PREPARED FOR

COACHELLA VALLEY WATER DISTRICT
COACHELLA WATER AUTHORITY
DESERT WATER AGENCY
INDIO WATER AUTHORITY

INDIO SUBBASIN ANNUAL REPORT FOR WATER YEAR 2016-2017

March 2018

Report

Stantec

INDIO SUBBASIN ANNUAL REPORT FOR WATER YEAR 2016-2017

March 2018

For submission to:

California Department of
Water Resources
In Accordance with
The Sustainable Groundwater Management Act

Prepared for:

Coachella Valley Water District
Coachella Water Authority
Desert Water Agency
Indio Water Authority

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Acronyms, Abbreviations, and Glosssary

Acronym	Definition
AB	Assembly Bill
AF	Acre-Feet
AFY	Acre-Feet per Year
AOB	Area of Benefit
CASGEM	California Statewide Groundwater Elevation Monitoring Program
CDPH	California Department of Public Health
CIB	Capital Improvement Budget
CVCC	Coachella Valley Conservation Commission
CVFTL	Coachella Valley Fringe-toed Lizard
CVMS	Coachella Valley Multiple Species
CVSC	Coachella Valley Stormwater Channel
CVWD	Coachella Valley Water District
CVWMP	Coachella Valley Water Management Plan
CWA	Coachella Water Authority
CWC	California Water Code
DWA	Desert Water Agency
DWR	California Department of Water Resources
EIR	Environmental Impact Report
ft	Feet
GIS	Geographic Information System
GRF	Groundwater Replenishment Facility
GRP	Groundwater Replenishment Program
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
HCP	Habitat Conservation Plan
ID	Improvement District
IID	Imperial Irrigation District

Acronym	Definition
IRWM	Integrated Regional Water Management
IWA	Indio Water Authority
MDMWC	Myoma Dunes Mutual Water Company
MSWD	Mission Springs Water District
MVP	Mid-Valley Pipeline
MWD	Metropolitan Water District of Southern California
MWH	MWH Americas, Inc.
QSA	Quantification Settlement Agreement
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SGMA	Sustainable Groundwater Management Act
SNMP	Salt and Nutrient Management Plan
SWP	State Water Project
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TEL GRF	Thomas E. Levy Groundwater Replenishment Facility
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USGS	United States Geological Survey
UWMP	Urban Water Management Plan
VSD	Valley Sanitary District
WMP	Water Management Plan
WRP	Water Reclamation Plant
WY	Water Year

Executive Summary

The California Legislature enacted the Sustainable Groundwater Management Act (SGMA) which was intended to provide a framework for the sustainable management of groundwater resources throughout California, primarily by local authorities. The SGMA required local authorities to form local Groundwater Sustainability Agencies (GSAs) by June 30, 2017 to evaluate conditions in their local groundwater basins and adopt locally-based Groundwater Sustainability Plans (GSPs) tailored to their regional economic and environmental needs.

The California Department of Water Resources (DWR) developed emergency regulations that defined the content of GSPs, as well as the annual reporting requirements by each GSA. This Executive Summary is prepared in response to Section 356.2 of GSP Emergency Regulations, which requires the submission of an annual report to the DWR. This report is the first SGMA annual report for the Indio Subbasin, designated the Basin No. 7-21.01 in DWR Bulletin No. 118 (2003).

ES.1 BACKGROUND

Presently, four water agencies have been designated as “Exclusive” GSAs to manage the Indio Subbasin of the Coachella Valley Groundwater Basin within their respective service areas:

- Coachella Valley Water District (CVWD)
- Coachella Water Authority (CWA)
- Desert Water Agency (DWA)
- Indio Water Authority (IWA)

SGMA recognizes the efforts many areas have made in developing and implementing groundwater management by allowing existing groundwater management plans to be submitted as an alternative to preparing a GSP. The original planning document for the Coachella Valley Groundwater Basin is the 2002 Coachella Valley Water Management Plan (CVWMP). The 2002 CVWMP was updated in 2010 and adopted in 2012. The Final Subsequent Program Environmental Impact Report Coachella Valley Water Management Plan Update (January 2012) provides important information on the Coachella Valley environment, the impacts of the original 2002 CVWMP and the 2010 CVWMP Update, and mitigation measures.

In December 2016, CVWD, DWA, CWA, and IWA collaboratively submitted the 2010 CVWMP Update as a SGMA Alternative GSP for the Indio Subbasin to DWR for review and evaluation.

In accordance with SGMA GSP Emergency Regulations, annual reports are required to be submitted to DWR on April 1 of each year, following adoption of a GSP. DWR requires GSAs that submitted Alternative GSPs submit their first annual reports by April 1, 2018. The annual reports are to be prepared in accordance with the SGMA GSP Emergency Regulations using information from Water Year (WY) 2017 (October 1, 2016 through September 30, 2017). The annual reports are required to present the following information:

- Groundwater elevation data
- Annual aggregated data identifying groundwater extraction for the preceding water year
- Surface water supply used for or available for use for groundwater recharge or in-lieu use
- Total water use
- Change in groundwater storage
- Progress toward implementing the GSP

The Indio Subbasin Annual Report for Water Year 2016-2017 (Annual Report) is the first annual report prepared for the Indio Subbasin in response to the SGMA requirements. This Annual Report contains a discussion of the Coachella Valley Groundwater Basin followed by sections describing each of the SGMA required annual report elements.

ES.2 COACHELLA VALLEY GROUNDWATER BASIN AND SUBBASINS

The Coachella Valley is a desert valley in Riverside County, California that extends approximately 45 miles southeast from the San Bernardino Mountains to the northern shore of the Salton Sea. The Coachella Valley Groundwater Basin underlies the cities of 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 Groundwater Basin, 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.

Although there is interflow of groundwater throughout the groundwater basin, fault barriers, constrictions in the groundwater 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 2003, and also by the United States Geological Survey (USGS) in 1971.

The subbasins of the Coachella Valley Groundwater Basin are the Indio[1], Mission Creek, Desert Hot Springs and San Gorgonio Pass Subbasins. The subbasins are defined without regard to water quantity or quality. They delineate areas underlain by formations which readily yield stored groundwater through water wells and offer natural reservoirs for the regulation of water supplies.

The boundaries between the 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.

ES.3 GROUNDWATER ELEVATION AND MONITORING WELLS

In response to 2010 legislation, DWR developed the California Statewide Groundwater Elevation Monitoring (CASGEM) program to track seasonal and long-term trends in groundwater elevations in California's groundwater basins. Monitoring wells are selected so they can provide a good representation of groundwater elevations within each agency's service areas. As shown in **Table ES-1**, the four GSAs maintain a total of 54 CASGEM monitoring wells in the Indio Subbasin. CVWD and DWA monitor water levels in 270 additional wells in the Indio Subbasin.

Table ES-1
WY 2016-2017 Wells Measured for Water Levels in the Indio Subbasin

Monitoring Agency	CASGEM Wells Monitored	Additional Wells Monitored	Total Wells Monitored
Coachella Valley Water District	40	242	282
Coachella Water Authority	1	0	1
Desert Water Agency	7	28	35
Indio Water Authority	6	0	6
Total Wells Monitored	**54**	**270**	**324**

Historical water level declines in the Indio Subbasin, and conditions producing those declines, have been extensively described by the United States Geological Survey (USGS) and DWR. The groundwater elevations presented in this Annual Report represent groundwater conditions in the principal groundwater producing aquifer of the

1 The Indio Subbasin is also identified as the Whitewater River Subbasin by the USGS. However, the subbasin is identified as the Indio Subbasin in DWR Bulletin 108 (1964) and Bulletin 118 (2003). For continuity, this annual report will identify the subbasin as the Indio Subbasin.

Indio Subbasin. Average levels are presented because the Indio Subbasin generally does not exhibit strong seasonal trends. Groundwater generally flows from the northwest near the Whitewater River Groundwater Replenishment Facility (GRF) toward the southeast at the Salton Sea. The groundwater gradient is typically steeper in the western portion of the Indio Subbasin, flattening to the southeast.

Water levels in the westerly portion of the Indio Subbasin have been very responsive to replenishment water deliveries at the Whitewater River Groundwater Replenishment Facility (GRF) and essentially all of the eastern portion of the Indio Subbasin showed increased groundwater storage, in response to decreased pumping and replenishment operations at the Thomas E. Levy Groundwater Replenishment Facility (TEL GRF).

The Groundwater Replenishment Program (GRP), combined with other water management elements, including source substitution and water conservation, are helping to control groundwater overdraft, restore water levels, and return artesian conditions within the eastern portion of the Indio Subbasin.

ES.4 GROUNDWATER EXTRACTION

During WY 2016-2017, there was 266,247 acre-feet (AF) of groundwater extracted from 575 wells in the Indio Subbasin. Because CVWD and DWA are authorized to collect replenishment assessment from groundwater producers, their respective legislations mandate the installation of water meters on all wells producing more than 25 acre-feet per year (AFY) for CVWD and 10 AFY for DWA. Groundwater is the principal source of water for urban water use which represents more than 80 percent of groundwater production from the Indio Subbasin.

ES.5 SURFACE WATER USE

Average annual precipitation in the Coachella Valley varies from 4 inches on the Coachella Valley floor to more than 30 inches in the surrounding mountains (DWR 1964). A portion of the flow percolating into the mountain watersheds eventually becomes subsurface inflow to the subbasins. Precipitation on the local mountain watersheds generate runoff that is captured and used for direct uses or for groundwater replenishment. A portion of the runoff is diverted for agricultural and municipal use and the balance naturally replenishes the groundwater basin.

Imported water deliveries to the Indio Subbasin for use in during WY 2016-2017 total 594,545 AF for agricultural, urban, environmental and aquifer recharge uses. Agricultural and aquifer recharge accounted for approximately 42% and 45% of the imported water use, respectively.

ES.5.1 Local Surface Water

DWA operates stream diversion facilities on several creeks and captures subsurface flow from Whitewater River Canyon. Of the 1,901 AF of surface water diversion, approximately 76% is for urban (including municipal and recreational) use. CVWD and DWA also divert water from a number of streams for aquifer recharge which is considered part of the natural inflow to the basin.

ES.5.2 Colorado River Water

In addition to natural replenishment from precipitation and stream flow, the Indio Subbasin receives artificial replenishment from importation of surface water from the Colorado River and water recycling. The Colorado River water has been a major source of supply for the Coachella Valley with the completion of the Coachella Canal. The Coachella Canal is a branch of the All-American Canal that brings Colorado River water into the Imperial and Coachella Valleys. During WY 2016-2017, CVWD took delivery of 334,876 AF of Colorado River water at Imperial Dam and delivered 326,752 AF for uses in the Coachella Valley. Approximately 77 percent of the delivered water was for agricultural use and about 11 percent each were delivered for urban and replenishment uses, respectively.

ES.5.3 State Water Project Water

CVWD and DWA have contracts with DWR for State Water Project (SWP) water with a combined Table A Amount of 194,100 AFY. There are no physical facilities to deliver SWP water to the Coachella Valley. CVWD's and DWA's Table A water is exchanged with Metropolitan Water District of Southern California (MWD) for a like amount of Colorado River water from MWD's Colorado River Aqueduct (CRA). SWP Exchange water has been used to recharge the Indio Subbasin at the Whitewater River GRF since 1973. MWD may also make advanced deliveries of SWP Exchange water to CVWD and DWA.

In WY 2016-2017, CVWD and DWA received 269,741 AF of SWP Exchange water from MWD. Of this amount, 267,793 AF was delivered to the Whitewater River GRF, with the remaining 1,948 AF delivered to the Mission Creek Subbasin. Of the total amont recharged, MWD added 147,146 AF to its Advanced Delivery account which had a positive balance of 259,221 AF as of September 30, 2017.

ES.5.4 Recycled Water

There are three Water Reclamation Plants (WRPs) that produce recycled water for non-potable reuse in the Indio Subbasin, primarily for golf course and greenbelt irrigation. Recycled water during WY 2016-2017 for the Indio Subbasin totaled 10,724 AF.

In addition to direct recycled water use, a portion of the municipal wastewater treated in the Indio Subbasin is disposed through percolation/evaporation ponds or is disposed to the Coachella Valley Stormwater Channel (CVSC). The percolated portion of the disposed wastewater contributes to the groundwater supply, while the disposal to the CVSC flows to the Salton Sea. In WY 2016-2017, a total of 38,758 AF of wastewater was treated of which 10,724 AF was reused, 8,552 AF was disposed through percolation/evaporation, and 19,482 AF was disposed to the CVSC.

ES.6 TOTAL WATER USE

A portion of the groundwater produced from the Indio Subbasin and imported water delivered to the Indio Subbasin is exported for use outside the Subbasin, totaling 5,015 AF. Some of this water is Coachella Canal water delivered to agricultural and urban users in the adjacent Desert Hot Springs Subbasin that are located within the CVWD Improvement District (ID)-1 service area. The remainder is groundwater pumped from the Indio Subbasin and delivered to CVWD customers in Imperial and Riverside County on the east and west sides of the Salton Sea and delivered to Mission Springs Water District (MSWD) customers in the Mission Creek Subbasin.

In total, 563,169 AF of water was delivered for direct use within the Indio Subbasin and 305,232 AF was delivered for aquifer recharge, for a total of 868,401 AF.

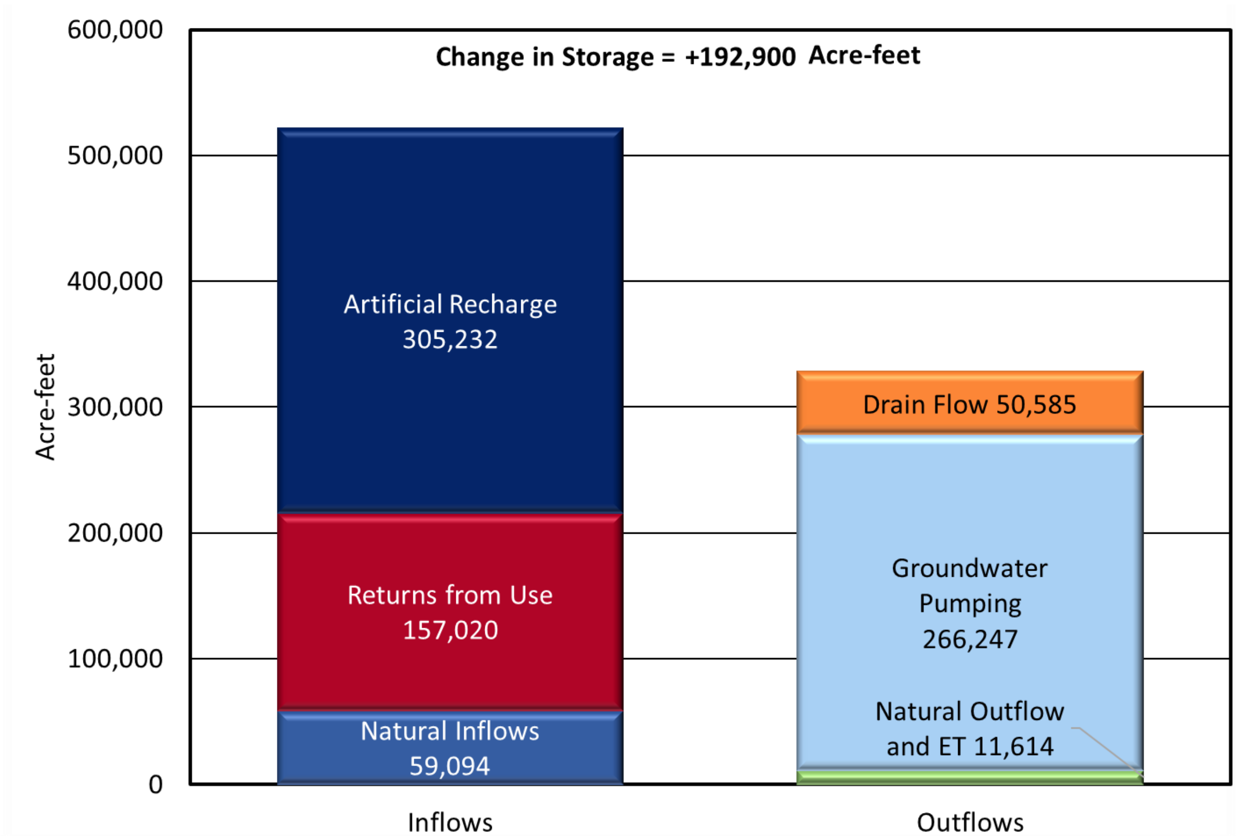
ES.7 GROUNDWATER BALANCE AND CHANGE IN GROUNDWATER STORAGE

A groundwater balance is helpful in assessing the condition of the groundwater of the Indio Subbasin. The groundwater balance compares the inflows and outflows to the Indio Subbasin. The difference between inflows and outflows at a given time is defined as the change in storage for that time period. The groundwater balance for WY 2016-2017 is summarized in **Figure ES-1**.

Groundwater inflows to the Indio Subbasin consist of infiltration of natural recharge and inflows, infiltration of return flows from urban and agricultural uses, artificial recharge, and Salton Sea intrusion. Inflows from outside the Indio Subbasin consist of underflow from the San Gorgonio Pass area and flows across the Banning fault. Groundwater outflows from the Indio Subbasin consist of groundwater pumping, flow from the semi-perched aquifer through the agricultural drains into the Salton Sea, evapotranspiration from the shallow unconfined aquifer, evaporation losses, and subsurface flow out of the Indio Subbasin, into the aquifers beneath the Salton Sea. Estimated inflows and outflow quantities to the Indio Subbasin are shown in **Figure ES-1**.

The annual change in groundwater storage represents the annual difference between inflows and outflows in the Indio Subbasin. During wet years or periods of high artificial recharge, the change in storage is positive (water in storage increases). In dry years or periods of high pumping, the change in storage is often negative (storage decreases). Because of the large amount of recharge, the change is storage for the Indio Subbasin is a positive 192,900 AF for WY 2016-2017.

Figure ES-1
WY 2016-2017 Water Balance - Indio Subbasin



The one-year change in groundwater storage demonstrates a significant increase in groundwater storage near the Whitewater River Groundwater Replenishment Facility (GRF) in response to the high recharge deliveries in WY 2016-2017. During the past ten years, there have been significant increases in groundwater storage throughout the Indio Subbasin in response to the high recharge deliveries in 2010-2012 and in WY 2016-2017. Essentially, all of the eastern portion of the Indio Subbasin showed increased groundwater storage, in response to decreased pumping and replenishment operations at the TEL GRF.

ES.8 SUMMARY OF PROGRESS AND PROJECTS

The sustainability goals described in the SGMA Alternative GSP for the Indio Subbasin identified the following water management elements for implementation:

- Water conservation measures
- Acquisition of additional water supplies
- Conjunctive use programs to maximize supply reliability

- Source substitution programs
- Groundwater recharge programs
- Water quality protection measures
- Other management activities

The Indio Subbasin GSAs continue to implement the goals and programs of the 2010 Water Management Plan Update. The 2016-2017 Water Year saw the highest volume of water recharged in a 12-month period. Groundwater production remained more than 25 percent less than the historical highs in the early 2000s. The results of the on-going basin monitoring program demonstrate the significant progress being made toward the goal of eliminating groundwater overdraft. Since 2009, the Indio Subbasin has gained over 500,000 AF of groundwater in storage.

Groundwater level monitoring demonstrates that most of the Indio Subbasin exhibited a water level gain in the past year except for portions of the Indio Subbasin between Palm Springs and Rancho Mirage and the Desert Palms (Sun City) community. The water level decline in the Palm Springs-Rancho Mirage area is the residual effect of low imported replenishment water deliveries to the Whitewater River GRF in previous years due to the recent drought.

Over the past ten years, much of the Indio Subbasin experienced water level gains in the range of 2 to over 50 feet as a result of continued recharge at the Whitewater River GRF, implementation of the TEL GRF, conversion of golf courses from groundwater to Canal water, and water conservation. The portion of the Indio Subbasin between Palm Springs and Palm Desert experienced water level declines in the range of 2 to 18 feet in this period. Eliminating this decline is the focus of the Mid-Valley Pipeline source substitution project and the proposed Palm Desert Groundwater Replenishment Facility.

CVWD continues to work with the golf courses in its service area to extend the Mid-Valley Pipeline distribution system to serve additional courses and reduce their groundwater pumping. Increased availability of Colorado River water through the Quantification Settlement Agreement (QSA) is expected to add 18,000 AF of deliveries in 2018.

Continued implementation of Water Management Plan programs is critical to meeting the goals of the plan. In the coming year, the GSAs will continue to pursue their successful water conservation efforts. CVWD plans to begin water deliveries to one golf course in early 2018 , connect two additional golf courses to non-potable water supplies and begin construction to connect four additional courses in the following year. Phase I of construction is scheduled to begin in April 2018 and to be completed in December 2018 and Phase II is currently being designed.

The GSAs continue to evaluate the effectiveness of their groundwater monitoring program; additional wells are added to the program as the need arises. In addition, the next USGS report on land subsidence is expected to be published in late 2018.

Section 1
Introduction

1.1 BACKGROUND

1.1.1 Implementation of the Sustainable Groundwater Management Act

In 2014, faced with declining groundwater levels (most notably in California's Central Valley), the California Legislature enacted the Sustainable Groundwater Management Act (SGMA) which was intended to provide a framework for the sustainable management of groundwater resources throughout California, primarily by local authorities. SGMA consisted of three bills, Assembly Bill (AB) 1739 (Dickinson), Senate Bill (SB) 1168 (Pavley), and SB 1319 (Pavley), and was signed into law by Governor Brown on September 16, 2014.

The SGMA required local authorities to form local Groundwater Sustainability Agencies (GSAs) by June 30, 2017 to evaluate conditions in their local groundwater basins and adopt locally-based Groundwater Sustainability Plans (GSPs) tailored to their regional economic and environmental needs. The SGMA allows a 20-year time frame for GSAs to implement their GSPs and achieve long-term groundwater sustainability. It protects existing water rights and does not affect current drought response measures. SGMA provides local GSAs with tools and authority to:

- Monitor and manage groundwater levels and quality
- Monitor and manage land subsidence and changes in surface water flow and quality affecting groundwater levels or quality or caused by groundwater extraction
- Require registration of groundwater wells
- Require reporting of annual extractions
- Require reporting of surface water diversions to underground storage
- Impose limits on extractions from individual wells
- Assess fees to implement local GSPs
- Request revisions of basin boundaries, including establishing new subbasins

The California Department of Water Resources (DWR) developed the California Statewide Groundwater Elevation Monitoring (CASGEM) program to track seasonal and long-term trends in groundwater elevations in California's groundwater basins. Through its CASGEM program, DWR ranked the priority of all 515 groundwater basins and subbasins in California as either very low, low, medium, or high. In addition, DWR, as required by SGMA, identified the basins and subbasins that are in conditions of critical overdraft. Twenty-one basins and subbasins in California were identified as critically-overdrafted basins. None of the subbasins in the Coachella Valley Groundwater Basin were listed as critically-overdrafted.

GSAs responsible for the 127 high-priority and medium-priority groundwater basins and subbasins must adopt GSPs by January 31, 2020 for critically overdrafted basins, and by January 31, 2022 for those not currently in critical overdraft. GSAs may adopt a single GSP covering an entire basin or combine a number of GSPs created by multiple GSAs. Sustainability must be achieved within 20 years after adoption of the GSP for all high-priority and medium-priority basins. GSAs who elect to submit an Alternative GSP, rather than prepare a GSP in accordance with Water Code §10727 et seq. must have done so by January 1, 2017, and every five years thereafter.

The State Water Resources Control Board (SWRCB) is empowered to intervene if local agencies fail to form GSAs or fail to adopt their GSPs on schedule. The Coachella Valley Groundwater Basin has been divided into four (4) subbasins by DWR in California Bulletin 108 (1964) and Bulletin 118 (2003): they are the Indio[1], Mission Creek, San Gorgonio Pass, and Desert Hot Springs Subbasins. The Indio, Mission Creek, and San Gorgonio Pass Subbasins have been designated medium-priority basins, and the Desert Hot Springs Subbasin has been designated a low-priority subbasin under SGMA.

1.1.2 Formation of GSAs by Local Agencies in the Indio Subbasin

Presently, four separate entities have been designated as "Exclusive" GSAs to manage the Indio Subbasin of the Coachella Valley Groundwater Basin within their respective service areas:

- Coachella Valley Water District (CVWD)
- Coachella Water Authority (CWA)
- Desert Water Agency (DWA)
- Indio Water Authority (IWA)

1.1.3 Submission of an Alternative Groundwater Sustainability Plan for the Indio Subbasin to the DWR

SGMA recognizes the efforts many areas, such as the Coachella Valley, have made in developing and implementing groundwater management by allowing existing groundwater management plans to be submitted as an alternative to preparing a GSP.

[1] The Indio Subbasin is also identified as the Whitewater River Subbasin by the USGS. However, the subbasin is identified as the Indio Subbasin in DWR Bulletin 108 (1964) and Bulletin 118 (2003). For continuity, this annual report will identify the subbasin as the Indio Subbasin.

Twenty years before the adoption of SGMA, CVWD began development of the initial Water Management Plan in 1994 after recognizing the need to sustainably manage the Coachella Valley Groundwater Basin. The original planning document is the 2002 Coachella Valley Water Management Plan (CVWMP). The 2002 CVWMP was updated in 2010 and adopted in 2012. The environmental documents associated with these management plans provide important information on the Coachella Valley environment, the impacts of the original 2002 CVWMP and the 2010 CVWMP Update, and mitigation measures. The 2014 CVWMP Status Report was a periodic review of the planning assumptions and implementation status for the 2010 CVWMP Update. Annual Engineer's Reports on Water Supply and Replenishment Assessment are prepared by CVWD under authority of California Water Code (CWC) §31631 and by DWA under authority of Chapter 100 of the CWC Appendix. These documents provide the basis for compliance with the requirements of SGMA.

On December 29, 2016, CVWD, DWA, CWA, and IWA collaboratively submitted the 2010 CVWMP Update as a SGMA Alternative GSP for the Indio Subbasin, (aka "SGMA Bridge Document") to DWR for review and evaluation. In December 2017, DWR stated that all GSAs who submitted Alternative GSPs would be required to submit annual reports pursuant to SGMA by April 1, 2018.

1.1.4 Annual Reporting

Annual reports of the Indio Subbasin conditions has been prepared since 1978 by both CVWD and DWA. CVWD has published an annual Engineer's Report on Water Supply and Replenishment Assessment for its West Whitewater River Area of Benefit (AOB) since 1978, and the East Whitewater River AOB since 2004, in the Indio Subbasin. DWA has published an annual Engineer's Report on the Groundwater Replenishment and Assessment Program for its Whitewater River Subbasin AOB since 1978, and its Garnet Hill Subbasin AOB since 2015, in the Indio Subbasin. The Engineer's Reports detail the groundwater levels, annual water balance, artificial and natural recharge, and groundwater pumping, as well as establish the replenishment assessment charged for production within each designated AOB for the following fiscal year.

In accordance with SGMA (Water Code Section 10728), on April 1 following the adoption of a GSP and annually thereafter, a GSA shall submit a report to DWR containing the following information about the basin managed in the GSP:

- Groundwater elevation data
- Annual aggregated data identifying groundwater extraction for the preceding water year
- Surface water supply used for or available for use for groundwater recharge or in-lieu use
- Total water use

- Change in groundwater storage
- Progress toward implementing the GSP

The Indio Subbasin Annual Report for Water Year 2016-2017 (Annual Report) is the first annual report prepared for the Indio Subbasin in response to the SGMA requirements. The Annual Report contains a discussion of the Coachella Valley Groundwater Basin followed by sections describing each of the SGMA required annual report elements.

