Final Groundwater Sustainability Plan

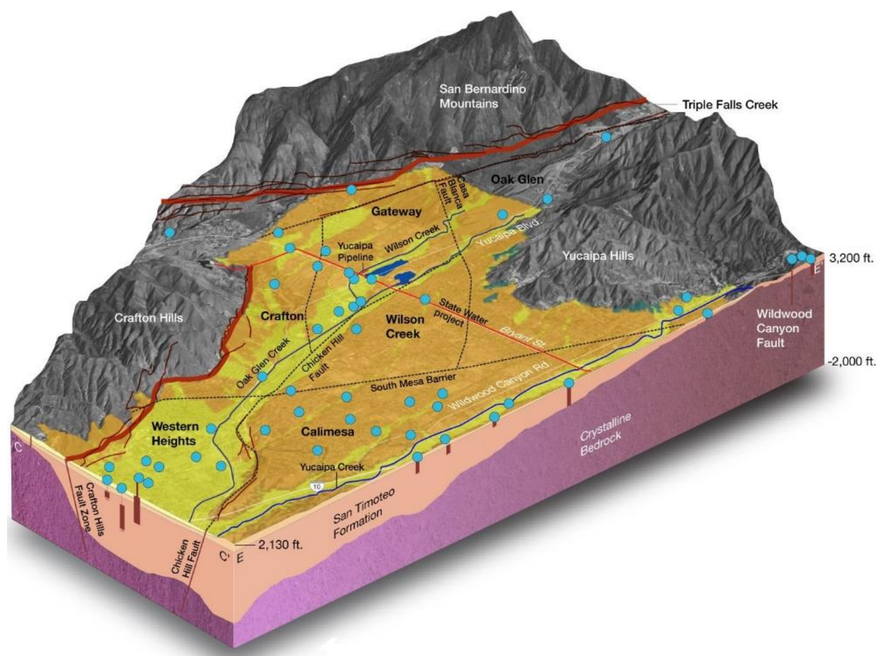
for the

Yucaipa Groundwater Subbasin

January 2022

Prepared for:

Yucaipa Groundwater Sustainability Agency
c/o San Bernardino Valley Municipal Water District



Prepared by:

DUDEK

MAIN OFFICE
605 Third Street
Encinitas, California 92024
T 800.450.1818
F 760.632.0164

FINAL

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Yucaipa Groundwater Sustainability Agency
c/o San Bernardino Valley Municipal Water District
San Bernardino, California 92408

Prepared by:

DUDEK
605 Third Street
Encinitas, California 92024
Contact: Steven Stuart, PE

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
μg/L	micrograms per liter
AF	acre-feet
AFY	acre-feet per year
bgs	below ground surface
BTAC	Basin Technical Advisory Committee
CalGEM	California Geologic Energy Management Division
CASGEM	California Statewide Groundwater Elevation Monitoring
CEQA	California Environmental Quality Act
CIMIS	California Irrigation Management Information System;
COC	contaminants-of-concern
DAC	disadvantaged community
DEH	Riverside County Department of Environmental Health
DMS	data management system
DTW	depth-to-water
DWR	California Department of Water Resources
EHS	San Bernardino County Department of Public Health Environmental Health Services
ET	evapotranspiration
ft/ft	feet per foot
GAMA	Groundwater Ambient Monitoring and Assessment Program
GDE	groundwater dependent ecosystem
GMZ	groundwater management zone
gpd	gallons per day
gpdf	gallons per day per foot
$gpdf^2$	gallons per day per square foot
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
GSSI	Geoscience Support Services Inc.
HMP	Habitat Monitoring Program
ILRP	Irrigated Lands Regulatory Program
IRUWMP	Integrated Regional Urban Water Management Plan
IRWMP	Integrated Regional Water Management Plan
LAMP	Local Agency Management Program
Ma	mega-annum (1 million years)
MBMP	Maximum Benefits Monitoring Program
mgd	million gallons per day
MOA	Memorandum of Agreement
MSL	mean sea level
NAVD88	North American Vertical Datum of 1988
NCCAG	Natural Communities Commonly Associated with Groundwater
NDMI	normalized difference moisture index
NDVI	normalized difference vegetation index

Acronym/Abbreviation	Definition
NOAA	National Oceanographic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
OGSWFF	Oak Glen Surface Water Filtration Facility
OWTS	on-site wastewater treatment systems
PCE	tetrachloroethylene
PEST	Parameter ESTimation software
PET	potential evapotranspiration
PRMS	Precipitation Runoff Modeling System
RMP	representative management practice
RMP	representative monitoring point (Chapter 4)
RO	reverse osmosis
RUWMP	San Bernardino Valley Regional Urban Water Management Plan
RWQCB	Regional Water Quality Control Board
SBCFCD	San Bernardino County Flood Control District;
SBVMWD	San Bernardino Valley Municipal Water District
SCAG	Southern California Association of Governments
SDAC	severely disadvantaged community
SGMA	Sustainable Groundwater Management Act
SGPWA	San Gorgonio Pass Water Agency
SWP	State Water Project
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
UWMP	urban water management plan
VOC	volatile organic compounds
WDR	Waste Discharge Requirement
WHWC	Western Heights Water Company
WRWRF	Henry N. Wochholz Regional Water Reclamation Facility
WSCP	Water Shortage Contingency Plan
WY	water year
YIHM	Yucaipa Integrated Hydrologic Model
YVRWFF	Yucaipa Valley Regional Water Filtration Facility
YVWD	Yucaipa Valley Water District

The Yucaipa Groundwater Sustainability Agency would like to recognize the coordination and collaboration between the member agencies of the Yucaipa GSA, especially San Bernardino Valley Municipal Water District for its guidance in forming the GSA and procuring a DWR Proposition 1 Sustainable Groundwater Planning Grant to help fund the development of the Yucaipa Subbasin Groundwater Sustainability Plan. This Groundwater Sustainability Plan will ensure the sustainable management of our local groundwater resources for the benefit of all users now and into the future.

Executive Summary

ES-1 Introduction

The Yucaipa Groundwater Sustainability Agency (GSA), acting as the GSA for the Yucaipa Subbasin (Plan Area, Subbasin), developed this Groundwater Sustainability Plan (GSP) in compliance with the 2014 Sustainable Groundwater Management Act (SGMA) and the California Department of Water Resources (DWR) GSP Regulations. The Yucaipa Subbasin lies within the Upper Santa Ana River Basin Hydrologic Region (DWR Basin Number 8-002.07) and underlies an area of approximately 25,300 acres under portions of the cities of Calimesa, Redlands, and Yucaipa, as well as unincorporated San Bernardino and Riverside Counties.

DWR designated the Yucaipa Subbasin a high priority basin based primarily on its reliance on groundwater for water supply. However, this Subbasin is not in a state of critical overdraft. Under SGMA, GSAs "have the responsibility for adopting a Plan that defines the basin setting and establishes criteria that will maintain or achieve sustainable groundwater management." The requirement of the GSP is to maintain or achieve sustainable groundwater management in the Yucaipa Subbasin by 2042.

Nine local agencies entered into a Memorandum of Agreement in 2017 to form the Yucaipa GSA. The local agencies included South Mesa Water Company, South Mountain Water Company, Western Heights Water Company, and Yucaipa Valley Water District, collectively referred to herein as the "Water Purveyors"; the Cities of Calimesa, Redlands, and Yucaipa, collectively referred to herein as the "Municipalities"; and San Bernardino Valley Municipal Water District and San Gorgonio Pass Water Agency, collectively referred to herein as the "Regionals." The County of Riverside and the County of San Bernardino, collectively referred to as the "Counties," are stakeholders. The City of Calimesa submitted a written Notice of Withdrawal dated November 19, 2018, and the Yucaipa GSA subsequently acknowledged the withdrawal of the City of Calimesa from the Yucaipa GSA at the January 23, 2019, GSA Board meeting. The City of Calimesa is now considered a stakeholder in the Plan Area.

A number of water resources monitoring and management programs have been implemented throughout the Plan Area by several Yucaipa GSA member agencies and stakeholders seeking to maintain and/or enhance water resources management in the region, and to comply with state and federal laws applicable to water supply, water quality, watershed health and/or wildlife habitat. These programs will be integral in the sustainable management of groundwater in the Plan Area.

The Southern California Association of Governments maintains a land use dataset that combines regional data from general plans, specific plans, zoning codes, and existing land use. The Southern California Association of Governments dataset includes land use designations for the Plan Area and San Timoteo Wash Watershed for years 1990, 1993, 2001, 2005, 2012 and 2016. The predominant land use types in the Plan Area from 1990 to 2016 include Vacant and Undeveloped or Protected Land and Single Family Residential, which combined, made up 82% of the Plan Area in 1990 and 70% of the Plan Area in 2016. The primary land use changes within the Plan Area from 1990 to 2016 include a decrease in Vacant and Undeveloped or Protected Land (19% decrease) and an increase in Single Family Residential (10% increase) and Open Space and Recreation (7% increase). Rural Residential, Facilities, and to a lesser extent, Commercial, Office, and Industrial, and Multi-Family Residential have increased since 1990, while Agriculture land use has decreased.

Water resources utilized in the Plan Area include local groundwater produced from the principal aquifer in the Yucaipa Subbasin, imported State Water Project (SWP) water from the San Bernardino Valley Municipal Water

District and San Gorgonia Pass Water Agency, surface water diverted from Oak Glen Creek, recycled water from the Henry N. Wochholz Regional Water Reclamation Facility (WRWRF), and captured stormwater at the Oak Glen Creek spreading basins (and Wilson Creek basins during significant runoff events). Beneficial uses of groundwater include municipal and domestic supply, industrial and commercial, agricultural and environmental uses. Yucaipa Valley Water District (YVWD) diverts surface water from Oak Glen Creek and Birch Creek to the Oak Glen Filtration Plant located in the Oak Glen subbasin. Recycled water produced from the WRWRF is served to YVWD customers via the recycled water distribution system for irrigation purposes only, or is discharged to San Timoteo Creek at a point upstream of the Yucaipa Subbasin.

Land use in the Yucaipa Subbasin in 2016 was 42% residential (single-family, rural, and multi-family), 8% facilities and commercial/industrial, 8% open space and recreational, 7% agricultural, and the remaining 35% vacant and undeveloped land. The 2015 RUWMP noted that approximately 96% of the water served by YVWD is for residential use. Approximately 2.4% is for commercial, institutional and industrial use, with another 1.4% used for irrigation purposes. Groundwater dependent ecosystems (GDEs) are the primary environmental users of groundwater in the Subbasin. The discharge of recycled water to San Timoteo Creek helps sustain the GDEs downstream of the WRWRF outfall. GDEs located in the upper elevations in the Oak Glen subarea and in the lower region of the Live Oak subarea are currently considered to be dependent on shallow groundwater.

ES-2 Basin Setting

The Yucaipa Subbasin (DWR Basin Number 8-2.07) comprises an eastern portion of the Upper Santa Ana Valley Groundwater Basin. The Subbasin is bounded to the north and northeast by the San Andreas Fault Zone and the San Bernardino Mountains, to the east by the Yucaipa Hills, to the south by San Timoteo Wash and the San Timoteo Badlands, and to the west by the Crafton Hills and the San Bernardino Basin Area. The Yucaipa Subbasin is overlain by the Yucaipa plain, a gently sloping area of unconsolidated deposits of late Pleistocene and Holocene sediments originating from the surrounding mountains and hills. The Yucaipa Subbasin ranges in elevation from 1,300 feet above the North American Vertical Datum of 1988 (NAVD88) to approximately 5,100 feet above NAVD88.

The bottom of the Yucaipa Subbasin consists of crystalline bedrock. Overlying the bedrock are late Pleistocene to Holocene deposits of alluvial sediments originating from the surrounding Crafton Hills, San Bernardino Mountains, and Yucaipa Hills. The deeper sedimentary deposits consist of units representing the San Timoteo Formation, the Sedimentary deposits of Live Oak Canyon, and surficial materials. The primary water-bearing formations in the Yucaipa Subbasin that form the principal aquifer are the Sedimentary deposits of Live Oak Canyon and the San Timoteo Formation.

ES-2.1 Precipitation and Surface Water

The Yucaipa Subbasin lies within the San Timoteo Wash watershed. The primary surface water drainage features are Wilson Creek, Oak Glen Creek, Yucaipa Creek and San Timoteo Creek. The headwaters for Wilson Creek and Oak Glen Creek originate in the San Bernardino Mountains. Yucaipa Creek begins in the Yucaipa Hills and flows east to west out of Wildwood Canyon. San Timoteo Creek is the major drainage feature in the San Timoteo Wash watershed. It enters the Yucaipa Subbasin at the southern end of the Live Oak subarea and runs approximately 3.5 miles before exiting the Plan Area. San Timoteo Creek is tributary to the Santa Ana River.

Stream flow near the upper reaches of Wilson Creek and Oak Glen Creek may be diverted to the Wilson Creek spreading basins and the Oak Glen spreading basins, respectively. The Wilson Creek spreading basins are used for the infiltration of imported SWP water and stormwater. The Oak Glen Creek spreading basins were designed to reduce flooding downstream of Bryant Street, collect debris and sediment in the basins to improve downstream water quality, enhance groundwater recharge by capturing stormwater runoff, and provide additional open space and habitat.

The San Bernardino County Flood Control District (SBCFCD), a division of the Department of Public Works, installed a network of climate stations throughout San Bernardino County to collect precipitation, stream flow and temperature data. Mean annual precipitation per water year (WY; defined as the 12-month period between October 1 and September 30 of the following calendar year) ranged from 11.15 inches in the Crafton subarea to 24.50 inches in the Triple Falls Creek subarea. The weighted mean annual precipitation across the Plan Area is 15.86 inches based on precipitation data collected at the 17 SBCDPW climate stations from the 1953 WY to the 2018 WY.

Periods of above or below average precipitation affect the volume of water that naturally recharges the groundwater aquifer underlying the Plan Area. To characterize the effects of total water year precipitation on local groundwater supplies and demands, and the volume of groundwater in storage, the precipitation measurements were categorized into six water year types. Water year type was characterized by normalizing measured water year precipitation by the long-term water-year precipitation averages measured at each of the 17 SBCFCD climate stations in the Subbasin. The normalized water year precipitation measurements were then categorized into the following water year types:

1. Critically Dry: < 50% of the long-term precipitation mean
2. Dry: ≥ 50%, but < 75% of the long-term precipitation mean
3. Below Normal: ≥ 75%, but < 90% of the long-term precipitation mean
4. Normal: ≥ 90%, but < 110% of the long-term precipitation mean
5. Above Normal: ≥ 110%, but < 150% of the long-term precipitation mean
6. Wet: ≥ 150% of the long-term precipitation mean

ES-2.2 Hydrogeological Conceptual Model

The Yucaipa Subbasin exists in a "right-step-over" zone between the active San Andreas and San Jacinto Fault Zones. The Yucaipa Plain lies between these two fault systems and comprises an extensive deposition of Quaternary sediments originating from the San Bernardino Mountains and Yucaipa Hills. The "right-step-over" zone created by the lateral displacement along the San Andreas and San Jacinto Fault Zones created a series of northeast-southwest trending normal-slip faults. Displacement along these faults, in turn, created drop-down structures that filled in with Quaternary alluvial sediments.

The geologic units defined within the Yucaipa Subbasin are Mesozoic and older crystalline bedrock, the Plio-Pleistocene San Timoteo Formation, and the Quaternary Sedimentary Deposits of Live Oak Canyon and surficial alluvial deposits. The crystalline bedrock provides the base for the sedimentary deposits in the Yucaipa Subbasin. The San Timoteo Formation and the Sedimentary Deposits of Live Oak Canyon define the principal aquifer in the Yucaipa Subbasin. The primary use of groundwater produced from the principal aquifer is for municipal water supply. The Yucaipa Subbasin is divided into nine hydrogeologic subareas based on the apparent influences of faults (both mapped and inferred) on groundwater flow.

San Timoteo Creek conveys surface water out of the Plan Area and is tributary to the Santa Ana River. Surficial soils mapped in the Plan Area indicate that the surface water drainages are underlain by highly permeable loamy sand with relatively high infiltration rates; thereby, indicating that leakage from stream flow is a major contributor to groundwater recharge. Geologic cross-sections provide scaled details of the physical features that influence groundwater flow and provide a visual approximation of the storage capacity of the Subbasin.

ES-2.3 Current and Historical Groundwater Conditions

Current Groundwater Elevations

The current condition for groundwater levels in the Yucaipa Subbasin is represented by static water levels measured in September 2018. The 2018 WY was characterized as a “dry” water year type. The preceding 2017 WY was characterized as an “above normal” water year type with precipitation ranging from 14.42 inches at SBCFCD station 3023 to 21.49 inches at SBCFCD station 3126A.

Static groundwater levels measured in September 2018, which represents the current water year low, ranged from 1,723.93 feet above NAVD88 at well WHWC-11 in the Western Heights subbasin to 3,331.80 feet above NAVD88 at well YVWD-14 in the Oak Glen subbasin. In general, groundwater flowed from the northeast to the southwest in the Yucaipa Subbasin. Static groundwater levels measured in March 2018 represent the current water year high. Groundwater levels ranged from 1,743.93 feet above NAVD88 at WHWC-11 to 3,297.90 feet above NAVD88 at YVWD-14.

Historical Groundwater Elevations

The earliest groundwater elevation data was collected in the 1920s. The first recorded static groundwater elevation was at YVWD-37 at 2,556 feet above NAVD88 in April 1921. This well is located in the northern part of the Crafton subarea. Historically, groundwater elevations in the Yucaipa Subbasin have ranged from 1,350.63 feet above NAVD88 in the Live Oak subarea to 3,355.80 feet above NAVD88 in the Oak Glen subarea.

In the 50-year historical period from 1966 to 2016, the highest static groundwater elevations (i.e., historical high) observed in the Calimesa, Wilson Creek and Gateway subareas occurred in the spring of 1988. Static groundwater elevations in the Subbasin ranged from 3,165.89 feet above NAVD88 at YVWD-13 in the Oak Glen subarea to 1,793.70 feet above NAVD88 at WHWC-02A in the Western Heights subarea. The hydraulic gradient in the principal aquifer in the spring of 1988 was 0.0448 feet/foot. The groundwater flow direction was to the southwest at an azimuth of 239 degrees.

The lowest groundwater elevations (i.e., historical low) observed in the Subbasin occurred in the Fall of 2007. The historical low in groundwater elevations occurred right before the marked increase in SWP water imported into the Subbasin by YVWD in the 2007 WY, and subsequent decline in groundwater production from 13,000 acre-feet per year (AFY) in the 2007 WY to 10,000 AFY in the 2009 WY. Static groundwater elevations in the Subbasin ranged from 3,346.50 feet above NAVD88 at YVWD-13 in the Oak Glen subarea to 1,728.90 feet above NAVD88 at WHWC-14 in the Western Heights subarea. The hydraulic gradient in the principal aquifer in Fall 2007 was 0.049 feet/foot. The groundwater flow direction was to the southwest at an azimuth of 232 degrees.

Groundwater in Storage

GSSI conducted a study in 2021 to estimate the volume of groundwater in storage at the end of the 2016 WY. GSSI's 2021 study used the integrated Santa Ana River numerical model as a tool to estimate the volume in storage. The model includes the full alluvial thickness of the Subbasin, in that the bottom of the model is defined by the contact between bedrock and the overlying alluvium. The estimated volume of groundwater in storage in the Yucaipa Subbasin at the end of the 2016 WY was 2,233,000 acre-feet (AF).

Groundwater Quality

The Regional Water Quality Control Board Santa Ana Region recognized in the 1975 and 1983 Basin Plans that the most serious water quality issue to the Santa Ana River Basin "was the buildup of dissolved minerals, or salts, in the ground and surface waters." The historical use of water for irrigation purposes, particularly for citrus that demanded large volumes of applied water, was a main contributor to increasing concentrations of total dissolved solids (TDS) and nitrate. The Regional Water Quality Control Board recognized the need to implement salt and nutrient management plans to control the salt and nutrient loading to the basin.

The 2004 Basin Plan update included the creation of new groundwater management zones (GMZs) and set "maximum benefit" objectives for TDS and nitrate-nitrogen in the Chino North, Cucamonga, San Jacinto Upper Pressure, Yucaipa, Beaumont, and San Timoteo GMZs. The majority of the Yucaipa Subbasin is within the Yucaipa GMZ, with part of the lower sections in the Beaumont and San Timoteo GMZs. In 2014, the Regional Board adopted order number R8-2014-0005, an amendment to the Basin Plan that revised the maximum benefit commitments in the Yucaipa, San Timoteo, and Beaumont GMZs.

The implementation of reverse-osmosis treatment at the YVWD WRWRF facility has reduced the TDS concentration in recycled water to an average of <300 milligrams per liter (mg/L). YVWD is serving some recycled water to its customers, with plans to increase the usage of recycled water, for irrigation purposes. The application of recycled water for irrigation purposes has not increased TDS concentrations in the principal aquifer. Nitrate concentrations observed in the Subbasin have, in general, remained steady at <10 mg/L after agricultural practices in the Plan Area decreased significantly after the 1970s and septic systems were replaced with sanitary sewer services in the 1980s, with the exception of the Western Heights subarea. There are no TDS or nitrate water quality issues that may affect the long-term supply and beneficial uses of groundwater produced from the principal aquifer.

Land Subsidence

Historical records of land subsidence in the Plan Area do not indicate that land subsidence resulted from past groundwater production from the principal aquifer. Land subsidence was attributed to past tectonic activity associated with movement along the San Andreas and San Jacinto Fault Zones. Land subsidence data obtained from the SGMA Data Portal indicated a range of subsidence for the Plan Area from 0.0 feet to 0.054 feet, or 0.65 inches, from June 2015 to October 1, 2018. This does not constitute a significant and unreasonable vertical displacement of land surface that "substantially interferes with surface land uses and may lead to undesirable results."

Because the minimum thresholds established in this GSP are based on groundwater elevations at or below the historical low groundwater elevations observed in the Plan Area, there exists the potential for land subsidence to occur should groundwater levels fall below the historical lows over a long period. Subsidence related to declining groundwater levels as a result of groundwater withdrawals cannot be directly measured in the Plan Area, so the minimum thresholds established for the chronic lowering of groundwater levels will be used as a surrogate for direct measurements of land subsidence. Should groundwater levels fall below the historical lows and persist at such a level for more than 12 months, then the Yucaipa GSA will refer to the integrated Santa Ana River data set included in the SGMA Data Portal and periodically obtain future data to compare to the baseline dataset compiled from June 2015 to October 1, 2018.

Groundwater – Surface Water Connections

Wilson Creek, Oak Glen Creek, and Yucaipa Creek are the major surface water drainages in the Yucaipa Subbasin that may have a hydrologic connection with the underlying principal aquifer. However, no direct investigations have been conducted to characterize the relationship between surface water flows in these drainages with the underlying groundwater. Groundwater elevation data collected at wells located near these drainages indicated depths-to-water greater than 200 feet below ground surface (bgs), except at the upper elevations in Oak Glen and in Wildwood Canyon. Shallow observation wells installed adjacent to San Timoteo Creek indicated that San Timoteo Creek was a gaining stream upstream of its confluence with Yucaipa Creek and the reach downstream of Alessandro Road was characterized as a losing stream. The best available estimates for groundwater-surface water connections derive from the U.S. Geological Survey integrated hydrological numerical model. The numerical model simulates the amount of runoff originating from precipitation over the San Timoteo Wash watershed and computes leakage from flows in the creeks to the underlying aquifer.

Groundwater Dependent Ecosystems

GDEs in the Plan Area were characterized by reviewing the NCCAG dataset alongside measured groundwater elevations, aerial photographs, and Landsat data analyzed by The Nature Conservancy. The Nature Conservancy used Landsat data to calculate historical variations in the Normalized Derived Vegetation Index (NDVI) and Normalized Derived Moisture Index (NDMI). The Nature Conservancy calculated average values of NDVI and NDMI between July 9 and September 7 of each year to estimate vegetation health during the driest period of the year, when the overlying habitats are most likely to depend on groundwater. GDEs were identified adjacent to San Timoteo Creek, Oak Glen Creek, and Wildwood Canyon Creek. The habitats located along Oak Glen Creek, Wildwood Canyon Creek, and San Timoteo Creek consist of coast live oak (*Quercus agrifolia*), riparian mixed hardwood, Fremont cottonwood (*Populus fremontii*), and willow (*Salix* spp.).

ES-2.4 Water Budget

A historical water budget was prepared for the 50-year period starting in the 1965 WY and ending in the 2014 WY (October 1, 1965, to September 30, 2014). Current conditions in the Subbasin were characterized by quantifying the water budget for the period from the 2015 WY through the 2018 WY (October 1, 2014, to September 30, 2018). Three future scenarios were assessed to characterize projected conditions in the Subbasin. These scenarios characterize projected water budgets for the period extending from the 2019 WY through the 2069 WY (October 1, 2018, to September 30, 2069). Individual components of the water budget are described in units of acre-feet (AF) or acre-feet per year (AFY).

Estimates of the individual water budget components for the historical and current conditions in the Basin are based on simulation results from the Yucaipa Integrated Hydrologic Model (YIHM). The YIHM is an integrated surface water and groundwater numerical model developed by the U.S. Geological Survey to simulate the effects of native and non-native water supplies and demands on groundwater conditions across the entire Yucaipa Valley watershed. Individual water budget components were extracted from the YIHM based on the B118 boundary for the Yucaipa Subbasin.

ES-2.5 Management Areas

In order to sustainably manage the groundwater resources of the Yucaipa Subbasin, the Subbasin was divided into four management areas. The boundaries of the management areas were based on the geologic structures (i.e., faults, hydraulic barriers) that influence groundwater flow and defined the hydrogeologic subareas in the Subbasin, the distribution of water supply wells by the different water purveyors, and the identification and location of GDEs in the Subbasin. The geologic structures, or faults and hydraulic barriers, that influence groundwater flow across them (e.g., the Chicken Hill Fault and South Mesa Barrier) are effective boundaries to establish management areas as groundwater production on one side of the structure will not significantly affect groundwater levels at wells located on the other side. Each management area was assigned minimum thresholds and measurable objectives that will define sustainability within their individual boundaries.

The following management areas, listed in order from the highest to lowest along the hydraulic gradient in the Subbasin, are based on the geologic structures that defined the hydrogeologic subareas in the Subbasin, the distribution of public water supply wells, and presence of GDEs:

1. North Bench Management Area
2. Calimesa Management Area
3. Western Heights Management Area
4. San Timoteo Management Area

ES-3 Sustainable Management Criteria

The goal is to manage groundwater resources for sustainable, long-term use in the Yucaipa Subbasin. Long-term sustainable management includes:

- Maintaining sufficient groundwater in storage to allow for ongoing groundwater production that meets the operational demands of South Mesa, South Mountain, WHWC and YVWD and private well users, and the regulatory commitments established in the Plan Area
- Ensuring that groundwater production does not result in significant and unreasonable loss of GDEs

The sustainability goal for the Plan Area was developed using historical groundwater elevations, groundwater in storage, and the identification of GDEs in the Plan Area. The importation of SWP water into the Subbasin in 2003 has provided a supplemental source of water, which led to a reduction in groundwater production in the Yucaipa Subbasin. This supplemental source of water, which averaged approximately 8,000 AFY since 2008, has led to an average reduction in groundwater production by 3,000 AFY. Consequently, groundwater levels have recovered between 50 feet in the Calimesa Management Area and 200 feet in the North Bench Management Area in the past 10 years, with the volume of groundwater in storage in the Subbasin increasing by approximately 18,000 AF. The cessation of the decline in groundwater levels observed from 1997 to 2007, and observed storage increase over the last 10 years, indicates that the Yucaipa GSA member agencies have been managing the groundwater resource sustainably.

ES-3.1 Undesirable Results

Under SGMA, undesirable results occur when groundwater conditions in the Plan Area cause significant and unreasonable effects to any of the six sustainability indicators:

- Chronic Lowering of Groundwater Levels
- Reduction of Groundwater Storage
- Degraded Water Quality
- Land Subsidence
- Depletions of Interconnected Surface Water
- Seawater Intrusion

The four sustainability indicators that do apply to the Yucaipa Subbasin, and which will be used to evaluate sustainable management in the Subbasin, include (1) chronic lowering of groundwater levels, (2) reduction of groundwater storage, (3) land subsidence, and (4) interconnected surface water. Minimum thresholds and measurable objectives were defined for each of these four sustainability indicators, where applicable, for the four management areas. A minimum threshold represents a condition in the management area when undesirable results are experienced. A measurable objective represents a condition when the groundwater resource is managed sustainably and no undesirable results are experienced.

For the North Bench, Calimesa and Western Heights management areas, the minimum thresholds and measurable objectives are based on historical lows in groundwater in storage and drought buffers that the Yucaipa GSA identified as providing operational flexibility before undesirable results are experienced. For the San Timoteo Management Area, the minimum threshold and measurable objective are based on shallow groundwater levels that sustain GDEs along San Timoteo Creek and potential GDEs along Yucaipa Creek.

The following minimum thresholds and measurable objectives established for each management area are applicable for these sustainability indicators: chronic lowering of groundwater levels, reduction of groundwater storage, land subsidence, and depletion of interconnected surface water. Degraded water quality and seawater intrusion are not applicable in the Subbasin.

North Bench Management Area: The current volume of groundwater in storage in the North Bench Management Area is 255,000 AF. The minimum threshold is established at the historical low for groundwater in storage at 220,000 AF. The top of the drought buffer is at a volume in storage of 230,000 AF, 10,000 AF above the minimum threshold. This represents the measurable objective and provides operational flexibility to implement management actions and/or programs to prevent undesirable results when groundwater conditions decline below the minimum threshold. Groundwater conditions are defined by static groundwater levels measured at 8 wells, or representative monitoring points, in the management area. Specific groundwater elevations were defined at each representative monitoring point (RMP) that represent the minimum threshold (220,000 AF) and measurable objective (230,000 AF). Monitoring of groundwater elevations at the RMPs will provide a spatial and temporal characterization of groundwater conditions to help guide management actions to sustainably managed the Subbasin.

Calimesa Management Area: The current volume of groundwater in storage in the Calimesa Management Area is 800,400 AF. The minimum threshold is established at the bottom of a drought buffer at 772,700 AF. The measurable objective was established at the historical low volume in storage of 798,700 AF, which is

26,000 AF above the minimum threshold and represents the beginning of the drought buffer. Groundwater conditions are defined by static groundwater levels measured at 13 RMPs in the management area. Specific groundwater elevations were defined at each RMP that represent the minimum threshold (772,700 AF) and measurable objective (798,700 AF). Monitoring of groundwater elevations at the RMPs will provide a spatial and temporal characterization of groundwater conditions to help guide management actions to sustainably managed the Subbasin.

Western Heights Management Area: The current volume of groundwater in storage in the Calimesa Management Area is 800,400 AF. A drought buffer was defined from the historical low in the volume of groundwater in storage at 408,800 AF to 398,800 AF. The minimum threshold is established at 398,800 AF, the bottom of the drought buffer. The measurable objective is established at a volume in storage of 408,800 AF. Groundwater conditions are defined by static groundwater levels measured at 7 RMPs in the management area. Specific groundwater elevations were defined at each RMP that represent the minimum threshold (398,800 AF) and measurable objective (408,800 AF). Monitoring of groundwater elevations at the RMPs will provide a spatial and temporal characterization of groundwater conditions to help guide management actions to sustainably managed the Subbasin.

San Timoteo Management Area: A minimum threshold for this management area was established for the GDEs identified along San Timoteo Creek. At this time, no sustainability criteria are established for the other sustainability indicators because there are no existing municipal water supply wells that extract groundwater from the principal aquifer. If a water purveyor plans to install and operate a municipal water supply well and produce from the principal aquifer, then the water purveyor must investigate the potential influences of pumping from the principal aquifer on the shallow groundwater table sustaining the GDEs identified along San Timoteo Creek and the potential GDEs identified along Yucaipa Creek upstream of its confluence with San Timoteo Creek. Additionally, the average long-term groundwater production from the principal aquifer in the San Timoteo Management Area will be held at or below the estimated sustainable yield of 325 AFY.

The undesirable result identified for the San Timoteo Management Area is the condition when the shallow groundwater table sustaining the GDEs falls below 30 feet bgs as a result of groundwater production from the principal aquifer. A measurable objective of 20 feet bgs for the shallow groundwater table was defined and provides a reasonable margin of operational flexibility under adverse conditions by allowing for changes to groundwater production (if demonstrated to influence shallow groundwater) or the implementation of projects and/or programs to prevent groundwater levels falling below 30 feet bgs. Groundwater conditions are defined by static groundwater levels measured at six RMPs in the management area.

ES-3.2 Monitoring Network

The objective of a monitoring network is to track and monitor parameters that demonstrate "short-term, seasonal, and long-terms trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate Plan implementation." To accomplish this objective, the monitoring network must be capable of the following:

- Monitoring changes in groundwater and surface water conditions that may impact the beneficial uses or users of groundwater
- Monitoring groundwater conditions relative to the sustainable management criteria
- Quantifying annual changes in water budget components

Groundwater Monitoring

The groundwater monitoring network includes 77 wells. Groundwater elevation data is collected at 73 of these wells; water quality data is collected at 40 of these wells; and groundwater production data is collected at 31 wells. Groundwater elevation and groundwater production data is collected on a monthly basis by the water purveyors. Groundwater quality data is collected quarterly to annually by the water purveyors. Four of the municipal wells in the monitoring network are located outside the Plan Area and supply water to the Subbasin. This water supply is characterized as an imported groundwater supply to the Subbasin. The majority of the wells are municipal supply and monitoring wells; however, the network does include two irrigation wells operated by South Mountain.

Surface Water Monitoring

The SBCFCD manages five stream gauges within the Plan Area. Two stream gauges are located on Yucaipa Creek, one is located on Wilson Creek upstream of the confluence with Oak Glen Creek, and two stream gages are located on Oak Glen Creek upstream of its confluence with Yucaipa Creek. These stream gauges record mean daily flow rates. These stations were designed to measure peak flow events and, therefore, do not accurately measure flow outside of those peak events. SBCFCD has confidence in measurements collected at the two farthest downstream gauging stations in the Subbasin. The Yucaipa GSA will evaluate the feasibility of installing new gauging stations, if funding becomes available, or work with SBCFCD to improve the existing stations to more accurately measure stream flows in the Subbasin. Stream flow measurements are recognized as a data gap in this GSP.

Precipitation

Precipitation is monitored at 17 precipitation stations managed by SBCFCD within the Plan Area and three National Oceanographic and Atmospheric Administration stations with one in the Plan Area, one in the City of Redlands, and one in Beaumont. Daily precipitation is recorded at these stations, which provides adequate temporal resolution to evaluate short-term and seasonal impacts of precipitation on groundwater conditions in the Plan Area. The longest continuous records of daily precipitation have been measured at two SBCFCD climate stations dating back to 1932. The lengths of these records, plus long-term records for other stations, are adequate to evaluate long-term trends in precipitation within the Plan Area.

Monitoring Protocols

Monitoring protocols have been established in this GSP for the collection of groundwater elevation, groundwater production, and groundwater quality data at all wells in the Subbasin (and for those outside the Subbasin that provide water to it) to ensure a consistent recording of information to accurately represent groundwater conditions and effectively evaluate the sustainable management of the groundwater resource.

Monitoring Network Improvements

The Yucaipa GSA is required to review and evaluate the monitoring network for the Plan Area during every 5-year assessment of this GSP. Specifically, “each agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.” While the existing monitoring network satisfies the requirements to “demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions," there are improvements that can be made to improve local spatial coverage. Future improvements to the monitoring network have been identified for the following:

- Stream flow gauging
- Interconnected surface water
- Information on private well users
- Spatial and temporal gaps in groundwater level measurements

ES-4 Projects and Management Actions

Future projections using the YIHM with groundwater production constrained to the estimated sustainable yield of 10,980 AFY indicate that the Subbasin will not experience undesirable results over the 50-year planning and implementation period. The simulated Future Baseline with Climate Change II scenario indicated that conditions in the Calimesa Management Area may decline below the measurable objective and trend toward the minimum threshold at the end of the 50-year planning and implementation period. Under such conditions, the Yucaipa GSA has defined management actions that will be implemented to prevent undesirable results.

The management actions described are not currently necessary to achieve sustainability in the Plan Area, which has experienced rising groundwater levels and increased groundwater in storage since 2008. They would be implemented, as necessary, to respond to declining conditions that deviate from the future predictions by the YIHM.

The Yucaipa GSA identified projects that have been designed, permitted, and are undergoing development or will in the near future. These include the Wilson Creek III Basins, the Pendleton Avenue Low Water Crossing, and the Upper Wildwood Creek Basin. These basins are designed to capture stormwater flows and enhance recharge to the Subbasin. These basins will be located in the North Bench Management Area. The Yucaipa GSA is evaluating potential sites to construct and operate spreading basins to enhance recharge in the Calimesa Management Area. The YIHM predicts that groundwater elevations will decline below the measurable objective under the Future Baseline with Climate Change II scenario within the 50-year planning and implementation horizon. The Yucaipa GSA will evaluate the proposed basin(s) after more details of their construction and operation are developed. The basins will be included in the YIHM and evaluated during the 5-year evaluation study after this GSP is adopted.

ES-4.1 Management Action No. 1

Management Action No 1: Reduce Net Use of Groundwater When Groundwater Levels Decline Below Measurable Objectives

The drought buffers established for the North Bench, Calimesa and Western Heights management areas provide operational flexibility to implement management actions when groundwater conditions decline below their respective measurable objectives. The following management action will prevent undesirable results related to the chronic lowering of groundwater levels, reduction in groundwater storage, and land subsidence for these three management areas. Management actions will be implemented when groundwater levels decline below measurable objectives established to protect the GDEs identified in the North Bench and San Timoteo Management Areas. The management actions will prevent significant and unreasonable effects resulting in a loss in surface water interconnected with shallow groundwater that sustain the GDEs.

If groundwater elevations decline below the measurable objective levels established at 50% or more of the RMPs for two consecutive years in a management area, then the net use of groundwater in that management area will be reduced by a minimum 5% (Calimesa and Western Heights management areas) to 25% (North Bench management area) of the estimated sustainable yield for that management area. Groundwater elevations below the measurable objectives fall within drought buffers established in the North Bench, Calimesa and Western Heights management areas. Reductions in the net use of groundwater in the Calimesa and Western Heights management areas are based on a tier structure that incrementally increases the reduction in groundwater use should groundwater elevations continue to decline.

If groundwater elevations decline below the minimum threshold levels established at 50% or more of the RMPs for two consecutive years in a management area, then the net use of groundwater in that management area will be reduced by a minimum 15% (Western Heights management area) to 35% (North Bench management area) of the estimated sustainable yield for that management area.

The net reductions in groundwater use may be achieved by either reducing groundwater production, artificially recharging the aquifer with supplemental water, using supplemental water for in lieu use, enacting water conservation programs and/or other programs that result in a net reduction of groundwater use, or any combination of these actions that result in a net reduction of groundwater use by the required reduction amount stipulated in this management action for a management area. Groundwater production may increase when groundwater levels recover to a higher tier in the drought buffer or rise above the measurable objective for two consecutive years. If the management action is implemented and conditions do not improve over a 5-year evaluation period, then the Yucaipa GSA will reevaluate and, possibly, recalibrate the YIHM to improve the accuracy of the model in estimating the sustainable yield and predicting future conditions.

For the San Timoteo Management Area, six RMPs were identified to characterize shallow groundwater elevations and evaluate whether groundwater production from the principal aquifer will cause significant and unreasonable effects on the interconnection between surface water and groundwater. GDEs have been identified along the reach of San Timoteo Creek in the Plan Area. GDEs were also identified in the upper reach of Oak Glen Creek and Yucaipa Creek. If groundwater levels decline below 20 feet bgs for two consecutive years at 50% or more of the RMPs in the San Timoteo management area or at the two RMPs in the North Bench management area, then the Yucaipa GSA will investigate to confirm that the decline in the water table is a result of groundwater production from the principal aquifer. This may include observing groundwater levels at the RMPs and measuring stream flow when the principal aquifer well(s) is operating, or designing and implementing an aquifer test to confirm the influence of groundwater production from the principal aquifer on stream flow and the groundwater table. If an aquifer test is conducted and confirms the influence of production from the principal aquifer on the surface water/groundwater interconnection and a subsequent drawdown of the water table, then production from the principal aquifer will be reduced to the extent that it no longer causes a significant and unreasonable effect.

ES-4.2 Management Action No. 2

Management Action No. 2: Sustainable Yield Pumping Allocations and Groundwater Replenishment

At the adoption of the GSP, groundwater sustainable yield pumping allocations will be assigned to YVWD and private water users in the North Bench Management Area, to South Mountain, South Mesa, YVWD and private water users in the Calimesa Management Area, and to WHWC in the Western Heights management area. No sustainable yield pumping allocations were assigned in the San Timoteo management area at this time because the Yucaipa GSA needs to confirm the location and volume of private pumping from the principal aquifer and determine whether sustainable yield pumping allocations are appropriate to manage groundwater production in this management area.

The pumping allocations are designed to regulate the annual volume of groundwater produced by each groundwater user per water year and maintain the total groundwater produced at or below the estimated sustainable yields for these management areas. As an incentive to manage groundwater production at or below the sustainable yield pumping allocation, a groundwater user may earn pumping credits in the amount of the sustainable yield pumping allocation less the groundwater pumped.

The Yucaipa GSA will apply a 5-year rolling pumping credit system to keep account of the pumping credits earned by each groundwater user, meaning pumping credits that are earned and not used after 5 years will be lost. Pumping credits, if available, may be used to offset the volume of groundwater produced in excess of the sustainable yield pumping allocation to the extent that the credits equal the pumping exceedance. Any remaining deficit will be charged a replenishment fee. The replenishment fee will be equivalent to the volume of groundwater that exceeds the sustainable yield pumping allocation multiplied by the rate per AF to purchase supplemental water at San Bernardino Valley Municipal Water District or San Gorgonia Pass Water Agency rates for imported SWP water. The supplemental water may be used to artificially recharge a management area, or as in lieu use to offset the pumping exceedance. Any pumping credits remaining will carry over into the next water year under the 5-year rolling pumping credit system.

The assessment for pumping credits will begin with the 2022 WY. The volume of water pumped per user will be accounted for on a monthly basis beginning October 1, 2021. Pumping credits will be earned by users that pump less than their respective sustainable yield pumping allocations for the 2022 WY. Pumping credits cannot be transferred or sold to another entity within a given management area or with the Subbasin. The sustainable yield pumping allocations will be reassessed during every periodic evaluation when the water budget analysis is updated and the sustainable yield reevaluated.

ES-4.3 Management Action No. 3

Management Action No. 3: Surplus Supplemental Water Spreading

Surplus supplemental water, which is not associated with Management Action #2, and discharged to a spreading basin to facilitate the artificial recharge of the Subbasin will have a separate accounting by the Yucaipa GSA. The surplus supplemental water will be accessible to the water purveyor that purchased the water and percolated it at a spreading basin. This water will be available to help offset production exceedances above the sustainable yield pumping allocations instead of pumping credits earned via Management Action #2.

ES-4.4 Projects

Currently, the Plan Area is not experiencing undesirable results with regard to the chronic lowering of groundwater elevations, reduction of groundwater in storage, land subsidence, and depletion of surface water as a result of groundwater production from the principal aquifer that threatens GDEs. The importation of SWP water as a supplemental source of water, both as direct use and through artificial recharge in the various spreading basins, has allowed the Yucaipa GSA member agencies to reduce groundwater production in the North Bench, Calimesa, and Western Heights management areas to levels below their respective estimated sustainable yields. Groundwater production by private well owners in the San Timoteo management area has not caused significant and unreasonable effects related to the sustainability indicators per SGMA. The Subbasin is currently managed sustainably.

Management actions were defined to achieve sustainable management of the groundwater resources in the Plan Area should groundwater elevations decline below measurable objectives. These actions will be implemented when groundwater levels decline to the drought buffers established for the North Bench, Calimesa, and Western Heights management areas. The drought buffers provide operational flexibility for the Yucaipa GSA to implement these management actions and/or other programs to prevent undesirable results.

Some of the member agencies of the Yucaipa GSA have constructed stormwater capture basins to enhance recharge to the Subbasin. The Wilson Creek and Oak Glen Creek basins are designed to capture stormwater but are primarily used to artificially recharge the Subbasin using surplus SWP water delivered by the SWP East Branch Extension. These basins are included in the YIHM to simulate their contributions to recharge to the Subbasin. The Wilson Creek and Oak Glen Creek basins have contributed an average 1,900 AFY and 170 AFY, respectively, to the Subbasin since 2011. The other existing stormwater capture basins are estimated to capture approximately 1,800 AFY. These projects provide additional benefits including improving water quality in surface waters by reducing stormwater runoff volumes and providing wildlife habitat.

The Yucaipa GSA identified proposed projects that have been designed and permitted and are undergoing development or will be developed in the near future. These include the Wilson Creek III Basins, the Pendleton Avenue Low Water Crossing, and the Upper Wildwood Creek Basin. The projects funded by the City of Yucaipa (with major funding also provided by San Bernardino Valley Municipal Water District for the Wilson III Basins) are designed to capture stormwater flows and enhance recharge to the Subbasin. The estimated average annual recharge contribution is approximately 1,500 AF. These basins will be located in the North Bench Management Area. These planned basins were not included in the future water budget analyses for the North Bench Management Area using the YIHM, because the North Bench Management Area is not projected to experience undesirable results over the 50-year planning and implementation horizon. However, these planned projects will provide additional opportunities to capture and recharge stormwater flows, thereby reducing the reliance on imported water to meet the basin measurable objectives.

ES-5 Plan Implementation

Upon adoption of this GSP by the Yucaipa GSA, the primary activities associated with implementing the GSP include administrative duties by the member agencies of the Yucaipa GSA, the management of data collection, data validation, and analysis to evaluate conditions in the Subbasin, the preparation and submittal of annual reports and periodic evaluations, with associated data, to DWR, and an assessment of conditions in the Subbasin and determination if management actions need to be implemented. During the initial 5-year period after the GSP is adopted, the Yucaipa GSA will evaluate options to address data gaps and conduct feasibility studies to evaluate the effectiveness of potential spreading basins and other programs that would maintain or achieve sustainability in the Subbasin.

1 Administrative Information, Plan Area, and Communication

This Groundwater Sustainability Plan (GSP) for the Yucaipa Subbasin (Plan Area, Subbasin) is organized as follows:

- **Executive Summary**—provides an overview of the GSP and a description of groundwater conditions in the Subbasin.
- **Chapter 1, Administrative Information, Plan Area, and Communication**—describes the purpose of the GSP, the sustainability goal, and provides information relating to the administration of the GSP and the area covered by the GSP.
- **Chapter 2, Basin Setting**—describes, in depth, the hydrogeologic setting of the Plan Area, including a description of current and historical conditions related to each undesirable result defined under SGMA. Chapter 2 also provides a summary of the groundwater modeling and water budget components established for the Plan Area.
- **Chapter 3, Sustainable Management Criteria**—describes criteria by which the GSA has defined conditions that constitute sustainable groundwater management for the Subbasin, including the process by which the GSA has characterized undesirable results, and established minimum thresholds and measurable objectives for each applicable sustainability indicator.
- **Chapter 4, Projects and Management Actions**—consists of a description of the projects and management actions the GSA has determined will achieve the sustainability goal for the Subbasin, including projects and management actions to respond to changing conditions in the Subbasin.
- **Chapter 5, Plan Implementation**—provides an estimate of GSP implementation costs, a schedule for implementation, and a plan for annual reporting and periodic (5-year) evaluations.

1.1 Administrative Information

1.1.1 Purpose of the Groundwater Sustainability Plan

The Yucaipa Groundwater Sustainability Agency (GSA), acting as the GSA for the Plan Area, developed this Groundwater Sustainability Plan (GSP) in compliance with the 2014 Sustainable Groundwater Management Act (SGMA; California Water Code Section 10720–10737.8 et seq.) and the California Department of Water Resources (DWR) GSP Regulations (23 CCR, Section 350 et seq.). Among the legislative purposes of SGMA are for California's groundwater basins to be managed sustainably "through the actions of local government agencies to the maximum extent feasible," and to provide local public agencies acting as GSAs with the authority and technical and financial assistance necessary to achieve basin sustainability (California Water Code Section 10720.1). Appendix 1-A includes the Preparation Checklist for GSP Submittal, which identifies where in this GSP each of the statutory requirements under SGMA are addressed.

Before SGMA was approved, the water agencies in the Subbasin were working collaboratively to develop a groundwater management plan. The following work was completed and is being utilized in the development of this GSP:

- Determination of the safe yield and basin capacity in 2013
- Calculation of the change in groundwater storage and identification of potential groundwater recharge sites in 2014

- Preliminary field evaluation of recharge potential at various sites using exploratory borings in 2014
- MODFLOW groundwater flow model for the Yucaipa Subbasin area (USGS 2018)
- Field recharge testing at various sites in 2019

In February 2016, San Bernardino Valley Municipal Water District (SBVMWD) submitted a basin boundary modification request to DWR recommending that the "proposed groundwater basin boundary modifications for the Yucaipa Basin be more consistent with the Yucaipa Basin watershed boundary and to close gaps between adjacent basins." In October 2016, DWR approved the basin boundary modification, to which the modified basin boundary was included in DWR's Bulletin 118 Interim Update 2016 released in December 2016.

The Yucaipa Subbasin lies within the Upper Santa Ana River Basin Hydrologic Region (DWR basin number 8-002.07) and underlies an area of approximately 25,300 acres under portions of the cities of Calimesa, Redlands, and Yucaipa, as well as unincorporated San Bernardino and Riverside Counties (Figure 1-1, Vicinity Map of the Yucaipa Subbasin Plan Area). The Yucaipa GSA jurisdictional boundary consists of the entire Yucaipa Subbasin within San Bernardino County and Riverside County.

DWR designated the Yucaipa Subbasin a high priority basin based primarily on its reliance on groundwater for water supply (DWR 2019). However, this Subbasin is not in a state of critical overdraft. Under SGMA, GSAs "have the responsibility for adopting a Plan that defines the basin setting and establishes criteria that will maintain or achieve sustainable groundwater management" (California Water Code, Section 350.4[e]). The requirement of the GSP is to maintain or achieve sustainable groundwater management in the Yucaipa Subbasin by 2042.

SGMA defines sustainable groundwater management as the "management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results" (California Water Code, Section 10721). Undesirable results, as defined in SGMA, are any of the following effects caused by groundwater conditions occurring throughout the basin:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon
- Significant and unreasonable reduction of groundwater storage
- Significant and unreasonable degradation of water quality, including the migration of contaminant plumes that impair water supplies
- Significant and unreasonable seawater intrusion
- Significant and unreasonable land subsidence that substantially interferes with surface land uses
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

As described in Chapter 2, Basin Setting, marked declines in groundwater levels were observed within the Yucaipa Subbasin prior to the mid-2000s. The declining trends in groundwater levels ceased, however, following the importation of water via the State Water Project (SWP) into the Subbasin in 2004. The importation of SWP water supplemented some of the local groundwater production in the Yucaipa Subbasin to where the annual rate of groundwater production fell within estimates of the safe yield for the Subbasin (GSSI 2014). A portion of the imported SWP water, when available, was discharged to spreading basins to promote artificial recharge to the principal aquifer in the Subbasin.

Groundwater production continues to be the primary contributor to the water supply in the Yucaipa Subbasin. Groundwater production therefore warrants evaluation to characterize sustainability and identify significant and undesirable results in regard to lowering water levels and reducing groundwater storage. Groundwater dependent ecosystems (GDEs) have been identified adjacent to creeks in the Yucaipa Subbasin and evaluation is warranted to determine if groundwater production from the principal aquifer may cause significant and undesirable impacts to GDEs dependent on shallow groundwater and surface water. Land subsidence is unlikely to produce significant and undesirable results in the foreseeable future, but groundwater levels will be used as a proxy to evaluate the potential of land subsidence should groundwater levels fall below historical lows. The Yucaipa Subbasin has not experienced significant and undesirable degradation of water quality. Seawater intrusion is not possible for this inland basin.

The publication of this GSP represents a key milestone in achieving groundwater sustainability within the Plan Area by 2042 as required by SGMA. This GSP characterizes groundwater conditions, trends, and the cumulative impacts of groundwater pumping for each of the SGMA-defined sustainability indicators (Chapter 2, Basin Setting); establishes minimum thresholds and measurable objectives by which sustainability can be measured and tracked (Chapter 3, Sustainable Management Criteria); identifies projects and management actions to be implemented by the GSA to minimize undesirable results (Chapter 4, Projects and Management Actions); and outlines a plan for annual reporting and periodic (i.e., 5-year) evaluations (Chapter 5, Plan Implementation). The GSP documents a viable path, determined by the Yucaipa GSA, in collaboration with stakeholders, and informed by the best available information to achieve the sustainability goal within the Yucaipa Subbasin.

1.1.2 Sustainability Goal

The goal is to manage groundwater resources for sustainable, long-term use in the Yucaipa Subbasin. Long-term sustainable management includes:

- Maintaining sufficient groundwater in storage to allow for ongoing groundwater production that meets the operational demands of South Mesa, South Mountain, Western Heights Water Company, Yucaipa Valley Water District, and private well users, as well as the regulatory commitments established in the Plan Area.
- Ensuring that groundwater production does not result in significant and unreasonable loss of GDEs.

1.2 Agency Information

1.2.1 Agency Name

Yucaipa Groundwater Sustainability Agency (Yucaipa GSA)

1.2.2 Agency Address

Yucaipa Groundwater Sustainability Agency
c/o San Bernardino Valley Municipal Water District
380 East Vanderbilt Way
San Bernardino, California 92408

1.2.3 Plan Manager

The contact name and mailing address of the Plan Manager for the Yucaipa GSA is as follows:

Mark Iverson, President Yucaipa GSA (m.iverson@westernheightswater.org, (909) 790-1901)
Yucaipa Groundwater Sustainability Agency
c/o San Bernardino Valley Municipal Water District
380 East Vanderbilt Way, San Bernardino, California 92408

1.2.4 Organization and Management Structure

The nine agencies that entered into an agreement to form the Yucaipa GSA, as documented in a Memorandum of Agreement (MOA) in 2017, included South Mesa Water Company, South Mountain Water Company, Western Heights Water Company and Yucaipa Valley Water District, herein collectively referred to as the "Water Purveyors"; the City of Calimesa, the City of Redlands, and the City of Yucaipa, herein collectively referred to as the "Municipalities"; and San Bernardino Valley Municipal Water District and San Gorgonio Pass Water Agency, herein collectively referred to as the "Regionals" (Table 1-1). The "Municipalities" are collectively referred to as the "Land Use Agencies." Each of the above-described entities are individually referred to as a "Party" and are collectively referred to as the "Parties." The County of Riverside and the County of San Bernardino, collectively referred to as the "Counties," are considered "Stakeholders" and were not Parties to this MOA. The City of Calimesa submitted a written Notice of Withdrawal dated November 19, 2018, and the Yucaipa GSA subsequently acknowledged the withdrawal of the City of Calimesa from the Yucaipa GSA at the January 23, 2019, GSA Board meeting. The City of Calimesa is now considered a stakeholder in the Plan Area.

Table 1-1. Yucaipa GSA Member Agencies

Water Purveyors
South Mesa Water Company
South Mountain Water Company
Western Heights Water Company
Yucaipa Valley Water District
Municipalities
City of Redlands
City of Yucaipa
Regionals
San Bernardino Valley Municipal Water District
San Gorgonio Pass Water Agency

The Yucaipa GSA completed the initial phase of stakeholder engagement (Phase 1) in June 2017 and provided the required documentation for GSA formation, which is available to the public through the DWR SGMA Portal (https://sgma.water.ca.gov/portal/gsa/print/349).

1.2.4.1 Yucaipa GSA Decision Making Process

The roles and responsibilities of the Yucaipa GSA were further clarified in the bylaws adopted in May 2018 (Appendix 1-B). The Yucaipa GSA is controlled by a governing board composed of one representative of each of the parties to the MOA. The officers of the governing board include a president, vice president, secretary, and treasurer. The officers and one alternate are chosen at the first regular meeting held each calendar year and each shall hold office until the officer resigns, is removed, or is otherwise disqualified to serve, or the officer's successor is elected. The voting structure for matters pertaining to the establishment and implementation of the administrative components of the Yucaipa GSA are by simple majority (51%) of the voting parties, wherein each member agency holds a single vote. A majority of the board is considered a quorum for purposes of meeting and decision making.

All board meetings are public meetings subject to the Ralph M. Brown Act. However, due to the COVID-19 pandemic, on March 17, 2020 Governor Newsom issued Executive Order N-29-20 waiving the requirements in the Brown Act for members of a legislative body and the public to be physically present when participating in a public meeting. Executive Order N-29-20 requires "a local legislative body to hold public meetings via teleconferencing and to make public meetings accessible telephonically or otherwise electronically to all members of the public seeking to observe and to address the local legislative body or state body." Subsequently, GSA public meetings beginning on April 22, 2020, were held remotely via teleconference. The Yucaipa GSA provided in its public notices announcing the meetings and on its website (www.yucaipasgma.org) directions on how to access and participate in each meeting online and by telephone. The telephone number was a toll-free number accessible with a passcode that was published with each meeting agenda.

Each party to the MOA appoints a principal representative and alternative representative, who may be changed from time to time at the sole discretion of the designating party. The individuals appointed to the Yucaipa GSA Governing Board shall be a senior executive management level employee of each designating party. In the event that the appointed representative(s) is/are no longer employed by the appointing party, the individual will be removed as a member of the governing board of the Yucaipa GSA. Written confirmation from the governing board shall be provided to the Yucaipa GSA at the Principal Office following any change in representation.

The powers and duties assigned to the Yucaipa GSA are as follows:

A. To adopt rules, regulations, policies, bylaws and procedures governing the operation of the Yucaipa GSA.
B. To establish as-needed ad hoc and standing advisory committees for making recommendations to the governing board. Committees shall exist for the term specified in the action creating the committee, and the board of directors may dissolve a committee at any time through a majority vote of the parties.
C. To monitor all public and private groundwater production and extractions.
D. To develop a Groundwater Sustainability Plan.
E. To prepare an Annual Groundwater Report that reflects: all public and private groundwater extractions; natural and artificial recharge; return from use; water quality issues; contamination plumes; and other parameters deemed necessary by the board of directors to accurately determine the quantity and quality of the groundwater conditions in the Yucaipa Subbasin (DWR Sub-Basin No. 8-02.07).
F. To determine the amount of additional artificial recharge for the Subbasin from imported sources as a complement to native sources, and to plan for the development and application of such additional sources of recharge.

G. By a majority vote, the governing board may elect to exercise the following powers for a duration determined or modified as needed:
   a. To contract for the services of engineers, attorneys, planners, financial consultants, and separate and apart therefrom, to appoint agents and representatives to employ such other staff persons as necessary.
   b. To determine, assess, collect, account, and audit annual groundwater extraction charges to recover expenses related to groundwater recharge, administrative expenses, data collection, and report preparation as determined by the governing board.
   c. To cooperate, act in conjunction, and contract with the United States, the State of California, or any agency thereof, counties, municipalities, public and private corporations of any kind (including without limitation, investor-owned utilities), and individuals, or any of them, for any and all purposes necessary or convenient for the purposes of the Yucaipa GSA.
   d. To accumulate operating and reserve funds and invest the same as allowed by law for the purposes of the Yucaipa GSA.
   e. As may be permitted by law, to apply for and accept grants, contributions, donations and loans, including under any federal, state or local programs for assistance in developing or implementing any of its projects or programs in connection with any project untaken by the Yucaipa GSA.
   f. To implement a cost-sharing methodology in a manner that qualifies as a pass-through charge under the constitutional requirements of Proposition 218 and similar revenue-raising requirements.
   g. To exercise any power necessary or incidental to the foregoing powers in the manner and according to the procedures provided for under the law applicable to the Parties to this Agreement.

