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 2019/2020

MAY 2019

Prepared by

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

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

101-33.43
(DFS/nr/blt)
(REPORTS/101-33P43RPT)

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 were adopted in the 2018/2019 Engineer's Report:

- "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 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 81,000 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 gross overdraft, without artificial replenishment, will result in declining groundwater levels and increasing pump lifts, thereby increasing energy consumption for groundwater extraction. Extreme cumulative gross 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 gross 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 AOB (including its upstream tributaries), or diversion of surface water that would otherwise naturally replenish the groundwater within the Management Area or AOB (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 Water Management Plan (WMP).

The MC/GH WMP determined that, since artificial recharge activities began, the GH has benefitted from artificial recharge in both 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 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 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 WWR 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 1996, 2005, 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 and Desert Water Agency Law.

Because groundwater production continues to exceed natural groundwater replenishment and cumulative gross 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 gross 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 2019 Table A SWP water allocation of 55,750 AF pursuant to its SWP Contract, for the purpose of groundwater replenishment. CVWD plans to do the same with its maximum 2019 Table A water allocation.

By virtue of the 2003 Exchange Agreement, The Metropolitan Water District of Southern California (MWD) temporarily transferred 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 California Department of Water Resources (CDWR) Notification 19-07 to State Water Project Contractors for 2019, dated March 20, 2019, CDWR will deliver 70% of Table A water allocation requests, resulting in deliveries of 135,870 AF of Table A water to the Coachella Valley agencies . Of the aforesaid quantity, 52,945 AF is scheduled for delivery during 2019 and 82,925 AF is scheduled to be carried over to 2020. For 2019, 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, water under the Yuba River Accord will be available to DWA via MWD for 2019. No Article 56 water will be carried over from

2018. However, CVWD is anticipated to receive approximately 44,500 AF of non-SWP water deliverable to the Whitewater River Replenishment Facility.

Pursuant to current Desert Water Agency Law, the maximum permissible replenishment assessment rate that can be established for fiscal year 2019/2020 is $202.17/AF, based on DWA's estimated Applicable Charges (Delta Water Charge, Variable Transportation Charge, and Off-Aqueduct Power Charge) of $9,170,249 (average of estimated 2019 and 2020 Applicable Charges) and estimated 2019/2020 combined assessable production of 45,360 AF within the WWR, MC, and GH AOBs.

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**. DWA has utilized two bases for estimating assessable production, either assessable production for the previous year, or, when statewide conservation mandates are in effect, a specified year's assessable production minus a water conservation factor. For the current report, the estimated assessable production for all three AOBs is being based on the assessable production for the previous year (2018), since the statewide conservation mandate has been satisfied.

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 DWA and CVWD, and based on DWA's estimated 2019/2020 Allocated Charges of $8,546,888 and estimated 2019 calendar year assessable production (shown in **Table 6** as estimated 2019/2020 assessable production) of 45,360 AF within the WWR, MC, and GH, the effective replenishment assessment rate component for Table A water

for the 2019/2020 fiscal year is $188/AF. **Table 7** includes DWA's historical estimated, actual effective, and estimated projected replenishment assessment rates.

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 2021/2022 were calculated to incorporate a diminishing deficit, to be recovered in subsequent years. The rate range adopted for the 2019/2020 fiscal year was $125 to $155. 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, since the 2019/2020 effective rate exceeds the maximum rate of the specified range for 2019/2020, DWA will levy a rate of $155/AF for FY 2019/2020, which is the maximum of the specified range.

At that rate, DWA's replenishment assessment for the entire Replenishment Program will be about $7,030,800, based on estimated assessable production of 45,360 AF (35,510 AF for the WWR AOB, 9,690 AF for the MC AOB, and 160 AF for the GH AOB). Accordingly, DWA will bill approximately $5,504,050 for the WWR AOB, approximately $1,501,950 for the MC AOB, and approximately $24,800 for the GH AOB.

Due to significant increases in the Delta Water Charge beginning 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 2019 calendar year is 160 AF, yielding $24,800 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 538,000 AF in the WWR Management Area (since 1956) and 109,000 AF in the MC Management Area (since 1978). Thus, there is a continuing need for groundwater replenishment to maintain stable groundwater levels for sustainability. Even though DWA has requested of CDWR its full SWP Table A allocation of 55,750 AF, CDWR has approved delivery of 70% of this allocation during the coming year, and DWA has elected to adopt a groundwater replenishment assessment rate for 2019/2020 of $155.00/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 AOBs 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 Whitewater River (Indio) 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 2018. 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 (Number 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 Update to the Coachella Valley Water Management Plan. 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 Coachella Valley Water Management Plan.

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 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 significantly declining water levels. The management area was established to encompass the area of groundwater overdraft as

evidenced by declining water level 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 AOBs. 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 AOBs, 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 2018, CVWD and DWA have replenished the WWR and MC Management Areas with approximately 3,648,028 AF (3,482,907 AF to WWR

Management Area and 161,588 AF to MC Management Area). Of this total, 3,355,379 AF consisted of exchange deliveries (Colorado River water exchanged for SWP water, including advance deliveries) and 4,272,705 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 2018, MWD had converted approximately 917,326 AF of advance delivered water to exchange water deliveries, leaving a balance of approximately 235,025 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 2018, the final allocation was 30% of maximum Table A allocations. However, the Table A water deliveries during 2018 amounted to approximately 35% of maximum Table A allocations. As of the writing of this report, Table A water deliveries in 2019 are projected to be 70% 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. To date, no Article 56 water carried over from 2018 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 past 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. According to communications from MWD management, it is unlikely that MWD will make any recalls for the foreseeable future.

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 2018, DWA and CVWD were not allocated any SWP surplus water under the Turn-Back Water Pool Program. Based on current projections, CVWD and DWA will not receive any Turn-Back Water Pool water in 2019.

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 2019 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 2019.

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. In 2018, CVWD and DWA jointly obtained 1,246 AF of water under the Yuba River Accord. CVWD and DWA are not scheduled to receive any water under the Yuba River Accord during 2019.

e. Past Year Water Deliveries

Total artificial recharge (to both the Whitewater River and Mission Creek Replenishment Facilities) for 2018 was 166,752 AF (including CVWD's MWD Quantitative Settlement Agreement purchases). 164,725 AF was delivered to the Whitewater River Replenishment Facility and 2,027 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 2019, based on delivery of 70% of the maximum Table A allocation, is as follows: 52,945 AF of Table A water (70% allocation of 135,870 AF minus 82,925 AF to be carried over to 2020). The estimated quantity of supplemental water is as follows: 0 AF of Turn-Back Pool water, 0 AF of Article 21 water, 0 AF of Yuba water, 9,500 AF of Rosedale/Glorious Land water (CVWD), and 35,000 AF of CVWD Quantitative Settlement Agreement water, for a grand total of approximately 97,445 AF. During the first three months of 2019, a total of 9,868 AF of Colorado River water has already been delivered to the Whitewater River Replenishment Facility, and a total of 1,171 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 3,951,000 AF in the WWR Management Area (since 1956) and 267,000 AF in the MC Management Area (since 1978). Cumulative net overdraft, (cumulative gross overdraft offset by artificial replenishment) is currently estimated at 538,000 AF in the WWR Management Area and 109,000 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 2017 SWP deliverability projections 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 91.8% of imported water deliveries in 2019 will be directed to the WWR Management Area and 8.2% to the MC Management Area based on 2018 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

As discussed in previous reports, the State of California is proposing a program of improvements to the SWP under the name *California WaterFix.*

The California WaterFix program 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.

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, CDWR 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. However, in his first State of the State address on February 12, 2019, Governor Gavin Newsom announced that he supports only the single-tunnel alternative.

Eventually, SWP water supply reliability, quality, and delivered quantities and the overall health of the Delta may improve upon implementation of either of the California WaterFix alternatives; however, it is unlikely that the costs for Delta improvements will be allocated to the State Water Contractors before 2025.

2) California Drought

In addition to the existing restrictions on water supplies from the SWP, California recently 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. The statewide drought emergency was declared at an end in early 2017 due to a series of winter storms producing record-level rainfall.

During the course of the drought, the state implemented a number of mandatory water conservation measures, which are discussed in detail in the previous report, along with the efforts of DWA and CVWD to comply with said measures.

At the end of the process, DWA elected to retain a 10% to 13% conservation target for its customers for the purposes of long-term sustainability.