Section 2
Coachella Valley Groundwater Basin Setting

The Indio Subbasin is shown on Figure **Figure 2-1,** which is part of the greater Coachella Valley Groundwater Basin, as shown on **Figure 2-2**. The Coachella Valley Groundwater Basin extends approximately 45 miles southeast from the San Bernardino Mountains to the northern shore of the Salton Sea. The Coachella Valley Groundwater Basin underlies the cities of 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 in 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, 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 Coachella Valley floor to more than 30 inches in the surrounding mountains (DWR, 1964). Most of the precipitation occurs during December through February, except for summer thundershowers. Prevailing winds in the area are usually gentle, but occasionally increase to velocities as high as 30 miles per hour or more. Mid-summer temperatures commonly exceed 100 degrees Fahrenheit (°F), frequently reach 110°F, and periodically reach 120°F. The average winter temperature is approximately 60°F.

2.1 COACHELLA VALLEY GROUNDWATER BASIN

The Coachella Valley Groundwater Basin 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 southern boundary crosses the Riverside County Line into Imperial and San Diego Counties.

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 groundwater 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 California Department of Water Resources (DWR) in 1964 and 2003, and also by the United States Geological Survey (USGS) in 1971.

2.1.1 Subbasins and Subareas

The subbasins of the Coachella Valley Groundwater Basin are the Mission Creek, Desert Hot Springs, San Gorgonio Pass, and Indio[2] Subbasins. The subbasins are defined without regard to water quantity or quality. They delineate areas underlain by formations which readily yield stored groundwater 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 in the Coachella Valley Groundwater Basin as designated by DWR in Bulletin 108 (1964) and in Bulletin 118 (2003).

- Indio Subbasin (Subbasin 7-21.01)
    - Palm Springs Subarea
    - Thermal Subarea
    - Thousand Palms Subarea
    - Oasis Subarea

[2]The Garnet Hill Subarea of the Indio Subbasin is also identified as a separate Garnet Hill Subbasin by the USGS. However, it is identified as the Garnet Hill Subarea of the Indio Subbasin in DWR Bulletin 108 (1964) and Bulletin 118 (2003). For continuity, this annual report will identify the subarea as the Garnet Hill Subarea of the Indio Subbasin.

  - Garnet Hill Subarea[2]
- Mission Creek Subbasin (Subbasin 7-21.02)
- Desert Hot Springs Subbasin (Subbasin 7-21.03)
  - Miracle Hill Subarea
  - Sky Valley Subarea
  - Fargo Canyon Subarea
- San Gorgonio Pass Subbasin (Subbasin 7-21.04)

The location of each subbasin is shown on **Figure 2-2**. 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 the Indio Subbasin and Indio Subareas are further described in the following sections.

2.1.2 Geology

The Coachella Valley Groundwater Basin encompasses much of the floor area of Coachella Valley. The Coachella Valley itself trends northwest–southeast; its surface slopes generally to the southeast, and is bounded on its northern, northwestern, southwestern, and southern margins by uplifted mountains of bedrock. Coachella Valley sedimentary fill consists of thick sand and gravel sedimentary sequences eroded from the surrounding mountains. Sedimentary infill within the Coachella Valley thickens from north to south, and depending on location within the basin, is at least several thousand and as much as 12,000 feet (ft) in thickness. The upper approximately 2,000 ft constitute the aquifer system that is the primary source of groundwater supply (DWR, 1979). A geologic map of the Coachella Valley Groundwater Basin is shown in **Figure 2-3**.

Figure 2-1

Regional Map of the Indio Subbasin

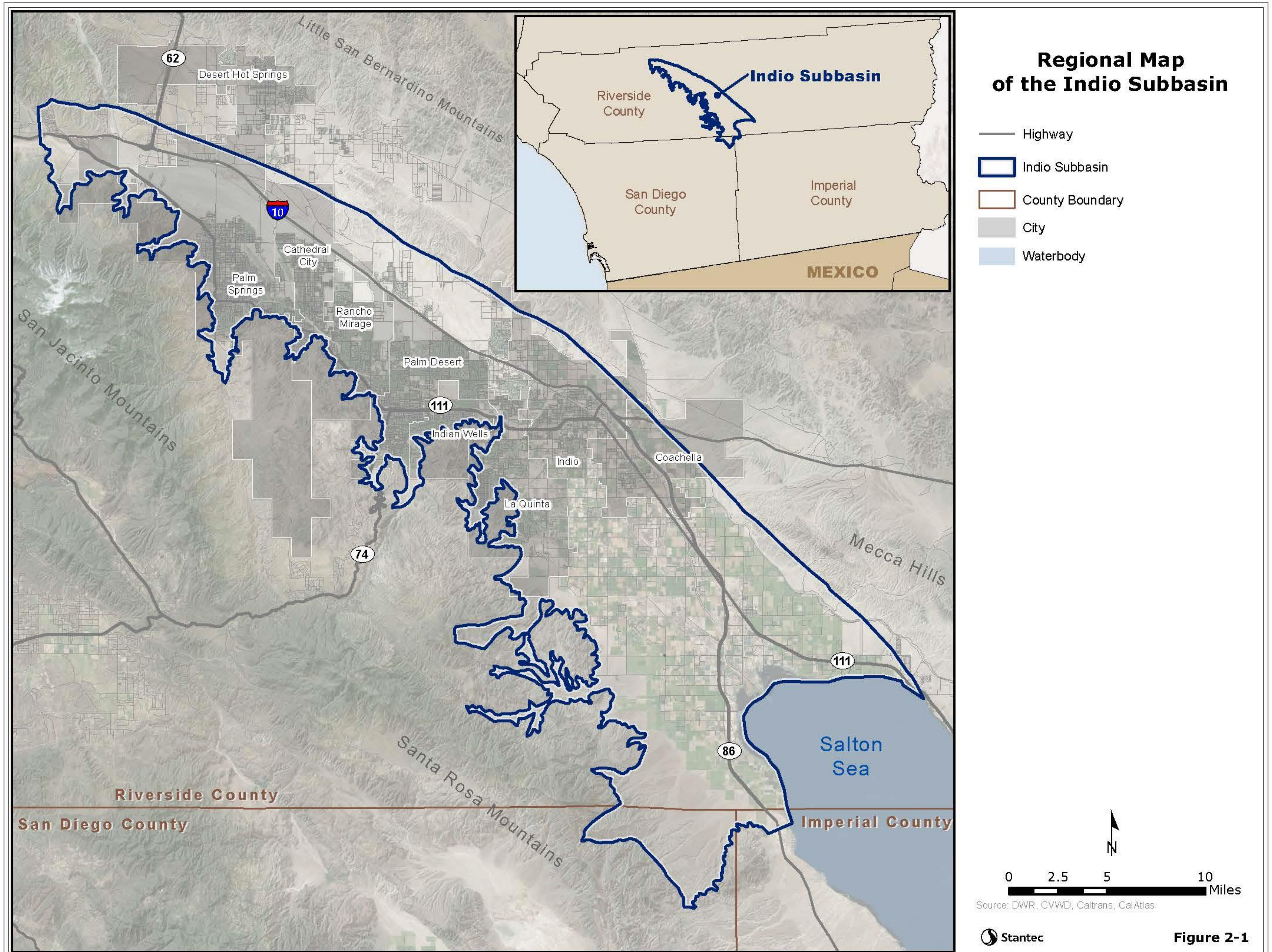


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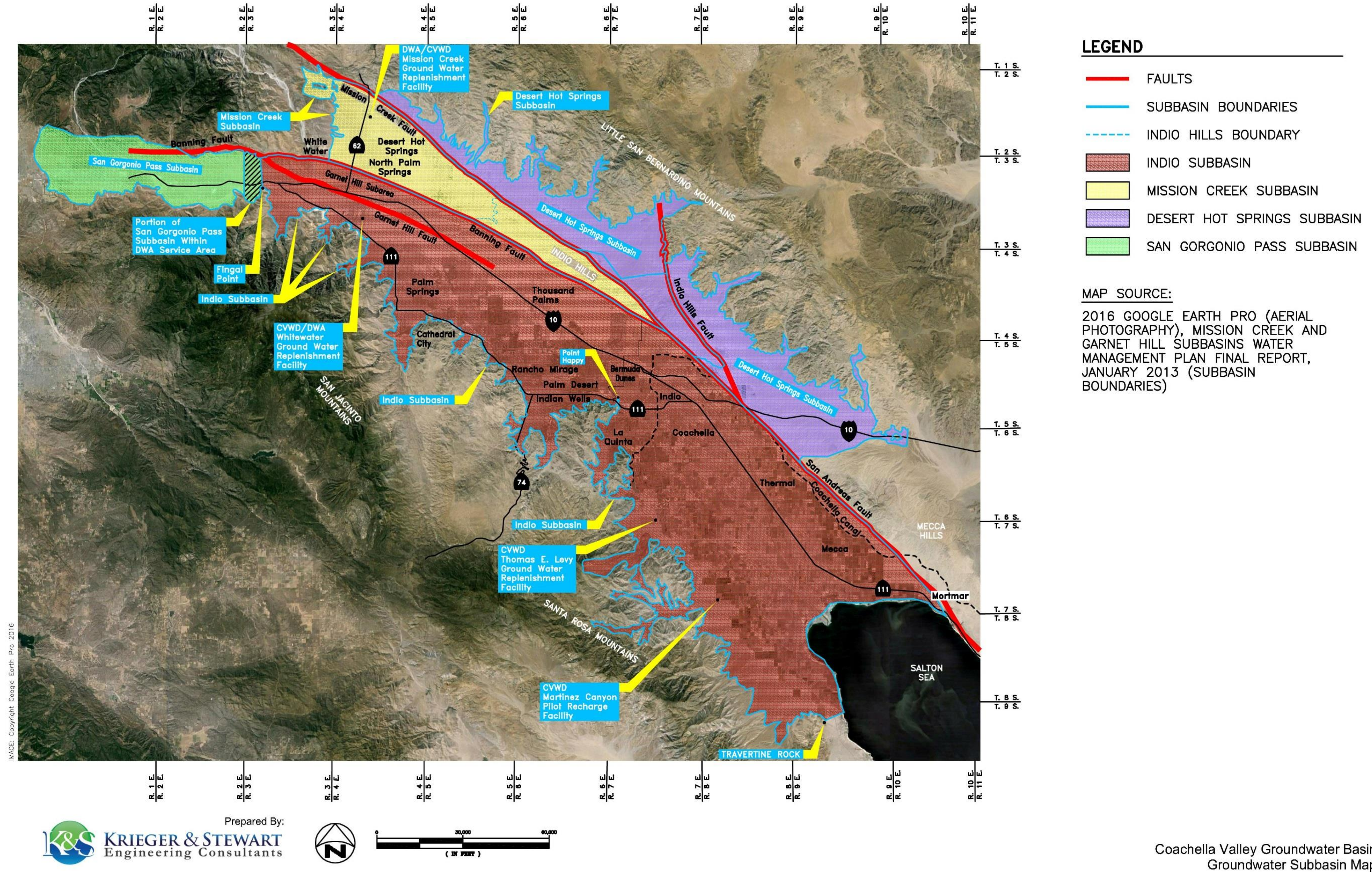
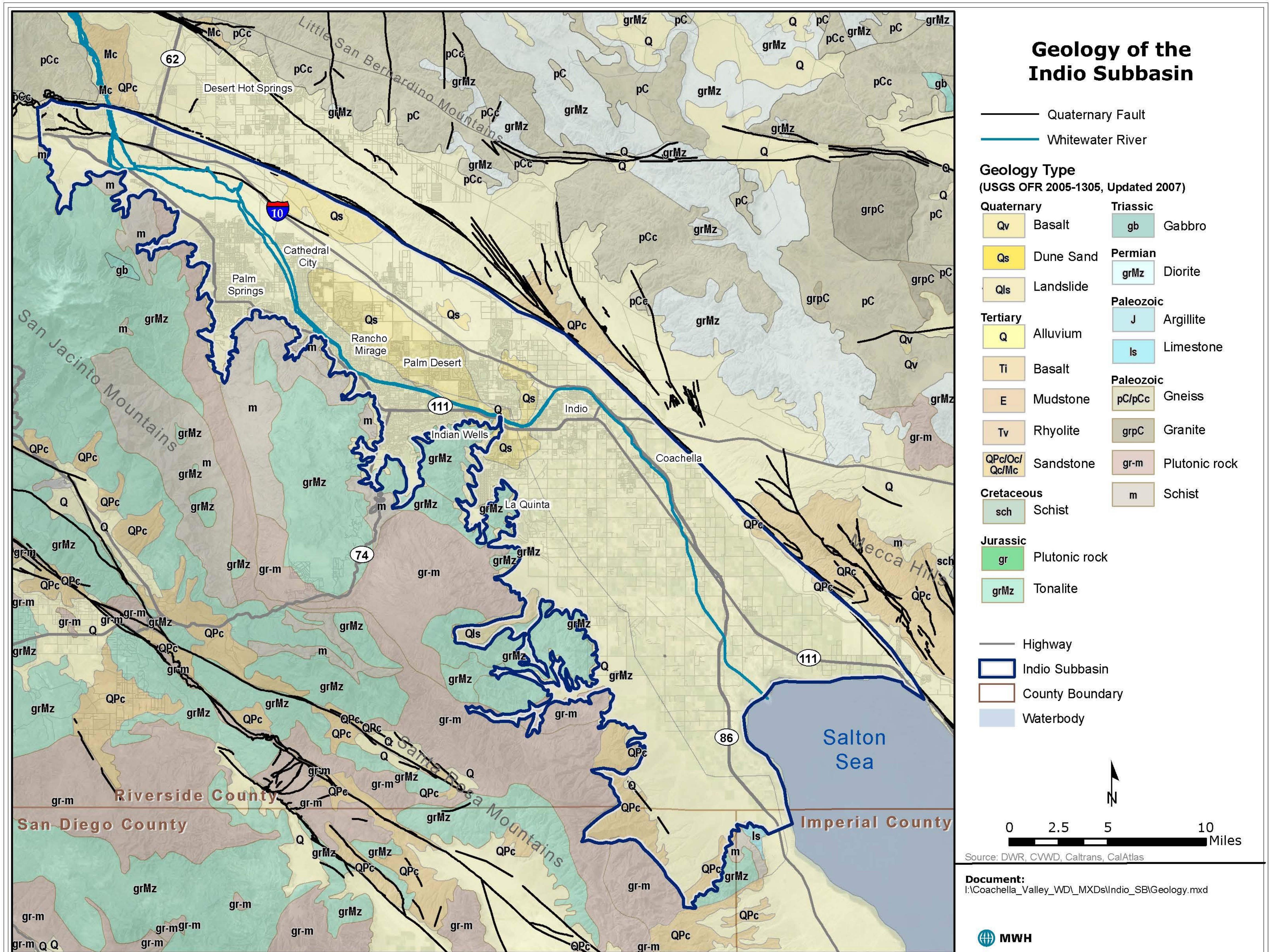
Figure 2-2
Coachella Valley Groundwater Basin and Subbasins



Coachella Valley Groundwater Basin
Groundwater Subbasin Map

1022–4f2.dwg

Figure 2-3
Coachella Valley Groundwater Basin Geological Map



2.1.3 Basin Storage Capacity

In 1964, DWR estimated that the subbasins in the Coachella Valley Groundwater Basin contained, in the first 1,000 ft below the ground surface, approximately 39,200,000 acre-feet (AF) of water. The capacities of the subbasins are shown in **Table 2-1**.

Table 2-1
Coachella Valley Groundwater Basin Groundwater Storage Capacity

Subbasin/Subarea	Groundwater Storage (AF)[1]
Indio Subbasin	
Palm Springs Subarea	4,600,000
Thousand Palms Subarea	1,800,000
Oasis Subarea	3,000,000
Thermal Subarea	19,400,000
Garnet Hill Subarea	1,000,000
Subtotal Indio Subbasin:	**29,800,000**
San Gorgonio Pass Subbasin	2,700,000
Mission Creek Subbasin	2,600,000
Desert Hot Springs Subbasin	4,100,000
Total All Subbasins:	**39,200,000**

Note: First 1,000 feet below ground surface. (DWR, 1964)

2.2 INDIO SUBBASIN DESCRIPTION

The Indio Subbasin, designated the Basin No. 7-21.01 in DWR 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 Indio Subbasin extends southeast approximately 70 miles to the Salton Sea.

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

The Indio 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 the City of Indio southeasterly to the Salton Sea, the Indio Subbasin contains increasingly thick layers of silt and clay, especially in the shallower portions of the Indio 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 Indio Subbasin (DWR 1964).

In 1964, DWR estimated that the four subbasins that make up the Coachella Valley Groundwater Basin contained a total of approximately 39.2 million acre-feet (AF) of water in the first 1,000 ft below the ground surface; much of this water originated as runoff from the adjacent mountains. Of this amount, approximately 29.8 million AF of water was stored in the Indio Subbasin (DWR 1964). However, the amount of water in the Indio 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 Indio Subbasin 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 Indio Subbasin, and large agricultural economy in the southeastern Indio Subbasin. Imported State Water Project (SWP) water allocations, and Colorado River Aqueduct water, are utilized for replenishment in the Indio Subbasin to replace consumptive uses created by the resort-recreation economy and permanent resident population, and the agricultural economy.

Hydrologically, the Indio Subbasin is divided into five subareas: the Palm Springs, Thermal, Thousand Palms, Oasis, and Garnet Hill Subareas. The Palm Springs Subarea is the forebay or main area of replenishment to the Indio Subbasin, and the Thermal Subarea is the pressure, or confined area, within the Indio Subbasin. The other three subareas are peripheral areas having unconfined groundwater conditions.

2.2.1 Palm Springs Subarea

The triangular area between the Garnet Hill Fault and the east slope of the San Jacinto Mountains southeast to the City of 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. The thickness of these water-bearing materials is not known; however, it exceeds 1,000 ft. 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 ft to 400 ft.

Natural replenishment to the aquifer in the Indio 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 Garnet Hill Subarea. Deep percolation of direct precipitation on the Palm Springs Subarea is considered negligible as it is consumed by evapotranspiration (DWR 1964).

2.2.2 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 the City of Cathedral City. The hydraulic conductivity parallel to the bedding of the deposits in the Thermal Subarea are several times the hydraulic conductivity 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 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 City of 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 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 Coachella 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. The top of the lower aquifer zone is present at a depth ranging from 300 ft to 600 ft 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 ft thick and may be in excess of 1,000 ft thick.

The aquitard overlying the lower aquifer zone is generally 100 ft to 200 ft thick, although in small areas on the periphery of the Salton Sea it is more than 500 ft thick. North and west of the City 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 (see **Figure 2-4** at the end of this Section).

This zone consists of recent silts, clays, and fine sands and is relatively persistent southeast of the City of Indio. It ranges from zero to 100 ft thick and is generally an effective barrier to deep percolation. However, north and west of the City 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 the City of Indio has contributed to irrigation drainage problems in the area. Semi-perched groundwater has been maintained by irrigation water applied to agricultural lands, necessitating the construction of an extensive subsurface tile drain system (DWR 1964).

A generalized stratigraphic diagram of the geologic units and groundwater zones of the Thermal Subarea (DWR 1964) is presented in **Figure 2-5**.

Figure 2-4
Approximate Extend of Shallow, Semi-Perched Aquifer in the Thermal Subarea of the Indio Subbasin

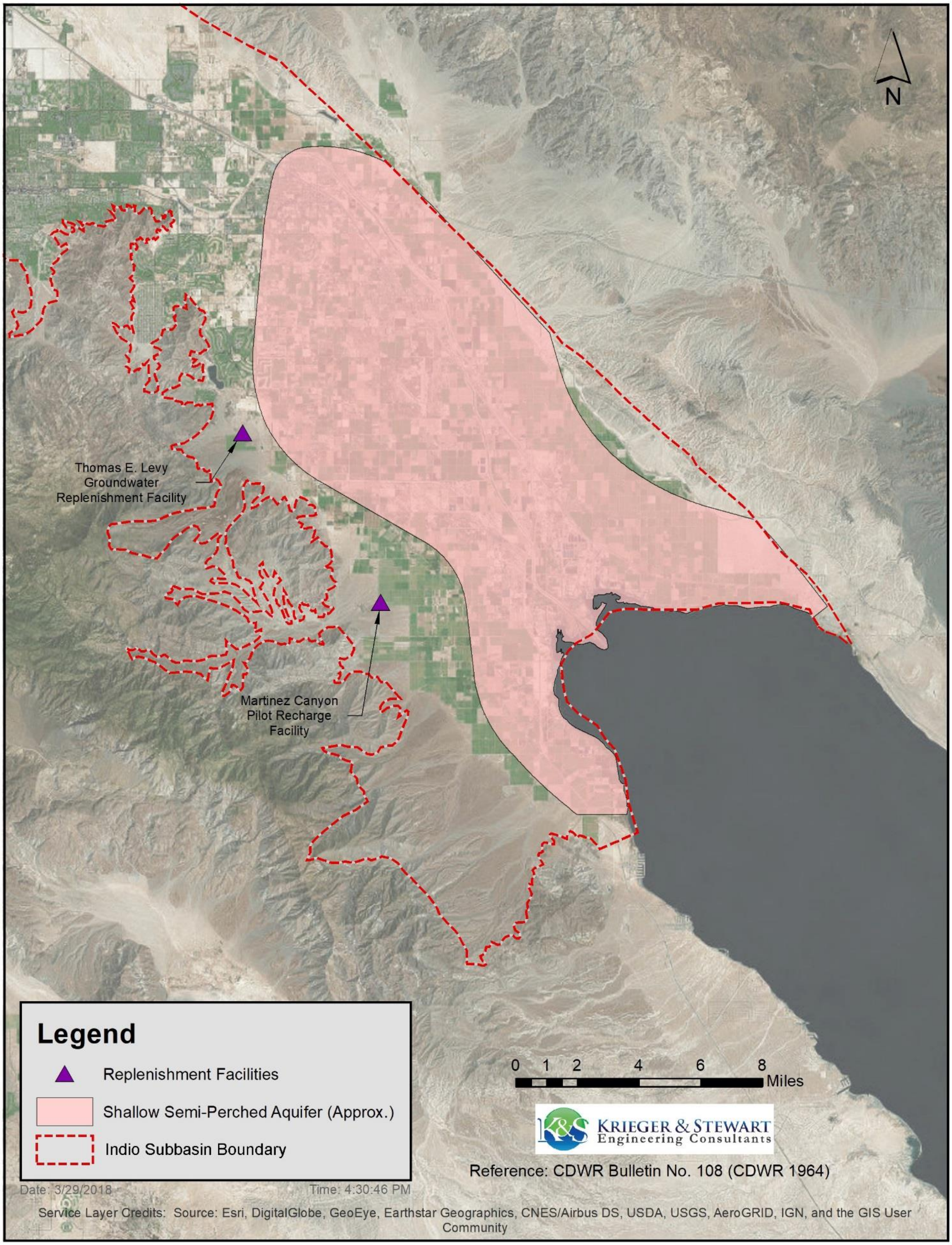
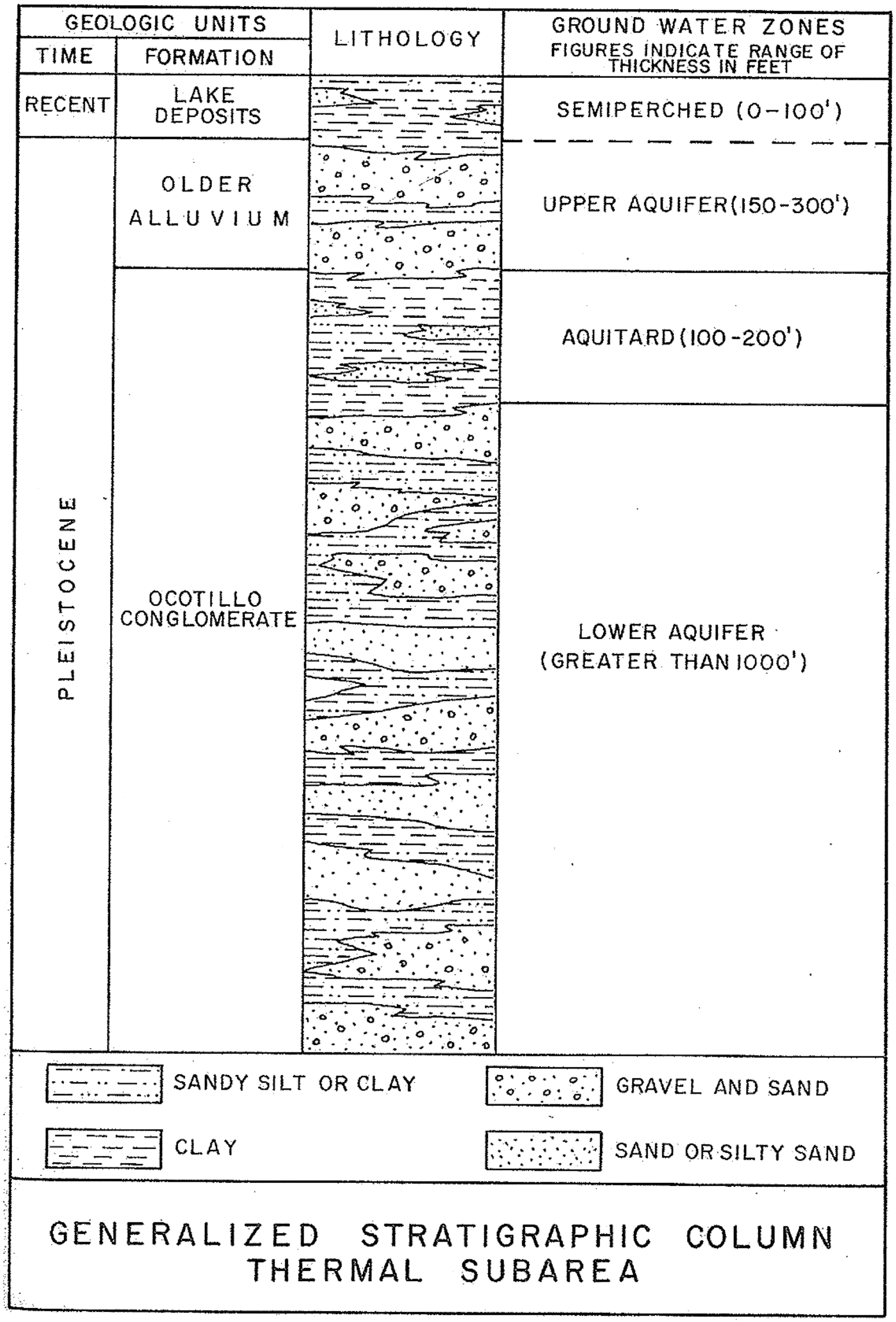


Figure 2-5
Generalized Stratigraphic Column of the Thermal Subarea of the Indio Subbasin



Source: CDWR Bulletin No. 108 (CDWR 1964)

FIGURE
III-3

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2.2.3 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 Indio Subbasin are characterized by calcium bicarbonate; but water in the Thousand Palms Subarea is characterized by sodium sulfate (DWR 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 DWR 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 western portion of the Indio Subbasin. Groundwater levels in this area show similar patterns to those of the adjacent Thermal Subarea, suggesting a hydraulic connectivity (DWR 1964).

2.2.4 Oasis Subarea

Another peripheral zone of unconfined groundwater that is different in chemical characteristics from water in the major aquifers of the Indio 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 ft. Groundwater levels in the Oasis Subarea have exhibited similar declines as elsewhere in the Indio Subbasin due to increased groundwater pumping to meet agricultural demands on the Oasis Piedmont slope (DWR 1964).

2.2.5 Garnet Hill Subarea

This subarea is considered part of the Indio Subbasin in Coachella Valley Water District's (CVWD) DWR's Bulletin 118 (2003). There are no assessable groundwater pumpers within CVWD's portion of the Garnet Hill Subarea, and CVWD considers the portion of the Garnet Hill Subarea within its boundaries to be a part of the Indio Subbasin and West Whitewater River Subbasin Area of Benefit (AOB). There are two assessable producers within Desert Water Agency's (DWA) portion of the Garnet Hill Subarea. DWA considers the portion of the Garnet Hill Subarea within its service area to be a separate AOB.