Appendix 1-B contains documentation of the formation of the Yucaipa GSA, including the MOA that describes the purpose, management, and structure of the Yucaipa GSA, the bylaws and notices to DWR regarding its intent to develop a GSP. Copies of the MOA and Bylaws can also be found at the Yucaipa-GSA website: https://yucaipasgma.org.

1.2.5 Legal Authority

On September 16, 2014, Governor Jerry Brown signed into law Senate Bills 1168 and 1319 and Assembly Bill 1739 as part of the SGMA legislation, which provides, among other powers, local groundwater agencies the authority and the technical and financial assistance necessary to sustainably manage groundwater. SGMA paved the way for the formation of the Yucaipa GSA to manage the Yucaipa Subbasin. The Yucaipa GSA has statutory authorities essential to groundwater management as well as SGMA compliance.

Section 10720.7 of SGMA requires that all basins designated in Bulletin 118 as high or medium priority be managed under a GSP. Pursuant to Section 10727 of SGMA, the parties are required to develop, adopt, and implement this GSP to manage the basin and intend on using the authorities granted to them to memorialize the roles and responsibilities for developing and implementing the GSP.

1.2.6 Groundwater Sustainability Plan Implementation and Cost Estimate

This GSP will be implemented by the Yucaipa GSA. The following sections provide a discussion of the standards for and costs associated with GSP implementation, including annual reporting, periodic updates, monitoring protocols, and projects and management actions. Potential funding sources and mechanisms are presented along with a tentative schedule for implementing the GSP's primary components.

1.2.6.1 Standards for Plan Implementation

1.2.6.1.1 Annual Reporting

The Yucaipa GSA shall submit an annual report to DWR by April 1 of each year following the adoption of the GSP. The annual report shall include the following components for the preceding water year (23 CCR, Section 356.2):

- General information, including an executive summary and a location map depicting the basin covered by the report
- A detailed description and graphical representation of
  - Groundwater elevation data from wells identified in the monitoring network
  - Groundwater extraction for the preceding water year
  - Change in groundwater in storage
  - Total volume of groundwater in storage
  - Groundwater elevations at representative monitoring points
  - Surface water supply used or available for use
  - Total water use
- A description of progress towards implementing the Plan, including achieving interim milestones, and implementation of projects or management actions since the previous annual report.

The description and graphical representation of groundwater elevations will include groundwater elevation contour maps for the principal aquifer in the Subbasin illustrating, at a minimum, the seasonal high and seasonal low groundwater elevations. Additionally, hydrographs of groundwater elevations and water year type using historical data to the greatest extent available, including from October 1, 2018, to the current reporting year, will be included in the annual report.

The description and graphical representation of change in groundwater storage will include a graph depicting water year type, groundwater use, the annual (by water year) change in groundwater in storage, and the cumulative change in groundwater in storage for the Subbasin based on historical data to the greatest extent available, including from October 1, 2018, to the current reporting year.

1.2.6.1.2 Five-Year Evaluations

The Yucaipa GSA will evaluate the GSP at least every 5 years. This 5-year evaluation will be provided as a written assessment to DWR. The assessment shall describe whether the Plan implementation, including implementation of projects and management actions, are meeting the sustainability goal in the basin. The evaluation will include the following:

- A description of current groundwater conditions for each applicable sustainability indicator relative to measurable objectives, interim milestones, and minimum thresholds.
- A description of the implementation of any projects or management actions, and the effect on groundwater conditions resulting from those projects or management actions.
- Revisions, if any, to the basin setting, management areas, or the identification of undesirable results and the setting of minimum thresholds and measurable objectives.

- An evaluation of the basin setting in light of significant new information or changes in water use, and an explanation of any significant changes.
- A description of the monitoring network within the basin, including whether data gaps exist, or any areas within the basin are represented by data that do not satisfy the requirements of the GSP Regulations (23 CCR, Sections 352.4 and 354.34[c]).
- A description of significant new information that has become available since the adoption of the GSP, GSP amendments, or the last 5-year assessment.
- A description of relevant actions taken by the Yucaipa GSA, including a summary of regulations or ordinances related to the GSP.
- Information describing any enforcement or legal actions taken by the Yucaipa GSA in furtherance of the sustainability goal for the basin.
- A description of completed or proposed GSP amendments.
- A summary of coordination that occurred between Yucaipa GSA and other agencies, if appropriate, in the Subbasin, as well as between Yucaipa GSA and other agencies in hydrologically connected basins.

1.2.6.2 GSP Implementation Budget

The primary costs associated with implementing the GSP are anticipated to be based on the following:

- Data collection, validation, and analysis
- Ongoing data gap analysis and assessments of priorities for filling data gaps
- Annual report preparation and preparation of the 5-year GSP evaluation reports
- Regional studies for basin optimization, groundwater numerical modeling, and other evaluations that benefit or support efforts to achieve groundwater sustainability
- Management, administration, public engagement, and other costs as needed and approved by the Yucaipa GSA governing board

1.2.6.2.1 Data Collection, Validation, and Analysis

As part of this GSP development, the Yucaipa GSA has established a monitoring network and data collection protocols to monitor streamflow, precipitation, groundwater elevation, groundwater production, and groundwater quality throughout the Yucaipa Subbasin. Data collection will be facilitated by the member agencies and other entities (e.g., U.S. Geological Survey, San Bernardino County Department of Public Works) that also collect data in the Yucaipa Subbasin pertinent to evaluating sustainable management. Relevant data collected by these entities will be added to the Yucaipa GSP data management system and included in the Yucaipa GSA annual groundwater monitoring reports required per SGMA.

1.2.6.2.2 Data Gap Analysis and Priorities

During the initial 5-year period after the GSP is implemented, Yucaipa GSA will explore options for filling data gaps identified in this GSP. The primary data gaps identified in the historical data are spatial and temporal gaps in groundwater elevations, which may be applicable at existing wells or in locations where no wells exist, and in stream flow data where existing gauging stations are designed to measure significant flows resulting from major runoff events. Currently, information on private well users is limited. Over the 5-year period following the adoption of the

GSP, the Yucaipa GSA will attempt to contact private well owners to obtain information on their respective wells, the volume of groundwater produced and its applied uses, and planned future use. In order to assess the priorities for filling these gaps, Yucaipa GSA plans to review options and potential costs associated with those options to direct funding toward the solutions that are needed most.

1.2.6.2.3 Annual Report Preparation and Preparation of the 5-Year Evaluation

Details of the information that will be included in the annual reports are presented in Section 1.2.6.1, Standards for Plan Implementation. The estimated costs associated with preparing the annual reports are incorporated as part of the annual operating budget of Yucaipa GSA.

Every fifth year of GSP implementation and whenever the GSP is amended, the Yucaipa GSA is required to prepare and submit an Agency Evaluation and Assessment Report to DWR together with the annual report for that year. The tasks associated with preparing this report include updating the water budget, updating the numerical groundwater flow model, and reassessing the sustainable yield, minimum thresholds, and measurable objectives (see Section 1.2.6.1).

1.2.6.2.4 Basin Optimization Studies, Groundwater Modeling, and Project Feasibility

During the initial 5-year period after the GSP is implemented, Yucaipa GSA will explore opportunities to optimize basin management. The work required to assess these opportunities may include implementing and supporting regional studies and groundwater modeling efforts that assess how to maximize the sustainable yield of the Yucaipa Subbasin. These studies may include more detailed feasibility studies for potential spreading basin projects to facilitate artificial recharge in the Calimesa area, as well as an investigation of how potential projects will be implemented, the costs associated with project implementation, and potential cost-sharing agreements for these projects.

As part of the project feasibility analyses, Yucaipa GSA anticipates evaluating potential revenue streams for implementing the projects required to optimize basin management. This analysis will include a review of the potential for implementing basin replenishment fees and the costs associated with proposing and passing such fees.

1.2.6.2.5 Cost Estimate

The estimated total GSP implementation costs are presented in Table 1-2. The starting cost for operations and monitoring is based on costs estimated by the member agencies for the 2020 fiscal year. These estimated annual costs started at $95,000 in 2022. The estimated annual costs for the management and administration of the GSA plus public engagement started at $25,000 in 2022. The estimated annual costs to prepare and submit the annual GSP reports and the 5-year evaluations started at $85,000 in 2022. Costs were increased annually, using an estimated 2.6% inflation rate projected for 2022, from 2022 to 2042 (Table 1-2).

The annual reports and 5-year evaluation costs are anticipated to cover the services to evaluate and assess the GSP and perform the additional work necessary to fill data gaps and analyze projects and management actions for the Yucaipa Subbasin. Yucaipa GSA is the GSA for the Yucaipa Subbasin and will be responsible for evaluating the GSP every 5 years.

The estimated implementation costs include a 10% contingency on the total operating and monitoring costs, management, administration, public engagement, and the annual reports and 5-year evaluations. Any remaining funds at the end of the calendar year will roll into the budget for the next subsequent calendar year.

Table 1-2. Groundwater Sustainability Plan Estimated Implementation Costs through 2042

Fiscal Year	Operations and Monitoring Costs	Management, Administration and Other Costs	Annual Reports and 5-Year GSP Evaluations	10% Contingency	Total
2022	$75,000.00	$25,000.00	$70,000.00	$17,000.00	$187,000.00
2023	$76,950.00	$25,650.00	$71,820.00	$17,442.00	$191,862.00
2024	$78,950.70	$26,316.90	$73,687.32	$17,895.49	$196,850.41
2025	$81,003.42	$27,001.14	$75,603.19	$18,360.77	$201,968.52
2026	$83,109.51	$27,703.17	$77,568.87	$18,838.15	$207,219.70
2027	$85,270.35	$28,423.45	$79,585.66	$19,327.95	$212,607.42
2028	$87,487.38	$29,162.46	$81,654.89	$19,830.47	$218,135.21
2029	$89,762.06	$29,920.69	$83,777.92	$20,346.07	$223,806.72
2030	$92,095.87	$30,698.62	$85,956.14	$20,875.06	$229,625.70
2031	$94,490.36	$31,496.79	$88,191.00	$21,417.82	$235,595.97
2032	$96,947.11	$32,315.70	$90,483.97	$21,974.68	$241,721.46
2033	$99,467.74	$33,155.91	$92,836.55	$22,546.02	$248,006.22
2034	$102,053.90	$34,017.97	$95,250.30	$23,132.22	$254,454.38
2035	$104,707.30	$34,902.43	$97,726.81	$23,733.65	$261,070.20
2036	$107,429.69	$35,809.90	$100,267.71	$24,350.73	$267,858.02
2037	$110,222.86	$36,740.95	$102,874.67	$24,983.85	$274,822.33
2038	$113,088.65	$37,696.22	$105,549.41	$25,633.43	$281,967.71
2039	$116,028.96	$38,676.32	$108,293.70	$26,299.90	$289,298.87
2040	$119,045.71	$39,681.90	$111,109.33	$26,983.69	$296,820.64
2041	$122,140.90	$40,713.63	$113,998.17	$27,685.27	$304,537.98
2042	$125,316.56	$41,772.19	$116,962.13	$28,405.09	$312,455.97

Notes: GSP = Groundwater Sustainability Plan.
Costs are in 2021 dollars.

1.2.6.3 Funding Sources

In general, Yucaipa GSA plans to fund operating costs by using general operating funds, charging its customers through water rates, and/or fees assessed to new developments to connect to existing water services (public water supply, sanitary sewer).

Projects to achieve sustainability are anticipated to require funding beyond that generated by the existing extraction fees and other fees. The Yucaipa GSA anticipates working with partner agencies and stakeholders to understand how individual projects will impact stakeholders and identify the most appropriate funding sources for these projects.

1.3 Plan Area

1.3.1 Description of the Plan Area

The Yucaipa GSA boundary encompasses the entire Yucaipa Subbasin (DWR Basin Number 8-002.07) of the Upper Santa Ana Valley Basin (DWR Basin Number 8-002) as defined following the basin boundary modification adopted by DWR in 2016 (DWR 2016a). The "Plan Area" is defined as the area enclosed within the Yucaipa Subbasin, which has a surface area of approximately 39.5 square miles or 25,300 acres (Figure 1-1). The Plan Area is bounded to the north by the San Andreas Fault Zone and San Bernardino Mountains, to the east by the Yucaipa Hills, to the west by the Crafton Hills, and to the south by the San Timoteo Badlands. The Plan Area, or Yucaipa Subbasin (8-002.07), is further compartmentalized into nine smaller hydrogeologic subareas delineated by fault zones and hydrogeologic barriers that influence groundwater flow (Figure 1-2, Hydrogeologic Subareas in the Yucaipa Subbasin; Section 2.5.1). Although the Plan Area is limited to the Yucaipa Subbasin, information for the San Timoteo Subbasin, as well as the hydrologic characteristics of the San Timoteo Wash watershed that contributes surface water flow and groundwater underflow to the Yucaipa Subbasin, is also provided in this GSP.

The San Timoteo Subbasin (DWR Basin Number 8-002.08) is adjacent to the Yucaipa Subbasin on its southern boundary (Figure 1-3, Adjacent Subbasins). The adjudicated San Bernardino Subbasin (DWR Basin Number 8-002.06) is adjacent to the Yucaipa Subbasin on its western boundary. The adjudicated Beaumont Basin lies almost entirely in the San Timoteo Subbasin and its northwestern boundary is adjacent to southeastern boundary of the Live Oak subbasin in the Yucaipa Subbasin.

1.4 Summary of Jurisdictional Areas and Other Features

The Plan Area lies under jurisdictional boundaries of the cities of Calimesa, Redlands, and Yucaipa, as well as unincorporated areas of San Bernardino and Riverside Counties (Figure 1-4, Jurisdictional Boundaries for Yucaipa Subbasin – GSA Member Agencies).

1.4.1.1 Water Purveyors

1.4.1.1.1 South Mesa Water Company

The South Mesa Water Company (South Mesa) is a mutual water company, formed in 1912, with approximately 4 square miles within the service area including portions of both the City of Calimesa and the City of Yucaipa. Water supplied by South Mesa is currently 100% groundwater. The South Mesa service area is approximately 90% residential with some industrial uses, several schools, and some small parks.

South Mesa also imports water into the Yucaipa Subbasin with groundwater supplied from its Well No. 4, which is located in the adjudicated Beaumont Basin. South Mesa's Well No. 4 groundwater production is in accordance with South Mesa's water rights established in the Beaumont Basin Adjudication, which includes rights to produce and also to carry over and store unproduced groundwater for future use. South Mesa's adjudicated water right comprises a key component to South Mesa's water supply portfolio for service to its customers. South Mesa has made major updates and improvements to its water system to ensure continuous and reliable water supply to its nearly 3,000 customers. South Mesa officials are executive leaders in the California Association of Mutual Water

Companies, a statewide association of mutual water companies, and among water systems serving disadvantaged communities in California.

1.4.1.1.2 South Mountain Water Company

The South Mountain Water Company (South Mountain) is a mutual water company with groundwater production in the Yucaipa Subbasin. South Mountain operates and maintains two wells in the Yucaipa Subbasin. These two wells provide water for irrigation purposes at the Crafton Hills College and Dangermond Park Foundation. Groundwater produced from the two wells is used for irrigation purposes only. The City of Redlands owns a majority of shares in South Mountain. The business activities of South Mountain are conducted by Bear Valley Mutual Water Company.

1.4.1.1.3 Western Heights Water Company

The Western Heights Water Company (WHWC) serves approximately 4.53 square miles including parts of the City of Yucaipa and the City of Redlands. Approximately 58% of WHWC customer demand is domestic (single-family residential, rural residential, multiple-family residential) with approximately 42% used for commercial, industrial, and institutional purposes (WHWC 2019). WHWC currently relies on groundwater for approximately 75% of its potable water demand and purchases imported SWP water to provide the remaining 25%. SWP water is delivered to WHWC through an intertie with Yucaipa Valley Water District.

1.4.1.1.4 Yucaipa Valley Water District

The Yucaipa Valley Water District (YVWD) is a special district that was formed in September 1971. The District operates under the County Water District Law, being Division 12 of the State of California Water Code. YVWD currently provides drinking water, recycled water, and sewer collection services to residential, commercial and industrial customers within its service area. The YVWD service area is approximately 40 square miles and includes portions of the City of Calimesa and the City of Yucaipa (WSC 2018). The YVWD sphere of influence, which represents the “ultimate planning area of the Yucaipa Valley Water District” (YVWD 2010), is approximately 68 square miles. Approximately 95% of the water used in the YVWD service area is for residential purposes with approximately 1.8% for commercial purposes and the remaining water used for industrial, institutional and fire service (WSC and Woodard & Curran 2021).

YVWD’s local water supply derives from groundwater through local wells and surface water collected from Birch Creek, Oak Glen Creek, Adams Tunnel and Clark Tunnel. Additionally, the District purchases imported SWP water through the San Bernardino Valley Municipal Water District and the San Gorgonio Pass Water Agency for direct filtration and to artificially recharge the Subbasin. Imported SWP water is treated at the Yucaipa Valley Regional Water Filtration Facility for use in its potable water distribution system. Surplus SWP water is directed to the Wilson Creek spreading basins to artificially recharge the Subbasin.

YVWD provides sewer collection and sewer treatment services. Sewer treatment takes place at the Wochholz Regional Water Recycling Facility that provides primary, advanced biological secondary and tertiary treatment, including the capability to demineralize the recycled water. The current capacity of the facility is 6.7 million gallons per day (mgd), with the capability to expand to 8.0 mgd. Tertiary treatment meets Title 22 requirements for reclaimed water.

YVWD operates several recycled water facilities in their service area, which serves as irrigation water to local parks, schools, golf courses and other landscaped areas in order to conserve drinking water supplies. In 2012, YVWD completed an extension of the Inland Empire Brineline operated by the Santa Ana Watershed Project Authority. The brine disposal facility is critical to ensure that YVWD meets the stringent water quality objectives set by the Santa Ana Regional Water Quality Control Board in the 2014 Basin Plan Amendment (R8-2014-0005).

1.4.1.2 Municipalities

1.4.1.2.1 City of Redlands

The City of Redlands was incorporated in 1888 and currently serves water to local businesses and more than 75,000 residents in Redlands, Mentone, parts of Crafton Hills, San Timoteo Canyon, and a small portion of San Bernardino County. The City of Redlands' service area encompasses 36 square miles inside the city boundaries and a relatively small area outside the city boundaries, but within the city's sphere of influence. The City of Redlands supplies a blend of surface water, groundwater and imported water purchased from SBVMWD to its customers. Redlands also owns and operates a sewer collection system and the Redlands Wastewater Treatment Facility, which can treat 7.2 mgd of wastewater for industrial and irrigation purposes, including supplying water to the Southern California Edison Mountainview Power Plant. The City of Redlands is a majority share owner in South Mountain.

1.4.1.2.2 City of Yucaipa

The City of Yucaipa was incorporated in 1989 and currently has over 58,000 residents. Water service in the City is provided by YVWD, South Mesa, and WHWC. Historically from the 1800s to mid-1950s, the main use of water in the Yucaipa Valley was for irrigating agriculture. In the 1950s and 1960s, Yucaipa underwent a significant transformation from agriculture to residential, with significant increases in the residential population coming in the 1970s and 1980s.

1.4.1.3 Regionals

1.4.1.3.1 San Bernardino Valley Municipal Water District

The SBVMWD was formed in 1954 as a regional water agency. It was incorporated under the Municipal Water District Act of 1911 (California Water Code Section 71000 et seq., as amended). SBVMWD has a contract to receive up to 102,600 acre-feet (AF) per year from the State Water Project.

SBVMWD covers about 325 square miles mainly in southwestern San Bernardino County, about 60 miles east of Los Angeles. It spans the eastern two-thirds of the San Bernardino Valley, the Crafton Hills, and the portion of the Yucaipa Valley above the county line and includes the cities and communities of San Bernardino, Colton, Loma Linda, Redlands, Rialto, Fontana, Bloomington, Highland, East Highland, Grand Terrace, Mentone, and Yucaipa. Figure 1-3 shows SBVMWD's service area, along with the service areas of the retail water purveyors, in the vicinity of the Plan Area. SBVMWD takes delivery of SWP water at the Devil Canyon Power Plant Afterbay just north of California State University, San Bernardino. From there, the water is delivered west to customers in the Rialto–Colton Basin or east as far as Yucaipa. SWP water is filtered and used for direct delivery or sunk into the ground to help replenish groundwater basins.

In the 1960s, dry conditions led to lawsuits between water users in the lower watershed and the upper watershed where SBVMWD is located. The lawsuits culminated in two settlements in 1969: the Orange County Judgment and the Western-San Bernardino Judgment. Under the terms of the judgments, SBVMWD became part of the Western-San Bernardino Watermaster and part of the Santa Ana River Watermaster. In this role, SBVMWD helps ensure compliance with both Judgments by participating in the measurement of groundwater pumping and monitoring the flow in the Santa Ana River. The SWP provides supplemental water that can be used to ensure compliance with both judgments, as required. The judgments allocated some of the surface water and groundwater from the SBVMWD service area to the lower watershed.

1.4.1.3.2 San Gorgonio Pass Water Agency

The San Gorgonio Pass Water Agency (SGPWA) was created by the San Gorgonio Pass Water Agency Act, which was passed by the California Legislature in 1961 and signed by Governor Pat Brown on July 12, 1961 (SGPWA 2020). SGPWA is a state water contractor and wholesale water agency that supplies SWP water to local water purveyors in its service area, which include YVWD and South Mesa. The SGPWA service area encompasses approximately 228 square miles and includes the Cities of Beaumont, Calimesa, and Banning, and includes unincorporated areas of Cherry Valley, Cabazon, Poppet Flat, Banning Bench, San Timoteo Canyon, and Live Oak Canyon. SGPWA has a contract with DWR for 17,300 AF of SWP water that is used to supplement local water demands. The supply of SWP water offsets local groundwater production, which, in turn, helps minimize or eliminate groundwater overdraft in SGPWA's service area.

1.4.1.4 Stakeholders

1.4.1.4.1 City of Calimesa

The City of Calimesa was incorporated in 1990 and encompasses approximately 14.9 square miles (9,536 acres) in Riverside County. The population in 2019 was estimated at 9,160 (US Census Bureau 2019) residents. Water service in the City is provided by South Mesa and YVWD. The City of Calimesa is located in Riverside County within the SGPWA service area.

1.4.1.4.2 County of Riverside

The County of Riverside was formed in 1893 and covers nearly 7,300 square miles (4.7 million acres). The County includes 28 cities, including the City of Calimesa. Land use in the County was mostly agriculture from its formation to the late 1970s, after which uses for commerce, construction, manufacturing, transportation and tourism increased. The County reported that "between 1980 and 1990, the number of residents grew by over 76%, making Riverside the fastest growing county in California. By 1992, the County was home to over 1.3 million residents" (County of Riverside 2017). The estimated population in Riverside County in 2019 was 2,470,546 (US Census 2019). The County anticipates a population of 2.8 million people residing in 918,000 housing units in 2020 (Strategic Plan; YVWD 2008).

1.4.1.4.3 County of San Bernardino

The County of San Bernardino was formed in 1853 from parts of Los Angeles, San Diego, and Mariposa Counties. The County has 24 cities within its boundary, including the cities of Yucaipa and Redlands. The County is the largest county in the contiguous United States covering over 20,000 square miles (12.8 million acres). Approximately 81% of the land is outside the governing control of the County and local jurisdictions; the majority of the non-jurisdictional land is owned and managed by federal agencies. The population in the County in 2019 was estimated at 2,180,085 (US Census Bureau 2019).

1.4.1.5 Tribal Communities

According to the DWR Water Management Planning Tool, as of January 2019, there are no tribal trust lands within the Subbasin. The Yucaipa GSA encourages participation from all stakeholders including tribal communities within the watershed although there are no federally recognized tribes, Indian land currently or historically held in trust by the federal government, or smaller reservation areas within the Yucaipa Subbasin.

1.5 Existing Water Resources Monitoring and Management Programs

Numerous water resources monitoring and management programs have been implemented throughout the Plan Area by several entities and stakeholders seeking to maintain and/or enhance water resources management in the region, and to comply with state and federal laws applicable to water supply, water quality, watershed health and/or wildlife habitat. This section describes the monitoring and management programs that are most relevant to groundwater sustainability. Generally, such programs are anticipated to be integral or complementary to the sustainable management criteria and/or the projects and management actions discussed in this GSP. Although surface streams in the Plan Area are generally ephemeral and reservoirs are artificial and managed, this section discusses surface water resources insofar as they are relevant to the Plan Area as a potential source of recharge to the underlying aquifer.

1.5.1 Monitoring Programs

A number of existing water resources monitoring programs have been implemented in the Subbasin. Table 1-3 summarizes these existing programs and identifies those programs with data and information that may be incorporated into the monitoring network developed for this GSP. The existing monitoring programs are anticipated to continue independent of the development of this GSP. The following provides a short synopsis for each program, and the anticipated contributions from each.

Table 1-3. Summary of Monitoring Programs in the Yucaipa Subbasin

Program Description	Parameter(s)	Source
Program: Maximum Benefits Monitoring Program		
Agency: YVWD, South Mesa, WHWC, City of Redlands		
Collect surface water (flow and water quality) and groundwater (water level and water quality) data to compute the triennial re-computation of ambient water quality in the Santa Ana Basin.	Groundwater levels and quality; surface water flows and quality.	YVWD, 2020. Maximum Benefit Monitoring Program 2019 Annual Report for the Beaumont, San Timoteo and Yucaipa Groundwater Management Zones; and subsequent annual monitoring reports.
Program: San Timoteo Creek Habitat Monitoring Program		
Agency: YVWD		
Conduct riparian vegetation surveys and collect groundwater level and climatic data to monitor the discharge of recycled water to the creek.	Riparian vegetation qualitative and quantitative surveys, including NDVI; precipitation data.	YVWD, 2020. San Timoteo Creek Habitat Monitoring Program Annual Monitoring Report Water Year 2018- 2019; and subsequent annual monitoring reports.

Table 1-3. Summary of Monitoring Programs in the Yucaipa Subbasin

Program Description	Parameter(s)	Source
Program: Annual Calculations of the Change in Groundwater Storage in the Yucaipa Subbasin		
Agency: SBVMWD		
Calculation of the annual change in groundwater in storage in the Yucaipa Subbasin using groundwater levels measured at select wells.	Groundwater levels; change in the volume of groundwater in storage	SBVMWD, 2018. Annual reports on the calculations of changes in storage plus subsequent reports.
Program: Monitoring by Water Purveyors		
Agency: YVWD, South Mesa, WHWC, City of Redlands		
Required monitoring and reporting for the California Division of Drinking Water	Groundwater levels, groundwater production, groundwater quality	Data obtained from the water purveyors
Program: CASGEM		
Agency: DWR		
Mandated statewide groundwater level monitoring program to characterize seasonal and long-term groundwater elevation trends	Groundwater level	Data accessible via online address: https://water.ca.gov/Pro grams/Groundwater-Management/Groundwater-Elevation-Monitoring- -CASGEM
Program: GAMA		
Agency: SWRCB, SBVMWD		
Comprehensive, statewide program for compiling groundwater quality data.	Groundwater quality.	Data accessible via online address: https://www.waterboards.ca.gov/wate r_issues/ programs/gama/online_ tools.html
Program: San Bernardino County Department of Public Works		
Agency: SBCFCD		
San Bernardino County Flood Control District installed a network of climatic stations and stream flow gauging stations in the County to monitor climatic conditions and stream flow.	Precipitation; stream flow	Data accessible via online address: http://www.sbcounty.go v/dpw/pwg/alert/
Program: United States Geological Survey Groundwater Levels for California		
Agency: USGS		
Statewide groundwater elevation monitoring program implemented by the USGS	Groundwater levels, groundwater quality.	Data accessible via online address: https://nwis.waterdata. usgs.gov/ca/nwis/gwlev els
Program: CIMIS		
Agency: DWR		
Statewide network of weather stations designed to assist irrigators in managing their water resources	Precipitation, evapotranspiration, temperature	Data accessible via online address: https://cimis.water.ca.g ov/Default.aspx

Table 1-3. Summary of Monitoring Programs in the Yucaipa Subbasin

Program Description	Parameter(s)	Source
Program: National Centers for Environmental Information		
Agency: NOAA		
Nationwide network of weather stations designed to collect climatic data and maintain a historical database.	Precipitation, temperature	Data accessible via online address: https://www.ncdc.noaa. gov/

Notes: YVWD = Yucaipa Valley Water District; South Mesa = South Mesa Water Company; WHWC = Western Heights Water Company USGS = U.S. Geological Survey; CIMIS = California Irrigation Management Information System; DWR = California Department of Water Resources; NOAA – National Oceanographic and Atmospheric Administration; SBCFCD = San Bernardino County Flood Control District; GAMA = Groundwater Ambient Monitoring and Assessment Program; CASGEM = California Statewide Groundwater Elevation Monitoring

1.5.1.1 Maximum Benefits Monitoring Program

In 2004, the Santa Ana River Basin Plan was updated to include revised management plans for total dissolved solids (TDS) and nitrogen. The 2004 update was the result of the work of a Nitrogen/TDS task force that conducted watershed-wide studies of TDS and nitrate as nitrogen (nitrate-nitrogen) objectives between 1994 and 2004. The 2004 Basin Plan update included the creation of new groundwater management zones (GMZ) based on previously defined groundwater subbasin boundaries, revised water quality objectives for TDS and nitrate-nitrogen in groundwater, revised wasteload allocations for TDS and nitrogen, and revised beneficial uses and objectives for TDS and nitrogen in surface waters.

The 2004 Basin Plan set "maximum benefit" objectives for TDS and nitrate-nitrogen in the Yucaipa and San Timoteo GMZs, among others, which lie within the Yucaipa Subbasin (Figure 1-5, Groundwater Management Zones in the Vicinity of the Yucaipa Subbasin). These maximum benefit objectives are less stringent than anti-degradation objectives, which were based on historical water quality data, and only apply to regions in which the responsible parties have demonstrated appropriate protection of beneficial use and maintenance of water quality consistent with maximum benefit to the people of the State of California. Table 1-4 includes the anti-degradation water quality objectives and the revised maximum benefits water quality objectives.

Table 1-4. Anti-Degradation and Maximum Benefits Water Quality Objectives

Groundwater Management Zone	Anti-Degradation Water Quality Objective		Maximum Benefits Water Quality Objective	
	Total Dissolved Solids (mg/L)	*Nitrate (as Nitrogen) (mg/L)*	*Total Dissolved Solids (mg/L)*	*Nitrate (as Nitrogen) (mg/L)*
Beaumont	230	1.5	330	5.0
Yucaipa	320	4.2	370	5.0
San Timoteo	300	2.7	400	5.0

Note: mg/L = milligrams per liter.

YVWD serves as the data manager for the Yucaipa, San Timoteo and Beaumont GMZs. YVWD implemented a comprehensive monitoring program in 2014 and collects groundwater level, groundwater quality, and surface water flow and quality data from participating agencies, including South Mesa, WHWC and South Mountain, operating in the GMZs. Data collected from this program is submitted to the Regional Water Quality Control Board will be incorporated into the data set collected for this GSP.

1.5.1.2 San Timoteo Habitat Monitoring Program

YVWD implemented a Habitat Monitoring Program (HMP) in 2011 to monitor riparian conditions within the San Timoteo Creek area influenced by discharges of recycled water from the YVWD HWRWRF to San Timoteo Creek. The HMP was designed to monitor and protect existing riparian conditions following the implementation of YVWD's Non-Potable Water Distribution System, which supplies recycled water to the District's customers and reduces recycled water discharges to the creek. YVWD installed a network of shallow groundwater observation wells, including three well pairs, to characterize the relationship between shallow groundwater and surface water in San Timoteo Creek.

Groundwater elevation data is collected on an hourly basis and was incorporated into the GSP to monitor and evaluate the interrelationship between groundwater and surface water along the reach of the creek in the Yucaipa Subbasin. YVWD also conducts semi-annual site inspections of riparian vegetation at specific stations, and collects NDVI data, to evaluate the habitat along this reach of San Timoteo Creek.

1.5.1.3 Annual Calculations of the Change in Groundwater Storage in the Yucaipa Subbasin

In 2014, SBVMWD integrated the Subbasin into its existing program that calculates an annual change in groundwater storage for the San Bernardino Basin Area (SBVMWD 2018). DWR first calculated the annual change in storage in the San Bernardino Basin Area from 1934 to 1960. SBVMWD continued the work initiated by DWR and calculated the annual change in groundwater storage from 1961 to present. The calculated annual change in storage, or the volume of groundwater lost or gained, is based on field groundwater level measurements at wells throughout the Subbasin. SBVMWD also calculates the annual change in storage for each of the hydrogeologic subareas in the Yucaipa Subbasin. Storage is an extremely important metric that the Yucaipa GSA will use to evaluate the effectiveness of the GSP.

1.5.1.4 Monitoring by Water Purveyors

YVWD, South Mesa, and WHWC have implemented groundwater elevation and groundwater quality monitoring programs as required by the California Division of Drinking Water for their respective municipal supply (both active and inactive) wells. These purveyors also report monthly groundwater production data for individual wells. Data collected from the purveyors will be incorporated into development of the GSP.

1.5.1.5 California Statewide Groundwater Elevation Monitoring Program

The California Statewide Groundwater Elevation Monitoring (CASGEM) program is a DWR-mandated program established in 2009 under Senate Bill X7-6 to track seasonal and long-term groundwater elevation trends throughout California. SBVMWD is the CASGEM monitoring entity managing groundwater elevation data for the groundwater basins within its service area, including Yucaipa Subbasin.

1.5.1.6 Groundwater Ambient Monitoring and Assessment Program

Created by the State Water Resources Control Board in 2000, and expanded under Assembly Bill 599 in 2001, the Groundwater Ambient Monitoring and Assessment (GAMA) program is a comprehensive system for compiling groundwater quality data collected throughout the state. SBVMWD is the local representative undertaking the management and compilation of groundwater quality data for the groundwater basins within its boundary, including the Yucaipa Subbasin, and uploading it to the GAMA program. Data is accessible via the GAMA portal (https://www.waterboards.ca.gov/water_issues/programs/gama/online_tools.html).

1.5.1.7 San Bernardino County Department of Public Works

The San Bernardino County Department of Public Works Flood Control District (SBCFCD) established a network of climate stations and/or stream gauging stations within the County, including the Yucaipa Subbasin. The climatic stations measure and record daily precipitation, with historical records extending as far back as the early 1950s that extend over various periods of time. Currently, SBCFCD is operating 12 stations collecting climatic data within the Plan Area. SBCFCD also installed five stream gauging stations; however, these stations were designed to measure large stream flows following major precipitation events.

1.5.1.8 United States Geological Survey

SBVMWD, in cooperation with the United States Geological Survey (USGS), installed four nested groundwater observation wells in the Yucaipa Subbasin. These wells are instrumented with dedicated pressure transducers and provide frequent measurements of groundwater elevations. The groundwater elevation data collected from these nested wells will be incorporated into the GSP monitoring network.

1.5.1.9 California Irrigation Management Information System

The nearest California Irrigation Management Information System (CIMIS) climatic station, which is managed and operated by DWR, is the Highland (No. 251) station located approximately 8.5 miles northwest of the Yucaipa Subbasin in Highland, California. The Highland station was installed in October 2016. It resides in the San Bernardino Basin Area. The Highland CIMIS station is at an elevation of 1,275 feet. The next closest CIMIS climatic station is the University of California Riverside (No. 44) station located on the UC Riverside campus. The UCR station is located approximately 9 miles southwest of the western end (e.g., farthest downstream) of the Yucaipa Subbasin at an elevation of 1,020 feet. These climatic stations record precipitation, solar radiation, vapor pressure, air temperature, relative humidity, dew point, wind speed, and soil temperature data on an hourly basis. The data is used to calculate potential evapotranspiration at their respective locations. SBVMWD has also installed climate monitoring stations within its service area, including at the YVWD water filtration plant. Data from these stations may be used to inform and compare estimates of evapotranspiration within the Yucaipa Subbasin.

1.5.1.10 National Centers for Environmental Information

The National Centers for Environmental Information is a branch of the National Oceanic and Atmospheric Administration (NOAA) that assists the NOAA in collecting, compiling, and archiving climatic data across the United States. There are three NOAA stations in the Yucaipa Subbasin and vicinity: Yucaipa 1.5 NNE, Redlands, and Beaumont. Climatic data (precipitation, temperature) collected at these stations will be used in this GSP to characterize historical and current climatic conditions in the Yucaipa Subbasin. This data will also inform climatic conditions in the projected simulations and future water budget analyses for this GSP.

1.5.2 Management Programs

A number of existing water resources management programs or plans have been implemented in the Yucaipa Subbasin. Table 1-5 summarizes these existing programs and identifies programs that may enhance this GSP or may affect the sustainable management of the Yucaipa Subbasin. The following provides a short synopsis for each program, and the anticipated contributions from each.

Table 1-5. Summary of Management Programs in the Yucaipa Subbasin

Program Description	Parameter(s)	Conjunctive Use Program?	Source
Program: 2008 Strategic Plan for a Sustainable Future			
Agency: YVWD			
Management program that includes steps to achieve sustainability by regulating the water services utilized by new developments and implementing programs to enhance the artificial recharge of the Subbasin with SWP water.	Local groundwater, surface water, supplemental SWP water, recycled water	Yes	YVWD (Yucaipa Valley Water District). 2008. A Strategic Plan for a Sustainable Future – The Integration and Preservation of Resources. Adopted by the YVWD Board of Directors on August 20, 2008.
Program: 2021 Water Shortage Contingency Plan			
Agency: YVWD			
Management plan that identified actions and procedures for managing water supply and demands during water shortages.	Local groundwater, surface water, supplemental SWP water, recycled water	No	YVWD. 2021. Yucaipa Valley Water District Water Shortage Contingency Plan. Prepared by Yucaipa Valley Water District. Adopted as Resolution No. 2021-38 by the YVWD Board of Directors, June 22, 2021. https://www.yvwd.us/Programs/FINAL_WSCP_2020.pdf.
Program: 2021 Water Shortage Contingency Plan			
Agency: South Mesa Water Company			
Management plan that identified actions and procedures for managing water supply and demands during water shortages.	Local groundwater, surface water, supplemental SWP water, recycled water	No	South Mesa (South Mesa Water Company). 2021. Water Shortage Contingency Plan. Prepared by Water Systems Consulting for South Mesa Water Company. June 18, 2021. https://southmesawater.com/wp- content/uploads/SMWC-WSCP.pdf.

Table 1-5. Summary of Management Programs in the Yucaipa Subbasin

Program Description	Parameter(s)	Conjunctive Use Program?	Source
Program: 2014 Amendment to the Santa Ana River Basin Plan			
Agency: Santa Ana RWQCB			
Salt Management Plan that established Groundwater Management Zones and "maximum benefits" water quality objectives that are less stringent that antidegradation WQOs to encourage recycled water use.	Local groundwater, surface water, and recycled water.	Yes	RWQCB (Regional Water Quality Control Board) Santa Ana Region. 2014. Resolution No. R8-2014-0005 – Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate Updates Related to the Salt Management Plan for the Santa Ana Region. April 25, 2014.
Program: 2015 Salt And Nutrient Management Plan			
Agency: YVWD			
As required by the 2014 Basin Plan Amendment, YVWD developed a salt and nutrient management plan that established actions and procedures to implement and protect groundwater quality should the use of recycled water impair the maximum benefit objectives.	Local groundwater, surface water, and recycled water.	Yes	YVWD. 2015. Salinity and Nutrient Management Plan for the Beaumont Management Zone, San Timoteo Management Zone and the Yucaipa Management Zone. Prepared by Yucaipa Valley Water District. October 29, 2015.
Program: State Water Project Importation			
Agency: SBVMWD, SGPWA, YVWD			
SBVMWD has an annual entitlement to 102,600 AF of SWP water; SGPWA has an annual entitlement to 17,300 AF of SWP water; YVWD purchases SWP water and treats some at the YVRWFF and discharges surplus water to the Wilson Creek Basins.	Supplemental Water	Yes	https://water.ca.gov/Programs/State-Water-Project.
Program: Salinity Management Pipeline			
Agency: YVWD			
Yucaipa Valley Regional brine line connects the WRWRF to the Santa Ana Watershed's Project Authority's Inland Empire Brine Line and conveys concentrate for treatment by the Orange County Sanitation District.	Recycled Water	Yes	yvwd.dst.ca.us.

Table 1-5. Summary of Management Programs in the Yucaipa Subbasin

Program Description	Parameter(s)	Conjunctive Use Program?	Source
Program: 2020 Upper Santa Ana River Watershed Integrated Regional Urban Water Management Plan			
Agency: SBVMWD, YVWD, other agencies in Upper Santa Ana River Watershed			
Regional management plan to address water supply and quality issues under current and future conditions.	Groundwater, surface water, recycled water, supplemental water	Yes	WSC (Water Systems Consulting Inc.) and Woodard & Curran. 2021. 2020 Upper Santa Ana River Watershed Integrated Regional Urban Water Management Plan. Prepared for San Bernardino Valley Municipal Water District et al. by WSC and Woodard & Curran.

1.5.2.1 2008 Strategic Plan for a Sustainable Future by Yucaipa Valley Water District

YVWD prepared a strategic plan outlining steps to achieve social, economic, and environmental sustainability within their service area (YVWD 2008). To achieve sustainability, YVWD recognized that (1) resources are limited and need to be conserved, nurtured, and renewed and (2) resources used to generate short-term gains result in an inefficient and inequitable consumption of resources that are not beneficial for the long-term. Therefore, the strategic plan established policies and guidelines necessary to protect and preserve the natural resources entrusted to YVWD and defined how to evaluate achieving sustainability. The 2008 sustainability plan was developed to identify key challenges over the next five decades, address these challenges in a transparent manner with stakeholder involvement, identify and manage the risks associated with future programs, and ensure that future generations can continue to grow sustainably.

YVWD has a diversified water supply portfolio that includes groundwater from the Yucaipa Subbasin and adjacent basins, surface water diversions, imported SWP water, and recycled water. Imported SWP water has become a less reliable resource due to environmental restrictions and increasing demand in the state, compounded by extended droughts that further limit resources. Consequently, YVWD developed a strategy to accommodate new development and growth without adversely impacting existing communities and resources under wet, normal, and dry conditions. Some of these strategies include programs implemented by the state, and others were developed specifically by YVWD.

In 2001, California signed into law Senate Bills 610 and 221. These two bills required a water supply assessment in conjunction with development project reviews under CEQA, and a written verification of water supply where a development is proposed for approval. YVWD developed a Water Resource Validation Program to apply to all new developments in YVWD's service area. The program calls on the methodologies in SB 610 and 221 to conduct water supply assessments, and incorporates strategies developed by YVWD. These strategies include:

- The requirement that all new developments provide bundled water, wastewater, and non-potable water services for all new construction.
- Using recycled water for non-potable use to the maximum extent possible. YVWD implemented a policy where "all new developments with non-potable water accessible will be required to connect to existing non-

potable water (recycled water) infrastructure to irrigate all greenbelt areas, commercial landscape areas, roadway medians, front yards of individual homes and rear yards of individual homes" (YVWD 2008).

- Installing dual-plumbed water systems (one serving potable water, the other serving non-potable water for uses described above). YVWD estimates that dual-plumbed water systems will reduce the potable water demand by 60%.
- Implementation of the Crystal Status Development Program. YVWD prepared a handbook to help guide developers with properly designing and building the new construction of water supply and sewer connections and facilities. The building requirements include the strategies (bundled water services, dual-plumbed water systems that utilize recycled water) for achieving sustainability in YVWD's service area. YVWD requires new developments to fund the purchase of 7 AF of imported supplemental water from SWP, if available, before issuing a grading or building permit. Any new development may achieve the status of Crystal Development if it secures the delivery of 15.68 AF of imported supplemental water per equivalent dwelling unit. The Crystal Status Development Program also calls for the following:
  - Construction of surface water detention basins in new development to maintain recharge conditions extant prior to development
  - Installation of fixed-based automatic water metering for both potable and non-potable use
  - Allowance for the construction and use of temporary facilities
  - Conversion from groundwater supply to recycled water supply for irrigation purposes at all parcels used for agriculture
  - Elimination of septic systems

1.5.2.2 YVWD Water Shortage Contingency Plan

YVWD prepared a water shortage contingency plan in 2021 in conjunction with YVWD's 2020 Urban Water Management Plan (UWMP) and the 2020 Upper Santa Ana River Watershed Integrated Regional Urban Water Management Plan (IRUWMP; WSC and Woodard & Curran 2021) (YVWD 2021). The water shortage contingency plan identifies strategies to manage water supplies during periods of water shortage, particularly during extended periods of drought when local and SWP water supplies may be limited. These strategies focus on collecting information to evaluate current and potentially near-term climatic conditions, communication to inform the local governmental agencies in which YVWD serves water of supply conditions, and maintaining operational flexibility to adjust operations to meet demands.

YVWD developed a phased curtailment plan to address water supply shortages that are assessed at an annual frequency. YVWD uses six shortage stages to identify and respond to water shortage emergencies. The shortage stages are each a level of response, quantified as a percentage of water supply shortage, from least to most severity: moderate conditions (up to 10% shortage), below average conditions, serious conditions, severe, extreme, and critical (>50% shortage). YVWD recognizes that the first two stages of informing the public and recommending voluntary actions to reduce water consumption make the implementation of mandatory and emergency actions for stages 3 through 6 more acceptable should water supply conditions continue to worsen during the period of water shortage.

1.5.2.3 South Mesa Water Shortage Contingency Plan

On June 18, 2021, the Board of Directors of South Mesa adopted an updated Water Shortage Contingency Plan (WSCP). The WSCP is a strategic plan to respond to foreseeable and unforeseeable water shortages resulting from water supply limitations, climate change, regional power outages, catastrophic events, and state-implemented water conservation requirements (South Mesa 2021). South Mesa prepared the WSCP in conjunction with South Mesa's 2020 UWMP, which is included in the 2020 IRUWMP (WSC and Woodard & Curran 2021).

The WSCP establishes four water shortage levels to respond appropriately to the severity of water shortage conditions. The four water shortage levels, from least to most severe in terms of a percentage of water shortage, are normal conditions (up to 10% shortage), water alert conditions (up to 20% shortage), water warning conditions (up to 30% shortage), and water emergency conditions (up to 40% shortage). South Mesa's WSCP identifies specific response actions depending on the level of water shortage. The estimated water savings when implementing the response actions ranges from approximately 1%-5% under normal conditions to >50% under water emergency conditions. The program imposes increasing fines and penalties for violations of the program.

In response to drought emergency regulations adopted by the State Water Resources Control Board in 2014, South Mesa took prompt and thorough actions to achieve water conservation requirements. South Mesa immediately notified its customers of the requirements, and provided regular information and updates to its customers, including applicable penalties for violations.

1.5.2.4 City of Redlands Water Shortage Contingency Plan

The City of Redlands prepared a WSCP in June 2021 to "prevent catastrophic service disruptions through proactive, rather than reactive, mitigation of water shortages" (City of Redlands 2021). The WSCP defines the processes to assess water supply conditions and actions to implement to maintain a reliable water supply and mitigate the impacts of any supply shortages. The WSCP was prepared in conjunction with the City of Redlands's 2020 UWMP, which is included in the 2020 IRUWMP (WSC and Woodard & Curran 2021).

The City of Redlands does not predict a water shortage based on climate conditions but does foresee the likelihood of imposing water shortage measures "due to a catastrophic failure of infrastructure or emerging regulatory constraints on groundwater quality" (City of Redlands 2021). The City of Redlands identified four water shortage measures, or stages, to implement to protect water supplies: (1) voluntary conservation measures that include small decreases in water supply; (2) mandatory compliance water alert that includes a medium decrease in water supply; (3) mandatory compliance water warning that includes a significant decrease in water supply; and (4) mandatory compliance water emergency that recognizes that "water supplies are in danger of being depleted to a point where such uses as human consumption, sanitation, and fire protection would be endangered. This would be a decrease in supply of more than 50 percent, most likely associated with a natural disaster" (City of Redlands 2021). The City of Redlands identified a number of response actions to be implemented and/or considered when experiencing one of the four water shortage stages: supply augmentation, demand reductions, operational changes and additional mandatory restrictions.

1.5.2.5 Porter–Cologne Water Quality Control Act and Clean Water Act Permitting

The Porter–Cologne Water Quality Control Act (Porter–Cologne Act; codified in California Water Code, Section 13000 et seq.) is the primary state water quality control law for California. Whereas the federal Clean Water Act applies to all waters of the United States, the Porter–Cologne Act applies to waters of the state, which includes isolated wetlands and groundwater in addition to federal waters. The Porter–Cologne Act is implemented by the State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs). In addition to other regulatory responsibilities, the RWQCBs have the authority to conduct, order, and oversee investigation and cleanup where discharges or threatened discharges of waste to waters of the state could cause pollution or nuisance, including impacts to public health and the environment.

The Yucaipa Subbasin is within the Santa Ana River Basin (RWQCB Region 8) and within the Yucaipa Hydrologic Unit (801.61) per the RWQCB Basin Plan. These statutes are relevant to the GSP in that they regulate the quality of point-source discharges (e.g., wastewater treatment plan effluent, industrial discharges, and on-site wastewater treatment systems [OWTS]) and non-point source discharges (e.g., stormwater runoff) to the underlying aquifer.

The Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the Basin Plan (California Water Code, Sections 13240–13247). The Porter–Cologne Act provides the RWQCBs with authority to include within their basin plan water discharge prohibitions applicable to particular conditions, areas, or types of waste.

The Basin Plan is periodically updated to include amendments related to implementation of total maximum daily loads, revisions of programs and policies within the Santa Ana River Basin RWQCB region, and changes to beneficial use designations and associated water quality objectives. Groundwater within the Yucaipa Hydrologic Unit (801.61) was designated with the following beneficial uses: municipal and domestic supply (MUN), industrial service supply (IND), agricultural supply (AGR), and industrial process supply (PROC). According to the SWRCB “Sources of Drinking Water Policy,” as adopted by the SWRCB on May 19, 1988 (Resolution No. 88-63), groundwater is considered to be suitable, or potentially suitable, for municipal or domestic water, except where:

- Total dissolved solids (TDS) exceed 3,000 milligrams per liter (mg/L) (5,000 microsiemens electrical conductivity), and it is not reasonably expected by the RWQCB to supply a public water system;
- There is contamination, either by natural processes or by human activity (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either best management practices or best economically achievable treatment practices; or
- The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day (gpd).

The Basin Plan recognizes that some hydrologic units contain multiple aquifers that may each support different beneficial uses.

The Basin Plan also designates beneficial uses for inland surface waters. The designated beneficial uses for Yucaipa Creek are described as intermittent for municipal and domestic supply (MUN), groundwater recharge (GWR), water contact recreation (REC1), non-contact water recreation (REC2), warm freshwater habitat (WARM), and wildlife habitat (WILD). Intermittent beneficial use in the Basin Plan refers to “water conditions [that] do not allow the beneficial use to exist year-round.” This applies, for example, to ephemeral streams when there is stream flow “only while it is raining or for a short time afterward”, or “for established streams which flow through part of the year but also dry up for part of the year.” The beneficial uses of such streams are realized when there is flow.

The reach of San Timoteo Creek within the Yucaipa Subbasin (Reach 2 from San Timoteo Canyon Road to the confluence with Yucaipa Creek) and Oak Glen Creek have the following designated beneficial uses: groundwater recharge (GWR), water contact recreation (REC1), non-contact water recreation (REC2), warm freshwater habitat (WARM), and wildlife habitat (WILD). Oak Glen Creek is also designated with the MUN beneficial use; however, this reach of San Timoteo Creek is excepted from the MUN beneficial use in accordance with the criteria specified in the "Sources of Drinking Water Policy." Other tributaries to Yucaipa Creek, Oak Glen Creek and San Timoteo Creek are designated with the following intermittent beneficial uses: MUN, GWR, REC1, REC2, WARM, and WILD.

The Porter–Cologne Act requires a "Report of Waste Discharge" for any discharge of waste (liquid, solid, or otherwise) to land or surface waters that may impair a beneficial use of surface or groundwater of the state. California Water Code, Section 13260(a) requires that any person discharging waste or proposing to discharge waste—other than to a community sewer system—that could affect the quality of the waters of the state, file a Report of Waste Discharge with the applicable RWQCB. For discharges directly to surface water (waters of the United States), a National Pollutant Discharge Elimination System (NPDES) permit is required, which is issued under both state and federal law. Other types of discharges, such as waste discharges to land (e.g., spoils disposal and storage), erosion from soil disturbance, or discharges to waters of the state (such as groundwater and isolated wetlands), are required to follow Waste Discharge Requirements (WDRs) issued exclusively under state law. WDRs typically require many of the same best management practices and pollution control technologies as required by NPDES-derived permits.

The NPDES and WDR programs regulate municipal, and industrial stormwater and non-stormwater discharges under the requirements of the Clean Water Act and the Porter–Cologne Act, respectively. The construction and industrial stormwater programs are administered by the SWRCB, whereas individual WDRs, low-threat waivers, and other basin-specific programs are administered by the Santa Ana RWQCB. Programs and policies that have particular relevance to the Yucaipa Subbasin include those introduced in Sections 1.5.2.5.1 through 1.5.2.5.4.

1.5.2.5.1 Stormwater General Permits (Construction and Industrial General Permits)

The SWRCB and Santa Ana RWQCB administer a number of general permits that are intended to regulate activities that collectively represent similar threats to water quality across the state and thus can appropriately be held to similar water quality standards and pollution prevention best management practices. Construction projects over 1 acre in size are regulated under the Statewide Construction General Permit and are required to develop and implement a Stormwater Pollution Prevention Plan (SWPPP). Similarly, industrial sites are also required to develop a SWPPP that identifies and implements best management practices necessary to address all actual and potential pollutants of concern.

1.5.2.5.2 Irrigated Lands Regulatory Program

Water discharges from agricultural operations include irrigation runoff, flows from tile drains, irrigation return flows, and stormwater runoff. These discharges can affect water quality by transporting pollutants including pesticides, sediment, nutrients, salts (including selenium and boron), pathogens, and heavy metals from cultivated fields into surface waters and/or groundwater. To prevent agricultural discharges from impairing the waters that receive these discharges, the Irrigated Lands Regulatory Program (ILRP) regulates discharges from irrigated agricultural lands. This is done by issuing WDRs or conditional waivers of WDRs to growers. These orders contain conditions requiring water quality monitoring of receiving waters and corrective actions when impairments are found. Through a series of events related to the passage of SB 390 (Alpert), the ILRP originated in 2003. Initially, the ILRP was developed for the Central Valley RWQCB. As the Central Valley RWQCB ILRP progressed, a groundwater quality element was added to the filing requirement for agricultural lands that had previously been subjected to only surface water discharge concerns. To date, the different RWQCBs are in different stages of implementing the ILRP. The Santa Ana RWQCB has a conditional waiver program for growers in the region.

1.5.2.5.3 On-Site Wastewater Treatment Systems Requirements

Requirements for the siting, design, operation, maintenance, and management of OWTSs are specified in the SWRCB's "Water Quality Control Policy for Siting, Design, Operation, and Maintenance of On-site Wastewater Treatment Systems (OWTS Policy)." The OWTS policy sets forth a tiered implementation program with requirements based upon levels (tiers) of potential threat to water quality. The OWTS policy includes a conditional waiver for on-site systems that comply with the policy. The San Bernardino County Department of Public Health Environmental Health Services (EHS) is the designated lead agency for the Local Agency Management Program in San Bernardino County. EHS enforces these statewide requirements through Sections 33.0890–33.08131 of the San Bernardino County Code. The Riverside County Department of Environmental Health (DEH) is the designated lead agency for the Local Agency Management Program in Riverside County.

The respective Local Agency Management Programs for San Bernardino and Riverside counties provide minimum standards and requirements for the treatment and disposal of sewage through the use of OWTS, when no connection to a public sanitary sewer system is available, to protect water quality, public health and safety. Standards and requirements include, but are not limited to, soil percolation tests to determine soil suitability; the selection of a treatment system appropriate for the site conditions; groundwater separation requirements; contractor licensing requirements; and specific layout/setback requirements from lakes, streams, ponds, slopes, and other utilities and structures.

The Santa Ana RWQCB adopted resolution R7-2017-0043 in November 2017 that approves a Local Agency Management Program for the City of Yucaipa. This resolution details the review and permitting processes required for installing and operating new and replacement OWTS. The City of Yucaipa Local Agency Management Program provides criteria that must be met to protect groundwater and surface water quality.

1.5.2.5.4 Individual Waste Discharge Requirements

Individual WDRs are required for point source discharges to land or surface water bodies not otherwise covered under a general permit program or conditional waiver. The purposes for individual WDRs are to define discharge prohibitions, effluent limitations, and other water quality criteria necessary to ensure discharges do not result in exceedances of Basin Plan objectives for receiving waters, including groundwater. Examples of individual WDRs in the Plan Area include Santa Ana RWQCB Order No. R8-2015-0027 (NPDES No. CA0105619) Waste Discharge Requirements and Master Reclamation Permit for the Yucaipa Valley Water District Henry N. Wochholz Regional Water Reclamation Facility (WRWRF). This order permits the discharge of tertiary treated wastewater to San Timoteo Creek at two designated discharge points. This order will expire on October 31, 2020. YVWD is currently working with the Santa Ana Board to renew the permit.

1.5.2.6 2014 Amendment to Santa Ana River Basin Plan

In 2014, the Regional Board adopted Resolution No. R8-2014-0005, an amendment to the Basin Plan that revised the maximum benefit commitments in the Yucaipa, San Timoteo and Beaumont GMZs and expanded the boundary of the Beaumont management zone farther east to match the hydrogeologic boundary (Santa Ana RWQCB 2014). The modified maximum benefit commitments assure reliable water supplies to meet present and anticipated future demands. The maximum benefit commitments, which are generally similar in all three GMZs, are summarized below:

- Established new Total Dissolved Solids and Nitrogen objectives based upon rigorous modeling (Table 1-4)
- Develop and implement a surface water monitoring program.

- Develop and implement a groundwater monitoring program.
- Determine ambient groundwater quality in the maximum benefit GMZs every three years.
- Implement non-potable water supply system to serve recycled water for irrigation purposes and/or direct non-potable use.
- Compliance must be achieved by the end of the 10th year after initiation of recycled water use/ recharge operations.
- Compliance will be measured by calculating the 10-year volume-weighted running average TDS and nitrate-nitrogen concentrations of recycled water. The 10-year running average concentration must be less than or equal to the maximum benefit objective for the underlying GMZ.
- Recycled water for recharge purposes shall be limited to the amount that can be blended with other recharge sources (e.g., imported water, stormwater, and/or reverse osmosis permeate diluent) to achieve a 10-year (120 month) rolling volume-weighted concentration that is less than or equal to the maximum benefit objectives for TDS and nitrate-nitrogen for the underlying GMZ.
- Completion of plans for and construction of wastewater desalters and brine disposal facilities.
- Development of anti-degradation salt mitigation plans to offset discharges in excess of the anti-degradation objectives for the GMZs in the event that the Regional Board finds that the maximum benefit commitments are not met by the participating party.

Pursuant to Resolution No. R8-2014-0005, YVWD will implement a salt mitigation plan (see 2015 Salt and Nutrient Management Plan in next section) should the Santa Ana RWQCB find that using recycled water for irrigation and other direct non-potable reuse impairs the "maximum benefit" of groundwater and surface water in the Yucaipa, San Timoteo, and Beaumont GMZs. The salt mitigation plan includes measures to improve the water quality of recycled water in an effort to meet the more stringent antidegradation objectives established by the Santa Ana RWQCB.