The winter storms of 2018-2019 have nearly completely ended the drought conditions in California. According to the California Drought Monitor website, as of March 2019, no part of California is listed as

being in moderate or higher drought conditions, and only portions of Modoc, Orange, Western Riverside, San Diego, and Southern Imperial Counties are listed as being in "abnormally dry" 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, CDWR issued the 2015 SWP Deliverability Capability Report. Beginning with said Report, CDWR 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). CDWR 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 CDWR's 2015 Delivery Capability Report.

In March of 2018, CDWR 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 CDWR 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 AOBs, water production within said AOBs, 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 water conservation programs implemented by both agencies and also partly to poor economic conditions reducing demands.

During the past five calendar years (2014 through 2018), average annual water production within the WWR Management Area has been about 156,000 AF/Yr, approximately three-fourths of which took place within CVWD's AOB and approximately one-fourth within DWA's AOB. Current (2018 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 52,100 AF/Yr, while natural outflow is currently estimated at approximately 21,600 AF/Yr (MWH 2011). Thus, approximately 30,500 AF (natural inflow less natural outflow) of natural, or native, groundwater is currently available for water supply.

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 by vegetation 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 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, Stantec 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 2018 was 166,752 AF (including CVWD's MWD Quantitative Settlement Agreement purchases). Of this quantity, 164,725 AF were delivered to the Whitewater River Replenishment Facility (the largest annual delivery to Whitewater in history), and 2,027 AF were delivered to the Mission Creek Replenishment Facility. 35,000 AF of the quantity delivered to WWR 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 156,000 AF for the past five years (including approximately 500 AF of annual production by minimal pumpers) has been met with an average of approximately 27,600 AF of net natural recharge, an average of approximately 48,600 AF of non-consumptive return, and 115,700 AF of net artificial recharge (less evaporative losses), resulting in a net increase in groundwater in storage of about 35,900 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 81,000 AF/Yr over the last five years. Since 1956, cumulative gross overdraft (net pumpage minus net natural recharge) is currently estimated at approximately 3,951,000 AF, and cumulative net overdraft (cumulative gross overdraft offset by artificial recharge) is currently estimated to be about 538,000 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 (2014 through 2018), 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 (2018 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 31% of total estimated production, or about 4,800 AF/Yr (average for the past five years).

D. ARTIFICIAL REPLENISHMENT

Total artificial replenishment (to both the WWR and MC Management Areas) for 2018 was 166,752 AF (including CVWD's MWD Quantitative Settlement Agreement purchases). Of this quantity, 2,027 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 91.8% of imported water deliveries in 2019 will be directed to the WWR Management Area and 8.2% to the MC Management Area based on 2018 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 3,400 AF of net natural recharge, approximately 4,800 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 2,700 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 2018, and 2,500 AF/Yr from 1998 through 2018 (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 267,000 AF, and cumulative net overdraft (cumulative gross overdraft offset by artificial recharge) is currently estimated to be about 109,000 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 (2018 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 33 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 AOBs 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 2019/2020 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 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 2018 WATER PRODUCTION AND ESTIMATED 2019/2020 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 metered water production. 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.

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**. DWA has utilized two bases for estimating assessable production, either assessable production for the previous year, or, when statewide conservation mandates are in effect, a specified year's assessable production minus a water conservation factor. For the current report, the estimated assessable production for all three AOBs is being based on the assessable production for the previous year (2018), since the statewide conservation mandate has been satisfied.

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

In 2018, actual reported production within CVWD's AOB within the WWR Management Area was about 3.4 times that within DWA's AOB, 119,250 AF versus 35,505 AF, whereas actual production within DWA's AOB within the MC Management Area was about 2.3 times that within

CVWD's AOB, 9,695 AF versus 4,175 AF. Production within DWA's GH AOB accounts for 100% of the total production, at 165 AF. DWA's 2018 actual production accounts for approximately 26.9% of the 168,791 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 132-18.

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 2019/2020 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% was applied in 2018 and is being applied in 2019.

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 the 2018/2019 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 SWP water for future years, including the 2019/2020 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 2019/2020--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, 2014 through 2018, DWA has been responsible for approximately 22.15% of the water produced within the WWR Management Area, and 69.16% 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 2018, DWA was responsible for approximately 26.9% of the combined water production within the Management Areas. On the assumption that DWA's relative production for 2019 and thereafter will be about the same as for 2018, DWA's share of the combined Applicable SWP Charges (i.e. Allocated Charges) for the next 17 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 decrease by about 20% between 2018 and 2019, decrease by about 2% between 2019 and 2020 and increase by about 10% between 2020 and 2021. 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 2019 Allocated Charges are about 93% 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 2019/2020 is $202.17/AF, based on DWA's estimated Applicable Charges (Delta Water Charge, Variable Transportation Charge, and Off-Aqueduct Power Charge) of $9,170,249 (average of estimated 2019 and 2020 Applicable Charges) and estimated 2019/2020 combined assessable production of 45,360 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**.

Pursuant to the terms of the Water Management Agreement between DWA and CVWD, and based on DWA's estimated 2019/2020 Allocated Charges of $8,546,888 and estimated 2019 calendar year assessable production (shown in **Table 6** as estimated 2019/2020 assessable production) of 45,360 AF within the WWR, MC, and GH, the effective replenishment assessment rate component for Table A water for the 2019/2020 fiscal year is $188/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, SWP 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 91.8% and 8.2% respectively for 2018. 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 165 AF in 2018. Of that 165 AF, 91.8% (151 AF) is assessed as part of the Whitewater River Subbasin, and 8.2% (13.5 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 2019/2020 Replenishment Assessment Rates

As shown in **Table 6**, the estimated effective Table A Assessment Rate is $188/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 $155/AF established in the Proposition 218 proceedings for 2019/2020. Therefore, as shown in **Table 7**, the recommended replenishment assessment rates proposed for 2019/2020 are:

- **$155.00/AF** for the West Whitewater River Subbasin (WWR) AOB,
- **$155.00/AF** for the Mission Creek Subbasin (MC) AOB, and
- **$155.00/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 2019/2020

The maximum replenishment assessment that can be levied by DWA for combined estimated production of 45,360 AF (see **Table 2**) within the WWR, MC, and GH AOBs based on a replenishment assessment rate of $155.00/AF is approximately $7,030,800 ($5,504,050 in the WWR AOB, $1,501,950 in the MC AOB, and $24,800 in the GH AOB).

DWA will continue to be the major producer within the WWR AOB, with assessable production of approximately 33,770 AF; seven other producers will be responsible for the remaining 1,740 AF of estimated assessable production. DWA will also be the major assessee with an estimated replenishment assessment of $5,234,350. The seven other producers will be responsible for the remaining $269,700. DWA will therefore be responsible for approximately 95% 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 5%.

MSWD will be the major producer within the MC AOB, with assessable production of approximately 7,570 AF; four other producers will be responsible for the remaining 2,120 AF of estimated assessable production. MSWD will also be the major assessee with an estimated replenishment assessment of $1,173,350. The four other producers will be responsible for the remaining $328,600. 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 150 AF and 10 AF, respectively. MSWD will also be the major assessee with an estimated replenishment assessment of $23,250, while the Indigo Power Plant is responsible for the remaining $1,550. MSWD will be responsible for approximately 94% of both the estimated assessable water production and the estimated replenishment in the GH AOB; Indigo Power Plant will be responsible for the remaining 6%.