The area between the Garnet Hill Fault and the Banning Fault, named the Garnet Hill Subarea of the Indio Subbasin by DWR (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 ft in groundwater level elevation in a horizontal distance of 3,200 ft 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 ft (MWH 2013).

The 2013 Mission Creek/Garnet Hill Subbasins Water Management Plan states that groundwater production is low in the Garnet Hill Subarea 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 portions of the subarea show response to large replenishment quantities from the Whitewater River Groundwater Replenishment Facility, while levels are relatively flat in the eastern portion of the subarea. The lack of wells in the subarea limits the geologic understanding of how this subarea operates relative to the Mission Creek Subbasin and Indio Subbasin.

Although some natural replenishment to this subarea 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 subarea comes from the Whitewater River through the permeable deposits which underlie Whitewater Hill (MWH 2013).

2.3 MANAGEMENT AREA AND AREAS OF BENEFIT

The Indio Subbasin is not adjudicated. From a management perspective, the Indio Subbasin contains two management areas. The western portion of the Indio Subbasin, designated the West Whitewater River Management Area, has been jointly managed by CVWD and DWA under management agreements since 1976. The 1976 and 1992 agreements were superceded by the 2014 Whitewater Water Management Agreement. The 2014 Management Agreement provides for replenishing the western Indio Subbasin and sharing the costs of replenishment between CVWD and DWA. The 2014 Management Agreement also specifies that the available SWP water will be allocated between the Mission Creek Subbasin and the western portion of the Indio Subbasin in proportion to the amount of water produced or diverted from each subbasin; cumulative replenishment water deliveries between the two subbasins will be balanced as determined by the Management Committee but no later than 20 years from December 7, 2004. The East Whitewater River Subbasin Management Area is managed by CVWD (CVWD 2012).

Under the authority of their respective enabling legislations, CVWD and DWA have each designated two areas of benefit (AOBs) within their respective agency boundaries of the Indio Subbasin for the purpose assessing groundwater replenishment charges on groundwater production from their respective portions of the Indio Subbasin. The funds derived from these charges recover a portion of the cost of purchasing and recharging imported water in the Indio Subbasin. CVWD has a West Whitewater River Subbasin AOB and an East Whitewater River Subbasin AOB within its service area. The dividing line between CVWD's West and East Whitewater Subbasin AOBs is an irregular line trending northeast to southwest between the Indio Hills north of the City of Indio and Point Happy in La Quinta. DWA has a West Whitewater River Subbasin AOB and a Garnet Hill Subbasin AOB within its service area. The dividing line between DWA's AOBs is the Garnet Hill Fault.

Section 3
Groundwater Elevation Data

Section 356.2(b) of the Sustainable Groundwater Management Act (SGMA) Emergency Regulations requires:

> *A detailed description and graphical representation of the following conditions of the basin managed in the Plan:*
>
> *(1) Groundwater elevation data from monitoring wells identified in the monitoring network shall be analyzed and displayed as follows:*
>
> *(A) Groundwater elevation contour maps for each principal aquifer in the basin illustrating, at a minimum, the seasonal high and seasonal low groundwater conditions.*
>
> *(B) Hydrographs of groundwater elevations and water year type using historical data to the greatest extent available, including from January 1, 2015, to current reporting year.*

This section presents the groundwater level monitoring program results for the Indio Subbasin for Water Year (WY) 2016-17.

3.1 MONITORING WELLS

In response to 2010 legislation, California Department of Water Resources (DWR) developed the California Statewide Groundwater Elevation Monitoring (CASGEM) program to track seasonal and long-term trends in groundwater elevations in California's groundwater basins. The hydrologic system of the Coachella Valley has been extensively monitored by a number of agencies for many years. Monitoring data in the Mission Creek Subbasin is available for selected wells since the 1950s.

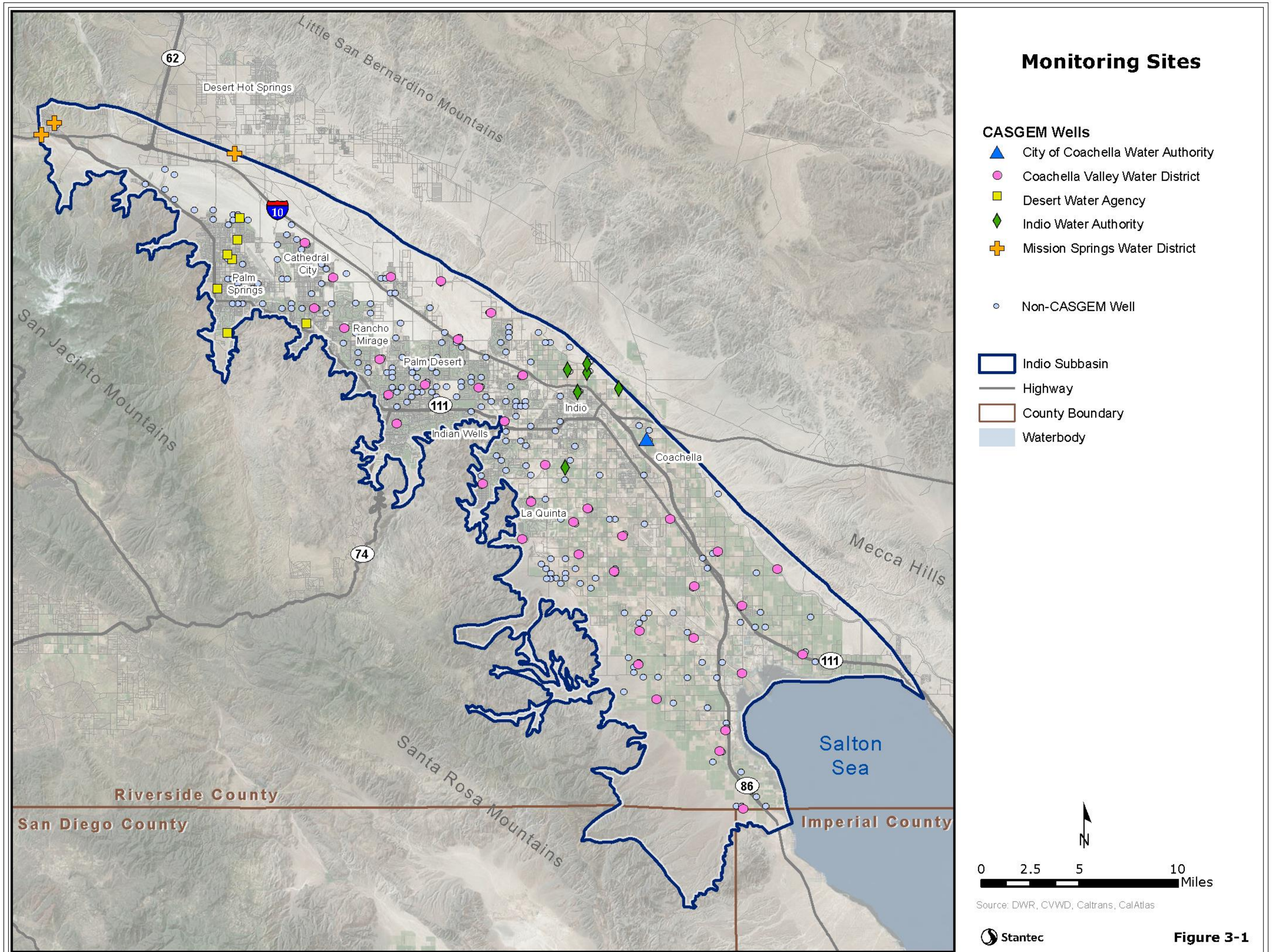
Monitoring wells, as shown in **Figure 3-1**, are selected so they can provide a good representation of groundwater elevations within each agency's service areas. If one monitoring well is decommissioned, another nearby well with the same approximate depth will be selected for monitoring. If there is no nearby agency-owned well, the agencies will reach out to nearby private well owners in the area for monitoring and include it in CASGEM. Also, if the water service areas increase, additional wells would be selected so a good representation of the service area's groundwater elevations is still obtained.

The four Groundwater Sustainability Agencies (GSAs) maintain a total of 54 CASGEM monitoring wells in the Indio Subbasin as shown in **Table 3-1.** In addition to the CASGEM wells, both the Coachella Valley Water District (CVWD) and Desert Water Agency (DWA) monitor water levels in additional wells in the Indio Subbasin. During Water Year (WY) 2016-17, CVWD monitored water levels three times per year in a total of 282 wells, including its CASGEM wells. DWA monitored water levels in 35 wells, including its CASGEM wells during WY 2016-2017. Indio Water Authority (IWA) monitors water levels in six CASGEM wells and Coachella Water Authority (CWA) monitors one CASGEM well. In total, 324 wells were monitored in the Indio Subbasin during WY 2016-17, as shown in **Table 3-1**. The four GSAs also maintain their own data management systems in compliance with CASGEM.

Table 3-1
WY 2016-2017 Wells Measured for Water Levels in the Indio Subbasin

Monitoring Agency	CASGEM Wells Monitored	Additional Wells Monitored	Total Wells Monitored
Coachella Valley Water District	40	242	282
Coachella Water Authority	1	0	1
Desert Water Agency	7	28	35
Indio Water Authority	6	0	6
Total Wells Monitored	**54**	**270**	**324**

Figure 3-1
Monitoring Well Locations in the Indio Subbasin



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3.2 GROUNDWATER LEVELS

Historical groundwater level declines in the Indio Subbasin, and conditions producing those declines, have been extensively described by the United States Geological Survey (USGS) and DWR, and are documented in the 2010 Coachella Valley Water Management Plan (CVWMP) Update and 2014 CVWMP Status Report.

Figure 3-2 presents the average groundwater elevations in the Indio Subbasin based on WY 2016-2017 monitoring data. The groundwater elevations represent groundwater conditions in the principal groundwater producing aquifer of the Indio Subbasin. Average levels are presented because the Indio Subbasin generally does not exhibit strong seasonal trends. Water levels near recharge areas respond directly to the timing of replenishment water deliveries and can vary from 10 feet (ft) seasonally to more than 200 ft during periods of high replenishment. Water levels outside recharge areas of the Indio Subbasin typically experience seasonal level variations of approximately 7 ft or less.

Groundwater generally flows from the northwest near the Whitewater River Groundwater Replenishment Facility (GRF) toward the southeast at the Salton Sea. The groundwater gradient is typically steeper in the western portion of the Indio Subbasin, flattening to the southeast.

3.3 HYDROGRAPHS

Figure 3-3 and **Figure 3-4** present hydrographs for a selection of eleven (11) representative wells separted by the western and eastern portions of the Indio Subbasin, to provide some context regarding the long-term changes in the water levels of the aquifer. The hydrographs are shown larger in **Appendix A**. These eleven (11) wells were selected on the basis of having been consistently monitored over a relatively long-time period and on their location in different regions within the Indio Subbasin. The hydrographs indicate that water levels in the westerly portion of the Indio Subbasin have been very responsive to replenishment water deliveries at the Whitewater River GRF, water levels in the City of Palm Springs area have remained relatively stable, and water levels in the Mid-Coachella Valley area near the City of Palm Desert generally stabilized around 2005. Water levels throughout the easterly portion of the Indio Subbasin have either increased or stabilized since commencement of replenishment activities at the Thomas E. Levy (TEL) GRF and other elements of the CVWMP in 2009. The analysis of the water levels observed at the monitoring wells emphasizes the benefit and effectiveness of the replenishment program in improving groundwater storage conditions even during a drought; without replenishment, greater declines in water levels would have been observed during this period.

Figure 3-2
WY 2016-2017 Average Groundwater Elevation Contours in the Indio Subbasin

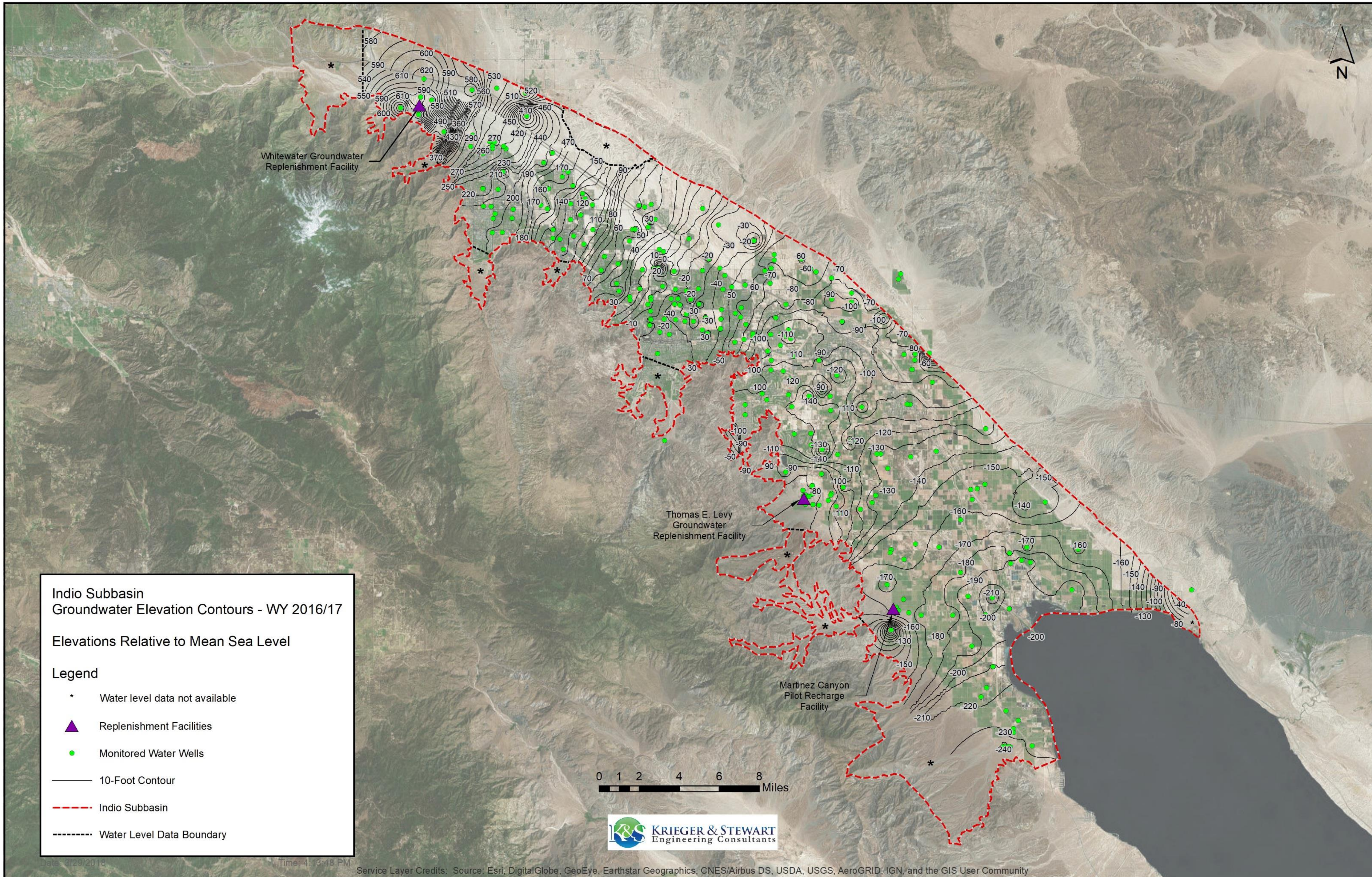


Figure 3-3
Representative Groundwater Elevation Hydrographs – Western Indio Subbasin Hydrographs

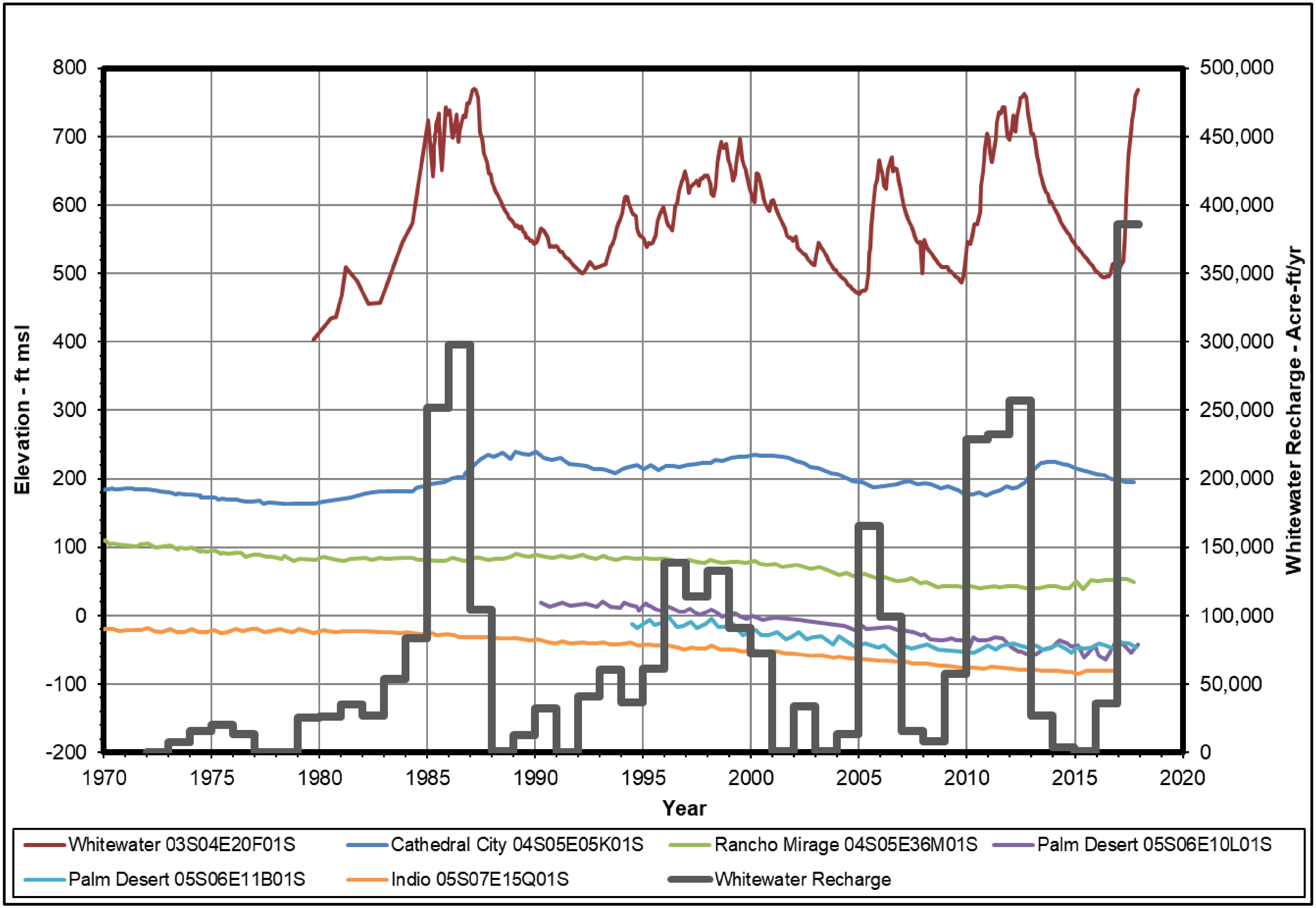
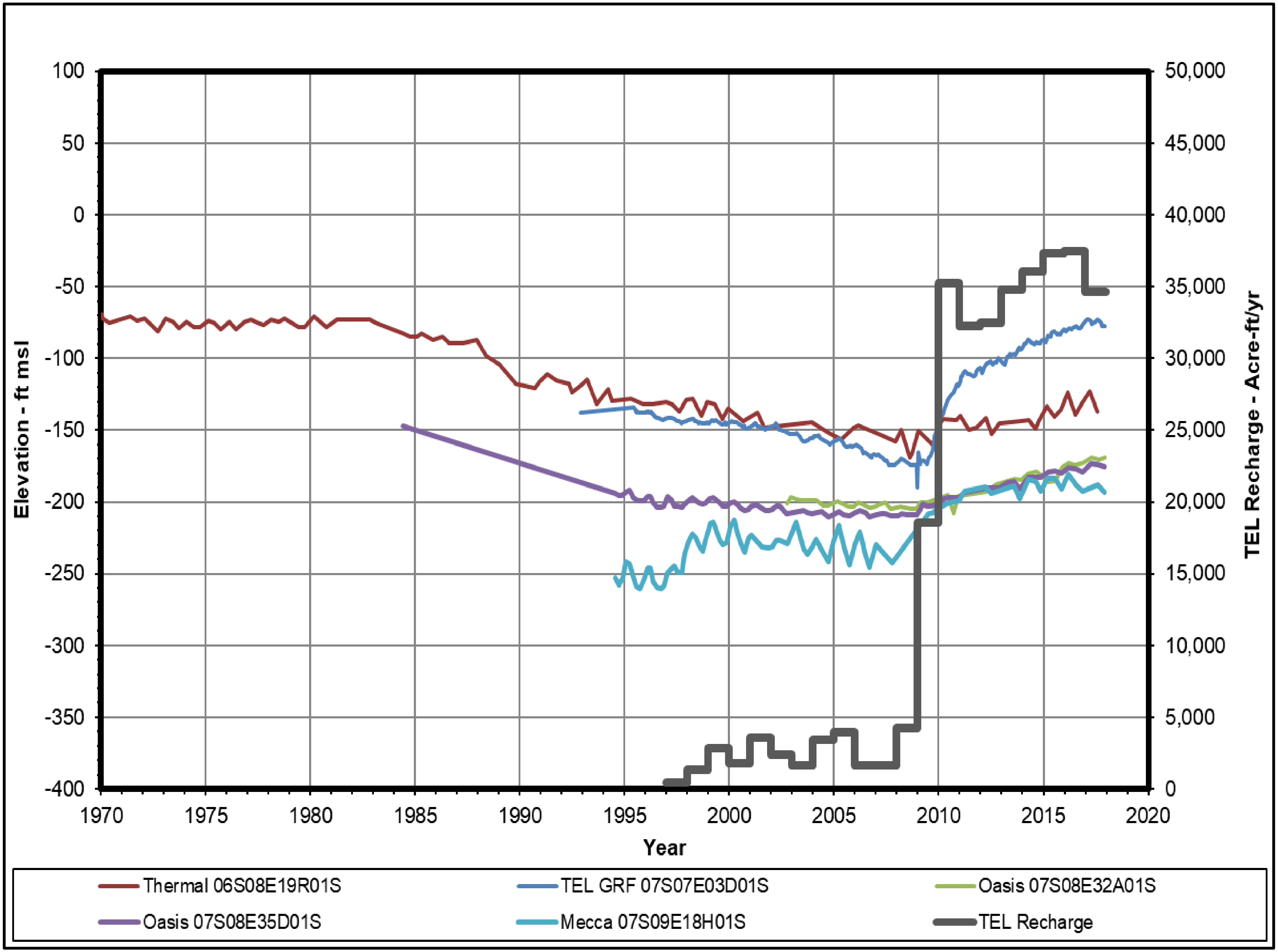


Figure 3-4
Representative Groundwater Elevation Hydrographs – Eastern Indio Subbasin Hydrographs



3.4 ARTESIAN CONDITIONS

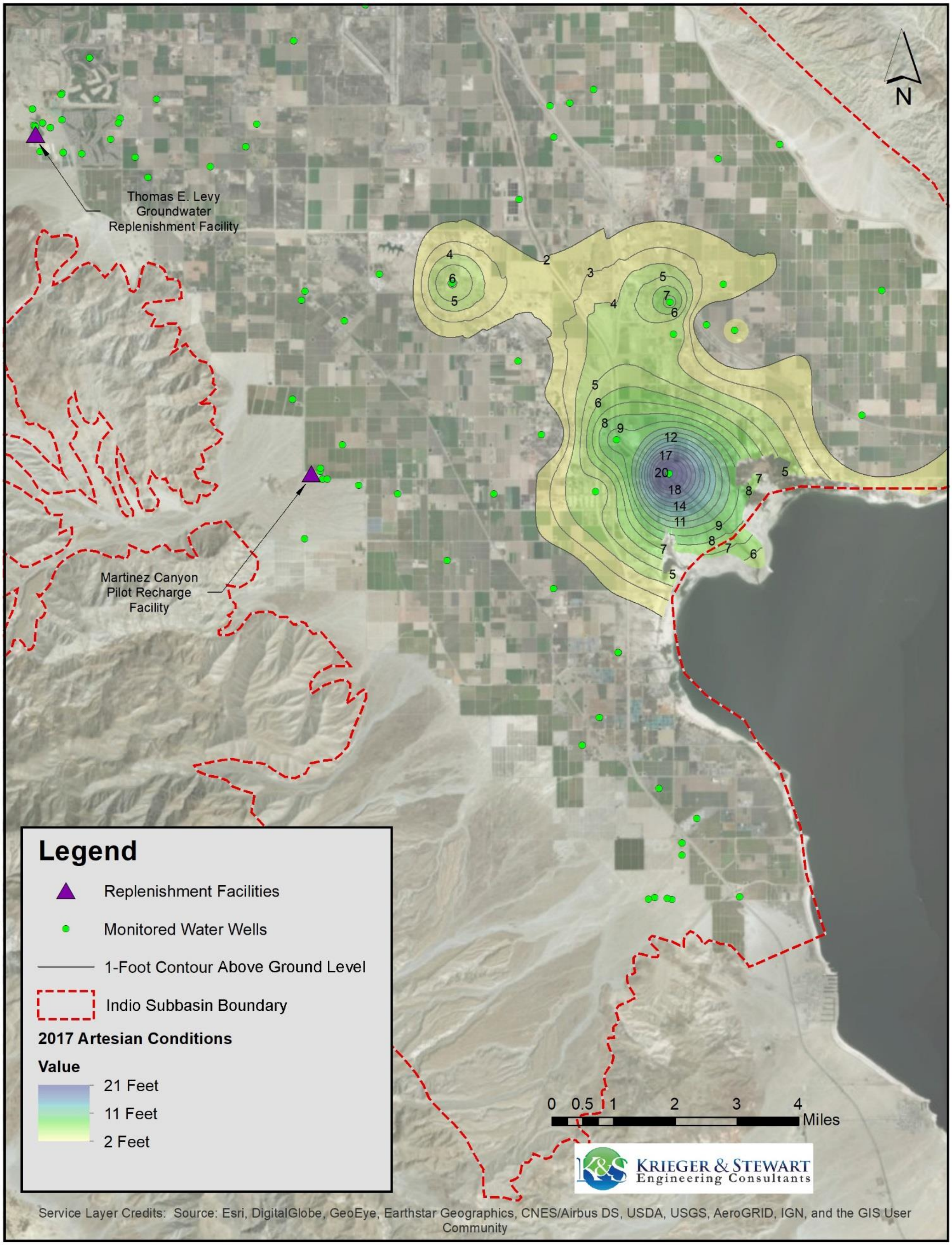
Historically, the eastern portion of the Indio Subbasin experienced confined aquifer artesian conditions with sufficient pressure to cause groundwater levels in wells to rise above the ground surface. Artesian flowing wells attracted early settlers to farm in this area. Artesian conditions declined in the late 1930s when increased groundwater pumping caused declining groundwater elevations. The completion of the Coachella Canal by the USBR in 1949 brought Colorado River water to the eastern Coachella Valley for agricultural irrigation purposes. Artesian conditions returned in the early 1960s through the 1980s as imported Colorado River water was substituted for groundwater production. Beginning in the late 1980s, groundwater uses again increased, resulting in declining water levels and a loss of artesian conditions.

The East Whitewater River Subbasin Groundwater Replenishment Program (GRP), combined with other water management elements, including source substitution and water conservation, are helping to control groundwater overdraft, restore water levels, and return artesian conditions within the eastern portion of the Indio Subbasin. This results in reduced groundwater pumping costs and water quality protection of the confined aquifer.