1.5.2.7 2015 Salt and Nutrient Management Plan

YVWD prepared a Salt and Nutrient Management Plan in 2015 (YVWD 2015). YVWD operates the WRWRF, a sewer treatment plant that meets Title 22 water recycling criteria for unrestricted reuse. Excess tertiary treated effluent is discharged to Reach 3 of San Timoteo Creek. Recycled water from the WRWRF is reused within YVWD's sphere of influence for landscape irrigation, construction grading, and, when permitted, for groundwater recharge. YVWD intends to decrease discharges of recycled water to San Timoteo Creek in order to serve all recycled water to its customers. YVWD has committed to maintaining a discharge at a minimum annual average of 0.72 mgd to San Timoteo Creek to sustain the riparian habitat between the WRWRF discharge point and confluence of Yucaipa Creek and San Timoteo Creek (see Section 1.5.1.2, San Timoteo Habitat Monitoring Plan). YVWD acknowledges that the use of recycled water in the Plan Area will accomplish the following:

- Provide an alternate water supply for residential, business, industrial and institutional customers thus preserving local water resources (e.g., groundwater) for use during high demand situations like a statewide drought emergency
- Conserve groundwater and surface water supplies that would otherwise be used for irrigation purposes.
- Provide a reliable and drought-proof water supply.
- Provide an alternative to sewer discharge to tributaries of the Santa Ana River and meets the Clean Water Act goal of zero discharge.

The 2015 Salt and Nutrient Management Plan identified the following actions should the Santa Ana RWQCB determine that the use of recycled water in the Yucaipa, San Timoteo and Beaumont GMZs impairs the maximum benefit water quality objectives and therefore enforces the more stringent antidegradation water quality objectives:

- YVWD is actively engaged in water quality monitoring and management programs to maintain a thorough understanding of conditions in the Yucaipa Subbasin and be in a position to implement programs to improve water quality in impaired areas.
- YVWD has worked with the City of Yucaipa and San Bernardino County Flood Control District in building and maintaining the Oak Glen Flood Control and Water Recharge Basins, and has discharged some SWP water to the Wilson Creek Flood Control and Spreading Basins and the Oak Glen basins to artificially recharge the Yucaipa Subbasin. YVWD has implemented a funding program to purchase SWP water when it is available to artificially recharge the subbasin, and treats SWP water at the Yucaipa Valley Regional Water Filtration Facility for direct treatment and use in its potable water distribution system.
- YVWD issued Ordinance No. 49-1998 that regulated the use of self-generating water softeners in an effort to reduce the TDS of wastewater to the sewer system. Should increasing TDS be an issue, YVWD will work to identify the source, or source area, and implement methods to reduce TDS, or charge additional costs to cover the additional treatment for those customers identified as the source of TDS.
- YVWD implemented a program in the 1980s and 1990s to provide sanitary sewer service throughout the Yucaipa Subbasin. A few small areas remain on septic, so "YVWD is developing a program to facilitate the extension of sewers to areas still served by septic systems and to facilitate the connection of customers currently on septic systems but "fronted" by a sewer collection main. YVWD developed an incentive program to promote the abandonment of septic systems and connect to a collector sewer main. YVWD also participates in the Santa Ana Region Septic Tank Off-Set Program. YVWD has committed to accelerating or expanding these programs should the maximum benefit with regards to TDS and nitrate be impaired and the Santa Ana RWQCB enforces the more stringent antidegradation water quality objectives.
- YVWD implemented reverse osmosis treatment at the WRWRF and constructed a brine line extension to the Inland Empire Brine Line. YVWD has also implemented denitrification treatment. YVWD has the capability to operate these two treatment technologies to achieve the antidegradation water quality objectives for recycled water produced at the WRWRF.

1.5.2.8 2020 Upper Santa Ana River Watershed Integrated Regional Urban Water Management Plan

Water agencies, and other agencies, in the Upper Santa Ana River watershed, collaborated during the development of the Upper Santa Ana River Watershed Integrated Regional Urban Water Management Plan (IRUWMP) in 2020 (WSC and Woodard & Curran 2021). The IRUWMP combines two of the region's foundational documents, the Upper Santa Ana River Watershed Integrated Regional Water Management Plan (IRWMP) and the San Bernardino Valley Regional Urban Water Management Plan (RUWMP). The IRWMP provides a comprehensive assessment of the area's water resources and includes management strategies to meet long-term water needs in the region. The UWMP was designed as a planning tool to guide broad-perspective decision making and water resource management by the region's water suppliers. Because both of these plans were due to be updated in 2020, SBVMWD and the participating agencies elected to combine both plans into the IRUWMP, which meets all the requirements under the Urban Water Management Planning Act of 1983 and the Integrated Regional Water Management (IRWM) Planning Act of 2002.

The Upper Santa Ana River Watershed IRWM Region (IRWM Region) covers 852 square miles of the Santa Ana River watershed (approximately 32% of the watershed) and is located primarily in San Bernardino and Riverside Counties. The general purpose of the IRUWMP is to help prepare for future population growth by developing local water supplies and optimizing the available imported water supplies.

The Region's first IRWMP, which was completed in 2007, identified, defined, and established strategies to capitalize on all water management opportunities that were present at that time or would potentially become available in the IRWM Region in the future. The 2015 IRWMP Update was prepared to satisfy the requirements described in the November 2012 IRWM Proposition 84 and 1E Program Guidelines by DWR (RMC 2015). The 2020 IRUWMP was developed to meet the IRWMP requirements in the 2016 Integrated Regional Water Management Grant Program Guidelines and the UWMP requirements described in the 2020 Urban Water Management Plan Guidebook (DWR 2021a).

A Regional Water Management Group, also known as the Basin Technical Advisory Committee (BTAC), was formed to develop and implement the strategies in the previous IRWMP and now the IRUWMP. The BTAC consists of water agencies and other stakeholders in the Upper Santa Ana River region. The BTAC is responsible for preparing and updating the IRUWMP, including reviewing and refining the water management goals and objectives defined in the IRUWMP. The goals listed in the IRUWMP are: (1) improve water supply reliability, (2) balance flood management and increase stormwater recharge, (3) improve water quality, (4) improve habitat and open space, and (5) address climate change through adaptation and mitigation.

1.5.3 Operational Flexibility Limitations

Operational flexibility is a key consideration in integrated water resource management because it helps water purveyors adapt to known legal, operational, and environmental constraints, and plan for an uncertain future, especially as it relates to drought resiliency and the effects of climate change. Operational flexibility can be measured over a given time horizon and/or geographic scale (e.g., water district service area) as the difference between available water supply and service area demand. Operational flexibility is maximized when a water purveyor has a large variety of sources in a water supply portfolio, when it has local control over such sources, and when such sources are connected to each other (i.e., conjunctively managed). On a general statewide scale, water purveyors are increasingly looking to minimize reliance on imported water supplies by promoting stormwater recharge, maximizing wastewater recycling, and sustainably developing local sources of water.

For the Yucaipa Subbasin, water purveyors collectively draw from a combination of sources—including local surface water, groundwater, imports from the SWP, and recycled water—which differ in terms of the volume available, area served, timing of peak availability, reliability, and cost. Climate and regulatory constraints (e.g., water quality standards, water rights, and minimum environmental flows) have historically had a greater impact on the availability of surface water supplies.

Groundwater sources were historically limited only by the capacity of production wells accessing the aquifer. However, declining water level trends prior to 2007 indicated an unsustainable withdrawal of groundwater from the Yucaipa Subbasin. The importation of supplemental SWP water into the subbasin led to a decrease in groundwater extractions to approximately the estimated safe yields of the minor subbasins. Consequently, the declining trends in groundwater levels ceased and water levels either stabilized or recovered to levels approaching the historical high groundwater levels observed in the Spring of 1988. With the passage of SGMA and the sustainable management criteria established in this GSP (Chapter 3), once adopted, groundwater extraction will be regulated by minimum thresholds established for each applicable sustainability indicator and an estimated sustainable yield.

The GSP complements and enhances existing projects and programs currently in place to maximize beneficial use of water resources and increase operational flexibility within the Yucaipa Subbasin. Existing water monitoring and management activities are summarized in Tables 1-3 and 1-5. To that end, individual Yucaipa GSA member agencies have implemented various policies and goals, such as enhancing recycled water use, implementing programs to conserve water usage, evaluating programs that would increase stormwater capture and artificial recharge, and policies requiring future developments to build and connect to existing water services, including recycled water, and sanitary sewer. Examples of projects that have increased operational flexibility within the Yucaipa Subbasin include YVWD's expansion and treatment upgrades at the WRWRF to increase recycled water output to serve back to its customers, and the near-future implementation of the Salinity and Groundwater Enhancement project designed to produce exceptionally pure recycled water for groundwater recharge.

Other projects include the Wilson Creek and Oak Glen Creek basins, which were designed to capture stormwater but are primarily used to artificially recharge the Subbasin using surplus SWP water delivered by the SWP East Branch Extension. These basins are included in the YIHM to simulate their contributions to recharge to the Subbasin. The Wilson Creek and Oak Glen Creek basins have contributed an average of 1,900 acre-feet per year (AFY) and 170 AFY, respectively, to the Subbasin since 2011. The other existing stormwater capture basins are estimated to capture approximately 1,800 AFY. These projects provide additional benefits, including improving water quality in surface waters by reducing stormwater runoff volumes and providing wildlife habitat.

1.6 Land Use Considerations

1.6.1 Southern California Association of Governments

The Southern California Association of Governments (SCAG) is a Regional Transportation Planning Agency and a Council of Governments that develops planning strategies and programs in six counties in Southern California. The SCAG maintains a land use dataset that combines regional data from general plans, specific plans, zoning codes, and existing land use. Their data is reviewed by local jurisdictions and is used for research purposes. The SCAG land use data includes 136 land use descriptions, which are further organized into 22 land use categories. A complete list of land use categories is available online through the SCAG GIS Open Data Portal (http://gisdata-scag.opendata.arcgis.com/). The SCAG dataset includes land use designations for the Plan Area and San Timoteo Wash Watershed for years 1990, 1993, 2001, 2005, 2012 and 2016 (Figures 1-6 to 1-11).

SCAG land use categories were combined into nine land use categories within the San Timoteo Wash Watershed. The nine land use categories are: Single-Family Residential (Single Family Residential and Mobile Home and Trailer Parks), Multi-Family Residential, Rural Residential (Mixed Residential and Rural Residential), Commercial, Office and Industrial (General Office, Commercial and Services, Industrial, Mixed Commercial and Industrial, and Mixed Residential and Commercial), Facilities (Facilities, Education, and Transportation, Communications, and Utilities), Open Space and Recreation, Agriculture, Vacant and Undeveloped or Protected (Vacant, Undevelopable or Protected, and Under Construction), and Water.

The predominant land use types in the Plan area from 1990 to 2016 include Vacant and Undeveloped or Protected Land and Single Family Residential, which combined, made up 82% of the Plan Area in 1990 and 70% of the Plan area in 2016.

The primary land use changes within the Plan Area from 1990 to 2016 include a decrease in Vacant and Undeveloped or Protected Land (19% decrease) and an increase in Single Family Residential (10% increase) and Open Space and Recreation (7% increase). Rural Residential, Facilities, and to a lesser extent, Commercial, Office, and Industrial, and Multi-Family Residential have increased since 1990, while Agriculture land use has decreased. A comparison between land use types by available year is presented in Table 1-6.

Land use changes in the last 8 years represent the most recent changes in the Plan area. Land use within the Plan Area in 2012 consisted primarily of Vacant and Undeveloped or Protected Land (50%) and Single Family Residential (33%). Land use types within the Plan Area that changed by 5% or less included Agriculture (5%), Facilities (4%), Open Space and Recreation (3%), Commercial, office, and Industrial (2%), Rural Residential (2%), and Multi-Family Residential (1%). Land Use changes within the Plan Area from 2012 to 2016 show a decrease in Vacant and Undeveloped or Protected Land (35%), while nearly all other land use types increased, with the exception of Multi-Family Residential, which remained the same (1%).

Table 1-6. Historical Land Use in the Yucaipa Subbasin Plan Area

Land Use Category	Year 1990	Year 1993	Year 2001	Year 2005	Year 2012	Year 2016
Vacant and Undeveloped or Protected Land	54%	53%	52%	49%	50%	35%
Single-Family Residential	28%	28%	30%	33%	33%	35%
Open Space and Recreation	1%	2%	2%	3%	3%	8%
Agriculture	10%	10%	7%	6%	5%	7%
Rural Residential	2%	2%	2%	2%	2%	6%
Facilities	3%	3%	3%	3%	4%	5%
Commercial, Office, and Industrial	2%	2%	2%	3%	2%	3%
Multi-Family Residential	0.4%	0.4%	0.4%	0.4%	1%	1%

1.6.2 General Plans and Other Land Use Plans

General plans are considered applicable to the GSP to the extent that they may change water demands within the Yucaipa Subbasin or affect the ability of the Yucaipa GSA to achieve sustainable groundwater management over the planning and implementation horizon. General Plans applicable to the Yucaipa Subbasin are (1) City of Calimesa, (2) the City of Redlands, (3) the City of Yucaipa, (4) the County of Riverside, and (5) the County of San Bernardino.

Based on the timing of the adoption of any General Plan Updates and the GSP, the land use planning agencies and Yucaipa GSA will be subject to the following California Government Code sections pertaining specifically to the coordination of planning and the SGMA-related documents:

- California Government Code, Section 65350.5 – requires that the planning agency review and consider GSPs prior to General Plan adoption.
- California Government Code, Section 65352 – requires that prior to adoption of a General Plan Update, the legislative body must refer the plan to the GSA for review.
- California Government Code, Section 65352.5 – requires that the GSA provide the current version of the GSP to planning agencies preparing to update or adopt the General Plan.

All existing general plans and future updates undergo an analysis of environmental impacts under the California Environmental Quality Act (CEQA). In addition, all discretionary projects proposed within the Yucaipa Subbasin under municipal, County, and/or state jurisdiction are required to comply with CEQA. In 2019, the Governor's Office of Planning and Research released an update to the CEQA Guidelines that included a new requirement to analyze projects for their compliance with adopted GSPs. Specifically, the applicable significance criteria include the following:

- Would the program or project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?
- Would the program or project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Therefore, to the extent general plans allow growth that could place additional demand on groundwater supply, such projects would be evaluated for their consistency with adopted GSPs and for whether they adversely impact the sustainable management of the Subbasin. Under CEQA, potentially significant impacts identified must be avoided or substantially minimized unless significant impacts are unavoidable, in which case the lead agency must adopt a statement of overriding considerations.

1.6.2.1 City of Calimesa

1.6.2.1.1 Plan Description

The current General Plan for the City of Calimesa was adopted on August 4, 2014 (Calimesa 2014). The planning area examined in the City of Calimesa's General Plan encompasses approximately 14.9 square miles, or 9,533 acres. The General Plan identified nine existing land use categories as of 2013, which were categorized and ordered from most to least area covered in the 9,533 acres: vacant (74.1%), single-family residential (12.7%), roads (5.3%), commercial (4.6%), open space (1.1%), multi-family residential (1.0%), residential (0.5%), manufactured/mobile homes (0.5%), and agricultural (0.2%). The General Plan reports that SCAG projects the population of the City of Calimesa to increase from 7,879 in 2010 to 25,800 in 2035.

Future development is expected to occur within three Specific Plan Areas; these areas include the Summerwind Ranch, Mesa Verde Estates, and the Heritage Oaks Equestrian Area. The Summerwind Ranch Specific Plan is not located within the Plan Area. The Mesa Verde Estates Specific Plan area is located in the northwest portion of the City of Calimesa and is a 1,493-acre approved development of up to 3,850 dwelling units, as well as mixed-use, open space, recreation, and public facility uses. An EIR and Water Supply Assessment was prepared to address water supply for the Mesa Verde Estates Specific Plan Area. The Heritage Oaks Equestrian Community Specific Plan is located in the northeast area of the City of Calimesa's limits and includes the development of 54 acres for 45 single-family homes. The City of Calimesa also identified two commercial areas to promote and expand commercial businesses: the Service Commercial Improvement Area and the Southern Calimesa Blvd Corridor Area.

1.6.2.1.2 How the Plan May Affect Sustainable Water Management

The City of Calimesa is supplied water from YVWD, South Mesa, and the Beaumont Cherry Valley Water District, which serves the eastern areas of the City of Calimesa outside the service areas of YVWD and South Mesa. City of Calimesa water services in the Plan Area are managed by plans and policies developed by YVWD. The policies are intended to manage local water resources sustainably and encourage water use conservation. Additionally, the General Plan listed the following policies to manage water resources within the City's limits:

- Support water conservation efforts through water efficiency, capture and reuse
- Maintain drainages in the natural condition
- Encourage the use of low-flow irrigation systems and water-efficient plumbing fixtures
- Require the use of drought-tolerant landscaping in new developments and encourage the replacement of existing water-consumptive landscaping.
- Require the use of non-potable and reclaimed water for irrigation purposes
- Require the use of low impact developments to reduce surface water runoff from new developments.

Updates to the General Plan will likely incorporate the GSP to aid in resource management practices. The policies implemented by YVWD and the City's policies summarized in the General Plan are considered in the GSP, and so the General Plan will not affect sustainable management of the subbasin.

1.6.2.1.3 How the GSP May Impact the Water Supply Assumptions of the General Plan

The City of Calimesa's General Plan includes policies to manage water resources, including water conservation measures and encourages the use of reclaimed water for irrigation purposes. These policies align with YVWD's policies to conserve water usage and increase the use of recycled water within its service area. Additionally, the General Plan includes policies addressing existing and new infrastructure for water services provided by Yucaipa GSA members YVWD and South Mesa. The General Plan emphasizes that the City will work with YVWD and South Mesa on the following:

- Coordinate capital improvement projects with YVWD and South Mesa.
- Require new developments to have adequate facilities for potable and non-potable water systems.
- Require that all water systems meet normal and emergency demands.
- Ensure that city facilities are designed and operate in adherence with water conservation practices and programs.
- Coordinate with YVWD to ensure that new developments include adequate collection, treatment, and disposal of wastewater so as not to exceed wastewater treatment capacity.
- All new residential development on 1 acre or less is required to be connected to the public sewer system. Developments greater than 1 acre may be required to connect to the public sewer system.

Projects identified in the GSP as helping to maintain or achieve sustainable management of groundwater in the Subbasin will be evaluated against these policies in General Plan updates. The GSP will not impact the water supply assumptions of the General Plan as YVWD and South Mesa, both member agencies of the Yucaipa GSA and participants in developing the GSP, will continue supplying water to meet the demands by the City of Calimesa.

1.6.2.2 City of Redlands

1.6.2.2.1 Plan Description

The City of Redlands General Plan was adopted in December 2017 (City of Redlands 2017). The General Plan identifies 16 existing major land use categories, which include Agriculture, Rural Living, Very Low Density Residential, Low Density Residential, Low Medium Density Residential, Medium Density Residential, High Density Residential, Office, Commercial, Commercial/Industrial, Light Industry, Public Institutional, Parks/Golf Courses, Open Space, Hillside Conservation, and Resource Preservation. The City anticipates that future development will occur as an expansion or redevelopment of existing structures, specifically within the East Valley Corridor and Transit Village area. Much of the land within the City of Redlands has already been developed. Future development is expected to increase population size by 16,355 to a total build out population of 93,624.

1.6.2.2.2 How the Plan May Affect Sustainable Water Management

The General Plan identifies two focus areas in the south-eastern section of the City that exist within the Plan Area. These areas are called the "Southern Hills and Canyons" and the "Southeast Area". The "Southern Hills and Canyons" area is defined by San Timoteo Canyon and Live Oak Canyon where development is limited to large single-family homes. The topography is characterized as having steep terrain and rugged canyon walls. The "Southeast Area" somewhat overlaps the "Southern Hills and Canyons" and offers the same topography. The General Plan proposes to retain the natural terrain and environmental conditions of the area. Therefore, future development will be limited with existing and future water sources originating from outside these areas. The General Plan will not affect sustainable water management in this area of the Yucaipa Subbasin because development is limited now and into the future.

1.6.2.2.3 How the GSP May Impact the Water Supply Assumptions of the General Plan

South Mountain operates two wells, Chicken Hill and Hog Canyon, in the Yucaipa Subbasin. Water supplied by these wells is used for irrigation purposes at the Crafton Hills College and Dangermond Park Foundation, in which Crafton Hills College is partially located in the northern area of the Western Heights subarea. These wells, in total, have produced an average 540 AFY from water year 1966 to 2018 (a water year extends from October 1 to September 30 of the following calendar year). The wells are located in the western portion of the Calimesa subarea near the Chicken Hill Fault.

1.6.2.3 City of Yucaipa

1.6.2.3.1 Plan Description

The City of Yucaipa's General Plan was adopted in April 2016 (City of Yucaipa 2016). The General Plan includes a Land Use Plan that guides land development in the City. The plan identifies 12 existing land use categories, which include Rural Living, Single Residential, Multiple Residential, Neighborhood Commercial, General Commercial, Service Commercial, Community Industry, Institutional, Floodway, Parks, Open Space, and Planned Development. Future development is governed by the anticipated maximum buildout, which considers the total amount of allowed development in the City. Future development includes the Custom Home Overlay, College Village Overlay, Oak Glen Creek Specific Plan, Uptown Specific Plan, Freeway Corridor Specific Plan, and Mobile home Park Overlay District

1, 2, and 3. These future development projects will increase available housing units and therefore contribute to the estimated population buildout of 77,328 people.

The City of Yucaipa receives water services from YVWD, South Mesa, and WHWC. YVWD is the largest municipal provider of water and sewer services to more than 50,000 residents in the City limits. WHWC serves the Dunlap Acres planning area in the Western Heights subbasin. South Mesa serves water within its service area south of Wildwood Canyon Road between Interstate 10 and Holmes Street. The General Plan projects considerable growth and future demand for water that will require additional water supply. Water supply is a critical component of the General Plan, which has established policies to help ensure the reliable supply of water in the future.

1.6.2.3.2 How the Plan May Affect Sustainable Water Management

From the standpoint of infrastructure planning, the General Plan adopted "infrastructure levels of service" that vary based on land use type and the anticipated needs for that land use. For instance, the needs of a high-density development area may be significantly greater than areas designated as low-density. The General Plan established four levels in an "Improvement Level System (ILS)" for different land uses/planning areas. These levels are:

- Level 1 – high-density development planned for commercial, industrial, multi-family, and high-density single-family residences.
- Level 2 – applies to lot sizes of 0.5-acre to 1-acre of high-density with existing infrastructure.
- Level 3 – applies to transitional areas where existing low-density development is expected to convert to higher density in the future.
- Level 4 – applies to areas with limited low-density development under existing conditions and into the future due to resource constraints and/or rural living environments.

New infrastructure for water and sanitary sewer services will require compliance and adherence to improvement standards established for Levels 1 through 3 in the General Plan. Projects identified in the GSP to help a chieve sustainable management of the subbasin will also require review and evaluation under the ILS depending on where the project is proposed and the land use type (either existing or proposed). The City implements various programs and/or fees to assist with the funding of new infrastructure and maintaining services. Funds are raised through a combination of impact fees, grants, fair share cost arrangements, and service fees. These funds may supplement the costs anticipated for the Yucaipa GSA in implementing programs identified in this GSP to achieve groundwater sustainability.

1.6.2.3.3 How the GSP May Impact the Water Supply Assumptions of the General Plan

The City of Yucaipa General Plan identified a number of policies that encompass an overall management strategy to ensure a reliable and sustainable supply of water to meet existing and future demands. These policies include:

- Work with YVWD, WHWC and South Mesa to plan, build and manage water supply, treatment, storage, and distribution systems to provide a reliable and high-quality water supply. The City will work with the water purveyors to manage stormwater runoff, protecting wellheads, using best management practices, monitoring water quality, and employing the latest water treatment technologies to ensure the highest water quality.
- Require water supply assessments and additional fees for new developments to ensure a long-term supply of water.

- Increase the use of recycled water to supplement irrigation supply, and support water conservation measures and practices that meet state and federal mandates and comply with urban water management plans.
- Increase stormwater capture, where possible.
- Support drought contingency planning and pursue capital projects to improve groundwater management and supply via recharge projects and extracting groundwater at sustainable levels.

The General Plan also identified policies to ensure the collection, treatment, storage, reuse, and disposal of wastewater is safe, reliable, and protects existing and future water supplies while meeting the projected increases in services in the long-term. The General Plan identified the following policies to manage wastewater within the City:

- Work with YVWD to ensure that adequate infrastructure is developed to serve existing and future needs. This includes continuing to provide support for the Yucaipa Valley Brineline and other new infrastructure that enhance wastewater treatment, phasing out septic systems and connecting users to the sanitary sewer system, and installation of recycled water infrastructure to serve residential and commercial properties.
- Support educational programs and outreach to inform the public on ways to conserve water usage, which in turn reduces demands on the wastewater treatment systems, and minimize sanitary sewer overflows.
- Require new developments that add substantial impervious surfaces to integrate low impact development best management practices to reduce stormwater runoff.

These policies align with this GSP and its goal of expanding the water supply portfolio for the subbasin with increased usage of recycled water for non-potable uses (e.g., applied irrigation), eliminating septic systems to connect to sanitary systems, and encourage water conservation measures to achieve sustainable groundwater management.

1.6.2.4 County of Riverside

1.6.2.4.1 Plan Description

The County of Riverside's General Plan and, more specifically, the Pass Area Plan, was adopted in 2017 (County of Riverside 2017). The County of Riverside was segmented into plan areas to facilitate detailed planning for unincorporated areas defined uniquely by local interests and natural environments. The Pass Area includes the incorporated cities of Banning, Beaumont, and Calimesa, which are governed by their own general plans (see Section 1.6.2.1 for a discussion of the City of Calimesa's General Plan). However, the County General Plan does recognize the importance of coordinating with these cities when addressing land use and development to ensure that the goals of the general plans are achieved.

The Pass Area Plan defines five broad land use categories—Agriculture, Rural, Rural Community, Open Space, and Community Development. The majority of the Yucaipa Subbasin that lies within Riverside County is incorporated land within the City of Calimesa. Small portions of land east and west of the City of Calimesa are unincorporated lands within the County of Riverside and lie within The Pass Area Plan of the Riverside County General Plan. The unincorporated land east of the City of Calimesa limits lies within the sphere of influence for the City of Calimesa and YVWD. This area is designated as Rural Residential, Rural Mountainous, and Rural Community Foundation. These rural land use types characterize rural areas with parcels of 1 acre up to 10 acres with limited single-family dwelling units per parcel. The unincorporated area east of the City of Calimesa is the Cherry Valley area, which lies within the Cherry Valley Policy Area and within the sphere of influence of YVWD. This area is developed and is characterized as Rural Community Foundation. The intent of the Cherry Valley Policy Area is to maintain the predominantly rural community, while allowing existing high density uses to remain legally conforming.

1.6.2.4.2 How the Plan May Affect Sustainable Water Management

The County of Riverside has adopted a policy to "notify city planning departments about new proposed discretionary projects that are located adjacent to cities or within their sphere of influence, with sufficient advance notice to allow for City-County coordination and city comments at public hearings" (County of Riverside 2015). The County will consider entering into intergovernmental agreements with cities and other entities to address land use, infrastructure, the environment, and other subjects in developing plans and approaches for development in these unincorporated areas. From the standpoint of SGMA and groundwater sustainability, the Pass Area Plan includes policies to maintain the rural land use in the unincorporated areas of the County in the Yucaipa Subbasin, which limits development and use of local water resources. The County will work with the City of Calimesa and YVWD to ensure that any future development will incorporate policies and programs implemented by both to protect and manage water resources, while maintaining their respective rural and natural environments.

1.6.2.4.3 How the GSP May Impact the Water Supply Assumptions of the General Plan

The rural land use types designated in the unincorporated areas of the Pass Area Plan include parcels of 1 acre to 10 acres with one to two dwelling units. Parcels not receiving service by YVWD are characterized as private domestic well users (i.e., de minimis extractors) with an average water consumption of 2 AF or less per year. These users are subject to SGMA and regulations imposed by the Yucaipa GSA in the interest of sustainably managing groundwater resources in the Yucaipa Subbasin.

1.6.2.5 County of San Bernardino

1.6.2.5.1 Plan Description

The County of San Bernardino's general plan was adopted in 2007 and was amended in 2014 (County of San Bernardino 2014). The General Plan identifies 18 land use zoning districts, which include Resource Conservation, Agriculture, Rural Living, Single Residential, Multiple Residential, Office Commercial, Neighborhood Commercial, Rural Commercial, Highway Commercial, General Commercial, Service Commercial, Community Industrial, Regional Industrial, Institutional, Special Development, Floodway, Specific Plan, and Open Space. Only a small portion of the Yucaipa Subbasin in the northeast corner is unincorporated land within the limits of the County of San Bernardino, where the major land use type is Rural Residential (low density) or vacant land. This is the Oak Glen Community Planning Area. The County released a draft Community Action Plan for Oak Glen in May 2019 and is currently available for public review.

The Oak Glen Community Action Plan notes that 64% of the land use in the community is rural living, while 36% is agriculture and resource conservation. The community action plan strives to maintain the rural and historical agricultural character of the region, including preserving the historical landmarks and areas that define the apple orchards that significantly bolstered the local economy. The General Plan, outside the Community Action Plan for Oak Glen, addresses water resources and includes policies to protect and ensure a clean supply for all users in the County.

1.6.2.5.2 How the Plan May Affect Sustainable Water Management

The general policies adopted in the County General Plan for water supply include the following:

- Require new development to connect to public water systems or a County-approved water supply well to ensure clean and resilient supply.
- Promote the use of recycled water for irrigation purposes, groundwater recharge where permitted, and other uses to supplement groundwater supplies.
- Promote water conservation.
- Collaborate with local groundwater sustainability agencies, water masters, water purveyors, and others to sustainably manage groundwater usage.
- Promote the development of additional water storage and conveyance systems to build and maintain a resilient water supply system throughout the County.
- Require new developments of 0.5-acre parcel and smaller to connect to public sewer systems, and possibly for larger lots where the local groundwater conditions require additional protection.
- Maintain flood control systems, either built or natural, to manage and reduce flood risk. Natural drainages are maintained to also protect wildlife corridors, prevent loss of critical habitat, and improve the amount and quality of surface water and groundwater resources.

The County will collaborate with the Yucaipa GSA on developing policies in the GSP that achieve sustainable groundwater management in the unincorporated area of the Oak Glen subbasin where the County General Plan covers land use and administers its policies.

1.6.2.5.3 How the GSP May Impact the Water Supply Assumptions of the General Plan

As described for the rural land use types in Riverside County within the Yucaipa Subbasin, the private domestic well users (i.e., de minimis extractors) are subject to SGMA and the regulations set by the Yucaipa GSA in the interest of sustainably managing groundwater resources in the Yucaipa Subbasin.

1.6.3 Urban Water Management Plans

Urban water suppliers are required to prepare a UWMP every 5 years. These plans support the suppliers' long-term resource planning to ensure that adequate water supplies are available to meet existing and future water needs (California Water Code, Sections 10610–10656 and 10608). Every urban water supplier that either provides over 3,000 AF of water annually or serves more than 3,000 urban connections is required to submit a UWMP. Within UWMPs, urban water suppliers must:

- Assess the reliability of water sources over a 20-year planning time frame
- Evaluates the water supply under the stress of drought
- Describe demand management measures and water shortage contingency plans
- Report progress toward meeting a targeted 20% reduction in per-capita (per-person) urban water consumption by the year 2020
- Discuss the use and planned use of recycled water

The information collected from the submitted UWMPs is useful for local, regional, and statewide water planning. Besides annual review of the GSP, the 5-year evaluation interval required for GSPs under SGMA will be coordinated with the 5-year review interval for UWMPs.

1.6.3.1 2015 San Bernardino Valley Regional Urban Water Management Plan

The 2015 San Bernardino Valley Regional Urban Water Management Plan (RUWMP) was developed for retail water purveyors operating in the SBVMWD service area. The City of Redlands and YVWD participated in the development of the RUWMP (WSC 2018).

A UWMP is a planning tool that generally demonstrates the water supply reliability of an urban water supplier(s). The RUWMP includes plans to enhance water supplies from traditional sources such as the SWP, as well as other options, including water recycling, stormwater capture, and water banking/conjunctive use. Senate Bill X7-7 (SB X7-7), also known as the Water Conservation Act of 2009, which was incorporated into the UWMP Act in 2009, requires that all water suppliers increase water use efficiency with the overall goal to decrease per-capita water consumption within the state by 20 percent by the year 2020. All of the urban water suppliers in the 2015 RUWMP have reported compliance with SB X7-7.

1.6.3.1.1 Yucaipa Valley Water District

The 2015 RUWMP reported that, as of March 2016, approximately 96% of YVWD's service connections were to single-family and multi-family residences, 1.8% commercial, and approximately 1.5% for irrigation purposes. YVWD anticipates no change to the customer base in the foreseeable future. Total water demand for YVWD was 11,000 AF in 2015 and is projected to be 19,500 AF by 2040 (WSC 2018). YVWD relies on four primary water resources to meet its customer demands. These include groundwater, surface water, imported SWP water, and recycled water. The 2015 RUWMP identified a number of programs implemented by YVWD to meet the projected water demands within its service area. These programs include:

- Conducted a distribution water system loss analysis to identify areas where and reasons why losses were occurring in the distribution system. YVWD has implemented programs to reduce the volume of water lost via the distribution system.
- Per SB X7-7, the Water Conservation Bill of 2009, YVWD identified a baseline of water usage within its service area for a 5-year average of 212 GPCD from 2005-2009, and a 10-year average of 219 GPCD from 2000-2009. YVWD established a compliance water use target for 2020 at 80% of the 10-year baseline usage, or 175 GPCD.
- YVWD implemented a number of demand management measures to promote water conservation. These include:
    - Water loss analysis
    - Implemented a retail conservation pricing scheme to reward water efficient customers
    - Adopted a water shortage contingency plan (see Section 1.5.2.2) describing voluntary and mandatory measures to be taken by customers to conserve water use during different levels of supply
    - Meters are in use by all YVWD customers; YVWD has implemented conservation pricing and conducted public outreach and education to promote water conservation

  - YVWD is participating in regional planning efforts to capture stormwater runoff for purposes of recharging the groundwater basin
  - YVWD has implemented a recycled water reuse program that meets 10%–15% of the total water demand. Recycled water is used for irrigation purposes, including eventually serving golf courses, parks, landscape areas, and eventually residential homes via dual plumbing

1.6.4 Well Permitting Policies and Procedures

The agencies responsible for issuing permits for new or replacement wells in the Plan Area are the County of San Bernardino EHS and the County of Riverside DEH.

1.6.4.1 County of Riverside

Wells drilled within the jurisdiction of the County of Riverside are regulated through Ordinance No. 682, which provides the minimum standards for well construction, reconstruction, destruction, and abandonment. Riverside County DEH enforces the provisions of the ordinance through Chapter 13801(c) of the California Water Code. The purpose of the ordinance is to provide safe water to the County of Riverside and protect groundwater resources. The standards for well construction, reconstruction, abandonment, and destruction are adopted from the California Department of Water Resources Bulletin No. 74-81 and 74-90 (California Well Standards).

The Ordinance requires that a permit application be filed with the County of Riverside DEH before the construction of a production or injection water well, cathodic protection well, monitoring well, or geothermal heat exchange well. Wells must be drilled by a C-57 contractor registered with the County of Riverside DEH. The County of Riverside DEH reviews permits to ensure compliance with California Well Standards and the Ordinance and may inspect the construction of each well to evaluate compliance with these permit conditions. Among the inspection criteria are set back distances, surface construction features, disinfection standards, water quality testing, and minimum well production standards. The County of Riverside DEH may deny a well permit if the permit does not meet the required standards. If wells are drilled, a well completion report, or well log, must be submitted to the Riverside DEH within 60 days of well completion.

1.6.4.2 County of San Bernardino

Wells drilled within the jurisdiction of the County of San Bernardino are regulated through Ordinance No. 3872, which provides the standards for permitting groundwater wells. The ordinance outlines the requirements of a permit, as well as the review and approval process. The ordinance also outlines excluded parties that are not subject to the well permitting requirements of the County of San Bernardino. A summary of excluded parties are as follows:

- Adjudicated groundwater basins within the Mojave Water Agency and Public Water Districts boundary
- A water district that has adopted a groundwater management plan pursuant to California Water Code 10750 and executed a MOU or other binding agreement with the County of San Bernardino
- Groundwater wells subject to the Lower Colorado Water Supply Project
- Groundwater wells within the jurisdictional boundary of the Mojave Water Agency. This included public water agencies within the Morongo Basins
- Groundwater wells approved before the effective date of October 2002

- Groundwater wells used for a mining operation that has a mining reclamation plan
- Agricultural wells, which use less than 1,100 AFY from all wells associated with the agricultural operation
- Groundwater wells that replace abandoned wells, as long as the well casing size and pumping capacity is less than or equal to the abandoned well
- Groundwater wells with a diameter less than ten inches and extraction amount less than 30 AF per year, unless the parcel has other wells, in which case groundwater extraction cannot be 50 AF from the entire parcel
- Groundwater wells located on federal lands

For wells in which the ordinance applies, the County of San Bernardino EHS provides steps for well permitting. The well owner must select a C-57 well driller or consultant who will complete and submit a permit to the County of San Bernardino EHS and pay necessary fees. If the permit is approved and the well is drilled, the well driller must submit a Well Completion Report to County of San Bernardino EHS with 30 days. The County of San Bernardino EHS then schedules a field inspection to verify the surface completion is constructed in accordance with standards outlined in California Well Standards. For domestic and individual wells, the County of San Bernardino EHS collects water quality samples and provides them to the owner via mail or email.

1.7 Notice and Communication

Notification and communication regarding the development of the Yucaipa Subbasin GSP takes place in the following four key phases:

1. Initial Notification
2. GSP Development
3. Draft GSP Review and Comment
4. GSP Implementation

The Initial Notification was completed with the submittal of a Notice of Intent on June 27, 2017, to DWR to develop a GSP for the Yucaipa Subbasin. The GSP Development phase included extensive outreach and engagement with the stakeholders, including beneficial users, as described in more detail in Section 1.9, Public Meetings Summary.

The Draft GSP Review and Comment phase included a formal public comment period for the Draft GSP and response to comments, as discussed in Section 1.9.2, Public Review of Draft GSP: Summary of Comments and Responses. The GSP Implementation notification and communication period will begin once the Yucaipa GSA submits the final GSP to DWR and will include engagement with the public and beneficial users regarding the progress of monitoring and reporting updates on the GSP to DWR, establishment of fees, and the development and implementation of management strategies, including projects as needed.

1.8 Summary of Beneficial Uses and Users

Water resources utilized in the Plan Area include local groundwater produced from the principal aquifer in the Yucaipa Subbasin, imported SWP water from SBVMWD and SGPWA, surface water diverted from Oak Glen Creek, recycled water from the WRWRF, and captured stormwater at the Oak Glen Creek spreading basins (and Wilson

Creek basins during significant runoff events). Beneficial uses of groundwater include municipal and domestic supply, industrial and commercial, agricultural, and environmental uses. YVWD diverts surface water from Oak Glen Creek and Birch Creek to the Oak Glen Filtration Plant (OGFP) located in the Oak Glen subbasin. Recycled water produced from the WRWRF is served to YVWD customers via the recycled water distribution system for irrigation purposes only, or discharged to San Timoteo Creek at a point upstream of the Yucaipa Subbasin.

As discussed in Section 1.6, Land Use Considerations, land use in the Yucaipa Subbasin in 2016 was 42% residential (single-family, rural, and multi-family), 8% facilities and commercial/industrial, 8% open space and recreational, 7% agricultural, and the remaining 35% vacant and undeveloped land. The 2015 RUWMP noted that approximately 96% of the water served by YVWD is for residential use. Approximately 2.4% is for commercial, institutional and industrial use, with another 1.4% used for irrigation purposes. GDEs are the primary environmental users of groundwater in the Subbasin. The discharge of recycled water to San Timoteo Creek helps sustain the GDEs downstream of the WRWRF outfall. GDEs located in the upper elevations in the Oak Glen subarea and in the lower region of the Live Oak subarea are currently considered to be dependent on shallow groundwater.

Prior to 2008, 100% of the groundwater extracted by WHWC was supplied for residential (single-family, rural, and multi-family) and commercial/industrial/institutional purposes. Beginning in 2008, WHWC purchased SWP water from YVWD to supplement the local groundwater supply. WHWC continued to serve water (a mix of groundwater and SWP water) for residential and commercial/industrial/institutional purposes.

South Mesa supplies water for residential (single-family, rural, and multi-family) and commercial, industrial, institutional purposes. The water supply is 100% groundwater. South Mesa is evaluating the potential installation of retention basins to capture stormwater and/or recharge with SWP water within the Calimesa Management Area of the Yucaipa Subbasin. South Mesa also operates a water supply well in the adjudicated Beaumont Basin and conveys groundwater from that well to its service area.

Beneficial users of groundwater and property interests potentially affected by the use of groundwater are described in the following paragraphs.

1.8.1 Surface Water Users

The primary surface water user within the Yucaipa Subbasin is YVWD, which diverts stream flow from the ephemeral Oak Glen Creek and diverted stream flow from Birch Creek between 2001 and 2009. The surface water is processed at the Oak Glen Filtration Plant and is added to YVWD's drinking water distribution system.

The Yucaipa Valley Water Conservation District built the Wilson Creek spreading basins in 1934-1935. The Wilson Creek basins are adjacent to, but removed from, flows in Wilson Creek. However, a control structure at the forebay may be opened to allow extremely high flows from the creek into the basins. This is a rare occurrence. The Wilson Creek basins are used to artificially recharge the Yucaipa Subbasin using surplus SWP water delivered via the SWP East Branch Extension. The Wilson Creek basins have a 7,000 AFY capacity. The Oak Glen Creek basins, located 0.25-miles south of the Wilson Creek basins, were constructed to control flooding, enhance the infiltration of stormwater to the underlying groundwater, and create a wildlife habitat and ecological landscape for the public.

There are also environmental uses of surface water, as discussed in this section under Environmental Users.

1.8.2 Municipal Well Operators and Public and Private Water Purveyors

The three water purveyors, South Mesa, WHWC and YVWD, and two regional SWP wholesalers, SBVMWD and SGPWA, supply water for municipal uses in the Plan Area. South Mountain extracts groundwater from the Yucaipa Subbasin for irrigation purposes only. These entities are all represented in the Yucaipa GSA and have participated in the development in this GSP. South Mesa, South Mountain, WHWC and YVWD monitor groundwater levels and record groundwater volumes extracted from their respective wells. YVWD purchases SWP from SBVMWD and SGPWA and treats the imported water at their YVWRFF before serving to their customers. YVWD is also equipped to sell treated SWP to other water purveyors. YVWD may also divert surplus SWP water, when available, to the existing Oak Glen and Wilson Creek spreading basins to artificially recharge the aquifer. The importation of SWP water beginning in 2003 supplemented the groundwater supply, which led to a decrease in groundwater production from approximately 14,000 AF in the early 2000s to 8,500 AF in the 2018 water year.

1.8.3 Agricultural Users

Agriculture has been a minor user of local groundwater in the subbasin, particularly since the 1970s when an increase in the urbanization of the region led to the conversion of agricultural, undeveloped and rural residential areas to single-family residential areas. Agriculture constitutes 7% of the current land use in the Plan Area. The primary crops grown in the Yucaipa Subbasin are citrus, apples, avocados, corn, sorghum and sudan, melons, squash and cucumbers (DWR 2016).

1.8.4 Domestic Users

The USGS identified 32 private wells with historical pumping in the Subbasin (Section 2.5.3, Groundwater Production Wells). Annual production by private well owners averaged approximately 3,200 AFY in the 1960s to an average 375 AFY after 2005. Private users constituted less than 4% of the total production from the Subbasin since 2005. Information on private wells in the Subbasin is mostly unknown. The Yucaipa GSA recognizes this lack of information as a data gap in evaluating conditions in the Subbasin. The Yucaipa GSA will make efforts in the next 5 years to contact the known and potential private well users to obtain information on well location, construction, and production. The majority of water users in the Yucaipa Subbasin are supplied water from YVWD, South Mesa, and WHWC.

1.8.5 Local Land Use Planning Agencies

The Yucaipa GSA includes the City of Yucaipa, the City of Redlands, and the County of San Bernardino and the County of Riverside as member agencies, all of whom have land use planning agencies and have developed their respective general plans. The City of Calimesa, although no longer a member agency in the Yucaipa GSA, is a stakeholder and conducts land use planning within its sphere of influence. The direct involvement of these public agencies in the development of the Yucaipa Subbasin GSP will ensure that General Plan Updates consider groundwater sustainable management and the GSP.

1.8.6 Environmental Users

Environmental users of groundwater are concentrated in the GDEs and potential GDEs described further in Chapter 2. These environmental users are concentrated along Oak Glen Creek, Yucaipa Creek, and San Timoteo Creek and consist predominantly of coast live oak (*Quercus agrifolia*), willow (*Salix* sp.), and cottonwood (*Populus* sp.). Yucaipa GSA has included GDEs in its evaluation of sustainable yield and has incorporated the interests of environmental users in the development of the GSP.

1.8.7 California Native American Tribes

According to the U.S. Bureau of Indian Affairs California Tribal Homelands and Trust Land Map, as of January 2019, there are not currently any federally recognized Indian Tribes, Indian land currently or historically held in trust by the U.S. government, or smaller Reservation or Rancheria areas in the Yucaipa Subbasin (Figure 1-12, Tribal Trust Lands).

1.8.8 Disadvantaged Communities

There are several communities within the Yucaipa Subbasin that DWR has mapped as Disadvantaged Communities (DAC) and Severely Disadvantaged Communities (SDAC) based on median household income within community census tracts, blocks, and places as shown on Figure 1-13, Disadvantaged Communities (DWR 2021b). The populations for each of these communities are included in the legend on Figure 1-13. The majority of these communities are within the service areas of YVWD and South Mesa and receive their water supply from these two water purveyors. DACs in the northeast corner of the Oak Glen area may rely on local groundwater (see Section 1.8.4, Domestic Users). The majority of the areas designated as DAC and SDAC are within either the City of Yucaipa or the City of Calimesa. Members of these communities are represented on the Yucaipa GSA by both their City representative and their water suppliers. Although it is not currently reflected as such in the DWR DAC Mapping Tool, South Mesa's service area has recently been recognized by DWR as a SDAC.

1.9 Public Meetings Summary

Yucaipa GSA has been holding public meetings to discuss the development of the GSA and the GSP since December 2017. Table 1-7 summarizes the Yucaipa GSA public meetings in which the participants discussed or took action on the development of the Yucaipa Subbasin GSP. Note that the list will be updated as additional meetings occur.

Table 1-7. Summary of Public Meetings Held by Yucaipa GSA

Yucaipa GSA Meetings	Date
Yucaipa GSA Board Meeting	12/19/2017
Yucaipa GSA Workshop	1/30/2018
Yucaipa GSA Workshop	2/28/2018
Yucaipa GSA Special Workshop	3/14/2018
Yucaipa GSA Workshop	3/28/2018
Yucaipa GSA Workshop	4/25/2018
Yucaipa GSA Workshop	5/23/2018

Table 1-7. Summary of Public Meetings Held by Yucaipa GSA

Yucaipa GSA Meetings	Date
Yucaipa GSA Workshop	6/27/2018
Yucaipa GSA Workshop	8/9/2018
Yucaipa GSA Workshop	8/29/2018
Yucaipa GSA Workshop	9/26/2018
Yucaipa GSA Workshop	10/24/2018
Yucaipa GSA Workshop	11/14/2018
Yucaipa GSA Board Meeting	1/23/2019
Yucaipa GSA Workshop	2/27/2019
Yucaipa GSA Workshop	3/27/2019
Yucaipa GSA Workshop	4/24/2019
Yucaipa GSA Workshop	5/22/2019
Yucaipa GSA Special Meeting	6/19/2019
Yucaipa GSA Workshop	6/26/2019
Yucaipa GSA Board Meeting	7/24/2019
Yucaipa GSA Workshop	8/28/2019
Yucaipa GSA Workshop	9/25/2019
Yucaipa GSA Board Meeting	10/23/2019
Yucaipa GSA Board Meeting	1/22/2020
Yucaipa GSA Workshop	4/22/2020
Yucaipa GSA Workshop	5/27/2020
Yucaipa GSA Workshop	6/24/2020
Yucaipa GSA Board Meeting	7/22/2020
Yucaipa GSA Workshop	8/26/2020
Yucaipa GSA Workshop	10/28/2020
Yucaipa GSA Board Meeting	1/27/2021
Yucaipa GSA Workshop	2/24/2021
Yucaipa GSA Workshop	3/24/2021
Yucaipa GSA Board Meeting	4/28/2021
First Community Engagement Meeting	4/28/2021
Yucaipa GSA Workshop	5/26/2021
Yucaipa GSA Workshop	6/9/2021
Yucaipa GSA Workshop	6/16/2021
Yucaipa GSA Workshop	6/23/2021
Yucaipa GSA Workshop	6/30/2021
Yucaipa GSA Workshop	7/14/2021
Yucaipa GSA Workshop	7/21/2021
Yucaipa GSA Board Meeting	7/28/2021
Yucaipa GSA Workshop	8/11/2021
Yucaipa GSA Workshop	8/25/2021
Yucaipa GSA Workshop	9/22/2021
Yucaipa GSA Board Meeting	10/27/2021
Second Community Engagement Meeting	11/16/2021
Yucaipa GSA Workshop	12/08/2021

Table 1-7. Summary of Public Meetings Held by Yucaipa GSA

Yucaipa GSA Meetings	Date
Yucaipa Special Board Meeting	12/22/2021
Yucaipa Board Meeting	01/26/2022

Note: GSA = Groundwater Sustainability Agency.

1.9.1 Communication

A public outreach and engagement plan was developed for the development of the Yucaipa Subbasin GSP (Appendix 1-C). The purpose of the public outreach and engagement plan is to create a common understanding and transparency throughout the groundwater sustainability planning process, including fulfilling the requirements of SGMA as described in DWR 2016b, Section 354.10.d. The public outreach and engagement plan discusses the Yucaipa GSA decision-making process; identifies opportunities for public engagement and provides a discussion of how public input and response will be used; describes how Yucaipa GSA encourages the active involvement of diverse social, cultural, and economic elements of the population within the Subbasin; and describes the methods Yucaipa GSA will follow to inform the public about progress implementing the public outreach and engagement plan, including the status of projects and actions.

Yucaipa GSA has provided ongoing and innovative opportunities for stakeholders to engage in the GSP development process. Yucaipa GSA has provided public notices of upcoming meetings to interested parties through monthly electronic emails. The meetings notices have provided information on the date, time and place for each meeting, and how the public may participate in the meeting. Due to the spread of COVID-19 in early 2020 and the Governor's Executive Order N-29-20 on March 17, 2020, "a local legislative body or state body is authorized to hold public meetings via teleconferencing and to make public meetings accessible telephonically or otherwise electronically to all members of the public seeking to observe and to address the local legislative body or state body." N-29-20 effectively waived the requirements in the Bagley-Keene Act and the Brown Act requiring the physical presence of members of the public to participate at public meetings. Accordingly, Yucaipa GSA stated in the monthly electronic notices of upcoming meetings after March 17, 2020, the following, "Due to the spread of COVID-19 and in accordance with the Governor's Executive Order N-29-20, this meeting will be conducted by teleconference only. There will be no location available to attend this meeting in person." To which the notices provided links to view in real-time the meeting online, and links to view the meeting agenda, meeting packet (both as a PDF and online). The notices also provided a telephone number for the public to call in and participate during the meeting.

Monthly updates and opportunities for public comment were provided at Yucaipa GSA Board Meetings and workshops. Meeting agendas and minutes are available on the Yucaipa GSA website (yucaipasgma.org). Yucaipa GSA encouraged active participation from stakeholders through two community engagement meetings held on April 28, 2021, and November 16, 2021.

1.9.2 Public Review of Draft GSP: Summary of Comments and Responses

The Draft GSP was made available to the public to review and provide comments on the Yucaipa GSA website on November 2, 2021. The Draft GSP was available online for a 30-day public comment period, which ended December 3, 2021. The Yucaipa GSA received a formal comment letter from South Mesa Water Company and a formal comment letter coauthored by The Nature Conservancy, Audubon California, the Local Government Commission, the Union of Concerned Scientists, and Clean Water Action/Clean Water Fund. The Yucaipa GSA also received email correspondence from the City of Yucaipa and the City of Redlands with comments on the Draft GSP. Copies of the formal letters and email correspondence from the two municipalities are included in Appendix 1-D. Responses to the comments are presented in a spreadsheet format in Appendix 1-D following the copies of the comments. Some of the responses included revisions to text and figures in the Draft GSP, and the insertion of new figures and appendices to address comments and questions on DACs, interconnected surface water, GDEs, the accounting of imported groundwater into the Plan Area, and a policy regarding pumping credits under Management Action No. 2 (see Section 4.2.2).

