ENGINEER'S REPORT ON WATER SUPPLY AND REPLENISHMENT ASSESSMENT

Mission Creek Subbasin Area of Benefit

2014-2015

Prepared for

COACHELLA VALLEY WATER DISTRICT

April 2014

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COACHELLA VALLEY WATER DISTRICT

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Prepared by
Environmental Services Department
and
Engineering Department
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INTRODUCTION

This is the 12th annual Engineer's Report on Water Supply and Replenishment Assessment for the Mission Creek Subbasin Area of Benefit managed by the Coachella Valley Water District (CVWD). This program began in the 2003-2004 fiscal year and has replenished the Mission Creek Subbasin with a cumulative total of approximately 145,683 acre-feet (AF) of supplemental water.

CVWD serves an area of approximately 1,000 square miles in the Coachella Valley (Valley) within the counties of Riverside, Imperial and San Diego. The Valley is situated in the northwesterly portion of California's Colorado Desert. The Valley is bordered on the west and north by high mountains, which provide an effective barrier against coastal storms, and which greatly reduce the contribution of direct precipitation to replenish the Valley's groundwater basin. The bulk of natural groundwater replenishment comes from runoff from the adjacent mountains.

The need to enhance the Valley's water supply has been recognized for many years. The formation of CVWD in 1918 was a direct result of the concern of residents over a plan to export water from the Whitewater River to Imperial Valley. The early residents of the Valley also recognized that action was needed to stem the decline of the water table, which was occurring as a result of their pumpage. This caused CVWD to enter into an agreement for construction of the Coachella Branch of the All American Canal (Coachella Canal or Canal) to bring Colorado River water to the Valley. Since 1949, the Coachella Canal has been providing water for irrigation use in an area generally from Indio and La Quinta southerly to the Salton Sea.

After providing supplemental water in the southeastern part of the Valley and with the onset of recreational development, the need for supplemental water in the northwestern part of the Valley was recognized. As a result, CVWD and the Desert Water Agency (DWA) entered into separate contracts with the State of California (State) to ensure that water from the State Water Project (SWP) would be available. A direct connection from the SWP to the Valley does not currently exist. Therefore, CVWD and DWA entered into an agreement with the Metropolitan Water District of Southern California (MWD) to obtain water from the MWD Colorado River Aqueduct, which crosses the western portion of the Valley near Whitewater, in exchange for CVWD and DWA SWP water. Since 1973, CVWD and DWA have been releasing Colorado River water near Whitewater to replenish groundwater in the west portion of the Whitewater River Subbasin of the Valley.

In 2003, CVWD, Desert Water Agency (DWA), and Mission Springs Water District recognized that management of the Mission Creek Subbasin extended across agency boundaries, and entered into the Mission Creek Agreement. This agreement recognized the need to operate the

subbasin as a complete unit rather than as individual segments delineated by agency boundaries.

The agreement was developed following numerous investigations regarding the groundwater supply within the Valley. Those investigations are addressed in previous reports (Engineer's Reports on Water Supply and Replenishment Assessment for Coachella Valley Water District, 1980-1981 through 2002-2003).

Both CVWD and DWA are permitted by the State Water Code to replenish 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 from replenishment of groundwater. CVWD began assessment of groundwater producers within the Whitewater River Subbasin in fiscal year 1980-1981, and DWA began its assessment program in fiscal year 1978-1979, thereby creating the Groundwater Replenishment Program (GRP). The two agencies are not required to implement assessment procedures jointly or identically.

Due to continuing overdraft conditions in the Mission Creek Subbasin, located northerly of the Whitewater River Subbasin, CVWD and DWA began constructing facilities to replenish the Mission Creek Subbasin in October 2001, in accordance with applicable law. Facilities were completed in June 2002 and in December 2002, DWA and CVWD began replenishment activities in the Mission Creek Subbasin.

The Mission Creek and Garnet Hill Subbasins Water Management Plan Final Report was completed in January 2013 through a collaboration between Desert Water Agency, Mission Springs Water District, and CVWD. The purpose of the Mission Creek and Garnet Hill Water Management Plan is to manage the water resources to meet demands reliably and protect water quality in a sustainable and cost-effective manner. The Plan provides the status of the subbasins, current issues, and water management goals.

The State Water Code requires completion of an Engineer's Report regarding the GRP before CVWD can levy and collect groundwater replenishment assessment charges (RACs). The report shall include the condition of groundwater supplies, the need for groundwater replenishment, the Area of Benefit, water production within said area, and RACs to be levied upon said water production. It shall also contain recommendations regarding the GRP including the source and amount of replenishment water and related costs. The first Engineer’s Report for the Mission Creek Subbasin Area of Benefit was completed in April 2003.

The purpose of this report is to update the groundwater supply conditions and current GRP and to establish a RAC for CVWD's Mission Creek Subbasin Area of Benefit for the upcoming fiscal year.

GROUNDWATER BASIN DESCRIPTION

Geology

The Coachella Valley Groundwater Basin, as described by the California Department of Water Resources (DWR), is bounded on the north and east by non-waterbearing 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 DWR in 1964 and the United States Geological Survey (USGS) in 1971.