As artesian conditions return, water pressure in the lower confined aquifer increases and can cause uncontrolled flows in wells that are not properly constructed and/or poorly maintained. The Coachella Valley Mosquito and Vector Control District and CVWD are cooperating in an effort to notify well owners of their responsibility to control artesian wells in accordance with State of California regulations, and offering artesian well owners, under the CVWD Artesian Well Rebate Program, who properly control artesian flows the opportunity to apply for a $3,000/well rebate to offset their costs. California Health and Safety Code, Section 2000-2007 states that flooding caused by artesian wells is a public nuisance which poses a risk to public health, safety, and welfare. In addition, Section 305 of the California Water Code (CWC) requires artesian wells to be capped or equipped with a mechanical appliance which will readily and effectively arrest and prevent the flow of water.

In accordance with Section 31638.5 of the CWC, producers within CVWD who extract greater than 25 acre-feet per year (AFY), including artesian flowing groundwater, are required to have water-measuring devices installed on all wells or other water producing facilities, and to report the total amount produced from all wells to CVWD on a monthly basis. **Figure 3-5** depicts the current annual average above ground artesian conditions within the East Whitewater River Subbasin; specifically, the water pressure equivalent elevation above ground surface. In 2017, water levels above ground surface in the artesian area were measured in twelve wells, with an average annual decrease in water levels of approximately 0.93 ft from 2016. Water levels in seven of the wells decreased (from 0.6 to 4.0 ft), and water levels in four of the wells increased (from 0.6 to 1.9 ft).

Figure 3-5
WY 2016-2017 Average Artesian Conditions in the Indio Subbasin



Note: Water levels in three of the wells in the historically artesian area have recently dropped below the threshold of 2' above ground surface, and are consequently not included within the shaded area.

3.5 LAND SUBSIDENCE

Land subsidence in the Coachella Valley has been investigated since 1996 through an on-going cooperative program between CVWD and the USGS. Global Positioning System (GPS) surveying and Interferometric Synthetic Aperture Radar (InSAR) methods are used to determine the location, extent, and magnitude of the vertical land-surface changes in the Coachella Valley.

A report was published by the USGS in 2007, entitled *Detection and Measurement of Land Subsidence Using Global Positioning System Surveying and Interferometric Synthetic Aperture Radar, Coachella Valley, California 1996-2005* (Sneed and Brandt, 2007). The most recent phase of the investigation evaluated correlations between subsidence and recovery related to local geology and groundwater level changes during the period 1993 to 2010. The most recent in this series of reports was published by the USGS in 2014 (Sneed et al., 2014).

This report indicated that subsidence occurred in the East Whitewater River Subbasin and portions of the West Whitewater River Subbasin (primarily within the Palm Desert area). However, decreased rates of subsidence, or uplift, were observed in the La Quinta area in 2010. The uplift was attributed to the recovering water levels in the vicinity of the TEL GRF (Sneed et al., 2014).The next round of subsidence monitoring and analysis is expected to be completed in 2018.

Section 4
Groundwater Extraction

Section 356.2(b)(2) of the Sustainable Groundwater Management Act (SGMA) Emergency Regulations requires:

> *A detailed description and graphical representation of the following conditions of the basin managed in the Plan: …*
>
> *(2) Groundwater extraction for the preceding water year. Data shall be collected using the best available measurement methods and shall be presented in a table that summarizes groundwater extractions by water use sector, and identifies the method of measurement (direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.*

This section presents the groundwater extraction monitoring program results for the Indio Subbasin for Water Year (WY) 2016-2017.

4.1 GROUNDWATER EXTRACTION

During Water Year (WY) 2016-2017, there was 266,247 acre feet (AF) of groundwater extracted from 575 wells in the Indio Subbasin. Because Coachella Valley Water District (CVWD) and Desert Water Agency (DWA)are authorized to collect replenishment assessment from groundwater producers, their respective legislations mandate the installation of water meters on all wells producing more than 25 acre feet per year (AFY) in CVWD's service area, and 10 AFY in DWA's service area. Groundwater is the principal source of water for urban water use and represents more than 80 percent of groundwater use in the Indio Subbasin.

As indicated in **Table 4-1,** some water use for industrial and urban purposes is not metered and is estimated for purposes of this report. In addition, the Groundwater Sustainability Agencies (GSA)s estimate there could be about 1,500 AFY of unreported pumping whose use is unknown. Some of this production may be from minimal producers (less than 25 AFY in CVWD and 10 AFY in DWA) or by tribal producers.

Figure 4-1 presents a map showing the general location of production in the Indio Subbasin. This map summarizes production by public land survey section and classifies the production intensity by color.

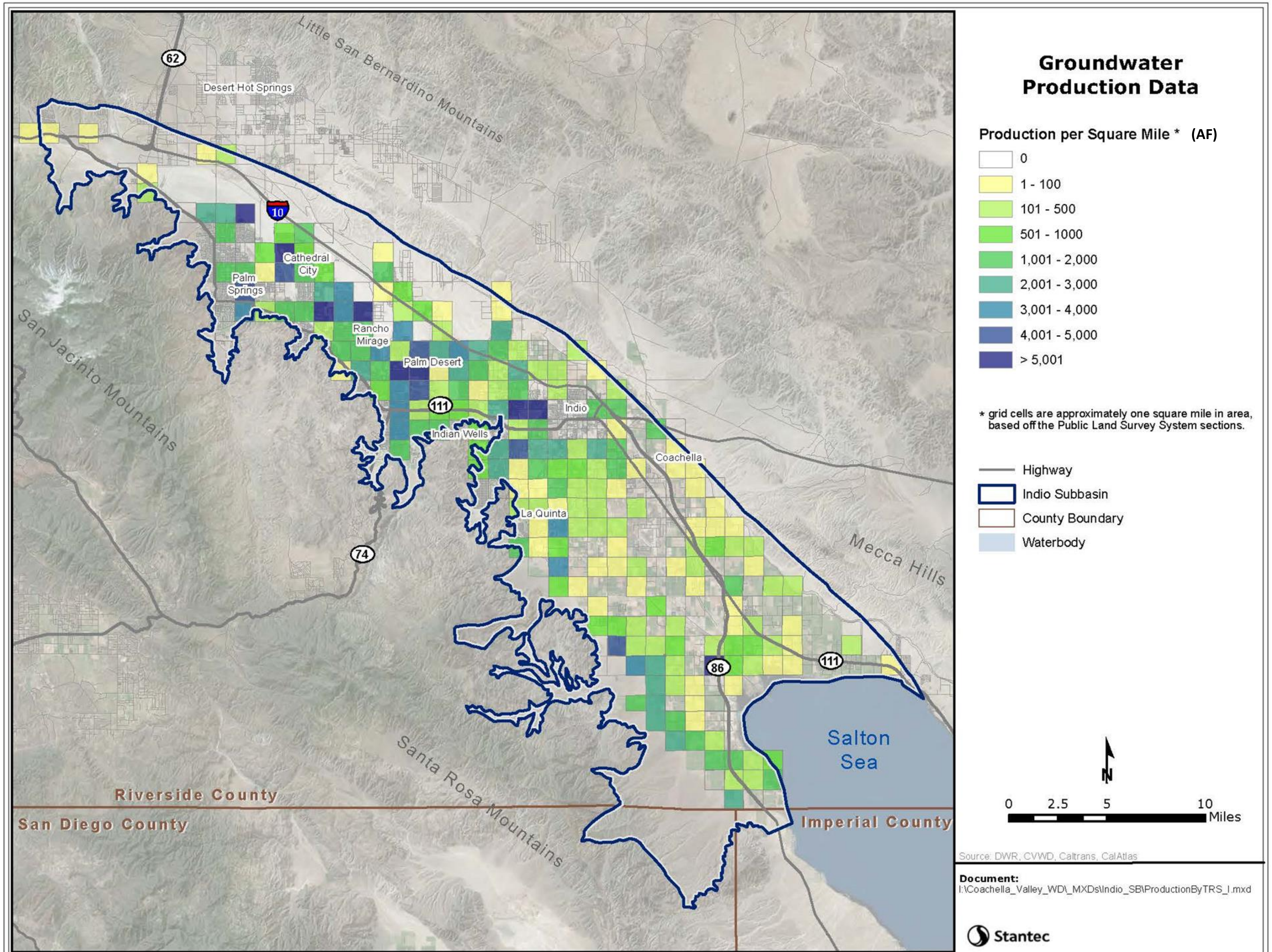
Table 4-1
WY 2016-2017 Groundwater Extractions by Water Use Sector in the Indio Subbasin

Water Use Sector	Groundwater Extractions (AF)	Method of Measurement[5]	Accuracy of Measurement
Agriculture[1]	46,993	100% metered	±1%
Industrial[2]	1,419	25% metered 75% estimated	±1% ±50%
Urban[3]	216,335	99% metered 1% estimated	±1% ±50%
Environmental	0	Not applicable	--
Undetermined[4]	1,500	100% estimated	±50%
Total Production	**266,247**		

Notes:

1. Includes crop irrigation and fish farms.
2. Includes unreported groundwater production for industrial use on tribal land that is estimated to be 1,100 AFY.
3. Includes municipal and recreational uses. Unreported groundwater production for recreational use on tribal land is estimated to be 1,200 AFY.
4. Estimated production by small pumpers and tribal use who do not report production to CVWD (<25 AFYA) or DWA (<10 AFY).
5. Method of measurement is estimated based on percent of total production. Estimated production includes unreported tribal and other unmetered water use.

Figure 4-1
WY 2016-2017 Groundwater Production Map for the Indio Subbasin



Section 5
Surface Water Use

Section 356.2(b)(3) of the Sustainable Groundwater Management Act (SGMA) Emergency Regulations requires:

> *A detailed description and graphical representation of the following conditions of the basin managed in the Plan: …*
>
> *(3) Surface water supply used or available for use, for groundwater recharge or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water year.*

This section presents the surface water availability and use for the Indio Subbasin for Water Year (WY) 2016-17. For purposes of this report, surface water supplies consist of local surface water, imported water from the Colorado River via the Coachella Canal and recycled water produced by publicly-owned wastewater treatment plants.

5.1 COACHELLA VALLEY GROUNDWATER BASIN PRECIPITATION AND STREAM FLOW

Average annual precipitation in the Coachella Valley varies from 4 inches on the Coachella 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, which can be captured by mountain-front debris basins and percolated into the aquifer. A portion of the flow percolating into the mountain watersheds eventually becomes subsurface inflow to the subbasins. The majority of the stream flow available for aquifer replenishment originates in the San Bernardino and San Jacinto Mountains, with lesser amounts from the Santa Rosa Mountains.

5.1.1 Precipitation

During Water Year (WY) 2016-2017, the average annual rainfall was 9.81 inches throughout the Coachella Valley, as recorded by 12 rain gage stations located throughout the Coachella Valley, monitored by the Riverside County Flood Control and Water Conservation District. **Table 5-1** presents the monthly precipitation data within the Coachella Valley watershed.

Precipitation on the local mountain watersheds generate runoff that is captured and used for direct uses or for groundwater replenishment.

Table 5-1
WY 2016-2017 Coachella Valley Precipitation Data
Monthly and Annual Recorded Precipitation (Inches)

STATION NAME	WHITEWATER NORTH	SNOW CREEK	DESERT HOT SPRINGS	TACHEVAH DAM	TRAM VALLEY	CATHEDRAL CITY	THOUSAND PALMS	PALM SPRINGS SUNRISE	EDOM HILL	OASIS	MECCA LANDFILL III	THERMAL AIRPORT
LOCATION	**WEST INDIO**	**WEST INDIO**	**MC**	**WEST INDIO**	**WEST INDIO**	**WEST INDIO**	**WEST INDIO**	**WEST INDIO**	**MC**	**EAST INDIO**	**EAST INDIO**	**EAST INDIO**
STATION NUMBER	**233**	**207**	**57**	**216**	**224**	**34**	**222**	**442**	**436**	**431**	**432**	**443**
OCTOBER	0.22	0.42	0.38	0.12	0.65	0.11	0.17	0.12	0.15	0.07	0.26	0.29
NOVEMBER	1.38	1.52	0.18	0.13	0.65	0.09	0.06	0.20	0.09	0.03	0.02	0.00
DECEMBER	4.08	4.44	1.48	1.75	3.25	1.38	1.34	1.53	1.08	1.18	1.23	1.24
JANUARY	10.40	11.30	3.51	4.73	8.81	2.57	2.12	4.27	2.49	1.41	0.94	1.39
FEBRUARY	2.89	3.41	2.09	1.49	2.68	2.05	1.62	1.74	1.48	0.69	0.50	0.68
MARCH	0.30	0.52	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01
APRIL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MAY	0.03	0.01	0.00	0.00	0.08	0.02	0.02	0.00	0.00	0.02	0.00	0.00
JUNE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JULY	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.02	0.00	0.05	0.06	0.00
AUGUST	0.09	0.09	0.34	0.00	0.56	0.55	0.78	0.93	0.25	0.16	0.01	0.08
SEPTEMBER	0.00	0.02	0.20	1.29	0.81	0.32	0.04	1.71	0.07	0.16	0.39	1.09
TOTAL	**19.39**	**21.73**	**8.19**	**9.54**	**17.49**	**7.09**	**6.15**	**10.53**	**5.61**	**3.77**	**3.42**	**4.78**
AVERAGE: UPPER	**11.75**											
AVERAGE: LOWER										**3.99**		
AVERAGE: ALL	**9.81**											

NOTE: DATA SHOWN HEREIN WAS PROVIDED BY RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT.

5.1.2 Streamflow

The United States Geological Survey (USGS) measures streamflow at thirteen (13) locations in the Indio Subbasin. **Table 5-2** presents the total gauged runoff for WY 2016-2017. A portion of this streamflow is diverted for agricultural and municipal use as described in Section 5.1.3 and the balance naturally replenishes the groundwater basin. One USGS gauge (10259540) measures the flow in the Coachella Valley Stormwater Channel before it enters the Salton Sea.

Table 5-2
WY 2016-2017 Local Streamflow Measurements for the Indio Subbasin

Gauge Number	Gauge Name	WY 2016-17 Annual Flow (AF)
10256500	Snow C Nr Whitewater CA	6,947
10256501	Snow C And Div Combined CA	7,575
10256550	Snow C Div Nr Whitewater CA[1]	633
10257499	Falls C Div Nr Whitewater CA	49
10257500	Falls C Nr Whitewater CA[1]	1,330
10257501	Falls C and Div Combined CA	1,378
10257548	Whitewater R At Windy Point Main Channel CA	211,361
10257549	Whitewater R At Windy Point Overflow Channel CA	2,303
10257550	Whitewater R At Windy Pt Nr Whitewater CA	213,664
10257720	Chino Cyn C Bl Tramway Nr Palm Springs CA	378
10258000	Tahquitz C Nr Palm Springs CA	6,756
10258500	Palm Cyn C Nr Palm Springs CA	5,328
10258700	Murray Cyn C Nr Palm Springs CA	2,042
10259000	Andreas C Nr Palm Springs CA	2,490
10259050	Palm Cyn Wash Nr Cathedral City CA	6,848
10259100	Whitewater R At Rancho Mirage CA	7,247
10259200	Deep C Nr Palm Desert CA	1,528
10259300	Whitewater R At Indio CA	3,615
10259540	Whitewater R Nr Mecca	44,367

Note: USGS measurements for Snow Creek and Falls Creek diversions use a different meter than DWA uses as shown in **Table 5-3**.

5.1.3 Direct Use of Local Surface Water

Desert Water Agency (DWA) operates stream diversions facilities on Snow, Falls, and Chino Creeks and captures subsurface flow from Whitewater River Canyon. In addition, Coachella Valley Water District (CVWD) and DWA divert water from a number of streams for aquifer recharge. **Table 5-3** summarizes the local surface water use during WY 2016-2017.

Table 5-3
WY 2016-2017 Direct Use of Local Surface Water in the Indio Subbasin

Water Use Sector	Surface Water Use (AF)	Method of Measurement[4]	Accuracy of Measurement
Agriculture[1]	461	100% metered	±1%
Industrial	0	100% metered	±1%
Urban[2]	1,440	100% metered	±1%
Environmental	0	Not applicable	--
Total Surface Water Use	**1,901**		

Notes:

1. Includes crop irrigation and fish farms.
2. Includes municipal and recreational uses.
3. Method of measurement is estimated based on percent of total production.

5.2 IMPORTED WATER DELIVERIES

In addition to natural replenishment from precipitation and stream flow, the Indio Subbasin receives artificial replenishment from importation of surface water from the Colorado River and from water recycling. More information on these programs is provided in the following sections.

CVWD provides artificial replenishment of the Coachella Valley Groundwater Basin through its Groundwater Replenishment Program (GRP). Groundwater replenishment is affected through two basic mechanisms: direct replenishment, in which imported surface water is percolated directly into the aquifer, and in-lieu replenishment, in which non-potable surface or reclaimed water is provided to groundwater pumpers for irrigation purposes, thus reducing or eliminating their use of pumped groundwater. In the future, delivery of treated surface water may be implemented to further offset groundwater pumping.

5.2.1 Colorado River Water

Colorado River water has been a major source of supply for the Coachella Valley since 1949 with the completion of the Coachella Canal. California has an annual apportionment of 4.4 million acre-feet per year (AFY) of Colorado River water. California's apportionment is allocated by the 1931 Seven Party Agreement among Palo Verde Irrigation District (PVID), Imperial Irrigation District (IID), CVWD, and Metropolitan Water District of Southern California (MWD). The three remaining parties - the City and the County of San Diego and the City of Los Angeles - are now part of MWD.

The Coachella Canal is a branch of the All-American Canal that brings Colorado River water into the Imperial and Coachella Valleys. Historically, CVWD received approximately 330,000 AFY of Priority 3A Colorado River water delivered via the Coachella Canal. The Coachella Canal originates at Drop 1 on the All-American Canal and extends approximately 122 miles, terminating in CVWD's Lake Cahuilla. The Coachella Valley service area for Colorado River water delivery under CVWD's contract with the United States Bureau of Reclamation (USBR) for Colorado River water is defined as Improvement District No. 1 (ID-1), a 136,436 acre area which encompasses most of the eastern Coachella Valley and a portion of the western Coachella Valley north of Interstate 10.

In 2003, CVWD, IID and MWD completed negotiation of the Quantification Settlement Agreement (QSA), which quantifies the Colorado River water allocations of California's agricultural water contractors for the next 75 years and provides for the transfer of water between agencies. Under the QSA, CVWD has a base allotment of 330,000 AFY. In accordance with the QSA, CVWD has entered into water transfer agreements with MWD and IID that increase CVWD supplies by an additional 129,000 AFY.

Between 2017 and 2026, CVWD's Colorado River water budget will increase annually in 5,000 acre feet (AF) increments with an 18,000 AF increment in 2018. CVWD is expected to receive 459,000 AFY of Colorado River water by 2026 at Imperial Dam, which should provide 443,300 AFY of water to the Coachella Valley through 2047 based on actual measured losses. The delivered water after losses will decrease to 440,300 AFY thereafter. A portion of this allocation through the QSA includes 35,000 AFY of State Water Project (SWP) water transferred from MWD. CVWD currently arranges for delivery of this water at the Whitewater River Groundwater Replenishment Facility (GRF); however, CVWD may also take delivery of this water through the Coachella Canal.

Table 5-4 presents CVWD's current (2017) and future Colorado River water budget under the QSA.

Table 5-4
CVWD Colorado River Water Budget under the QSA

Component	2017 Amount (AF)	2026-2047 Amount (AFY)	2048-2077 Amount (AFY)
Base Entitlement	330,000	330,000	330,000
Less Coachella Canal Lining (to SDCWA)	-26,000	-26,000	-26,000
Less Miscellaneous/Indian PPRs[4]	-3,000	-3,000	-3,000
1988 MWD/IID Approval Agreement	20,000	20,000	20,000
First IID/CVWD Transfer	45,000	50,000	50,000
Second IID/CVWD Transfer	0	53,000	0
MWD/CVWD Replacement Water[1]	0	0	50,000
MWD/CVWD SWP Transfer[2]	35,000	35,000	35,000
Total Diversion at Imperial Dam	**401,000**	**459,000**	**456,000**
Less Conveyance Losses and Regulatory Water [3]	**-15,700**	**-15,700**	**-15,700**
Total Deliveries Available to CVWD	**385,300**	**443,300**	**440,300**

Notes:
1. MWD assumes the obligation to provide 50,000 AFY of replacement water after 2048.
2. The 35,000 AFY may be delivered at either Imperial Dam or Whitewater River and is not subject to SWP or Colorado River reliability.
3. Conveyance losses and regulatory water based on 2009-2014 averages.
4. Indian Present Perfected Rights

During WY 2016-2017, CVWD took delivery of 334,876 AF of Colorado River water at Imperial Dam and delivered 326,752 AF for uses in the Coachella Valley. The difference between diversions and deliveries (8,124 AF) is conveyance loss and regulatory water release. Approximately 77 percent of the delivered water Colorado River water was for agricultural use and about 11 percent each were delivered for urban and replenishment uses, respectively.

5.2.2 State Water Project Water

CVWD and DWA have contracts with the California Department of Water Resources (DWR) for State Water Project (SWP) water with a combined Table A Amount of 194,100 AFY as shown in **Table 5-5**. There are no physical facilities to deliver SWP water to the Coachella Valley. CVWD's and DWA's Table A water is exchanged with MWD for a like amount of Colorado River water from MWD's Colorado River Aqueduct (CRA), that extends from Lake Havasu, through the Coachella Valley to MWD's Lake Mathews. SWP Exchange water has been used to recharge the Indio Subbasin at the Whitewater River GRF since 1973. MWD, DWA and CVWD executed an advanced delivery agreement in 1985 that allowed MWD to pre-deliver up to 600,000 AF of SWP water into the Coachella Valley. MWD then has the option to deliver CVWD's and DWA's SWP allocation either from the CRA or from water previously stored in the basin. This agreement was subsequently amended to increase the pre-delivery amount to a maximum of 800,000 AF.

Table 5-5
State Water Project Table A Amounts

Agency	Original SWP Table A	Tulare Lake Basin Transfer #1	Tulare Lake Basin Transfer #2	Metropolitan Transfer	Berrenda Mesa Transfer	Total
CVWD	23,100	9,900	5,250	88,100	12,000	138,350
DWA	38,100	--	1,750	11,900	4,000	55,750
Total	61,200	9,900	7,000	100,000	16,000	194,100

Note: All values expressed in AFY.

Each year, DWR determines the amount of water available for delivery to SWP contractors based on hydrology, reservoir storage, the requirements of water rights licenses and permits, water quality, and environmental requirements for protected species in the Sacramento-San Joaquin Delta. The available supply is then allocated according to each SWP contractor's Table A Amount. During calendar year 2016, DWR allocated 60 percent of the Table A Amounts to contractors. In response to the high snowpack, DWR allocated 85 percent of CVWD's and DWA's Table A Amounts in calendar year 2017.

For the WY 2016-17, CVWD's and DWA's SWP allocation was delivered to MWD in accordance with the Exchange Agreement. As shown in

Table 5-6, MWD received on behalf of CVWD and DWA, 31,753 AF of SWP Table A water, 25,435 AF of SWP Article 56 carryover water from calendar year 2016, 1,131 AF of SWP Turnback Pool water, 16,776 AF of Flexible Storage Payback water, and 12,500 AF of Rosedale-Rio Bravo water transfers on behalf of CVWD. In addition, MWD received 35,000 AF of SWP water transferred to CVWD under QSA.

Due to the nature of the Advanced Delivery agreement with MWD, CVWD and DWA may either receive direct deliveries of SWP Exchange water or water delivered from the Advanced Delivery storage account. As shown in

Table 5-6, CVWD and DWA took delivery of 267,793 AF of SWP Exchange water at the Whitewater River GRF and 1,948 AF was delivered to the Mission Creek GRF.

As of the end of WY 2016-2017, there was 259,221 AF stored in MWD's advanced delivery account in the Coachella Valley. This represents over two years of SWP Exchange deliveries at the current average reliability of 62 percent of CVWD's and DWA's combined Table A Amounts.

Table 5-6
Deliveries of CVWD and DWA State Water Project Water to Metropolitan Water District in WY 2016-2017

Description	CVWD (AF)	DWA (AF)	Total (AF)
Table A	22,632	9,121	31,753
Article 21 "Interruptible"	0	0	0
Turnback Pool A and B	806	325	1,131
Multi-Year Pool	0	0	0
Dry Year (Yuba)	0	0	0
Flex Storage Payback	11,959	4,817	16,776
Article 56 (c) "Carryover" from 2016 delivered in 2017	18,129	7,306	25,435
Rosedale-Rio Bravo	12,500	0	12,500
CVWD QSA Transfer	35,000	0	35,000
Total Delivered to MWD	**101,026**	**21,569**	**122,595**
Water Delivered to CVWD and DWA at Whitewater	--	--	267,793
Water Delivered to CVWD and DWA at Mission Creek	--	--	1,948
Total Water Delivered to Coachella Valley			269,741
Credit to/from Advanced Delivery Account			+147,146

Note: Credit to/from Advanced Delivery Account is the difference between Total Water Delivered to MWD and Total Water Delivered to Coachella Valley.

5.2.3 Total Imported Water Deliveries

Table 5-7 summarizes the imported water deliveries to the Indio Subbasin by water use sector and source during Water Year 2016-2017. Total imported water deliveries were 594,545 AF.

Table 5-7
WY 2016-2017 Imported Water Use in the Indio Subbasin

Water Use Sector	Water Source	Imported Water Use (AF)	Method of Measurement	Accuracy of Measurement
Agriculture[1]	Coachella Canal	251,398	100% metered	±1%
Industrial	Coachella Canal	0	100% metered	±1%
Urban[2]	Coachella Canal	37,915	100% metered	±1%
Environmental[3]	Coachella Canal	0	Not available	--
Aquifer Recharge	Coachella Canal	37,439	100% metered	±1%
Aquifer Recharge	SWP Exchange	267,793	100% metered	±1%
Total Imported Water Use		594,545		

Notes:

1. Includes crop irrigation and fish farms.
2. Includes municipal and recreational uses.
3. A small amount of Coachella Canal water is used for wildlife habitat enhancement and mitigation in the East Salton Sea groundwater basin.

5.3 RECYCLED WATER

There are three Water Reclamation Plants (WRPs) that produce recycled water for reuse in the Indio Subbasin, as shown in **Table 5-9**. CVWD operates two WRPs in the Indio Subbasin that produce recycled water for reuse. Recycled water from two facilities (WRP-9 and WRP-10) has been used for golf course and greenbelt irrigation in the City of Palm Desert area for many years, thereby reducing demand on the Indio Subbasin. WRP-7 located north of the City of Indio, began providing recycled water for golf course and greenbelt irrigation in 1997. Colorado River water is also available for golf course source substitution projects via the Mid-Valley Pipeline (MVP) from the Coachella Canal. DWA operates one WRP in the City of Palm Springs, delivering recycled water for golf course and park irrigation.

Table 5-8 summarizes recycled water use during WY 2016-2017 for the Indio Subbasin. All 10,724 AF of the recycled water was used for urban uses primarily golf, park, and median irrigation with a small amount used for on-site WRP use.

Table 5-8
WY 2016-2017 Recycled Water Use in the Indio Subbasin

Water Use Sector	Water Source	Recycled Water Use (AF)	Method of Measurement	Accuracy of Measurement
Urban[1]	Palm Springs WRP	4,050	100% metered	±1%
Urban[1]	CVWD WRP-7	1,830	100% metered	±1%
Urban[1]	CVWD WRP-10	4,844	100% metered	±1%
Total Recycled Water Use		**10,724**		

Note: Includes municipal, recreational, and reclamation plant, including on-site WRP water uses.

In addition to direct recycled water use, a portion of the municipal wastewater generated in the Indio Subbasin is disposed through percolation/evaporation ponds or is disposed to the Coachella Valley Stormwater Channel (CVSC). A portion of the disposed wastewater is contributed to the groundwater supply, while the disposal to the CVSC flows to the Salton Sea. In WY 2016-2017, a total of 38,758 AF of wastewater was treated of which 10,725 AF was used for recycled water and WRP on-site use,, 8,552 AF was disposed through percolation/evaporation, and 19,482 AF was disposed to the CVSC as shown in **Table 5-9**.