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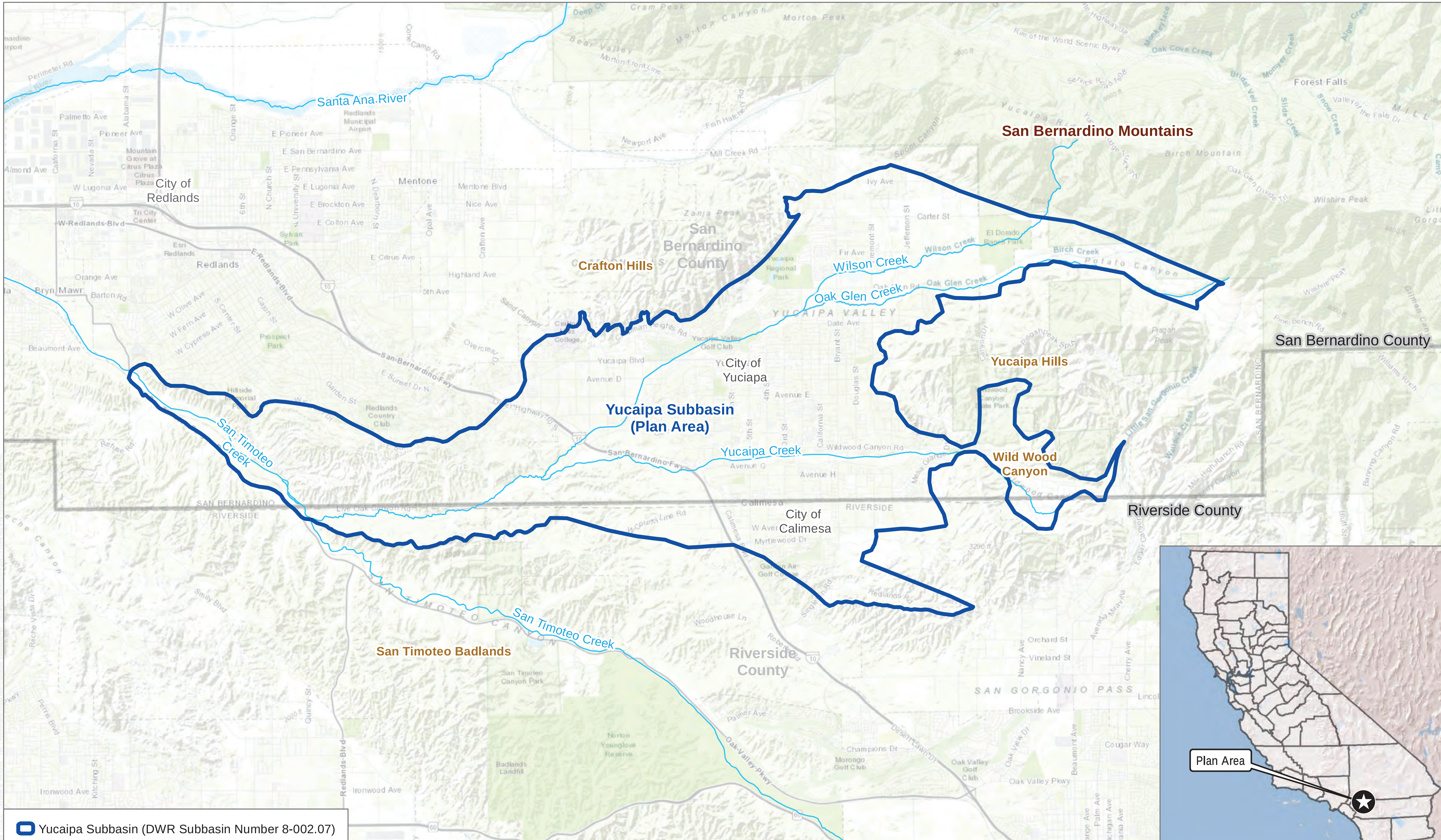

SOURCE: ESRI, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordanance Survey, ESRI Japan, METI, ESRI China (Hong Kong), swisstopo, OpenStreetMap contributors, and the GIS User Community; DWR 2015; USGS NHD 2017

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FIGURE 1-1

Vicinity Map of the Yucaipa Subbasin Plan Area

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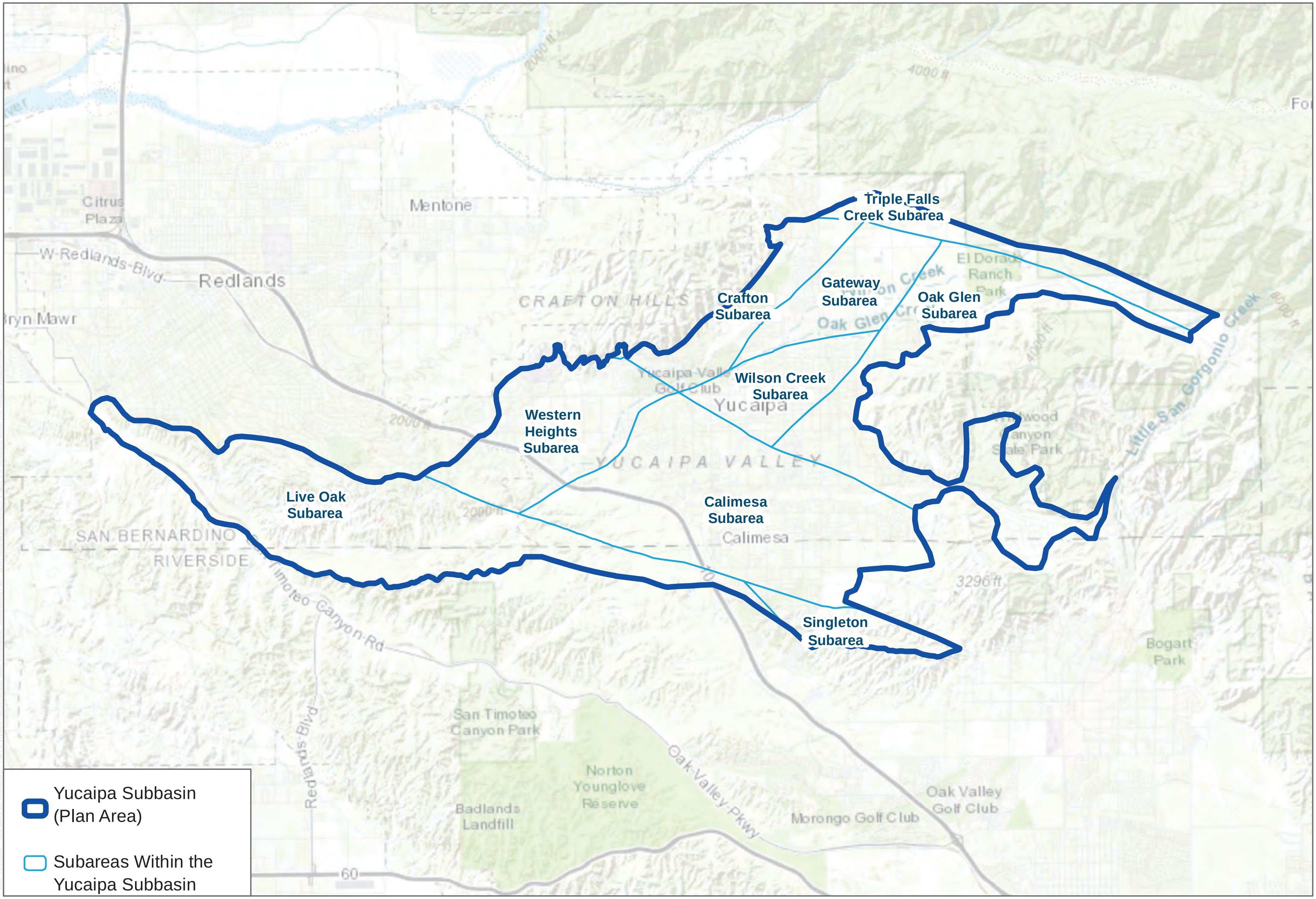

SOURCE: ESRI, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordanance Survey, ESRI Japan, METI, ESRI China (Hong Kong), swisstopo, OpenStreetMap contributors, and the GIS User Community; DWR 2015; USGS NHD 2017

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FIGURE 1-2

Hydrogeologic Subareas in the Yucaipa Subbasin

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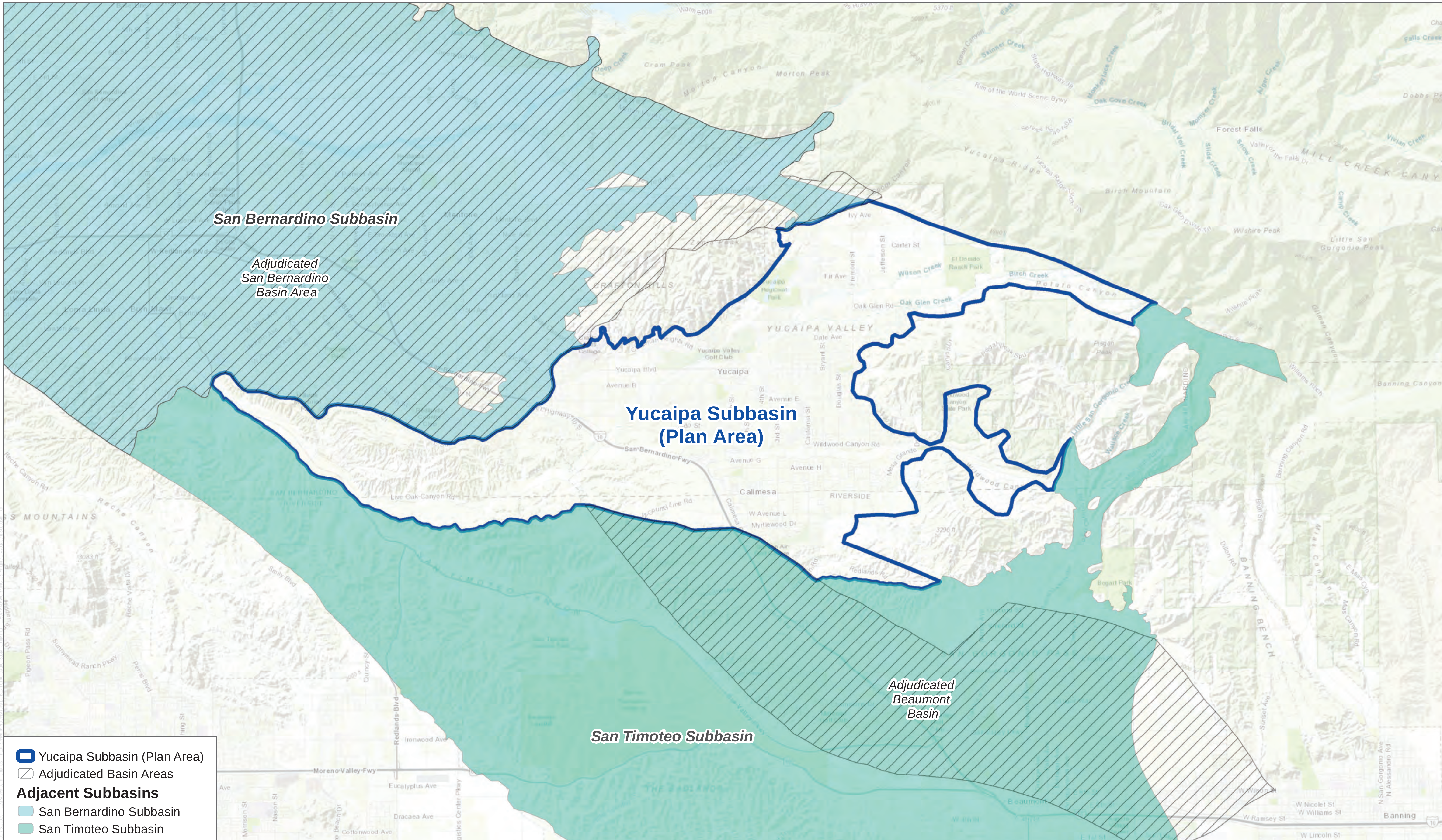

SOURCE: ESRI, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordanance Survey, ESRI Japan, METI, ESRI China (Hong Kong), swisstopo, OpenStreetMap contributors, and the GIS User Community; DWR 2015; USGS NHD 2017

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FIGURE 1-3

Adjacent Subbasins

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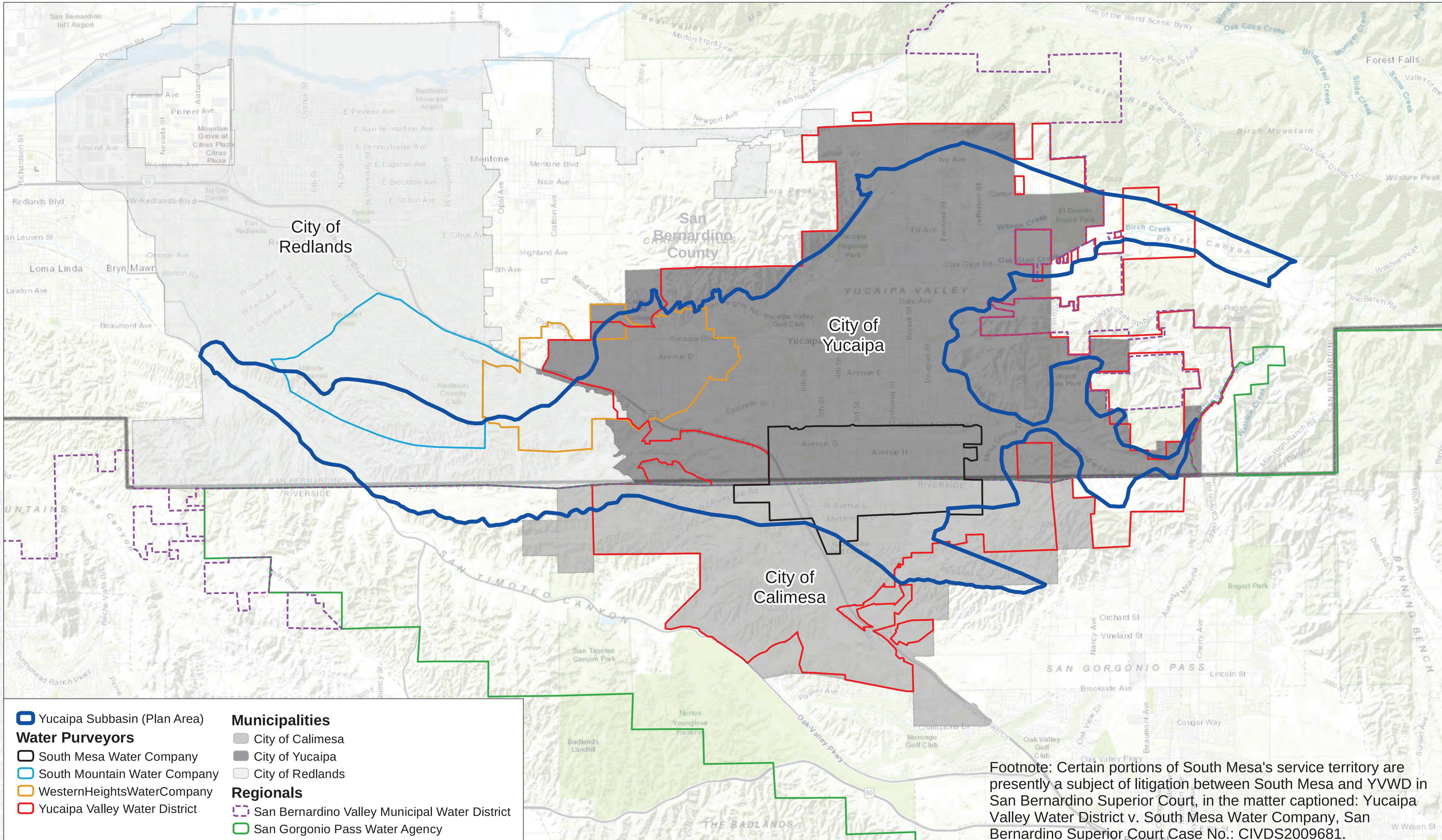

Footnote: Certain portions of South Mesa's service territory are presently a subject of litigation between South Mesa and YVWD in San Bernardino Superior Court, in the matter captioned: Yucaipa Valley Water District v. South Mesa Water Company, San Bernardino Superior Court Case No.: CIVDS2009681.

SOURCE: ESRI, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordanance Survey, ESRI Japan, METI, ESRI China (Hong Kong), swisstopo, OpenStreetMap contributors, and the GIS User Community; DWR

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FIGURE 1-4

Jurisdictional Boundaries for Yucaipa Subbasin - GSA Member Agencies

Yucaipa Subbasin Groundwater Sustainability Plan

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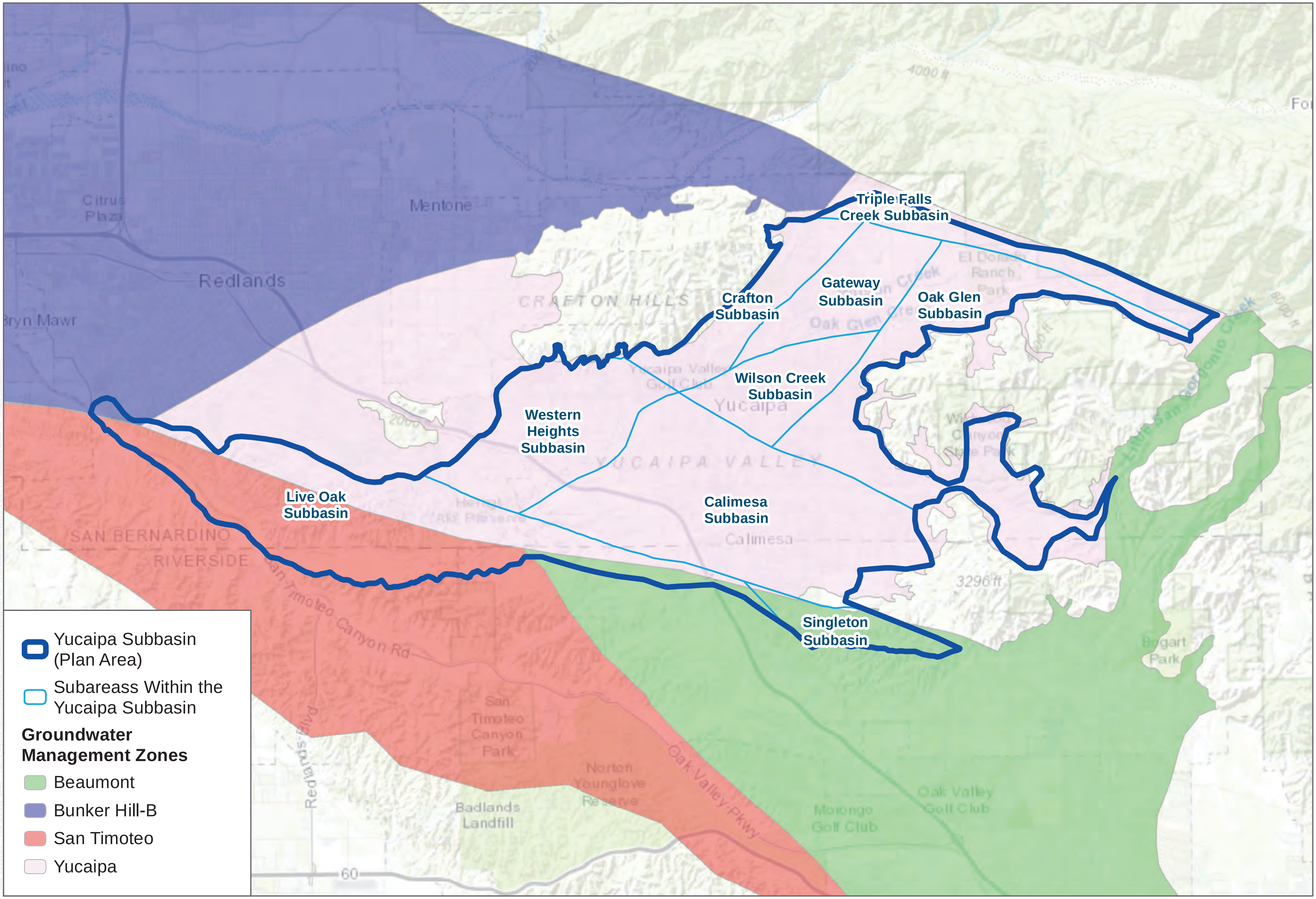

SOURCE: ESRI, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordanance Survey, ESRI Japan, METI, ESRI China (Hong Kong), swisstopo, OpenStreetMap contributors, and the GIS User Community; DWR 2015; USGS NHD 2017

DUDEK

0 0.5 1 Miles

FIGURE 1-5

Groundwater Management Zones in the Vicinity of the Yucaipa Subbasin

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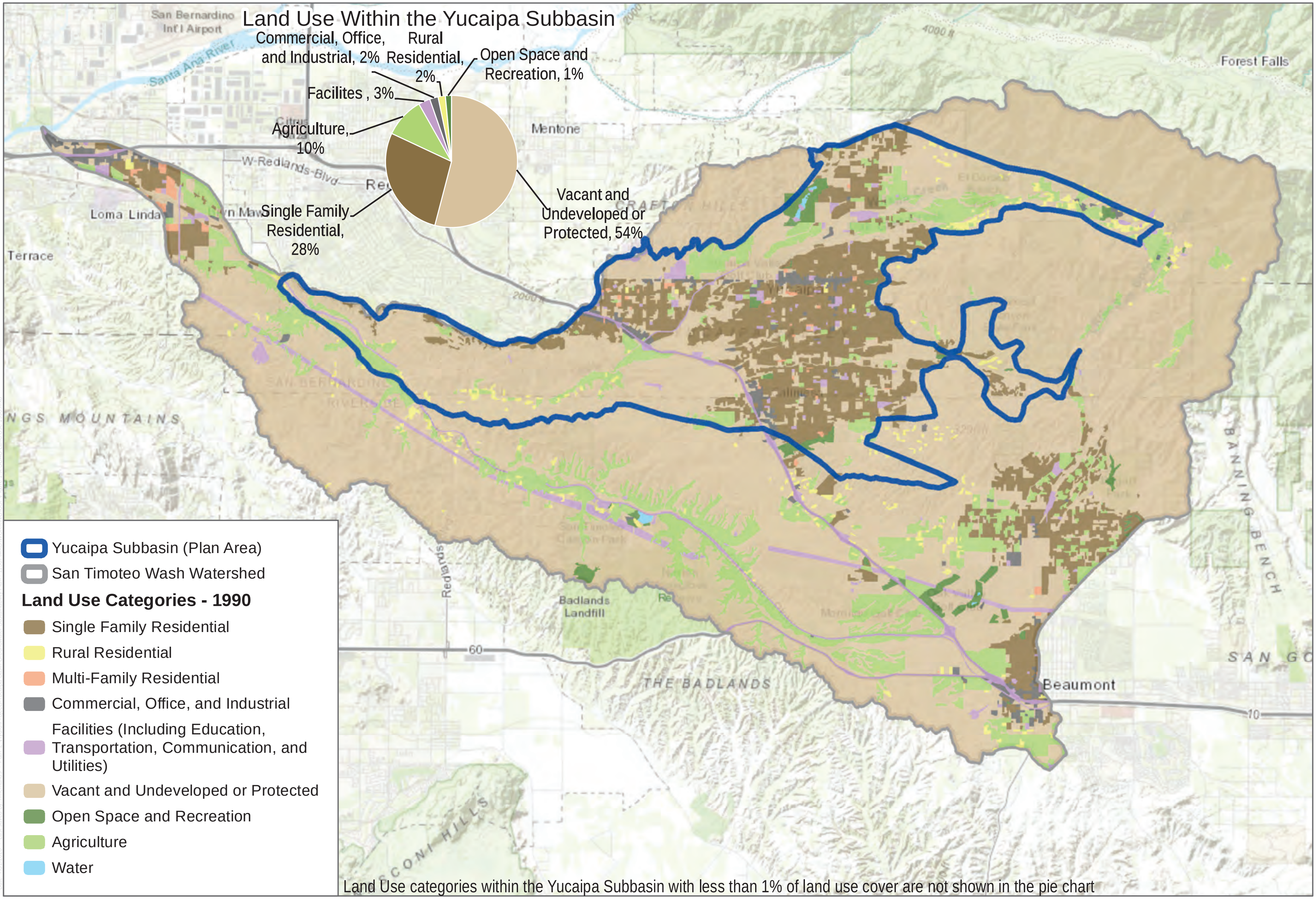

SOURCE: SCAG

DUDEK

0 1.25 2.5 Miles

FIGURE 1-6

1990 Land Use

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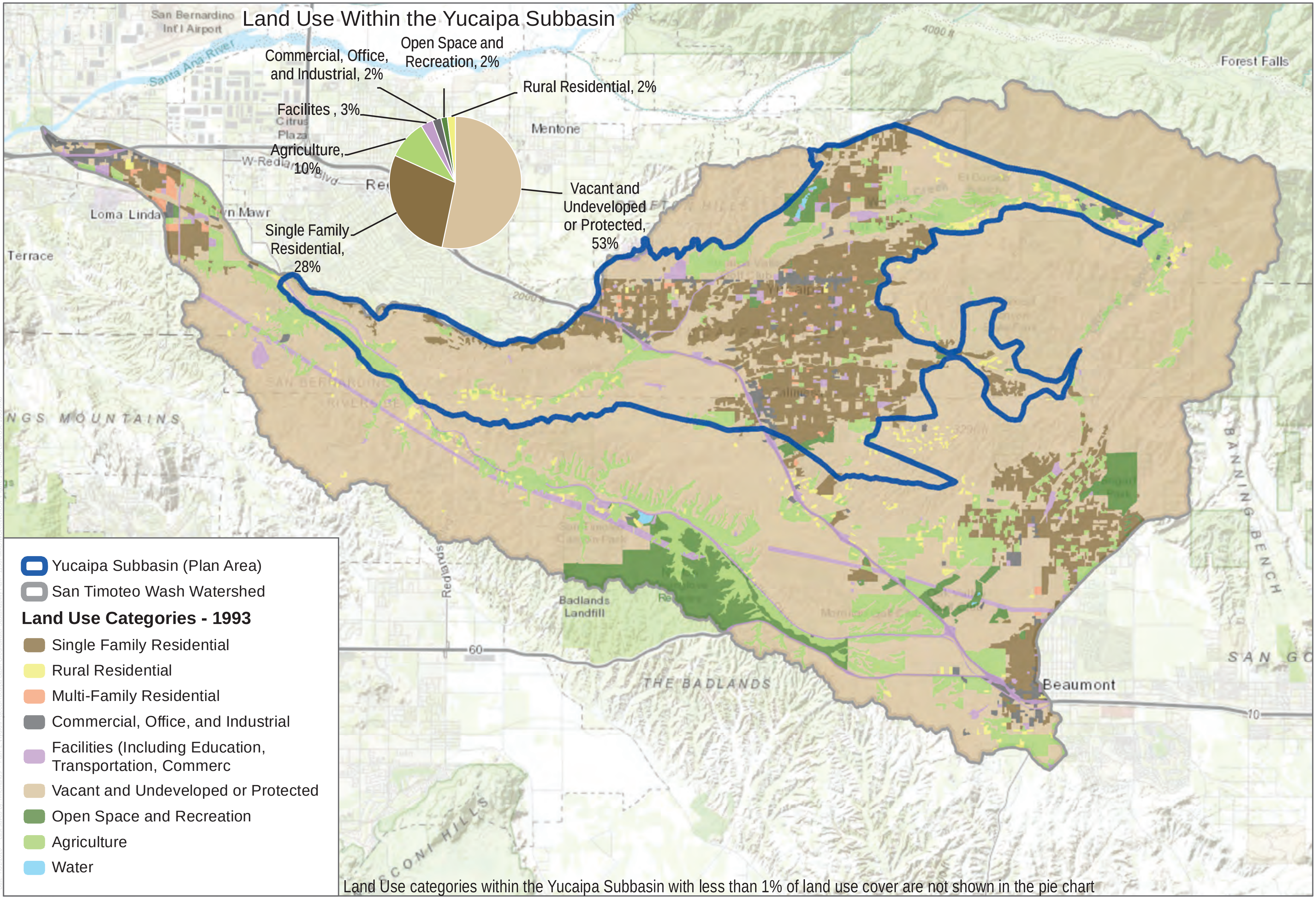

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FIGURE 1-7

1993 Land Use

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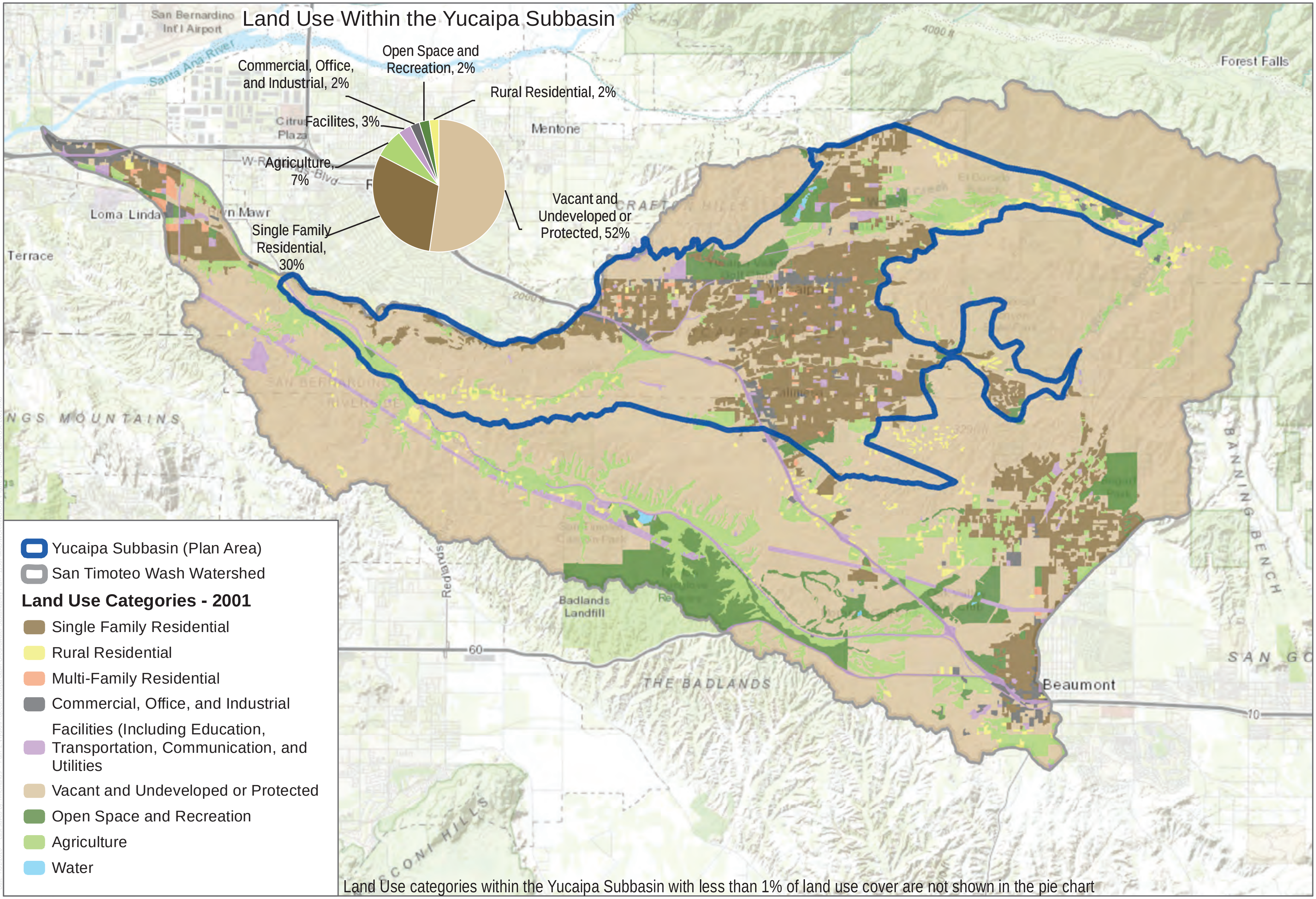

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0 1.25 2.5 Miles

FIGURE 1-8

2001 Land Use

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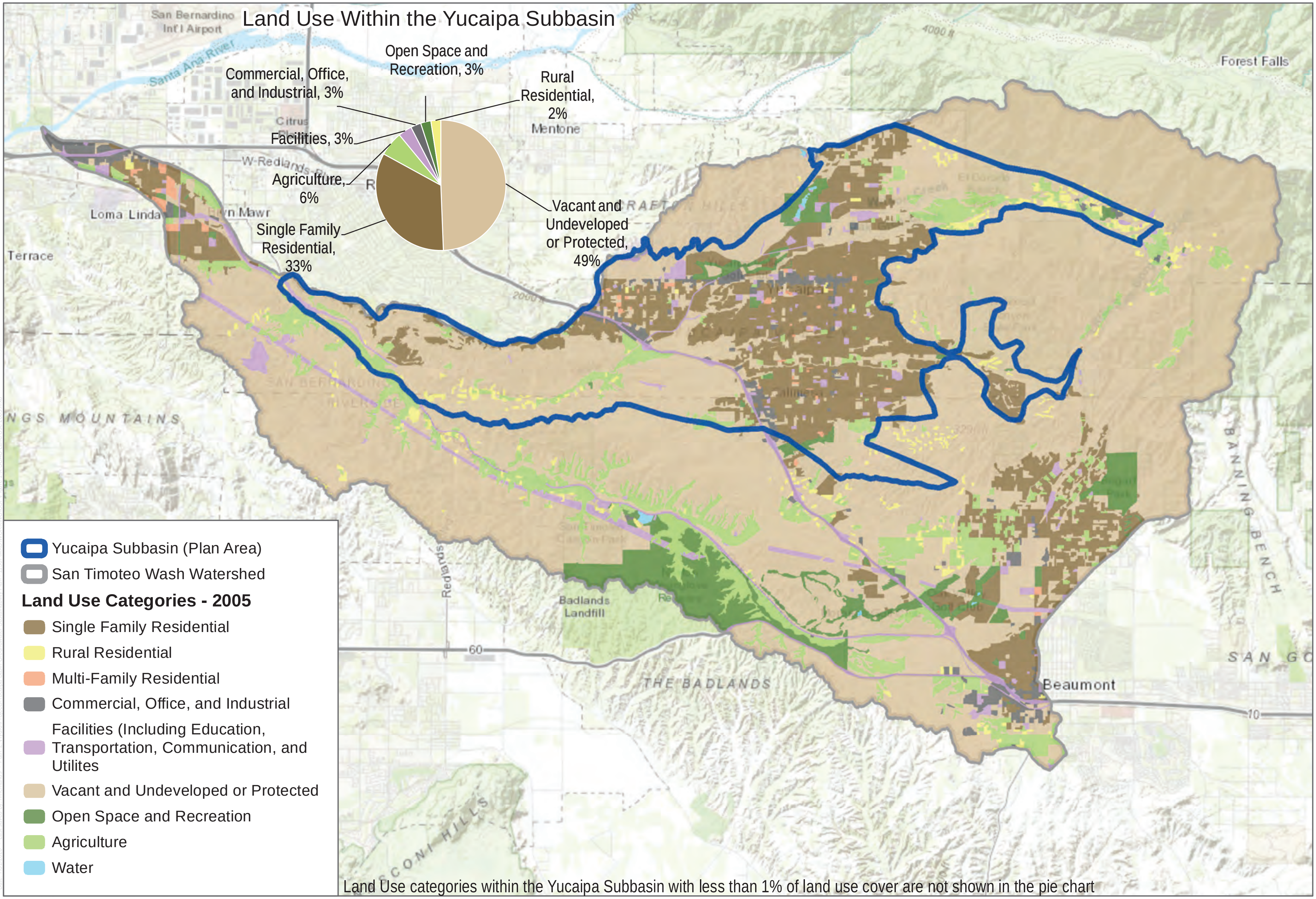

SOURCE: SCAG

DUDEK

0 1.25 2.5 Miles

FIGURE 1-9

2005 Land Use

Yucaipa Subbasin Groundwater Sustainability Plan

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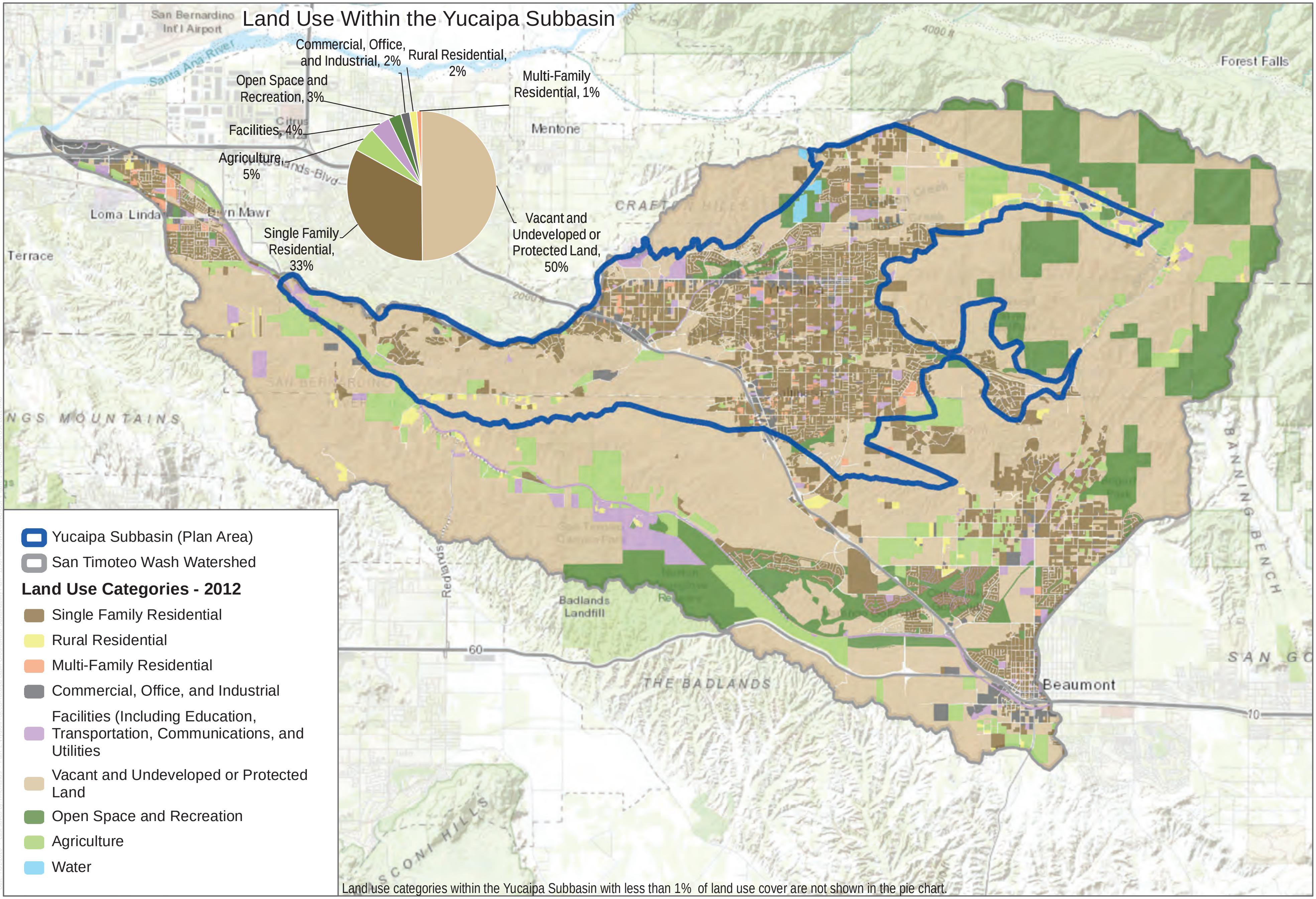

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FIGURE 1-10

2012 Land Use

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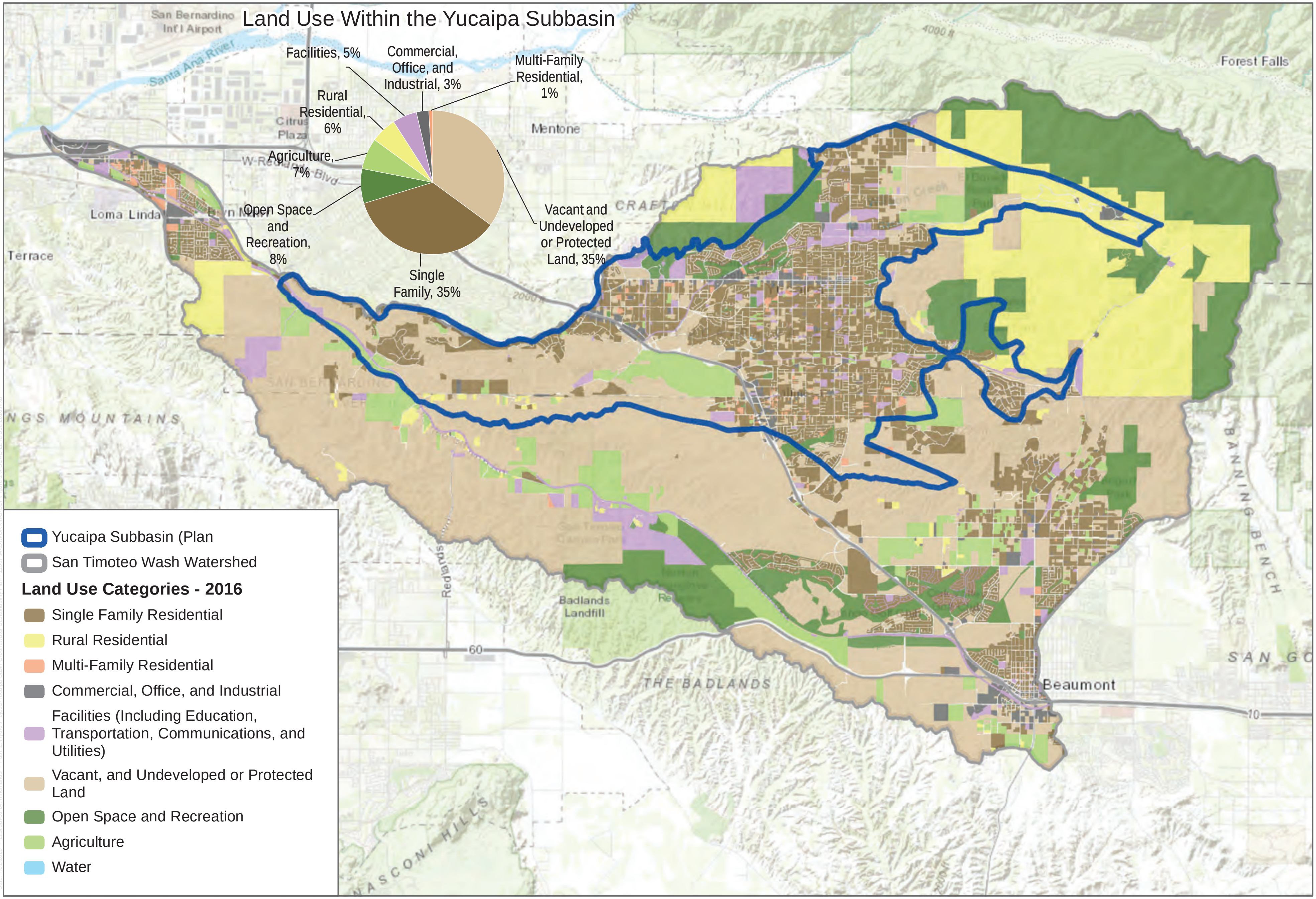

SOURCE: SCAG

DUDEK

0 1.25 2.5 Miles

FIGURE 1-11

2016 Land Use

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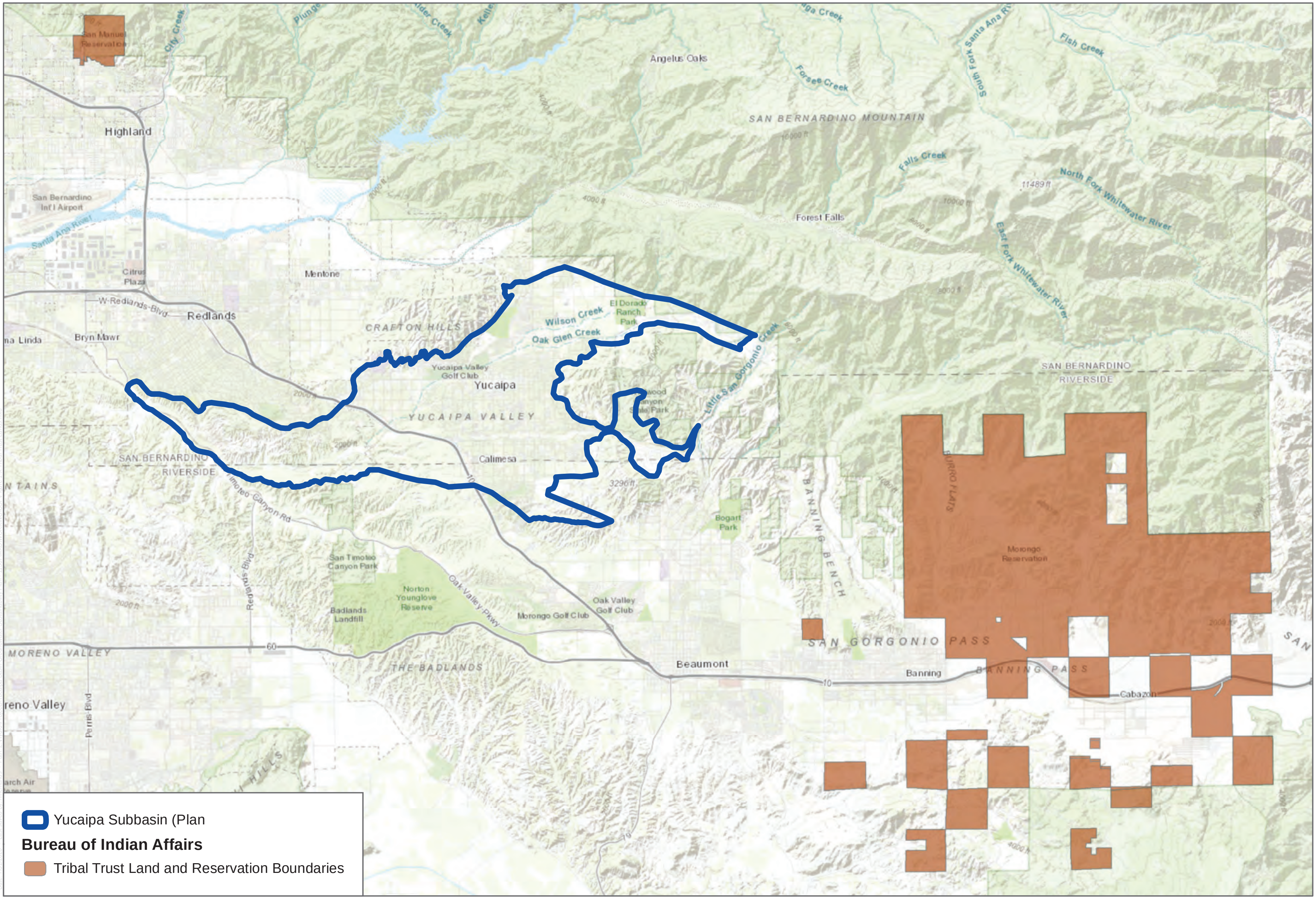

SOURCE: ESRI, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordanance Survey, ESRI Japan, METI, ESRI China (Hong Kong), swisstopo, OpenStreetMap contributors, and the GIS User Community; BLM; DWR

DUDEK

0 1 2 Miles

FIGURE 1-12

Tribal Trust Lands

Yucaipa Subbasin Groundwater Sustainability Plan

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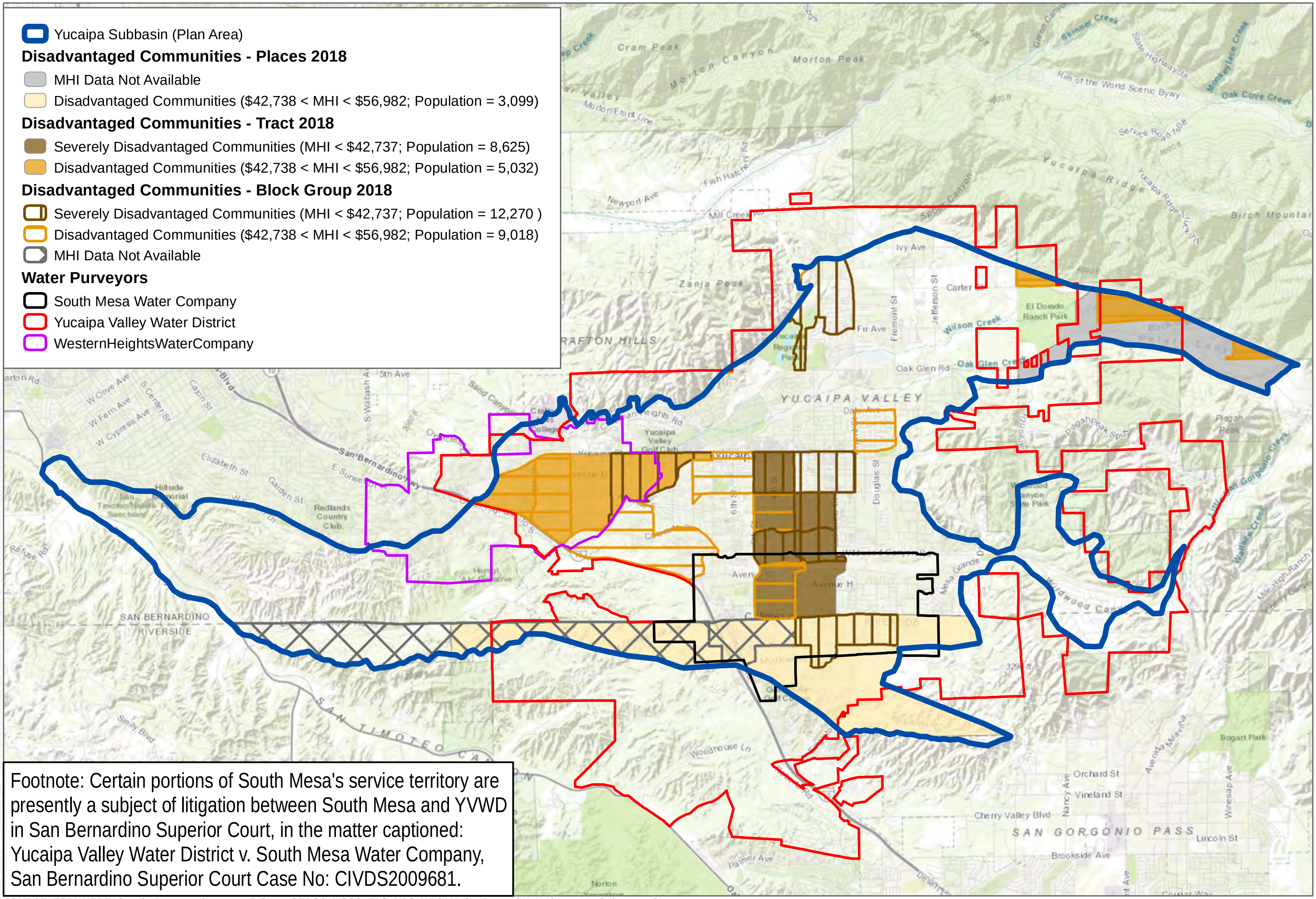

SOURCE: ESRI, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordanance Survey, ESRI Japan, METI, ESRI China (Hong Kong), swisstopo, OpenStreetMap contributors, and the GIS User Community; DWR 2019

Note: MHI = Median Household Income

DUDEK

0 0.5 1 Miles

FIGURE 1-13

Disadvantaged Communities

Yucaipa Subbasin Groundwater Sustainability Plan

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2 Basin Setting

2.1 Physical Setting and Characteristics

The Yucaipa Subbasin (California Department of Water Resources [DWR] Basin Number 8-2.07) comprises an eastern portion of the Upper Santa Ana Valley Groundwater Basin and lies beneath the southeast section of San Bernardino Valley. The Yucaipa Subbasin is bounded to the north and northeast by the San Andreas Fault Zone and the San Bernardino Mountains, to the east by the Yucaipa Hills, to the south by San Timoteo Wash and the San Timoteo Badlands, and to the west by the Crafton Hills and the San Bernardino Basin Area. The Yucaipa Subbasin is overlain by the Yucaipa plain, a gently sloping area of unconsolidated deposits of late Pleistocene and Holocene sediments originating from the surrounding mountains and hills. The Yucaipa Plain is drained by Oak Glen Creek, Wilson Creek, and Yucaipa Creek south and west to San Timoteo Creek, which is tributary to the Santa Ana River (Figure 1-1, Vicinity Map of the Yucaipa Subbasin Plan Area). The Yucaipa Subbasin ranges in elevation from approximately 1,300 feet above the North American Vertical Datum of 1988 (NAVD88) at the downstream end where San Timoteo Canyon Road crosses San Timoteo Creek, to approximately 5,100 feet above NAVD88 at the northeastern end of the Triple Falls Creek subarea (Matti et al. 2003).

The bottom of the Yucaipa Subbasin consists of crystalline bedrock divided into two distinct lithologic groups: the Peninsular Range-type bedrock south of the Banning Fault, and the San Gabriel Mountains-type bedrock between the Banning Fault and the San Andreas Fault. The Peninsular Range-type bedrock consists of Mesozoic plutonic rocks and older metasedimentary rocks, which are generally described as very hard, slightly to moderately weathered, and not extensively fractured. The San Gabriel Mountains-type bedrock consists of foliated granodiorite and tonalite that have been deformed by ductile shearing. This bedrock crops out extensively in the hills surrounding the Subbasin. Outcrops of the San Gabriel Mountains-type bedrock are highly weathered and display an abundant number of closely spaced fractures (Mendez et al. 2016).

Overlying the basement rock of the Yucaipa Subbasin are late Pleistocene to Holocene deposits of alluvial sediments originating from the surrounding Crafton Hills, San Bernardino Mountains, and Yucaipa Hills. The deeper sedimentary deposits consist of consolidated and unconsolidated units representing the Pliocene-Pleistocene San Timoteo Formation, the Pleistocene Sedimentary deposits of Live Oak Canyon, and the mid-Pleistocene to Holocene surficial materials (Cromwell and Matti 2022). The primary water-bearing formations in the Yucaipa Subbasin that form the principal aquifer are the Sedimentary deposits of Live Oak Canyon and the San Timoteo Formation.

2.2 Climate

San Bernardino Valley has a semiarid, Mediterranean climate characterized by relatively hot, dry summers and cool winters with intermittent precipitation. Most precipitation occurs from December through March, and rainless periods of several months are common in the summer. Precipitation is mostly in the form of rain in the lower elevations and mostly snow above approximately 6,000 feet above NAVD88 in the San Bernardino Mountains.

Mean annual precipitation by water year (a water year extends from October 1 to September 30 of the following calendar year) in the San Bernardino Valley ranges from approximately 10 inches near Riverside to approximately 30 inches in the upper San Bernardino Mountains (WSC 2018). Mean annual precipitation in the Yucaipa Subbasin is approximately 16 inches. Historical precipitation data indicates that a period of above average or below-average precipitation can last more than 30 years, such as the dry period that extended from 1947 to 1977. The region has been experiencing an ongoing drought since about 1999 (SBVWMD et al. 2017).

The Santa Ana River Basin receives precipitation from three general types of storms: winter storms, local storms, and summer storms. Winter storms originate over the Pacific Ocean and move eastward over the basin usually from December through March. Winter storms often last for several days and are accompanied by widespread precipitation in the form of rain and, at higher elevations, snow. Local storms cover small areas but can result in high intensity precipitation for durations of approximately 6 hours. These storms can occur any time of the year. Summer storms can occur in the late summer and early fall months in the San Bernardino area, although they are infrequent (SBVWMD et al. 2017).

2.2.1 Precipitation

2.2.1.1 San Bernardino County Flood Control District

The Hydrology Section of the Water Resources Division in San Bernardino County's Department of Public Works collects a variety of climatology data around San Bernardino County. The San Bernardino County Flood Control District (SBCFCD), a division of the Department of Public Works, installed a network of climate stations throughout San Bernardino County to collect precipitation, stream flow and temperature data. The data is used to manage flood control storm warnings, structure and channel design, runoff calculations, and environmental studies (SBCFCD 2021). Daily precipitation data was obtained from San Bernardino's online database for 17 stations within the Plan Area (Figure 2-1, Climate Station Locations in the San Timoteo Wash Watershed). The stations range in elevation from 1,285 feet above NAVD88 at the Redlands – Roth station (Site ID 3023), which is located approximately 850 feet downstream of the farthest downstream end of the Yucaipa Subbasin, to 4,630 feet above NAVD88 at the Oak Glen station (Site ID 3015) located near the eastern end of the Triple Falls Creek subarea (Section 2.5.1, Hydrogeologic Subareas; Appendix 2-A). Table 2-1 summarizes the locations and periods of record for each of the 17 stations used to characterize precipitation in the Yucaipa Subbasin.

The historical precipitation data collected at the 17 SBCFCD climate stations was used to characterize the water year types from the 1954 water year (WY) to the 2018 WY. The Yucaipa GSA defined the following six categories to characterize the water year types based on the amount of precipitation per water year relative to the mean annual precipitation estimated for each subarea in the Yucaipa Subbasin: Wet, Above Normal, Normal, Below Normal, Dry, and Critically Dry. The water year types are intended to define a relationship between changing hydrological conditions and the associated aquifer response to changing water supply, demand, and storage. Further discussion of the use of water year type characterization is included in Section 2.8, Water Budget Analysis.

Daily precipitation data was collected at various periods between these stations, with the longest running data collection period recorded at the Oak Glen station (SBCFCD Station ID No. 3015) from October 1, 1945, to current time (the last data point obtained for purposes in this GSP was September 30, 2018). The daily precipitation data was compiled by water year for each station.

Table 2-1. San Bernardino County Flood Control District Climatic Stations in the Yucaipa Subbasin

SBCFCD Station ID No.	Site Name	Subarea	Latitude	Longitude	Elevation (ft NAVD88)	Begin Data Record	End Data Record
2890	Yucaipa Regional	Crafton	34.04876	−117.04857	2,606	9/5/1989	Ongoing
2915	Wilson Creek	Western Heights	34.03437	−117.07441	2,235	2/12/2004	Ongoing
3015	Oak Glen	Triple Falls Creek	34.05185	−116.95272	4,680	10/1/1945	Ongoing
3023	Redlands–Roth	Live Oak	34.03402	−117.21035	1,285	2/1/1932	Ongoing
3099	Yucaipa County Yard	Western Heights	34.03351	−117.10241	2,140	5/1/1957	10/1/1978
3126	Yucaipa	Wilson Creek	34.03340	−117.03511	2,815	1/31/1949	10/1/1990
3126A	Calimesa East	Calimesa	34.00444	−117.01733	2,813	5/1/1964	Ongoing
3128B	Yucaipa Adams 2e	Wilson Creek	34.02924	−117.04426	2,860	10/1/1949	10/1/1980
3129	Yucaipa C.D.F.	Gateway	34.04653	−117.03558	2,660	1/1/1951	1/22/1980
3129A	Yucaipa C.D.F.	Gateway	34.04654	−117.03559	2,660	1/22/1980	Ongoing
3132	Yucaipa Water Company	Calimesa	34.02157	−117.04470	2,710	2/20/1953	Ongoing
3239	Redlands Country Club	Live Oak	34.01898	−117.14947	2,080	5/24/1964	1/27/2005
3239A	Redlands Country Club WT	Live Oak	34.01385	−117.13868	2,281	1/27/2005	Ongoing
3356	Crafton Hills Fire Station #18	Western Heights	34.03435	−117.09252	2,125	9/28/1979	Ongoing
3386	Calimesa–Raisner	Calimesa	34.00435	−117.03375	2,620	11/23/1988	Ongoing
3121	Oak Glen–Sample	Oak Glen	34.05525	−116.98675	3,695	10/2/1980	Ongoing
2800	Wildwood Canyon	Oak Glen	34.01434	−117.00778	2,946	9/14/1999	Ongoing

Note: SBCFCD = San Bernardino County Flood Control District; ft NAVD88 = feet above North American Vertical Datum of 1988.

Mean annual precipitation per water year ranged from 11.15 inches at Station 2890 in the Crafton subarea to 24.50 inches at Station 3015 in the Triple Falls Creek subarea (Table 2-2). Precipitation amounts tended to follow the topographical landscape of the Yucaipa Subbasin. Mean annual precipitation declined when transitioning from the highest elevations in the Triple Falls Creek subarea (24.50 inches) and the foothills of the San Bernardino Mountains to the lower elevations in the Yucaipa Plain where mean annual precipitation ranged from 15.09 to 18.15 inches in the Oak Glen, Gateway, Wilson Creek and Calimesa subareas. The mean annual precipitation in the Crafton, Western Heights and Live Oak subareas ranged from 11.15 to 13.65 inches.

The weighted mean annual precipitation across the Plan Area is 15.86 inches based on precipitation data collected at the 17 SBCDPW climate stations from the 1953 WY to the 2018 WY (Table 2-2). The mean annual precipitation estimate was weighted against the number of annual precipitation totals recorded for each station divided by the total number of annual precipitation totals across the Subbasin.

Table 2-2. Mean Annual Precipitation in the Yucaipa Subbasin

Subarea	Mean Annual Precipitation (inches)	Minimum Elevation at SBCFCD Station (ft NAVD88)	Maximum Elevation at SBCFCD Station (ft NAVD88)
Crafton	11.15	2,606	2,606
Live Oak	11.69	1,285	2,281
Western Heights	13.65	2,125	2,235
Gateway	15.09	2,660	2,660
Wilson Creek	15.31	2,815	2,860
Calimesa + Singleton	16.68	2,620	2,813
Oak Glen	18.15	2,946	3,695
Triple Falls Creek	24.50	4,680	4,680
Yucaipa Subbasin	**15.86**	**1,285**	**4,680**

Note: SBCFCD = San Bernardino County Flood Control District; ft NAVD88 = feet above North American Vertical Datum of 1988.

2.2.1.2 National Oceanic and Atmospheric Administration

Additionally, daily precipitation data were obtained from National Oceanic and Atmospheric Administration (NOAA) weather stations located in Redlands (Station #USC00047306), Yucaipa (Station #US1CASR0044), and Beaumont (Station #US1CARV0018), California. The Redlands station is located approximately 0.5 miles northeast of the farthest downgradient end of the Plan Area (Figure 2-1). The station is at an elevation of 1,417 feet above NAVD88. The Yucaipa station, "Yucaipa 1.5NNE," is located approximately 0.5 miles northwest of the Wilson Creek spreading basins. The Yucaipa station is at an elevation of 2,776 feet above NAVD88. The Beaumont station is located approximately 2 miles northwest of the intersection of Interstate 10 and State Route 60 in the San Timoteo Wash Watershed, approximately 1.9 miles south of the Singleton Subbasin (Figure 2-1). The elevation of the Beaumont station is 2,532 feet above NAVD88 (Table 2-3).

The mean annual (by water year) precipitation at these three NOAA stations ranged from 12.51 inches to 15.82 inches. The Redlands station, with an annual mean of 12.51 inches, has the longer record of data and is also at the lowest elevation. The highest average was 15.82 inches at the Yucaipa 1.5 NNE station, which is also at the highest elevation at 2,776 feet above NAVD88 (Table 2-3).

Table 2-3. Summary Information for NOAA Climatic Stations in the Vicinity of the Yucaipa Subbasin

NOAA Station ID	NOAA Network ID	Latitude (degrees)	Longitude (degrees)	Elevation (ft NAVD88)	Period of Data Collection	Mean Annual Precipitation (inches)[1]
Redlands	USC00047306	34.037	−117.195	1,417	Oct. 1963–Sep. 2018	12.51
Beaumont 2.5 NW	US1CARV0018	33.954	−117.012	2,532	Oct. 2009–Sep. 2018	12.74
Yucaipa 1.5 NNE	US1CASR0044	34.054	−117.038	2,776	Oct. 2014–Sep. 2018	15.82

Notes: NOAA = National Oceanic and Atmospheric Administration; ft NAVD88 = feet above North American Vertical Datum of 1988; NW = northwest; NNE = north by northeast.
1 Per water year (October 1 to September 30).

2.2.1.3 Cumulative Departure from Mean Monthly Precipitation

Historical daily precipitation data from the SBCFCD climatic stations 3015 (Oak Glen) and 3126A (Calimesa East) and from the NOAA Redlands, Yucaipa 1.5 NNE, and Beaumont 2.5NW stations were compiled as total monthly precipitation. Mean monthly precipitation was calculated for each station. Mean monthly precipitation ranged from 0.03 inches in June at the NOAA Beaumont 2.5 NW station to 4.55 inches in February at the SBCFCD Oak Glen station (Table 2-4).

The cumulative departure from the mean monthly precipitation was calculated for the SBCFCD Oak Glen and Calimesa East stations and the NOAA Redlands station because these stations had precipitation data records extending as far back as 1963 (Figure 2-2, Cumulative Departure from Mean Monthly Precipitation at the SBCFCD Oak Glen and Calimesa East Climatic Stations and the NOAA Redlands Climatic Station). The declining cumulative departure of mean monthly precipitation (i.e., less-than-normal rainfall) from the 1945 WY to 1965 WY at the Oak Glen station indicates an extended 20-year drought with intermittent wet years in 1951 and 1958. The trend after 1965 reversed direction and generally increased with significant wet periods from 1965 to 1969, 1978 to 1983, and 1992 to 1998. The region experienced another 20-year drought from 1998 to 2018 with intermittent wet years in 2005, 2010, and 2016 (Figure 2-2). This comports with the observation by San Bernardino Valley Municipal Water District et al. that the "region has been experiencing an ongoing drought since about 1999" (WSC 2018). The cumulative departure from the mean monthly for the SBCFCD Calimesa East and NOAA Redlands stations show the same trends, but with less variation in the changes in rainfall because these stations are at lower elevations than the Oak Glen station.