CHAPTER VII
BIBLIOGRAPHY

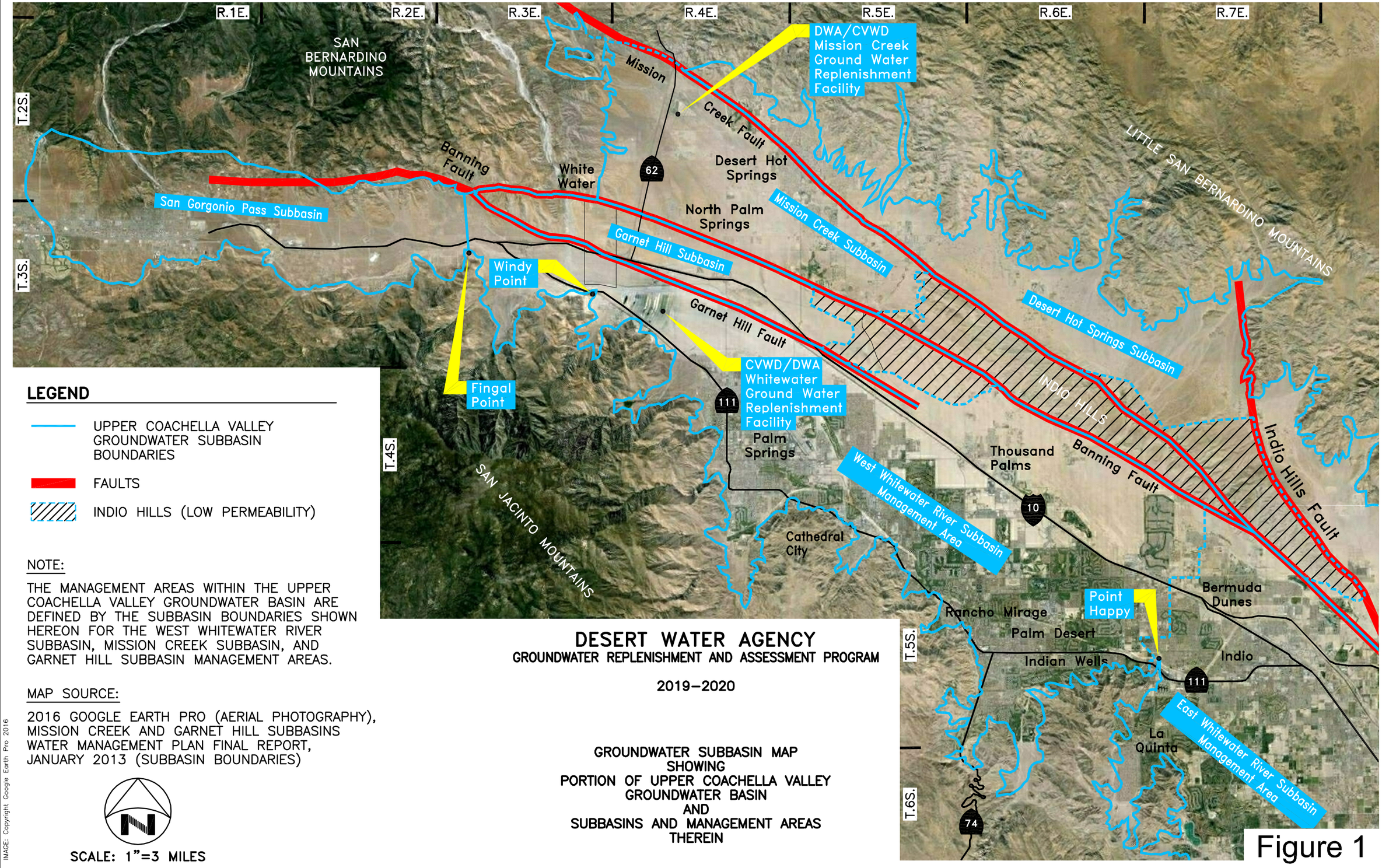
CHAPTER VII
BIBLIOGRAPHY

- 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*, reports prepared by Krieger & Stewart for Fiscal Years 2016/2017 and 2017/2018
- Desert Water Agency, *Engineer's Report: Groundwater Replenishment and Assessment Program for the West Whitewater River Subbasin, Mission Creek Subbasin, and Garnet Hill Subbasin Areas of Benefit 2018/2019*, prepared by Krieger & Stewart, May 2018