The Subbasins present in the Valley are Mission Creek, Desert Hot Springs, Garnet Hill and Whitewater River (Indio) Subbasins. 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 based upon faults that are 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 DWR and USGS designations:

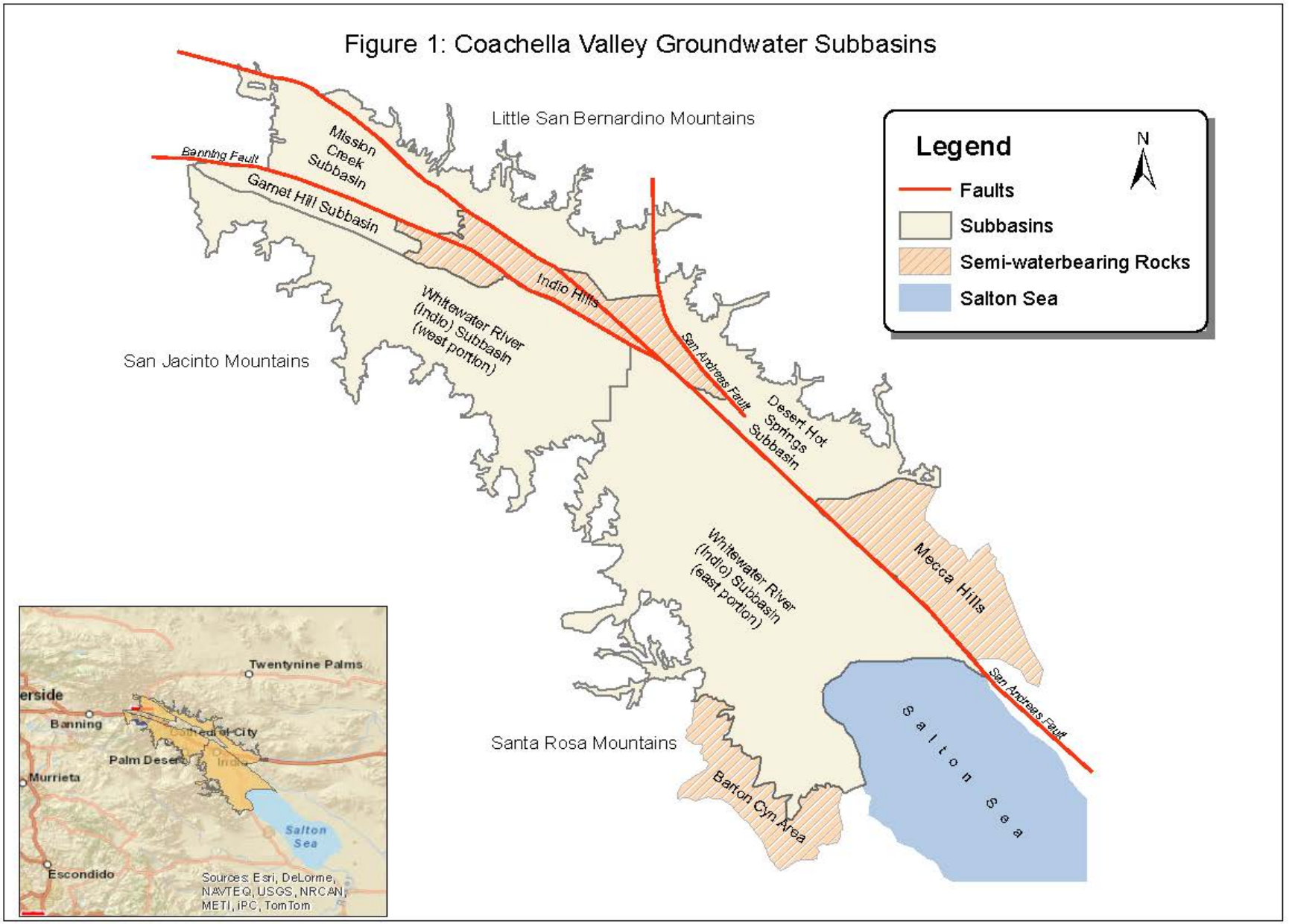
- Mission Creek Subbasin
- Desert Hot Springs Subbasin
- Garnet Hill Subbasin
- Whitewater River (Indio) Subbasin
    - Palm Springs Subarea
    - Thermal Subarea
    - Thousand Palms Subarea
    - Oasis Subarea

Figure 1 shows the locations of these Subbasins and Subareas. This report presents brief descriptions of the Desert Hot Springs Subbasin, Garnet Hill Subarea, and Whitewater River (Indio) Subbasin as they are located outside the area of interest for this report. A more detailed description of the Mission Creek Subbasin is provided in this report.

The following are areas within the Valley where a supply of potable groundwater is not readily available:

- Indio Hills area
- Mecca Hills area
- Barton Canyon area
- Bombay Beach area
- Salton City area

Figure 1 Coachella Valley Groundwater Subbasins



MISSION CREEK SUBBASIN

Water-bearing materials underlying the Mission Creek upland comprise the Mission Creek subbasin. This subbasin is designated number 7-21.02 in DWR'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 non-waterbearing rocks of the San Bernardino Mountains. To the southeast of the subbasin are the Indio Hills, which consist of the semiwater-bearing Palm Springs Formation. The area within this boundary reflects the estimated geographic limit of effective storage within the subbasin. This subbasin relies on the same imported State Water Project Exchange water source for replenishment as does the Whitewater River Subbasin.

Both the Mission Creek Fault and the Banning Fault are effective barriers to groundwater movement, as evidenced by offset water levels, fault springs, and changes in vegetation. Water level differences across the Banning Fault, between the Mission Creek Subbasin and the Garnet Hill Subbasin, are on the order of 200 to 250 feet. Similar water level differences exist across the Mission Creek Fault between the Mission Creek and Desert Hot Springs Subbasins.

CVWD, DWA, and Mission Springs Water District jointly manage this subbasin under the terms of the 2004 Mission Creek Settlement Agreement. This agreement and the 2003 Mission Creek Groundwater Replenishment Agreement between the District and DWA specify that the available State Water Project water will be allocated between the Mission Creek and Whitewater River Subbasins in proportion to the amount of water produced or diverted from each subbasin during the preceding year.

Desert Hot Springs Subbasin

The Desert Hot Springs subbasin is bounded on the north by the Little San Bernardino Mountains and to the southeast by the Mission Creek and San Andreas faults. The San Andreas fault separates the Desert Hot Springs subbasin from the Whitewater River subbasin and serves as an effective barrier to groundwater flow. The subbasin has been divided into three subareas: Miracle Hill, Sky Valley and Fargo Canyon. This subbasin is designated number 7-21.03 in DWR's Bulletin 118 (2003).