Table 2-4. Mean Monthly Precipitation in the Yucaipa Subbasin

Climatic Station ID	Elevation (ft NAVD88)	Mean Monthly Precipitation (inches)											
		Oct	*Nov*	*Dec*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*
SBCFCD 3015 (Oak Glen)	4,680	0.91	2.28	3.21	4.45	4.55	4.07	1.89	0.94	0.16	0.41	0.46	0.66
SBCFCD 3126A (Calimesa East)	2,813	0.67	1.72	2.52	3.37	3.55	2.81	1.28	0.62	0.16	0.21	0.20	0.43
NOAA Yucaipa 1.5 NNE	2,776	0.49	1.49	2.74	3.37	2.77	2.25	1.21	1.00	0.04	0.29	0.28	0.33
NOAA Beaumont 2.5 NW	2,532	0.33	1.22	2.79	2.49	2.11	1.93	0.96	0.59	0.03	0.24	0.20	0.13
NOAA Redlands	1,417	0.51	1.20	1.90	2.68	2.56	2.05	0.98	0.37	0.08	0.12	0.19	0.28
Maximum Mean Monthly Precipitation		**0.91**	**2.28**	**3.21**	**4.45**	**4.55**	**4.07**	**1.89**	**1.00**	**0.16**	**0.41**	**0.46**	**0.66**
Minimum Mean Monthly Precipitation		**0.33**	**1.20**	**1.90**	**2.49**	**2.11**	**1.93**	**0.96**	**0.37**	**0.03**	**0.12**	**0.19**	**0.13**

Notes: ft NAVD88 = feet above North American Vertical Datum of 1988; SBCFCD = San Bernardino County Flood Control District; NOAA = National Oceanic and Atmospheric Administration; NNE = north by northeast; NW = northwest.
[1] Per water year (October 1 to September 30)

2.2.1.4 Water Year Type

Periods of above or below average precipitation affect the volume of water that naturally recharges the groundwater aquifer underlying the Plan Area. To characterize the effects of total water year precipitation on local groundwater supplies and demands, and the volume of groundwater in storage, the precipitation measurements were categorized into six water year types. Water year type was characterized by normalizing measured water year precipitation by the long-term water-year precipitation averages measured at each of the 17 SBCFCD climate stations in the Subbasin. The normalized water year precipitation measurements were then categorized into the following water year types:

1. Critically Dry: <50% of the long-term precipitation mean
2. Dry: ≥50%, but <75% of the long-term precipitation mean
3. Below Normal: ≥75%, but <90% of the long-term precipitation mean
4. Normal: ≥90%, but <110% of the long-term precipitation mean
5. Above Normal: ≥110%, but <150% of the long-term precipitation mean
6. Wet: ≥150% of the long-term precipitation mean

Appendix 2-A shows the water year type characterization for the 17 SBCFCD climate stations in the Yucaipa Subbasin. Appendix 2-A is aggregated by hydrogeologic subarea (Section 2.5.1), and both the percentage of annual average water year precipitation and annual water year type characterization are shown for each station. Characterization of basin-wide water year type was computed by taking the average water year type characterization across the 17 SBCFCD stations for each water year. The resulting distribution of water year types from the 1953 WY to the 2018 WY is shown on Figure 2-3, Historical Water Year Types in the Yucaipa Subbasin. Three “above normal” to “wet” water year types were observed from the 1966 WY to the 1969 WY, five from the 1978 WY to the 1983 WY, and six from the 1991 WY to the 1998 WY. However, only four “above normal” to “wet” water year types were observed since the 1999 WY, a span of 20 years from 1999 to 2018. There were four “critically dry” water years in the last 55 years, with three of those “critically dry” water years occurring in the last 17 years.

Precipitation measurements collected at the SBCFCD stations 3015, 3129/3129A, and 3239/3239A were analyzed to characterize historical rainfall variability in the Plan Area. Precipitation measurements are largest in the northern reaches of the Plan Area. Average annual water year precipitation measured at the Oak Glen station is approximately 24.50 inches (Appendix 2-A). Precipitation rates are highest between December and March, with monthly precipitation averaging approximately 4 inches. Large winter storm events can deliver in excess of 20 inches of rain per month. Summer months (June-September) are relatively dry, with monthly precipitation averaging 0.4 inches. Large summer storms can deliver in excess of 5 inches per month at these elevations.

Average annual water year precipitation at intermediate altitudes within the Plan Area is approximately 10 inches less than precipitation measured at the Oak Glen station. Average annual water year precipitation measured at 3129/3129A is approximately 15 inches. Precipitation rates are highest between December and March, with monthly precipitation during these winter months averaging between 2 and 3 inches. Large winter storm events can produce nearly 15 inches of rain. Summer months are relatively dry, with monthly precipitation averaging approximately 0.25 inches. Summer storm events can produce up to 6 inches of rain.

Precipitation gauges 3239 and 3239A are the lowest elevation gauges operated by SBCFCD located within the Plan Area. Average annual water year precipitation measured at these gauges is approximately 12 inches per year. The majority of this precipitation occurs between December and March, where monthly precipitation averages between 1 and 2 inches. Summer months are dry, with monthly precipitation averaging approximately 0.16 inches.

2.2.2 Temperature

The NOAA Redlands climate station also recorded the maximum and minimum daily air temperature from 1900 to 2015. The air temperature data was compiled to characterize the mean daily maximum and minimum temperatures for each month of the year. The highest mean daily temperatures were recorded in July at 34.7°C and August at 34.6°C, or 94.4°F. The lowest mean daily temperatures were recorded in December at 4.3˚C and in January at 4.1°C, or 39.5°F (Figure 2-4, Mean Daily Maximum and Minimum Temperature (Degrees Celsius) at NOAA Redlands Climate Station, and Figure 2-5, Mean Daily Maximum and Minimum Temperature (Degrees Fahrenheit) at NOAA Redlands Climate Station).

NOAA maintains a climate station called Mill Creek BDF, which is located at approximately 1 mile northwest of the northwestern end of the Plan Area (34.0836°N and −117.0347°W). The Mill Creek BDF station is at an elevation of 3,400 feet above NAVD88. Daily air temperatures have been measured at this station since February 1998. The highest mean daily temperatures were recorded in July at 34.3°C and August at 34.6°C or 94.3°F. The lowest mean daily temperatures were recorded in December at 6.4°C and in February at 6.2°C or 43.2°F (Figure 2-6, Mean Daily Maximum and Minimum Temperature (Degrees Celsius) at NOAA Mill Creek BDF Climate Station).

2.3 Surface Water and Drainage Features

The Yucaipa Subbasin lies within the San Timoteo Wash watershed. The primary surface water drainage features are Wilson Creek, Oak Glen Creek, Yucaipa Creek, and San Timoteo Creek (Figure 2-7, Surface Water Flow in San Timoteo Wash Watershed). The headwaters for Wilson Creek and Oak Glen Creek originate in the San Bernardino Mountains above the Triple Falls Creek subarea (Section 1.3.1, Description of the Plan Area). Yucaipa Creek begins in the Yucaipa Hills and flows east to west out of Wildwood Canyon. San Timoteo Creek is the major drainage feature in the San Timoteo Wash watershed. It enters the Yucaipa Subbasin at the southern end of the Live Oak subarea and runs approximately 3.5 miles before exiting the Plan Area. San Timoteo Creek is tributary to the Santa Ana River.

The general orientation of surface water flow in the Yucaipa Valley is from northeast to southwest. Oak Glen Creek joins Yucaipa Creek just inside the northern boundary of the Live Oak subarea. Yucaipa Creek converges with San Timoteo Creek at the farthest upstream point of San Timoteo Creek in the Live Oak subarea. Flows in Wilson Creek, Oak Glen Creek and Yucaipa Creek are mostly ephemeral, with some intermittent flows in the upper elevations of the Subbasin in response to large storm events.

Stream flow near the upper reaches of Wilson Creek and Oak Glen Creek may be diverted to the Wilson Creek spreading basins and the Oak Glen spreading basins, respectively (Figure 2-8, Locations of the Wilson Creek and Oak Glen Creek Spreading Basins in the Yucaipa Subbasin). The Wilson Creek spreading basins, which were constructed by the Yucaipa Valley Water Conservation District in 1934–1935, are now owned and maintained by SBCFCD and used for the infiltration of State Water Project (SWP) water and stormwater. The Oak Glen Creek spreading basins, which were constructed by the City of Yucaipa and are now owned and maintained by SBCFCD, were designed to reduce flooding downstream of Bryant Street, collect debris and sediment in the basins to improve downstream water quality, enhance groundwater recharge by capturing stormwater runoff, and provide additional open space and habitat.

Approximately 0.25 miles downstream of the confluence of Wilson Creek with Oak Glen Creek the channel becomes an engineered, concrete-line channel developed by SBCFCD for flood control purposes. The concrete-lined channel runs approximately 1.8 miles before becoming unlined in the Western Heights subarea. SBCFCD maintains the unlined channel over the next 1.75 miles by clearing vegetation and employing rock check dams to control flooding.

Yucaipa Creek originates out of the Yucaipa Hills through Wildwood Canyon. An unlined, trapezoidal engineered channel runs from Wildwood Canyon approximately 0.33 miles to spreading basins where stream flow may be diverted for flood control and enhance groundwater recharge. The engineered unlined channel continues to run through the Calimesa subarea before becoming a natural unlined reach just south of Interstate Highway 10. The natural course of Yucaipa Creek and Oak Glen Creek in the Live Oak subarea is a highly incised, slightly meandering channel that flows from an elevation at approximately 1,900 feet above NAVD88 to 1,550 feet above NAVD88 where Yucaipa Creek joins San Timoteo Creek.

2.3.1 Characterization of Flow

2.3.1.1 San Bernardino County Flood Control District

SBCFCD installed five stream gauging stations in the Yucaipa Subbasin (Figure 2-7). Table 2-5 summarizes the details of the five SBCFCD stations, including the latitude/longitude coordinates, station elevations and when the stations were established. These stations were designed to measure peak flow events. SBCFCD stated that for "95% of the year the creeks do not contain significant quantities of water" and therefore do not accurately measure flow outside of those peak events (SBCFCD, pers. comm., July 2019). SBCFCD has confidence in measurements collected at stations 3601C and 3608A, the two farthest downstream gauging stations in the Subbasin.

Table 2-5. Summary Details for SBCFCD Stream Gauging Stations in the Yucaipa Subbasin

SBCFCD Station ID	Station Name	Latitude	Longitude	Elevation (ft NAVD88)	Established	Discontinued
2800	Wildwood Canyon	34.0143	−117.0078	2946	9/14/1999	—
2915	Wilson Creek	34.0344	−117.0744	2235	2/12/2004	—
S3601A	Wilson Creek @ Jefferson	34.0184	−117.0963	3025	1/11/1968	—
S3601C	Wilson @ Dunlap	34.0184	−117.0963	2305	9/1/1947	—
S3608A	Wildwood @ Calimesa	34.0118	−117.0691	2280	9/13/1972	—

Notes: SBCFCD = San Bernardino County Flood Control District; ft NAVD88 = feet above North American Vertical Datum of 1988.

2.3.1.1.1 Oak Glen Creek

Stream flow in Oak Glen Creek is measured at SBCFCD gauging stations 2915 (upstream) and S3601C (downstream). Gauging station 2915 is approximately 2 miles downstream of the confluence of Wilson Creek and in an underground, concrete-lined section of the creek. Gauging station S3601C is approximately 1.5 miles downstream of station 2915 in an unlined, trapezoidal channel. The reach between stations 2915 and S3601C is mostly an engineered, unlined trapezoidal channel with rock check dams positioned approximately every 100 feet along the channel.

Figure 2-9, Cumulative Stream Flow at SBCFCD Stations 2915 and S3601C on Oak Glen Creek, shows stream flow data recorded at gauging stations 2915 and S3601C, and the mean monthly precipitation measured at SBCFCD climate stations 2915, 3099 and 3356 since 1995. Beginning in late 2007, stream flow at the upstream gauging station, 2915, is markedly higher than at the downstream gauging station, S3601C. Gauging station 2915 may be registering flows collectively from Wilson Creek and Oak Glen Creek that were conveyed from the confluence of these two creeks in a lined, concrete channel. The marked increase in flow during the later months of 2010 indicates an influence of the more-than-normal rainfall in the 2011 WY wet season, which was a "Wet" water year type that ranged from 138% to 188% of mean annual rainfall measured in the Yucaipa Subbasin (Appendix 2-A).

In contrast, the lower flows measured at the downstream gauging station indicated that the reach between 2915 and S3601C was a losing stream where surface water discharged to groundwater. SBCFCD, however, does not have high confidence in stream flow measured at gauging station 2915. In correspondence with SBCFCD in July 2019, the high and consistent rate of flow registered at this station between 2007 and 2009, and again from 2011 to 2013, could not be explained. SBCFCD suggested the "elevated baseflow [was] likely due to silt/debris build up on the pressure transducer" that was installed in the wall of the channel to gauge flow. A site inspection of the gauging station to clear silt/debris buildup and calibrate the pressure transducer may improve results. The alternative is modifying the gauging station so that it collects representative data during lower flow events.

2.3.1.1.2 Yucaipa Creek

Stream flow in Yucaipa Creek is measured at SBCFCD gauging stations 2800 (upstream) and S3608A (downstream). Gauging station 2800 is approximately 1,400 feet downstream from the narrow gap between the Yucaipa Hills in Wildwood Canyon. Gauging station S3608A is approximately 3.5 miles downstream of gauging station 2800. The entire reach of Yucaipa Creek between these two stations is an unlined, engineered trapezoidal channel. Just downstream of gauging station S3608A the creek enters its natural, deeply incised and slightly meandering course. Higher flows were measured at the downstream gauging station compared to the upstream gauging station, indicating that this reach of the Yucaipa Creek was potentially a gaining stream (i.e., groundwater discharging to surface water), or runoff entered the creek between the two stations that increased surface water flows (Figure 2-10, Cumulative Stream Flow at SBCFCD Stations 2800 and S3608A on Yucaipa Creek).

Gauging station 2800 measured a constant discharge of approximately 1 cubic foot per second after 2010. As with gauging station 2915 in Oak Glen Creek, SBCFCD does not have high confidence in the stream flow measured at gauging station 2800. Per personal correspondence with SBCFCD (July 31, 2019, email), stream flow is measured using a dedicated pressure transducer where the pressure head (i.e., water level) is converted to stream flow based on a rating curve established at this station. SBCFCD noted that the "constant baseflow is likely due to silting of pipe with transducer (debris settles on pressure transducer causing a non-zero low flow)." As with gauging station 2915, a site inspection to clear silt/debris buildup and calibrate the pressure transducer may improve results. The alternative is modifying the gauging station so that it collects representative data during lower flow events.

2.3.1.2 United States Geological Survey

The U.S. Geological Survey (USGS) installed stream flow gauging station 11057000 (34.0159° N, −117.1229° W) where San Timoteo Canyon Road crosses over San Timoteo Creek (Figure 2-7). This location represents the farthest downstream extent of the Yucaipa Subbasin. This gauging station operated from October 1926 to April 1979. It is no longer in service. Cumulative annual (by water year) stream flow measured at station 11057000 was compared to annual precipitation (by water year) from 1926 to 1979 to characterize the relationship between rainfall and stream flow at this location of the Yucaipa subbasin (Figure 2-11, Stream Flow Measured at USGS Station 11057000 and Precipitation at NOAA Redlands). The mean annual precipitation observed at the NOAA Redlands station from the 1927 WY to the 1978 WY was 13.23 inches.

Marked increases in streamflow out of the Yucaipa Subbasin occurred after wet water years (e.g., 1936–1937, 1943–1944, 1952–1953) when the annual precipitation was 159% to 201% of the mean annual precipitation. No stream flow data was recorded from the 1969 WY to the 1973 WY, and so no relationship could be characterized between stream flow and the wet 1969 WY when the annual precipitation was 190% of the mean annual. In contrast to the marked increases in annual stream flow following major wet years, increases in stream flow were minimal during dry years when the annual precipitation was less than the mean annual precipitation (e.g., 1946–1952, 1959–1966, and 1970–1977).

The USGS installed a replacement station, 11057500 (34.0341° N, −117.1600° W), located approximately 4.2 miles farther downstream from former station 11057000 (Figure 2-7). This station records stream flow in San Timoteo Creek approximately 1 mile upstream of its confluence with the Santa Ana River. In addition to measuring stream flow originating from the San Timoteo Wash watershed, this station captures runoff from a 125-square-mile watershed that is more urbanized than Yucaipa Valley. Stream flow measured at this station does not accurately represent runoff from the Plan Area and will not be used to characterize flows leaving the Yucaipa Subbasin.

2.4 Geology

2.4.1 Geology and Geologic Structures

The Yucaipa Subbasin (DWR Basin Number 8-2.07) is located at the southeastern corner of the Upper Santa Ana Valley Groundwater Basin, which exists in a “right-step-over” zone between the active San Andreas and San Jacinto Fault Zones (Matti et al. 2003). Several branches, or strands, of the San Andreas Fault Zone run in a southeast-northwest direction across the Upper Santa Ana Valley Groundwater Basin (Figure 2-12, Geologic Map of the Yucaipa Subbasin). The San Bernardino strand, the modern trace of the San Andreas Fault, marks the northern boundary of the Yucaipa Subbasin. The Banning Fault, “a major right-lateral strike-slip fault that was part of the San Andreas system in late Miocene time (Matti et al. 2003),” marks the boundary between the Yucaipa Plain and the San Timoteo Badlands to the south. The Yucaipa Plain lies between these two fault systems and comprises an extensive deposition of Quaternary sediments originating from the San Bernardino Mountains to the north and Yucaipa Hills to the east.

The “right-step-over” zone created by the lateral displacement along the San Andreas and San Jacinto Fault Zones created a series of northeast–southwest-trending normal-slip faults. Displacement along these faults, in turn, created drop-down structures that filled in with Quaternary alluvial sediments originating from the surrounding Crafton Hills, San Bernardino Mountains and Yucaipa Hills. Some of the northeast–southwest-trending normal-slip faults mark the boundaries of hydrogeologic subareas delineated in the Yucaipa Subbasin and act as partial barriers to groundwater flow (Figure 2-12).

2.4.1.1 Geologic History

The geologic structures defining the Yucaipa Subbasin evolved from tectonic activity in the Mesozoic and Cenozoic eras. Activity of the right-lateral strike-slip San Andreas and San Jacinto fault zones created a drop-down block of the San Gabriel Mountain-type crystalline bedrock (Mendez et al. 2001). This drop-down block, or graben, was then filled by the deposition of Quaternary sediments originating from the surrounding San Bernardino Mountains and Yucaipa Hills. The earliest deposited sediments comprised the early Quaternary San Timoteo beds of Frick, or San Timoteo Formation. This formation was overlain by middle to late-Quaternary sediments deposited by several generations of axial-valley stream flows and alluvial-fan sediments. The Quaternary deposits most likely originated from "west-flowing stream flows of the ancestral San Gorgonio River and its tributaries and…middle and late Quaternary fault movements" (Matti et al. 2003).

The present alignment of the San Andreas Fault zone has been tectonically active for approximately 5 million years, or 5 mega-annums (Ma). The San Jacinto Fault zone has been active for approximately 1.2 Ma to 1.5 Ma (Cromwell and Matti 2022). These two fault zones converge approximately 31 miles northwest of the Yucaipa Subbasin. Movement between these two northwest-southeast trending fault zones created the drop-down geologic structure of the Yucaipa Subbasin. The Banning Fault is a right-lateral strike-slip fault that bisects the Yucaipa Subbasin between the San Andreas and San Jacinto Fault zones (Figure 2-12). This fault, however, has been inactive since approximately 5 Ma (Cromwell and Matti 2022). The eastern extent of the Banning Fault (east of Calimesa) marks the contact between the southern extent of the crystalline bedrock of the Yucaipa Hills and the Sedimentary Deposits of Live Oak Canyon. The Banning Fault is concealed west of this contact in the Yucaipa Subbasin beneath Pleistocene deposits of the Live Oak Formation and older alluvium.

Tectonic activity and motion between the right-lateral strike-slip San Andreas and San Jacinto Fault zones created a series of northeast-southwest trending dip-slip faults that mark the western and southwestern boundaries of the Yucaipa Subbasin. These faults have been active for approximately 1.2 Ma. Cromwell and Matti (2022) note that "much of the topographic and structural relief that characterizes the Yucaipa subbasin can be attributed to tectonic interactions between these two structural systems." The northeast–southwest-trending dip-slip faults include the Live Oak Canyon fault, the Crafton Hills fault zone, the Yucaipa Graben fault, Chicken Hill Fault and the Casa Blanca Fault (Figure 2-12).

2.4.1.2 Geologic Units

There are four major geologic units defined within the Yucaipa Subbasin: Mesozoic and older crystalline bedrock, the Plio-Pleistocene San Timoteo Formation, the Quaternary Sedimentary Deposits of Live Oak Canyon and surficial alluvial deposits. The crystalline bedrock provides the base for the sedimentary deposits in the Yucaipa Subbasin (Mendez et al. 2016). The San Timoteo Formation and the Sedimentary Deposits of Live Oak Canyon define the principal aquifer in the Yucaipa Subbasin, with the Sedimentary Deposits of Live Oak Canyon being the more permeable and higher-yielding unit of the aquifer. The surficial alluvial deposits are unsaturated and presently hold no groundwater.

2.4.1.2.1 Mojave Desert-Type Crystalline Bedrock

The Mojave Desert-type crystalline bedrock forms the San Bernardino Mountains north of the San Andreas Fault zone. The Mojave Desert-type crystalline bedrock consists "primarily of foliated and gneissic Mesozoic granitoid rocks (granodiorite and less common monzogranite) that intrude older plutonic rocks (Triassic quartz monzonite and monzogranite) and even older metamorphic rocks (Paleozoic and [or[late Proterozoic quartzite, marble, and gneiss)" (Cromwell and Matti 2022). These rocks comprise the west-facing San Bernardino Mountains from the trace of the San Andreas Fault zone to the ridge marking the eastern boundary of the Yucaipa Valley watershed. The Mojave Desert-type crystalline bedrock is north and outside the Yucaipa Subbasin.

2.4.1.2.2 San Gabriel Mountains-Type Crystalline Bedrock

The bedrock underlying the alluvial deposits of Quaternary age sediments in the Yucaipa Subbasin derives from the San Gabriel Mountains-type rock, which consists of "two suites [or plates] separated by a low-angle thrust fault – the region-wide Vincent Thrust" (Matti et al. 2003). The lower plate is northwest of the Yucaipa Subbasin and outside the Plan Area. The upper plate comprises the Crafton Hills on the west side of the Subbasin, and the Yucaipa Hills on the east side of the Subbasin (Figure 2-12). The Crafton Hills and Yucaipa Hills consist "of strongly foliated Mesozoic granitoid rocks that mainly are granodiorite and tonalite in composition" (Matti et al. 2003).

2.4.1.2.3 Peninsular Ranges-Type Crystalline Bedrock

The Peninsular Ranges-type bedrock includes mainly granitoid rocks of various tonalite, granodiorite and quartz diorite composition and various Mesozoic rock that intruded "much older metasedimentary rock (quartzite, marble, biotite-quartz gneiss)" (Cromwell and Matti 2022). The Peninsular Ranges-type bedrock is found in the subsurface in the Yucaipa Subbasin south of the Banning Fault (Figure 2-12).

2.4.1.2.4 San Timoteo Formation

Overlying the San Gabriel Mountains-type bedrock in the Yucaipa Subbasin is a grouping of consolidated and unconsolidated sedimentary materials originally characterized as the upper member of the San Timoteo beds of Frick. Matti et al. (2003) provided the following description:

> The San Timoteo beds are named from exposures in the San Timoteo Badlands, which parallel the San Jacinto Fault and extend more than 40 km from the Loma Linda area southeastward to the San Jacinto Mountains. Canyons and arroyos eroded into the Badlands during the last million years or so reveal a gently- to moderately-dipping sequence of nonmarine sediment and sedimentary rock that have been deformed into a major anticlinal fold that for much of its length plunges gently to the northwest. Due to this gentle tilting, older strata in the sequence crop out in the southeast San Timoteo Badlands while younger strata crop out in the northwestern Badlands, mainly in the Redlands, San Bernardino South, and Yucaipa quadrangles.

Mendez et al. (2016) notes that the Pliocene to mid-Pleistocene members of the San Timoteo Formation (QTst), despite being exposed only south of the Banning Fault, are "likely to underlie the Yucaipa groundwater subbasins" because the Banning Fault likely terminated slip prior to the deposition of these beds (Figure 2-12). The middle member of the San Timoteo formation "generally consists of light-gray, sheet-like layers of well-consolidated to cemented pebble-cobble conglomerate, with medium to thick intervals of gray-brown fine- to coarse-grained sandstone and minor amounts of siltstone and mudstone intervals" (Cromwell and Matti 2022). The upper San Timoteo formation has been characterized as predominantly "sand, gravelly sand, and gravel and their consolidated equivalents (sandstone, conglomeratic sandstone, conglomerate)" with minor occurrences of "muddy materials and their consolidated equivalents (mudstone, claystone, siltstone)" (Matti et al. 2003). The upper San Timoteo formation was deposited along streambeds and drainages down an ancestral valley to the south and southwest between the Crafton Hills and Yucaipa Hills. The deposited alluvial sediments originated from rocks of both the San Gabriel Mountains and San Bernardino Mountains.

Matti et al. (2003) note that the contact between the upper San Timoteo beds and the overlying alluvium is not well documented because, “sedimentary materials in this part of the stratigraphic section have generally similar lithologic characterizations.” The distinction between the San Timoteo beds and the overlying older alluvium has been difficult in the vicinity of Live Oak Canyon (Matti et al. 2003).

Cromwell and Matti (2022) note that sediments of the San Timoteo formation are more compacted, consolidated, cemented, and have a greater abundance of clay and silt relative to the overlying Sedimentary deposits of Live Oak Canyon and Quaternary surficial material. The San Timoteo formation is likely the least transmissive sedimentary unit in the study area. Dutcher et al. (1972) estimated a transmissivity for the middle San Timoteo formation at 3,000 gallons per day per foot (gpdf) based on a 24-hour aquifer test conducted “at the city of Redlands deep test hole (2S/3W-10B2), which was located approximately 1.25 miles downstream of the intersection of San Timoteo Canyon Road and Live Oak Canyon Road along the San Timoteo Creek corridor just north of Alessandro Road.” The estimated hydraulic conductivity of the middle unit of the San Timoteo formation, based on a saturated thickness of 600 feet when the test was conducted, was 5 gallons per day per square foot (gpdf^2), or 1 foot per day.

2.4.1.2.5 Sedimentary Deposits of Live Oak Canyon

The upper member of the San Timoteo beds of Frick, or San Timoteo Formation, was “reassigned by Matti and others to ‘Sedimentary deposits of Live Oak Canyon’ because it developed in a synclinal trough north of the San Timoteo Badlands about 1.2 million years ago” (Mendez et al. 2016). The Pleistocene Sedimentary deposits of Live Oak Canyon (Qsdloc) outcrop primarily south of the Banning Fault in the western part of the Yucaipa Subbasin (Figure 2-12). As previously described for the upper San Timoteo Formation, Matti et al (2015) described the Sedimentary deposits of Live Oak Canyon as having an abundance of coarser grained materials (gravel and sand-bearing) than finer grained materials (mud-bearing). Mendez (2016) describes the Sedimentary deposits of Live Oak Canyon as “medium- to thick-bedded, moderately to well sorted, moderately indurated, very fine- to coarse-grained sandstone interlayered with subordinate pebbly sandstone and pebble to small-cobble gravel.”

Matti et al (2015) noted that the Sedimentary deposits of Live Oak Canyon coincide “with sedimentary materials that are more permeable and hydrologically more transmissive than tighter rocks of the underlying [middle and lower units of the] San Timoteo formation.” Cromwell and Alzraiee (2022) note that “sedimentary deposits of Live Oak Canyon likely comprise much of the sedimentary basin fill in the Yucaipa subbasin north of San Timoteo Canyon.” The Sedimentary deposits of Live Oak Canyon are characterized as both consolidated and unconsolidated coarse-grain sand and gravel that derived from the San Gabriel Mountains and Mojave Desert-type rocks, which resulted as a function of tectonic movement along the San Andreas Fault zone that brought the Yucaipa Subbasin in contact with this rock type.

Cromwell and Matti (2022) note that the unconsolidated sedimentary deposits of Live Oak Canyon are the primary aquifer unit in the Yucaipa Subbasin and that it is the “most extensive and voluminous sedimentary unit in the Subbasin.” The water table exists almost exclusively within the Sedimentary deposits of Live Oak Canyon. Dutcher et al. (1972) estimated a transmissivity for this unit at 25,000 gpdf based on an aquifer test conducted at well 2S/3W-11M1 located approximately 0.65 mile downstream of the intersection of San Timoteo Canyon Road and Live Oak Canyon Road. The aquifer test included pumping the well at 80 GPM for 15.5 hours. The hydraulic conductivity was estimated at 220 gpdf^2, or 30 feet per day, using a saturated thickness of 116 feet at the time of the aquifer test.

2.4.1.2.6 Quaternary Surficial Deposits

Overlying the Sedimentary deposits of Live Oak Canyon is a sequence of Quaternary (early Pleistocene to Holocene age) deposits of alluvium (Qa) characterized as unconsolidated, coarse-grained sediments of approximately 30 to 50 feet thick (Figure 2-12). The alluvial deposits sit above the regional water table and are unsaturated. The Quaternary sedimentary deposits are mostly "alluvial-fan or alluvial axial-valley deposits, with local outcrops of landslide, wash, and colluvial materials" (Cromwell and Matti 2022). Alluvial-fan sediments are coarser-grained, gravel-rich, and more poorly sorted than the axial-valley sediments, which include lenses of clay and silt interbedded in layers of sand and gravel. The Quaternary surficial deposits are exposed along the deeply incised channels of Yucaipa Creek and Oak Glen Creek.

2.4.1.2.7 Surficial Soils

The United States Department of Agriculture (USDA) has classified twelve major soil types, or classes, based on the percentages of sand (between 0.02 and 2 millimeters in size), silt (between 0.002 and 0.02 millimeters) and clay (less than 0.002 millimeters) in soil. The soil type data was obtained from the USDA Natural Resources Conservation Service Web Soil Survey website (https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm) in November 2020. The four soil types identified in Yucaipa Valley were silt loam, loam, sandy loam, and loamy sand (Figure 2-13, Soils within the San Timoteo Wash Watershed). Additionally, two other soil classifications were identified in the Plan Area within the San Timoteo Wash watershed: bedrock outcrop and terrace deposits, which have low percentages of sand relative to the loams identified in the Yucaipa Valley. The USDA characterizes each soil type with a series of physical and chemical properties. Some of these properties include the soil's capacity to hold water, its permeability under saturated conditions, rooting depths, and slope. These properties help characterize the infiltration of water through the soil and the potential runoff of rainfall from the soil surface.

The soil types with the lowest infiltration rates in the Plan Area were the rock outcrop and terrace deposits. Rock outcrops occur at the highest elevations in the Plan Area and are composed of granitic bedrock. Terrace deposits are also found at higher elevations where bedrock has been subjected to weathering (Figure 2-13). Terrace deposits are comprised of boulders and alluvium from various sources. The low infiltration rates for these soil types indicates a low recharge rate from precipitation relative to the amount of runoff that contributes to streamflow in the lower elevations in the Plan Area.

Infiltration rates increase with higher percentages of sand. The following order of soil types identified in the Yucaipa Valley begins with the highest in sand content to the lowest (and therefore from the highest infiltration rate to the lowest infiltration rate): loamy sand, sandy loam, loam, and silt loam. The following includes a brief summary of each soil type identified in the Yucaipa Valley:

- The soil type with the highest infiltration rate in the San Timoteo Wash watershed is loamy sand. Loamy sands consist of 70% to 90% sand with smaller fractions of silt and clay. Sandy loam soils are found along drainages and in the higher elevations in the northern part of the San Timoteo Wash watershed. Loamy sand soils cover approximately 8,200 acres, or 10% of the area in the San Timoteo Wash Watershed (Figure 2-13).
- Sandy loam soils consist of 50% to 70% sand with lower percentages of silt and clay. Sandy loam soils are the most widespread in the San Timoteo Wash watershed, generally being found in areas with lower topographic relief between drainages. Sandy loam soils cover approximately 41,200 acres, or 53% of the area in the San Timoteo Wash Watershed (Figure 2-13).

- Loam soils consist nearly equal parts sand and silt (approximately 40% each) with a smaller fraction of clay at approximately 20%. Loam soils in the San Timoteo Wash watershed are generally found on the tops of hills in the southern part of the watershed. Loam soils cover approximately 10,400 acres, or 13% of the San Timoteo Wash Watershed (Figure 2-13).
- Silt loam consists of 20% to 50% sand and 50% to 80% silt. The larger percentage of silt means that silt loam has low infiltration rates. As a result, less recharge occurs through silt loam soils than in soils with higher sand content. In the San Timoteo Wash watershed, silt loam soils are found in a relatively small area along San Timoteo Creek and its tributaries east of its confluence with Yucaipa Creek. Silt loam soil type covers approximately 520 acres, or 1% of the San Timoteo Wash Watershed (Figure 2-13).

2.4.1.3 Geologic Structures

The Yucaipa Subbasin is situated between the right-lateral strike-slip San Andreas and San Jacinto fault zones (Figure 2-12). Extensional stress caused by their lateral displacements created northeast-southwest trending normal dip-slip faults that compartmentalized the Yucaipa Subbasin. Displacements along these normal faults caused the down-dropped graben complex in the Yucaipa Valley, which created the current topography defined by the Crafton Hills in the west and the Yucaipa Hills in the east, with the valley filled in between with alluvial deposits originating from these hills. The northeast-southwest trending normal faults, to some extent, act as partial groundwater flow barriers and affect the movement of groundwater through the Yucaipa Subbasin. Consequently, the Yucaipa Subbasin was further divided into nine hydrogeologic subareas based on ancestral northwest–southeast-trending fault splays originating from tectonic activity along the San Andreas and San Jacinto fault zones, and northeast–southwest-trending normal faults resulting from the right-lateral displacements of the San Andreas and San Jacinto fault zones (Figure 2-14, Hydrogeologic Subareas in the Yucaipa Subbasin).

2.4.1.3.1 Mission Creek and San Bernardino Strands of the San Andreas Fault Zone

The Mission Creek strand represents a major strand of the San Andreas Fault zone where crystalline rocks of the San Bernardino-type rocks are juxtaposed against San Gabriel Mountain-rock types. This strand underlies Quaternary deposits of alluvium along the base of the San Bernardino Mountains. Matti et al. (2003) inferred that the Mission Creek strand is concealed and lies underneath the younger San Bernardino strand, which represents the modern trace of the San Andreas Fault (Figure 2-12). The San Bernardino strand "evolved through re-activation of the older fault (Mission Creek strand), and the two structures occupy the same trace" (Matti et al. 2003).

The San Bernardino strand of the San Andreas Fault Zone defines the southwest margin of the San Bernardino Mountains. It also marks the northern boundary of the Plan Area (Figure 2-12). The Triple Falls Creek subarea lies between the northern and southern branches of the San Bernardino strand. The extension of the San Bernardino strand of the San Andreas Fault southeast of Mill Creek has an average orientation of N 55° W. Evidence of recent movement characterized in the latest Pleistocene and Holocene indicates a slip rate of approximately 25 millimeters per year (Matti et al. 2003).

2.4.1.3.2 Banning Fault

The Banning Fault is an ancestral major right-lateral strike-slip fault that was part of the San Andreas system in late Miocene time. Matti et al. (2003) mapped the Banning Fault as a concealed trace through the Yucaipa Valley and observed "no evidence that the Banning fault breaks Quaternary alluvial deposits or the upper member of the San Timoteo beds of Frick" (i.e., Sedimentary deposits of Live Oak Canyon) and therefore concluded that the Banning fault had no influence on the Quaternary structural history in the Yucaipa Subbasin (Figure 2-12). Cromwell and Matti (2022) noted that the Banning Fault does not offset the Sedimentary deposits of Live Oak Canyon, the main aquifer unit in the Yucaipa Subbasin, and there is no evidence of a significant influence on hydraulic heads across the inferred concealed boundary of the Banning Fault. Cromwell and Alzraiee (2022) note that the Banning Fault is "not interpreted to directly offset or juxtapose layers within the basin-fill hydrogeologic units. However, the inactive faults indirectly may cause thinning or pinching out of hydrostratigraphic layers that 'drape' across structural crests in crystalline basement, potentially restricting the movement of groundwater."

2.4.1.3.3 San Jacinto Fault Zone

The San Jacinto Fault zone lies approximately 1.5 miles southwest of the Yucaipa Subbasin (Figure 2-12). It bounds the western extent of the San Timoteo Badlands and briefly intersects the western boundary of the San Timoteo Wash watershed. This fault zone does not define any hydrogeologic boundary of the Subbasin.

2.4.1.3.4 Crafton Hills Fault Zone

The Crafton Hills Fault Zone defines a series of sub-parallel, northeast-trending normal dip-slip faults that run along the east side of the Crafton Hills (Figure 2-12). The fault zone demarks the boundary between the uplifted crystalline bedrock of San Gabriel Mountains-type of the Crafton Hills and the alluvial deposits in the down-dropped Yucaipa valley. The zone extends from west of Live Oak Canyon near its confluence with San Timoteo Creek northeast to where it encounters the normal faults associated with the Yucaipa Graben Complex. Cromwell and Matti (2022) note that the Crafton Hills Fault zone "defines the northwestern boundary of the Yucaipa Subbasin."

2.4.1.3.5 Yucaipa Graben Complex

The Yucaipa Graben Complex is a series of northeast–northwest-trending normal dip-slip faults that form the northeastern terminus of the Crafton Hills Fault zone (Figure 2-12). Associated with the Yucaipa Graben Complex are the Oak Glen Fault, a south-facing scarp mostly parallel with the San Andreas Fault zone, and the Chicken Hill Fault. The Oak Glen Fault lies within the Yucaipa Subbasin and curves southward to become part of the east-facing, north–south-trending fault scarps that characterize the Yucaipa Graben Complex.

2.4.1.3.6 Chicken Hill Fault Zone

The Chicken Hill Fault is a northeast-trending normal fault that is associated with the Yucaipa graben complex and extends southwest down Live Oak Canyon (Matti et al. 2003). The Chicken Hill Fault zone is east of the Crafton Hills Fault zone, in which tectonic activity between these two fault zones led to the down-dropped graben that formed Live Oak Canyon (Figure 2-12). Burnham and Dutcher (1960) and Cromwell and Alzraiee (2022) recognize the Chicken Hill Fault as a barrier to groundwater flow. This is evidenced by the marked difference in hydraulic heads measured at Yucaipa Valley Water District (YVWD) and City of Redlands wells on the east side of the fault in the Calimesa subarea compared to hydraulic heads measured at Western Heights Water Company (WHWC) wells on the west side of the fault. The difference in hydraulic head across the fault is approximately 200 to 300 feet (see Section 2.5.1.6, Calimesa Subarea).

2.4.1.3.7 Live Oak Canyon Fault Zone

Cromwell and Matti (2022) characterized the Live Oak Canyon Fault Zone, which is located along the north flank of San Timoteo Canyon and runs parallel with San Timoteo Creek before turning west at the downstream terminus of the Yucaipa Subbasin (Figure 2-12), as north-dipping contractional structures (e.g., reverse and thrust faults).

2.4.1.3.8 Oak Glen Fault

Moreland (1970) identified a fault trace parallel to and approximately 1 mile south of the San Andreas Fault Zone as the Oak Glen Fault (Figure 2-12). A south-facing scarp near its western end is the only surficial evidence of the Oak Glen Fault. Cromwell and Matti (2022) note that the Oak Glen Fault does not extend west beyond the Crafton Hills, but "instead curves southward to form one of several east-facing north-south trending fault scarps that [are associated with the] Yucaipa graben complex." Moreland (1970) noted that the Oak Glen Fault does impede groundwater flow to where a hydraulic head difference "of as much as 400 feet exist across part of the fault."

2.4.1.3.9 Hydrogeologic Barriers

San Bernardino Valley Municipal Water District (SBVMWD) entered into a contract with DWR to receive SWP water beginning in 1972. The Yucaipa area was tentatively scheduled to receive 5,000 AFY of SWP water by 1972. One possible use of the SWP water was to temporarily store the water in the alluvial aquifer as part of an aquifer storage and recovery project. Moreland (1970), in cooperation with SBVMWD, conducted an investigation to evaluate the feasibility of artificially recharging the Yucaipa Subbasin with imported SWP water. The investigation included estimates of storage capacity, aquifer transmissivity, infiltration rates, and a reassessment of the subareas within the Yucaipa Subbasin that were previously defined by others based on the influence of fault zones on groundwater flow.

Moreland (1970) noted that "faults that transect permeable unconsolidated materials may produce barriers to ground-water flow." Moreland (1970) noted that geologic structures mapped as "faults," such as the San Andreas Fault and the Chicken Hill Fault, are based on exposures and surficial evidence of displacement; whereas "barriers to ground-water flow" have no surface expressions, but are postulated from geophysical and water level data. Moreland (1970) identified the South Mesa Barrier and the Casa Blanca Barrier as probable faults based on the marked hydraulic head differences observed in wells on either side of these barriers (Figure 2-12). The hydraulic head difference across the Casa Blanca Barrier was approximately 600 feet in 1968, while the hydraulic head difference across the South Mesa Barrier was approximately 160 to 200 feet (Moreland 1970).

Moreland (1970) identified seven hydrogeologic subareas within the Yucaipa Subbasin: Triple Falls Creek, Crafton, Oak Glen, Gateway, Wilson, Calimesa, and Western Heights. These seven subareas were defined within the Yucaipa Subbasin and north of the Banning Fault. Subsequent investigations by Geoscience (2014) and Cromwell and Matti (2022) led to further refinements of the boundaries of these subareas, plus the additions of the Live Oak and Singleton subareas that were defined south of the Banning Fault and extend to the southern boundary of the Yucaipa Subbasin.

2.4.2 Basin Bottom

In 2009, the USGS, in collaboration with SBVMWD, conducted a gravity anomaly survey to estimate the depths to bedrock in the Yucaipa Subbasin and thickness of alluvial fill in the Yucaipa Valley (Mendez et al. 2016). The survey was part of an investigation to enhance an understanding of the basin geometry and structure, which would lead to better management of groundwater resources by the water purveyors extracting groundwater from the Subbasin. Mendez et al. (2016) noted that the Yucaipa Subbasin is underlain by San Gabriel Mountains-type bedrock between the San Andreas Fault and the Banning Fault, and by Peninsular Ranges-type bedrock south of the Banning Fault (which includes the Live Oak and Singleton subareas). The San Gabriel Mountains-type bedrock is characterized as, "strongly foliated granitoid rocks, mainly of granodiorite to tonalite, that have been deformed by brittle-ductile and ductile shearing" (Mendez et al. 2016). The Peninsular Ranges-type bedrock is characterized as, "very hard; slightly to moderately weathered, where exposed; and not extensively fractured" (Mendez et al. 2016).

The 2009 survey included 256 gravity measurements along 20 profiles in the Yucaipa Subbasin. These measurements supplemented a previous survey conducted in 1982 that included 384 gravity measurements. The combined gravity datasets were used to estimate the depth to contact with the bedrock. There was a marked contrast between the gravity values for the bedrock, which corresponded with the high gravity values measured at exposed bedrock in the Crafton Hills and Yucaipa Hills, and the overlying alluvial fill in the Yucaipa Valley. The USGS calibrated the subsurface gravity measurements to gravity measurements of bedrock outcrops and to the depths-to-bedrock recorded in drilling logs for wells drilled in the study area. The USGS reviewed the drilling logs for 51 wells, where the drillers noted that they penetrated bedrock at 15 of these wells (Mendez et al. 2016).

The USGS estimated the thickness of alluvial deposits in the basin at 0 feet at the fringes of Yucaipa Valley to approximately 3,000 feet in the Western Heights subarea, to approximately 7,000 feet south of the Banning Fault (Mendez et al. 2016). The estimated alluvial thickness in the Live Oak subarea ranges from approximately 2,000 feet to 5,000 feet. The USGS presented a series of cross sections detailing the depth-to-bedrock profiles across the Subbasin. These profiles were incorporated into the development of the hydrogeologic conceptual model for this GSP (Section 2.6).

2.5 Hydrogeology

2.5.1 Hydrogeologic Subareas

The Yucaipa Subbasin is divided into nine hydrogeologic subareas, or subareas, based on the apparent influences of faults (both mapped and inferred) on groundwater flow. The configuration of these subareas in the Yucaipa Subbasin is shown in Figure 2-14. The following presents a brief description of each subarea, from northeast to southwest across the Yucaipa Valley, and the apparent influence of the faults that mark their boundaries on groundwater flow.

2.5.1.1 Triple Falls Creek Subarea

The Triple Falls Creek subarea is the northernmost subarea in the Plan Area and lies between the east–west-trending San Andreas Fault Zone and the Oak Glen Fault (Figure 2-14). The subarea is approximately 1,000 acres in area with land surface elevations ranging from approximately 2,900 feet above NAVD88 in the southwestern corner to approximately 5,100 feet above NAVD88 in the northeastern corner of the subarea. Wilson Creek and Oak Glen Creek begin in this subarea with runoff from the adjacent San Bernardino Mountains. Birch Creek is a minor drainage that flows out of the San Bernardino Mountains and is tributary to Oak Glen Creek. Sources of water to this subarea include infiltrating stream flow, subsurface flows from the adjacent San Bernardino Mountains (i.e., mountain front recharge), and deep percolation from direct precipitation.

Six private wells and two municipal water supply wells owned by YVWD (YVWD-31 and YVWD-36) were drilled in this subarea. The estimated thickness of alluvium in this subarea ranges from land surface at the contact with the San Bernardino Mountains to 430 feet, the depth at which bedrock was encountered when drilling YVWD-36. The static depths-to-water (DTW) measured at YVWD-31 and YVWD-36 ranged from 200 to 260 feet below ground surface (bgs) in the 1990s, or at elevations of 2,880 to 2,950 feet above NAVD88. No groundwater levels were measured at these wells after 1999. Moreland (1970) noted that, "the water table ranges from a few feet below land surface near the mountain front to 300 feet below land surface at well 1S/2W-24H1 in the central part of the subbasin."

Annual groundwater production in the Triple Falls Creek subarea from the 1966 WY to 2014 WY has ranged between approximately 85 AF (2014 WY) to 750 AF (1983 WY) (Cromwell and Alzraiee 2022). The volume of groundwater produced in the 2014 WY was approximately 85 AF (Cromwell and Alzraiee 2022). Production since the 1995 WY has been attributed to private well users, which has steadily decreased from a peak of approximately 290 AFY in the 1999 WY to 85 AFY in the 2014 WY. One municipal water supply well, YVWD-36, was active from 1965 to 1993. Municipal water supply well YVWD-31 never produced groundwater.

2.5.1.2 Oak Glen Subarea

The Oak Glen subarea is bounded to the north by the Oak Glen Fault (adjacent to the Triple Falls Creek subarea), to the east by the Yucaipa Hills, to the west by the Casa Blanca Barrier, and the south by the South Mesa Barrier (Figure 2-14). The area of the subarea is approximately 3,660 acres with land surface elevations ranging from approximately 2,500 feet above NAVD88 in the southwest corner of the subarea to 4,900 feet above NAVD88 in the northeast corner. The upper reaches of Wilson Creek and Oak Glen Creek run northeast to southwest through the subarea (Figure 2-1). Sources of water to this subarea include infiltrating stream flow from Wilson Creek, Oak Glen Creek, and Wildwood Creek, subsurface flows from the adjacent Yucaipa Hills (i.e., mountain front recharge) and the adjacent Triple Falls Creek subarea to the north, and deep percolation from direct precipitation.

The Oak Glen subarea includes the Wildwood Creek detention basins, which were built by the City of Yucaipa to control flooding and mitigate damage to downstream, adjacent residential properties of Wildwood Creek. The detention basins include a desilting basin, two retention basins, and a bioretention swale that bypasses the desilting and detention basins and conveys low flows and first flush flows (URS 2007). Stormwater runoff contained by the retention basins is a source of local recharge to the underlying aquifer.

YVWD operates eight municipal water supply wells in the subarea, with a few other wells used for monitoring groundwater elevations. There are also 8 private wells in the subarea (Cromwell and Alzraiee 2022). The aquifer thickness in the subarea ranges from land surface at the contact with the Yucaipa Hills to 420 feet, the depth at which bedrock was encountered when drilling YVWD-50, which is located near the southwestern corner of the subarea and the farthest from the Yucaipa Hills (Figure 2-14). Static groundwater elevations have ranged from 2,275 feet above NAVD88 at YVWD-50 to 3,837 feet above NAVD88 at well YVWD-25, which is located in the higher elevations of the subarea at approximately 3,880 feet above NAVD88.

Annual groundwater production in the Oak Glen subarea from the 1966 WY to 2014 WY has ranged from approximately 150 AFY (2011 WY) to 600 AFY (1995 WY) (Cromwell and Alzraiee 2022). The volume of groundwater produced in the 2014 WY was approximately 160 AF (Cromwell and Alzraiee 2022). Production has steadily declined since the peak of approximately 600 AF in the 1995 WY to 160 AFY in the 2018 WY. Approximately 60 AFY has been produced by private well users since the 1998 WY (Cromwell and Alzraiee 2022).

Infrastructure is in place to divert surface water from Birch Creek and Oak Glen Creek to the Oak Glen Surface Water Filtration Facility (OGSWFF), but no surface water has been diverted from Birch Creek since 2009 and from Oak Glen Creek since 2017 because of “numerous clay pipe transmission line failures” (personal communication with YVWD, 9/4/2020). Groundwater produced from well YVWD-25 is under the direct influence of surface water from nearby Oak Glen Creek. Groundwater produced from YVWD-25 is treated at the OGSWFF located approximately 0.25 miles west of YVWD-25. Since the 2001 WY, YVWD-25 has delivered 192 AFY to 342 AFY of water to the OGSWFF.

2.5.1.3 Gateway Subarea

The Gateway subarea is bounded to the north by the San Andreas Fault (adjacent to the Triple Falls Creek subarea), to the east by the Casa Blanca Barrier, to the south by the Chicken Hill Fault, and to the west by the Yucaipa Graben Complex (Figure 2-14). The area of the subarea is approximately 1,500 acres. Land surface elevation ranges from approximately 2,460 feet above NAVD88 in the southwest corner to 3,400 feet above NAVD88 in the northeast corner. The subarea includes the Wilson Creek spreading basins, where a branch of the SWP pipeline along Bryant Street connects to these spreading basins and surplus SWP water is diverted for artificial recharge purposes. Sources of water to this subarea include infiltrating stream flow from Wilson Creek and Oak Glen Creek, subsurface flows from the adjacent Triple Falls Creek and Oak Glen subareas, imported SWP water discharged to the Wilson Creek and Oak Glen spreading basins, irrigation return flows and deep percolation from direct precipitation.

YVWD owns nine municipal water supply wells in the subarea. The aquifer thickness in the subarea ranges from 380 feet to 1,210 feet, the depths at which bedrock were encountered when drilling YVWD-44 and YVWD-53, respectively. Static groundwater elevations have ranged from 2,178 feet above NAVD88 at YVWD-56 to 2,661 feet above NAVD88 at well YVWD-43, which is the farthest north well in the subarea near the Oak Glen Fault.

Annual groundwater production in the Gateway subarea from the 1966 WY to 2014 WY has ranged from approximately 570 AFY (1983 WY) to 3,100 AFY (2005 WY) (Cromwell and Alzraiee 2022). The volume of groundwater produced in the 2014 WY was approximately 2,260 AF (Cromwell and Alzraiee 2022). Private well users produced approximately 1,000 AFY from the mid-1960s to early 1970s, and then steadily decreased production to approximately 90 AFY in the 2001 WY. No production by private well users occurred after the 2001 WY (Cromwell and Alzraiee 2022).

2.5.1.4 Wilson Creek Subarea

The Wilson Creek subarea is bounded to the north and west by the Chicken Hill Fault (adjacent to the Gateway subarea), to the east by the Casa Blanca Barrier, and to the south by the South Mesa Barrier (Figure 2-14). The area of the subarea is approximately 1,250 acres. Land surface elevation ranges from approximately 2,330 feet above NAVD88 in the southwest corner to 2,960 feet above NAVD88 in the northeast corner. Sources of water to this subarea include infiltrating stream flow from Wilson Creek and Oak Glen Creek, subsurface flows from the adjacent Gateway and Oak Glen subareas, irrigation return flows and deep percolation from direct precipitation.

YVWD owns four municipal water supply wells in the subarea. The aquifer thickness in the subarea ranges from approximately 600 feet at YVWD-6 to 1,150 feet at YVWD-46. Static groundwater elevations have ranged from 2,185 feet above NAVD88 to 2,452 feet above NAVD88.

Annual groundwater production in the Wilson Creek subarea from the 1966 WY to 2014 WY has ranged from 0 AF (1988 WY) to 2,100 AFY (2001 WY) (Cromwell and Alzraiee 2022). Well YVWD-46 came online in 1990 and has been the only municipal water supply well operating in this subarea since 2011. The annual average production by YVWD-46 from the 2011 WY to 2018 WY is 1,500 AFY. No private well users produced groundwater in this subarea from the 1966 WY to the 2018 WY (Cromwell and Alzraiee 2022).

2.5.1.5 Crafton Subarea

The Crafton subarea is bounded to the north by the Oak Glen Fault, to the east by the Yucaipa Graben Complex, to the south by the South Mesa Barrier and to the west by the Crafton Hills Fault (Figure 2-14). The area of the subarea is approximately 1,360 acres. Land surface elevation ranges from approximately 2,330 feet above NAVD88 in the southeast corner to 3,040 feet above NAVD88 in the northeast corner. Sources of water to this subarea include subsurface flows from the adjacent Crafton Hills (i.e., mountain front recharge), subsurface flows from the adjacent Triple Falls Creek, Gateway and Wilson Creek subareas, irrigation return flows and deep percolation from direct precipitation.

The Crafton subarea also includes the Yucaipa Regional Park, which consists of three surface water reservoirs, called the Yucaipa Lakes, that receive leakage from the nearby Crafton Hills Reservoir. The three Yucaipa Lakes were constructed with clay and asphaltic liners, each with a drain blanket underneath to capture leakage. SBVMWD owns and manages the Yucaipa Lakes and reported that no "significant amount of water [i.e., leakage] was ever recorded" from the Yucaipa Lakes (SBVMWD, pers. comm., 2020). SBVMWD estimates that any leakage from the Yucaipa Lakes is negligible. The Crafton Hills Reservoir is part of the East Branch Aqueduct that brings SWP water to the Yucaipa area. The reservoir is managed by DWR, which reported that, on average, seepage from the two reservoir dams is approximately 50 gpm. The seepage flows in the natural drainages leading from the reservoir to Yucaipa Lakes Reservoir 2 (the middle lake) (DWR, pers. comm., 2020).

YVWD owns four municipal water supply wells in the subarea. The aquifer thickness in the subarea ranges from land surface at the contact with the Crafton Hills to 860 feet at YVWD-57. Static groundwater elevations have ranged from 2,187 feet above NAVD88 at YVWD-57 to 2,642 feet above NAVD88 at well YVWD-37.

Annual groundwater production in the Crafton subarea from the 1966 WY to 2014 WY has ranged from approximately 20 AF (2010 WY) to 310 AF (1994 WY) (Cromwell and Alzraiee 2022). The volume of groundwater produced in the 2014 WY was approximately 30 AF (Cromwell and Alzraiee 2022). Groundwater production has averaged 160 AFY since 1970. No private well users produced groundwater in this subarea from the 1966 WY to the 2018 WY (Cromwell and Alzraiee 2022).

San Bernardino County maintains the former Yucaipa Landfill, which is located on the slopes of the Crafton Hills south and adjacent to the Yucaipa Regional Park. A network of shallow groundwater monitoring wells is sampled periodically to monitor contaminants originating from wastes buried at the landfill. Further discussion of the contaminants detected in the shallow groundwater at this former landfill site is discussed in Section 2.7.5.2.1, Former Yucaipa Landfill. In summary, no contaminants have migrated from the former landfill site to adversely impact water quality at nearby municipal water supply wells YVWD-55 and YVWD-57.

2.5.1.6 Calimesa Subarea

The Calimesa subarea is bounded to the north by the South Mesa Barrier, to the east by the Yucaipa Hills, to the south by the Banning Fault, and to the west by the Chicken Hill Fault (Figure 2-14). The subarea is approximately 5,290 acres in area. Land surface elevation ranges from 1,900 feet above NAVD88 in the southwest corner of the subarea to 3,000 feet above NAVD88 at the farthest eastern extent rising up into the Yucaipa Hills. Sources of water to this subarea include infiltrating stream flow from Yucaipa Creek, subsurface flows from the Yucaipa Hills and the adjacent Oak Glen, Wilson Creek and Singleton subareas, irrigation return flows, and deep percolation from direct precipitation. Moreland (1970) stated, "underflow across the South Mesa barrier and runoff from the Yucaipa Hills are the primary sources of recharge to the subbasin."

There are 16 municipal water supply wells that are owned and operated by YVWD and South Mesa Water Company (South Mesa) in the Calimesa subarea. Of the 16 municipal water supply wells, 8 have been actively producing water in the last 5 years. South Mountain owns two irrigation supply wells, Chicken Hill and Hog Canyon 2, that pump groundwater to the Crafton Hills College located partly in the Western Heights subarea.

Annual groundwater production in the Calimesa subarea from the 1966 WY to 2014 WY has ranged from approximately 3,800 AF (1965 WY) to 7,200 AF (2002 WY) (Cromwell and Alzraiee 2022). The volume of groundwater produced in the 2014 WY was approximately 5,200 AF (Cromwell and Alzraiee 2022). Groundwater production has averaged approximately 3,300 AFY from the 2015 WY to 2018 WY.

The depth to bedrock ranges from 375 feet bgs (well South Mesa-02) to >1,400 feet bgs (well South Mesa-09). There are 8 private wells in the subarea, one of which is the only well that has produced groundwater since the 2007 WY. This well, located just east of the Chicken Hill Fault, produced approximately 190 AFY from the 2007 WY to the 2018 WY (Cromwell and Alzraiee 2022).

Historically, static groundwater elevations measured in the Calimesa subarea have ranged from 1,942 feet above NAVD88 at the Hog Canyon 2 well to 2,276 feet above NAVD88 at well YVWD-02. Groundwater elevations measured across the South Mesa Barrier and the Chicken Hill Fault indicate that they influence groundwater flow. Groundwater elevations measured at wells on either side of the Chicken Hill Fault indicate a hydraulic head difference of approximately 300 feet (see Section 2.5.1.7, Western Heights Subarea). The hydraulic head difference across the South Mesa Barrier is approximately 100 to 200 feet (see Section 2.9.2, Calimesa Management Area). The Banning Fault, as mentioned in Section 2.4.1.3.2, does not influence groundwater flow, although it does mark the southern boundary of the Calimesa subarea.

2.5.1.7 Western Heights Subarea

The Western Heights subarea is bounded to the north by the South Mesa Barrier, to the east by the Chicken Hill Fault, to the south by the Banning Fault, and to the west by Crafton Hills (Figure 2-14). The area of the Western Heights subarea is approximately 2,500 acres. Land surface elevations range from 1,900 to 2,500 feet above NAVD88. WHWC is the sole water purveyor in the subarea. Sources of water to this subarea include infiltrating stream flow from unlined sections of Oak Glen Creek, subsurface flows from the Crafton Hills and the adjacent Crafton, Calimesa and Live Oak subareas, irrigation return flows, septic system discharges, and deep percolation from direct precipitation. WHWC began purchasing SWP water from YVWD in 2008 to supplement its water supply, which led to a reduction in groundwater pumping from an average of 2,500 AFY in the 5 years prior to 2008 to 1,900 AFY after 2008.

The Chicken Hill Fault, which marks the boundary between the Western Heights and Calimesa subareas, has a marked influence on groundwater flow. Hydraulic heads measured at wells WHWC-11 and WHWC-12, located west of the Chicken Hill Fault in the Western Heights subarea, were approximately 300 feet lower than hydraulic heads measured at wells YVWD-49 and City of Redlands wells Chicken Hill and Hog Canyon 2, located east of the fault in the Calimesa subarea (Figure 2-15, Hydraulic Heads across the Chicken Hill Fault).

WHWC owns and operates eight municipal water supply wells in the Western Heights subarea. Private well users stopped producing groundwater in 2000. Annual groundwater production from the 1966 WY to 2014 WY has ranged from approximately 1,900 AF (2010 WY) to 3,200 AF (1998 WY) (Cromwell and Alzraiee 2022). The volume of groundwater produced in the 2014 WY was approximately 2,100 AF (Cromwell and Alzraiee 2022). Wells WHWC-10, WHWC-11, WHWC-12 and WHWC-14 have collectively produced groundwater in the last 10 years at an average annual rate of 1,900 AFY. The estimated alluvial thickness in the Western Heights subarea ranges from 0 feet at the contact with the Crafton Hills to approximately 1,100 feet, which was the depth to bedrock reported in the driller's log for well WHWC-14.