- 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

2019–2020

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

2019–2020

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

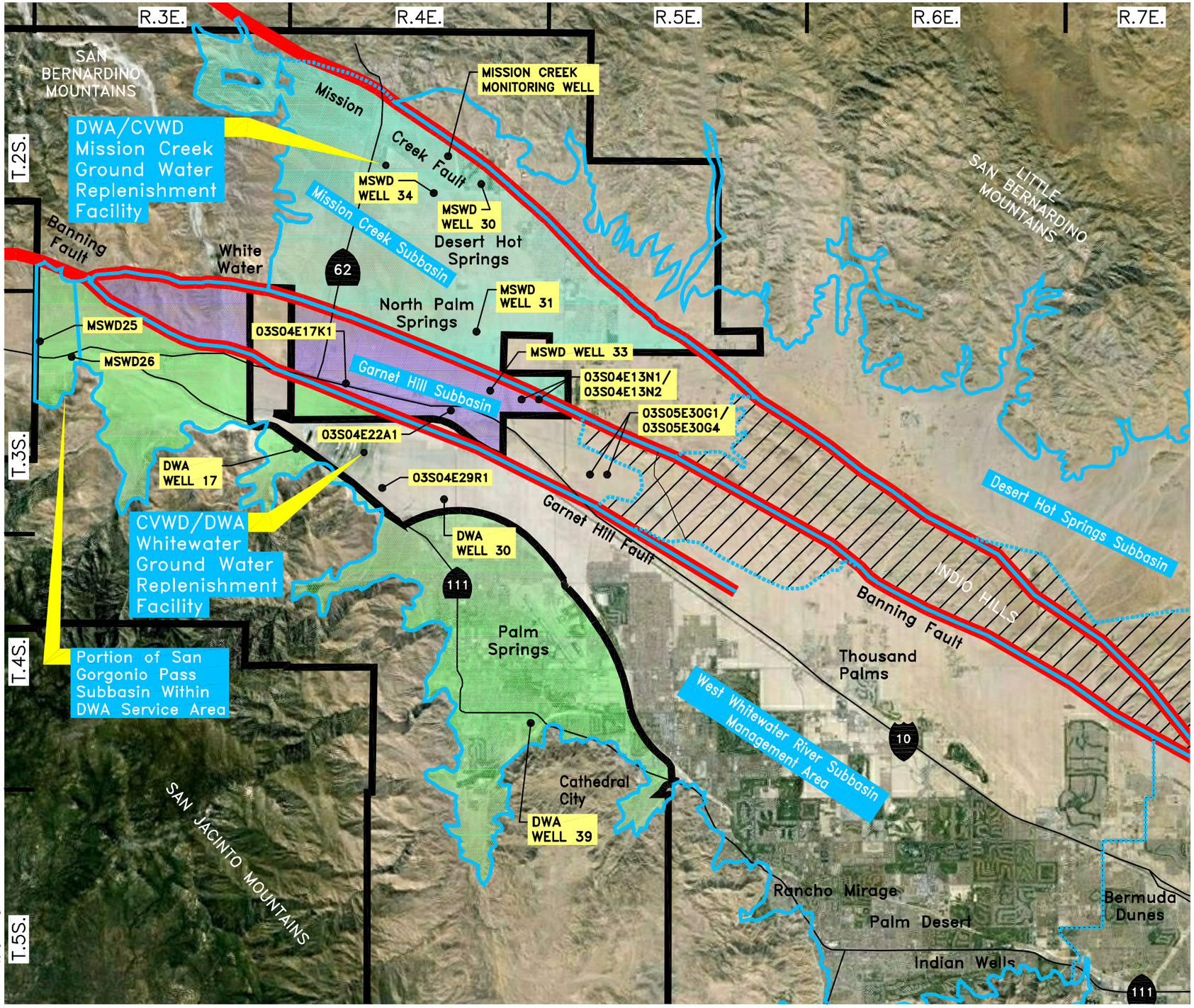


IMAGE: Copyright Google Earth Pro 2016

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

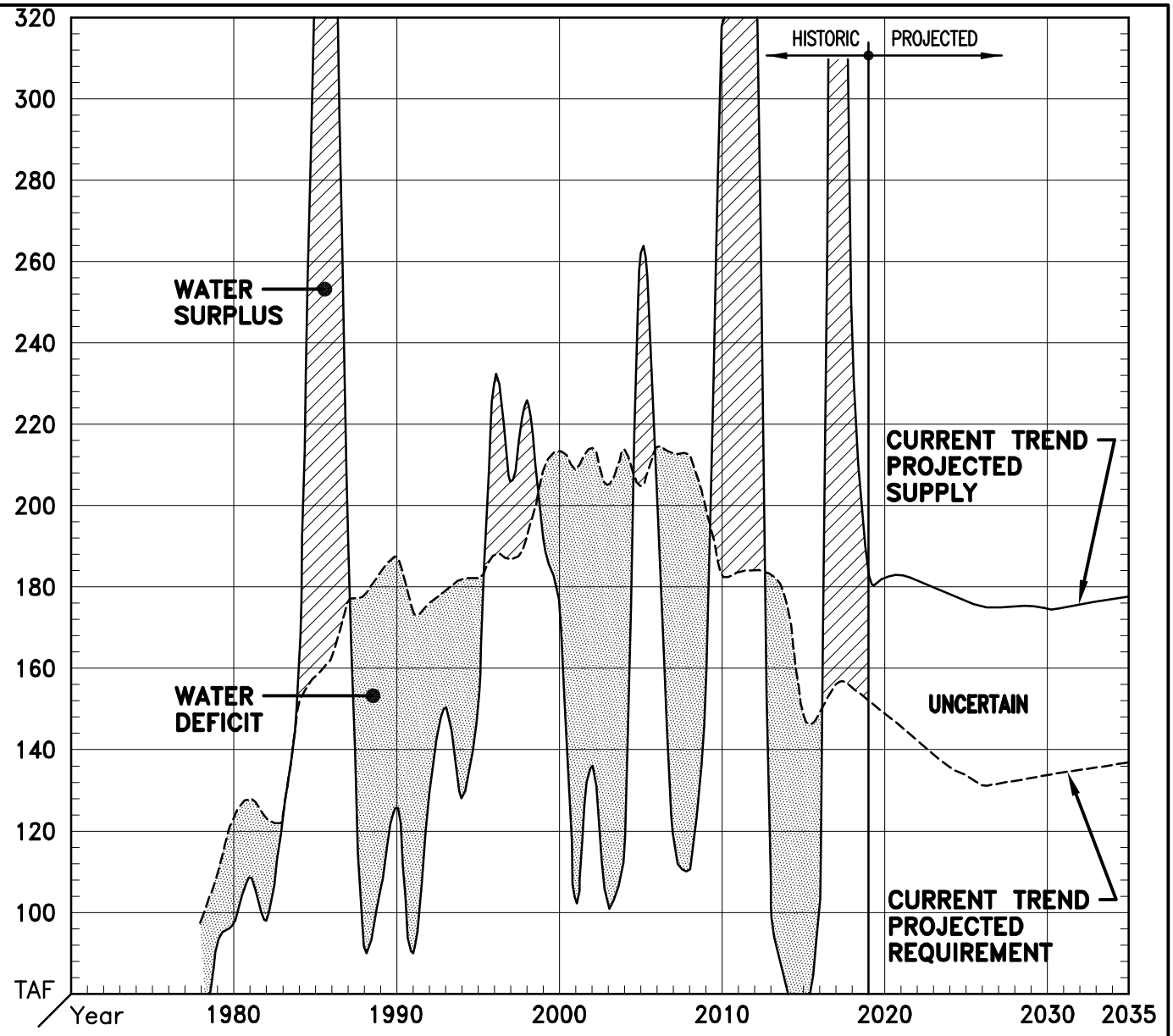
MAP SOURCE:

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\33p43\Drawings\Figures\101-33p43f2.dwg



YEARS	1980	1990	2000	2010	2020	2030	2035
NET INFLOW (ACRE FEET)	98,000	125,800	174,500	317,100	182,739	174,609	177,683
NONCONSUMPTIVE RETURN	43,200	65,700	74,500	64,300	48,000	43,000	44,000
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

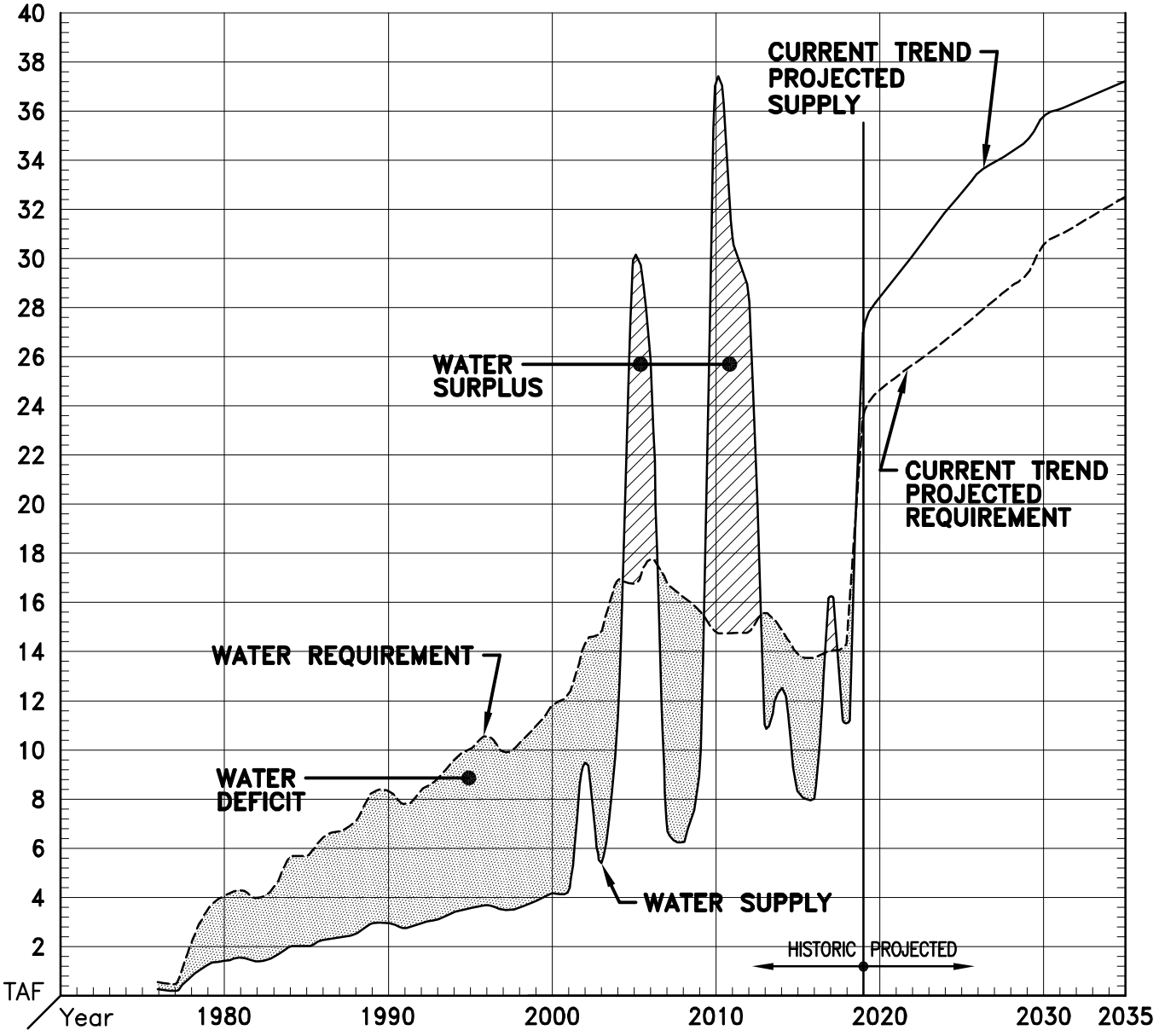
DESERT WATER AGENCY

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

FIGURE 3

SCALE: N/A DATE: 03/25/19 DRAWN BY: SPK CHECKED BY: DFS W.O.: 101-33.43

101-33p43f3.dwg



YEARS	1980	1990	2000	2010	2020	2030	2035
NET INFLOW (ACRE FEET)	1,400	2,900	4,100	37,700	28,400	35,800	37,200
NONCONSUMPTIVE RETURN	1,400	2,900	4,100	5,200	7,600	9,500	10,100
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: 03/25/19 DRAWN BY: SPK CHECKED BY: DFS W.O.: 101–33.43

101–33p43f4.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), 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							
YEAR	WWR AF	MC AF	WWR AF	MC AF	GH AF	WWR AF	WWR AF	COMB AF	GWE AF	SWD AF	TOTAL AF	TOTAL AF	TOTAL AF	COMB 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%
2018	119,250	4,175	33,873	9,695	165	1,632	35,505	45,365	153,124	1,632	154,755	13,871	165	168,791	77.06%	22.94%	73.12%	26.88%	30.10%	69.90%

NOTES:

Cumulative CVWD and DWA West Whitewater River Subbasin Management Area production 2014 through 2018: 779,540 AF
Cumulative CVWD and DWA Mission Creek Subbasin Management Area production 2014 through 2018: 67,729 AF
Average annual CVWD and DWA West Whitewater River Subbasin Management Area production 2014 through 2018 (rounded): 155,910 AF
Average annual CVWD and DWA Mission Creek Subbasin Management Area production 2014 through 2018 (rounded): 13,550 AF
Average annual DWA West Whitewater River Subbasin Area of Benefit production 2014 through 2018 (rounded): 34,530 AF
Average annual DWA Mission Creek Subbasin Area of Benefit production 2014 through 2018(rounded): 9,370 AF
Average DWA West Whitewater River Subbasin Area of Benefit production percentage 2014 through 2018: 22.15%
Average DWA Mission Creek Subbasin Area of Benefit production percentage 2014 through 2018: 69.16%

