.41 | 2.09 | 1.49 | 2.68 | 2.05 | 1.62 | 1.74 | 1.48 | 0.69 | 0.50 | 0.68 |
| MARCH | 0.30 | 0.52 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 |
| APRIL | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MAY | 0.03 | 0.01 | 0.00 | 0.00 | 0.08 | 0.02 | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 |
| JUNE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| JULY | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.05 | 0.06 | 0.00 |
| AUGUST | 0.09 | 0.09 | 0.34 | 0.00 | 0.56 | 0.55 | 0.78 | 0.93 | 0.25 | 0.16 | 0.01 | 0.08 |
| SEPTEMBER | 0.00 | 0.02 | 0.20 | 1.29 | 0.81 | 0.32 | 0.04 | 1.71 | 0.07 | 0.16 | 0.39 | 1.09 |
| OCTOBER | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NOVEMBER | 0.02 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DECEMBER | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **TOTAL** | **13.73** | **15.38** | **6.15** | **7.54** | **12.94** | **5.51** | **4.58** | **8.68** | **4.29** | **2.49** | **1.91** | **3.25** |
| **AVERAGE: UPPER** | **8.76** | | | | | | | | | | | |
| **AVERAGE: LOWER** | | | | | | | | | | **2.55** | | |
| **AVERAGE: ALL** | **7.20** | | | | | | | | | | | |

**APPENDIX B**

# ADDENDUM TO SETTLEMENT AGREEMENT
# MANAGEMENT AREA DELIVERIES

The Settlement Agreement between Coachella Valley Water District (CVWD), Desert Water Agency (DWA) and Mission Springs Water District (MSWD) dated December 7, 2004 shall be supplemented by the following Addendum, and thus shall be deemed a part thereof:

The Mission Creek Groundwater Replenishment Agreement provides for the delivery to the Mission Creek Subbasin, for groundwater replenishment, of a proportionate share of the imported water delivered to CVWD and DWA for replenishment of the Upper Coachella Valley Groundwater Basin. To ensure that the Mission Creek Subbasin receives its proportionate share of that water, as set forth in the Mission Creek Replenishment Agreement, and to provide for the monitoring thereof, the following procedures shall be applied:

Each year CVWD and DWA shall calculate the combined total quantity of water produced during the previous year from the Whitewater River Management Area and the Mission Creek Management Area, and from sources tributary to those Management Areas, and shall determine from that the percentages of the total production from those Management Areas and their sources.

Water supplies available to CVWD and DWA each year, through their respective State Water Project Contracts, for the replenishment of those Management Areas will be allocated and delivered to the Management Areas for groundwater replenishment in the same percentages, subject to delivery capability and operational constraints in any particular year.

In the event that additional subbasins benefit from recharge programs within CVWD and DWA boundaries, the respective production and recharge delivery percentages from those management areas in those subbasins shall be included in the above described calculations, allocations, and deliveries.

Production and recharge quantities shall be reviewed by the parties to the Management Committee (MSWD, CVWD and DWA) through the Management Committee process. CVWD and DWA will endeavor to accomplish annual proportionate management area deliveries; however, when constrained by operating limitations, they may over deliver or under deliver water to the management areas from year to year as necessary to obtain as much imported water as may be available. Cumulative water deliveries between or among management areas shall be balanced as and when determined by the Management Committee, but no later than 20 years from the date of the settlement agreement and each 20 years thereafter.

The provisions of this Addendum may be enforced by any party hereto.

IN WITNESS WHEREOF, The Parties have caused this Addendum to be executed by their duly authorized representatives on the date first above written.

**MSWD:**

Mission Springs Water District,
a California county water district

By _____

Its: President

By _____

Its: Vice President

**DWA:**

Desert Water Agency,
a public agency of the State of California

By _____

Its: President

By _____

Its: Vice President

**CVWD:**

Coachella Valley Water District,
a California county water district

By _____

Its: President

By _____

Its: Vice President