2.5.1.8 Singleton Subarea

The Singleton Subarea is bounded to the east and south by the southern flank of the Yucaipa Hills, and to the north and west by the Banning Fault and a splay of the San Gorgonio Pass Fault Zone (Figure 2-14). The area of the Singleton subarea is approximately 700 acres. Land surface elevations range from 2,400 to 3,040 feet above NAVD88. Sources of water to this subarea include infiltrating stream flow from an unnamed tributary that terminates at small spreading basins located near the southwestern boundary between the Yucaipa Subbasin and the adjudicated Beaumont Basin, subsurface flows from the adjacent Calimesa subarea, irrigation return flows and deep percolation from direct precipitation.

YVWD operated municipal water supply well YVWD-47 from 1987 to 1994 at an average rate of 17 AFY. YVWD-47 has not produced water since 1994. Three private wells located in this subarea have not produced groundwater since the 1966 WY (Cromwell and Alzraiee 2022). The estimated alluvial thickness ranges from 0 feet at the contact with the Yucaipa Hills to >300 feet, the total depth of well YVWD-47. No bedrock was encountered when drilling YVWD-47.

2.5.1.9 Live Oak Subarea

The Live Oak subarea is the farthest downgradient subarea in the Yucaipa Subbasin and includes the lowest reach of Yucaipa Creek to where it joins San Timoteo Creek (Figure 2-14). Surface water flow out of the Yucaipa Subbasin is in San Timoteo Creek. The Live Oak subarea is bounded to the north by the Banning Fault and the City of Redlands, to the east and south by a ridgeline marking the boundary of the minor Yucaipa Creek watershed and terminates where San Timoteo Creek leaves the Yucaipa Subbasin and continues to the Santa Ana River. The subarea is approximately 5,000 acres. Land surface elevation ranges from 2,500 feet above NAVD88 at the eastern corner of the subarea to 1,280 feet above NAVD88 where San Timoteo Creek leaves the Yucaipa Subbasin. Sources of water to this subarea include infiltrating stream flow from Yucaipa Creek, San Timoteo Creek and other minor tributaries, subsurface flows from the adjacent Western Heights and Calimesa subareas, and deep percolation from direct precipitation.

South Mesa owns and operates three municipal water supply wells, South Mesa-01, South Mesa-05 and South Mesa-07, in the upper eastern portion of the subarea. Wells South Mesa-05 and South Mesa-07 are active and have produced an average 550 AFY from 2014 WY to 2018 WY. South Mesa-01 historically produced water but is currently used to measure static groundwater levels. Static groundwater elevations in the upper eastern portion of the subarea have ranged from 1,978 feet above NAVD88 to 2,268 feet above NAVD88 since 1966 (Figure 2-16, Hydraulic Heads at South Mesa Wells 1, 5, and 7). There are no other municipal water supply wells in the subarea.

YVWD installed a network of shallow groundwater observation wells to monitor groundwater levels as part of the Habitat Monitoring Program implemented along San Timoteo Creek (Section 1.5.1.2). The shallow observation wells indicate that the depth-to-groundwater is approximately 2 to 20 feet along the reach of San Timoteo Creek in the Yucaipa Subbasin. This reach of San Timoteo Creek includes groundwater dependent ecosystems (GDEs). There are approximately 140 acres of citrus groves along the west bank of San Timoteo Creek beginning approximately 0.7 miles downstream of the confluence of Yucaipa Creek and San Timoteo Creek. There is one known irrigation supply well within the citrus groves, but other wells operating outside the Subbasin and located in the hills west of San Timoteo Canyon supply irrigation water to the groves. SBCFCD created a series of flood control basins in the last 0.7 miles of San Timoteo Creek before it leaves the Yucaipa Subbasin.

2.5.2 Principal Aquifer

The principal aquifer in the Yucaipa Subbasin comprises the Sedimentary deposits of Live Oak Canyon and the underlying San Timoteo Formation. The majority of public water supply wells are screened in these two formations. Cromwell and Matti (2022) note that the “unconsolidated sediment unit [Sedimentary deposits of Live Oak Canyon and middle Pleistocene alluvial deposits] comprises the primary aquifer unit in the Yucaipa Subbasin.” The water table exists almost exclusively within this unit. The estimated transmissivity is 25,000 gpdf, or 3,340 square feet per day (Dutcher and Fenzel 1972). The hydraulic conductivity was estimated at 220 gpdf^2, or 30 feet per day, using a saturated thickness of 116 feet at the time of the aquifer test.

Cromwell and Matti (2022) note that sediments of the San Timoteo formation are “more compacted, consolidated, cemented and have a greater abundance of clay and silt relative to the overlying unconsolidated sediment [Sedimentary deposits of Live Oak Canyon] and surficial materials [Quaternary surficial material].” The estimated transmissivity for the San Timoteo formation is 3,000 gpdf, or 400 square feet per day (Dutcher and Fenzel 1972). The estimated hydraulic conductivity of the San Timoteo formation, based on a saturated thickness of 600 feet when the test was conducted, was approximately 5 gpdf^2, or 1 foot per day.

2.5.2.1 Safe Yield

Geoscience Support Services Inc. (GSSI) conducted a study to estimate the useable storage capacity and safe yield in the Yucaipa Subbasin and for its subareas (GSSI 2014). GSSI (2014) defined safe yield as a “sustainable yield,” which takes into account natural and anthropogenic sources of recharge to the Subbasin. Natural recharge occurs from infiltration of rainfall, streambed recharge and mountain-front recharge. Anthropogenic sources derive from return flows from applied irrigation, septic systems and imported water to artificially recharge the Subbasin. GSSI (2014) applied three different methods to estimate the safe yield: zero-net draft method, the Hill method, and applied a hydrologic water balance to the Yucaipa Subbasin using a watershed model.

The zero-net draft method “involves plotting average groundwater elevation for a selected period of time, and comparing it to groundwater production for the same period. If the mean groundwater elevation at the beginning and end of the period is the same, the production during the period is taken as a measure of the sustainable yield”

(GSSI 2014). The Hill method includes comparing annual changes in groundwater elevations to annual production, with the safe yield equivalent to the annual production that resulted in a net zero change in groundwater elevation.

At the time of the GSSI study, the southern boundary of the Yucaipa Subbasin was defined by the Banning Fault. Therefore, it did not include the Singleton and Live Oak subareas, which were later included in the Yucaipa Subbasin when it was expanded during the basin boundary modification adopted by DWR in 2016. Table 2-6 summarizes the estimates of safe yield for the Triple Falls Creek, Oak Glen, Gateway, Wilson Creek, Crafton, Calimesa, and Western Heights subareas, and provides an estimate of safe yield for the Yucaipa Subbasin north of the Banning Fault. An estimate of the sustainable yield, as defined under the Sustainable Groundwater Management Act (SGMA), for the entire Yucaipa Subbasin (including the Singleton and Live Oak subareas) is presented in Section 2.8.6, Estimate of Sustainable Yield.

Table 2-6. Estimated Safe Yields in the Yucaipa Subbasin

Subarea	Estimates of Safe Yield (AFY)		
	Zero-Net Draft	*Hill Method*	*Hydrologic Water Balance*
Triple Falls Creek	215	310	—
Oak Glen	415	600	—
Gateway	1,775	1,440	—
Wilson Creek	1,520	1,245	—
Crafton	200	370	—
Calimesa	3,195	3,580	—
Western Heights	2,270	2,100	—
Total for Yucaipa Subbasin[1]	**9,590**	**9,645**	**9,683**

Notes: AFY = acre-feet per year.
1 Excludes the Singleton and Live Oak subareas south of the Banning Fault.

2.5.3 Groundwater Production Wells

The California Department of Water Resources designated the Yucaipa Subbasin as a high priority basin. This designation resulted from a dependence on groundwater as a local source of water, the density of water production wells per square mile in the Subbasin, and the population being reliant on the local water supply. There are 90 water supply wells in the Subbasin, with approximately one-third of those wells being privately owned and used to produce domestic and/or irrigation water supply (Figure 2-17, Well Locations and Well Owners within the Yucaipa Subbasin; Tables 2-7a, 2-7b). YVWD maintains 34 municipal water supply wells within the Subbasin, with 12 currently active. YVWD reported approximately 4,600 AF of groundwater production from within the Subbasin in WY 2018.

YVWD also maintains 24 wells outside the Subbasin, 20 of which produce groundwater from the fractured San Gabriel-type rock in the Yucaipa Hills. These wells supply water to the local communities outside the Subbasin, but within YVWD's service area. YVWD also maintains three wells, YVWD-34, YVWD-35, and YVWD-48, in the adjudicated Beaumont basin. Wells YVWD-34 and YVWD-35 are inactive and used for monitoring purposes only, but YVWD-48 is active and supplies water to a portion of YVWD's service area within the Singleton, Calimesa, and Live Oak subareas. Well YVWD-51 is northwest of the Subbasin in the Mill Creek subbasin and produces water for the local community within YVWD's service area. No groundwater produced from YVWD-51 enters the Subbasin.

WHWC maintains 10 municipal water supply wells (4 are currently active), all within the Western Heights subarea, and South Mesa maintains 12 municipal water supply wells in the Calimesa and Live Oak subareas (7 are currently active). South Mesa also has 2 municipal water supply wells outside the Subbasin in the adjudicated Beaumont basin. One of these wells, South Mesa-04, is active and conveys water to South Mesa's drinking water distribution system in its service area. The other well, South Mesa-03, is inactive and used to measure groundwater elevations only. Both mutual water companies produced approximately 2,000 AF from the Yucaipa Subbasin in the 2018 WY.

There are 2.3 water supply wells per square mile in the Subbasin (Tables 2-7a, 2-7b). Figure 2-17 includes the status for each of the municipal water supply wells: "production wells" are connected to their respective water agency's drinking water distribution system and are active or inactive, "abandoned" wells are abandoned and/or destroyed wells that are no longer accessible, and "monitoring" wells are existing wells used only for monitoring purposes (e.g., measuring groundwater elevations and/or collecting water quality samples).

Table 2-7a. Wells in the Yucaipa Subbasin

Public Agency or Private Well Owners	Number of Water Supply Wells in Subbasin	Number of Active Wells in Subbasin
Yucaipa Valley Water District	34	12
Western Heights Water Company	10	4
South Mesa Water Company	12	7
South Mountain Water Company	2	2
Private	32	5
Total number of wells	**90**	**30**

Table 2-7b. Plan Area and Wells per Square Mile

Plan Area/Wells per Square Mile	Area/Number
Area of Plan Area (square miles)	39.5
Municipal Supply Wells per Square Mile (number)	1.5
Total Wells per Square Mile (number)	**2.3**

Prior to 1900, water supply in Yucaipa Valley was sourced from naturally flowing streams originating from the adjacent mountains, and from spring flow along the Chicken Hill Fault Zone (YVWD 2008). A number of wells completed in the western portion of the valley were artesian. From 1900 to 1930, the valley experienced an increase in agricultural development along with an increase in groundwater production. After 1945, groundwater production from the principal aquifer increased due to further expansion and development of residential communities in the Plan Area. Total groundwater production averaged approximately 10,000 AFY from the late 1960s into the mid-1980s (Figure 2-18, Annual Groundwater Production by Water Agency in the Yucaipa Subbasin). Pumping data included in Figure 2-18 was obtained from the USGS Yucaipa Integrated Hydrologic Model (YIHM) numerical model and represents pumping during the historical period from 1947 to 2014 (Cromwell and Alzraiee 2022).

Further expansion and development in the Plan Area after 1985 increased the water demand to where groundwater production approached 15,000 AFY and markedly exceeded the estimated safe yield of 9,640 AFY (average of the three methods used to estimate the safe yield in Table 2-6) for the Yucaipa Subbasin (GSSI 2014). The maximum amount of groundwater produced was approximately 15,400 AF in the 2002 WY (Figure 2-18).

Annual production by private well owners in the late 1960s averaged approximately 3,200 AFY, which was comparable to the average annual production of 3,300 AFY by YVWD (Figure 2-18). The peak production by private well owners was approximately 3,900 AF in the 1966 WY, which constituted 33% of the total production from the Subbasin. Since the 1966 WY, production by private wells steadily declined to an average 375 AFY after 2005, or less than 4% of the total production from the Subbasin.

Production by YVWD steadily increased from 1984 to 2002 to a peak of approximately 9,100 AFY in the 2002 WY (Figure 2-18). YVWD production averaged 60% of the total production from the Subbasin. Groundwater production by YVWD markedly declined after the 2007 WY when YVWD began importing SWP water as a supplement to its water supply. In that water year, YVWD purchased 3,539 AF of SWP water from SBVMWD, all of which was delivered to the Yucaipa Valley Regional Water Filtration Facility (YVRWFF) for treatment. Consequently, groundwater production by YVWD declined from 7,800 AF in the 2007 WY to 6,300 AF in the 2008 WY. YVWD pumped an average 6,000 AFY between the 2008 WY and 2015 WY until a further decline in groundwater production occurred during the 2016 WY when production fell to 3,900 AF. YVWD averaged 3,900 AFY between the 2016 WY and 2018 WY. The decrease in groundwater production was attributed to the use of recycled water beginning in the 2015 WY and an increase in the amount of SWP water imported via SBVMWD that, together, reduced the demand for groundwater. YVWD's share of the total groundwater produced from the Subbasin was approximately 50% between the 2016 WY and 2018 WY, with the remaining production coming from WHWC and South Mesa.

WHWC and South Mesa showed steady increases in groundwater production since the early 1980s. The peak annual production by WHWC was 3,000 AF in the 1998 WY, which was approximately 25% of the total production from the Subbasin in that water year. WHWC began purchasing water from YVWD in the 2008 WY. Consequently, the average annual groundwater production by WHWC declined from approximately 2,500 AF (1998 WY–2008 WY) to 1,800 AF (2009 WY–2018 WY) (Figure 2-18). Recent groundwater production by WHWC has declined to a level comparable to production in the early 1980s.

The recent peak annual production by South Mesa was 2,300 AF in the 2003 WY, which was approximately 16% of the total production from the Subbasin (Figure 2-18). Groundwater production by South Mesa has declined since then to an average annual rate of approximately 1,900 AFY in the last 5 years. South Mountain operates two water supply wells within the Calimesa subarea, which deliver water to locations outside the Calimesa subarea for irrigation purposes only. Production by these wells has averaged an annual rate of approximately 700 AF between the 1966 WY and 2005 WY. After which, the wells were idle until the 2014 WY. These wells averaged approximately 220 AFY after they resumed production in 2014 (Figure 2-18).

The majority of groundwater production has consistently been from the Calimesa and Western Heights subareas (Figure 2-19, Annual Groundwater Production by Hydrogeologic Subarea in the Yucaipa Subbasin). Production increased in the Gateway and Wilson Creek subareas after the 2000 WY to annual rates comparable to production in the Western Heights subarea. Production in the Oak Glen, Triple Falls Creek, Crafton, and Singleton subareas has each been below 250 AFY since the 2009 WY. The primary use of groundwater produced from the principal aquifer is for municipal water supply.

2.5.4 Supplemental Water

2.5.4.1 Groundwater under the Influence of Surface Water

YVWD uses well YVWD-25 as a source of supply for the OGSWFF. Groundwater produced by this well is under the direct influence of surface water from nearby Oak Glen Creek and is treated at the OGSWFF for drinking water purposes. Section 64651.50 (CCR Title 22) defines groundwater under the direct influence of surface water as "any water beneath the surface of the ground with significant occurrence of insects or other macroorganisms, algae or large diameter pathogens such as *Giardia lamblia* or Cryptosporidium, or significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity or pH which closely correlate to climatological or surface water conditions." YVWD-25 previously pumped approximately 300 AFY until production was reduced to approximately 200 AFY after the 2012 WY (Figure 2-20, Groundwater under the Influence of Surface Water).

2.5.4.2 Surface Water Diversions

YVWD constructed diversion structures to divert surface water from Oak Glen Creek and Birch Creek, which is tributary to Oak Glen Creek. YVWD historically diverted an average 40 AFY from the 2001 WY to 2018 WY at the Oak Glen Creek diversion, and an average of 70 AFY from the 2001 WY to 2009 WY at the Birch Creek diversion point. No surface water has been diverted from Birch Creek since the 2009 WY. Surface water diversions from Oak Glen Creek have declined to approximately 1 AFY or less since the 2018 WY. Both surface water diversion structures have experienced clogging and other technical issues that prevent further diversions of surface water.

The Oak Glen Creek basins, located 0.25 miles south of the Wilson Creek basins, were constructed to control flooding, enhance the infiltration of stormwater to the underlying groundwater, and create a wildlife habitat and ecological landscape for the public. The Wilson Creek basins are primarily used to artificially recharge the Yucaipa Subbasin using surplus SWP water delivered via the SWP East Branch Extension. Both basins have received surplus SWP water. The Wilson Creek spreading basins have received the majority of surplus SWP water with a peak discharge of 6,579 AF in the 2017 WY (Figure 2-21, Annual Distribution of State Water Project Water in the Yucaipa Subbasin).

The Wildwood Creek detention basins include a desilting basin, two retention basins, and a bioretention swale that bypasses the desilting and detention basins and conveys low flows and first flush flows (URS 2007). Stormwater runoff contained by the retention basins is a source of local recharge to the underlying aquifer. Other stormwater retention basins have been constructed in the Subbasin and are summarized in Section 4.3, Projects, of Chapter 4, Projects and Management Actions.

2.5.4.3 State Water Project

YVWD began purchasing SWP water from SBVMWD in the 2003 WY. YVWD purchased 855 AF of SWP water from SBVMWD in that water year (Figure 2-21). YVWD may also purchase and import SWP water from San Gorgonio Pass Water Agency, but only purchased 226 AF of SWP water in the 2019 WY (not included in Figure 2-21). The SWP water purchased from SBVMWD from the 2003 WY to 2006 WY was treated at the YVRWFF for distribution in YVWD's drinking water distribution system. Some surplus SWP water (48 AF) was diverted to the Oak Glen Creek spreading basins in the dry 2009 WY, but it wasn't until the 2011 WY, which was characterized as a "wet" water year type with 22.24 inches of rainfall, when approximately 1,500 AF of surplus SWP water was diverted to the Wilson Creek spreading basins (the Oak Glen Creek spreading basins received 141 AF).

Over the subsequent two water years, which were characterized as “below normal” and “critically dry” water year types, YVWD imported approximately 9,000 AFY, with approximately 3,000 AFY of surplus SWP water being discharged to the Wilson Creek and Oak Glen Creek spreading basins. Despite the drier climatic conditions, there was a surplus of water banked by DWR that was made available up to 2 years after the “wet” 2011 WY. The extended drought through the next three water years (2013-2014 to 2015-2016) resulted in no surplus water and a general decline of SWP water available (Figure 2-21). The subsequent 2017 WY, which was characterized as an “above normal” water year type with 17.75 inches of rainfall, resulted in the peak purchase of 15,343 AF, to which 6,579 AF of surplus water was discharged to the Wilson Creek spreading basins. In the subsequent 2018 WY, which was characterized as “critically dry” with 6.50 inches of rainfall, the same volume of SWP water was purchased and transferred to the YVRWFF for treatment, but only 1,700 AF of surplus water was available to discharge to the spreading basins (Figure 2-21).

2.6 Hydrogeologic Conceptual Model

The Emergency Groundwater Sustainability Plan regulations (Section 354.14) state that each Plan “shall include a descriptive hydrogeologic conceptual model of the basin based on technical studies and qualified maps that characterize the physical components and interaction of the surface water and groundwater systems in the basin.” The previous sections in this chapter characterized the physical components that influence the groundwater resources in the Subbasin.

In summary, the Yucaipa Subbasin exists in a “right-step-over” zone between the active San Andreas and San Jacinto Fault Zones. The Yucaipa Plain lies between these two fault systems and comprises an extensive deposition of Quaternary sediments originating from the San Bernardino Mountains and Yucaipa Hills. The “right-step-over” zone created by the lateral displacement along the San Andreas and San Jacinto Fault Zones created a series of northeast-southwest trending normal-slip faults. Displacement along these faults, in turn, created drop-down structures that filled in with Quaternary alluvial sediments (Figure 2-12).

The geologic units defined within the Yucaipa Subbasin are Mesozoic and older crystalline bedrock, the Plio-Pleistocene San Timoteo Formation, and the Quaternary Sedimentary Deposits of Live Oak Canyon and surficial alluvial deposits. The crystalline bedrock provides the base for the sedimentary deposits in the Yucaipa Subbasin. The San Timoteo Formation and the Sedimentary Deposits of Live Oak Canyon define the principal aquifer in the Yucaipa Subbasin. The primary use of groundwater produced from the principal aquifer is for municipal water supply. The Yucaipa Subbasin is divided into nine hydrogeologic subareas based on the apparent influences of faults (both mapped and inferred) on groundwater flow (Figure 2-14).

In 2009, the USGS conducted a gravity anomaly survey to estimate the depths to bedrock in the Yucaipa Subbasin and thickness of alluvial fill in the Yucaipa Valley (Mendez et al. 2016). The Yucaipa Subbasin is underlain by San Gabriel-Mountain type bedrock between the San Andreas Fault and the Banning Fault, and by Peninsular Ranges-type bedrock south of the Banning Fault. The USGS estimated the thickness of alluvial deposits in the basin to approximately 3,000 feet in the Western Heights subbasin, to approximately 7,000 feet south of the Banning Fault (Mendez et al. 2016). The estimated alluvial thickness in the Live Oak subbasin ranges from approximately 2,000 feet to 5,000 feet.

The major surface water drainages in the Yucaipa Subbasin include Wilson Creek, Oak Glen Creek, Yucaipa Creek and San Timoteo Creek. San Timoteo Creek conveys surface water out of the Plan Area and is tributary to the Santa

Ana River. Surficial soils mapped in the Plan Area indicate that the surface water drainages are underlain by highly permeable loamy sand with relatively high infiltration rates; thereby, indicating that leakage from stream flow is a major contributor to groundwater recharge.

The following geologic cross sections provide scaled details of the physical features that influence groundwater flow and provide a visual approximation of the storage capacity of the Subbasin. The construction details of some public water supply wells are provided to give context to where groundwater is produced from the Subbasin.

2.6.1 Geologic Cross Sections

Geologic cross sections prepared by Mendez (2016) and GSSI (2014) were the foundational pieces used to develop geologic cross sections characterizing the geometry of the Yucaipa Subbasin, including the thickness of the principal aquifer and location of fault structures that defined the boundaries of the hydrogeologic subareas. Figure 2-22, Geologic Map with Delineations of Geologic Cross Sections, shows the orientations of cross sections A–A′ through E–E′ in the Subbasin. Each cross section identifies the depth to bedrock, the apparent thicknesses of the San Timoteo Formation, the Sedimentary deposits of Live Oak Canyon, and younger alluvium based on lithologic logs recorded when drilling wells and exploratory borings in the Subbasin.

Cross Section A–A′ traverses northeast to southwest across the Yucaipa Subbasin between the Wilson Creek and Oak Glen Creek spreading basins, parallels the Chicken Hill Fault, and runs through the Western Heights subarea and terminates in the Live Oak subarea. (Figure 2-22). The A–A′ profile indicates a gradual thickening of the principal aquifer from approximately 0 feet at the base of the San Gabriel Mountains to 1,200 feet near the intersection of the Chicken Hill Fault and South Mesa Barrier (Figure 2-23, Geologic Cross Section A–A′). A marked drop to bedrock occurs in the Western Heights subarea to approximately 2,000 feet below NAVD88, a drop of approximately 3,000 feet. Well WHWC-11 was drilled to 1,720 feet bgs, the deepest well in the Subbasin, but no bedrock was encountered to that depth. Bedrock gradually rises to the southwest in the Western Heights subarea until it markedly drops again south of the Banning Fault.

Cross Section B–B′ is based on investigative work conducted by GSSI and shows the basin profile perpendicular to the northeast–southwest orientation of the Yucaipa Subbasin and cross section A–A′ (Figure 2-22). Cross section B–B′ starts in the Crafton Hills and traverses southeast across the Yucaipa Regional Park, the Oak Glen Creek spreading basins, and into the Yucaipa Hills (Figure 2-24, Geologic Cross Section B–B′). Profile B–B′ crosses the Crafton, Gateway, Wilson Creek and Oak Glen subareas. The thickest section of the Principal aquifer lies in the Gateway subarea where bedrock was encountered at 1,210 feet bgs while drilling YVWD-53.

Cross Section C–C′ begins in the Crafton Hills and traverses south through the Crafton, Wilson Creek, Calimesa, and Live Oak subareas (Figure 2-22). The cross section intersects the Chicken Hill Fault, the South Mesa Barrier and Banning Fault, plus Oak Glen Creek and Yucaipa Creek before terminating in the San Timoteo Badlands. The principal aquifer thickens along this profile south of the South Mesa Barrier in the Calimesa subarea. The thickest section is located near the Banning Fault where the principal aquifer is approximately 4,500 feet thick (Figure 2-25, Geologic Cross Section C–C′). The two deepest wells drilled in the Calimesa subarea are South Mesa-09, drilled down to 1,400 feet bgs, and YVWD-49, drilled down to 1,200 feet bgs. Drilling logs for both wells indicated that no bedrock was encountered down to their respective total depths.

Cross Section D–D′ begins at Crafton Hills College in the northernmost point of the Western Heights subarea and runs south through Western Heights, crosses the Chicken Hill Fault into the Calimesa subarea, and then crosses the Banning Fault into the Live Oak subarea before terminating in the San Timoteo Badlands near San Timoteo Creek (Figure 2-22). The D–D′ profile crosses Oak Glen Creek and Yucaipa Creek (approximately 3,600 feet upstream of their confluence). The principal aquifer thickens to approximately 3,000 feet in the Western Heights subarea, before the bedrock drops markedly south of the Banning Fault to a depth at approximately 5,000 feet below NAVD88, or an alluvial thickness of approximately 7,000 feet (Figure 2-26, Geologic Cross Section D–D′).

Cross Section E–E′ begins in the Live Oak subarea and traverses east through the Calimesa and Oak Glen subareas before terminating in Wildwood Canyon (Figure 2-22). The E–E′ profile indicates a gradual thinning of the principal aquifer from east to west from the Live Oak subarea to Wildwood Canyon (Figure 2-27, Geologic Cross Section E–E′). The thickness of the principal aquifer along this profile was estimated from results of the USGS gravity survey. The deepest well set at the USGS Equestrian Park site, well #1, encountered bedrock at 850 feet bgs.

2.6.2 Three-Dimensional Hydrogeologic Conceptual Model

A 3-dimenisonal block diagram of a portion of the Yucaipa Valley is shown in Figure 2-28, Hydrogeologic Conceptual Model of the Yucaipa Subbasin. The conceptual model is orientated northeast to southwest and is bounded to the west and south by geologic cross sections D–D′ and E–E′, and to the north and east by the Crafton Hills, San Bernardino Mountains, and Yucaipa Hills. The San Bernardino Mountains, Crafton Hills and Yucaipa Hills contributed to the alluvial sediments filling the Subbasin and are the sources of runoff to the major drainages: Wilson Creek, Oak Glen Creek, and Yucaipa Creek. The East Branch Extension of the SWP pipeline extends from the Crafton Hills Reservoir to Bryant Street and south with connections to the Wilson Creek spreading basins and YVWD's YVWRFF. The drop-down basin structure of the Yucaipa Subbasin is the result of tectonic activity between the major right-slip faulting along the San Andreas and San Jacinto fault zones. Movement along these fault structures affected groundwater flow, which, in part, led to the designation of hydrogeologic subareas in the Yucaipa Subbasin. The principal aquifer consists of the Sedimentary Deposits of Live Oak Canyon and the underlying San Timoteo Formation. The bottom of the principal aquifer is defined by San Gabriel Mountain-type bedrock north of the Banning Fault and by Peninsular Ranges-type bedrock south of the Banning Fault.

2.6.3 Data Gaps

The primary data gaps in the hydrogeologic conceptual model are as follows:

- Distributed measurements of aquifer properties in the principal aquifer. Representative estimates of aquifer properties, like hydraulic conductivity and storage, may be obtained from aquifer tests conducted at wells completed only in the principal aquifer. The information from aquifer tests is limited. Additional tests will provide critical information to enhance the characterization of the aquifer and improve the results of the YIHM used for the water budget analysis for the Subbasin.
- Non-representative and/or inaccurate measurements of low-flow stream flow at the SBCFCD gauging stations. Accurate measurements of stream flow in Wilson Creek, Oak Glen Creek and Yucaipa Creek, at locations upstream and downstream of major reaches, will enhance our understanding of surface water runoff and leakage from the creeks to the underlying groundwater basin.
- Areas with interconnected surface water. The YIHM indicated that surface water in the upper reaches of Wilson Creek and Oak Glen Creek, and the upper reach of Yucaipa Creek in Wildwood Canyon, may be interconnected with groundwater; however, there are limited observed shallow groundwater level measurements to confirm this relationship at this time. Shallow groundwater elevation data collected in

these reaches will help characterize the groundwater/surface water relationship and improve the results of the YIHM.

- Spatial limitations on groundwater elevation data. There are no wells completed in the principal aquifer in the eastern half of the Calimesa subarea and most of the Live Oak subarea. Groundwater elevation data collected in these areas will enhance our understanding of mountain front recharge to the Calimesa subarea from the adjacent Yucaipa Hills, and the influence of stream leakage from the Yucaipa Creek along its reach in the Live Oak subarea.
- Current groundwater elevation data demonstrating the influence of the Casa Blanca Barrier, Oak Glen Fault, and the Crafton Hills Fault Zone in the Live Oak subarea on groundwater flow.
- Confirmation of whether groundwater-dependent ecosystems (GDEs) identified as "potential GDEs" are groundwater dependent or not. Confirmation, for example, may come from the advancement of a boring to a depth greater than 30 feet bgs to characterize soil conditions and whether the water table was encountered (see Section 2.7.8, Groundwater–Surface Water Connections).
- Limited to no information received to date by the Yucaipa GSA for private well users actively producing groundwater in the Subbasin. The Yucaipa GSA will continue to make efforts to contact existing and potential private well users to obtain information on well construction, production, and water quality to help inform that condition of the Subbasin.

The data gaps listed above create uncertainty in the understanding of the impacts of surface water and groundwater level changes on changes in storage in the aquifer. Additional aquifer tests, groundwater elevation data, and stream flow gauging stations in the future would help reduce the uncertainty associated with these data gaps.

2.7 Current and Historical Groundwater Conditions

The Emergency Groundwater Sustainability Plan regulations (Section 354.16) state that each Plan, "shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information." The following section characterizes historical and current groundwater elevations, and the influence of climate and groundwater production on fluctuations in groundwater elevations observed since the 1965 water year. The following section also, per SGMA requirements, addresses seawater intrusion (Section 2.7.3), groundwater quality issues that may affect supply and beneficial uses of groundwater (Sections 2.7.4 through 2.7.6), land subsidence that may permanently affect aquifer storage (Section 2.7.7), and groundwater–surface water interactions and the identity of groundwater-dependent ecosystems that rely on shallow groundwater (Section 2.7.8).

2.7.1 Groundwater Elevation Data

The water purveyors YVWD, WHWC, South Mesa, and South Mountain measure DTW at their wells monthly. The DTW are either measured using an electric tape or an airline. The electric tape, or DTW sounder, is a double-wired and graduated tape fitted with a weighted probe at the end of the tape that houses a water sensor. The accuracy of the electric tape sounder is +/− 0.01 foot (Cunningham and Schalk 2011). The airline involves the pressurization of a dedicated tube, or airline, to displace water from it. The pressure required to displace all air is equivalent to the height of water above the bottom of the airline, which is then converted to a DTW. The accuracy of the airline ranges between +/− 0.1 to 1 foot (Cunningham and Schalk 2011). All DTW measurements are referenced to a surveyed measuring point that was referenced to the National Geodetic Vertical Datum of 1929 (NGVD29) or the NAVD88. Elevations referenced to the NGVD29 datum were converted to the NAVD88 datum using the U.S. Army Corps of Engineers software program, Corpscon 6.0 (ACOE 2004). This is a publicly owned, free software program that converts coordinates and vertical elevations between various datums used in the United States.

The USGS, in cooperation with SBVMWD, constructed a network of multiple-well monitoring sites to characterize groundwater conditions in the San Bernardino Basin Area and Yucaipa Subbasin (Mendez et al. 2018). The USGS installed four multiple-well monitoring sites in the Yucaipa Subbasin: Wilson Creek (YVWC), 6th and E (YV6E), Dunlap Acres (YVDA), and Equestrian Park (YVEP). These multiple-well monitoring sites were constructed as nested wells in one boring with each well completed with 20 feet of screen set at various depths below land surface.

Each well at the monitoring sites was equipped with dedicated, non-vented pressure transducers that were programmed to measure and record pressures every hour. The measured pressures represented the pressure exerted on the transducer by the height of water above it plus atmospheric pressure. The USGS installed a barometer at each monitoring site to adjust the non-vented pressure readings by subtracting atmospheric pressure. The resulting pressure represented the height of water above the pressure, which was then converted to an elevation referenced to NAVD88. Water level data was downloaded from the USGS website (USGS 2021). USGS noted that the accuracy of the measurements recorded by the dedicated pressure transducers is to the nearest hundredth of a foot (USGS 2021).

Other sources of groundwater elevation data include the draft USGS integrated hydrologic numerical model and the CASGEM website, which includes a selection of YVWD wells and one City of Redlands well. The groundwater elevation data collected from these two sources was compared to the groundwater elevation data obtained directly from the water purveyors. YVWD received a grant from the Bureau of Reclamation to install additional remote telemetry systems at YVWD wells, which will allow the remote collection of groundwater level data at these wells. Installation will take place in 2022.

2.7.1.1 Current Groundwater Levels

The current condition for groundwater levels in the Yucaipa Subbasin is represented by static water levels measured in September 2018, the last month of the 2017–2018 water year. Groundwater levels in the Yucaipa Subbasin are influenced by precipitation and subsequent runoff directly in the Subbasin, and by stormwater runoff originating in the surrounding San Bernardino Mountains, Yucaipa Hills, and Crafton Hills. Precipitation in the 2017–2018 water year ranged between 5.43 inches at SBCFCD station 3023 in the Live Oak subarea and 7.52 inches at SBCFCD station 3126A in the Calimesa subarea, which were approximately 45% of the mean annual rainfall estimated at these stations. The 2017–2018 water year was characterized as a “dry” water year type. The preceding 2016–2017 water year was characterized as an “above normal” water year type with precipitation ranging from 14.42 inches at SBCFCD station 3023 to 21.49 inches at SBCFCD station 3126A.

Groundwater level data was provided by the City of Redlands (majority owner of South Mountain), South Mesa, WHWC, and YVWD. DTW at all wells were measured using either an electric water level sounder, dedicated pressure transducers that measured absolute or gauge pressure, or dedicated airlines that measured the pressure of water exerted above. All DTW measurements were converted to elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

Static groundwater levels measured in September 2018, which represents the current water year low, ranged from 1,723.93 feet above NAVD88 at well WHWC-11 in the Western Heights subbasin to 3,331.80 feet above

NAVD88 at well YVWD-14 in the Oak Glen subbasin (Figure 2-29, September 2018 Groundwater Elevations within the Yucaipa Subbasin). In general, groundwater flowed from the northeast to the southwest in the Yucaipa Subbasin. The hydraulic gradient in the principal aquifer was estimated between groundwater elevations measured at wells YVWD-13, South Mesa-11, and WHWC-10. Their respective groundwater elevations in September 2018 were 3,160.89 feet above NAVD88, 2,096.14 feet above NAVD88, and 1,766.04 feet above NAVD88. The estimated hydraulic gradient was 0.0471 feet/foot with the groundwater flow direction to the southwest at an azimuth of 236°.

Static groundwater levels measured in March 2018 represent the current water year high. Groundwater levels ranged from 1,743.93 feet above NAVD88 at WHWC-11 to 3,297.90 feet above NAVD88 at YVWD-14 (Figure 2-30, March 2018 Groundwater Elevations within the Yucaipa Subbasin). Groundwater flowed from northeast to southwest. The hydraulic gradient in the principal aquifer was estimated between groundwater elevations measured at wells YVWD-13, South Mesa-11, and WHWC-10. Their respective groundwater elevations in March 2018 were 3,156.38 feet above NAVD88, 2,098.14 feet above NAVD88, and 1,762.04 feet above NAVD88. The estimated hydraulic gradient was 0.0469 feet/foot with the groundwater flow direction to the southwest at an azimuth of 236°.

Areas of hydraulic depression were observed in the Western Heights, Calimesa, and Gateway subareas where approximately 77% of the total groundwater produced from the principal aquifer occurred in the Yucaipa Subbasin (Figures 2-29 and 2-30). The hydraulic depression in the Western Heights subarea was centered on wells WHWC-02A, WHWC-11, WHWC-12, and WHWC-14, the only four active wells since 2007. These four wells produced approximately 1,900 AF in the 2018 WY. The hydraulic depression in the Calimesa subarea was located in an area that included wells YVWD-02, YVWD-12, and YVWD-24. These three wells produced approximately 1,600 AF in the 2018 WY. The hydraulic depression in the Gateway subarea was centered around YVWD-46, which produced approximately 870 AF in the 2018 WY.

2.7.1.2 Historical Groundwater Levels

The earliest groundwater elevation data was collected in the 1920s. The first recorded static groundwater elevation was at YVWD-37 at 2,556 feet above NAVD88 in April 1921. This well is located in the northern part of the Crafton subarea. YVWD-02, which was installed in 1921 in the Calimesa subarea, had a static groundwater elevation at 2,273.9 feet above NAVD88 in February 1926. Historically, groundwater elevations in the Yucaipa Subbasin have ranged from 1,350.63 feet above NAVD88 at well GWMW-5B in the Live Oak subarea (approximately 4,500 feet upstream from the farthest downstream end of the Yucaipa Subbasin) to 3,355.80 feet above NAVD88 at well YVWD-14 in the Oak Glen subarea (Figure 2-31, Historical Groundwater Elevations in the Yucaipa Subbasin).

2.7.1.2.1 Historical High Groundwater Elevations

In the 50-year historical period from 1966 to 2016, the highest static groundwater elevations (i.e., historical high) observed in the Calimesa, Wilson Creek, and Gateway subareas occurred in the spring of 1988 (Figure 2-32, Historical High (Spring 1998) Groundwater Elevations in the Yucaipa Subbasin). Static groundwater elevations in the Subbasin ranged from 3,165.89 feet above NAVD88 at YVWD-13 in the Oak Glen subarea to 1,793.70 feet above NAVD88 at WHWC-02A in the Western Heights subarea (Figure 2-31). The hydraulic gradient in the principal aquifer in the spring of 1988, estimated between static groundwater elevations measured at wells YVWD-13 (3,165.89 feet above NAVD88), South Mesa-11 (2,164.54 feet above NAVD88), and WHWC-10 (1,813.25 feet above NAVD88), was 0.0448 feet/foot. The groundwater flow direction was to the southwest at an azimuth of 239 degrees. The hydraulic depressions in the Calimesa, Western Heights and Gateway subareas were not as pronounced as noted for the current conditions in September 2018 even though total pumping from those three subareas in the 1988 WY was approximately 2,400 AF more than in the 2018 WY (Figure 2-19). This was attributed to groundwater elevations being approximately 50 feet higher than levels observed in September 2018 (Figure 2-29).

2.7.1.2.2 Historical Low Groundwater Elevations

The lowest groundwater elevations (i.e., historical low) observed in the Subbasin occurred in the Fall of 2007. The historical low in groundwater elevations occurred right before the marked increase in SWP water imported into the Subbasin by YVWD in the 2007 WY (Figure 2-21), and subsequent decline in groundwater production from 13,000 AFY in the 2007 WY to 10,000 AFY in the 2009 WY (Figure 2-18). Static groundwater elevations in the Subbasin ranged from 3,346.50 feet above NAVD88 at YVWD-13 in the Oak Glen subarea to 1,728.90 feet above NAVD88 at WHWC-14 in the Western Heights subarea (Figure 2-33, Historical Low (Fall 2007) Groundwater Elevations in the Yucaipa Subbasin). The hydraulic gradient in the principal aquifer in Fall 2007, estimated between static groundwater elevations measured at wells YVWD-13 (3,172.89 feet above NAVD88), South Mesa-11 (2,053.14 feet above NAVD88), and WHWC-10 (1,759.04 feet above NAVD88), was 0.049 feet/foot. The groundwater flow direction was to the southwest at an azimuth of 232°.

The areas of hydraulic depression observed in the Western Heights, Calimesa and Gateway subareas in the Spring of 1988 and September 2018 were more pronounced in the Fall of 2007 (Figure 2-33, Historical Low (Fall 2007) Groundwater Elevations in the Yucaipa Subbasin). Approximately 73% of the total groundwater produced from the principal aquifer occurred in these three subareas (Figure 2-19). The hydraulic depression in the Western Heights subarea was centered on wells WHWC-02A, WHWC-11, WHWC-12, and WHWC-14, the only four active wells since 2007. These four wells produced approximately 2,700 AF in the 2007 WY. The hydraulic depression in the Calimesa subarea was located in an area that included wells YVWD-02, YVWD-12, and YVWD-24. These three wells produced approximately 2,600 AF in the 2007 WY. The hydraulic depression in the Gateway subarea was centered on wells YVWD-18 and YVWD-46, which produced approximately 1,800 AF in the 2007 WY.

2.7.1.3 Groundwater Level Trends

A declining trend in groundwater elevations was observed at wells YVWD-02, YVWD-37, YVWD-04, YVWD-05, YVWD-11, and YVWD-13 from the 1920s to 1970 (Figure 2-31). The declining trend was attributed to further expansion and development in the Plan Area after 1945, which led to an increase in groundwater production from the principal aquifer to meet the increasing local water demand (YVWD 2008). The latter part of that period from 1945 to 1965 was relatively dry with annual precipitation typically below mean annual rainfall, as evidenced by the declining trend in the cumulative departure from mean monthly precipitation (Figure 2-2). Only one “wet” water year type (1958 WY) and one “above normal” water year type (1962 WY) were observed from 1953 to 1965 (Figure 2-3).

Increasing trends in groundwater elevations were observed in the Calimesa, Wilson Creek, and Gateway subareas from 1970 to 1988. The increasing trends were attributed to groundwater production in these subareas declining to or below their respective estimated safe yields and the Subbasin experiencing a relatively wet period from 1978 to 1983 that increased the natural recharge to the aquifer. For example, the static groundwater elevation at well YVWD-10 in the Calimesa subarea increased approximately 75 feet from 2,103 feet above NAVD88 in 1970 to a peak elevation at 2,174 feet above NAVD88 in March 1988 while groundwater production declined from 4,350 AF in 1972 to 3,500 AF in 1982 (Figure 2-34, Annual Groundwater Production by Water Year and Groundwater Elevations in the Calimesa Subarea). This coincided with a relatively wet period from 1978 to 1983 when precipitation in the Subbasin was 130% or more of normal annual precipitation in 5 of the 6 years in that period (Figure 2-35, Historical Groundwater Elevations vs. Water Year Type in the Yucaipa Subbasin).

Marked increases in groundwater elevations were observed in the Wilson Creek and Gateway subareas from 1978 to 1988. These increases were attributed to declines in groundwater production to below the estimated safe yields[1] for each subarea and the wet water year types from 1978 to 1983 (Figure 2-36, Annual Groundwater Production by Water Year and Groundwater Elevations in the Wilson Creek Subarea, and Figure 2-37, Annual Groundwater Production by Water Year and Groundwater Elevations in the Gateway Subarea). The Western Heights subarea is the only subarea in the Subbasin where groundwater elevations declined from 1970 to 1988 (Figure 2-38, Annual Groundwater Production by Water Year and Groundwater Elevations in the Western Heights Subarea). Groundwater production in the Western Heights subarea averaged 2,370 AFY in that period, which was above the estimated safe yield of 2,100 to 2,270 AFY (Table 2-6).

Further expansion and development in Yucaipa after 1985 increased the water demand to where local groundwater production from the early 1990s to the mid-2000s markedly exceeded the estimated safe yield of 9,640 AFY for the Subbasin (Figures 2-18 and 2-19). Additionally, the area experienced a drier climatic period from 1984 to 1990 when annual precipitation ranged between 68% and 99% of mean annual precipitation (Figure 2-35). Consequently, the Calimesa subarea experienced a declining trend in groundwater elevations of approximately 100 feet from 1989 to 2005 (Figure 2-34). This declining trend occurred despite the “above normal” and “wet” water year types from 1991 to 1998 when the average annual precipitation was 140% of the mean annual precipitation of 15.86 inches (Figure 2-35). The declining trend in groundwater elevation was attributed to groundwater production from this subarea at approximately 6,000 AFY, or almost double the estimated safe yield for the Calimesa subarea, in the late 1990s and early 2000s (Figure 2-34).

Groundwater elevations in the Wilson Creek and Gateway subareas were influenced by climatic conditions where groundwater level declines were observed during the relatively dry period from 1984 to 1990 with subsequent increases in groundwater levels during the wet period from 1991 to 1998 (Figure 2-35). Marked declines in groundwater elevations of approximately 100 feet in the Wilson Creek and Gateway subareas were observed after 2000 when groundwater production exceeded the estimated safe yield in both subareas (Figures 2-36 and 2-37), and the water year types from 1999 to 2002 were characterized as mostly “dry” or “critically dry” (Figure 2-35). Groundwater elevations in these two subareas by 2005 to 2007 were back down to levels previously observed in the late 1960s to early 1970s.

The declining trends in groundwater elevations observed in the Yucaipa Subbasin ceased by 2006 to 2007 with the importation of SWP water to the Subbasin as a supplemental water source. Total production from the Yucaipa Subbasin steadily declined from a peak of 15,200 AF in the 2002 WY to 13,200 AF in the 2007 WY, but then markedly dropped to 11,400 AF in the 2008 WY and 10,200 AF in the 2009 WY when total production was approximately the estimated safe yield for the Subbasin (Figure 2-18). The marked decrease in groundwater production in the 2008 WY and 2009 WY coincided with a marked increase in SWP water imported into the Subbasin during those years. YVWD imported approximately 7,000 AF of SWP water in the 2008 WY and 2009 WY, up from 3,500 AF the year prior (Figure 2-21). Groundwater elevations recovered approximately 100 feet to 200 feet in the Wilson Creek and Gateway subareas (Figures 2-36 and 2-37), and approximately 50 feet in the Calimesa subarea (Figure 2-34). The steady

1 Estimated safe yields represent the safe yield values calculated by GSSI (2014).

decline in groundwater elevation in the Western Heights subarea ceased by 2010. WHWC began purchasing SWP water from YVWD in 2008, which supplemented WHWC's water supply and led to a reduction in groundwater production beginning in the 2009 WY to rates below an estimated safe yield of 2,100 AF (Figure 2-38, Annual Groundwater Production by Water Year and Groundwater Elevations in the Western Heights Subarea).

The drought from the 2012 WY to 2018 WY included water year types that were mostly characterized as "dry," with the 2017 WY as "above normal" and the subsequent 2018 WY characterized as "critically dry" (Figure 2-35). Despite the drought, increasing trends in groundwater elevations were observed in the Calimesa, Wilson Creek, Gateway, and Western Heights subareas (Figures 2-34 to 2-38). Groundwater elevation increases continued in the 2018 WY during this "critically dry" year as YVWD imported 15,300 AF of SWP water in the 2017 WY, of which 6,600 AF was discharged to the Wilson Creek spreading basins, and 10,200 AF in the 2018 WY, of which 870 AF was discharged to the Wilson Creek and Oak Glen Creek spreading basins (Figures 2-21 and 2-35). Consequently, groundwater production in the 2017 WY and 2018 WY from these four subareas and the Yucaipa Subbasin were below their respective estimated safe yields. Currently, groundwater elevations in the Yucaipa Subbasin are at levels previously observed in the 1960s and 1970s before groundwater production increased during the expansive growth in the 1990s and 2000s.

2.7.2 Estimate of Groundwater in Storage

GSSI (2021) conducted a study to estimate the volume of groundwater in storage at the end of the 2016 WY. GSSI (2021) used the integrated Santa Ana River (SAR) numerical model as a tool to estimate the volume in storage. The SAR model was developed with collaboration by stakeholders in the Santa Ana River basin and peer reviewed by outside technical experts, including the USGS. The SAR model includes the full alluvial thickness of the Subbasin, in that the bottom of the SAR model is defined by the contact between bedrock and the overlying alluvium (Mendez et al. 2016). The SAR model is a more appropriate tool to estimate the total volume of groundwater in storage than the YIHM because the USGS, in its recent design and calibration iterations of the YIHM, truncated the bottom of the YIHM at approximately 1,900 feet bgs. This depth was based on the deepest well (WHWC-11 at 1,710 feet bgs) located in the Subbasin. The USGS truncated the YIHM to maintain reasonable transmissivity values in the active part of the aquifer. The YIHM is the appropriate tool to evaluate changes in storage in the Subbasin as a function of watershed processes (e.g., rainfall, stream flow), well production and the potential impacts of climate change in the future; whereas, the SAR model was the appropriate tool to estimate the total volume of groundwater in storage.

GSSI (2021) provided estimates of the volume in storage at the end of the 2016 WY for each subarea and the management areas (Section 2.9) defined in the Subbasin. The volume in storage estimates are summarized in Table 2-8. The estimated volume in storage at the end of the 2016 WY was used to calculate the annual volume in storage using the water balance results by the YIHM for the historical, current, and future baseline simulations (Section 2.8, Water Budget Analysis).

Historical changes to groundwater in storage within the Yucaipa Subbasin were estimated using the YIHM, a numerical flow model designed by the USGS to simulate the interaction between surface water and groundwater across the Yucaipa Watershed (Cromwell and Alzraiee 2022). Details of the YIHM development, representation of groundwater processes, and resulting estimates of groundwater storage changes are described in Section 2.8.

Table 2.8. Estimated Volume of Groundwater in Storage in the Yucaipa Subbasin

Hydrogeologic Subarea	Groundwater in Storage in Sept. 2016 (acre-feet)	Management Area	Groundwater in Storage in Sept. 2016 (acre-feet)
Triple Falls Creek	7,000	North Bench	243,000
Crafton	73,000		
Gateway	41,000		
Wilson Creek	79,000		
Oak Glen	43,000		
Western Heights	409,000	Western Heights	409,000
Calimesa	638,000	Calimesa[1]	799,000
Singleton	13,000		
Live Oak	930,000	San Timoteo	782,000
Total Volume	**2,233,000**	**N/A**	**2,233,000**

Notes: N/A = not applicable.
[1] The Calimesa Management Area includes approximately 460 acres of the northeastern portion of the Live Oak subarea.

2.7.3 Seawater Intrusion

The Yucaipa Subbasin is located approximately 50 miles east of the Pacific Ocean. The lowest elevation of the base of the principal aquifer (contact with the underlying crystalline bedrock) is 1,000 feet above NAVD88, which is approximately 1,000 feet above mean sea level. Therefore, the Yucaipa Subbasin is not threatened by seawater intrusion nor the potential for seawater intrusion in the future. DWR, when ranking the Subbasin as a “high” priority basin, did not assign any points in the category for salt intrusion impacting water quality. This GSP will not consider seawater intrusion as a sustainability indicator to evaluate sustainability of the Yucaipa Subbasin (see Chapter 3, Sustainable Management Criteria).

2.7.4 Groundwater Quality

The Emergency Groundwater Sustainability Plan regulations (Section 354.16 [d]) state that each Plan “shall provide a description of groundwater quality issues that may affect the supply and beneficial uses of groundwater, including a description and map of the location of known groundwater contamination sites and plumes.” The following provide a description of the general geochemistry in the Yucaipa Subbasin and the physical features/processes that influence groundwater quality.

2.7.4.1 General Geochemistry

Cromwell et al. (2022) reviewed general water geochemistry data collected during previous investigations conducted by the USGS. There are four general types of groundwater in the Yucaipa Subbasin: (1) calcium-bicarbonate ($Ca\text{-}HCO_3$) groundwater that is sourced from direct precipitation and natural recharge from the adjacent San Bernardino Mountains, Yucaipa Hills and Crafton Hills; (2) sodium-sulfate ($Na\text{-}SO_4$) groundwater that derives from subsurface flow through the adjacent crystalline bedrock; (3) imported SWP water originating from northern California that has a higher chloride (Cl^-) concentration than ambient groundwater; and (4) sulfate-rich, $Ca\text{-}HCO_3$ groundwater in a perched aquifer system within the Western Heights subarea. Most groundwater in the Yucaipa Subbasin has similar major ionic composition ($Ca\text{-}HCO_3$) and is characteristic of groundwater sourced from direct precipitation and natural recharge (via runoff) from the surrounding hills (Cromwell et al. 2022). This is corroborated by an analysis of the ratios of the stable isotopes of hydrogen and oxygen. Cromwell et al. (2022) found "a consistent grouping of stable isotopic values [that indicated] that most groundwater in the aquifer has a consistent source of recharge." The isotopic analysis also indicated that "groundwater from natural recharge quickly infiltrated in the aquifer, and was not subject to evaporation" (Cromwell et al. 2022).

Cromwell et al. (2022) noted that groundwater from deep wells completed near the base of crystalline bedrock had concentrations of sulfate, sodium, and potassium that were "about 6 and 15 times higher than respective concentrations in the [corresponding] shallower well." The deeper nested wells completed by the USGS in the Calimesa subarea (6th Street and Equestrian Park) had sulfate concentrations ranging from 120 milligrams per liter (mg/L) to 630 mg/L; whereas sulfate concentrations at the shallower nested wells ranged from 25 mg/L to 45 mg/L. Well YVWD-24, completed in the Calimesa subarea with the lower portion of the well screen in fracture crystalline bedrock, had sulfate concentrations in the deeper sections of the well screen at 370 mg/L compared to 28 mg/L approximately 100 feet higher in the screen interval.

Cromwell et al. (2022) reported that SWP water imported from northern California had chloride concentrations ranging from 66 to 109 mg/L, which was more than 10 times higher than ambient concentrations observed at wells near the Oak Glen and Wilson Creek spreading basins. Increasing trends in chloride concentration were observed at wells near these spreading basins after 2008 when SWP water was used to artificially recharge the groundwater basin.

The perched aquifer in the Western Heights subarea appears to have been influenced by previous agricultural practices that increased concentrations of chloride, fluoride, sulfate, and bicarbonate above ambient concentrations observed in the rest of the Yucaipa Subbasin (Cromwell et al. 2022). Moreland (1970) noted that this subarea in the past experienced artesian conditions with flows occurring at springs and areas influenced by the Chicken Hill Fault. The artesian conditions were attributed to an extensive, fine-grain layer at approximately 300 feet bgs. The perched aquifer has a different chemical signature than groundwater in the principal aquifer below it.

2.7.4.2 Total Dissolved Solids and Nitrate

The Regional Water Quality Control Board (RWQCB) Santa Ana Region recognized in the 1975 and 1983 Basin Plans that the most serious water quality issue to the Santa Ana River Basin "was the buildup of dissolved minerals, or salts, in the ground and surface waters" (RWQCB 2019a). The RWQCB (2019a) acknowledged that water quality sampling and computer modeling projected increasing trends in the concentrations of total dissolved solids and nitrate to where their respective concentrations would exceed water quality objectives. The historical use of water for irrigation purposes, particularly for citrus that demanded large volumes of applied water, was a main contributor to increasing concentrations of TDS and nitrate. The RWQCB (2019a) recognized the need to implement salt and nutrient management plans to control the salt and nutrient loading to the basin, and, therefore, incorporated measures to improve the quality of the water supply (including the importation of SWP water), developing waste discharge regulatory strategies, and recharge projects and encourage the use of recycled water to offset potable water used for irrigation purposes (RWQCB 2019a).

In the course of considering the adoption of the 1995 Basin Plan, a number of water supply and wastewater agencies requested a review of the TDS and nitrate water quality objectives defined in the Basin Plan. Consequently, the Nitrogen/Total Dissolved Solids Task Force was created to reassess the groundwater objectives and the TDS/Nitrogen Management Plan in the Basin Plan (RWQCB 2019a). YVWD participated as a member of the

Nitrogen/TDS Task Force to evaluate the impacts of total inorganic nitrogen and TDS on water resources in the Santa Ana Watershed. YVWD collected groundwater and surface water quality data from 1994 to 2004, which was used to characterize ambient conditions in the watershed and were the basis for the RWQCB to update the Basin Plan in 2004 (RWQCB 2004).

The 2004 Basin Plan update included the creation of new groundwater management zones (GMZs) based on previously defined groundwater subbasin boundaries, revised water quality objectives for TDS and nitrate-nitrogen in groundwater, revised wasteload allocations for TDS and nitrogen, and revised beneficial uses and objectives for TDS and nitrogen in surface waters. Additionally, the 2004 Basin Plan set "maximum benefit" objectives for TDS and nitrate-nitrogen in the Chino North, Cucamonga, San Jacinto Upper Pressure, Yucaipa, Beaumont, and San Timoteo GMZs. These maximum benefit objectives are less stringent than anti-degradation objectives, which are based on historical water quality data and only apply to regions in which the responsible parties have demonstrated appropriate protection of beneficial use and maintenance of water quality consistent with maximum benefit to the people of the State of California.

In 2014, the RWQCB adopted order number R8-2014-0005, an amendment to the Basin Plan that revised the maximum benefit commitments in the Yucaipa, San Timoteo, and Beaumont GMZs and expanded the boundary of the Beaumont management zone farther east to match the hydrogeologic boundary. The previous boundary was a jurisdictional boundary that corresponded to the boundary between the Santa Ana regional board and the Colorado River regional board. The modified maximum benefit commitments assure reliable water supplies to meet present and anticipated future demands. One of the commitments in the 2014 Basin Plan amendment was to establish a maximum benefits monitoring program to characterize water quality conditions with biweekly surface water sampling and semi-annual groundwater sampling. The following two sections discuss the water quality data collected since 1994 to characterize nitrate and TDS conditions in the Yucaipa Subbasin.

2.7.4.2.1 Total Dissolved Solids

Concentrations of TDS in the Subbasin from 1993 to 2018 ranged from 130 to 1,500 mg/L (Figures 2-39 to 2-41). A secondary MCL for TDS, which has been established as a guideline to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor, is 1,000 mg/L. No public water supply wells have produced water with TDS concentrations greater than 1,000 mg/L (Figure 2-41 and Figure 2-42, Maximum Total Dissolved Solids Concentrations Detected Above the MCL in Groundwater Wells). The highest TDS concentrations (>1,000 mg/L) were detected at five monitoring wells at the former Yucaipa Landfill site, which is south of and adjacent to the Yucaipa Regional Park in the Crafton subarea, and at the two deepest nested wells at the USGS 6th Street site in the Calimesa subarea (Figure 2-42). The high TDS concentrations at the former Yucaipa Landfill are attributed to past disposal activities associated with the site (Figure 2-39). The former Yucaipa Landfill is an inactive municipal solid waste facility that was operated by the County of San Bernardino as a Class III Disposal Site from 1963 to 1980. The site underwent remediation and closure construction in 1997 (Geo-Logic 2018). Currently, there is no active remediation at the site for inorganic constituents in groundwater. There is active remediation to extract and treat landfill gas and an enhanced bioremediation program to treat organic constituents of concern in groundwater (Geo-Logic 2018). Groundwater at the former landfill is encountered at depths ranging from 65 to 215 feet bgs, and groundwater flow is generally to the southwest (Geo-Logic 2018).

TDS concentrations at the two deep USGS nested wells at the 6th Street site ranged from 1,030 mg/L to 1,120 mg/L (Figure 2-40). These higher concentrations are attributed to the wells being completed near the base of the crystalline bedrock where concentrations of sulfate, sodium and potassium were markedly higher than concentrations observed in shallower wells screened in the principal aquifer (Cromwell et al. 2022).