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
2019/2020

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	35,510	$155.00	$5,504,050	78%
Mission Creek Subbasin AOB	9,690	$155.00	$1,501,950	21%
Garnet Hill Subbasin AOB	160	$155.00	$24,800	0%
Combined AOBs	45,360		$7,030,800	100%

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

Producer	2018 Water Production (1) Groundwater Extraction AF	Surface Water Diversion AF	Combined Water Production AF	Estimated 2019/2020 Assessable Water Production AF[2]	Estimated Water Replenishment Assessment @ $155/AF $	Percent
West Whitewater River Subbasin AOB						
Desert Water Agency (Chino, Falls, Snow Creeks)	32,135.33	1,007	33,142	33,140	$5,136,700	93.33%
Desert Water Agency (Whitewater)	0.00	625	625	630	$97,650	1.77%
Caltrans Rest Stop	51.08	0	51	50	$7,750	0.14%
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	570.34	0	570	570	$88,350	1.61%
Los Compadres	47.29	0	47	50	$7,750	0.14%
Mission Springs Water District (Wells 25 & 25A and 26 &26A)	152.98	0	153	150	$23,250	0.42%
Seven Lakes Country Club	158.85	0	159	160	$24,800	0.45%
Escena	495.32	0	495	500	$77,500	1.41%
Palm Springs Village	262.24	0	262	260	$40,300	0.73%
Palm Springs West	0.00	0	0	0	$0	0.00%
Subtotal	33,873.43	1,632	35,505	35,510	$5,504,050	100.00%
Mission Creek Subbasin AOB						
Mission Springs Water District	7,568	0	7,568	7,570	$1,173,350	78.12%
Hidden Springs Country Club	425	0	425	420	$65,100	4.33%
Mission Lakes Country Club	1,013	0	1,013	1,010	$156,550	10.42%
Sands RV Resort	414	0	414	410	$63,550	4.23%
CPV-Sentinel	276	0	276	280	$43,400	2.89%
Subtotal	9,695.35	-	9,695	9,690	$1,501,950	100.00%
Garnet Hill Subbasin AOB						
Mission Springs Water District	154	0	154	150	$23,250	93.75%
Indigo Power Plant	10	0	10	10	$1,550	6.25%
Subtotal	165	0	165	160	$24,800	100.00%
Total	43,734	1,632	45,365	45,360	$7,030,800	

(1) 2018 Metered water production, except for Exempt Production and Estimated Production.
(2) Based on 2018 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	83,908	83,908	5,779,583	68.88	12,344,361	148.39	111,815	1.33	18,235,759	217.33
2018	138,350	138,350	85,777	9,694,185	70.07	18,713,968	218.17	88,350	1.03	28,496,503	332.22
2019	138,350	138,350	85,777	9,279,115	67.07	13,279,137	154.81	231,598	2.70	22,789,850	265.69
2020	138,350	138,350	85,777	8,975,854	64.88	12,876,843	150.12	609,874	7.11	22,462,572	261.87
2021	138,350	138,350	85,777	9,389,537	67.87	15,285,461	178.20	11,151	0.13	24,686,150	287.79
2022	138,350	138,350	85,777	8,933,879	64.57	15,564,237	181.45	11,151	0.13	24,509,267	285.73
2023	138,350	138,350	85,777	9,167,261	66.26	15,318,057	178.58	11,151	0.13	24,496,469	285.58
2024	138,350	138,350	85,777	9,200,420	66.50	15,611,414	182.00	11,151	0.13	24,822,985	289.39
2025	138,350	138,350	85,777	9,207,859	66.55	15,813,848	184.36	11,151	0.13	25,032,858	291.84
2026	138,350	138,350	85,777	9,209,135	66.56	15,059,010	175.56	11,151	0.13	24,279,297	283.05
2027	138,350	138,350	85,777	9,628,302	69.59	15,647,440	182.42	11,151	0.13	25,286,893	294.80
2028	138,350	138,350	85,777	9,664,328	69.85	15,146,503	176.58	11,151	0.13	24,821,982	289.38
2029	138,350	138,350	85,777	9,702,372	70.13	15,447,580	180.09	11,151	0.13	25,161,103	293.33
2030	138,350	138,350	85,777	9,588,608	69.31	15,364,376	179.12	11,151	0.13	24,964,136	291.04
2031	138,350	138,350	85,777	9,743,996	70.43	16,936,669	197.45	11,151	0.13	26,691,815	311.18
2032	138,350	138,350	85,777	9,941,825	71.86	14,516,042	169.23	11,151	0.13	24,469,018	285.26
2033	138,350	138,350	85,777	10,086,241	72.90	16,648,458	194.09	11,151	0.13	26,745,850	311.81
2034	138,350	138,350	85,777	10,338,546	74.73	14,727,053	171.69	11,151	0.13	25,076,750	292.35
2035	138,350	138,350	85,777	10,405,738	75.21	19,174,591	223.54	11,151	0.13	29,591,479	344.98

(1) As set forth in CDWR Bulletin 132-18, 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	31,636	31,636	2,179,088	68.88	4,694,526	148.39	96,134	3.04	6,969,748	220.31
2018	55,750	55,750	34,565	3,906,403	70.07	7,541,046	218.17	81,573	2.36	11,529,022	333.55
2019	55,750	55,750	34,565	3,739,145	67.07	5,351,008	154.81	198,749	5.75	9,288,901	268.74
2020	55,750	55,750	34,565	3,616,942	64.88	5,188,898	150.12	245,757	7.11	9,051,596	261.87
2021	55,750	55,750	34,565	3,783,641	67.87	6,159,483	178.20	4,493	0.13	9,947,617	287.79
2022	55,750	55,750	34,565	3,600,027	64.57	6,271,819	181.45	4,493	0.13	9,876,340	285.73
2023	55,750	55,750	34,565	3,694,072	66.26	6,172,618	178.58	4,493	0.13	9,871,183	285.58
2024	55,750	55,750	34,565	3,707,433	66.50	6,290,830	182.00	4,493	0.13	10,002,757	289.39
2025	55,750	55,750	34,565	3,710,431	66.55	6,372,403	184.36	4,493	0.13	10,087,328	291.84
2026	55,750	55,750	34,565	3,710,945	66.56	6,068,231	175.56	4,493	0.13	9,783,670	283.05
2027	55,750	55,750	34,565	3,879,854	69.59	6,305,347	182.42	4,493	0.13	10,189,695	294.80
2028	55,750	55,750	34,565	3,894,371	69.85	6,103,488	176.58	4,493	0.13	10,002,353	289.38
2029	55,750	55,750	34,565	3,909,702	70.13	6,224,811	180.09	4,493	0.13	10,139,006	293.33
2030	55,750	55,750	34,565	3,863,859	69.31	6,191,283	179.12	4,493	0.13	10,059,635	291.04
2031	55,750	55,750	34,565	3,926,475	70.43	6,824,859	197.45	4,493	0.13	10,755,827	311.18
2032	55,750	55,750	34,565	4,006,193	71.86	5,849,435	169.23	4,493	0.13	9,860,121	285.26
2033	55,750	55,750	34,565	4,064,387	72.90	6,708,721	194.09	4,493	0.13	10,777,601	311.81
2034	55,750	55,750	34,565	4,166,057	74.73	5,934,465	171.69	4,493	0.13	10,105,015	292.35
2035	55,750	55,750	34,565	4,193,132	75.21	7,726,660	223.54	4,493	0.13	11,924,286	344.98