The Desert Hot Springs subbasin is not extensively developed except in the area of Desert Hot Springs. 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 to over 1,000 mg/L.

Garnet Hill Subbasin

The area between the Garnet Hill fault and the Banning fault, named the Garnet Hill Subarea by DWR (1964), was considered a distinct subbasin by the USGS because of the effectiveness of the Banning and Garnet Hill faults as barriers to groundwater movement. This is illustrated 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 fault does not reach the surface and is probably effective as a barrier to groundwater movement only below a depth of about 100 feet.

The 2013 Mission Creek and Garnet Hill Water Management Plan states groundwater production is low in the Garnet Hill Subbasin and is not expected to increase significantly in the future due to relatively low well yields compared to those in the Mission Creek Subbasin. Water levels in the western and central portion of the subbasin show response to replenishment from the Whitewater River Replenishment Facility while levels are relatively flat in the eastern portion of the subbasin. The lack of wells in the subbasin limits the geologic understanding of how this subbasin operates relative to the Mission Creek and Whitewater River Subbasins.

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 plus 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. This subbasin is considered part of the Whitewater River (Indio) Subbasin in DWR's Bulletin 118 (2003).

Whitewater River (Indio) Subbasin

The Whitewater River Subbasin, designated the Indio Subbasin (Basin No. 7-21.01) in DWR Bulletin No. 118 (2003), underlies the major portion of the Valley floor and encompasses approximately 400 square miles. Beginning approximately one mile west of the junction of State Highway 111 and Interstate Highway 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 Garnet Hill, Mission Creek and Desert Hot Springs Subbasins to the north and east by the Garnet Hill and San Andreas faults (DWR 1964). The Garnet Hill fault, which extends southeastward from the north side of San Gorgonio Pass to the Indio Hills, is a relatively effective barrier to groundwater movement from the Garnet Hill Subbasin into the Whitewater River Subbasin, with some portions in the shallower zones more permeable. The San Andreas fault, extending southeastward 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 groundwater movement from the northeast. 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 beds, impede the percolation of water applied for irrigation and limit groundwater replenishment opportunities to the westerly fringe of the subbasin.

The Whitewater River (Indio) Subbasin is divided into four Subareas: 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 comprises the pressure or confined area within the basin. The other two Subareas are peripheral areas having unconfined groundwater conditions. The Whitewater River (Indio) Subbasin is discussed in more detail in the *Engineer's Report on Water Supply and Replenishment Assessment Upper Whitewater River Subbasin Area of Benefit (CVWD 2013)*.

WATER SUPPLY

Groundwater Storage

In 1964, DWR estimated that the Subbasins in the Coachella Valley Groundwater Basin contained, in the first 1,000 feet below the ground surface, approximately 39,200,000 AF of water. The capacities of the Subbasins are shown in Table 1.

Table 1 Groundwater Storage Coachella Valley Groundwater Basin

Area	Storage [1] (AF)
San Gorgonio Pass Subbasin	2,700,000
Mission Creek Subbasin	2,600,000
Desert Hot Springs Subbasin	4,100,000
Garnet Hill Subbasin	1,000,000
Subtotal	10,400,000
Whitewater River Subbasin	
Palm Springs Subarea	4,600,000
Thousand Palms Subarea	1,800,000
Oasis Subarea	3,000,000
Thermal Subarea	19,400,000
Subtotal Whitewater River (Indio) Subbasin	28,800,000
Total all Subbasins	**39,200,000**

[1] First 1,000 feet below ground surface. California Department of Water Resources estimate (DWR, 1964). Water supply and groundwater replenishment for the Mission Creek Subbasin are calculated based on the entire Subbasin. The Subbasin is utilized jointly by CVWD and DWA for water supply purposes and the two agencies jointly manage the water supply there.

Precipitation and Streamflow

Average annual precipitation in the Coachella Valley varies from 4 inches on the valley floor to more than 30 inches in the surrounding mountains (DWR 1964). Precipitation predominantly occurs December through March, with occasional intense precipitation events during the summer months resulting from subtropical thunderstorms. The precipitation that occurs within the tributary watersheds either evaporates, is consumed by native vegetation, percolates into underlying alluvium and fractured rock or becomes runoff. A portion of the flow percolating into the mountain watersheds eventually becomes subsurface inflow to the subbasins.

Precipitation in the surrounding mountains is included in the natural inflow estimates found in the water balance calculated in Table 3 of this report. The natural inflow estimates are based on long-term average rates provided in USGS Report 91-4142, Evaluation of a Ground-water Flow and Transport Model of the Upper Coachella Valley, California, 1994.

Recycled Water and Source Substitution

CVWD recognized the need to identify alternative sources of water and entered the water reclamation field in 1967. Recycled water is a significant potential local resource that can be used to help reduce overdraft. Wastewater that has been highly treated and disinfected can be reused for landscape irrigation and other purposes; however, treated wastewater is not suitable for direct potable use. Recycled wastewater has historically been used for irrigation of golf courses and municipal landscaping in the Coachella Valley.

CVWD operates six water reclamation plants (WRPs) in the Whitewater River (Indio) Subbasin. Recycled water from two of these facilities (WRP 9 and WRP 10) has been used for golf course and greenbelt irrigation in the Palm Desert area for many years, thereby reducing demand on the groundwater basin. A third facility (WRP 7), located north of Indio, began providing recycled water for golf course and greenbelt irrigation in 1997. CVWD is currently planning to expand non-potable water (imported water and recycled water) use throughout the mid-valley area of the Whitewater River (Indio) Subbasin. CVWD continues to work with groundwater users throughout the Coachella Valley such as farmers, golf courses and others to encourage the use of non-potable water.