The TDS concentration in the rest of the Yucaipa Subbasin, outside the former Yucaipa Landfill and the USGS 6th Street monitoring sites, ranged from 130 mg/L to 690 mg/L with an average of 324 mg/L (Figures 2-40 and 2-41). The maximum benefit water quality objectives for the Yucaipa and San Timoteo GMZs are 370 mg/L and 400 mg/L, respectively. Groundwater in the principal aquifer has an average TDS concentration below the maximum benefit water quality objectives. Only a few well locations outside the Yucaipa Landfill had maximum TDS concentrations detected greater than 400 mg/L (Figure 2-43, Maximum Total Dissolved Solids Concentrations in Groundwater Wells Relative to Maximum Benefit Water Quality Objectives).

YVWD discharges tertiary treated recycled water from the Wochholz Regional Water Recycling Facility (WRWRF) to San Timoteo Creek approximately 2.5 miles upstream from where the creek enters the Plan Area. YVWD installed a reverse osmosis (RO) treatment system at the WRWRF in 2013, but it was not used until the desalter and brine disposal facilities were completed and operational in 2016. The RO concentrate, containing the constituents removed from the water, is disposed outside the Plan Area via the Yucaipa Valley Regional Brine Line, which was completed in 2012. The RO permeate is recombined with the WRWRF microfiltration effluent (which does not pass through the RO membranes) to dilute this effluent stream to meet the TDS maximum benefit objectives for the Yucaipa and San Timoteo GMZs.

Under the 2014 Basin Plan amendment, the desalter and brine disposal facilities were required to be operational by June 30, 2015. The District obtained the required permits to operate these facilities and continues to purchase additional brine line capacity as needed to provide for future expansion of the desalting facilities. These facilities were put into operation on July 25, 2016. Consequently, the mean monthly TDS concentration of the WRWRF effluent discharged to San Timoteo Creek beginning August 2016 has ranged from 210 to 480 mg/L with a mean monthly TDS concentration of 286 mg/L (Figure 2-44, Total Dissolved Solids and Monthly Discharges of Recycled Water at WRWRF Outfall).

In summary, higher concentrations of TDS observed in the Subbasin are attributed to local influences by previous operations at the former Yucaipa Landfill or to the chemical composition of crystalline bedrock at the bottom of the principal aquifer. High TDS concentrations at the former Yucaipa Landfill were observed in shallow groundwater and did not affect water quality at nearby wells screened in the principal aquifer. The implementation of RO treatment at the YVWD WRWRF facility has reduced the TDS concentration in recycled water to an average of <300 mg/L. YVWD is serving some recycled water to its customers, with plans to increase the usage of recycled water, for irrigation purposes. The application of recycled water for irrigation purposes has not increased TDS concentrations in the principal aquifer. Therefore, there are no TDS water quality issues that may affect the long-term supply and beneficial uses of groundwater produced from the principal aquifer.

2.7.4.2.2 Nitrate

The presence of nitrate in groundwater is the result of agricultural activity (fertilizer application and animal waste), other applied irrigation practices where fertilizer is used and human wastewater (septic systems or wastewater discharge). Nitrate concentrations are reported as either nitrate as nitrogen (as N) or nitrate as nitrate (as NO_3). The California MCL for nitrate (as N) is 10 mg/L (the MCL is 45 mg/L for nitrate [as NO_3]). The Basin Plan water quality objective, which is based on the maximum benefit water quality objective, for nitrate (as N) in groundwater in the Yucaipa and San Timoteo GMZs (which constitute the Yucaipa Subbasin) is 5.0 mg/L.

Nitrate (as N) concentrations in the Yucaipa Subbasin since 1994 have ranged from <0.05 mg/L to 21 mg/L (Figures 2-45 to 2-47). The maximum nitrate concentration of 21 mg/L was observed in April 2009 at the shallowest nested well at the USGS Dunlap location, which is in the Western Heights subarea (Figure 2-46). The screen interval for this well (USGS Dunlap 05) is 230 to 250 feet bgs. This depth interval is in the perched water table where water quality has been influenced by previous agricultural activities and the continuing use of septic systems. In comparison, well WHWC-14, which is 50 feet from USGS Dunlap 05 and is screened from 410 to 1,090 feet bgs in the principal aquifer, had a nitrate (as N) concentration in May 2009 at 2.1 mg/L. The maximum nitrate (as N) concentration ever detected at WHWC-14 was 2.8 mg/L in May 2016 (Figure 2-47). The marked difference in concentration between the perched aquifer and the underlying principal aquifer indicated that the confined layer of fine-grained sediment marking the boundary between the two aquifers limits the vertical migration of lower quality water to the principal aquifer.

Other areas in the Yucaipa Subbasin where concentrations of nitrate (as N) exceeded the MCL include the former Yucaipa Landfill, well WHWC-12 in the Western Heights subarea, and South Mountain well Hog Canyon 2 in the Calimesa subarea (Figure 2-48, Maximum Nitrate Concentrations Detected above the MCL in Groundwater Wells). Nitrate (as N) concentrations at the former Yucaipa Landfill have ranged from <0.008 mg/L to 12.5 mg/L (Figure 2-45). The bottom elevations of the screens set for the monitoring wells at the former landfill range from 52 feet bgs to 300 feet bgs, with well screen lengths ranging from 15 feet to 30 feet. The highest nitrate (as N) concentrations were detected at the shallowest wells with screen intervals between 52 feet bgs to 108 feet bgs. The nearest water supply well to the former landfill is YVWD-55, which is approximately 2,000 feet southeast of the former landfill. YVWD-55 is screened from 400 feet bgs to 1,030 feet bgs. Nitrate (as N) at YVWD-55 has ranged from 2.3 mg/L to 5.5 mg/L from 2006 to 2018 (Figure 2-47). It does not appear that the water quality at YVWD-55 has been influenced by the former landfill.

In the Western Height subarea, only one well, WHWC-12, had nitrate (as N) concentrations detected greater than the MCL at 10.4 mg/L (Figure 2-47). Nitrate (as N) has not been greater than 10 mg/L at this well since July 2009. The South Mountain well, Hog Canyon 2, had a nitrate (as N) concentration detected at 11.7 mg/L in 2011, but this well is used for irrigation supply only and is not contributing water to the City of Redlands' drinking water supply system. No other public water supply well has had nitrate (as N) concentrations greater than the MCL of 10 mg/L (Figure 2-47).

In 2009, YVWD implemented a denitrification process at the WRWRF that removed a significant amount of nitrate from the treated effluent (i.e., recycled water) that was discharged to San Timoteo Creek. The nitrate-nitrogen concentration of recycled water discharged from the WRWRF to San Timoteo Creek has averaged 2.8 mg/L since 2009 (Figure 2-49, Nitrate (as N) and Monthly Discharges of Recycled Water from WRWRF to San Timoteo Creek). The maximum benefits water quality objective for nitrate (as N) in groundwater is 5.0 mg/L. Nitrate (as N) in the Yucaipa Subbasin has been detected above the 5.0 mg/L concentration in the Calimesa, Western Heights, Gateway, Crafton, and Oak Glen subareas (Figure 2-50, Maximum Nitrate Concentrations Detected in Groundwater Wells Relative to Maximum Benefit Water Quality Objectives). Most wells show a steady or declining trend in nitrate (as N) concentrations since 2010 (Figure 2-47). The exception being at wells YVWD-02, YVWD-12, and South Mesa-16 in the Calimesa subarea where increasing trends in nitrate (as N) concentrations have been observed since 2008 (Figure 2-51, Water Quality Hydrographs – Calimesa Subarea). The Yucaipa GSA will continue monitoring nitrate concentrations at these and other wells in the Calimesa subarea and investigate the potential reasons for these observed increasing trends. Increasing nitrate (as N) concentrations were not observed in the other subareas of the Yucaipa Subbasin.

In summary, nitrate concentrations observed in the Subbasin have, in general, remained steady at <10 mg/L after agricultural practices in the Plan Area decreased significantly after the 1970s and septic systems were replaced with sanitary sewer services in the 1980s, with the exception of the Western Heights subarea. Higher nitrate (as N) concentrations were observed in the shallow, perched aquifer in the Western Heights subarea and in shallow groundwater at the former Yucaipa Landfill. Water quality in the principal aquifer was not influenced by nitrate concentrations in the shallow groundwater at these two locations. The recently observed increasing trends at some wells in the Calimesa subarea will continue to be monitored to evaluate potential causes. However, there are no nitrate water quality issues that may affect the long-term supply and beneficial uses of groundwater produced from the principal aquifer.

2.7.5 Contaminated Surface Water and Groundwater Sites

2.7.5.1 303(d) Listed

The reach of the San Timoteo Creek within the Yucaipa Subbasin is included in the list of impaired surface waters (i.e., 303 (d) listed reaches) compiled by the State Water Resources Control Board (SWRCB) in 2016 (Figure 2-52, 303(d) Listed Waters). The impairment listed for San Timoteo Creek is indicator bacteria E. coli and total coliform (SWRCB 2018). The presence of indicator bacteria is associated with contamination from human or animal wastewater. The 303(d) report does not investigate potential sources for elevated indicator bacteria in San Timoteo Creek.

2.7.5.2 Contaminated Soil and Groundwater Sites

Sites with impacted soil and groundwater in the Subbasin and that are actively being remediated were identified from the SWRCB GeoTracker website (SWRCB 2021) and the California Department of Toxic Substances Control EnviroStor Website (DTSC 2021). Cases that were closed by the supervisory agency were not investigated. Three active cleanup sites within the Subbasin were identified in the GeoTracker and EnviroStor databases (Figure 2-53, Cleanup Sites).

Conditions at the three cleanup sites described in more detail below have not affected water quality in the principal aquifer. Remediation activities implemented at the former Yucaipa Landfill will contain and treat shallow contaminated groundwater at the property; contamination at the other two sites affected only soil and not groundwater (J and J Texaco) or the perched water table in the Western Heights subarea and not the underlying principal aquifer (Sorenson Engineering).

2.7.5.2.1 Former Yucaipa Landfill

San Bernardino County performs quarterly and semi-annual groundwater and soil gas monitoring, including groundwater quality sampling at 27 monitoring wells at the former Yucaipa Landfill site located in the Crafton subarea (Figure 2-53). The sampling program includes analyzing groundwater samples for concentrations of nitrate, sulfate, TDS, select metals, and volatile organic compounds (VOCs). Tetrachloroethylene (PCE), along with its breakdown products (including trichloroethylene), are the primary contaminants of concern (COCs) at the former Yucaipa Landfill site. The County of San Bernardino implemented enhanced in-situ bioremediation in 2018 to reduce VOC concentrations in groundwater (Geo-Logic 2018). Enhanced remediation appears to have reduced

VOCs in groundwater (Geo-Logic 2020). PCE was not detected at the farthest downgradient monitoring wells at the site in January 2020 (Geo-Logic 2020).

2.7.5.2.2 J and J Texaco

The J and J Texaco site is located at 34253 Yucaipa Boulevard in the Wilson Creek subarea (Figure 2-53). Contamination was discovered at the site during the removal of underground storage tanks in 1998 (Frey 2019). COCs included total petroleum hydrocarbons–diesel, total petroleum hydrocarbons–gasoline, methyl tert-butyl ether, and other fuel oxygenates. Contamination at the site was greatest between 60 to 90 feet bgs, with detectable concentrations of COCs down to 180 feet bgs and no COCs detected from 200 to 270 feet bgs (Frey 2019). No groundwater was encountered from ground surface to 270 feet bgs. Remediation at the site included soil vapor extraction and a catalytic oxidizer from March 2006 to December 2012 (Frey 2019). Confirmation soil sampling in 2019 indicated minor residual concentrations of total petroleum hydrocarbons–gasoline and methyl tert-butyl ether between 70 and 115 feet bgs. Groundwater was not encountered during confirmation soil sampling. The RWQCB issued a letter in November 2019 stating that "groundwater was not impacted due to the unauthorized release" (RWQCB 2019b). The site is in the process of being closed under the low-threat closure policy by the RWQCB (RWQCB 2020).

2.7.5.2.3 Sorenson Engineering

The Sorenson Engineering facility is located at 32032 Dunlap Boulevard in the Western Heights subarea (Figure 2-53). The site has been an industrial facility since 1961 (Apex 2018). COCs include PCE, trichloroethylene, and other chlorinated hydrocarbons that have been detected in soil, soil gas, and shallow groundwater at the site (Apex 2018). The COCs originated from former leaking underground storage tanks that were removed from the site in 2000. The groundwater gradient at the site is generally to the northeast (Apex 2020). Groundwater monitoring wells at the Sorenson site have well screen intervals of 10 to 20 feet in length and are typically set between 30 and 65 feet bgs (Apex 2018). The shallow groundwater contamination occurs in the perched aquifer characterized in the Western Heights subarea (see Section 2.7.4.1, General Geochemistry). Remediation at the site is expected to start by the fourth quarter of 2020 and will consist of a dual extraction system to remove VOCs from soil and groundwater (Apex 2020).

Since 2017, PCE concentrations have ranged from non-detect to 9,200 micrograms per liter (µg/L), which was detected at a well located approximately 300 feet northeast of the former underground storage tanks. Deeper monitoring wells with screen intervals set at approximately 120 to 195 feet bgs are located approximately 0.25 miles northeast of the former underground storage tanks. These wells are set in a deeper portion of the perched aquifer, but PCE concentrations have attenuated over the last few years to concentrations at or below the MCL of 5 µg/L (Apex 2020).

WHWC wells WHWC-2A, WHWC-10, WHWC-11, WHWC-12, and WHWC-14, which constitute the entire pumping program for WHWC, are located approximately 0.5 miles northeast from the Sorenson site. These wells are screened from 330 feet bgs to 670 feet bgs (WHWC-10) to 705 feet bgs to 1690 feet bgs (WHWC-11) in the principal aquifer. Groundwater samples collected at these wells by WHWC in 2016 to 2018 were analyzed for concentrations of, among other constituents, PCE, and trichloroethylene. All samples were non-detect for these VOCs. These results indicate that VOC contamination at the Sorenson Engineering site has not impacted water quality in the principal aquifer at the WHWC water supply wells.

2.7.6 Oil and Gas Wells

A search for oil and gas wells on the California Geologic Energy Management Division (CalGEM; formerly the Division of Oil, Gas, and Geothermal Resources [DOGGR]) well finder tool indicated no active oil and gas wells and one idle well within the Subbasin (CalGEM 2020). The idle well was located near the boundary between the Gateway and Crafton subareas (Figure 2-54, Oil and Gas Wells). The well was installed in 1928 (Appendix 2-B). It appears that the well was intended to be an oil well, but no production from the well was recorded. Well logs indicate that the well was completed to a depth of 2,164 feet bgs. There is no well destruction report on record. The well was located in what is currently a residential community. Water quality sampling at wells YVWD-37 and YVWD-53, which are near the location of the idle well, had TDS concentrations that ranged from 200 to 330 mg/L, which are similar to the average basin-wide concentration of 324 mg/L (Figure 2-41). It does not appear that the idle oil well influenced water quality in the Yucaipa Subbasin.

2.7.7 Land Subsidence

Land subsidence is the result of the compaction of unconsolidated alluvial sediments following the lowering of groundwater levels by pumping, the vertical displacement by tectonic activities, or the underlying compaction of petroleum reservoirs. The compaction of fine-grain sediments is irrecoverable and results in a permanent reduction in the specific storage of an aquifer. The USGS maintains a website titled, "Areas of Land Subsidence in California" (USGS n.d.) that identifies an area called "Yucaipa Valley" that experienced land subsidence due to groundwater pumping. The area designated as Yucaipa Valley includes the Plan Area, plus the cities of Redlands, Highland, San Bernardino, Rialto, Fontana, and parts of Beaumont. The USGS website notes the following in describing the Yucaipa Valley area that experienced land subsidence (USGS n.d.):

> The Yucaipa Valley, in southwestern San Bernardino County, is a small, tectonically formed trough mostly filled with silt and clay. The valley has a long history of water development. The first irrigation ditch was constructed in 1819 to support farming and cattle raising. By 1909, about 95 percent of the area's water supply was used for agricultural irrigation. (Yucaipa Valley Water District web page, https://www.yvwd.dst.ca.us/index.aspx?page=133, accessed January 13, 2014). Irrigation wells to support agriculture and post-World War II urbanization contributed to groundwater-level declines of more than 35 m [115 feet] by 1952. In January 1952, a 600-m-long fissure opened about 5 km (3.1 mi) west of the town of Yucaipa (Holzer, 1984, citing Burnham, unpublished report, 1952). Hydrogeologic studies were not performed to determine whether historically low groundwater levels in 1952 triggered the fissure or if tectonics caused or contributed to its formation. Managers at the Yucaipa Valley Water District are not aware of the location of the fissure reported by Burnham (1952, unpublished report) and have not observed other fissures in Yucaipa Valley (Jack Nelson, Yucaipa Valley Water District, oral commun., January 2014).

The 600-meter-long fissure may be attributed to tectonic activity associated with the Crafton Hills Fault Zone (the 3.1-mile distance west of Yucaipa places the fissure at approximately the boundary between Yucaipa Valley and the Crafton Hills). Cromwell et al. (2022) state that "displacements of these normal-slip faults led to tectonic subsidence in the Yucaipa Valley watershed, downdropping crystalline basement rocks and facilitating the accumulation of the Sedimentary deposits of Live Oak Canyon and younger surficial materials."

Recent land subsidence data for the Yucaipa Subbasin was obtained from the SGMA Data Viewer website (DWR 2021). Vertical ground surface displacement estimates were derived from Interferometric Synthetic Aperture Radar data that is collected by the European Space Agency Sentinel-1A satellite and processed by TRE ALTAMIRA Inc. (CNRA 2021). The Interferometric Synthetic Aperture Radar data is included as part of DWR's SGMA technical assistance to provide important SGMA-relevant data to Groundwater Sustainability Agencies (GSAs) for GSP development and implementation. The Sentinel-1A Interferometric Synthetic Aperture Radar data was based on a rasterized dataset estimating land subsidence in the Yucaipa subbasin from June 2015 to October 1, 2018. Image resolution is approximately 100 meters (330 feet). The estimated range of subsidence during this period ranged from 0.0 feet to 0.054 feet, or 0.65 inches (Figure 2-55, Land Subsidence). This is an insignificant decline in land surface and is not attributed to declining groundwater elevations as the Yucaipa Subbasin experienced stable or recovering water levels from June 2015 to October 2018 as groundwater extractions declined because imported SWP water supplemented the local water supply.

DWR, when ranking the Subbasin as a “high” priority basin, did not assign any points in the category for impacts caused by land subsidence. Here, land subsidence, in the context of groundwater sustainability and managing groundwater resources in a basin, is attributed to the compaction of aquifer systems caused by significant lowering of groundwater elevations. Because groundwater elevations are increasing from recently observed historical lows, there exists the potential for land subsidence to occur should groundwater levels fall below the historical lows over a long period. The potentiality of land subsidence will be evaluated against groundwater elevations observed in the Subbasin, particularly when levels fall below historical lows.

2.7.8 Groundwater–Surface Water Connections

Wilson Creek, Oak Glen Creek, and Yucaipa Creek are the major surface water drainages in the Yucaipa Subbasin that may have a hydrologic connection with the underlying principal aquifer. However, no direct investigations have been conducted to characterize the relationship between surface water flows in these drainages with the underlying groundwater. Groundwater elevation data collected at wells YVWD-13, YVWD-20, YVWD-44, YVWD-53, South Mesa-06, and South Mesa-17, all located near these drainages, indicated depths-to-water greater than 200 feet bgs, except well YVWD-13 where the depth-to-water averaged 26 feet bgs in the last 10 years. YVWD-13 is located near the Yucaipa Hills in the higher elevations of the Oak Glen subarea. The well is screened from 26 to 415 feet bgs, which includes the younger alluvium influenced by surface water flows in Oak Glen Creek and extends into the crystalline bedrock by 100 feet.

Two shallow paired observation wells were installed adjacent to San Timoteo Creek: one just upstream of its confluence with Yucaipa Creek and other installed approximately 1,600 feet downstream of where Alessandro Road crosses San Timoteo Creek. The paired wells at each location were spaced approximately 10 feet apart and vertically offset by 10 feet. Limited groundwater elevation data collected at these wells indicated that the reach of San Timoteo Creek upstream of its confluence with Yucaipa Creek was a gaining stream where groundwater discharged to surface water. Hydraulic heads measured at the deeper well were higher than hydraulic heads measured at the shallower well. The reach downstream of Alessandro Road was characterized as a losing stream.

The best available estimates for groundwater-surface water connections derive from the preliminary USGS integrated hydrological numerical model (Cromwell and Alzraiee 2022). The numerical model simulates the amount of runoff originating from precipitation over the San Timoteo Wash watershed and computes leakage from flows in the creeks to the underlying aquifer.

2.7.8.1 Interconnected Surface Water

Surface water is conveyed through the Yucaipa Subbasin via Wilson Creek, Oak Glen Creek, Yucaipa Creek, and San Timoteo Creek (Section 2.3, Surface Water and Drainage Features). Wilson Creek, Oak Glen Creek, and Yucaipa Creek drain to San Timoteo Creek, which is the primary drainage feature in the Subbasin and a tributary to the Santa Ana River.

Groundwater elevations measured along San Timoteo Creek indicate that surface water and groundwater are interconnected to varying degrees in this region of the Plan Area. Along the far western portion of San Timoteo Creek, groundwater has historically been encountered at depths that range from 4 feet bgs (measured at GWMW-5B on September 2, 2010) to 0.23 feet bgs (measured at GWMW-5B on April 23, 2018; see Figure 2-56, Possible Interconnected Surface Water and Mapped Groundwater Dependent Ecosystems in the Plan Area, and Figure 2-E1 in Appendix 2-E). These conditions are indicative of a hydraulic connection between surface water and groundwater. Approximately 2.5 miles upstream of this section, groundwater has historically been encountered at depths that range from approximately 14 feet bgs (measured at GWMW-2 on June 30, 2021) to 21 feet bgs (measured at GWMW-2 on July 26, 2013; see Figure 2-56 and Figure 2-E1 in Appendix 2-E). Along this portion of San Timoteo Creek, groundwater and surface water are disconnected by the vadose zone. Numerical model results from the YIHM are in general agreement with these measurements, indicating that within the Plan Area, surface water in San Timoteo Creek is locally connected to groundwater (dark blue shaded regions in Figure 2-56).

The YIHM also indicates that surface water and groundwater may be interconnected along (1) Yucaipa Creek upstream of its confluence with San Timoteo Creek, (2) the upstream reaches of Wilson Creek and Oak Glen Creek, and (3) Yucaipa Creek near Wildwood Canyon (Figure 2-56). Simulated groundwater elevations and stream flows are not constrained by measured data along Yucaipa Creek near its confluence with San Timoteo Creek. Accordingly, model predictions of both groundwater elevations and interconnected surface water are uncertain in this location. The degree to which interconnected surface water persists along this stretch of Yucaipa Creek is a data gap.

Surface water flows in the upstream reaches of Wilson Creek and Oak Glen are ephemeral where seasonal flows are influenced by large storm events (Section 2.3). Groundwater elevations measured at YVWD-25 have historically ranged from 4 feet bgs (measured on March 22, 2005) to 44 feet bgs (measured on December 23, 2007, and are currently at approximately 38 feet bgs (measured on December 14, 2008) (Figure 2-56 and Figure 2-E2 in Appendix 2-E). These measurements indicate that surface water and groundwater along this stretch of Oak Glen Creek may experience periods of interconnectedness, but these conditions are not persistent. Groundwater elevations decline downgradient of YVWD-25, from depths that have historically ranged from 22 to 60 feet bgs measured at the Chlorinator Well (Figure 2-E2 in Appendix 2-E) to depths that have exceeded 200 feet bgs at the USGS Wilson Creek nested well cluster and YVWD-53 (Figure 2-56 and Figure 2-E3 in Appendix 2-E). These measurements suggest that surface water and groundwater are not interconnected downgradient of YVWD-25. Numerical model results from the YIHM along Oak Glen Creek and Wilson Creek downgradient of YVWD-25 that suggest possible interconnected surface water are not supported by groundwater elevation and stream flow measurements. This area includes possible interconnected surface water and is recognized as a data gap.

Similar to flows in Wilson Creek and Oak Glen Creek, surface water flows in Yucaipa Creek near Wildwood Canyon are ephemeral and influenced by large storm events. Groundwater elevations decline along this reach of Yucaipa Creek from depths that have ranged from approximately 8 to 30 feet bgs measured at YVWD-28 to depths that have historically ranged from approximately 45 to 75 feet bgs at YVWD-27A (Figure 2-56 and Figure 2-E4 in

Appendix 2-E). The groundwater elevations measured at these two wells suggest that surface water and groundwater are separated by a gradually thickening vadose zone that limits hydraulic connection between Yucaipa Creek and the underlying water table. This area includes possible interconnected surface water and is recognized as a data gap.

2.7.8.2 Groundwater Dependent Ecosystems

A GDE is defined under SGMA as an ecological community or species that depends on groundwater emerging from aquifers or on groundwater that occurs near the ground surface (23 CCR, Section 351[m]). GDEs encompass a wide range of natural communities, such as seeps, springs, wetlands, lakes, terrestrial vegetation, rivers, streams, and estuaries.

The Natural Communities Commonly Associated with Groundwater (NCCAG) dataset is provided by DWR as a reference dataset and starting point for the identification of GDEs in groundwater basins (DWR 2018). Because the scale of the NCCAG dataset is statewide (i.e., coarse), and consists of a compilation of vegetation and surface hydrology features (e.g., wetlands) mapping, it does not incorporate local, basin-specific groundwater conditions such as aquifer characteristics or current data on depths-to-groundwater. Therefore, the dataset is most appropriately used as an indicator of where GDEs, as defined by SGMA, are potentially present. A local, basin-specific analysis is required to verify which features mapped in the NCCAG dataset are dependent on groundwater emerging from aquifers (e.g., seeps, springs) or on groundwater occurring shallower than 30 feet bgs.

2.7.8.2.1 Overview of the NCCAG Dataset within the Plan Area

The GDE characterization described in this GSP focuses on NCCAG indicators mapped within the Plan Area. The NCCAG dataset identified 37 habitats within the Plan Area that consist of common phreatophytes (Table 2-9; Figure 2-56). The most prominent phreatophytes in the Plan Area are coast live oak and Riversidean alluvial scrub. These two vegetation types cover approximately 330 acres of the Plan Area and are predominantly located at higher elevations and along the banks of unlined stream channels.

Due to the variety of ecosystems identified in the NCCAG dataset, the NCCAG individual indicators were aggregated into larger “GDE Evaluation Units” within the Plan Area. The potential interactions between groundwater and the habitats within each GDE Evaluation Unit are evaluated in Section 2.7.8.2.3, Groundwater Dependent Ecosystem Characterization.

Table 2-9. Vegetation Types and Coverage in the Plan Area

Vegetation Type	No. of Mapped Communities	Average Root Depth (feet)	Area (acres)
Coast live oak	15	36	189
Common elderberry	1	3	15
Fremont cottonwood	5	9.8–16.4	86
Mule fat	1	1.97	<1
Riversidean alluvial scrub	8	N/A	179
Red willow	3	6.89	3

Table 2-9. Vegetation Types and Coverage in the Plan Area

Vegetation Type	No. of Mapped Communities	Average Root Depth (feet)	Area (acres)
Scalebroom	1	N/A	<1
Willow	3	2–15	74

Sources: Steinberg 2002 (coast live oak); Fryer 2008 (common elderberry); Taylor 2000 (Fremont cottonwood); Stromberg 2013 (mule fat and red willow); CH2MHill 2003; Lite and Stromberg 2005 (willow).
Note: N/A = not applicable.

2.7.8.2.2 Methods for Identifying Groundwater Dependent Ecosystems

GDE Evaluation Units in the Plan Area were characterized by reviewing the NCCAG dataset alongside measured groundwater elevations, aerial photographs, and Landsat[2] data analyzed by The Nature Conservancy (TNC). TNC used Landsat data to calculate historical variations in the Normalized Derived Vegetation Index (NDVI) and Normalized Derived Moisture Index (NDMI) (Klausmeyer et al. 2019). TNC calculated average values of NDVI and NDMI between July 9 and September 7 of each year to estimate vegetation health during the driest period of the year, when the overlying habitats are most likely to depend on groundwater. Groundwater elevation measurements, aerial photographs, lithological data, and NDVI and NDMI indicators were reviewed following the guidance developed by TNC (2019). TNC's (2019) guidelines follow the outline provided by DWR in its GSP Regulations (23 CCR, Section 350).

The analysis of groundwater elevation measurements, aerial photographs, and NDVI and NDMI data focused on the period between 2009 and 2019. During this period, groundwater production in the Yucaipa Subbasin decreased as supplemental SWP water was imported into the Plan Area (Figure 2-21). This period also corresponded with a drier than average hydrologic period when average water year precipitation in the basin was approximately 12.03 inches per year, compared to the long-term water year precipitation average of 15.86 inches per year. Seven of the ten water years between 2009 and 2019 were characterized as "below normal," "dry," or "critically dry" water year types (Figure 2-3).

GDE Evaluation Units were characterized as:

1. Groundwater dependent ecosystems
2. Ecosystems that are <u>not</u> groundwater dependent
3. Potential groundwater dependent ecosystems

Habitats mapped in the NCCAG dataset were characterized as groundwater dependent ecosystems if:

1. NDVI and NDMI were positively correlated with static groundwater elevations measured in the principal aquifer; and
2. Groundwater levels measured at nearby wells <0.5 miles from the GDE Evaluation Unit Boundary were shallower than the average rooting depth of the habitat mapped in the NCCAG database (TNC 2020).

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2 The Landsat mission is the longest running satellite monitoring program used to capture space-based images of the Earth's surface every 16 days. Landsat is managed by NASA and records visible, near-infrared, middle-infrared, and thermal wavelengths reflected from the Earth's surface. TNC aggregated this data to generate the NDVI and NDMI.

Average root depths were collected from the Fire Effects Information System, a database managed by USDA Fire Service that provides references on the general biology and ecology of organisms in North America (USDA 2020). When average rooting depth was not available, the mapped NCCAG indicators were considered groundwater dependent if static groundwater levels at nearby wells were shallower than 30 feet bgs. This criterion for groundwater depth is identified by TNC as representative groundwater conditions that sustain common phreatophytes (TNC 2019).

Ecosystems were characterized as not groundwater dependent if groundwater level trends were not correlated with NDVI and NDMI trends, the habitats persisted during periods where underlying groundwater was deeper than the overlying vegetation's average rooting depth or previous site investigations indicated that the habitats were sustained by surface water. As noted above, when average rooting depth was not available, it was assumed that static groundwater levels shallower than 30 feet bgs were indicative of groundwater conditions that supply water to the overlying habitat.

Ecosystems were characterized as potentially groundwater dependent if the source of water sustaining the habitat was not identifiable and/or groundwater levels underlying the habitat have not been measured and are unknown. GDE Evaluation Units that were farther than 0.5 miles from the nearest groundwater extraction well were characterized as not likely impacted by current production within the Plan Area.

2.7.8.2.3 Groundwater Dependent Ecosystem Characterization

This section describes the characterization of each GDE Evaluation Unit within the Plan Area. The section first describes habitats in the Plan Area that are groundwater dependent, followed by a description of habitats that are potentially groundwater dependent, and lastly a description of the habitats that are not groundwater dependent. Data supporting the categorization of each GDE Evaluation Unit is provided within each subsection.

2.7.8.2.4 Groundwater Dependent Ecosystems in the Plan Area

There are three GDE Evaluation Units within the Plan Area that are groundwater dependent (green habitat areas in Figure 2-57, Characterization of Groundwater Dependent Ecosystems in the Plan Area). These habitats lie along the banks of Oak Glen Creek in the northern part of the Oak Glen subarea, Wildwood Canyon Creek in the southeastern part of the Oak Glen subarea, and San Timoteo Creek in the Live Oak subarea. The GDEs adjacent to Oak Glen Creek and Wildwood Canyon Creek occur along the upstream reaches of these creeks. The GDE located along San Timoteo Creek is located downstream of its confluence with Yucaipa Creek.

Groundwater underlying these habitats is encountered at depths shallower than 30 feet bgs. Data describing the average rooting depth for the prominent vegetation communities in these environments indicates that the main root systems may extend below the water table (USDA 2020).

Groundwater is extracted from the principal aquifer within 0.5 miles of the GDEs adjacent to Oak Glen Creek. However, habitat health, as indicated by trends in NDVI and NDMI, has not declined as a result of historical and current extraction (Klausmeyer et al. 2019).

The three GDE Evaluation Units are characterized in the following subsections.

2.7.8.2.4.1 Oak Glen Creek near the Triple Falls Creek Subarea

The NCCAG dataset identified two coast live oak vegetation communities and one riparian mixed hardwood community located near the border of the Oak Glen and Triple Falls Creek subareas (Figure 2-57). Aerial imagery from Google Earth of these habitats indicates that they lie along the northern reaches of the Oak Glen Creek, which conveys surface runoff from the San Bernardino Mountains to its confluence with Wilson Creek. The Fire Effects Information System database indicates that the main roots of coast live oak may extend 36 feet bgs (Steinberg 2002). The Fire Effects Information System database does not have information on average root depths for the Riparian Mixed Hardwood.

NDVI and NDMI trends at these habitats range from moderately increasing to largely decreasing. The largest decreases are in the northernmost coast live oak habitat. NDVI and NDMI at that riparian mixed hardwood has moderately increased since 2009. Annual precipitation during this period was generally less than the 33-year average of 14 inches between 1985 and 2018.

Groundwater levels are measured at two wells within 0.5 miles of these mapped habitats: YVWD-25 (screened at 45 to 55 feet bgs) and the Chlorinator Well (unknown screen interval). The shallowest depth to groundwater recorded at YVWD-25 was 4 feet bgs on March 22, 2005, and the maximum depth to water measured at YVWD-25 was 44 feet bgs on December 23, 2007 (Figure 2-E2 in Appendix 2-E). Both measurements were collected during a period when YVWD-25 was actively extracting water. The shallowest static water level measured at YVWD-25 was 22.5 feet bgs in March 2009. Static water levels have not been measured at YVWD-25 since November 2015.

Static groundwater levels have been measured at the Chlorinator well since January 1987. Between January 1987 and February 2018, the shallowest static water level recorded at the Chlorinator well was measured at 13 feet bgs in February 1993 (Figure 2-E2 in Appendix 2-E). The deepest static groundwater level measured at the Chlorinator well was measured at 60 feet bgs in November 2006. Since 2015, average depth to groundwater measured at the Chlorinator well was approximately 49 feet bgs.

YVWD-25 is an active well that produces groundwater under the direct influence of surface water (see Section 2.5.4.1, Groundwater under the Influence of Surface Water). YVWD-25 has produced an average 274 AFY since 2001. Between 2001 and 2013, NDVI and NDMI increased; this increase was correlated with above average annual precipitation for this 12-year period.

Because water levels measured at the Chlorinator well and YVWD-25 have been measured shallower than 30 feet bgs, the coast live oak and riparian mixed hardwood habitats located along the border between the Oak Glen and Triple Falls Creek subareas were characterized as groundwater dependent. However, the fact that NDVI and NDMI increased between 2001 and 2013, a period when YVWD-25 was actively producing an average 274 AFY, indicates that continued production at YVWD-25 at current production rates will not adversely impact the health of these mapped habitats. If future production is expected to exceed historical extractions in the region, additional field work may be required to characterize the impact that proposed pumping rates will have on the coast live oak and riparian mixed hardwood.

2.7.8.2.4.2 Wildwood Canyon State Park

The NCCAG dataset identified multiple coast live oak habitats located along the Wildwood Canyon Creek near Wildwood Canyon State Park (Figure 2-57). Aerial photographs indicate that these habitats predominantly border Wildwood Canyon Creek but also extend south into undeveloped lands that border the local residential community.

NDVI moderately increased across the majority of this habitat between 2009 and 2018, while NDMI moderately decreased. During this period, annual precipitation was generally lower than the 33-year average of 14 inches between 1985 and 2018.

Static groundwater levels have been measured within 0.5 miles of this habitat at YVWD-28 since May 2004. Static groundwater elevations at this well have ranged from 50 feet bgs, measured on December 14, 2018, to 8 feet bgs, measured on June 20, 2011 (Figure 2-E4 in Appendix 2-E). Prior to 2018, static groundwater was encountered at an average elevation of approximately 13 feet bgs, and between 2008 and 2018, static groundwater levels measured at YVWD-28 fluctuated between 8 and 18 feet bgs.

Because static groundwater levels measured at YVWD-28 are shallower than the average rooting depth of coast live oak, the habitats mapped by the NCCAG dataset near the Wildwood Canyon State Park were characterized as GDEs.

2.7.8.2.4.3 San Timoteo Creek within the Live Oak Subarea

The NCCAG dataset identified five vegetation communities associated with common phreatophytes along the San Timoteo Creek in the Live Oak subarea (Figure 2-57). These vegetation communities consist of willow and Fremont cottonwood. Aerial photographs suggest that these habitats are densely vegetated and that they have not been altered by land development.

NDVI and NDMI trends vary spatially across the five habitats. These trends range from large decreases to large increases. The aggregate trend for these five habitats shows that NDVI and NDMI both increased between 2009 and 2018. During this period, annual precipitation was generally lower than the 33-year average of 14 inches between 1985 and 2018.

Static groundwater elevations near these habitats were measured at 11 monitoring wells: GWMW-1 (screened at 45 to 60 feet bgs), GWMW-2 (screened at 55 to 70 feet bgs), GWMW-3 (screened at 45 to 60 feet bgs), GWMW-5A (screened at 120 to 140 feet bgs), GWMW-5B (screened at 285 to 305 feet bgs), OW-2P (screened at 5 to 20 feet bgs), OW-3P (screened at 5 to 20 feet bgs), OW-5A (screened at 5 to 10 feet bgs), OW-5B (screened at 15 to 20 feet bgs), OW-6A (screened at 6 to 11 feet bgs), and OW-6B (screened at 16 to 21 feet bgs). Monitoring wells GWMW-5A and GWMW-5B are a nested well pair that provide information on the vertical hydraulic gradient near the outlet of San Timoteo Creek to Redlands. Wells OW-5A and OW-5B and wells OW-6A and OW-6B were both nested observation well pairs that provided estimates of the vertical hydraulic gradients along San Timoteo Creek near, and downstream of, the confluence of San Timoteo Creek and Yucaipa Creek. Wells OW-2P, OW-5A, OW-5B, OW-6A, and OW-6B no longer exist, as they were destroyed either by flooding of San Timoteo Creek following major precipitation events or by grading activities that cleared large areas of habitat where the wells were located.

Groundwater elevations measured at all eleven wells were shallower than 30 feet bgs. The maximum depth to water measured at these wells was 23.9 feet bgs, measured at GWMW-5A on September 27, 2016 (Figure 2-E1 in Appendix 2-E). Upstream of GWMW-5A, the principal aquifer occurs under artesian conditions. Groundwater levels measured at OW-6A and OW-6B on August 7, 2018, were both above ground surface, indicating that this reach of San Timoteo Creek was a gaining stream with groundwater discharging to San Timoteo Creek at this location.

Local groundwater elevation data that indicate the presence of shallow groundwater and an interconnected groundwater-surface water system demonstrates that the Fremont cottonwood, common elderberry, and willow habitats located along the San Timoteo Creek are groundwater dependent ecosystems.

2.7.8.2.5 Potential Groundwater Dependent Ecosystems in the Plan Area

There are two GDE Evaluation Units within the Plan Area that are potentially groundwater dependent (yellow habitat areas in Figure 2-57). These GDE Evaluation Units lack data characterizing the interaction between groundwater and habitat health. Groundwater is not currently extracted within 0.5 miles of these habitats; therefore, current production is not expected to negatively impact these environments. If future additional extractions are proposed within 0.5 miles of these habitats, additional field work may be necessary to characterize the potential groundwater dependence of the habitats described below.

2.7.8.2.5.1 Calimesa and Singleton Subareas

The NCCAG identified three different vegetation communities located in the eastern portions of the Calimesa and Singleton subareas (Figure 2-57). These vegetation communities consist of coast live oak, Fremont cottonwood, and red willow. Aerial photographs of these habitats indicate that they are located along earthen surface depressions that carry surface runoff from the hills that border the Calimesa and Singleton subareas to the east into the central portion of the Subbasin.

Groundwater levels are not measured within 0.5 miles of these habitats. Because there is limited data characterizing the potential interaction between groundwater and these ecosystems, the Fremont cottonwood, red willow and coast live oak communities were characterized as potential GDEs.

2.7.8.2.5.2 Yucaipa Creek

The NCCAG identified two different vegetation communities located near Yucaipa Creek and upstream of the confluence of Yucaipa Creek with San Timoteo Creek that are potentially groundwater dependent (Figure 2-57). These vegetation communities consist of common elderberry and Fremont cottonwood. Aerial photographs of these habitats from Google Earth indicate that they are located along surface depressions that divert surface runoff to the Yucaipa Creek, as well as along the banks of the Yucaipa Creek, upstream of its confluence with the San Timoteo Creek.

Groundwater levels were measured within 0.5 miles of the Yucaipa Creek habitats at OW-5A (screened at 5 to 10 feet bgs), OW-5B (screened at 15 to 20 feet bgs), and OW-2P (screened at 5 to 20 feet bgs). These wells were located along the San Timoteo Creek and are more representative of groundwater-surface water interactions along the San Timoteo Creek than of groundwater conditions in the principal aquifer underlying these habitats.

Because there is a lack of site-specific data near the habitats located along the Yucaipa Creek, the common elderberry and Fremont cottonwood ecosystems at these locations were characterized as potentially groundwater dependent.

2.7.8.2.6 Habitats in the Plan Area that are not Groundwater Dependent

A comparison of aerial photographs, groundwater elevations, NDVI and NDMI trends and rooting depth information indicates that six GDE Evaluation Units mapped within the NCCAG dataset are not groundwater dependent (e.g., white habitat areas in Figure 2-57). These local data demonstrate that groundwater in the principal aquifer does not provide a source of water supply to the mapped ecosystems. A detailed discussion of the separation between groundwater and the six habitats is provided below.

2.7.8.2.6.1 Crafton Hills Subarea

The NCCAG dataset identified one coast live oak habitat and one Riversidean alluvial scrub habitat located along the foothills of the Crafton Hills (Figure 2-57). Aerial photographs of these habitats indicate that they are located directly north of Yucaipa Regional Park. Land use surrounding these mapped habitats has not changed in the last 15 years. The Fire Effects Information System database has not estimated average root depths for Riversidean alluvial scrub.

Between 2009 and 2018, NDVI and NDMI trends at the Riversidean alluvial scrub habitat show little to no change, while NDVI and NDMI trends at the coast live oak habitat show moderate declines. During this period, annual precipitation was generally lower than the 33-year average of 14 inches between 1985 and 2018.

Static groundwater levels are actively measured at two wells within 0.5 miles of these mapped habitats: YVWD-37 (unknown screen interval), and YVWD-09 (screened at 120 to 706 feet bgs). The shallowest depth to water measurement at these two wells was 88 feet bgs measured on February 17, 2018, at YVWD-09 (Figure 2-E5 in Appendix 2-E). Static groundwater levels at YVWD-09 have been measured as deep as 359 feet bgs (measured on July 2, 1973). Static groundwater levels at both YVWD-09 and YVWD-37 have been increasing since 2010 (Figure 2-E5 in Appendix 2-E). The NDVI and NDMI indicators are not correlated with the trend in rising groundwater elevations.

Groundwater is not actively extracted from any well within 0.5 miles of these mapped habitats.

Because static groundwater levels have not been measured shallower than 88 feet bgs, the Riversidean alluvial scrub and coast live oak habitats located in the Crafton Hills sub-basin were characterized as habitats that are not groundwater dependent.

2.7.8.2.6.2 Wilson Creek Spreading Basins

The NCCAG dataset identified a Riversidean alluvial scrub habitat located along the periphery of the Wilson Creek spreading basins as groundwater dependent (Figure 2-57). Aerial photographs indicate that the footprint of this habitat aligns with the boundary of the westernmost spreading basin, which has been unaltered over the last 15 years.

Between 2009 and 2018, NDVI trends at this habitat have moderately increased, while NDMI trends show little to no change. Annual precipitation during this period was generally lower than the 33-year average of 14 inches between 1985 and 2018.

Static groundwater levels are actively measured within 0.5 miles of this habitat at well YVWD-53 (screened at 450 to 970 feet bgs) and at the USGS Wilson Creek nested well cluster. Static groundwater levels have been measured at YVWD-53 since January 1993 and depths-to-water have ranged from 222 feet bgs (measured on February 18, 2018) to 554 feet bgs (on September 24, 2003) (Figure 2-E3 in Appendix 2-E). Groundwater is actively extracted at wells YVWD-53 and YVWD-44 (screened at 275 to 650 feet bgs). Between 2001 and 2018, YVWD-44 and YVWD-53 extracted a combined rate of approximately 1,100 AFY of groundwater from the principal aquifer. Throughout this period, both NDVI and NDMI increased at the Riversidean alluvial scrub habitat.

Because static groundwater levels have not been measured shallower than 222 feet bgs and habitat health increased during periods of active production, the Riversidean alluvial scrub habitat located along the Wilson Creek spreading basins was characterized as a habitat that is not groundwater dependent.

2.7.8.2.6.3 Oak Glen Creek

The NCCAG dataset identified Riversidean alluvial scrub habitats along Oak Glen Creek that may be groundwater dependent (Figure 2-57). Aerial photographs indicate that these habitats are located along the boundary between the Wilson Creek and Gateway subareas. Aerial photographs indicate that a large portion of the habitat near the intersection of Bryan Street and Eucalyptus Avenue was developed in 2009.

NDVI and NDMI trends between 2009 and 2018 vary spatially across the habitats and range from moderately increasing to moderately decreasing. During this period, annual precipitation was generally lower than the 33-year average of 14 inches between 1985 and 2018.

Static groundwater levels are actively measured within 0.5 miles of these habitats at YVWD-53 (screened at 450 to 970 feet bgs), YVWD-07 (screened at 135 to 645 feet bgs), YVWD-46 (screened at 340 to 1130 feet bgs), YVWD-18 (screened at 290 to 584 feet bgs), YVWD-56 (screened at 512 to 832 feet bgs), YVWD-05 (screened at 190 to 470 feet bgs), and the USGS nested well cluster at Wilson Creek (screened at 350 to 370, 500 to 520, 640 to 660, and 820 to 840 feet bgs). The shallowest groundwater elevation measured from this group of wells was 137 feet bgs at YVWD-05 on April 3, 1946 (Figure 2-E3 in Appendix 2-E). Static groundwater elevations measured at the USGS Wilson Creek monitoring wells indicate that water levels are currently deeper than 250 feet bgs.

Groundwater is actively extracted within 0.5 miles of this habitat at wells YVWD-46, YVWD-18, YVWD-56, and YVWD-55. Between 2001 and 2018, these wells extracted a combined average annual extraction rate of 2,600 AFY. During this period, NDVI increased and NDMI showed little to no change.

Because static groundwater levels have not been measured shallower than 137 feet bgs and habitat health increased during periods of active production, the Riversidean alluvial scrub habitat located along the Oak Glen Creek was characterized as a habitat that is not groundwater dependent.

2.7.8.2.6.4 Wildwood Canyon Near the Boundary Between the Oak Glen and Calimesa Subareas

The NCCAG dataset identified a coast live oak habitat located along Yucaipa Creek out of Wildwood Canyon that may be groundwater dependent (Figure 2-57). Aerial photographs indicate that this habitat is more densely populated on the southern bank of the creek and is bordered on the north and south by residential communities. Development of the residential community located north of the creek began in 2002, and the residential community located south of the creek was present in 1995. This section of Yucaipa Creek is unlined and carries surface water runoff from the hills in Wildwood Canyon State Park through the Calimesa subarea before discharging to San Timoteo Creek.

NDVI and NDMI trends between 2009 and 2018 show little to no change. During this period, annual precipitation was generally lower than the 33-year average of 14 inches between 1985 and 2018.

Static groundwater levels are actively measured within 0.5 miles of this habitat at well YVWD-27 (screened at 164 to 314 feet bgs) and have historically been measured at wells YVWD-27A (screened at 160 to 207 feet bgs), YVWD-15 (screened at 50 to 129 feet bgs), and YVWD-26 (unknown screen interval). From this set of wells, the shallowest depth to water was recorded at YVWD-27, at a depth of 44 feet bgs on June 17, 2011 (Figure 2-E4 in Appendix 2-E). Groundwater levels at YVWD-27 between 2009 and 2018 declined from approximately 56.4 feet bgs in January 2009 to the current level of 129 feet bgs measured on December 16, 2018.

Groundwater is actively extracted within a 0.5-mile distance from this habitat at YVWD-27. Between 2001 and 2018, YVWD-27 extracted an average of approximately 100 AFY. During this period, NDVI and NDMI both increased.

This coast live oak community located along Yucaipa Creek near the boundary between the Calimesa and Oak Glen subareas was characterized as a habitat that is not groundwater dependent. This characterization was based on data showing that groundwater levels have not been measured shallower than 44 feet bgs, approximately 10 feet deeper than the coast live oak rooting depth (Fryer 2008), and that habitat health increased during a period of active extraction at YVWD-27.

2.7.8.2.6.5 Calimesa and Live Oak Subareas

The NCCAG dataset identified four coast live oak habitats and one red willow habitat located near the border of the Calimesa and Live Oak subareas (Figure 2-57). Aerial photographs indicate that the northernmost coast live oak habitats are located along the troughs of local surface depressions that likely carry surface water runoff derived from precipitation that falls on the local hills. The long branch of coast live oak and red willow just south of these two habitats is located along an earthen stream channel that is an extension of a lined stormwater channel in the Calimesa subarea. This earthen stream channel carries surface flows out of the Plan Area before discharging to San Timoteo Creek.

NDVI and NDMI in the northern coast live oak habitats show little to no change between 2009 and 2018. NDVI along the earthen stream channel that extends from the Calimesa subarea to the Plan Area boundary increased between 2009 and 2018; NDMI at this habitat has not changed. During this period, annual precipitation was generally lower than the 33-year average of 14 inches between 1985 and 2018.

Static groundwater elevations were measured within 0.5 miles of these habitats at seven wells: South Mesa-05 (screened at 264 to 514 feet bgs), South Mesa-07 (screened at 242 to 800 feet bgs), South Mesa-09 (screened at 250 to 985 feet bgs), South Mesa-11 (unknown screen interval), South Mesa-12 (screened at 250 to 770 feet bgs), South Mesa-16 (unknown screen interval), and South Mesa-17 (screened at 350 to 885 feet bgs). From this set of wells, the shallowest depth to water was measured at a depth of 193 feet bgs at South Mesa-12 on March 1, 1992 (Figure 2-E6 in Appendix 2-E). At this well, static water levels have been measured as deep as 319 feet bgs. Between 2001 and 2018, static groundwater levels at these seven wells were measured at an average depth of approximately 275 feet bgs.

Groundwater is actively extracted within 0.5 miles of these habitats at the seven wells listed above, as well as at SMWC-05 (screened at 264 to 514 feet bgs). Extractions from the South Mesa wells between 2001 and 2018 averaged approximately 2,050 AFY. During this period, NDVI and NDMI increased at each habitat located along the border of the Live Oak and Calimesa subareas.

2.7.8.2.7 Summary of GDEs in the Plan Area

The Plan Area includes diverse communities of habitats that are sustained by infiltrating surface water, precipitation, and shallow groundwater. The NCCAG database identified 37 unique vegetation community indicators commonly associated with phreatophytes (Figure 2-56). The natural communities underlying these indicators were characterized as either groundwater dependent, potentially groundwater dependent, or not groundwater dependent. This characterization was based on a review of local groundwater elevations, groundwater extraction history, aerial photographs, and satellite data[3] prepared by TNC.

Three groups of habitats mapped by the NCCAG dataset contain vegetation that rely on groundwater as a source of water supply (e.g., green habitat areas in Figure 2-57). These habitats are located along Oak Glen Creek, Wildwood Canyon Creek, and San Timoteo Creek and consist of coast live oak, riparian mixed hardwood, Fremont cottonwood, and willow.

The groundwater-dependent ecosystem located along Oak Glen Creek is comprised of coast live oak. A review of ecological data describing coast live oak indicates that the root system may extend to depths greater than 36 feet bgs (Steinberg 2002). NDVI at this location has generally increased over the last decade, while NDMI has generally decreased. The decreased moisture content (NDMI) is reflective of the lower-than average annual precipitation during this period compared to the 33-year average between 1985 and 2018. The increasing NDVI during periods of decreasing NDMI suggest that the habitat is sustained by water other than surface water flows in Oak Glen Creek.

Groundwater elevations measured at YVWD-25 (screened at 45 to 55 feet bgs) and the Chlorinator well (unknown screen interval) indicate that the groundwater table underlying the habitat is shallower than 30 feet bgs. Groundwater elevations measured at YVWD-25 during periods when the well was active have been measured as shallow as 7 feet bgs (measured on April 26, 2005). At the Chlorinator well, static water levels have been measured as shallow as 13 feet bgs. Groundwater elevations at these depths likely occur within the root zone of the Coast Live Oak that lines Oak Glen Creek. YVWD-25 has produced an average of 274 AFY since 2001. Between 2001 and 2018, NDVI increased, indicating that the health of the coast live oak ecosystem was not impacted by production at YVWD-25. Therefore, future pumping at YVWD-25 under historical production rates are not expected to impact the habitat along Oak Glen Creek. If additional production is planned for the future, further characterization of the local conditions underlying the coast live oak may be warranted.

The groundwater dependent ecosystem that borders the Wildwood Canyon State Park is composed of coast live oak (Figure 2-57). Similar to the NDVI and NDMI trends in the habitats along Oak Glen Creek, NDVI in the Wildwood Canyon State Park GDE increased between 2009 and 2018, while NDMI decreased. As noted above, annual precipitation during the period between 2009 and 2018 was generally lower than the 33-year precipitation average between 1985 and 2018. Static groundwater levels near this habitat have been measured at YVWD-28 since May 2004. Groundwater levels at this well have fluctuated between 50 feet bgs and 8 feet bgs. In 2018, groundwater elevations dropped below 40 feet bgs. However, prior to 2018, groundwater elevations averaged approximately 13 feet bgs. Water levels at this depth likely occur within the root zone of the coast live oak habitat. There are no active groundwater extraction wells located within 0.5 miles of this habitat that may impact future health of the coast live oak.

Lastly, the NCCAG dataset identified a densely vegetated community of willow and Fremont cottonwood located along San Timoteo Creek downstream of its confluence with Yucaipa Creek (Figure 2-57). NDVI and NDMI both increased between 2009 and 2018, indicating that moisture content (a measure of surface water availability in the habitat) and habitat greenness have both increased over the past decade. Static groundwater elevations were measured at 11 monitoring wells that extend from the confluence of Yucaipa Creek and San Timoteo Creek downstream to the boundary of the Plan Area. Since 2016, static groundwater levels measured at all 11 wells were not measured deeper than approximately 24 feet bgs. Further, measurements at a set of nested wells located along

[3] Landsat data was analyzed by The Nature Conservancy to quantify time-varying trends in Normalized Derived Vegetation Index (NDVI) and Normalized Derived Moisture Index (NDMI).

this reach of San Timoteo Creek indicate that groundwater is under artesian conditions; these pressurized conditions may indicate that groundwater actively discharges to San Timoteo Creek along this reach.

The shallow and artesian groundwater conditions located along this reach of San Timoteo Creek indicate a complex groundwater–surface water connection underlying the Willow and Fremont cottonwood habitats mapped by the NCCAG dataset. As indicated by the NDVI and NDMI data, current private well extractions that may occur near these habitats have not impacted habitat health. Accordingly, private well extractions that remain at historical groundwater extraction rates are not expected to impact the future water supplies for the Willow and Fremont cottonwood that border this reach of San Timoteo Creek.

The remaining habitats that were mapped within the NCCAG dataset were characterized as either potentially groundwater dependent or not groundwater dependent. The natural communities that reside in these habitats have not been impacted by historical groundwater extractions from the principal aquifer in the Plan Area.

2.8 Water Budget Analysis

The Emergency Groundwater Sustainability Plan regulations Section 354.18(a) state that each Plan "shall include a water budget for the basin that provides an accounting and assessment of the total volume of groundwater and surface water entering and leaving the basin, including historical, current, and projected water budget conditions, and the change in volume of water stored."

This section describes the sources of groundwater recharge and discharge to the Yucaipa Subbasin, and the historical, current, and projected water budget analyses. The historical water budget was prepared for the 50-year period starting in water year 1965 and ending water year 2014 (October 1, 1965, to September 30, 2014). Current conditions in the Subbasin were characterized by quantifying the water budget for the period from the 2015 WY through 2018 WY (October 1, 2014, to September 30, 2018). Three future scenarios (Section 2.8.7.3, Projected Water Budget) were assessed to characterize projected conditions in the Subbasin. These scenarios characterize projected water budgets for the period extending from the 2019 WY through the 2069 WY (October 1, 2018, to September 30, 2069). Individual components of the water budget are described in units of AF or AFY.

Estimates of the individual water budget components for the historical and current conditions in the Subbasin are based on simulation results from the YIHM (Cromwell and Alzraiee 2022). The YIHM is a numerical surface water and groundwater model developed by the USGS to simulate the effects of native and non-native water supplies and demands on groundwater conditions across the entire Yucaipa Valley watershed. An overview of the YIHM is provided in Section 2.8.1, Integrated Surface Water and Groundwater Numerical Model. Individual water budget components were extracted from the YIHM based on the B118 boundary for the Yucaipa Subbasin. These components were extracted from the version of the YIHM provided to the Yucaipa GSA in May 2021.

Sections 2.8.2 and 2.8.3 provide a detailed description of the sources of groundwater recharge and discharge in the Subbasin. These sections also provide a description of the methods used by the YIHM to represent each process. Quantitative assessments of the historical, current, and projected water budgets are provided in Section 2.8.7. These sections are accompanied by tabular and graphical representations of the historical, current, and future water budgets, which are included as an attachment to this GSP in Appendix 2-C.

2.8.1 Integrated Surface Water and Groundwater Numerical Model

The YIHM is a numerical flow model that simulates the interaction between surface water and groundwater processes across the Yucaipa Valley watershed (Cromwell and Alzraiee 2022). Surface water processes in the YIHM are simulated using the USGS modular modeling code, Precipitation Runoff Modeling System (PRMS). Groundwater processes are simulated using the USGS finite-difference modeling code, MODFLOW-NWT. These two codes are integrated using the USGS code, GSFLOW, which allows for the simultaneous computation of surface water processes, groundwater processes, and their interactions.

The YIHM active model domain is approximately 78,100 acres and covers over 90% of the Yucaipa Subbasin (blue fill in Figure 2-58, Yucaipa Integrated Hydrologic Model Active Model Domain). Regions of the Subbasin not included in the active model domain are shown in yellow fill in Figure 2-58. Areas of the Subbasin that are not simulated in the YIHM are located along the bedrock expression along the southeastern boundary of the Singleton Subarea.

The YIHM was designed to evaluate water supplies, demands, and changes in storage in the Yucaipa Subbasin between January 1, 1947, and December 31, 2014. The YIHM utilizes daily time steps to simulate surface water processes, and monthly stress periods to simulate changes in groundwater stresses (e.g., pumping, aquifer recharge). The PRMS model was calibrated using geospatial data of potential evapotranspiration and solar radiation compiled by the California Irrigation Management Information System (CIMIS). The MODFLOW model was calibrated using transient groundwater elevation and drawdown measurements from about 250 wells in the Yucaipa Valley watershed (Cromwell and Alzraiee 2022). A more detailed overview of the YIHM model calibration is provided in Section 2.8.8, Characterization of Model Sensitivity and Predictive Uncertainty.