(1) As set forth in CDWR Bulletin 132-18, 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) %
2017	18,235,759	6,969,748	25,205,507	18,430,267	6,775,240		
						3,983,621	59
2018	28,496,503	11,529,022	40,025,525	29,266,664	10,758,861		
						(2,136,093)	(20)
2019	22,789,850	9,288,901	32,078,751	23,455,983	8,622,768		
						(151,760)	(2)
2020	22,462,572	9,051,596	31,514,168	23,043,160	8,471,008		
						838,549	10
2021	24,686,150	9,947,617	34,633,767	25,324,210	9,309,557		
						(66,706)	(1)
2022	24,509,267	9,876,340	34,385,607	25,142,756	9,242,851		
						(4,826)	0
2023	24,496,469	9,871,183	34,367,652	25,129,627	9,238,025		
						123,134	1
2024	24,822,985	10,002,757	34,825,742	25,464,582	9,361,159		
						79,147	1
2025	25,032,858	10,087,328	35,120,186	25,679,880	9,440,306		
						(284,181)	(3)
2026	24,279,297	9,783,670	34,062,967	24,906,841	9,156,125		
						379,982	4
2027	25,286,893	10,189,695	35,476,588	25,940,481	9,536,107		
						(175,326)	(2)
2028	24,821,982	10,002,353	34,824,334	25,463,553	9,360,781		
						127,888	1
2029	25,161,103	10,139,006	35,300,108	25,811,439	9,488,669		
						(74,279)	(1)
2030	24,964,136	10,059,635	35,023,771	25,609,381	9,414,390		
						651,536	7
2031	26,691,815	10,755,827	37,447,643	27,381,716	10,065,926		
						(838,254)	(8)
2032	24,469,018	9,860,121	34,329,139	25,101,466	9,227,672		
						858,632	9
2033	26,745,850	10,777,601	37,523,451	27,437,147	10,086,304		
						(629,446)	(6)
2034	25,076,750	10,105,015	35,181,765	25,724,906	9,456,858		
						1,702,580	18
2035	29,591,479	11,924,286	41,515,765	30,356,327	11,159,438		

(1) Proportioned in accordance with 2018 Water Management Area production percentages; CVWD is responsible for 73.12% and DWA is responsible for 26.88% 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]	9,690,815	44,270	218.90	219.00
2019/2020	[4]	8,546,888	45,360	188.42	188.00
2020/2021	[4]	8,890,283	47,007	189.13	189.00
2021/2022	[4]	9,276,204	46,694	198.66	199.00
2022/2023	[4]	9,240,438	46,380	199.23	199.00
2023/2024	[4]	9,299,592	46,066	201.88	202.00
2024/2025	[4]	9,400,733	45,886	204.87	205.00
2025/2026	[4]	9,488,207	45,846	206.96	207.00
2026/2027	[4]	9,346,116	46,075	202.85	203.00
2027/2028	[4]	9,448,444	46,569	202.89	203.00
2028/2029	[4]	9,424,725	47,063	200.26	200.00
2029/2030	[4]	9,451,530	47,775	197.83	198.00
2030/2031	[4]	9,740,158	48,434	201.10	201.00
2031/2032	[4]	9,646,799	48,821	197.60	198.00
2032/2033	[4]	9,656,988	49,208	196.25	196.00
2033/2034	[4]	9,771,581	49,593	197.04	197.00
2034/2035	[4]	10,308,148	49,977	206.26	206.00

(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

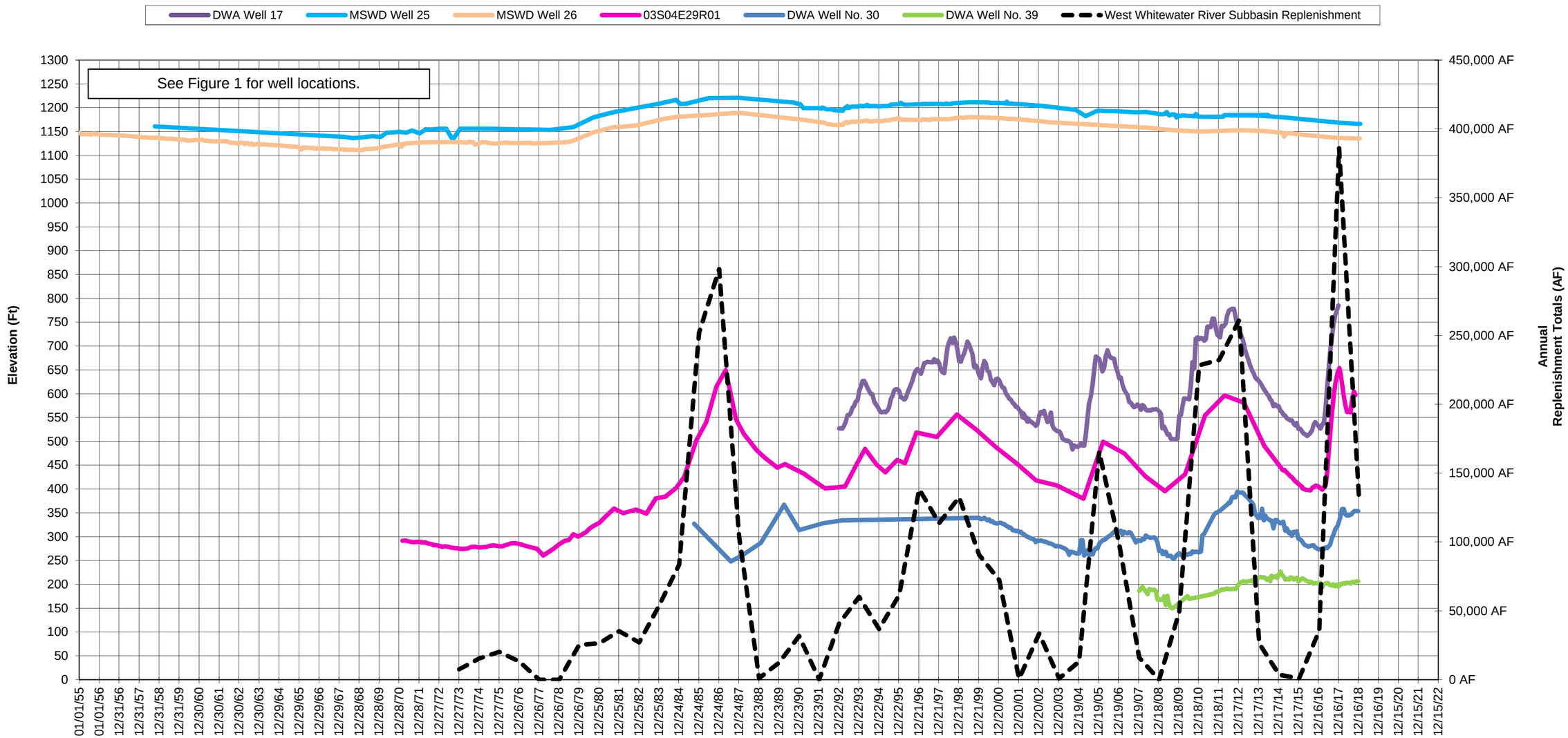
TABLE 7
DESERT WATER AGENCY
WEST WHITEWATER RIVER SUBBASIN, MISSION CREEK SUBBASIN, AND GARNET HILL SUBBASIN AREAS OF BENEFIT
HISTORIC AND PROPOSED REPLENISHMENT ASSESSMENT RATES