Groundwater Levels

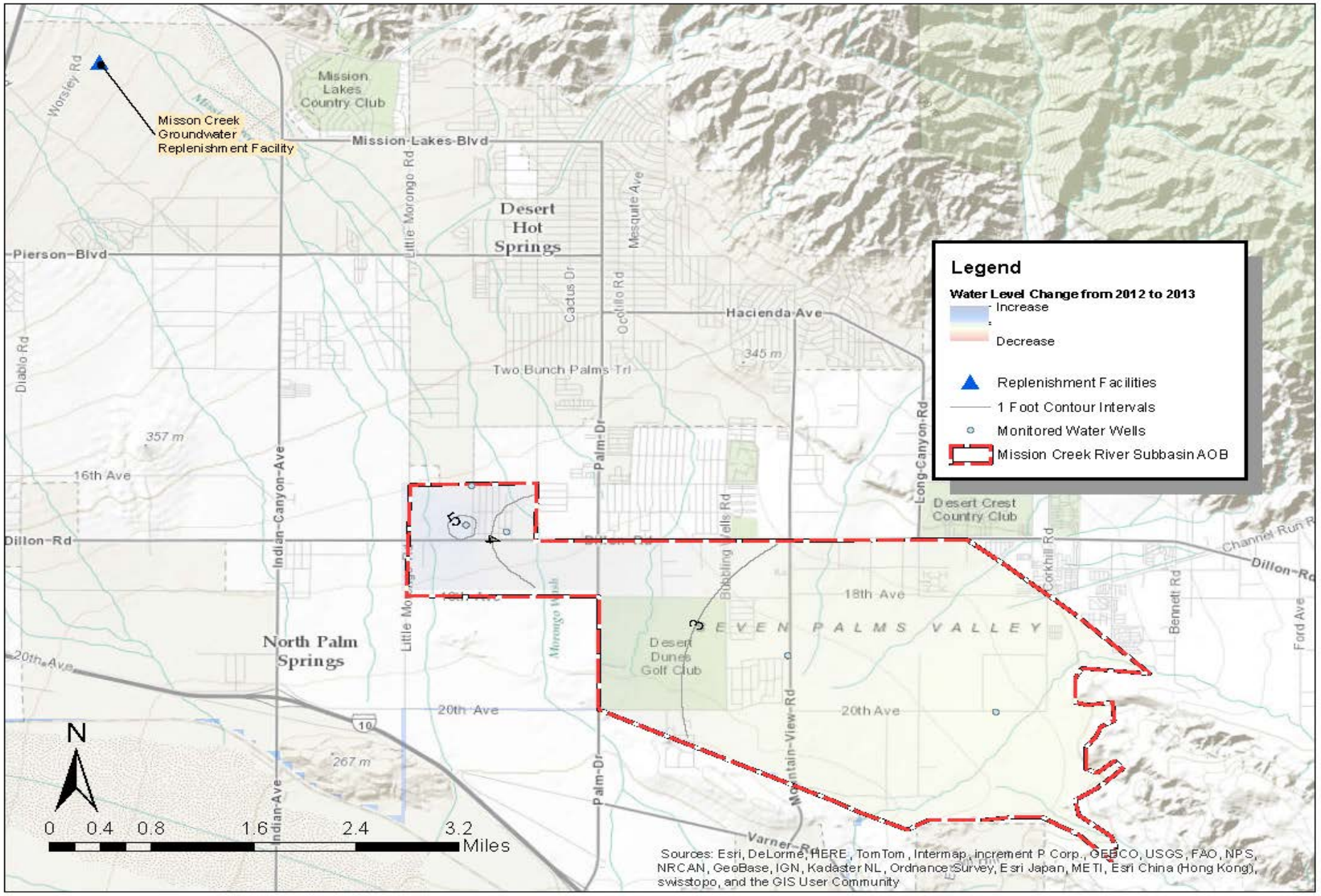
Historical water level declines and conditions producing those declines in the Coachella Valley Groundwater Basin have been extensively described by the USGS and DWR.

Although groundwater levels had indicated a general rise in groundwater levels within the Mission Creek Subbasin between 1938 and 1952, since 1952, a steady decline has been experienced until replenishment began in 2002.

The historic declining water table in the Mission Creek Subbasin Area of Benefit led to the determination that a management program is required to stabilize water levels and prevent other adverse effects such as water quality degradation and land subsidence. Groundwater replenishment in the Mission Creek Subbasin began in 2002. A reduction in declining water levels observed in this subbasin corresponds to the period when significant replenishment occurred.

Figure 2 depicts the change in average groundwater levels from 2012 to 2013 in CVWD's Mission Creek Subbasin Area of Benefit. The average rise observed in the 6 wells monitored from 2012 to 2013 was 1.7 feet. The Mission Creek Subbasin Area of Benefit boundary and location of the Mission Creek Replenishment Facility are also shown in Figure 2.

Figure 2 Groundwater Level Changes in Mission Creek Subbasin Area of Benefit from 2012 to 2013



Management Area

CVWD and DWA have recognized the need to manage the Mission Creek Subbasin as a complete unit rather than as individual segments underlying the individual agencies' boundaries.

Mission Creek Subbasin Area of Benefit Boundary

Figure 2 shows CVWD's Mission Creek Subbasin Area of Benefit. This boundary is defined as follows:

> That portion of the Mission Creek Subbasin within the boundaries of CVWD, bounded on the east beginning approximately one-eighth mile west of the center of Section 10, Township 3 South, Range 5 East, San Bernardino Base and Meridian; thence southeasterly along the trace of the Mission Creek Fault to the base of Edom Hill; thence curving westerly along the base of the Indio Hills following along the southern San Andreas Fault to the intersection of Avenue 20 and Palm Drive; thence north along Palm Drive to Avenue 18; thence west along Avenue 18 to Little Morongo Road; thence north along the west section line of Section 12, Township 3 South, Range 4 East, to Avenue 16; thence east along the north section line of said Section 12 to the northeast corner of the section; thence south along the east section line of said Section 12 to the east-west midsection line, which is Dillon Road; thence east along Dillon Road to the point of beginning.