Table 5-9
WY 2016-2017 Wastewater Treatment, Reuse, and Disposal in the Indio Subbasin

Plant	Wastewater Treated (AF)	Recycled Water Use[1] (AF)	On-site WRP Use[2] (AF)	Disposal Percolation/ Evaporation (AF)	Disposal to CVSC[3] (AF)
Palm Springs WRP[4]	6,550	4,034	17	2,500	N/A
CVWD WRP-7[5]	3,066	1,739	91	1,236	N/A
CVWD WRP-10[5]	9,647	4,594	250	4,803	N/A
Valley SD WRP[6]	6,378	0	0	0	6,378
City of Coachella WRP[6]	2,895	0	0	0	2,895
CVWD WRP-4[6]	5,596	0	0	0	5,596
CVWD WRP-2[8]	13	0	0	13	0
Kent SeaTech[7]	4,613	0	0	0	4,613
Total	**38,758**	**10,367**	**358**	**8,552**	**19,482**

Notes:

1. Recycled water sold to customers.
2. Recycled water used for WRP on site water uses.
3. Coachella Valley Stormwater Channel (CVSC)
4. Reference: 2016-17 Veolia Water and DWA operations reports. (DWA, 2018)
5. Reference: 2016-2017 CVWD Non-potable Report Tables (Coachella Valley Water District, 2018)
6. Reference: Total of monthly reporting, (Colorado Regional Water Quality Control Board, 2018)
7. Reference: Kent Seatech reporting to CVWD, 2018
8. Reference: CVWD Monthly General Manager's Reports of Activities

Section 6
Total Water Use

Section 356.2(b)(4) of the Sustainable Groundwater Management Act (SGMA) Emergency Regulations requires:

> *A detailed description and graphical representation of the following conditions of the basin managed in the Plan: …*
>
> *(4) Total water use shall be collected using the best available measurement methods and shall be reported in a table that summarizes total water use by water use sector, water source type, and identifies the method of measurement (direct or estimate) and accuracy of measurements. Existing water use data from the most recent Urban Water Management Plans or Agricultural Water Management Plans within the basin may be used, as long as the data are reported by water year.*

This section presents the total water use for the Indio Subbasin for Water Year (WY) 2016-2017.

Table 6-1 presents a summary of water use by source and type. The information presented in this table is derived from the tables in Sections 4 and 5. This table lists the method of measurement and the estimated accuracy of the measurements.

It should be noted that a portion of the water produced from or delivered to the Indio Subbasin is exported for use outside the Indio Subbasin.

Table 6-1 shows a total of 5,016 acre-feet (AF) of water exported from the Indio Subbasin. Some of this water is Coachella Canal water delivered to agricultural and urban users in the adjacent Desert Hot Springs Subbasin that are located within the Coachella Valley Water District (CVWD) ID-1 service area. The remainder is groundwater pumped from the Indio Subbasin and delivered to CVWD customers in Imperial and Riverside County on the east and west sides of the Salton Sea.

As shown in **Table 6-1**, a total of 563,169 AF of water was delivered for direct use within the Indio Subbasin and 305,232 AF was delivered for aquifer recharge, for a total of 868,401 AF.

Table 6-1
WY 2016-2017 Total Water Use by Sector and Source in the Indio Subbasin

Water Use Sector	Water Source (AF)							Method of Measurement	Accuracy of Measurement
	Groundwater Production	Local Surface Water	Coachella Canal Water	SWP Exchange Water	Recycled Water	Exported for Use Outside Basin[5]	Total Water Use Within Basin		
Agriculture[1]	46,993	461	251,398	0	0	-1,625	**297,227**	100% metered	±1%
Industrial	1,419	0	0	0	0	0	**1,419**	25% metered 75% estimated	±1% ±50%
Urban[2]	216,335	1,440	37,915	0	10,725	-3,391	**263,023**	99% metered 1% estimated	±1% ±50%
Environmental	0	0	0	0	0	0	**0**	Not applicable	--
Undetermined[3]	1,500	0	0	0	0	0	**1,500**	100% estimated	±50%
Aquifer Recharge			37,439	267,793	0	0	**305,232**	100% metered	±1%
Total	**266,247**	**1,901**	**326,752**	**267,793**	**10,725**	**-5,016**	**868,4012**		

Notes:

1. Includes crop irrigation and fish farms. Some agricultural use is located in the Desert Hot Springs Subbasin and is served with Coachella Canal water.
2. Includes municipal and recreational uses. Some groundwater and Coachella Canal water is delivered to users in the Mission Creek, Desert Hot Springs, West Salton Sea and East Salton Sea groundwater basins.
3. Estimated production by small pumpers and tribal uses who do not report production to CVWD (<25 AFY) or DWA (<10 AFY).
4. Exported water is groundwater or Coachella Canal water that is delivered for use outside the Indio Subbasin.

Section 7
Groundwater Balance and Change in Groundwater Storage

Section 356.2(b)(4) of the Sustainable Groundwater Management Act (SGMA) Emergency Regulations requires:

> *A detailed description and graphical representation of the following conditions of the basin managed in the Plan: …*
>
> *(5) Change in groundwater in storage shall include the following:*
>
> *(A) Change in groundwater in storage maps for each principal aquifer in the basin.*
>
> *(B) A graph depicting water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the basin based on historical data to the greatest extent available, including from January 1, 2015, to the current reporting year.*

This section presents the groundwater balance and change in storage for the Indio Subbasin for Water Year (WY) 2016-2017.

7.1 GROUNDWATER BALANCE

A groundwater budget is helpful in assessing the condition of the Indio Subbasin. The groundwater budget compares the inflows and outflows to the groundwater Indio Subbasin. The difference between inflows and outflows at a given time defines the change in storage for that time period. The annual water balance for the Indio Subbasin during WY 2016-2017 is presented in the following sections.

7.1.1 Groundwater Inflows

Indio Subbasin groundwater inflows consist of:

- Infiltration of natural recharge and inflows,
- Infiltration of return flows from urban and agricultural uses,
- Artificial recharge, and
- Salton Sea intrusion.

7.1.1.1 Natural Recharge

Precipitation in the bordering San Jacinto and Santa Rosa Mountains produces surface runoff and subsurface inflow that are the chief natural sources of recharge to the Indio

Subbasin. Additional recharge may be derived from precipitation in the Little San Bernardino Mountains in extremely wet years. The volume of natural recharge varies dramatically annually due to wide variations in precipitation. Perennial flow is limited to only a few streams. The long-term average historical natural recharge to the Indio Subbasin (based on 1936-2009) is approximately 46,000 acre-feet per year (AFY), ranging from 204,000 AFY in very wet years to 8,400 AFY in dry years. The natural inflow estimates are based on the Coachella Valley Groundwater Flow Model data (prepared by Stantec and others), which was utilized for the 2010 Coachella Valley Water Management Plan (CVWMP) Update and 2014 CVWMP Status Report.

7.1.1.2 Inflows from Outside the Indio Subbasin

Inflows from outside the Indio Subbasin consist of underflow from the San Gorgonio Pass area and flows across the Banning fault. Historically, these inflows are estimated to range from 7,000 AFY to 13,000 AFY. The 2010 WMP Update estimated inflow was approximately 11,405 AFY, the long-term average as shown in **Table 7-1**. This is a relatively small component of the water balance (less than 3 percent) and does not change significantly with time.

In addition, subsurface inflow and outflow takes place near the Salton Sea. Groundwater modeling estimated the net subsurface inflow from the Salton Sea to be 1,102 acre-feet (AF) for WY 2016-2017.

Table 7-1
Indio Subbasin Estimated Average Subsurface Inflows

Subbasin Boundary Transfer	Estimated Average Annual Underflow (AF)
San Gorgonio Pass Subbasin to the Indio Subbasin	6,135 [1]
Mission Creek Subbasin to the Indio Subbasin	5,100 [2]
Desert Hot Springs Subbasin (Fargo Canyon) to the Indio Subbasin	170 [1]
Subsurface Inflow to Indio Subbasin	**11,405**
Salton Sea to the Indio Subbasin	1,736 [3]
Indio Subbasin to the Salton Sea	- 634 [3]
Net Subsurface Inflow - Indio Subbasin from the Salton Sea	**1,102**

Notes:
1. Estimated from groundwater modeling. Fogg, et al. 2000
2. Estimated from groundwater modeling. MWH 2013, Psomas 2013
3. Estimated inflow and outflow to Semi-perched Aquifer from groundwater modeling. MWH 2011

7.1.1.3 Return Flows from Use

Return flow is the difference between the amount of water applied for irrigation (agricultural, golf course, or urban) and the amount consumed by plants to satisfy their evapotranspiration (ET) requirement. Water is also returned to the Indio Subbasin through percolation of treated wastewater and septic tank flow. A relatively rigorous calculation of irrigation return flows was utilized that considers types of water use, irrigation efficiency, and water conservation impacts. Irrigation return flows are estimated to be 144,730 AF for WY 2016-2017 in the Indio Subbasin.

Other components of return flows are wastewater percolation and septic returns. Much of the urban portions of the Indio Subbasin is served by municipal sewer systems that convey wastewater to municipal treatment plants. A portion of the treated wastewater that is not reused is disposed to percolation/evaporation ponds as described in Section 5. Wastewater percolation was 8,552 AF in the Indio Subbasin for WY 2016-17. Rural portions of the Indio Subbasin and a few urban areas that do not currently have access to the sewer system use septic tank/leachfield systems to treat and dispose wastewater. It is estimated that about 3,738 AFY of septic effluent is disposed to the Indio Subbasin.

Both return flows and wastewater percolation are affected by water use efficiency and overall demands. As conservation efforts increase, the amount of return flow decreases, reducing a source of inflow to the Indio Subbasin. Agricultural return flows have generally decreased over the past 20 years due to a combination of increased irrigation efficiency (including conversion to drip irrigation) and conversion of agricultural lands to urban land uses.

7.1.1.4 Artificial Recharge

Artificial recharge consists of recharge in the western portion of the Indio Subbasin at the Whitewater River Groundwater Replenishment Facility (GRF)using State Water Project (SWP) Exchange water [exchanged for Colorado River Aqueduct (CRA) water] and in the eastern portion of the Indio Subbasin at the Thomas E. Levy (TEL) GRF, formerly the Dike 4 Recharge Facility, which began operation in 2009 using Colorado River water (Coachella Canal water).

Recharge at the Whitewater River GRF has been variable based on availability of SWP Exchange water and deliveries by the Metropolitan Water District of Southern California (MWD). During WY 2016-2017, a total of 267,793 AF of imported water was recharged at the Whitewater River GRF.

Recharge at the TEL GRF was 37,439 AF in WY 2016-2017. For groundwater balance purposes, a two percent evaporation loss is applied to all replenishment water deliveries as an outflow.

7.1.1.5 Salton Sea Intrusion

Intrusion of saline water from the Salton Sea into the shallow aquifers is possible if groundwater elevations are lower than the level of the Salton Sea. Although no direct evidence of intrusion has been observed, monitoring wells near the Salton Sea show elevated salinity at depth, which may be the result of ancient saline water left by previous saline lakes in the Salton Sink. Groundwater modeling performed by the Coachella Valley Water District (CVWD)estimates that about 1,736 AFY of saline water intrusion may be occurring in the semi-perched aquifer. While this may not directly impact the deeper groundwater supplies, it does provide a potential source of water quality degradation.

7.1.2 Groundwater Outflows

Indio Subbasin groundwater outflows consist of:

- groundwater pumping to meet Coachella Valley demands,
- flow from the semi-perched aquifer through the agricultural drains into the Salton Sea,
- evapotranspiration from the semi-perched aquifer, and
- subsurface flow out of the Indio Subbasin, into the aquifers beneath the Salton Sea.

7.1.2.1 Groundwater Pumping

Groundwater pumping refers to the amount of groundwater pumped for agricultural, golf course, urban use and other uses. Groundwater pumping is the largest component of outflow from the Indio Subbasin. During WY 2016-2017, there was 266,247 AF of groundwater pumped for beneficial uses within the Indio Subbasin or exported for use in adjacent basins as shown previously in **Table 4-1**.

7.1.2.2 Flow to Drains

Semi-perched groundwater conditions in many parts of the eastern portion of the Indio Subbasin impede the downward migration of return flows from water applied at the surface. This condition causes saturated soils and the accumulation of salts in the root zone, reducing agricultural productivity. Twenty-six surface (open) drains were constructed in the 1930s to alleviate this condition. With the delivery of Canal water to the Coachella Valley in 1949, subsurface (tile) drainage systems were first installed in 1950 to control the high water table conditions and to intercept poor quality shallow groundwater. CVWD currently maintains 21 miles of open drains and 166 miles of subsurface pipe drains serving 37,425 acres of agricultural lands in the Coachella Valley.

Maintaining the water table at the level of the drains acts as a barrier to the percolation of poor quality return flows into the deeper potable aquifers. Flow in the drains increased steadily as additional drains were installed, until the early 1970s. Agricultural drainage flow remained relatively stable through the 1970s and steadily declined through 2009. Drain flow (excluding wastewater discharges and fish farm effluent) has decreased steadily from a high of approximately 158,000 AF in 1976, to 58,800 AF in 1999, and about 40,000 AF in 2009. Since 2009, drain flows have increased due to improved groundwater conditions in the eastern portion of the Indio Subbasin.

CVWD monitors flows in the drainage system entering the Salton Sea on a monthly basis. The total flow to the Salton Sea in WY 2016-2017 was 77,258 AF as shown in **Table 7-2**. Of this total amount, Coachella Canal water that exceeds requested deliveries downstream of Lake Cahuilla (regulatory water), treated wastewater, and fish farm effluent are discharged to the Coachella Valley Storm Water Channel (CVSC) and the drain system. These flows must be deducted from the total flow to calculate the amount of water leaving the Indio Subbasin through the drain system. In WY 2016-2017, 50,585 AF of drain water flowed from the shallow groundwater system to the Salton Sea as shown in **Table 7-3**.

Table 7-2
WY 2016-2017 Measured Drain Flows from the Indio Subbasin to the Salton Sea

Drains	Measured Drain Flows (AF)
F Channel	-
E Channel	1,840
Oasis-Grant	556
D Channel	958
C Channel	711
Ave 83	937
Ave 79	1,666
Lincoln-Oasis	4,316
A Channel	1,980
Ave 76	2,020
Ave 74	469
Coachella Valley Stormwater Channel	44,367
Johnson St.	3,691
Grant St.	2,345
Grant 0.5	1,252
Hayes	2,037
Hayes 0.5	213
Garfield St.	1,837
Garfield 0.5	503
Arthur St.	1,762
Arthur 0.5	848

Drains	Measured Drain Flows (AF)
Cleveland East	388
Cleveland West	377
Caleb Channel	926
Cleveland 0.5	578
McKinley	681
Total Drain Flows	**77,258**

Note: Drain flows are measured once per month using current meter and cross-sectional areas. If conditions are unsafe for metering, flows are estimated based on the average for the three previous years. Total shown reflects rounding. Coachella Valley Stormwater Channel flow is measured by USGS Gauge 10259540 – Whitewater River near Mecca.

Table 7-3
WY 2016-2017 Net Drain Flow from the Indio Subbasin to the Salton Sea

Component	Net Drain Flow (AF)
Total Drain Flow	77,258
Storm Flow[1]	-735
Regulatory Water[2]	-6,395
Valley Sanitary District	-6,378
Coachella Water Authority	-2,956
Water Reclamation Plant No. 4	-5,596
Kent Seatech	-4,613
Net Drain Flow to Salton Sea	**50,585**

Notes:

1. Storm flow is the volume of Coachella Valley Stormwater Channel flow attributed to storm events and is calculated using a base flow separation methodology.
2. Regulatory water is Coachella Canal water discharged to the drain system that cannot be delivered to users due to scheduling changes.

7.1.2.3 Subsurface Flow to the Salton Sea

Historically, when groundwater levels were relatively high, groundwater naturally flowed toward the Salton Sea. Shallow semi-perched groundwater discharged into the Salton Sea and deeper groundwater left the Indio Subbasin as subsurface outflow. As groundwater levels in the Indio Subbasin declined, the rate of outflow decreased. Modeling studies performed for the 2010 CVWMP Update indicate that both inflow and outflow from under the Salton Sea has occurred in recent years; about 634 AFY of groundwater is estimated to flow under the Salton Sea. Declining Salton Sea levels in the future could increase subsurface outflow.

7.1.2.4 Evapotranspiration

Native vegetation on undeveloped lands receives its water supply from precipitation and shallow groundwater. In the area underlain by the semi-perched aquifer, evapotranspiration (ET) was a significant water loss component in the eastern Coachella Valley. As lands were developed for agricultural uses, the amount of ET from native vegetation declined. The installation of drains in the 1950s and 1960s further reduced ET as the water table was lowered. Further ET reductions occurred in the 1980s and 1990s as increased pumping reduced groundwater levels. The ET component was estimated using the groundwater model to be 4,619 AFY, a relatively small outflow (less than 1 percent) of the total outflow.

In addition, a portion of the imported water used for recharge and wastewater disposal is lost to evaporation. This is estimated to be about 6,361 AF for WY 2016-2017.

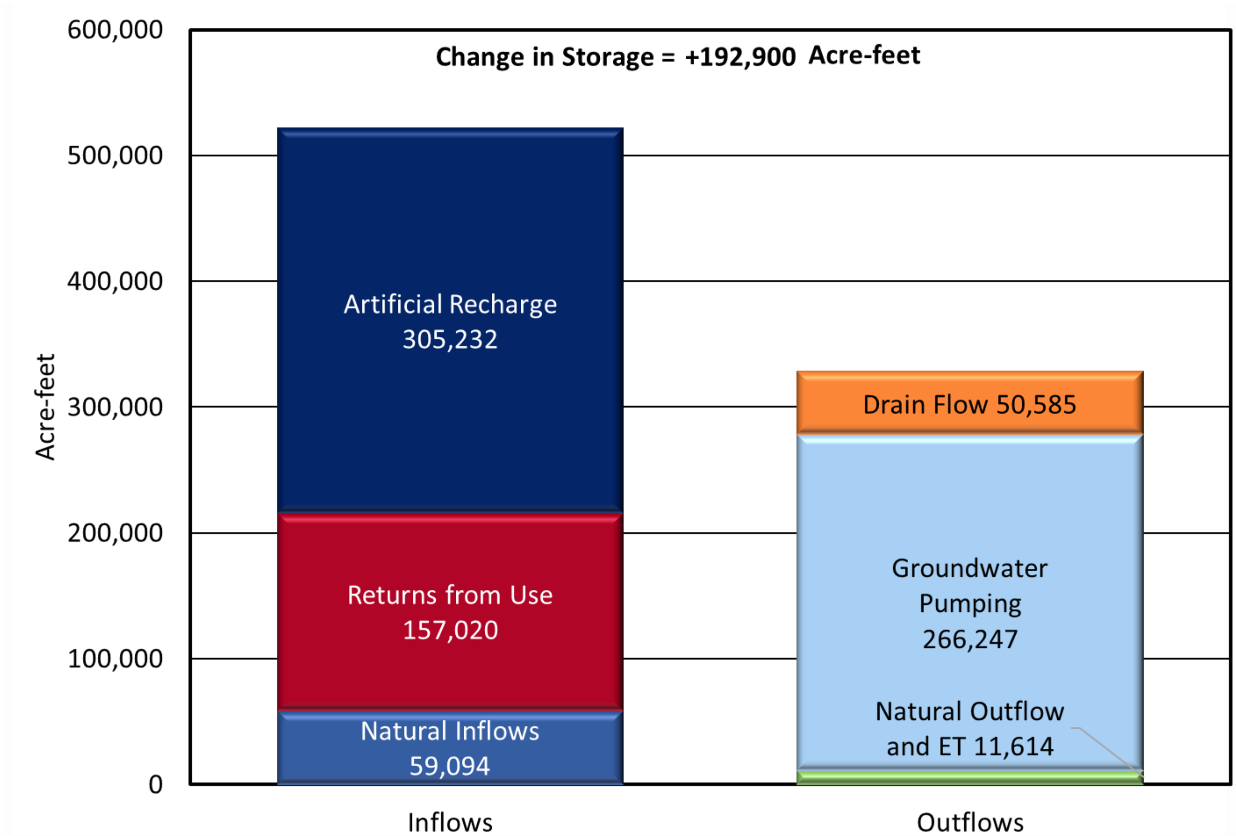
7.1.3 Annual Change in Groundwater Storage

The annual change in groundwater storage represents the annual difference between inflows and outflows in the Indio Subbasin. During wet years or periods of high artificial recharge, the change in storage is positive (water in storage increases). In dry years or periods of high pumping, the change in storage is often negative (storage decreases). Because of the large amount of recharge, the change is storage for the Indio Subbasin is a positive 192,900 AF for WY 2016-2017, as shown in **Table 7-4.** Refer to **Figure 7-1** graphical representation of the annual water balance in the Indio Subbasin.

Table 7-4
WY 2016-17 Groundwater Balance in the Indio Subbasin

Component	Flows (AF)
Inflows	
Infiltration of natural runoff	45,953
Subsurface inflows from adjacent basins	11,405
Infiltration of applied irrigation water	144,730
Wastewater percolation	8,552
Septic tank percolation	3,738
Artificial recharge	305,232
Salton Sea intrusion	1,736
Total Inflow	**+ 521,346**
Outflows	
Groundwater pumping	266,247
Net drain flow to Salton Sea	50,585
Evaporative losses	6,361
Evapotranspiration from the shallow aquifer	4,619
Subsurface outflow to adjacent basins:	634
Total Outflow	**– 328,446**
Change in Groundwater Storage	**+ 192,900**

Figure 7-1
WY 2016-2017 Annual Groundwater Balance in the Indio Subbasin



Historical change in storage is shown **Figure 7-2** from 1970 to the present. It should be noted that 1970 was selected as it is three years before the commencement of imported water replenishment activities in the Indio Subbasin. In addition, the data used to prepare this figure is on a calendar year basis. Insufficient historical data is available to prepare this chart on a water year basis.

Also shown on **Figure 7-2** are annual inflows, outflows, groundwater production, and ten-year and twenty-year running average change in storage. Indio Subbasin inflows are variable due to the nature of imported water replenishment deliveries. High inflows occurred in the mid 1980s when MWD commenced large-scale advanced water deliveries to the Indio Subbasin. Other years of high inflows correspond to wet years on the SWP when increased deliveries occurred. Outflows from the Indio Subbasin were significantly higher than groundwater production in the 1970s and early 1980s due to high drain flows when water levels were high. Since the mid-1980s, groundwater production and total outflows have tracked more closely. After extended periods of decline, both the ten- and twenty-year running average change in storage have shown upward trends since 2009.

Figure 7-2
Historical Annual Change in Groundwater Storage in the Indio Subbasin

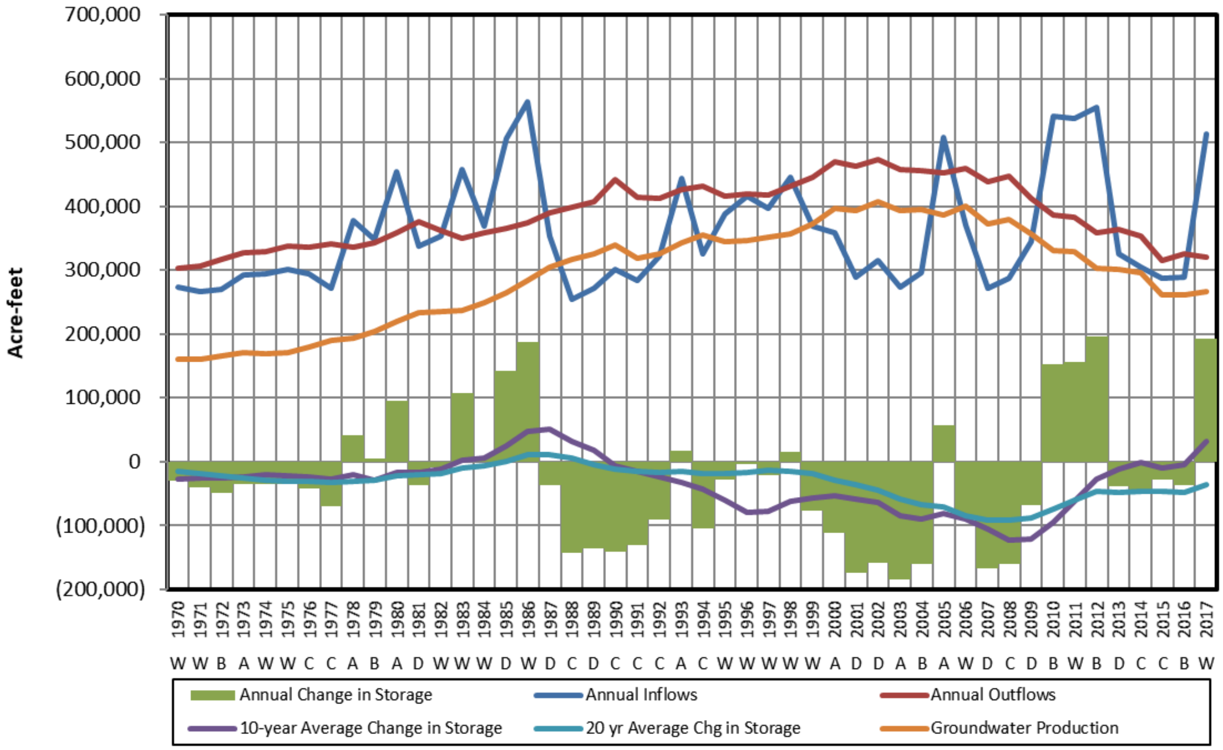
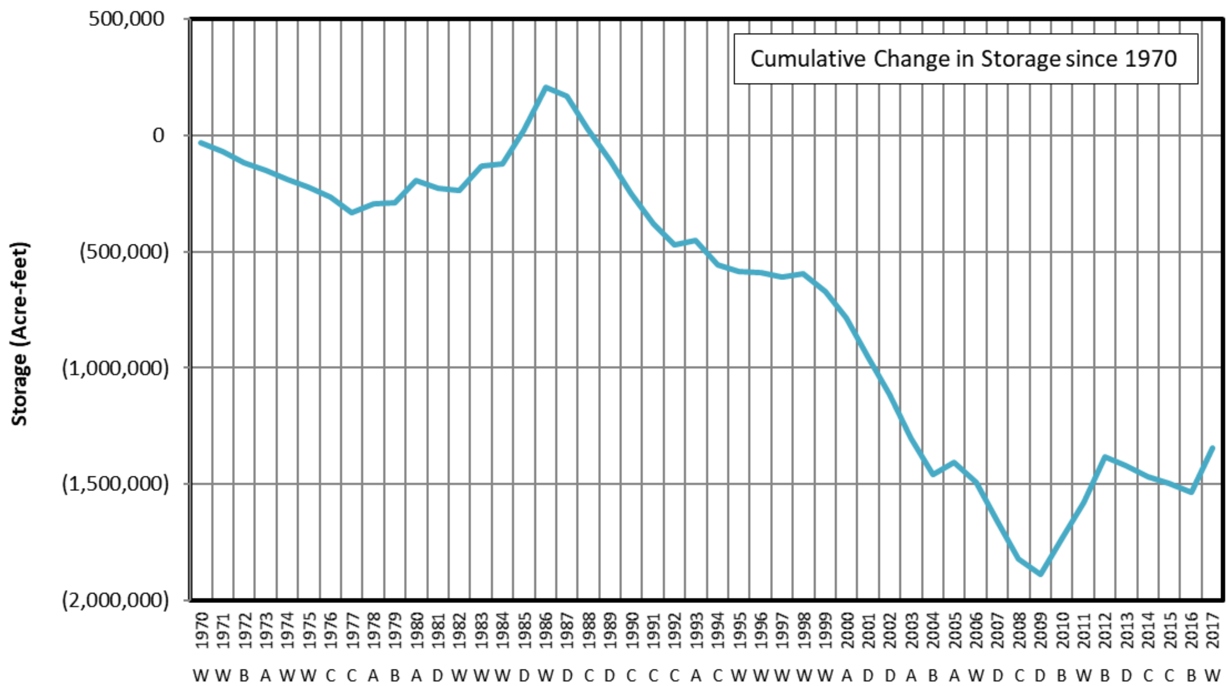


Figure 7-2 shows the cumulative change in storage since 1970. The goal of the Water Management Plan is to eliminate groundwater overdraft, but not to restore the basin to historical conditions. Currently, about 1.2 million AF have been removed from storage since 1970. The basin was at its minimum storage in 2009, which was the first year of operation for the TEL GRF and before significant water conservation efforts were implemented. Since 2009, groundwater pumpage has reduced by 25 percent and replenishment activities have increased. Consequently, the basin has recovered over 650,000 AF of groundwater in storage, about one-third of the depletion in 2009. This demonstrates the progress made through implementation of the Water Management Plan.