	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		3,297,079	616,632		3,913,711	79,137	0		4,174,012	(260,301)	(16,167,473)
11/12	115.00	(33.00)	82.00	(33.00)	82.00			3,302,140	805,240		3,347,596	820,179		3,275,375	820,179		4,095,554	72,221	0		7,005,049	(2,909,495)	(19,076,968)
12/13	117.00	(25.00)	92.00	(25.00)	92.00			3,788,326	878,600		3,690,594	888,405		3,683,732	888,405		4,572,137	6,861	0		8,169,744	(3,597,607)	(22,674,574)
13/14	111.00	(19.00)	92.00	(19.00)	92.00			3,779,360	785,587		3,809,930	785,587		3,803,852	785,587		4,589,439	6,078	0		6,078,542	(1,489,103)	(24,163,678)
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	66	0		3,798,705	447,427	(23,716,250)
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	656	0	0	7,304,465	(3,349,007)	(27,065,258)
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	4,386,192	43,996	0	4,430,188	19	0	0	3,782,326	647,862	647,862
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	3,496,332	827,106	34,771	4,358,209	9	0	0	8,767,051 [12]	(4,408,842)	(3,760,980)
18/19	196.00	(56.00)	140.00	(56.00)	140.00	(56.00)	140.00	4,010,381	2,142,642	44,777	4,010,381	2,142,642	44,777	4,010,381 [10]	2,142,642	44,777	6,197,800	0	0 [11]	0	9,690,815	(3,493,015)	(7,253,994)
19/20	188.00	(33.00)	155.00	(33.00)	155.00	(33.00)	155.00	5,504,050	1,501,950	24,800	5,504,050	1,501,950	24,800	5,504,050	1,501,950	24,800	7,030,800	0			8,546,888	(1,516,088)	(8,770,082)
20/21	189.00	(24.00)	165.00	(24.00)	165.00	(24.00)	165.00	4,831,011	2,869,113	56,100	4,831,011	2,869,113	56,100	4,831,011	2,869,113	56,100	7,756,224	0			8,890,283	(1,134,059)	(9,904,141)
21/22	199.00	(24.00)	175.00	13.05	175.00	13.05	175.00	5,005,718	3,106,205	59,500	5,005,718	3,106,205	59,500	5,005,718	3,106,205	59,500	8,171,422	0			9,276,204	(1,104,782)	(11,008,923)
22/23	199.00	13.05	212.05	13.05	212.05	13.05	212.05	5,922,524	3,840,415	72,098	5,922,524	3,840,415	72,098	5,922,524	3,840,415	72,098	9,835,038	0			9,240,438	594,600	(10,414,323)
23/24	202.00	13.05	215.05	13.05	215.05	13.05	215.05	5,861,161	3,972,344	73,118	5,861,161	3,972,344	73,118	5,861,161	3,972,344	73,118	9,906,624	0			9,299,592	607,032	(9,807,291)
24/25	205.00	13.05	218.05	13.05	218.05	13.05	218.05	5,824,979	4,106,515	74,138	5,824,979	4,106,515	74,138	5,824,979	4,106,515	74,138	10,005,632	0			9,400,733	604,899	(9,202,392)
25/26	207.00	13.05	220.05	13.05	220.05	13.05	220.05	5,788,106	4,225,580	74,818	5,788,106	4,225,580	74,818	5,788,106	4,225,580	74,818	10,088,505	0			9,488,207	600,298	(8,602,094)
26/27	207.00	13.05	220.05	13.05	220.05	13.05	220.05	5,755,265	4,308,902	74,818	5,755,265	4,308,902	74,818	5,755,265	4,308,902	74,818	10,138,985	0			9,346,116	792,869	(7,809,225)
27/28	207.00	13.05	220.05	13.05	220.05	13.05	220.05	5,780,674	4,392,223	74,818	5,780,674	4,392,223	74,818	5,780,674	4,392,223	74,818	10,247,716	0			9,448,444	799,272	(7,009,953)
28/29	207.00	13.05	220.05	13.05	220.05	13.05	220.05	5,805,995	4,475,545	74,818	5,805,995	4,475,545	74,818	5,805,995	4,475,545	74,818	10,356,359	0			9,424,725	931,634	(6,078,319)
29/30	207.00	13.05	220.05	13.05	220.05	13.05	220.05	5,830,943	4,607,292	74,818	5,830,943	4,607,292	74,818	5,830,943	4,607,292	74,818	10,513,053	0			9,451,530	1,061,524	(5,016,795)
30/31	207.00	13.05	220.05	13.05	220.05	13.05	220.05	5,855,516	4,727,739	74,818	5,855,516	4,727,739	74,818	5,855,516	4,727,739	74,818	10,658,074	0			9,740,158	917,916	(4,098,879)
31/32	207.00	13.05	220.05	13.05	220.05	13.05	220.05	5,879,978	4,788,463	74,818	5,879,978	4,788,463	74,818	5,879,978	4,788,463	74,818	10,743,259	0			9,646,799	1,096,460	(3,002,419)
32/33	207.00	13.05	220.05	13.05	220.05	13.05	220.05	5,904,353	4,849,186	74,818	5,904,353	4,849,186	74,818	5,904,353	4,849,186	74,818	10,828,357	0			9,656,988	1,171,369	(1,831,049)
33/34	207.00	13.05	220.05	13.05	220.05	13.05	220.05	5,928,398	4,909,910	74,818	5,928,398	4,909,910	74,818	5,928,398	4,909,910	74,818	10,913,126	0			9,771,581	1,141,545	(689,504)
34/35	207.00	13.05	220.05	13.05	220.05	13.05	220.05	5,952,201	4,970,633	74,818	5,952,201	4,970,633	74,818	5,952,201	4,970,633	74,818	10,997,652	0			10,308,148	689,504	(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 and second quarters of assessment period.
(11) Delinquent assessment is estimated based on first and second quarters of assessment period.
(12) For 2017/2018 and beyond, Payments Made are estimated based on estimated allocated Table A charges.