Groundwater Production

Table 2 presents historical groundwater production for the Mission Creek Subbasin. This table includes groundwater production for both CVWD's and DWA's Areas of Benefit. Production in 2012 totaled 14,075 AF.

Table 2 Production Within the Mission Creek Management Area in Acre Feet

Year	CVWD Area of Benefit	DWA Area of Benefit	Total	Annual Change	CVWD Percentage	DWA Percentage
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1978	854	1,399	2,253		37.91	62.09
1979	1,001	2,564	3,565	1,312	28.08	71.92
1980	1,107	2,914	4,021	456	27.53	72.47
1981	1,421	2,878	4,299	278	33.05	66.95
1982	1,302	2,630	3,932	-367	33.11	66.89
1983	1,442	2,979	4,421	489	32.62	67.38
1984	1,915	3,740	5,655	1,234	33.86	66.14
1985	2,148	3,559	5,707	52	37.64	62.36
1986	2,159	4,278	6,437	730	33.54	66.46
1987	2,234	4,483	6,717	280	33.26	66.74
1988	2,302	4,834	7,136	419	32.26	67.74
1989	2,606	5,690	8,296	1,160	31.41	68.59
1990	2,512	5,790	8,302	6	30.26	69.74
1991	2,292	5,486	7,778	-524	29.47	70.53
1992	2,188	6,187	8,375	597	26.13	73.87
1993	2,528	6,333	8,861	486	28.53	71.47
1994	2,863	6,813	9,676	815	29.59	70.41
1995	2,865	7,237	10,102	426	28.36	71.64
1996	2,838	7,724	10,562	460	26.87	73.13
1997	2,104	7,795	9,899	-663	21.25	78.75
1998	2,757	7,534	10,291	392	26.79	73.21
1999	3,004	7,970	10,974	683	27.37	72.63
2000	3,433	8,405	11,838	864	29.00	71.00
2001	3,929	8,421	12,350	512	31.81	68.19
2002	4,371	9,597	13,968	1,618	31.29	68.71
2003	4,425	10,073	14,498	530	30.52	69.48
2004	4,628	11,920	16,548	2,050	27.97	72.03
2005	4,247	12,080	16,327	-221	26.01	73.99
2006	4,757	12,608	17,365	1,038	27.39	72.61
2007	4,547	11,862	16,409	-956	27.71	72.29
2008	4,543	11,232	15,775	-634	28.80	71.20
2009	4,813	10,295	15,108	-667	31.86	68.14
2010	4,484	9,820	14,304	-804	31.35	68.65
2011	4,653	9,550	14,203	-101	32.76	67.24
2012	4,582	9,493	14,075	-127	32.55	67.45
2013	4,415	10,080	14,495	420	30.46	69.54
		Average Annual Change		**350**		

(1) Year
(2) Production within CVWD Area of Benefit
(3) Production within DWA Area of Benefit, per Krieger and Stewart
(4) Column (2) plus Column (3)
(5) Current year total minus previous year total
(6) and (7) Percentage of total production

Groundwater Inflows and Outflows

Total inflows and outflows to the Mission Creek Subbasin Area of Benefit for the year 2013 are summarized in Table 3. The Mission Creek and Garnet Hill Subbasins Water Management Plan Final Report (MWH 2013) provides updated estimates of natural recharge and subsurface flows. The natural inflow of 9,340 AF/year includes natural replenishment and flow across subbasin boundaries into the Mission Creek Subbasin. The nonconsumptive return of applied water is estimated at 5,073 AF, which is 35 percent of the estimated groundwater production of 14,495 AF/year. The total inflow includes the natural inflow, the nonconsumptive return and the 2,379 AF of actual water replenished at the Mission Creek Groundwater Replenishment Facility. The total outflow is the groundwater production estimate plus 6,000 AF/year of natural outflows. Natural outflows include 4,000 AF/year of subsurface outflow to Garnet Hill Subbasin, 1,100 AF/year of subsurface outflow to the west portion of the Whitewater River Subbasin, and 900 AF/year of evapotranspiration (MWH 2013).

Overdraft

Groundwater overdraft is manifested not only as a prolonged decline in groundwater storage, but also through secondary adverse effects including decreased well yields, increased energy costs, water quality degradation and land subsidence. The 2010 Coachella Valley Water Management Plan (CVWMP) Update defines overdraft as the calculated change in storage based on long-term local hydrology and imported water deliveries. The California Department of Water Resources California Water Plan Update 2009 defines overdraft as the condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that replenishess the basin over a period of years during which water supply conditions approximate average conditions.

In 2013, the annual water balance for the Mission Creek Subbasin was negative, providing an increase in the cumulative overdraft. Imported water may offset groundwater overdraft in a particular year. On a long-term basis water requirements are likely to continue to place demands on groundwater in storage.

Based on the calculations in Table 3, without artificial replenishment, the annual reduction in stored groundwater within the Mission Creek Subbasin for 2013 would be approximately -6,082 AF, compared to an annual balance of -3,703 AF. Continued groundwater replenishment is necessary to reduce annual and cumulative overdraft.

Table 3 Annual Water Balance in the Mission Creek Subbasin	
Item	**Annual Calculation (AF)**
2013 Groundwater Production	-14,495
Non-consumptive return[(1)]	5,073
Natural inflow[(2)]	9,340
Natural outflow[(3)]	-6,000
Groundwater replenishment	2,379
Annual balance	-3,703

(1) Based on 35% of production (14,495 AF x 0.35 = 5,073 AF).
(2) Natural replenishment and subsurface flows into the Mission Creek Subbasin (MWH 2013).
(3) Subsurface flows across subbasin boundaries and evapotranspiration (MWH 2013).
(4) Water delivered to the Mission Creek Replenishment Facility.

The annual balance is the total inflow less the total outflow for a loss of 3,703 AF of water in storage in the subbasin.