Figure 7-3
Cumulative Change in Groundwater Storage Since 1970



Note: The goal of the Water Management Plan is to eliminate groundwater overdraft, not to restore the Indio Subbasin to historical conditions.

7.2 CHANGE IN GROUNDWATER STORAGE MAPS

Figure 7-4 and **Figure 7-5** show the one-year and ten-year changes in groundwater storage throughout the Indio Subbasin. These maps show the difference in average groundwater elevations from 2016 to 2017 and 2007 to 2017 for wells in the Indio Subbasin monitored by CVWD, Coachella Water Authority (CWA), Desert Water Agency (DWA)and Indio Water Authority (IWA) staff. Cooler colors (greens and blues) depict increases in groundwater storage while warmer colors (yellow through red) depict decreases in groundwater storage.

Figure 7-4 shows significant increases in groundwater storage near the Whitewater River GRF in response to the high recharge deliveries in WY 2016-2017. The Palm Springs and Cathedral City areas to the south of Whitewater showed decreasing water levels in the range of 1 to 6 ft. Much of the middle portions of the Indio Subbasin showed increasing water levels in the range of 0-6 ft, most likely due to decreased groundwater production. One portion of the Indio Subbasin near the Salton Sea showed declining water levels, possibly in response to increased pumping in the area.

Figure 7-5 shows significant increases in groundwater storage in the Indio Subbasin over the past ten years. Water levels near the Whitewater River GRF show increased water levels in response to the high recharge deliveries in 2010-2012 and in WY 2016-2017. Portions of the Palm Springs and Cathedral City areas to the south of Whitewater showed decreasing water levels in the range of 1 to 12 ft, while areas closer to the mountains showed increased water levels. The middle portion of the Indio Subbasin near Palm Desert and Indian Wells showed decreasing water levels in the range of 0-18 ft due to groundwater production. Essentially all of the eastern portion of the Indio Subbasin showed increased groundwater storage, in response to decreased pumping and replenishment operations at the TEL GRF.

Figure 7-4
One-Year (2016 to 2017) Change in Groundwater Storage in the Indio Subbasin

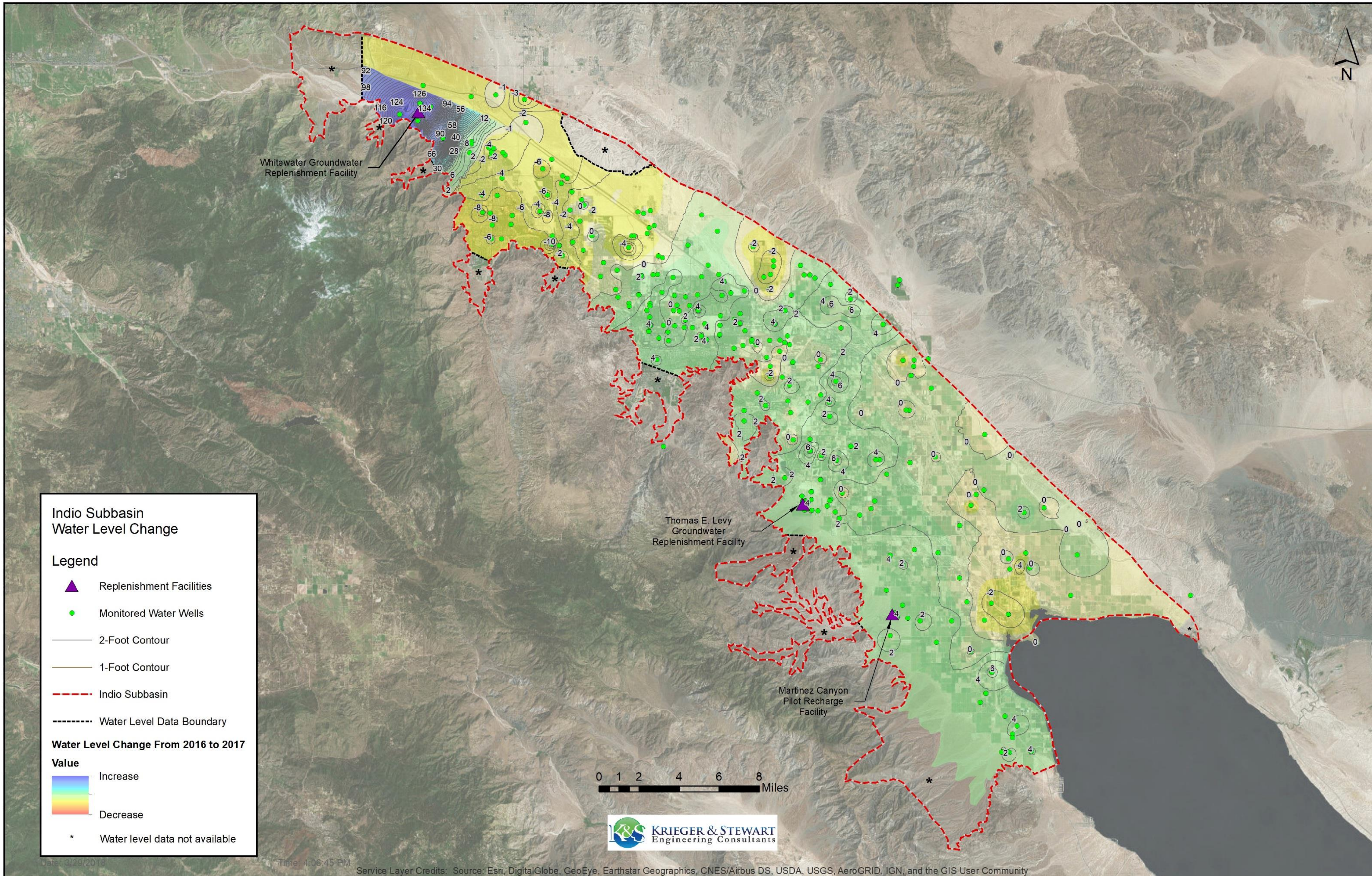
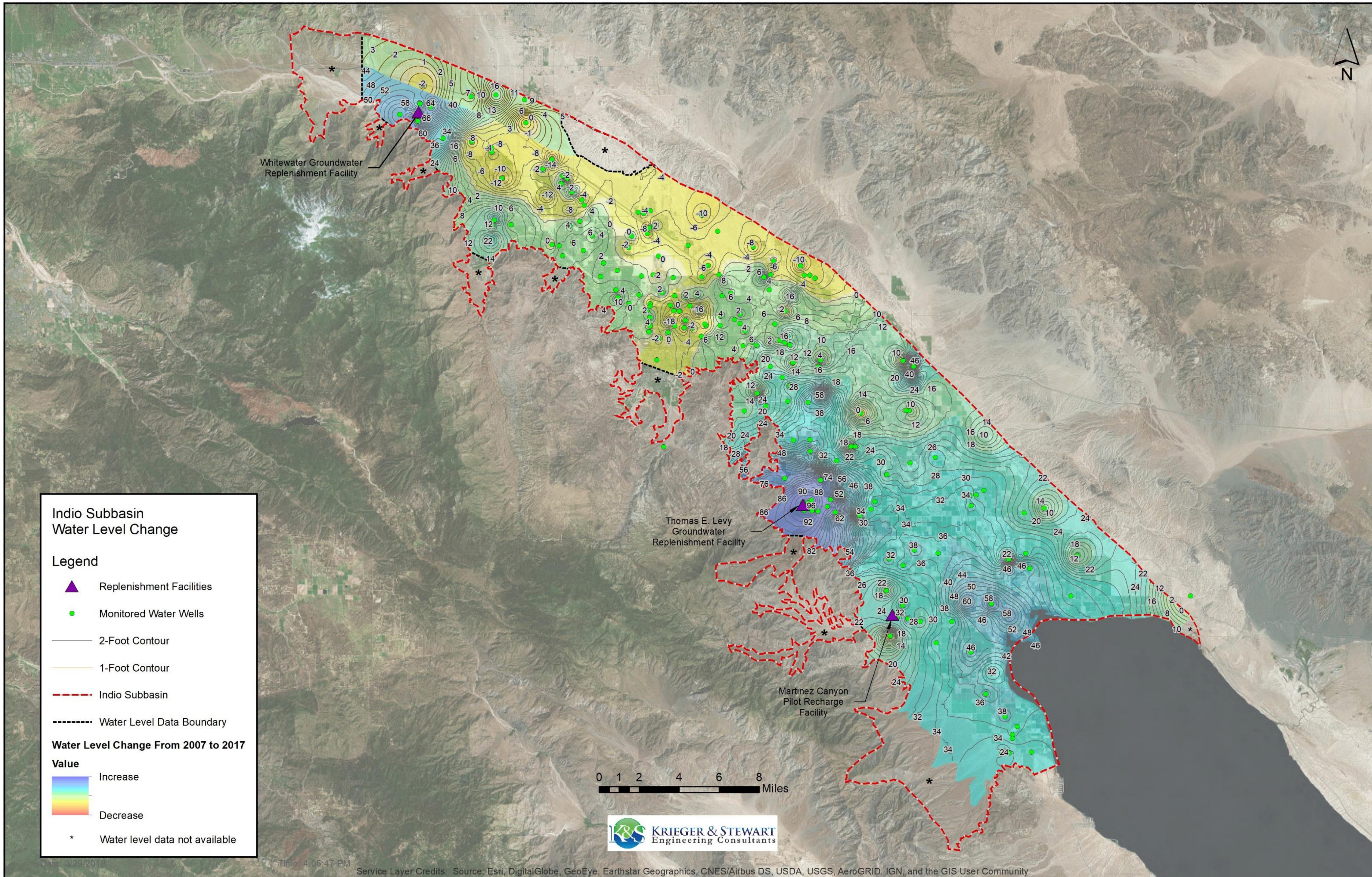


Figure 7-5
Ten-Year (2007 to 2017) Change in Groundwater Storage in the Indio Subbasin



Section 8
Description of Progress

The 2010 Coachella Valley Water Management Plan (CVWMP) Update was adopted in January 2012 as an update to the original 2002 CVWMP for the Indio Subbasin.

The 2002 CVWMP identified specific objectives and projects for water conservation, new sources, groundwater recharge and source substitution. The established goal of the 2002 CVWMP was to assure adequate quantities of safe, high-quality water at the lowest cost to Coachella Valley water users. This would be accomplished by meeting the following objectives:

1. Elimination of groundwater overdraft and its adverse impacts, including:
    a. Groundwater storage reductions,
    b. Declining groundwater levels,
    c. Land subsidence and
    d. Water quality degradation.
2. Maximizing conjunctive use opportunities,
3. Minimizing adverse economic impacts to Coachella Valley water users,
4. Minimizing adverse environmental impacts.

The 2010 CVWMP Update refined these goals and objectives to better match the current needs of the Coachella Valley. The basic goal of the CVWMP remains the same but has been modified to reflect a more holistic approach: "to reliably meet current and future water demands in a cost-effective and sustainable manner."

1. Meet current and future water demands with a 10 percent supply buffer.
2. Eliminate long-term groundwater overdraft.
3. Manage and protect water quality.
4. Comply with state and federal laws and regulations.
5. Manage future costs.
6. Minimize adverse environmental impacts.

In response to the adoption of Sustainable Groundwater Management Act (SGMA) in 2014, and as stated in Section 1, Coachella Valley Water District (CVWD), Desert Water Agency (DWA), Coachella Water Authority (CWA), and Indio Water Authority (IWA) submitted the 2010 CVWMP Update as an Alternative Groundwater Sustainment Plan (GSP) that described how the existing CVWMP meets the requirements of SGMA. This document was submitted to California Department of Water Resources (DWR) in December 2016.

This section provides an update of the status of CVWMP implementation activities during Water Year (WY) 2016-2017.

8.1 IMPLEMENTATION OF PROJECTS AND MANAGEMENT ACTIONS

The sustainability goals described in the SGMA Alternative GSP for the Indio Subbasin identified the following water management elements for implementation:

- Water conservation measures
- Acquisition of additional water supplies
- Conjunctive use programs to maximize supply reliability
- Source substitution programs
- Groundwater recharge programs
- Water quality protection measures
- Other management activities

8.1.1 Water Conservation

Water conservation strategies in place are described in Section 6.2 of the SGMA Bridge Document. In July 2015, the State Water Resources Control Board (SWRCB) mandated that water agencies develop and implement plans to reduce water use statewide by 25 percent in response to statewide drought. CVWD, DWA, and Myoma Dunes Mutual Water Company were required to meet a target of reducing overall use by 32 percent relative to 2013 baseline use. CWA, IWA, and Mission Springs Water District (MSWD) were assigned targets of 20 percent, 28 percent, and 24 percent, respectively. In May 2016, the SWRCB adopted a statewide water conservation approach (effective from June 2016 through January 2017) that replaced the prior percentage reduction-based water conservation standard with a localized "stress test" approach that mandates urban water suppliers act to ensure at least a three-year supply of water to their customers under drought conditions. In response to the "stress test" regulation, CVWD, DWA, MSWD, the City of Coachella, the City of Indio, and Myoma Dunes Mutual Water Company (MDMWC) all self-certified that sufficient water had been identified to meet all anticipated demands with existing conservation programs and plans in place, effectively placing their local conservation targets at 0%.

CVWD, CWA, DWA, and IWA have initiated and continue to implement the following on-going water conservation programs for large landscape and residential customers.

- Compliance with California building codes and the Federal Energy Policy Act of 1992 (PL 102-486) requires the installation of water efficient plumbing for all new home construction and large rehabilitation projects.

- Most water purveyors and several cities within the Indio Subbasin have implemented landscape audit programs and rebates for replacements of lawns with water-efficient landscaping as well as weather-based irrigation controller and toilet rebates.
- The CVWD Ordinance No. 1302.3 (2017) provides uniform landscaping standards throughout the Coachella Valley, to include stringent ordinances and turf limitations for new golf courses. All cities and water agencies agreed to either adopt the ordinance in its entirety, adopt a similar version, or adopt it by reference in the local agency's ordinance. This ordinance was subsequently adopted by the Coachella Valley Association of Governments to cover the entire Valley.
- CVWD developed a new valley-wide program in conjunction with the College of the Desert and Coachella Valley Association of Governments to ensure that landscaping businesses must be trained on efficient watering practices before renewing their business licenses.
- The Coachella Valley Integrated Regional Water Management Group was awarded a grant for Proposition 84 Round 4, which included $547,387 in turf removal by DWA and CWA.
- Between 2000 and 2016 urban water use for all water agencies declined by 18.8% through a combination of water rate restructuring, rebates, incentive programs, and efficiency improvements. Urban water use increased by about 6 percent in the past year due to the elimination on mandatory water conservation. The local water agencies have all achieved their 20 by 2020 (SBx 7-7) savings requirements ahead of schedule.
- The local water agencies invested about $120,000 in 2016 for the *CV Water Counts* regional conservation campaign to advertise water conservation awareness. This includes the establishment of the Water Counts Academy, a community water education program that started in 2017.
- In mid-2016, the United States Bureau of Reclamation (USBR) awarded CVWD a $300,000 Drought Resiliency Project grant to help offset the costs of a pipeline and pump station that will enhance CVWD's ability to deliver Colorado River water to the Bermuda Dunes area. The new infrastructure will make it possible to annually bring more than 1,000 acre feet (AF) of Colorado River water to Bermuda Dunes for irrigation purposes, reducing groundwater pumping by a like amount.
- USBR awarded CVWD a $1 million WaterSMART Water and Energy Efficiency grant to help finance rebates for the removal of turf that is replaced with drought-tolerant, low water-use desert landscaping at golf courses (USBR, 2014). CVWD combines these funds with their own $6 million budgeted for turf replacement rebates at residences, businesses and homeowners associations.

8.2 ADDITIONAL WATER SUPPLIES

The following describes the management strategies and their status associated with securing additional sources of water:

8.2.1 Colorado River Supplies under the Quantification Settlement Agreement

Demands on the Colorado River supplies have been reduced by voluntarily agreement between the USBR, Central Arizona Project, Metropolitan Water District of Southern California (MWD), Denver Water, and Southern Nevada Water Authority under the USBR 2014 Pilot System Conservation Program (USBR, 2014). Under this program, CVWD is offering rebates to farming customers to convert up to 667 acres of farmed land from flood/furrow to drip irrigation. The program began in 2016, is scheduled to operate for five years, and is estimated to conserve up to 5,000 acre-feet (AF).

As part of the Quantification Settlement Agreement (QSA), CVWD's Colorado River allocation through the Coachella Canal increased by 4,000 AFY.

8.2.2 State Water Project

State Water Project water allocations for 2016 were 60 percent of the State Water Project (SWP) Table A Amounts. During 2017, SWP allocations increased to 85 percent of SWP Table A Amounts in response to the wet winter of 2016-2017.

The SWP faces many challenges including the on-going drought, risk of Delta levee failure, legal and regulatory restrictions on exports due to environmental degradation, water quality degradation, and climate change. In the absence of definitive measures to resolve these challenges, SWP reliability is likely to continue declining in the absence of the California WaterFix. CVWD and DWA are actively participating in the WaterFix and other statewide programs to improve the long-term reliability of the SWP supply.

8.2.3 Other Water Transfers

As opportunities arise, CVWD and DWA make water purchases from programs such as SWP Article 21 (interruptible water) and Turnback Pool water, Governor's Drought Water Bank, the Yuba Accord and the Rosedale-Rio Bravo transfer. During WY 2016-17, CVWD and DWA acquired over 26,200 AF of supplemental water through these programs.

8.2.4 Recycled Water

The principal non-potable uses for recycled water in the Indio Subbasin are:

- Golf course irrigation
- Urban landscape irrigation

CVWD and DWA currently delivered approximately 10,725 AF of recycled water in the western portion of the Indio Subbasin for golf course and other large irrigation uses.

Wastewater generated in the western Indio Subbasin that is not reused for irrigation is disposed into the Indio Subbasin. Current recycled water usage in the eastern portion of the Indio Subbasin is approximately 700 AF for agricultural irrigation. Wastewater from the eastern portion of the Indio Subbasin that is not reused is disposed to the Coachella Valley Storm Water Channel (CVSC).

8.2.5 Desalinated Drain Water

The 2002 CVWMP recommended that a drain water desalination facility commence operation between 2010 and 2015 with a 4,000 AFY facility to treat agricultural drainage water for irrigation purposes. The facility would be expanded to 11,000 AFY by 2025.

A brackish groundwater treatment study and feasibility study was completed in 2008. Source water supply options for producing desalinated water includes the installation of a well field to extract groundwater in the upper part of the aquifer (2010 CVWMP Update).

The 2015 Urban Water Management Plan (UWMP) (CVWD, 2016b) anticipates the need for desalinated drain water starting in 2025. No activities were conducted during WY 2016-2017 with regard to desalinated drain water.

8.3 GROUNDWATER SUPPLY SUBSTITUTION

Groundwater supply substitution represents an effective strategy to mitigate the lowering of groundwater levels, consequent groundwater storage capacity, and subsidence. Management strategies currently include the substitution of groundwater supply with recycled water and Canal water for golf and agricultural use and future treatment of Canal water for urban use. Several groundwater substitution projects were identified in the SGMA Alternative GSP. These include:

- Conversion of existing and future golf courses in the western Indio Subbasin from groundwater to recycled water.
- Conversion of existing and future golf courses in the eastern Indio Subbasin from groundwater to Colorado River water.
- Conversion of existing and future golf courses in the western Indio Subbasin from groundwater to Colorado River water via the Mid-valley Pipeline.
- Conversion of agricultural irrigation from groundwater to Colorado River water, primarily in the Oasis area.
- Conversion of urban use from groundwater to treated Colorado River water in the eastern Indio Subbasin.
- Conversion of outdoor urban use to non-potable water including Colorado River water or recycled water in the eastern Indio Subbasin. Although not specifically stated, it is anticipated that some volume of the outdoor urban use water is derived from Indio Subbasin groundwater.

8.3.1 Golf Courses Served with Canal Water

CVWD has worked closely with golf courses in the eastern portion of the Indio Subbasin to encourage the use of Canal water instead of pumping groundwater. Currently, 23 golf courses are connected to the Coachella Canal distribution system and CVWD plans to connect six additional courses by 2019.

CVWD staff works closely with the connected golf courses to ensure they meet at least 80 percent of their demand with Canal water.

8.3.2 Mid-Valley Pipeline

The Mid-Valley Pipeline (MVP) is a key element of "in-lieu" replenishment designed to help eliminate overdraft in the Indio Subbasin. This source substitution project is currently being implemented to reduce groundwater pumping by supplying CVWD recycled water and Colorado River water from the Coachella Canal through the MVP to Water Reclamation Plant No. 10 (WRP-10) where it supplements the supply of recycled water and both are delivered to nonpotable water customers for golf course and landscape irrigation.

Construction of the first phase of the MVP from the Coachella Canal in Indio to WRP-10 (6.6 miles in length) was completed in 2009. Since that time, CVWD staff have worked with local golf courses to connect them to the non-potable water system. During 2017, CVWD connected three golf courses to the MVP system: two courses at Palm Valley and one course at Desert Falls. Connection of an additional course, Indian Springs, is complete but they will not officially receive water until February 2018. Currently, 20 golf courses are connected either directly to the MVP or to the non-potable water system supplied by the MVP and WRP-10 recycled water.

In 2018, CVWD intends to connect Emerald Desert and Marriott Shadow Ridge, and will begin construction for four additional golf course connections (Oasis, Woodhaven, Palm Desert Resort, and Bermuda Dunes). These latter four courses will not be completed until the following fiscal year.

CVWD contracted with a consulting firm to prepare a non-potable water master plan to guide the implementation of the MVP project. This plan was completed in 2016. A total of 35 additional golf courses are expected to connect to the MVP non-potable water system. When completed (estimated after fiscal year 2022/23), the MVP will deliver about 52,000 AFY of recycled water and Canal water, together known as "non-potable" water, for irrigation.

8.4 GROUNDWATER RECHARGE

Groundwater recharge in the Indio Subbasin is a major groundwater management strategy that has been employed in the Coachella Valley.

8.4.1 Whitewater River Groundwater Replenishment Facility

CVWD initiated activities in 1918 to obtain water rights and acquire lands to begin groundwater replenishment activities using stream flows from the Whitewater River. Replenishment with imported water commenced in 1973, and the Whitewater River GRF was expanded in 1984. Replenishment with imported water commenced in 1973. During WY 2016-2017, groundwater recharge operations replenished 267,793 AF of imported water at the Whitewater facility. This was the largest volume of water recharged in a 12 month period since imported water replenishment commenced. As of September 30, 2017, a total of 3,199,981 AF of imported water has been recharged at the Whitewater facility.

8.4.2 Palm Desert Groundwater Replenishment Project

The Palm Desert Groundwater Replenishment Project includes re-purposing land with existing ponds on CVWD's Palm Desert property, adjacent to the Steve Robbins Administration Building and WRP-10, and constructing detention basins in the Whitewater River Storm Water Channel between Cook Street and Fred Waring Drive, for the purpose of replenishing the Indio Subbasin using Colorado River Water. The total project capacity is estimated to be 25,000 AF/Yr. The estimated capital cost is approximately $9.8 million. Project design began in April 2017. Phase I of construction is scheduled to begin in April 2018 and to be completed in December 2018 and Phase II is currently being designed.

8.4.3 Thomas E. Levy Groundwater Replenishment Facility

Recharge operations continued at the Thomas E. Levy (TEL)GRF with annual recharge of 37,439 AF. Since the full-scale facility commenced operation in 2009, a total of 298,773 AF has been recharged and groundwater elevations near the facility have increased by 97 feet.

8.5 WATER QUALITY IMPROVEMENTS

Based on historical and recent monitoring, CVWD, CWA, and IWA identified that approximately 30 percent of their drinking water wells have chromium-6 levels above California’s standard of 10 micrograms per liter (µg/L) adopted in 2014. Building on the success with ion exchange (IX) technology for arsenic removal and treatment, the water agencies evaluated the use of similar technology to reduce chromium-6 levels found in other drinking water wells. CVWD operates two IX facilities reducing chromium-6 levels in four wells and IWA is currently treating three wells to remove chromium-6.

In October 2016, the CVWD Board of Directors approved launching a pilot study to evaluate the feasibility and effectiveness of using stannous chloride to reduce chromium-6 levels in drinking water. CVWD received State approval to complete a full-scale demonstration of this new treatment process in June 2017 and planned to start this demonstration by the end of 2017. This process has the potential to be a simpler alternative to IX that is more environmentally friendly, more cost-effective, and would have less impact on the community.

On September 11, 2017, the State deleted the drinking water standard for chromium-6 in response to a court order. The State plans to complete work needed to establish a new chromium-6 drinking water standard in the next two years.

8.6 CURRENT IMPLEMENTATION STATUS

The recommended actions identified in the 2010 CVWMP Update and the SGMA Alternative GSP are described in Table 6-2 of the Alternative GSP. A revised version of Table 6-2, with the current updated status, is presented as **Table 8-1**.