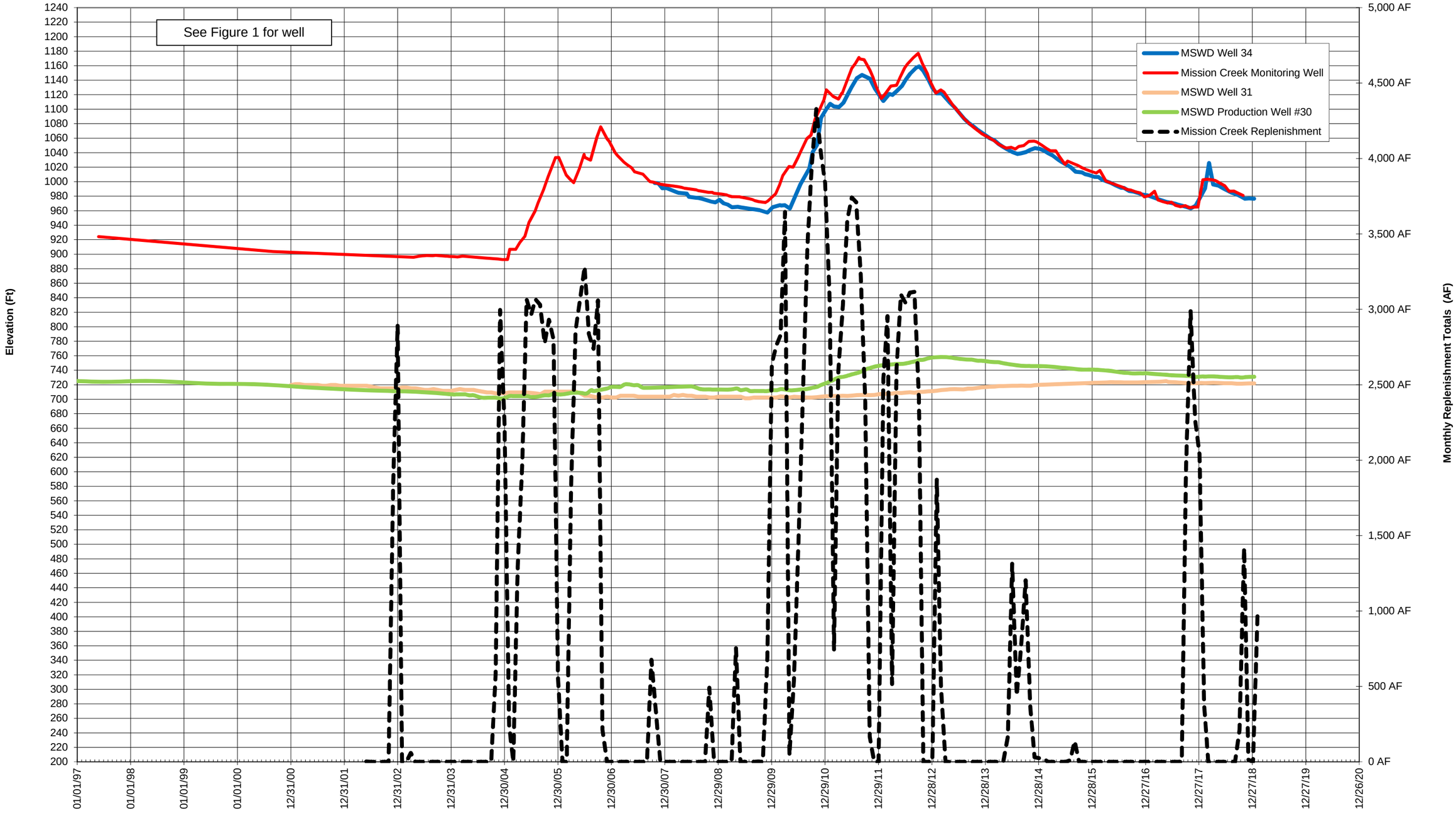
EXHIBITS

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



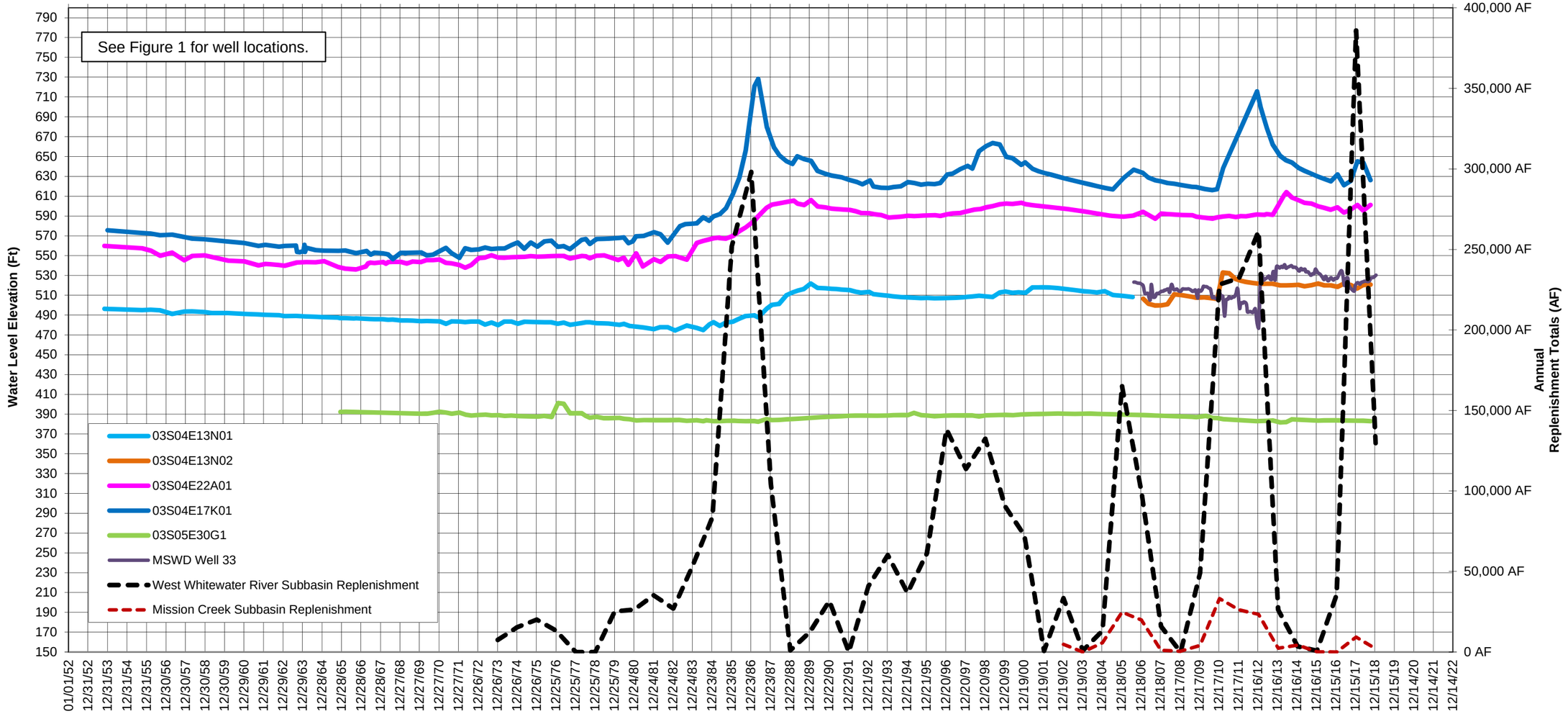
/DFS
101-33P43-HYDROGRAPHS.xls/Exhibit1 (5/9/2019)

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



/DFS
101-33P43-HYDROGRAPHS.xls/Exhibit2 (5/9/2019)

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



/DFS
101-33P43-HYDROGRAPHS.xls/Exhibit3 (5/9/2019)

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 - 2018	**1955 - 2018**
Number of Years		24	19	20	**63**
Water Level Decline, FT[3]		20	30	14	**64**
Period Reduction in Storage, AF		71,200	106,800	49,840	**227,840**
Annual Reduction in Storage, AF/Yr		3,000	5,600	2,500	**3,600**
Change in Storage		0.047	0.074	0.037	**0.151**
Remaining Storage, AF	1,511,800	1,440,600	1,333,800	1,283,960	**1,283,960**

(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%
2018	154,755	3,179,958	13,871	251,263	168,626	3,431,221	91.8%	8.2%

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%
2018	164,725	1,728,362	2,027	161,588	166,752	1,889,950	98.8%	1.2%

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%
2018	129,725	1,454,063	2,027	153,238	131,752	1,607,301	98.5%	1.5%

(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.

/DFS
101-33P43TBLS.xlsx/Exhibit5
(5/9/2019)

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			SWP Contract Water									Non-SWP Contract Water							Delivery to DWA/CVWD Recharge Facilities									
					SWP Surplus Water									CVWD					DWA		From SWP Exchange Account			From Other Accounts						MWD Delivery Surplus/(Deficit) Prior to Exchange and Delivery Agreement	
Year	Table A DWA/CVWD Combined Allocation	Table A Allocation Delivered to MWD	% Delivery to MWD	Carry-Over From Previous Year	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			SWP Contract Water									Non-SWP Contract Water							Delivery to DWA/CVWD Replenishment Facilities									MWD Exchange and Advance Deliveries				
					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*	32,796	16,570		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				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				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				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	1131						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
2018	194,100	67,936	35%	97,050						1,246			1,246	166,232		20,603				35,000	221,835	129,725	2,027	131,752	35,000		35,000	164,725	2,027	166,752	131,752			90,083	(90,083)	235,025
TOTALS[12]:	4,085,711	2,377,571	---	191,957	5,160	292,681	633	42,272	47,286	11,331	17,279	416,642	2,986,170	8,393	83,500	32,000	10,000	256,057	8,350	3,384,443	2,717,889	153,238	3,355,379	284,299	8,350	292,649	3,482,907	161,588	3,648,028	3,355,379	1,152,351	917,326	---	---

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
101-33P43TBLS.xlsx/Exhibit6 (5/9/2019)

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%
19/20	$155.00 *	11%	$158.18 *	10%	$135.52 *	0%

* Proposed replenishment assessment rate

APPENDIX A

APPENDIX A
COACHELLA VALLEY
MONTHLY AND ANNUAL RECORDED PRECIPITATION DATA
(INCHES)
2018

STATION NAME	WHITEWATER NORTH	SNOW CREEK	TACHEVAH DAM	TRAM VALLEY	CATHEDRAL CITY	THOUSAND PALMS	PALM SPRINGS SUNRISE	DESERT HOT SPRINGS	EDOM HILL	OASIS	MECCA LANDFILL III	THERMAL AIRPORT
LOCATION	**WWR**	**WWR**	**WWR**	**WWR**	**WWR**	**WWR**	**WWR**	**MC**	**MC**	**EWR**	**EWR**	**EWR**
STATION NUMBER	**233**	**207**	**216**	**224**	**34**	**222**	**442**	**57**	**436**	**431**	**432**	**443**
LATITUDE	33°59'23.06"	33°53'32.64"	33°49'51.26"	33°50'11.56"	33°46'51.49"	33°49'1.66"	33°48'35.94"	33°58'2.85"	33°53'7.52"	33°26'21.64"	33°34'20.19"	33°37'53.90"
LONGITUDE	116°39'21.39"	116°41'41.06"	116°33'31.53"	116°36'49.72"	116°27'29.69"	116°23'46.30"	116°31'37.94"	116°29'39.93"	116°26'18.48"	116° 4'44.83"	116° 0'15.33"	116° 9'50.81"
ELEVATION (FT ABOVE MSL)	2220	1658	570	2675	283	230	397	1223	1038	-108	13	-122
JANUARY	3.57	4.53	2.24	3.81	1.35	1.07	1.64	1.76	1.27	0.25	0.19	0.42
FEBRUARY	0.35	1.35	0.00	0.06	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
MARCH	1.25	3.37	0.22	1.98	0.15	0.14	0.35	0.25	0.15	0.00	0.01	0.00
APRIL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
MAY	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	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	0.01	0.00	0.42	0.83	0.13	0.06	1.08	0.13	0.03	0.01	0.01	0.00
AUGUST	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.11
SEPTEMBER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OCTOBER	0.66	0.66	0.69	0.98	1.55	0.69	0.98	1.09	0.83	0.80	2.78	0.85
NOVEMBER	1.38	1.87	0.11	0.90	0.03	0.02	0.08	0.15	0.06	0.02	0.00	0.00
DECEMBER	1.22	1.51	0.71	1.50	0.26	0.48	0.57	0.51	0.40	0.21	0.28	0.43
TOTAL	**8.48**	**13.29**	**4.39**	**10.06**	**3.47**	**2.47**	**4.70**	**3.93**	**2.78**	**1.29**	**3.27**	**1.81**
AVERAGE: WWR	**6.69**											
AVERAGE: MC								**3.36**				
AVERAGE: WWR+MC	**5.95**											
AVERAGE: EWR										**2.12**		
AVERAGE: ALL	**5.00**											

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