REPLENISHMENT PROGRAM

Current Replenishment Activities

Alleviation of the Mission Creek Subbasin overdraft was initiated in 2002 by CVWD and DWA using SWP water (Table A Amount).

SWP Table A Amounts

The SWP includes 660 miles of aqueduct and conveyance facilities from Lake Oroville in the north to Lake Perris in the south. The SWP has contracts to deliver 4.1 million AF/year to 29 contracting agencies. CVWD's original Table A Amount is 23,100 AF per year and DWA's original Table A Amount is 38,100 AF/year for a combined Table A Amount of 61,200 AF/year. In 2004, CVWD purchased 9,900 AF/year of SWP Table A Amount from the Tulare Lake Basin Water Storage District to bring its basic Table A Amount to 33,000 AF/year. The total basic Table A Amount for CVWD and DWA is 71,100 AF/year.

CVWD and DWA do not directly receive SWP water. CVWD and DWA have existing exchange agreements (signed in 1972 and amended in 1983) with MWD. These agreements provide for CVWD and DWA to exchange their SWP water deliveries with MWD for Colorado River water. The 1984 Advance Delivery Agreement between CVWD, DWA and MWD allows MWD to store water in the Coachella Valley groundwater basin. The 2003 Exchange Agreement between CVWD, DWA and MWD provides for the transfer of 100,000 AF/year of MWD's Table A Amount to CVWD and DWA. MWD has transferred 88,100 AF/year and 11,900 AF/year of its Table A Amount to CVWD and DWA, respectively. The 2003 Exchange Agreement increased the total Table A Amount for CVWD and DWA to 171,100 AF/yr with CVWD's portion equal to 121,100 AF/yr.

In 2007, CVWD and DWA completed negotiations for two water transfers. The first transfer is for 12,000 AF/year and 4,000 AF/year, respectively, from Berenda Mesa Water District for a total Table A Amount of 16,000 AF/year. The second transfer is for 5,250 AF/year and 1,750 AF/year, respectively, from Tulare Lake Water Basin Storage District for a total of 7,000 AF/year. The transfers were completed in 2007 but did not take effect until January 1, 2010, when deliveries under these two transfers first began. These Table A Amount transfers increased the total combined Table A Amount for CVWD and DWA to 194,100 AF/year with CVWD's portion equal to 138,350 AF/year. CVWD and DWA also purchase available water from the SWP on the spot market including Pool A and Pool B water.

SWP Supplemental Water

In 2003, CVWD and MWD executed a Delivery and Exchange Agreement pursuant to the quantification settlement agreement (QSA). Under the agreement, MWD delivers up to 35,000 AF of its SWP water to CVWD. CVWD exchanges the SWP water for an equal amount of MWD's Colorado River water. The exchanged Colorado River water can be delivered to Imperial Dam or the Whitewater Connections. No water pursuant to this agreement was delivered to the Mission Creek Subbasin in 2013.

In 2008, CVWD and DWA executed Agreements to augment SWP water supplies. CVWD and DWA executed separate Agreements to acquire SWP supplemental water from the California Department of Water Resources (DWR) for a Water Supply and Conveyance Under a Dry Year Water Purchase Program. DWR initiated this Dry Year Water Purchase Program to augment water supplies in anticipation of less water available to SWP Contractors resulting from dry hydrologic conditions and/or regulatory constraints. DWR will make the water available for purchase from its Yuba Agreement. The amount of water available for purchase will be based on DWR's determination of the Water Year Classification. It is estimated that CVWD and DWA may be able to purchase up to 4% or 5,600 AF per year, and 1.3% or 1,820 AF per year, respectively. These Agreements provide for the exchange of these supplies with MWD for Colorado River water in accordance with existing exchange agreements. In 2013, 1,212 AF was delivered to the West Whitewater River Subbasin pursuant to this to agreement.

Non-SWP Supplemental Water

In 2003, CVWD and MWD entered into a one-time agreement for MWD to return 32,000 AF of Colorado River water received as a result of water conservation measures taken by CVWD in Palo Verde prior to execution of the quantification settlement agreement (QSA). Per the agreement with MWD, MWD delivered half of the 32,000 AF (16,000 AF) back to CVWD in 2007 at the Whitewater Spreading Basins. In 2008, 8,008 AF was delivered, and in 2009 the remaining 7,992 AF was delivered to CVWD at the Whitewater Groundwater Replenishment Facility.

In 2008, CVWD executed an Agreement with Rosedale Rio Bravo Water Storage District (Rosedale) for a one-time transfer of 10,000 AF, of banked Kern River flood water that is exportable to CVWD. Deliveries to CVWD began in 2008 when 3,000 AF was delivered and 3,000 AF was delivered in 2009. There were no deliveries in 2010 or 2011. The 4,000 AF remaining balance was delivered in 2012. CVWD entered into an Assignment Agreement with the Glorious Lands Company (GLC) effective July 10, 2012 which transferred the existing Amended Water Supply Agreement between GLC and Rosedale to CVWD. CVWD will receive up to 9,500 AF per year of Rosedale water through 2035. In 2013, 16,500 AF was delivered to CVWD at the Whitewater Groundwater Replenishment Facility.

In 2008, DWA and MWD executed an Exchange Agreement for delivery of non-SWP supplemental water purchased by DWA to MWD. MWD will exchange these supplies with Colorado River water in accordance with existing exchange agreements. DWA plans to acquire up to 36,000 acre-feet of non-SWP supplemental water during the period from 2008 through 2015 from entities in Kern County. MWD delivered 754 AF, 1,743 AF, 5,350 AF, and 134 AF to the Mission Creek Subbasin in 2009, 2010, 2011, and 2012 respectively, pursuant to this agreement.

In 2010, CVWD executed an agreement with DMB Pacific, Inc. (DMB) for the one-time transfer of 8,393 AF of "Nickel" water made available through Kern County Water Agency's Kern River Restoration and Water Supply Program. Per the agreement, CVWD received the full transfer amount in 2010.