Table 8-1
WY 2016-2017 Coachella Valley Water Management Plan Implementation Status Update

Plan Element	Responsible Entity(ies)	SGMA Bridge Document Goal	2017 Status	2018 Planned Activities
WATER CONSERVATION PROGRAM				
Adopt and implement 2009 CVWD/CVAG Landscape Ordinance or equivalent	CVWD, water purveyors, cities, Riverside County	Ongoing	**Complete**	Ordinance revised in 2015 to comply with new State requirements and reduce ETAF
Establish urban water conservation baseline	CVWD, other urban water purveyors	Completed	**Complete**	Re-evaluated in 2016 UWMPs based on 2010 census population
Achieve minimum 10 percent reduction in existing golf course use	CVWD, DWA	2015	In Progress	Work with Golf Task Force to implement and monitor custom water budgets. Budget program funds in CIB
Achieve 14 percent reduction in agricultural water use	CVWD	2020	Deferred	CVWD will work with growers to develop methodology to evaluate conservation effectiveness.
Achieve 20 percent reduction in urban use	CVWD, other urban water purveyors	2020	In Progress	2015 UWMPs documented 37% reduction in 2015 from 1999 to 2008 baseline

Plan Element	Responsible Entity(ies)	SGMA Bridge Document Goal	2017 Status	2018 Planned Activities
WATER SUPPLY DEVELOPMENT PROGRAM				
Complete siting studies, environmental impact evaluation and design for CVSC drain water capture and treatment facilities	CVWD	2013	Deferred due to changes in needs	Imported water status report (2015) indicated potential deferral until 2025
File for water rights application for change of point of use for wastewater effluent discharges to allow water recycling	CVWD, VSD, CWA	2015	CVWD's wastewater change petition to reuse effluent from WRP-4 was released for public review in October 2017	CVWD has 180 days to resolve any concerns identied by valid protests.
Complete construction of initial CVSC drain water capture and treatment facilities	CVWD	2015	Deferred due to changes in needs	Imported water status report (2015) indicated potential deferral until 2025
Conduct a feasibility study to investigate the potential for additional stormwater capture in the East Valley	CVWD	2015	Ongoing with stormwater studies	Maximize stormwater capture in facilities design
Conduct a study to determine the amount of water lost to leakage or otherwise unaccounted in the first 49 miles of the Coachella Canal and evaluate the feasibility of corrective actions to capture lost water	CVWD	2015	No longer a priority due to measured losses below 5% since canal lining	Continue to monitor annual system losses
Conduct a joint investigation with IWA and CWA of groundwater development potential in Fargo Canyon Subarea of the Desert Hot Springs Subbasin to determine the available supply and suitability for use in meeting non-potable demands of development east of the San Andreas fault	CVWD, IWA, CWA	2020	Deferred due to changes in water needs	Re-evaluate need in next WMP update

Plan Element	Responsible Entity(ies)	SGMA Bridge Document Goal	2017 Status	2018 Planned Activities
SOURCE SUBSTITUTION PROGRAM				
Prepare a master plan for Mid-Valley Pipeline completion	CVWD	2011	Final Draft Completed	
Connect four golf course users along the Mid-Valley Pipeline alignment to the Mid-Valley Pipeline	CVWD	2011	**Complete**	Monthly Progress Report to Board
Work with existing East Valley golf courses having Canal water access to increase their use to 90 percent of demand	CVWD	2012	In Progress - revised to 80% via non-potable agreements	Report Progress in annual Non-Potable Water Report
Investigate regional opportunities for Colorado River water treatment facilities	CVWD, IWA, CWA	2012	Completed via Source of Supply/Treatment Study (SS/TS)	Budget funds in future CIB based on growth
Develop policy requiring the installation of non-potable water systems for new development	CVWD	2012	**Complete**	Required via WSAs/WSVs and Development Design Manual
Work with large agricultural groundwater pumpers to determine what obstacles exist that prevent them from using additional Canal water and encourage them to reduce their groundwater pumping	CVWD	2012	Deferred	Re-evaluate need in next WMP update
Construct north and east extensions to the Mid-Valley Pipeline system	CVWD	2013	Design and environmental documentation is currently underway	Complete design and environmental review; proceed to construction
Complete siting studies, environmental impact evaluation and design for Colorado River water treatment facilities	CVWD	2013	Deferred	Re-evaluate schedule based on SS/TS and growth
Complete construction of initial Colorado River water treatment facilities and connect to distribution system	CVWD	2015	Deferred	Re-evaluate schedule based on SS/TS and growth

Plan Element	Responsible Entity(ies)	SGMA Bridge Document Goal	2017 Status	2018 Planned Activities
Complete Oasis study update	CVWD	2015	Design completed in 2015 and construction by 2025	Quarterly Progress Report to Board, Budget funds in CIP
Prepare a non-potable water distribution master plan Phase 3	CVWD	2015	**Complete**	
Complete construction of Mid-Valley Pipeline backbone system	CVWD	2020	Deferred pending results of master plan	Re-evaluate schedule based on Phase 3 MVP master plan
GROUNDWATER RECHARGE PROGRAM				
Operate and monitor the TEL GRF with a 40,000 AFY goal	CVWD	2010	In Progress with lower goal of 32,000 AFY	Re-evaluate need in next WMP update
Investigate groundwater storage opportunities with IID	CVWD	2010	**Complete**	
Transfer the unused portion of the 35,000 AFY of SWP water available under the QSA to the WR GRF	CVWD	2011	**Complete**	Budget transportation funds annually. Maximize advanced delivery opportunities
Work with IWA to evaluate the feasibility of developing a groundwater recharge project that reduce groundwater overdraft. If feasible, work with IWA to construct the facility	CVWD, IWA	2011	Deferred pending evaluation of need	Continue evaluation
Design and construct an additional pumping station and pipeline from Lake Cahuilla to the TELGRF if the existing pumping station and pipeline cannot provide sufficient water to meet the annual goal	CVWD	2015	Deferred	Re-evaluate need in next WMP update
Conduct siting studies, environmental impact evaluation and design for Martinez Canyon GRF	CVWD	2018	Deferred due to monitoring results	Budget Oasis expansion funds in CIB
MONITORING AND DATA MANAGEMENT				
Continue to monitor the extent of land subsidence	CVWD, USGS	2010	Monitoring ongoing - next report in 2018	Continue monitoring and evaluate results

Plan Element	Responsible Entity(ies)	SGMA Bridge Document Goal	2017 Status	2018 Planned Activities
Provide additional information in the annual engineers' reports:	CVWD, DWA	2011	More consistency with DWA's reports achieved	Evaluate report content for coordination with SGMA annual reporting requirements
* Annual precipitation and stream flow			**Complete**	
* Additional groundwater level data and hydrographs			**Complete**	
* In-lieu recharge water deliveries from imported water and recycled water that offset pumping			**Complete**	
* Imported water deliveries for direct use			**Complete**	
Obtain DWR designation as groundwater level monitoring and reporting entity for the Coachella Valley within their respective service areas	CVWD, DWA, water purveyors	2011	**Complete** via the CASGEM Program	Budget funds as needed to continue program participation
Prepare a comprehensive groundwater monitoring plan	CVWD, DWA, water purveyors, wastewater agencies, tribes	2012	Developed monitoring well grid with the GSA's in 2017 and will continue adding wells as needed.	Pursue IRWM grant funding, periodic reviews by GSAs
Enhance the CVSC gauging station at Lincoln Street to provide continuous flow recording	CVWD, USGS	2012	**Complete**	Budget CIB funds as necessary to continue drain flow monitoring
Develop centralized groundwater database	CVWD, DWA, water agencies, tribes	2012	Deferred	Budget funds in CIB as necessary to maintain program participation
OTHER PROGRAMS				
Continue to operate a groundwater advisory committee regarding groundwater management issues in the East Valley	CVWD, water agencies, pumpers, tribes	2010	**Complete**	Budget CIB funds as necessary to continue annual meetings

Plan Element	Responsible Entity(ies)	SGMA Bridge Document Goal	2017 Status	2018 Planned Activities
Develop a program to educate and work with well owners to properly control artesian wells	CVWD	2011	**Complete.** Obtained $250,000 IWRM grant funding for artesian well sealing – up to $35,000/well.	
Update and recalibrate the CVWD groundwater model based on the most current information	CVWD	2012	Deferred	Complete in parallel with future WMP update
Develop a water planning interface to the groundwater model	CVWD	2012	Deferred	Add to scope of work for next groundwater model update
Prepare a plan to maintain and enhance the existing drainage system to allow its future use for urban purposes	CVWD	2012	**Complete**, legal authority established	
Develop well construction, destruction and abandonment policies	CVWD, DWA, water agencies, tribes, Riverside County	2012	Obtained $250,000 grant funding – up to $35,000/well for artesian well retrofits (sealing, well destruction, and conversion to CASGEM monitoring well.)	Support County's efforts to enforce. Pursue additional IRWMP Well Retrofit Rebate Program grant funding as available.
Add groundwater quality simulation capabilities to the model that will allow simulation of salinity (TDS) and nitrogen in the groundwater	CVWD	2013	Deferred	Add to scope of work for next groundwater model update
Prepare a salt/nutrient management plan for the Valley to meet SWRCB Recycled Water Policy requirements	CVWD, DWA, water purveyors, wastewater agencies, tribes, agricultural and golf communities, and Regional Board	2014	Submitted to RWQCB in June 2015, RWQCB acceptance pending	Continue coordination with RWQCB to obtain acceptance

Plan Element	Responsible Entity(ies)	SGMA Bridge Document Goal	2017 Status	2018 Planned Activities
Extend urban water and sewer service to trailer/RV park communities with deficient infrastructure and poor water quality	CVWD	2015	Ongoing. Formed Disadvantaged Community Task Force. Developing an implementation strategy that prioritizes connection needs. Secured IRWM and USDA rural assistance funding for St. Anthony's, Huerda, and Mountain View Estates mobile home parks. Short term arsenic treatment	Continue to sponsor applications for USDA, IRWM, CDPH, and SWRCB funding
Investigate the feasibility of installing nitrate treatment on selected high nitrate wells to avoid redistribution of nitrates	CVWD	2015	In Progress via CVWD's Source of Supply/ Treatment Study. Treatment process being re-evaluated	CVWD continues to explore new technologies to identify for pilot testing any promising processes that may be technically and economically feasible to implement.
Undertake a cooperative program to identify and cap wells that are no longer being used for groundwater production	CVWD, DWA	2015	In Progress	Support County's efforts to enforce. Pursue IRWM grant funding
ENVIRONMENTAL ENHANCEMENT AND MITIGATION PROJECTS				
Develop plans for the creation of: * 25 acres of managed pupfish replacement habitat * 66 acres of managed rail replacement habitat * 44 acres of Sonoran cottonwood-willow riparian forest habitat	CVWD	2010	In Progress. Received wildlife agency approval of site, workplan under review by wildlife agencies	Work with wildlife agencies to complete review. Update project implementation schedule. Budget funds in CIB/CIP

Plan Element	Responsible Entity(ies)	SGMA Bridge Document Goal	2017 Status	2018 Planned Activities
Remove tamarisk, restore and enhance mesquite and Coachella Valley round-tailed ground squirrel habitat on land CVWD owns in the East Indio Hills Conservation Area	CVWD, CVCC	Not Specified	Completed tamarisk removal at WRP-7 site. CVCC study on mesquite restoration in progress	Support CVCC efforts to complete feasibility study
Conserve approximately 1,200 acres of land owned in the CVFTL HCP Whitewater Floodplain Preserve in perpetuity as part of the CVMSHCP Reserve System	CVWD, CVCC	2010	In Progress. Resource agencies reviewing Draft Conservation Easement prepared by CVCC and CVWD	Work with Resource agencies to achieve conservation easement approvals

8.7 SUMMARY OF PROGRESS

The Indio Subbasin GSAs continue to implement the goals and programs of the 2010 Water Management Plan Update. WY 2016-2017 saw the highest volume of water recharged in a 12-month period. Groundwater production remained more than 25 percent less than the historical highs in the early 2000s. The results of the on-going basin monitoring program demonstrate the significant progress being made toward the goal of eliminating groundwater overdraft. Since 2009, the Indio Subbasin has gained over 500,000 AF of groundwater in storage.

Groundwater level monitoring demonstrates that most of the Indio Subbasin exhibited a water level gain in the past year except for portions of the Indio Subbasin between Palm Springs and Rancho Mirage and the Desert Palm (Sun City) community. The water level decline in the Palm Springs-Rancho Mirage area is the residual effect of low imported replenishment water deliveries in previous years due to the recent drought.

Over the past ten years, much of the Indio Subbasin experienced water level gains in the range of 2 to over 50 ft as a result of implementation of the TEL GRF, conversion of golf courses from groundwater to Canal water, and water conservation. The portion of the Indio Subbasin between Palm Springs and Palm Desert experienced water level declines in the range of 2 to 18 ft in this period. Eliminating this decline is the focus of the Mid-Valley Pipeline source substitution project and the proposed Palm Desert Groundwater Replenishment Facility.

CVWD continues to work with the golf courses in its service area to extend the Mid-Valley Pipeline distribution system to serve additional courses and reduce their groundwater pumping. Increased availability of Colorado River water through the QSA is expected to add 18,000 AF of deliveries in 2018.

Continued implementation of Water Management Plan programs is critical to meeting the goals of the plan. In the coming year, the GSAs will continue to pursue their successful water conservation efforts. CVWD plans to begin water deliveries to one golf course in early 2018, connect two additional golf courses to non-potable water supplies and begin construction to connect four additional courses in the following year.

CVWD also plans to commence construction of Phase I of the Palm Desert Groundwater Replenishment Facility by April 2018; Phase II is in design phase.

The GSAs continue to evaluate the effectiveness of their groundwater monitoring program; additional wells are added to the program as the need arises. In addition, the next USGS report on land subsidence is expected to be published in late 2018.

Section 9
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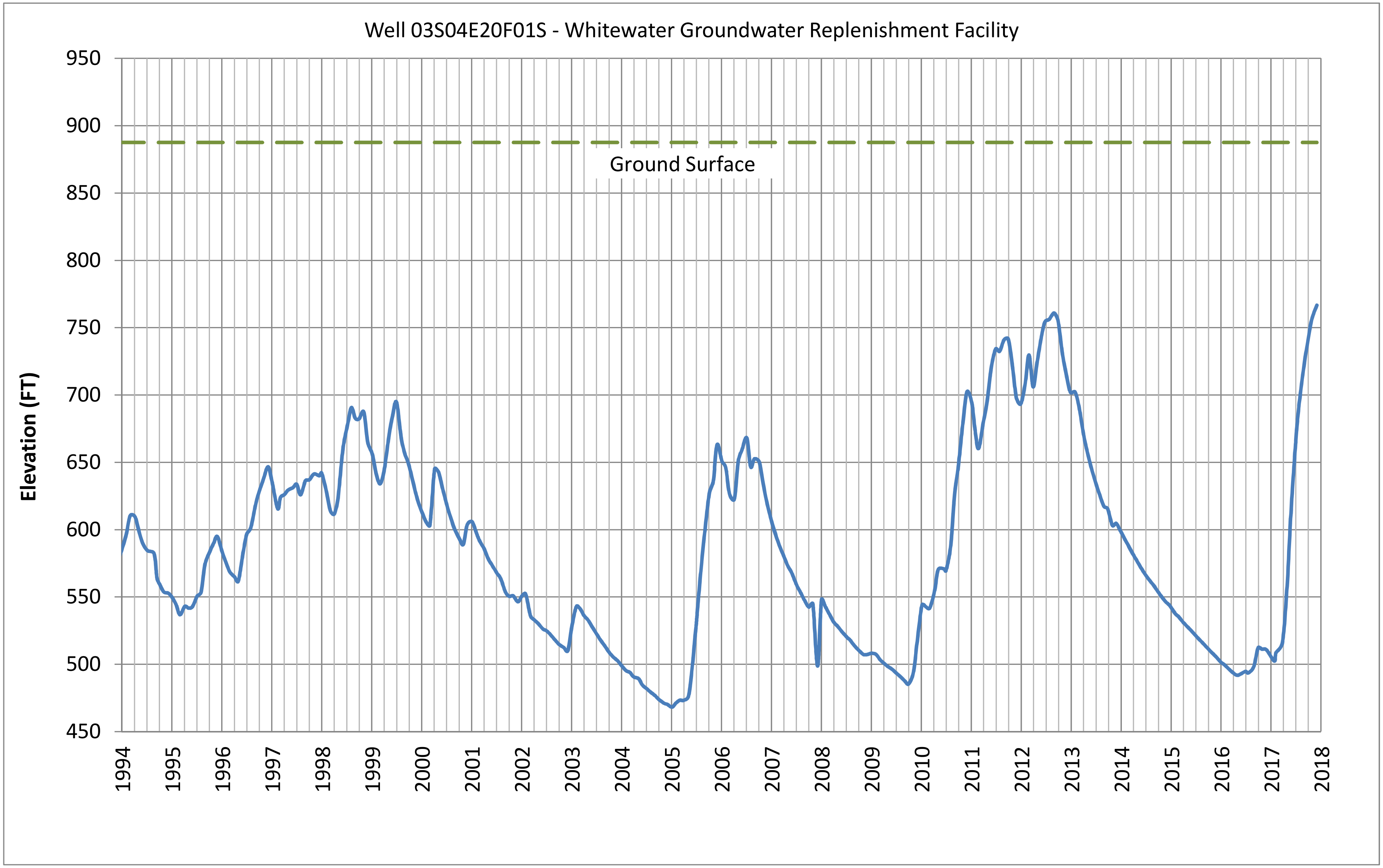
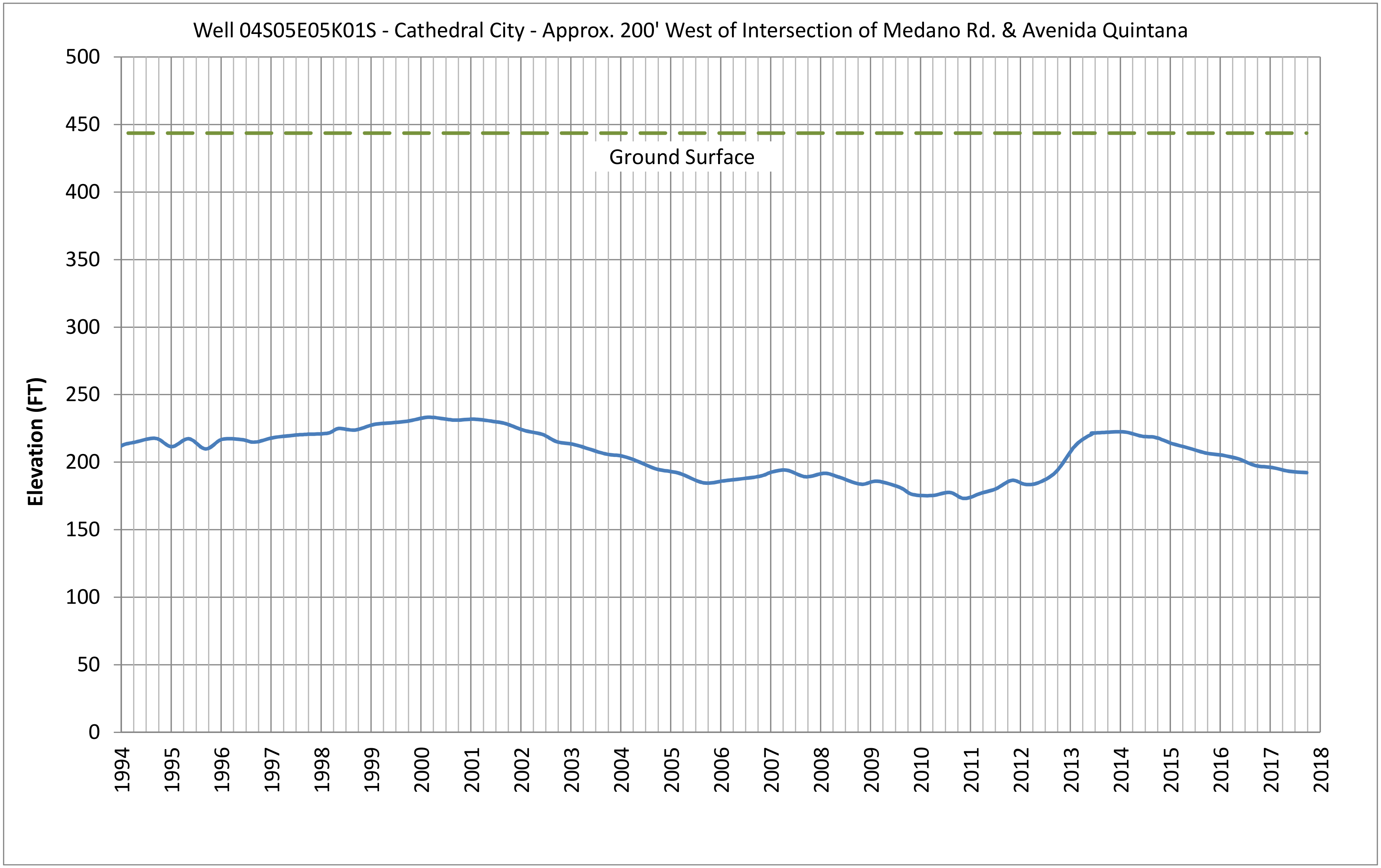
APPENDICES

APPENDIX A

Representative Groundwater Elevation Hydrographs


Well 03S04E20F01S - Whitewater Groundwater Replenishment Facility
Elevation (FT)
950
900
850
800
750
700
650
600
550
500
450
Ground Surface
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018


Well 04S05E05K01S - Cathedral City - Approx. 200' West of Intersection of Medano Rd. & Avenida Quintana
Elevation (FT)
Ground Surface
500
450
400
350
300
250
200
150
100
50
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
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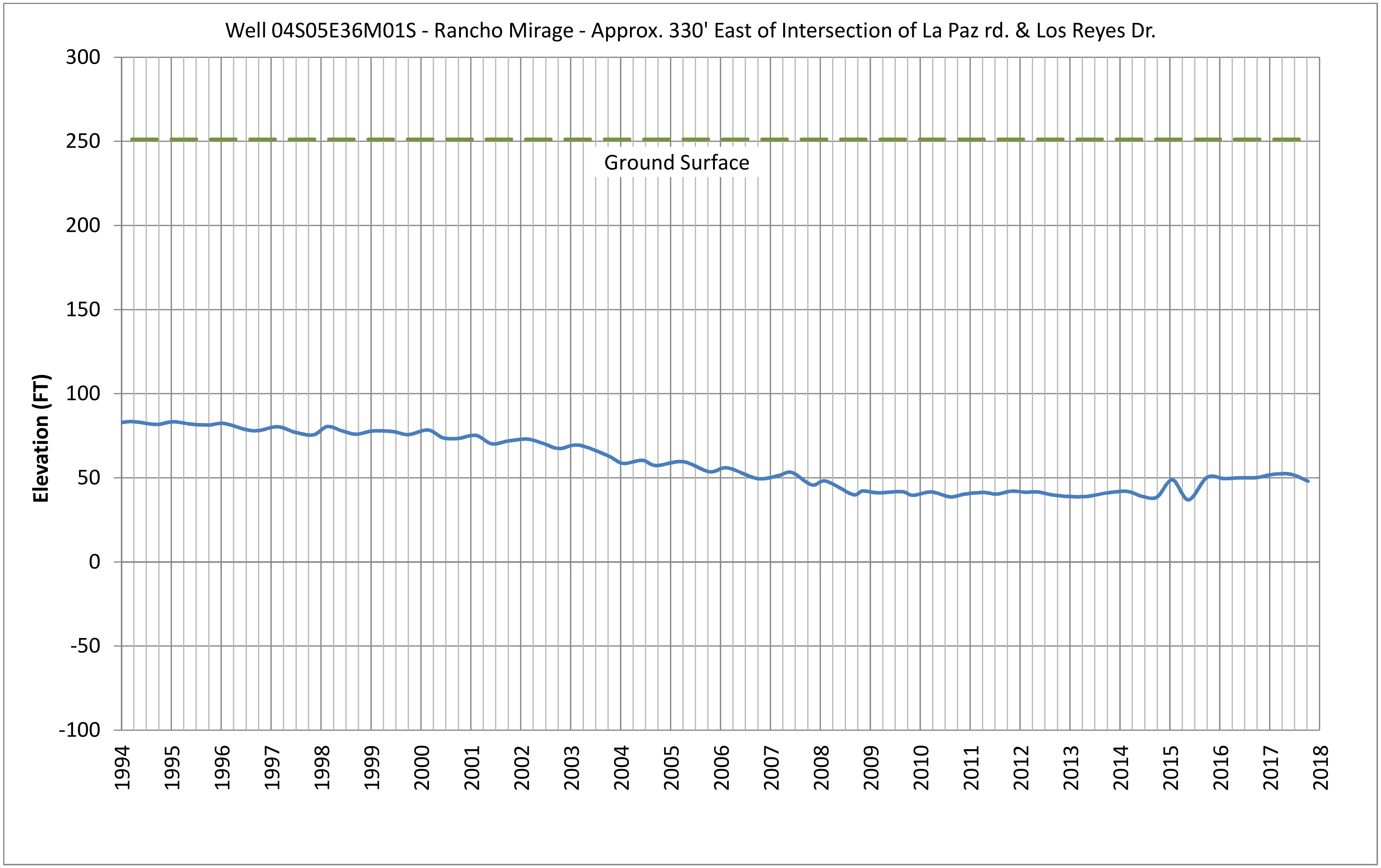
2014
2015
2016
2017
2018


Well 04S05E36M01S - Rancho Mirage - Approx. 330' East of Intersection of La Paz rd. & Los Reyes Dr.
Ground Surface
Elevation (FT)
300
250
200
150
100
50
0
-50
-100
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
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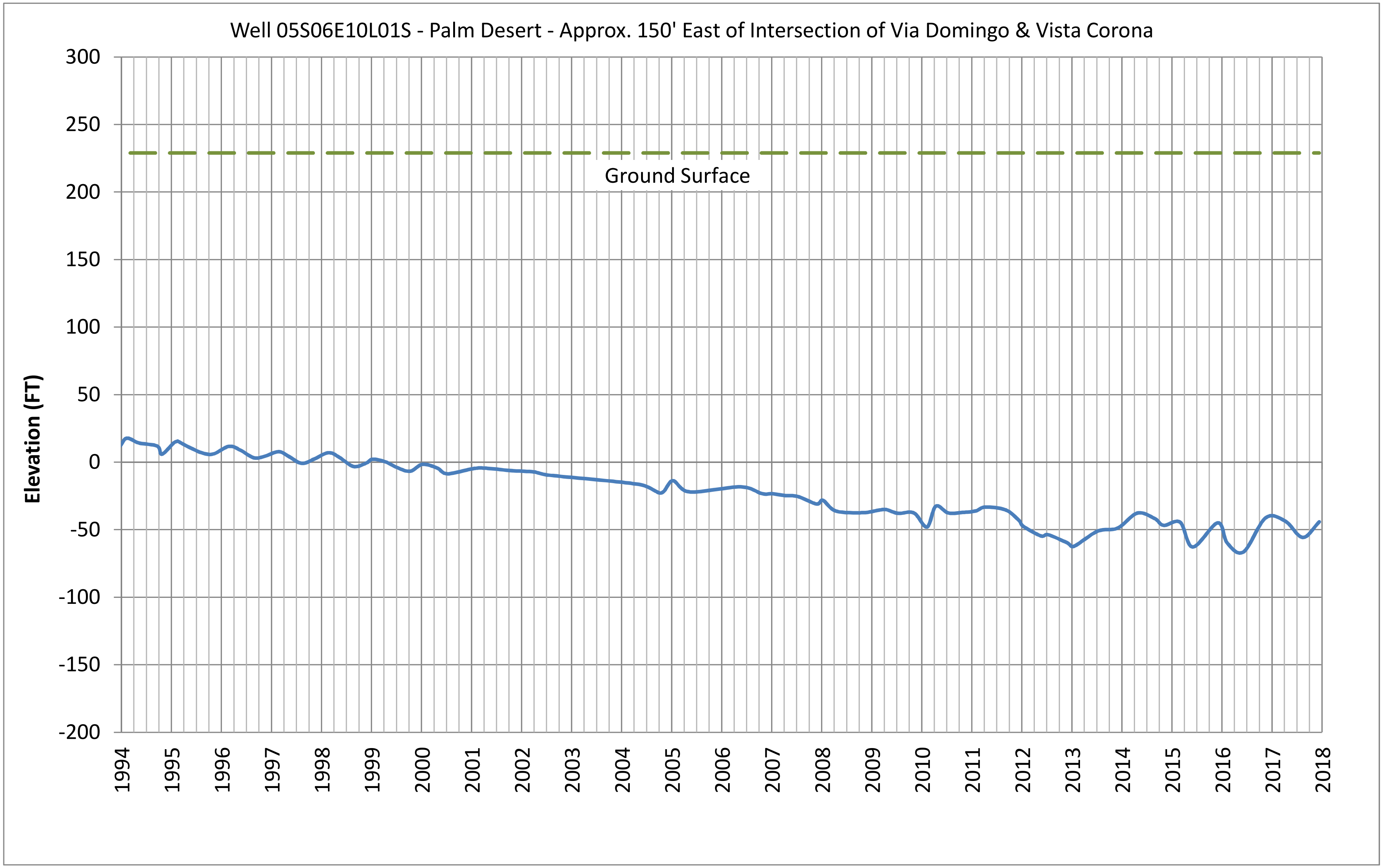
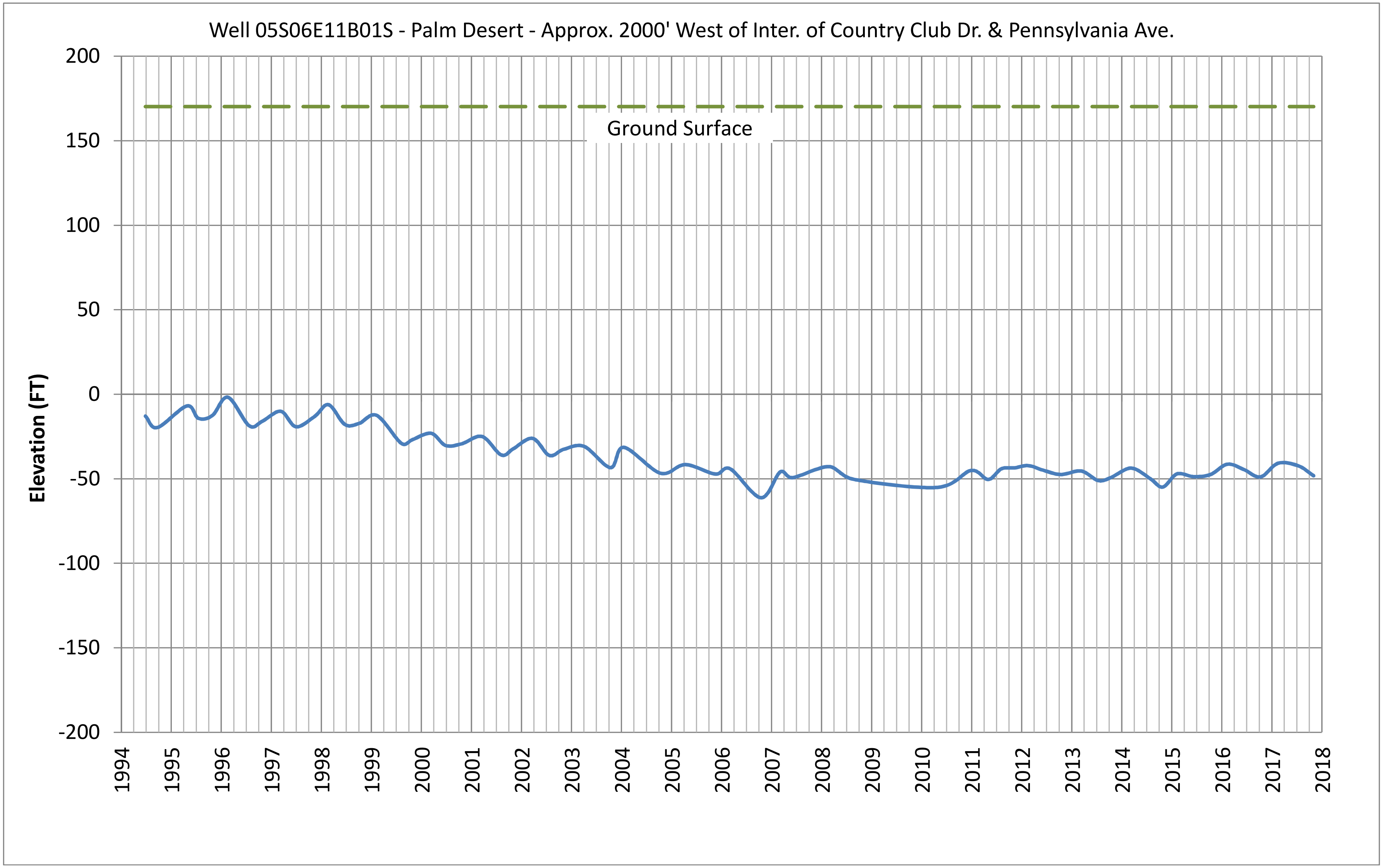
2013
2014
2015
2016
2017
2018