2013 Deliveries

In 2013, a total of 87,330 AF was delivered via the SWP to CVWD and DWA for replenishment at the Whitewater Groundwater Replenishment Facility and the Mission Creek Replenishment Facility as shown in Table 4.

Table 4 State Water Project Delivery in 2013

Description	CVWD (AF)	DWA (AF)	Total (AF)
TABLE A	48,423	19,513	67,936
ARTICLE 21	0	0	0
TURNBACK POOL A & B	164	66	230
DRY YEAR (YUBA)	1,452	1,212	2,664
ROSEDALE	16,500	0	16,500
MWD 35 TAF	0	0	0
ARTICLE 56 (c) "CARRYOVER"	0	0	0
TOTAL DELIVERED TO MWD	66,539	20,791	87,330

During 2013, MWD delivered 28,999 AF of Colorado River exchange water for replenishment to the Mission Creek Subbasin and the west portion of the Whitewater River Subbasin. The Colorado River exchange water includes all deliveries except Article 56 (c) “Carryover” and MWD Advance Delivery. Article 56 (c) “Carryover” is water requested under Article 56 (c) of the Water Supply Contracts. SWP Contractors can carry over a portion of their allocated water approved for delivery in the current year for delivery during the next year. There were no carryover deliveries in 2013.

The amount of water that MWD has previously stored in the groundwater basin through the Advance Delivery Agreement was 321,252 AF at the beginning of 2013 and was decreased by 60,840 AF to 260,413 AF at the end of 2013.

Of the total amount of Colorado River exchange water, typically 90 percent is delivered to the Whitewater River Subbasin and 10 percent is delivered to the Mission Creek Subbasin. The total amount of water delivered for replenishment within the West Whitewater River Subbasin Area of Benefit in 2013 was 26,620 AF. The total amount of water delivered for replenishment within the Mission Creek Subbasin Area of Benefit in 2013 was 2,379 AF as shown in Table 5.

Table 5 Colorado River Exchange Water Delivered to Mission Creek Replenishment Facility (1)

Year	AF
2002	4,733
2003	59
2004	5,564
2005	24,723
2006	19,901
2007	1,011
2008	503 (2)
2009	4,090 (2)
2010	33,210 (2)
2011	26,238 (2)
2012	23,272 (2)
2013	2,379
Total	**145,683**

(1) Delivered water quantities vary as a result of drought conditions and advance deliveries associated with the exchange agreement.
(2) Includes deliveries of DWA’s non-SWP supplemental water purchased from entities in Kern County for the CPV Sentinal Energy power plant.

Other Replenishment Activities

Desert Water Agency, Mission Springs Water District, and CVWD completed the Mission Creek and Garnet Hill Subbasins Water Management Plan Final Report in January 2013. The purpose of the Mission Creek and Garnet Hill Water Management Plan is to manage the water resources to meet demands reliably and protect water quality in a sustainable and cost-effective manner. The Plan provides the status of the subbasins, current issues, and water management goals.

GRPs are also under way in the west and east portions of the Whitewater River Subbasin. These programs are described in separate Engineer's Reports.

REPLENISHMENT ASSESSMENT

State Water Code

Sections 31630 through 31639 of the State Water Code (Code) authorize CVWD to levy and collect RACs for the purpose of replenishing groundwater supplies within its area of jurisdiction. The Code defines production, producer, and minimal pumper for groundwater replenishment purposes as follows:

1. "**Production**" or "**produce**" means the extraction of groundwater by pumping or any other method within the boundaries of the district or the diversion within the district of surface supplies that naturally replenish the groundwater supplies within the district and are used therein.
2. **"Producer"** means any individual, partnership, association or group of individuals, lessee, firm, private corporation, or any public agency or public corporation, including, but not limited to CVWD.
3. **"Minimal pumper"** means any producer who produces 25 or fewer acre-feet of groundwater in any year.

This RAC is based on groundwater production within the Mission Creek Subbasin within the boundaries of CVWD and is limited to the Area of Benefit.

Production by minimal pumpers is exempt from assessment. There are approximately 10 to 20 minimal pumpers within the Area of Benefit. These are predominantly small wells used for domestic or limited irrigation purposes. Maximum pumpage by the minimal pumpers in the Area of Benefit would be less than 500 AF/year, or less than five percent of annual groundwater production within the Management Area.

The code defines "replenishment assessment" and it states that RACs may be levied upon all water production within the Area of Benefit, provided the RAC is uniform throughout said Area of Benefit. The RAC is a monetary charge authorized by the State Water Code and uniformly

applied to extractions of groundwater within certain specified geographic boundaries of CVWD for payments of an imported or recycled (reclaimed) water supply purchased to supplement naturally existing water supplies. Charges for the water supply are limited to certain specified costs.

In the initial twelve years of the upper portion of the Whitewater River Subbasin GRP, only the Variable Operation, Maintenance, Power and Replacement (VOMPR) component of the Transportation Charge and the Delta Water Charge for the SWP could be included in the calculation. However, in 1991 the legislature passed and the governor signed into law AB 1070. This bill continues to limit the charges assessable against production, but includes an additional component of the Transportation Charge, the Off-Aqueduct Power component. CVWD has also been allowed, under the Water Code, to include in its calculations surplus or excess water charges, payments to DWA for similar payments by DWA to the State, the cost of importing and recharging water from sources other than the SWP and the cost of treating and distributing recycled water. The RAC considered in this report is based on the most recent and reliable information available with respect to applicable costs or charges.

CVWD has incurred additional costs associated with the GRP, which include continuing engineering studies, well meter reading and maintenance, and groundwater monitoring. These costs have now been included as a portion of the RAC.

Replenishment Program Accounting & Replenishment Assessment Development

Coachella Valley Water District State Water Project Tax

In 1959, the voters of California approved and adopted the Burns-Porter Act (The California Water Resources Development Bond Act-Water Code 12930) and in so doing, approved the use of local taxes when a local agency's board of directors determines such use to be necessary to fund that agency's water contract obligations. CVWD's Board of Directors determined that such a tax was necessary to carry out those obligations, which were incurred pursuant to CVWD's long-term plan to eliminate groundwater overdraft through replenishment basins that would benefit the entire Coachella Valley. This property tax has been levied on all property within the CVWD boundary since 1967 and is currently set at $0.08/$100 of assessed valuation. On March 12, 2013, the CVWD Board of Directors approved an increase in the property tax from $0.08/$100 of assessed valuation to $0.10/$100 of assessed valuation to be effective July 1, 2013.

The CVWD property tax revenues have traditionally been utilized to pay a large portion of CVWD's State Water Project (SWP) water invoice. Since SWP water was directly replenished in the West Whitewater River Subbasin Area of Benefit and the Mission Creek Subbasin Area of Benefit, the East Whitewater Replenishment Fund did not benefit from these revenues. CVWD has reexamined this policy and obtained a legal opinion that indicates a portion of these CVWD State Water Project Tax (SWP Tax) revenues can in fact be used to fund the direct and indirect GRP in the East Whitewater River Subbasin Area of Benefit.

Income Statement

Table 6 presents an income statement showing Actual Fiscal Year 2013, Projected Fiscal Year 2014 and Projected Fiscal Year 2015 Revenues, Expenses, and Cash Flow. Table 6 shows that without increasing the RAC rate, existing reserves are sufficient to support expenditures. No increase to the Mission Creek Subbasin RAC is proposed for Fiscal Year 2014-2015.

TABLE 6
COACHELLA VALLEY WATER DISTRICT
MISSION CREEK SUBBASIN AREA OF BENEFIT
GROUNDWATER REPLENISHMENT PROGRAM INCOME STATEMENT

(000's)	Actual FY 2013	Projected FY 2014	Projected FY 2015
Revenues			
Replenishment Assessment Revenue (RAC) (1)	$435	$454	$454
State Water Project Tax Revenue (SWP) (2)	4,076	1,990	1,990
Other Revenue (3)	94	83	71
Total Revenues	**$4,605**	**$2,527**	**$2,515**
Expenses			
Total O&M Costs	$32	$112	$116
Administrative Costs (4)	101	96	96
State Water Project Costs			
SWP Allocable Costs (5)	2,294	1,092	1,125
Supplemental SWP Water Costs (6)	56	48	49
SWP Non-Allocable Costs (7)	2,556	1,347	1,434
Total SWP Costs	**4,906**	**2,487**	**2,608**
Supplemental Non SWP Water Costs (8)	-	1,019	785
Capital Improvement Budget (9)	71	72	73
Total Expenses	**$5,110**	**$3,786**	**$3,678**
Increase (Decrease) in Cash Flow (10)	**($434)**	**($1,187)**	**($1,090)**
Beginning Unrestricted Reserves	**5,159**	**4,725**	**3,538**
Ending Unrestricted Reserves	**4,725**	**3,538**	**2,448**

NOTES:

(1) FY 2013 through FY 2015 RAC = $98.73/AF.

(2) SWP revenues collected from $.08 tax levy.

(3) Other Revenues include investment income.

(4) Includes personnel, meter reading, billing, groundwater monitoring and report preparation.

(5) Includes variable O&M, power, and replacement component of transportation charges.

(6) Turnback Water Pool A & B, Pool A & B Water and Yuba Dry Year.

(7) SWP costs that cannot be paid for by the RAC.

(8) Beginning FY 2014 the Mission Creek Fund will receive a prorated amount of non-SWP water costs.

(9) Costs of construction, including interest, to be recovered over a 20 year period along with CVWD capital improvement costs.

(10) Cash Flow does not include capital improvement budget as the cash outlay was deducted in the prior years beginning unrestricted reserves.

Methods for Determining Production

In accordance with Section 31638.5 of the California Water Code, Producers are required to have water-measuring devices installed on all wells or other water producing facilities within one year following the levy of a RAC. Minimal pumpers are exempt from this provision.

Producers shall submit a water production statement on a CVWD approved form with their RAC payment each month or enter into a Water Production Metering Agreement with CVWD to have CVWD staff measure and report groundwater production.

If no statement of production is furnished, CVWD will calculate production based on energy consumption records (in kilowatt-hours) and the results of well pump tests indicating unit energy consumption per acre-foot of production (in kilowatt-hours per acre-foot).

If no energy consumption records are available, CVWD will compute the groundwater pumping based on consumptive use of water. Consumptive use will be computed by multiplying the irrigated acreage for each crop type by a water consumption factor for each crop. The water consumption factor will be based on published crop evapotranspiration requirements, an allowance for leaching and an irrigation efficiency of 70 percent. Other water consumption factors will be used to compute production not used for irrigation. Production will be computed by subtracting any metered deliveries of Canal water or recycled water.

If the total metered, estimated or computed annual amount of production for any producer is 25 AF or less, that entity will be designated a minimal pumper and will be exempt from the RAC for that year. Minimal pumpers will be re-evaluated as necessary.

Replenishment Assessment Charge

GRP costs continue to increase. CVWD has analyzed projected expenses, revenues, and reserves over the next five years and determined that the RAC can be continued during Fiscal Year 2014-2015 at the same rate of assessment.

Estimating 2014 production based on 2013 calendar year reported production of 4,415 acre-feet, at $98.73 per acre-foot, the 2014 estimated assessment dollars equals $435,932.

CONCLUSION AND RECOMMENDATION

The average natural water inflow into the Mission Creek Subbasin is less than production. Therefore, this Subbasin must continue to use imported water for replenishment to reduce total overdraft. The GRP has proven to be effective in reducing groundwater overdraft.

It is recommended that no change be made in the $98.73/AF RAC that became effective on July 1, 2011.

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