Well 05S06E10L01S - Palm Desert - Approx. 150' East of Intersection of Via Domingo & Vista Corona
Ground Surface
Elevation (FT)
300
250
200
150
100
50
0
-50
-100
-150
-200
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018



Well 05S06E11B01S - Palm Desert - Approx. 2000' West of Inter. of Country Club Dr. & Pennsylvania Ave.
Ground Surface
Elevation (FT)
200
150
100
50
0
-50
-100
-150
-200
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
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2008
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2010
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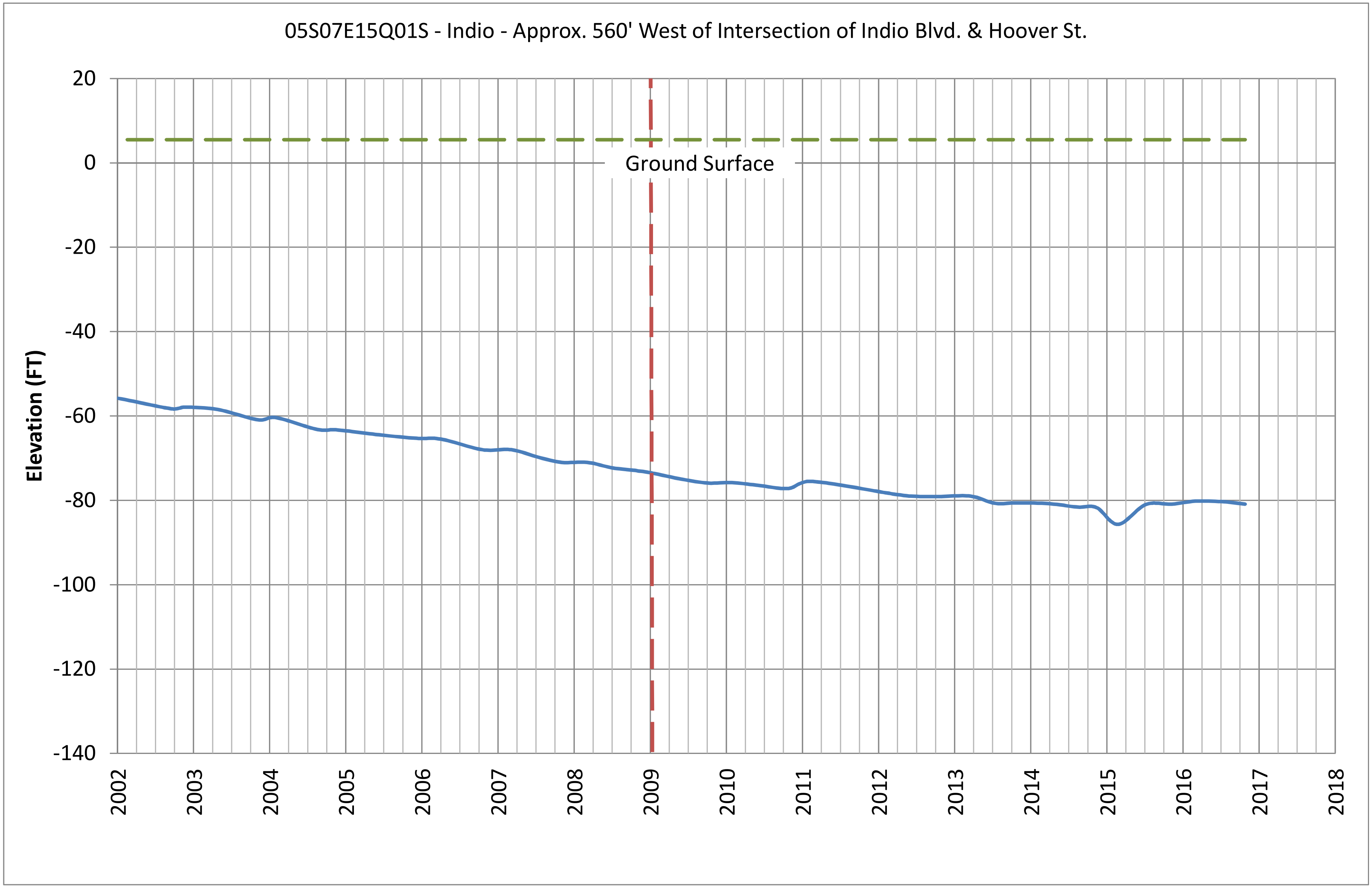
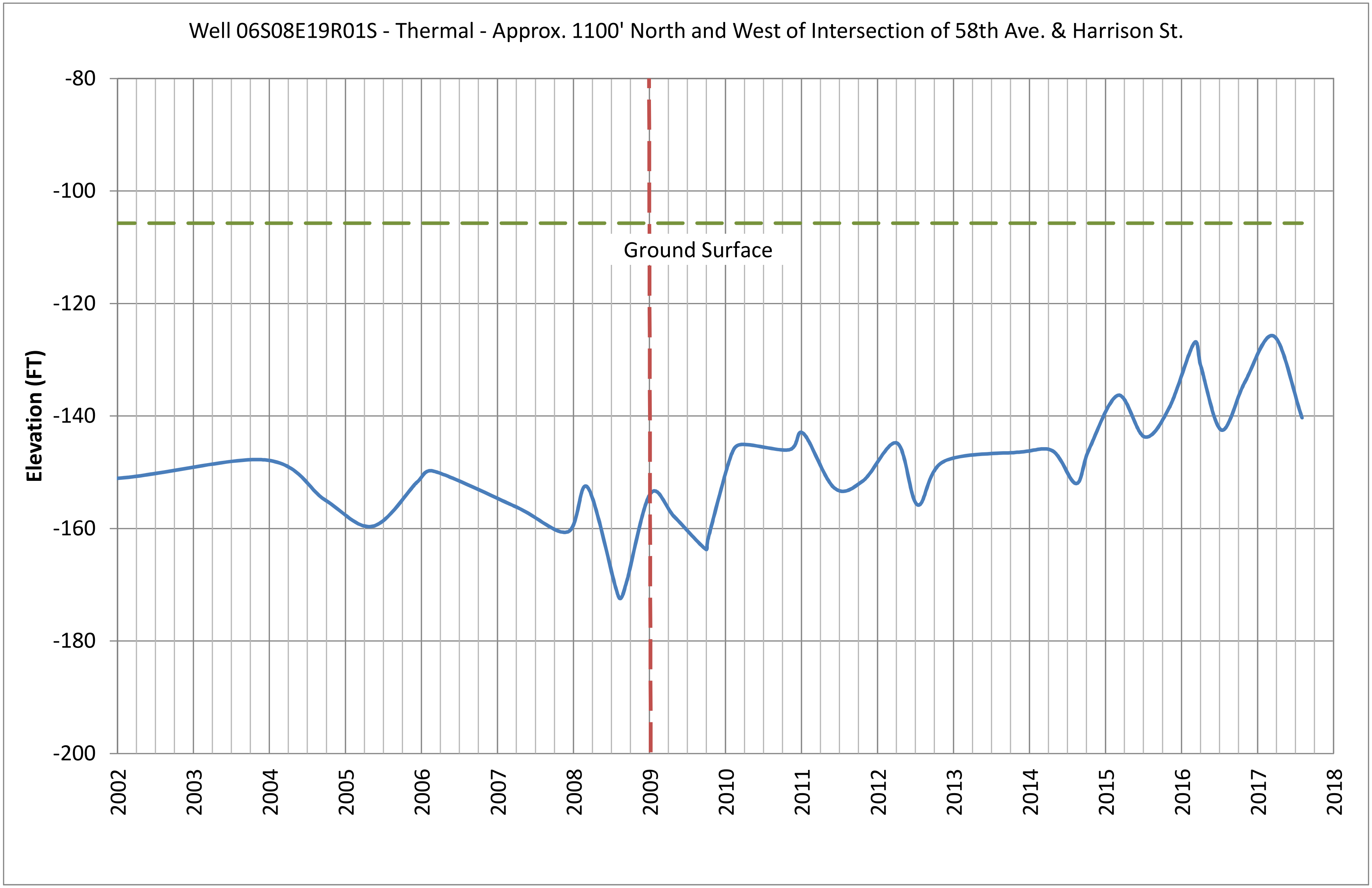
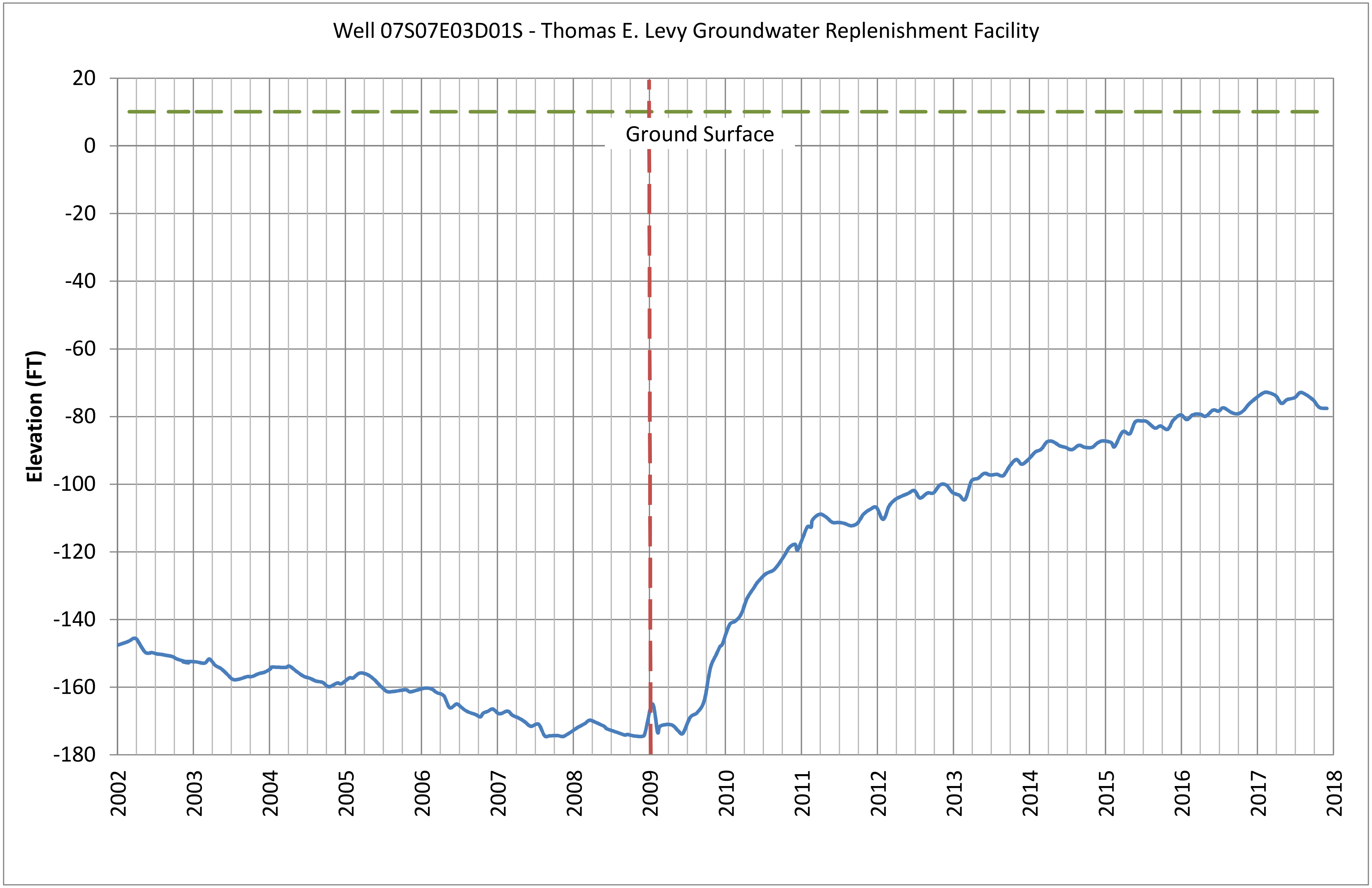
2012
2013
2014
2015
2016
2017
2018

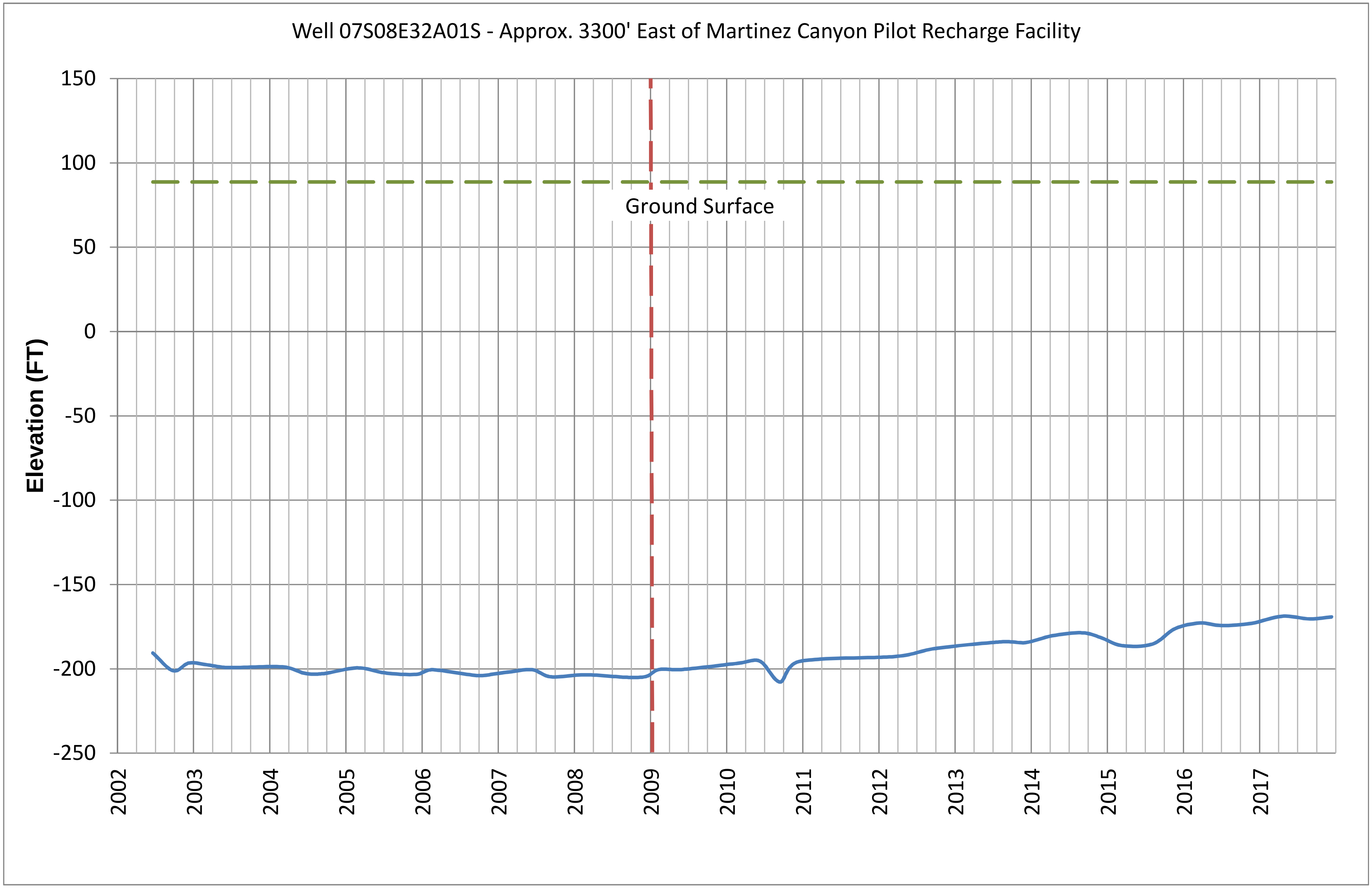


05S07E15Q01S - Indio - Approx. 560' West of Intersection of Indio Blvd. & Hoover St.
Elevation (FT)
Ground Surface
20
0
-20
-40
-60
-80
-100
-120
-140
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

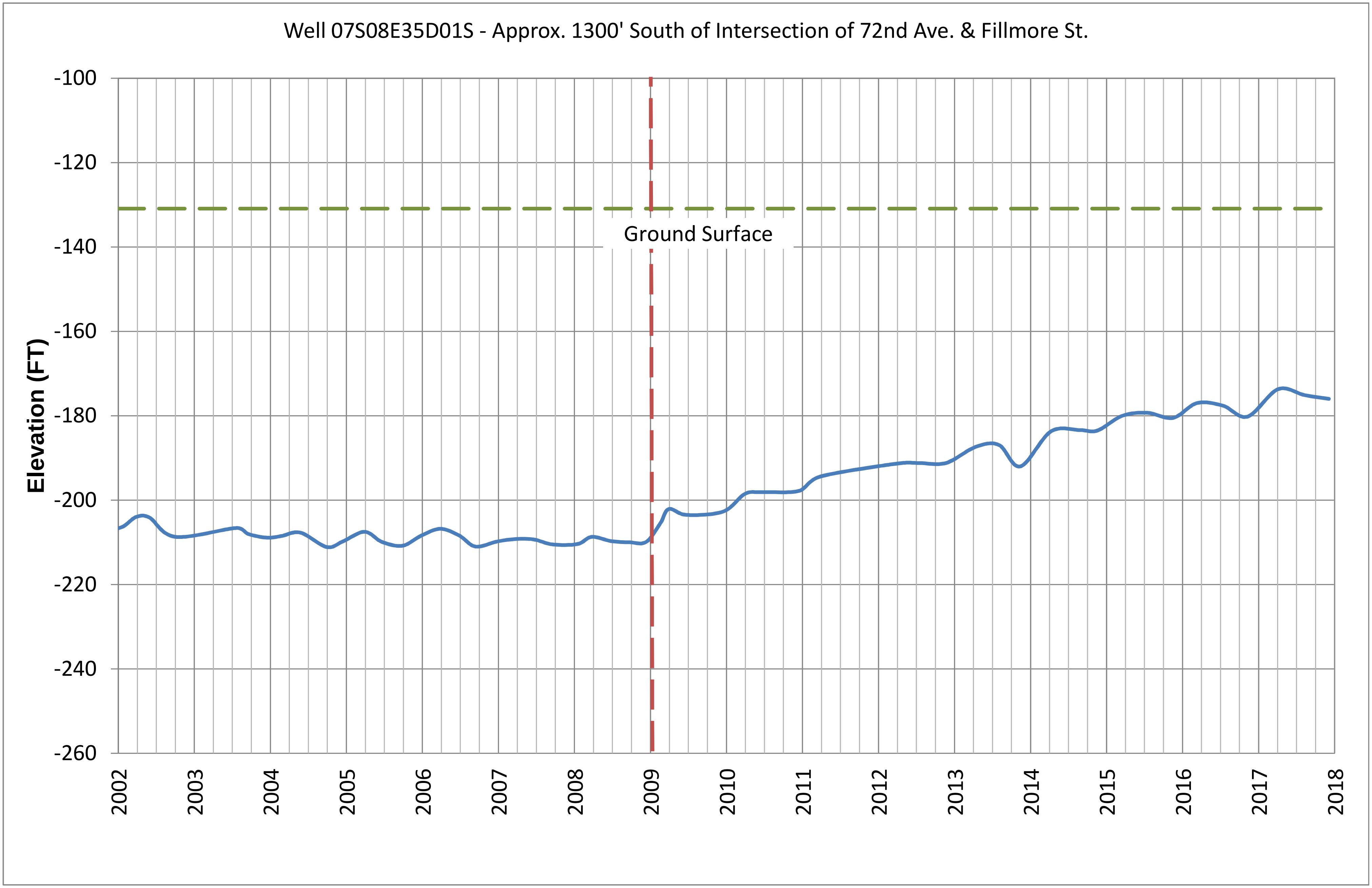


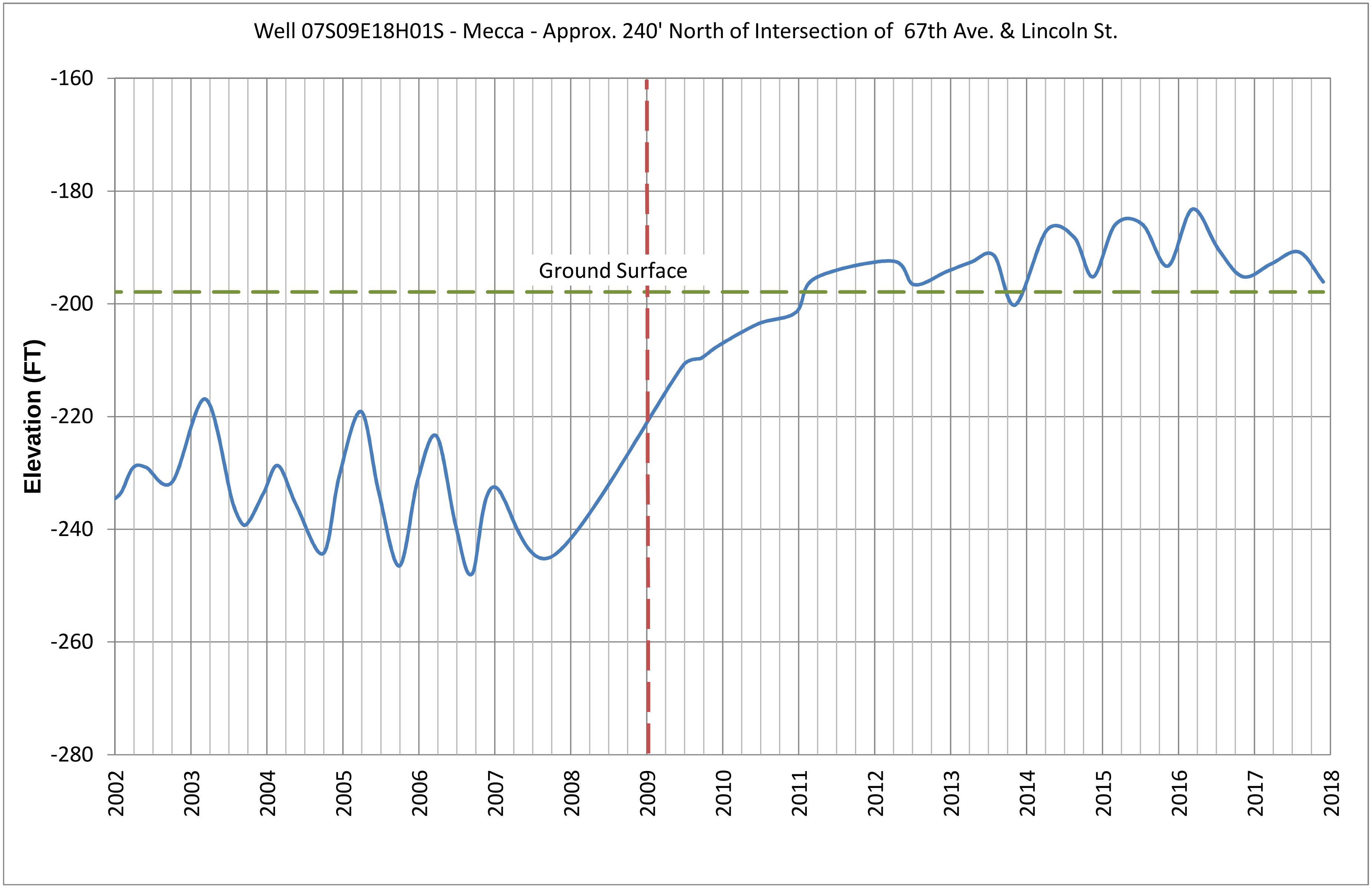
Well 06S08E19R01S - Thermal - Approx. 1100' North and West of Intersection of 58th Ave. & Harrison St.
Elevation (FT)
-80
-100
-120
-140
-160
-180
-200
Ground Surface
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018


Well 07S07E03D01S - Thomas E. Levy Groundwater Replenishment Facility
Elevation (FT)
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
Ground Surface
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018



Well 07S08E32A01S - Approx. 3300' East of Martinez Canyon Pilot Recharge Facility
Elevation (FT)
150
100
50
0
-50
-100
-150
-200
-250
Ground Surface
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017


Well 07S08E35D01S - Approx. 1300' South of Intersection of 72nd Ave. & Fillmore St.
Elevation (FT)
-100
-120
-140
-160
-180
-200
-220
-240
-260
Ground Surface
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018


Well 07S09E18H01S - Mecca - Approx. 240' North of Intersection of 67th Ave. & Lincoln St.
Elevation (FT)
-160
-180
-200
-220
-240
-260
-280
Ground Surface
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

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