Sections 2.8.1.1 and 2.8.1.2 provide a brief overview of the general structure of the YIHM and describe how the surface water and groundwater processes communicate throughout the simulation. Methods for constraining individual components of the watershed and groundwater models are described in Sections 2.8.2 and 2.8.3, as well as in the USGS report documenting the YIHM development, included in Appendix 2-D.

2.8.1.1 Watershed Model

Watershed processes simulated in the YIHM include precipitation, evapotranspiration, surface water runoff, and soil zone processes. Variations in both the rate and location of each process is controlled by user-defined climatic conditions, land surface properties, and soil characteristics.

Data constraining land surface properties, soil characteristics, and climatic conditions were aggregated from a combination of measured data and geospatial datasets. Geospatial datasets used during the development of the YIHM included LANDFIRE data for vegetation coverage, National Land Coverage Database for the distribution of impervious land coverage, soil maps from the USDA Soil Survey Geographic (SSURGO) Database, and land surface elevations from the National Elevation Dataset 10-meter digital elevation model (Cromwell and Alzraiee 2022). These data were mapped onto the YIHM model grid and used to generate estimates of PRMS-specific parameters that constrain surface water runoff properties, surface water flow directions, vegetation coverage and evapotranspiration demands, and soil zone storage and conductivity. Measured climate data from the NOAA climate station located in the City of Redlands (station ID: 47306 Redlands) was used for the precipitation and temperature inputs throughout the simulation.

Simulation results from the watershed model of the YIHM provide estimates of three key quantities that help constrain natural groundwater supplies and demands in the Yucaipa Valley watershed: (1) the volumes and rates of surface water runoff across the watershed, (2) the volumes and rates of precipitation infiltration beyond the soil zone, and (3) the evapotranspiration demands based on local land surface properties and climate conditions.

2.8.1.1.1 Surface Water Runoff

The PRMS model simulates precipitation at the grid-cell level and preforms a water balance calculation that meets evapotranspiration demands, fills surface depressions and plant canopy storage, and allows for precipitation to infiltrate into underlying soils. Precipitation that is in excess of these demands is routed downhill to adjacent model cells as surface runoff before discharging to the stream segment that drains the local sub-watershed.

In addition to runoff derived from excess precipitation, the PRMS module of the YIHM allows water stored in the soil zone to discharge to ground surface and contribute to local runoff. This occurs when land surface topology changes such that the elevation of soil water column is higher than the elevation of the neighboring model cell. The direction of surface water and soil water flow is constrained by the local topology of the watershed. Flow directions were calculated in the YIHM using the USGS Cascade Routing Tool software (Henson et al. 2013).

The total summation of precipitation excess and soil zone discharges to land surface are added as streamflow inputs to the MODFLOW streamflow routing package as part of the GSFLOW integration process. Stream flows are subsequently routed downstream, where they either recharge groundwater, are consumed by evapotranspiration, or are fed by groundwater discharging to land surface (Section 2.8.2.4, Stream Flow Leakage, and Section 2.8.3.3, Subsurface Outflows).

2.8.1.1.2 Volumes and Rates of Precipitation Infiltration beyond the Soil Zone

Precipitation that is not evaporated, stored in surface depressions or the vegetation canopy, or lost to surface runoff will infiltrate into soils that underlie land surface. Once in the soil zone, water can flow downhill to neighboring model cells, discharge to land surface, be consumed by evapotranspiration, or infiltrate into the groundwater domain. The soil zone is a key link between surface water and groundwater processes in the YIHM and acts as a buffer between infiltrating surface water and precipitation recharge to the principal aquifer. The rate and relative magnitude of each process is influenced by local topography and soil characteristics.

Soil zone characteristics were constrained in the YIHM using the USDA SSURGO database (Cromwell and Alzraiee 2022). This database provides estimates of soil composition, available water holding capacity, saturated hydraulic conductivity, and soil depth across the Yucaipa Valley Watershed. The SSURGO database estimates these soil properties over much larger spatial scales than the YIHM model grid and therefore does not capture local variability that may affect infiltration rates. To account for this, the soil-zone parameters generated using SSURGO data were used as initial estimates of soil properties and were adjusted during model calibration.

Calibrated soil-zone properties in the PRMS model were used to constrain equations that control the rate at which soil water discharges to underlying groundwater. In addition to incorporating local soil characteristics, these water-transfer equations incorporate information on the underlying groundwater elevations to constrain exchange rates between the PRMS and MODFLOW domains. When the soil zone is shallower than the water table, water that leaves the PRMS model to enter the groundwater domain is added to the unsaturated zone. Flow through the unsaturated zone is simulated using MODFLOW-NWT. When the groundwater table is extends into the soil zone, soil water is discharged directly to the saturated zone.

2.8.1.1.3 Evapotranspiration Demands Based on Local Land Surface Properties and Climate Conditions

The YIHM estimates evapotranspiration (ET) demands across the Yucaipa Valley watershed using a modified Jensen-Haise formulation for potential evapotranspiration (PET). This formulation estimates PET based on average air temperature, solar radiation, and two empirical parameters that incorporate the effects of altitude, vapor pressure, and plant coverage (Markstrom et al. 2015).

Average air temperatures in the YIHM were constrained using daily values of minimum and maximum temperature measured at the NOAA Redlands climate station (station ID: 47306 Redlands). Minimum and maximum daily air temperature were mapped across the YIHM model domain using monthly temperature adjustment factors calculated using Parameter-evaluation Regressions on Independent Slopes Model (PRISM) monthly normal temperature minimum and maximum datasets.

Monthly minimum and maximum temperature averages generated by PRISM indicate that temperature varies non-linearly with elevation in the Yucaipa Valley Watershed. To represent this non-linearity, the YIHM uses temperature lapse rates to scale temperature at four different elevation thresholds in the watershed. The first group is for all model cells at an elevation between approximately 1,300 feet above NAVD88 and approximately 3,300 feet above NAVD88; the second group corresponded to all cells between approximately 3,300 feet above NAVD88 and 5,900 feet above NAVD88; the third group corresponded to all cells between approximately 5,900 feet above NAVD88 and approximately 8,800 feet above NAVD88. Temperature lapse rates for each grouping were calculated by generating linear regressions between PRISM monthly normal temperature values at elevation using all model cells that corresponded to each elevation grouping. Values of the temperature lapse rates used in the model are shown in Table 2-C1 of Appendix 2-C.

Coefficients of the modified Jensen-Haise equation that incorporate the effects of altitude, vapor pressure, and plant coverage on PET were adjusted during calibration of the PRMS model. Calibration of PRMS-estimated PET was preformed using PET data collected at four climate measurement stations within the CIMIS.

As Markstrom et al. (2015) discuss, evapotranspiration demands are met using both the groundwater and surface water models in GSFLOW. First, ET demands are met by removing water from the soil zone in the PRMS model; any remaining ET demands are met by water stored in the unsaturated and saturated zones of the MODFLOW model. Importantly, ET demands in the YIHM are allowed to change at the daily time scale and directly impact the volume of water stored in the soil zone throughout the simulation; these time and location-dependent variations in ET demands and soil zone storage directly impact estimates of precipitation recharge in the Yucaipa Valley watershed.

2.8.1.2 Groundwater Numerical Model

The YIHM uses MODFLOW-NWT to characterize human-derived groundwater supplies and demands, surface water-groundwater interactions through streams, and subsurface interactions with adjacent basins. These interactions are constrained by local aquifer properties and the implementation of time-varying boundary conditions that represent anthropogenic recharge sources, extractions, and subsurface flows into and out of the Subbasin. Boundary conditions that represent anthropogenic recharge and discharge sources change at a monthly time-step, and natural recharge and discharge sources (such as streamflow interactions) are computed at the daily time scale.

A detailed description of how the YIHM constrains each recharge and discharge component from the groundwater system is provided in Sections 2.8.2 and 2.8.3, respectively.

2.8.2 Inflows to the Groundwater System

This section presents the sources of groundwater recharge to the Yucaipa Subbasin as well as a description of how each source is modeled in the YIHM. Average annual values of recharge by source are provided in Sections 2.8.2.1 through 2.8.2.5. These average annual values were extracted from the YIHM based on the B118 Yucaipa Subbasin boundary and represent 50-year average recharge rates computed using simulation results from the 1965 WY to 2014 WY.

2.8.2.1 Deep Percolation of Precipitation

Precipitation was simulated in the YIHM using a combination of precipitation measurements from the NOAA climate station located in Redlands (station ID: 47306 Redlands) and monthly normal precipitation values generated using the PRISM. The PRISM-generated monthly normal values were mapped onto the YIHM grid and used to calculate monthly precipitation adjustment factors that scaled precipitation from the NOAA station across the watershed. Monthly precipitation adjustment factors were calculated by dividing the PRISM monthly normal values associated with each model cell by the monthly normal value calculated from precipitation measurements collected at the NOAA station in Redlands.

Depending on the local soil storage capacity, a portion of the precipitation at each YIHM model cell will infiltrate into the soil zone, where it is either stored, lost to evapotranspiration, routed downhill, or allowed to migrate vertically into the groundwater domain. Groundwater levels vary throughout the Subbasin, from near ground surface to hundreds of feet below ground surface. As a result, infiltrating precipitation that leaves the soil zone will either enter the unsaturated zone or will directly recharge the saturated zone of the principal aquifer.

The volume of water that enters the saturated zone, either from the unsaturated zone or directly from the soil zone, was calculated throughout the historical period by the YIHM. During the period from the 1965 WY to 2014 WY, the YIHM estimates that direct precipitation provided approximately 6,100 AFY of groundwater recharge to the Subbasin (Appendix 2-C, Table 2-C2). This historically accounted for an average of approximately 17% of the average annual recharge to the Subbasin.

2.8.2.2 Return Flows

The principal aquifer in the Subbasin is also recharged from anthropogenic sources of water that originate as septic system discharges, irrigation return flows, and leaks in the municipal supply delivery system (Cromwell et al. 2022). These sources of anthropogenic recharge are collectively referred to as *return* flows in this Plan. Return flows to the Yucaipa Subbasin vary in both time and location and are predominantly driven by land use change, water consumption and conservation patterns, and residential wastewater discharge practices.

2.8.2.2.1 Septic System Discharges

Prior to 1986, septic tanks were the primary method for disposal of residential wastewater in the Subbasin (YVWD 2010). In 1986, a sewer network was constructed to convey residential wastewater to the WRWRF, where it is treated and discharged to the San Timoteo Creek. While the majority of the residences in the Subbasin are connected to the sewer network, several areas in the Subbasin, including much of the Western Heights subarea, continue to utilize septic systems for residential wastewater disposal.

Residential wastewater discharges from septic systems were estimated in the YIHM using historical population estimates and an average septic discharge rate of 70 gallons per day per person (Umari et al. 1995). The YIHM estimated the location of septic discharges using land use data compiled from GIRAS, NLCD, and LANDFIRE (Cromwell and Alzraiee 2022). Prior to 1986, land use data designated as "Developed" in the geospatial data were assumed to use septic systems for wastewater disposal (Cromwell et al. 2022). Since 1986, the USGS has identified parcels that are likely using septic systems by combining the land use data with geospatial data provided by YVWD on their Sewer Network Service Area (Cromwell et al. 2022). Regions of the Subbasin that are outside the Sewer Network Service Area were assumed to use septic systems as the primary method for disposal of residential wastewater (Cromwell et al. 2022).

2.8.2.2.2 Irrigation Return Flows

A portion of the locally pumped groundwater, potable water, and recycled water delivered to customers in the Subbasin used for outdoor irrigation will infiltrate beyond the root zone and provide a source of groundwater recharge. The location and extent of these return flows depend on local land use properties, irrigation systems, and climatic conditions that all impact evapotranspiration demands and water availability.

The YIHM simulates irrigation return flows from four primary sources: golf courses, parks, agriculture, and residential landscaping. The Subbasin has two golf courses: the Yucaipa Valley Golf Club and Calimesa County Club. About 4 AFY per irrigated acre is required to meet the water demands for turf grass at each golf course (USGA 2012). In calendar year 2019, about 215 AF of recycled water was applied to the Yucaipa Valley Golf Club. An average of 260 AFY of recycled water was delivered to the Calimesa County Club between 2010 and 2014 (Cromwell et al. 2022). The YIHM assumes that 1.6 AFY per irrigated acreage is required for turf irrigation at parks and residential parcels.

Initial estimates of return flows from these applied water sources ranged from 15% to 30% of the total water applied at each location (Cromwell et al. 2022). Irrigation return flows at agricultural parcels are estimated by the YIHM based on local PET, crop coefficients, available soil moisture, and water deliveries.

2.8.2.2.3 Imported Groundwater

Municipal water used for residential use in the Subbasin is supplied by locally pumped groundwater, recycled water, imported surface water, and groundwater extracted from outside the Subbasin boundary. YVWD and South Mesa both operate wells outside the Subbasin and import some of the extracted groundwater to supplement water supplies within their respective service areas in the Plan Area. Some of the groundwater imported to the Subbasin by YVWD and South Mesa recharges the Subbasin as return flows via landscape irrigation and through leaks in the municipal water supply network.

YVWD operates 17 municipal water supply wells outside the Yucaipa Subbasin. These wells are located in the Yucaipa Hills, San Timoteo Subbasin, and San Bernardino Subbasin. The majority of these wells are used to serve communities within YVWD's service area that lie outside the Subbasin; therefore, return flows from groundwater extractions at these wells do not directly recharge the Subbasin. YVWD historically imported groundwater extracted from YVWD-16, YVWD-48, and YVWD-61 to supplement municipal supplies in the Subbasin. When operational, these wells supplemented water supplies to communities located in the Oak Glen, Wilson Creek, Gateway, Calimesa, and Singleton subareas.

South Mesa operates well South Mesa-04, which is located outside the Yucaipa Subbasin and extracts groundwater from the San Timoteo Subbasin. Groundwater imported into the Subbasin by YVWD and South Mesa contribute to return flows.

Table 2-C3 in Appendix 2-C tabulates historical groundwater production, as represented in the YIHM, from wells YVWD-16, YVWD-48, YVWD-61, and South Mesa-04. The data presented in Table 2-C3 indicates that YVWD began supplementing water supplies in the Subbasin in the 1981 WY via the operation of YVWD-16, which serves communities in the Oak Glen subarea located both within and outside the Subbasin. In the 1993 WY, YVWD began operating well 61, which has historically produced 1 to 2 AFY and serves communities near Wildwood Canyon located both within and outside the Subbasin. In the 2001 WY, YVWD began operating YVWD-48, which produced an average of approximately 1,100 AFY between water years 2001 and 2014. Groundwater extracted from YVWD-48 is served within the YVWD service area.

The YIHM simulates that groundwater production from South Mesa-04 began in the 1988 WY. Between the 1988 and 2014 WY, the YIHM indicates that South Mesa-04 produced an average of approximately 480 AFY.

2.8.2.2.4 Groundwater under the Influence of Surface Water

Water produced from YVWD-25 is delivered to the OGSWFF, where it is treated and subsequently used to supplement municipal supplies in YVWD's service area. Between the 2001 WY and 2014 WY, YVWD-25 produced an average of approximately 294 AF of water annually (Appendix 2-C, Table 2-C6). A portion of the water produced by YVWD-25 will recharge groundwater as return flows to the Subbasin. Recharge from water supplied by YVWD-25 is incorporated into the return flow estimates calculated by the YIHM.

2.8.2.2.5 Surface Water Diversions

YVWD historically diverted an average 40 AFY from the 2001 WY to 2018 WY at the Oak Glen Creek diversion point, and an average of 70 AFY from the 2001 WY to 2009 WY at the Birch Creek diversion point (Appendix 2-C, Table 2-C6). No surface water has been diverted from Birch Creek since the 2009 WY. Surface water diversions from Oak Glen Creek have declined to approximately 1 AFY or less since the 2018 WY. Surface water diverted from these two diversion points is directed to the OGSWFF for treatment and subsequent distribution into YVWD's drinking water system. A portion of the surface water diverted recharged groundwater as return flows to the Subbasin. The recharge from diverted surface water is incorporated into the return flow estimates calculated by the YIHM.

2.8.2.2.6 Municipal System Leaks

The YIHM estimates that municipal water system leakage ranges from about 15% to 30% of the total pumping required to meet municipal water demands.

2.8.2.2.7 Net Recharge from Return Flows

The net recharge from septic system return flows, irrigation return flows, surface water diversions, municipal system leaks, and residential landscaping is simulated in the YIHM using the MODFLOW specified-flux well (WEL) package. The MODFLOW WEL package applies a user-defined flux of water to the top layer of the YIHM model domain. The net recharge rate assigned to each model cell in the YIHM is the summation of septic system discharges, irrigation return flows, and municipal water system leakage.

The YIHM estimates that these three sources of water provided an average of approximately 2,800 AF of recharge to the Subbasin annually (Appendix 2-C, Table 2-C2). Historically, this accounted for approximately 8% of the average annual recharge to the Subbasin.

2.8.2.3 Indirect Precipitation and Mountain Front Recharge

The Yucaipa Subbasin is surrounded by alluvial deposits and consolidated rock that act as a source of recharge to the Subbasin. Recharge from these sources is driven by precipitation that falls outside the Subbasin boundaries and percolates into the aquifer system that underlies each of these environments. Indirect precipitation recharge and mountain front recharge occurs along the southern, northern, western, and eastern boundaries of the Subbasin through the San Bernardino Subbasin, San Timoteo Subbasin, San Bernardino Mountains, Crafton Hills, and Yucaipa Hills. Sections 2.8.2.3.1 and 2.8.2.3.2 describe the mechanisms through which these sources recharge the Subbasin, and Section 2.8.2.3.3 describes the historical contribution of these sources to overall recharge within the Subbasin.

2.8.2.3.1 Mountain Front Recharge and Underflows from Crystalline Basement

The Yucaipa Subbasin is underlain by crystalline bedrock that is exposed at land surface in the Yucaipa Hills, Crafton Hills, and San Bernardino Mountains. Precipitation that falls in these regions will either be stored in the overlying soils, be lost via evapotranspiration, runoff into streams that flow into the Subbasin, or infiltrate into the crystalline basement. Underflows from the crystalline basement provide recharge to the Subbasin along the Subbasin boundaries. Surface water runoff conveyed into the Subbasin boundaries may recharge the Subbasin as stream leakage or be lost via evapotranspiration.

In addition to the crystalline bedrock expressions that border the north, east, and west, the Subbasin is bordered on the south by the San Timoteo Badlands, which contains surface expressions of the Sedimentary Deposits of Live Oak Canyon and San Timoteo Formation. Precipitation runoff and subsurface inflows that originate in the San Timoteo Badlands provide additional recharge to the Subbasin through the Live Oak Subarea.

Deep percolation of precipitation into the crystalline bedrock and San Timoteo Badlands is simulated directly in the YIHM. The YIHM represents bedrock and San Timoteo Formation characteristics using similar aquifer properties as the principal aquifer in the Subbasin. The YIHM assumes that groundwater stored in the San Timoteo Badlands and crystalline bedrock is in complete hydraulic communication with the Subbasin. Groundwater elevations in the crystalline basement or San Timoteo Badlands that are higher than the adjacent groundwater elevations in the principal aquifer will cause subsurface flows into the Subbasin that act as a source of recharge.

2.8.2.3.2 Subsurface Inflows from Adjacent Basins

The Yucaipa Subbasin is bordered by the San Timoteo Subbasin, both the adjudicated (Beaumont Watermaster) and non-adjudicated portions, to the southeast and by the adjudicated San Bernardino Subbasin to the southwest and northwest. The Yucaipa Subbasin, San Timoteo Subbasin, and San Bernardino Subbasin are locally disconnected by bedrock expressions in the Crafton Hills and Yucaipa Hills but may be hydraulically connected where these crystalline rocks are overlain by older alluvium and deposits from the Sedimentary Deposits of Live Oak Canyon.

Inflows from adjacent Subbasins into the Yucaipa Subbasin are not gauged but have been previously estimated at approximately 150 acre-feet per year (Rewis et al. 2006).

The YIHM estimates subsurface flows between the Yucaipa Subbasin and San Bernardino Subbasin using the MODFLOW General Head Boundary condition (GHB) package. General Head Boundaries in the YIHM are located along the jurisdictional boundaries between the Yucaipa Subbasin and San Bernardino Subbasin. Each general head boundary was assigned a groundwater elevation that was held constant through time. The value of the groundwater elevation assigned to each model cell located along the boundary was determined using measured groundwater elevations from two nearby groundwater monitoring wells.

Subsurface flows across each general head boundary are controlled by the pre-defined groundwater elevation at the boundary condition, the simulated groundwater elevation at the adjacent model cell in the YIHM, and a conductance parameter that describes the conductivity of the subsurface materials along the boundary. Conductance values were estimated during model calibration.

The Yucaipa Subbasin, San Timoteo Subbasin, and Beaumont Basin are hydrogeologically connected through the sedimentary deposits of the Live Oak Canyon. The YIHM simulates groundwater flow within the sedimentary deposits of the Live Oak Formation across the entire Yucaipa Valley Watershed. Underflows and subsurface exchanges between the Yucaipa Subbasin and San Timoteo Subbasin are internally calculated by the YIHM.

2.8.2.3.3 Subsurface Inflows

Simulation results from the YIHM indicate that an average of approximately 13,800 AFY of groundwater flowed into the Subbasin via subsurface exchanges with the surrounding mountains, hills, and groundwater basins (Appendix 2-C, Table 2-C2). The YIHM indicates that the largest source of subsurface inflow to the Subbasin occurs via underflow from the San Timoteo Subbasin through the San Timoteo Badlands (Figure 2-59, Subsurface Inflows and Outflows Simulated by the YIHM). Between 1965 and 2014, results from the YIHM indicate that underflow from the San Timoteo Subbasin provided an approximate average 6,500 AF of recharge to the Subbasin annually. This accounted for approximately 20% of the total average annual recharge to the Subbasin.

Along the northern boundaries of the Subbasin, the YIHM indicates that mountain front recharge from the San Bernardino Mountains and Yucaipa Hills provided approximately 2,300 AFY and 3,500 AFY of recharge to the Subbasin, respectively (Figure 2-59). Combined, these two sources accounted for approximately 17% of the average annual recharge to the Subbasin.

2.8.2.4 Stream Flow Leakage

The Yucaipa Valley Watershed is drained by a network of streams and creeks that convey surface water runoff from the San Bernardino Mountains, Yucaipa Hills, and San Timoteo Badlands to San Timoteo Creek before discharging to the San Bernardino Subbasin. The primary drainage features in the Subbasin are Wilson Creek, Oak Glen Creek, Yucaipa Creek, and San Timoteo Creek. The headwaters of Oak Glen Creek and Wilson Creek originate in the San Bernardino Mountains and the headwaters of Yucaipa Creek originate in the Yucaipa Hills. The San Timoteo Creek is the major drainage feature of the San Timoteo Wash watershed and enters the Subbasin in the Live Oak subarea.

Stream flows are actively measured within the Subbasin by SBCFCD along Oak Glen Creek and Yucaipa Creek and downstream of the Subbasin by the USGS along the San Timoteo Creek (see Section 2.3, Surface Water and

Drainage Features). Stream gauges installed along Oak Glen Creek and Yucaipa Creek were designed by SBCFCD to measure peak flow events during large storms; measurements collected at these gauges during low-intensity precipitation events are of variable quality and uncertain (see Section 2.3.1, Characterization of Flow).

The YIHM simulates streamflow, stream flow leakage, and groundwater discharges to streams in the Yucaipa Valley watershed using the MODFLOW stream flow routing package. Estimates of surface runoff generated from the PRMS module of the YIHM are used as inputs to the MODFLOW stream flow routing package, which then routes surface water flow downhill before discharging out of the Subbasin. Because surface water flow measurements at the SBCFCD stream flow measurement gauges are impacted by silting/debris buildup, the YIHM's ability to simulate measured stream flows was down-weighted during the model calibration process.

Simulated stream stage and underlying groundwater elevations change in both location and time based on regional groundwater and climatic conditions. Groundwater discharges to streams and stream leakage are calculated in the YIHM by multiplying the difference between simulated stream stage and groundwater elevation with a streambed conductance parameter that characterizes stream bed conductivity. Streambed conductance is not measured and was adjusted during model calibration to provide a better fit to groundwater elevations measured near streams in the Subbasin. Because the YIHM was not calibrated to streamflow measurements, and the interaction between surface water and groundwater is highly non-linear, estimates of stream leakage from the YIHM are uncertain.

The YIHM estimates that stream leakage provided an average of approximately 11,800 AFY of recharge to the Subbasin (Appendix 2-C, Table 2-C2). This historically accounted for approximately 34% of the average annual recharge to the Subbasin. The YIHM indicates that most of the stream leakage in the Subbasin occurs in the Live Oak and Gateway subareas.

2.8.2.5 Imported Water from State Water Project

SBVMWD imports SWP water into the San Bernardino Valley for municipal, agricultural, and domestic supplies. SBVMWD is California's fifth largest State Water Contractor, with an annual maximum entitlement of 102,600 acre-feet (WSC 2018). YVWD began importing SWP water, purchased from SBVMWD, in the 2003 WY (Appendix 2-C, Table 2-C4). SWP water imported to the Yucaipa Subbasin recharges the principal aquifer either as return flows or via infiltration through the Oak Glen Creek and Wilson Creek spreading basins (see Section 2.5.4.2, Surface Water Diversions). Return flows from imported water used for municipal supplies are included in the return flow estimates calculated by the YIHM and presented in Section 2.8.2.2.

The YIHM assumes that all imported water delivered to the Oak Glen Creek and Wilson Creek Spreading Basins recharges the Subbasin. In addition to SWP water, YVWD delivers excess municipal supplies produced at the YVRWFF to the spreading basins (Appendix 2-C, Table 2-C5). The YIHM represents these infiltration basins using a network of 19 wells that inject spreading water into the saturated zone of the YIHM model domain. Because the Oak Glen Creek and Wilson Creek spreading basins are also used to capture runoff during large storm events, the total volume of water injected by these 19 wells exceeds the total volume of water delivered to the Wilson Creek and Oak Glen Creek spreading basins.

Table 2-C5 summarizes historical measured and simulated spreading volumes in the YIHM at the Oak Glen Creek and Wilson Creek spreading basins between water years 2001 and 2019. Spreading between the 2015 WY and 2019 WY represents current conditions in the Subbasin. The difference between reported and simulated recharge rates at the Oak Glen Creek and Wilson Creek spreading basins between the 2001 WY and 2014 WY is

approximately 600 AFY (Appendix 2-C, Table 2-C5). Documentation of the YIHM model development attributes this difference to storm flow diversions at the two basins (Cromwell and Alzraiee 2022).

2.8.3 Outflows from the Groundwater System

This section outlines the sources of groundwater discharge from the Yucaipa Subbasin and provides a description of how each discharge source is simulated in the YIHM. Average annual values of discharge by source are provided in Subsections 2.8.3.1 through 2.8.3.4. These average annual values were extracted from the YIHM based on the B118 Yucaipa Subbasin boundary and represent the 50-year average from the 1965 WY through 2014 WY.

2.8.3.1 Groundwater Production in the Yucaipa Subbasin

Groundwater from the Yucaipa Subbasin is extracted by municipal water suppliers and private well owners. Municipal suppliers in the Subbasin include YVWD, WHWC, and South Mesa. South Mountain operates two irrigation supply wells. In addition to municipal suppliers, groundwater is also extracted from the Subbasin via private well owners that utilize groundwater to supplement local domestic and irrigation demands. A description of historical municipal and private well extractions is described in Section 2.5.3, Groundwater Production Wells, and presented in tabular form in Table 2-C7 of Appendix 2-C.

Throughout the historical simulation, groundwater extractions by municipal suppliers and private well extractors averaged approximately 9,600 and 1,900 AFY, respectively (Appendix 2-C, Table 2-C7). YVWD has historically been the largest producer of groundwater in the Subbasin, extracting an average of approximately 5,100 AFY. Between the 1965 WY and 2014 WY, South Mesa and WHWC produced an average of approximately 2,100 AFY and 1,900 AFY from the Subbasin, respectively.

South Mountain extracted an average of approximately 650 AFY from the Subbasin between the 1965 and 2006 WY. Between the 2007 WY and 2013 WY, South Mountain did not extract groundwater from the Subbasin. In the 2014 WY, South Mountain extracted approximately 200 AF of groundwater from the Subbasin through the operation of the Chicken Hill Well.

The YIHM simulates groundwater extractions from 32 privately owned wells in the Subbasin. Private well extractions were highest in the 1960s (Appendix 2-C, Table 2-C7) and steadily declined throughout the historical period. In the 1965 WY, private well extractions accounted for approximately 35% of the total groundwater extracted from the Subbasin. By the 2014 WY, private well extractions accounted for approximately 5% of the total extractions from the Subbasin.

2.8.3.2 Groundwater under the Influence of Surface Water

Well YVWD-25 has produced groundwater under the direct influence of surface water from nearby Oak Glen Creek to the OGSWFF at an average rate of 274 AFY since 2001. The YIHM includes production by YVWD-25, which is accounted for as a groundwater extraction from the flow regime. However, the water produced by YVWD-25 is groundwater under the direct influence of surface water and is not factored into the water budget analysis for the Subbasin as a groundwater withdrawal.

2.8.3.3 Subsurface Outflows

As discussed in Section 2.8.2.3, Indirect Precipitation and Mountain Front Recharge, the Yucaipa Subbasin is hydraulically connected to varying degrees with the San Bernardino Subbasin, San Timoteo Subbasin, and Beaumont Basin (Figure 2-59). The YIHM estimates that an average of approximately 16,200 AF of groundwater flows out of the Subbasin as subsurface outflows (Appendix 2-C, Table 2-C2). Subsurface outflows from the Subbasin have historically accounted for approximately 46% of the total outflows from the Subbasin. Of this, the YIHM indicates that approximately 9,100 AFY flowed out of the Subbasin through the Live Oak subarea into the San Timoteo Subbasin (Appendix 2-C, Table 2-C22; Figure 2-59). The remaining subsurface outflows to the San Bernardino Subbasin, Beaumont Subbasin, and surrounding hills are summarized in Table 2-C22 (Appendix 2-C; Figure 2-59).

2.8.3.4 Groundwater Discharges to Streams

Groundwater in the Yucaipa Subbasin discharges to Oak Glen Creek, Wilson Creek, Yucaipa Creek, and San Timoteo Creek when underlying groundwater elevations are above the bottom elevation of each stream channel. Groundwater conditions that cause this are influenced by local pumping, climatic conditions, upstream stream leakage, and subsurface inflows from adjacent Subbasins, crystalline bedrock, and the San Timoteo Badlands.

Groundwater discharges to streams in the Subbasin were estimated using the YIHM. As discussed in Section 2.8.2.4, the YIHM simulates surface water-groundwater interactions using the MODFLOW streamflow routing (streamflow routing) package. Stream leakage and groundwater discharges are calculated at each time step in the YIHM using computed groundwater elevations, stream stages, and calibrated values of streambed conductance.

The YIHM estimates that an average of approximately 4,000 AF of groundwater discharged to streams in the Subbasin annually between the 1965 WY and 2014 WY (Appendix 2-C, Table 2-C2). Historically, this accounted for approximately 11% of the average annual groundwater outflows from the Subbasin. Results from the YIHM indicate that the majority of groundwater discharges to streams occurs in the Oak Glen subarea.

As noted in Section 2.8.2.4, the uncertainty in streamflow measurements in the Subbasin affect the quantitative assessment of the YIHM's representation of groundwater-surface water interactions in the Subbasin. Accordingly, estimates of groundwater discharges to streams calculated by the YIHM are a large source of uncertainty in the YIHM-estimated water budget for the Subbasin. Estimates of groundwater-surface water interactions will be refined in the future as stream flow gauging stations are installed in the Subbasin.

2.8.3.5 Evapotranspiration

A portion of the water stored in the soil zone, unsaturated zone, and shallow groundwater table will be consumed by ET. ET rates vary in both location and time, and are influenced by climatic conditions, soil and unsaturated zone properties, and overlying vegetation coverage.

The YIHM was used to calculate PET across the Yucaipa Valley watershed using the modified Jensen-Haise formulation. This formulation for PET incorporates the effects of plant coverage, average daily air temperature, solar radiation, altitude, and air vapor pressure. Estimates of PET calculated by the YIHM were calibrated using geospatial data from the CIMIS. The YIHM simulates ET by removing water from the soil zone, unsaturated zone, and groundwater to meet local PET demands.

The YIHM estimates that an average of approximately 3,500 AF of groundwater was removed via ET annually between the 1965 WY and 2014 WY (Appendix 2-C, Table 2-C2). Historically, this accounted for approximately 10% of the average annual groundwater outflows from the Subbasin. Simulation results from YIHM indicate that the largest groundwater losses from ET occur in the Live Oak and Oak Glen subareas. Both subareas have historically experienced shallow groundwater conditions (Section 2.5.1) and are the largest contributors to groundwater-surface water interactions in the Subbasin.

2.8.4 Change in Annual Volume of Groundwater in Storage

Historical annual changes in groundwater in storage were calculated by the YIHM from the 1965 WY through 2014 WY. Estimates of the annual change in groundwater in storage were extracted from the YIHM using the B118 Subbasin boundary shown on Figure 1-1. Historical change in volume of groundwater in storage is presented over the entire historical period and further aggregated by water year type. Water year type definitions are provided in Section 2.2.1.4.

Throughout the 50-year historical record, the YIHM estimates that groundwater in storage declined by an average of approximately 400 AFY (Appendix 2-C, Table 2-C2).

The YIHM estimates that groundwater in storage decreased by an average of approximately 8,700 AFY in critically dry water years and increased by approximately 6,800 AFY in wet water years. During dry, below normal, normal, and above normal water years, the YIHM estimates that groundwater in storage decreased by approximately 3,000, 1,500, 1,300, and 600 AFY, respectively.

Figure 2-60, Historical Cumulative Change in Storage and Production in the Yucaipa Subbasin, shows historical cumulative change in groundwater in storage in the Subbasin. Between the 1965 WY and 1977 WY, groundwater in storage fluctuated between a surplus of groundwater in storage of approximately 2,200 AF and a deficit of groundwater in storage of approximately 6,800 AF. Groundwater in storage increased between the 1977 WY and 1987 WY to a surplus of approximately 50,000 AF in response to consecutive wet and above normal water years and groundwater extraction rates that remained at, or below, the estimated sustainable yield of the Subbasin (see Section 2.8.6, Estimate of Sustainable Yield).

Groundwater in storage declined between the 1987 WY and 2009 WY to a net deficit of approximately 26,600 AF. Groundwater in storage has increased since 2009 due to the importation of SWP water as a supplemental water supply that reduced groundwater production from the Subbasin and provided some artificial recharge to the Subbasin. At the end of the historical period, the YIHM estimates that the Subbasin experienced a net deficit of groundwater in storage of approximately 18,300 AF.

2.8.5 Quantification of Overdraft

DWR has designated the Yucaipa Subbasin as a high-priority basin. The GSP Emergency Regulations require that the water budget "include a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions" if the Basin is found to experience overdraft (23 CCR, Section 354.18, Water Budget). Groundwater overdraft is defined in DWR Bulletin 118 (DWR 2003) as:

> …the conditions of a groundwater basin or subbasin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years, during which the water supply conditions approximate average conditions. Overdraft can be characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years.

Simulation results from the YIHM indicate that the Subbasin is not in overdraft. Figure 2-60 shows the cumulative change in groundwater in storage across the Subbasin and demonstrates that the Yucaipa Subbasin has historically experienced periods of groundwater storage decline, driven both by climatic conditions across the Yucaipa Watershed and by periods of groundwater extractions that exceeded the sustainable yield, followed by recovery of groundwater in storage. Recent operations within the Subbasin have resulted in an increasing trend in the volume of groundwater in storage, indicating that the Subbasin is not in overdraft (Figure 2-60). The interpretation of these simulation results as indicative of non-overdraft conditions is supported by increasing groundwater elevation trends observed in the Yucaipa Subbasin.

Water levels collected across the Subbasin show that groundwater elevations have fluctuated throughout the historical period; these water level fluctuations vary in both time and location. In the Crafton, Triple Falls Creek, Live Oak, Singleton, and Oak Glen subareas, water levels throughout the historical period either remained constant or increased, indicating that these subareas did not experience overdraft conditions between the 1965 WY and 2014 WY. Similarly, in the Gateway and Wilson Creek subareas, water levels measured at YVWD-18 and YVWD-07 fluctuated between 2,300 and 2,400 feet above NAVD88 and did not show long-term declines indicative of overdraft. In the Calimesa subarea, water levels increased during the historical period to approximately 2,150 to 2,200 feet above NAVD88 in the late 1980s and then decreased to approximately 2,050 feet above NAVD88 by 2006. Following this decline, water levels in the Calimesa subarea have been rising and are currently near the historical average water levels in the subarea. These periodic water level fluctuations in the Calimesa subarea are not indicative of overdraft conditions.

Water levels in the Western Heights subarea generally declined from 1965 into the early 2000's. Between the 1965 WY and 2008 WY, the YIHM estimates that groundwater in storage was declining at an average rate of approximately 800 AFY per year. During this same period, groundwater extractions from the Western Heights subarea averaged approximately 2,500 AFY. Since 2008, water levels in the Western Heights subarea have either stabilized or increased. Water level trends in the Western Heights subarea following 2008 indicate that the subarea is not experiencing overdraft conditions.

2.8.6 Estimate of Sustainable Yield

GSP Emergency Regulations Section 354.18(b)(7) states that each Plan shall use the water budget to develop an estimate of the Sustainable Yield for the basin. The SGMA legislation defines the sustainable yield of the basin as, "the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from groundwater supply without causing undesirable results" (Section 107271, Definitions [w]).

Undesirable results are defined under SGMA as significant and unreasonable impacts to six different sustainability indicators:

- Chronic Lowering of Groundwater Levels
- Reduction of Groundwater in Storage

- Degradation of Water Quality
- Land Subsidence
- Depletion of Interconnected Surface Water (GDEs)
- Seawater Intrusion

As described in Section 2.7.3, Seawater Intrusion, and Section 2.7.4, Groundwater Quality, seawater intrusion and degradation of water quality are not sustainability indicators applicable to the Yucaipa Subbasin. Additionally, historical operations within the Subbasin have not impacted habitat health at the groundwater dependent ecosystems located in the Oak Glen subarea and Live Oak subarea (Section 2.7.8, Groundwater–Surface Water Connections). Historical land subsidence was attributed to tectonic activity in the Plan Area and not attributed to declining groundwater levels. Because of this, the historical estimate of sustainable yield presented in this Plan focuses on avoiding significant and unreasonable chronic lowering of groundwater levels and reduction of groundwater in storage (and to the potential of land subsidence should groundwater levels fall below the historical lows for a significant period of time). A more detailed discussion of undesirable results associated with these sustainability indicators are provided in Chapter 3 of this Plan.

The historical sustainable yield of the Yucaipa Subbasin was estimated using simulation results from the YIHM from the 1965 WY to 2014 WY. During this period, average annual net stream leakage, precipitation recharge, surface water spreading, and return flows, provided approximately 7,830 AFY, 6,100 AFY, 310 AFY, and 2,830 AFY of recharge to the Subbasin. Over the same period, net subsurface interactions and evapotranspiration resulted in an average annual outflow of groundwater from the Subbasin of 2,390 AFY and 3,460 AFY, respectively. In addition to this, approximately 220 AFY of percolating surface water is extracted from the Subbasin and 20 AFY of groundwater discharges to land surface. Summing these average annual water budget components leaves a surplus of approximately 10,980 AFY, which could be extracted from the Subbasin without causing a net loss of groundwater in storage. **The estimated sustainable yield of 10,980 AFY avoids undesirable results associated with chronic lowering of groundwater levels and reduction of groundwater in storage by ensuring that long-term operations within the Subbasin results in no net-change of groundwater in storage.**

Previous investigations of safe yield for the Yucaipa Subbasin are in general agreement with the historical estimate of sustainable yield presented in this Plan (Appendix 2-C, Table 2-C8). In their 2014 study of safe yield for the Yucaipa Subbasin, GSSI estimated the Subbasin safe yield using three different methods that relied on measured groundwater elevations, groundwater extractions rates, and a hydrologic water balance computed using the US EPA's watershed modeling software, Hydrologic Simulation Program (GSSI 2014). Measured groundwater elevations and groundwater extraction rates were analyzed using the Zero-Net Draft Method and Hill Method described in GSSI (2014). GSSI's estimate of safe yield for the Subbasin using these three methods ranged from approximately 9,600 FY to 9,700 AFY. These estimates of safe yield do not include an estimate of safe yield for the Live Oak and Singleton subareas (Section 2.5.2.1).

Future conditions in the Subbasin may deviate from historical conditions due to increasing water demands, availability of recycled water for municipal supply, impacts of climate change on temperature and precipitation, and availability of SWP water. The final estimate of sustainable yield for the Subbasin will consider the historical yield of the Subbasin but will also be defined to prevent the undesirable results of future significant and unreasonable groundwater storage declines, chronic lowering of water levels, and impacts to groundwater dependent ecosystems. These will be assessed using the future simulations discussed in Section 2.8.7.3; the ability for the Subbasin to operate at the historical sustainable yield while avoiding undesirable results in the future will be described in Chapter 3 of this GSP.

2.8.7 Quantification of Historical, Current, and Projected Water Budgets

Each GSP is required to include an accounting of the total annual volume of surface water and groundwater entering and leaving the basin during historical, current, and projected conditions (23 CCR 354.18). Historical conditions for the Plan Area were defined using data for the period between the 1965 WY and 2014 WY. Current conditions for the Plan Area were defined using data for the period between the 2015 WY and 2018 WY. The projected water budgets were prepared for 51-year period from the 2019 WY through 2069 WY. The historical, current, and projected future baseline water budgets for the Plan Area are presented in Figure 2-61. A summary of the water budget for the historical, current, and projected water budgets are provided in Sections 2.8.7.1, 2.8.7.2, and 2.8.7.3.

2.8.7.1 Historical Water Budget

Section 354.18(c) (2) of the GSP Emergency Regulations state that historical water budget information shall be, "used to evaluate availability of reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year." The water budget discussed in this section provides a historical accounting of surface water availability, groundwater inflows, groundwater outflows, and corresponding changes to the volume of groundwater in storage between the 1965 WY and 2014 WY. Estimates of the individual water budget components are based on simulation results from the YIHM.

Table 2-C9 of Appendix 2-C tabulates the water year type distribution between the 1965 WY and 2014 WY in the Subbasin. Climate during this 50-year period was generally dry, with 31 out of the 50-year historical record characterized as "normal," "below normal," "dry," and "critically dry" water year types. Over the same period, 19 water years were characterized as "above normal" or "wet" water year types.

2.8.7.1.1 Historical Surface Water Availability

Table 2-C10 of Appendix 2-C shows historical surface water availability in the Yucaipa Subbasin from the 2001 WY through 2014 WY. Historical surface water supplies included SWP water purchased from SBVMWD and imported to the Subbasin by YVWD and surface water diversions from Oak Glen Creek and Birch Creek.

2.8.7.1.1.1 State Water Project Water

YVWD began importing SWP water into the Subbasin in the 2003 WY. Between the 2003 WY and 2014 WY, YVWD imported an average of approximately 5,000 AF of SWP water to the Subbasin. SWP water imports during this period ranged from 855 AF in water year 2003 to 9,394 AF in the 2012 WY. The 2012 WY was a "dry" water year type.

SWP Water imports to the Subbasin were historically highest during dry water years. During the prolonged dry period between the 2012 WY and 2014 WY, YVWD imported an average of approximately 7,900 AF of SWP water annually.

The majority of SWP water imported to the Subbasin by YVWD is used to supplement annual municipal supplies via treatment at the YVRWFF and distribution into the drinking water supply. Imported water that is in excess of YVWD's service area demands is discharged to the Wilson Creek and Oak Glen spreading basins to artificially recharge the Subbasin. YVWD delivered SWP water to the Wilson Creek and Oak Glen Creek spreading basins in the 2011 WY, 2012 WY, and 2013 WY, which ranged from approximately 1,700 AF to 3,400 AF (Appendix 2-C, Table 2-C5).

2.8.7.1.1.2 Surface Water Diversions from Oak Glen Creek and Birch Creek

Between the 2001 WY and 2014 WY, YVWD diverted an average of approximately 92 AF of surface water from Oak Glen Creek and Birch Creek annually (Appendix 2-C, Tables 2-C6 and 2-C10). Surface water diversions during this period ranged from approximately 206 AF in 2005 to 8 AF in 2012. Data for surface water diversions along Oak Glen Creek and Birch Creek were not available prior to 2001.

Surface water has not been diverted from Birch Creek since 2009 due to maintenance issues with the surface water transmission lines between Birch Creek and the OGSWFF (personal correspondence with YVWD, 2020). Prior to 2009, diversions from Birch Creek ranged from 148 AF in the 2006 WY to 9 AF in the 2008 WY.

2.8.7.1.1.3 Inflows to Groundwater System

Between the 1965 WY and 2014 WY, the YIHM estimates that groundwater in the Yucaipa Subbasin was recharged at an average rate of approximately 34,900 AFY (Appendix 2-C, Table 2-C2). Average annual groundwater recharge to the Subbasin varied by water year type: during critically dry water years, the YIHM estimates that the Subbasin was recharged at an average rate of approximately 29,900 AFY, and during wet water years, the YIHM estimates that the Subbasin was recharged at an average rate of approximately 42,900 AFY.

The largest sources of groundwater recharge were stream leakage, subsurface inflows from the San Timoteo Badlands, and deep percolation of precipitation (Appendix 2-C, Table 2-C2). These three sources of recharge accounted for approximately 35%, 19%, and 17% of the average annual recharge to the Subbasin, respectively. Results from the YIHM indicate that subsurface inflows from the San Timoteo Badlands do not vary by water year type (Appendix 2-C, Table 2-C2). The YIHM estimates that stream leakage during critically dry water years provided an average of approximately 10,700 AF of recharge to the Subbasin annually. During wet water years, the YIHM estimates that stream leakage provided an average of approximately 13,800 AF of recharge to the Subbasin annually.

Groundwater recharge from deep percolation of precipitation averaged approximately 6,100 AFY (Appendix 2-C, Table 2-C2). During wet water years, the YIHM estimates that precipitation provides an average of approximately 12,100 AFY of recharge to the Subbasin (Appendix 2-C, Table 2-C2). In critically dry water years, the YIHM estimates that precipitation provided approximately 2,500 AFY of recharge to the Subbasin.

Groundwater recharge from return flows (Section 2.8.2.2) fluctuated throughout the historical period. Between the 1965 WY and 1989 WY, return flows increased from approximately 2,000 AFY to 6,000 AFY (Appendix 2-C, Table 2-C2). Following the 1989 WY, return flows declined to a recharge rate of 1,000 AFY through the 1992 WY. Recharge from return flows increased after the 1992 WY to a value of approximately 4,000 AF in the 2014 WY. Simulation results from the YIHM indicate that return flows historically provided approximately 8% of the average annual recharge to the Subbasin and are not correlated with water year type.

2.8.7.1.1.4 Outflows from Groundwater System

Between the 1965 WY and 2014 WY, the YIHM estimates that an average of approximately 35,200 AF of groundwater was removed from the Subbasin annually (Appendix 2-C, Table 2-C2). Average annual groundwater outflows from the Subbasin were not historically correlated with water year type.

The largest sources of groundwater outflows during the historical period were groundwater extractions, subsurface underflows to the San Timoteo Badlands, underflows to the San Bernardino Basin, and groundwater discharges to streams. The YIHM estimates that subsurface flows to the San Timoteo Badlands and San Bernardino Basin averaged approximately 9,100 AFY and 4,000 AFY, respectively (Appendix 2-C, Table 2-C2). Results from the YIHM indicate that subsurface flows out of the Subbasin are not correlated with water year type (Appendix 2-C, Table 2-C2).

The YIHM estimates that an average of approximately 4,000 AFY of groundwater discharged to streams in the Subbasin (Appendix 2-C, Table 2-C2). Groundwater discharges to streams during critically dry and wet years averaged approximately 3,200 AFY and 5,400 AFY, respectively.

Between the 1965 WY and 2014 WY, groundwater extractions in the Subbasin averaged approximately 11,300 AFY (Appendix 2-C, Tables 2-C2 and 2-C7). Private well extractions were historically highest in the 1960s, where they accounted for an average of approximately 35% of the total extractions within the Subbasin. Private well extractions have steadily decreased to approximately 5% of the total extractions in the Subbasin in the 2014 WY.

Figure 2-60 shows historical groundwater extraction rates in the Subbasin between the 1965 WY and 2014 WY. Between the 1983 WY and 2002 WY, groundwater extraction rates increased from 8,400 AFY to approximately 15,400 AFY to meet increasing demands in the Subbasin. In the 2003 WY, YVWD began importing SWP water into the Subbasin to supplement municipal supplies. Following these imports, groundwater extraction rates across the Subbasin declined.

2.8.7.1.1.5 Change in Groundwater Storage

Throughout the historical period, the YIHM estimates that groundwater in storage declined at an average annual rate of 370 AFY. Over the 50-year historical period, this resulted in a cumulative loss of groundwater in storage of approximately 18,300 AF from the start of the 1965 WY. A detailed discussion of storage change trends and relationship to water year type is provided in Section 2.8.4, Change in Annual Volume of Groundwater in Storage.

2.8.7.2 Current Water Budget

GSP Emergency Regulations Section 354.18(c)(1) states that each Plan shall characterize "current groundwater inflows and outflows for the Basin using the most recent hydrology, water supply, water demand, and land use information." To characterize current conditions in the Basin, the YIHM was extended to simulate conditions in the Subbasin between January 1, 2015, and September 30, 2018.

Data on groundwater extractions and imported water supplies were provided by YVWD, WHWC, South Mesa, and South Mountain for the 2015 WY through 2018 WY. These data were used to update groundwater pumping and spreading volumes in the current condition simulations performed using the YIHM. Private well extractions across the Yucaipa Valley watershed were estimated using the 2014 WY groundwater extraction rates. Private wells that did not operate in the 2014 WY did not extract groundwater from the Subbasin during the current condition simulations.

Return flows and general head boundary conditions were held constant at the 2014 WY rates and conditions.

Precipitation in the current condition simulation was based on the precipitation measurements collected at the NOAA climate measure station in Redlands. The NOAA climate station in Redlands stopped collecting minimum and maximum temperature measurements in May 2015. Because minimum and maximum temperature measurements were not available at this station during water years 2015 through 2018, temperature conditions in the current condition simulation were constrained using minimum and maximum temperature values measured at the NOAA climate station located at Mill Creek (station ID: USR000CMCB Mill Creek BDF California, CA US; see Section 2.2.2, Temperature). A linear regression was developed between historical minimum and maximum temperatures measured at the Mill Creek and Redlands station to extrapolate temperature data from the Mill Creek station to the Redlands location. The lapse rates defined in the historical simulation of the YIHM were then used to extrapolate the resulting minimum and maximum air temperature data onto the YIHM model grid.

Average groundwater inflows, outflows, and changes in storage between the 2015 WY and 2018 WY were used to characterize the current water budget conditions in the Subbasin.

The 2015, 2016, 2017, and 2018 water years were characterized as below normal, dry, above normal, and critically dry water year types, respectively (Appendix 2-C, Table 2-C11). During this period, the Subbasin received an average 12.3 inches of rain per year.

2.8.7.2.1 Surface Water Availability

State Water Project Water

Between the 2015 WY and 2018 WY, YVWD imported an average 9,100 AF of SWP water to the Subbasin annually (Appendix 2-C, Table 2-C4). Surface water imports were highest in 2017, when YVWD imported approximately 15,300 AF of SWP water to the Subbasin. The 2017 WY was an above normal water year type.

During this period, YVWD delivered imported SWP water to the Oak Glen Creek and Wilson Creek spreading basins in the 2017 WY and 2018 WY (Appendix 2-C, Table 2-C5). In the 2017 WY, YVWD recharged approximately 6,500 AF of SWP water via the spreading basins, and in the 2018 WY, YVWD recharged approximately 1,700 AF of SWP water via the spreading basins.

Surface Water Diversions from Oak Glen Creek

Between the 2015 WY and 2018 WY, YVWD diverted an average 213 AF of surface water from Oak Glen Creek (Appendix 2-C, Table 2-C6). The majority of these diversions occurred through the operation of YVWD-25, which diverted an average of 206 AFY during this period.

No surface water was diverted from Birch Creek between the 2015 WY and 2018 WY.

2.8.7.2.2 Inflows to Groundwater System

Results from the YIHM under current conditions indicate that the Subbasin was recharged at an annual average rate of approximately 36,000 AFY (Appendix 2-C, Table 2-C11). The largest sources of recharge between water years 2015 and 2018 were stream leakage and underflows from the San Timoteo Badlands. Stream Leakage provided an average of approximately 11,700 AFY of recharge to the Subbasin between the 2015 WY and 2018 WY. Subsurface inflows from the San Timoteo Badlands provided an average of approximately 6,700 AFY of recharge. These two recharge sources accounted for 33% and 18% of the average annual recharge, respectively.

Recharge from precipitation provided an average of approximately 5,500 AFY of recharge to the Subbasin and ranged from approximately 2,900 AF in water year 2015 to 10,000 AF in the 2017 WY (Appendix 2-C, Table 2-C11). Groundwater recharge from irrigation return flows, septic system discharges, and leaks in the municipal supply lines provided an average of approximately 4,000 AFY of recharge to the Subbasin (Appendix 2-C, Table 2-C11). Between the 2015 WY and 2018 WY, recharge at the Oak Glen Creek and Wilson Creek Spreading Basins ranged from a minimum of 6 AF to a maximum of approximately 6,600 AF (Appendix 2-C, Table 2-C11).

2.8.7.2.3 Outflows from Groundwater System

The YIHM estimates that outflows from the groundwater system between the 2015 WY and 2018 WY averaged approximately 33,500 AFY. This is approximately 1,600 AFY less than average annual outflows from the groundwater system compared to historical conditions (Appendix 2-C, Table 2-C11).

The largest sources of groundwater outflows from the Subbasin were subsurface discharges to the San Timoteo Badlands and groundwater extractions. Subsurface underflows to the San Timoteo Badlands averaged approximately 9,200 AFY and groundwater extractions averaged approximately 8,100 AFY.

During this period, YVWD extracted an average of approximately 4,000 AFY from the Subbasin, South Mesa extracted an average of approximately 1,900 AFY from the Subbasin, and WHWC extracted approximately 1,600 AFY from the Subbasin. These combined extraction rates are approximately 20% lower than historical municipal extraction rates in the Subbasin.

The YIHM estimates that an average of approximately 4,100 AFY of groundwater discharged to streams between the 2015 WY and 2018 WY. Similar to historical conditions in the Subbasin, these discharges occurred predominantly in the northern reaches of the Oak Glen Subarea and in the Live Oak Subarea.

2.8.7.2.4 Change in Groundwater Storage

The YIHM estimates that groundwater in storage increased by an average rate of approximately 2,500 AFY from the 2015 WY to 2018 WY (Appendix 2-C, Table 2-C11).

Groundwater in storage increased by a total of approximately 10,000 AF between the 2015 WY and 2018 WY (Appendix 2-C, Table 2-C11). This cumulative increase of groundwater in storage leaves a deficit of approximately 8,300 AF of groundwater in storage compared to water year 1965 conditions.

2.8.7.3 Projected Water Budget

Each GSP is required to included projected water budgets in order to estimate “future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify uncertainties of these projected water budget conditions (22 CCR Section 254.18[c]3).” To assess future conditions, the projected water budgets are required to utilize a 50-year projection horizon that incorporates the most recent land use and population data, projected water demands, and surface water availability. Projected water budgets shall also be used to evaluate the potential impacts of climate change on operations within the Subbasin.

Projected water budgets for the Subbasin were generated using simulation results from the YIHM for three future scenarios: (1) Future Baseline, (2) Future Baseline with Climate Change I, and (3) Future Baseline with Climate Change II. Each scenario incorporated the same groundwater extraction and surface water spreading scenarios and utilized the hydrologic conditions recorded at the NOAA Redlands station from the 1963 WY to 2013 WY. This hydrologic record measured at the NOAA Redlands station was used to simulate projected conditions in the Subbasin from the 2019 WY through the 2069 WY. In the Future Baseline with Climate Change I scenario, the precipitation and temperature data collected at the NOAA Redlands station were adjusted using DWR 2030 Central

Tendency precipitation and evapotranspiration climate change factors. In the Future Baseline with Climate Change II scenario, the precipitation and temperature data collected at the NOAA Redlands station were adjusted using DWR 2070 Central Tendency climate change factors. Under all three scenarios, land use was held constant and equal to land use in the 2014 WY.

During the period from 1962 through 2012, average annual precipitation, daily temperature maximum, and daily temperature minimum values measured at the NOAA Redlands station were 13.13 inches per year, 79°F, and 50°F, respectively. The application of DWR 2030 Central Tendency climate change factors decreased the average annual precipitation to 13.03 inches per year and increased the average daily temperature maximum and minimum to 83°F and 53°F, respectively. The application of DWR 2070 Central Tendency climate change factors decreased average annual precipitation to 12.5 inches per year and increased the average daily temperature maximum and minimum to 87°F and 55°F, respectively.

Groundwater extraction rates and imported surface water supplies available for groundwater recharge were held constant in all three future scenario simulations. Groundwater extraction rates were constrained by the historical estimate of sustainable yield for each management area defined in Section 2.9. Results from the historical model indicate that the sustainable yields for the Calimesa, Western Heights, North Bench, and San Timoteo Management Areas are 4,955 AFY, 1,760 AFY, 3,940 AFY, and 325 AFY, respectively (Appendix 2-C, Table 2-C12). Private wells that were active in the current condition simulation extracted groundwater in the future simulations at their 2014 groundwater extraction rates. Simulated extractions by YVWD, WHWC, South Mesa, and South Mountain were generated using the average water year 2015–2018 groundwater extraction distributions within each Management Area. Private well extractions in the San Timoteo Management Area, as simulated by the YIHM, ceased in water year 2006 (Section 2.9.4, San Timoteo Management Area). Because there are no municipal extractions in this Management Area, groundwater production within the San Timoteo Management Area was not simulated under projected conditions. Therefore, the total projected groundwater extraction rate in the Subbasin was approximately 10,600 AFY, or 400 AFY less than the sustainable yield of the entire Subbasin. In addition to this, surface water diversions along Oak Glen Creek were simulated at a constant rate of approximately 190 AFY through the operation of YVWD Well 25.

Surface water spreading under projected conditions was held constant at the average 2011-2018 spreading rate of approximately 2,100 AFY. Based on data provided by YVWD, approximately 92% of the 2,100 AFY was recharged at the Wilson Creek spreading basins and the remaining 8% was recharged at the Oak Glen Creek spreading basins.

2.8.7.3.1 Future Baseline Scenario

Groundwater Inflows

The YIHM estimates that the Subbasin will receive approximately 41,500 AFY of recharge under Future Baseline conditions (Appendix 2-C, Table 2-C13). Approximately 14,000 AFY, or 34% of the total recharge, occurred in the form of stream leakage, and approximately 13,500 AFY, or 32% of the total recharge, occurred in the form of subsurface inflows from the mountain front and adjacent Subbasins. The YIHM estimates that precipitation within the Subbasin boundaries will provide approximately 7,900 AFY of recharge to the Subbasin.

The estimated average annual recharge to the Subbasin under Future Baseline conditions is approximately 6,600 AFY higher than historical conditions (Appendix 2-C, Table 2-C13). The increase in average annual recharge is due to the increase in return flows, stream leakage, precipitation recharge, and surface water spreading. Under the Future Baseline conditions, return flows are approximately 1,200 AFY higher than the historical average, stream leakage is approximately 2,200 AFY higher than the historical average, precipitation recharge is approximately 1,800 AFY higher than the historical average, and surface water spreading is approximately 1,800 AFY higher than the historical average. Conversely, subsurface inflows provide approximately 300 AFY less than the historical average.

Groundwater Outflows

As previously stated, groundwater extractions under the Future Baseline Scenario were held constant at approximately 10,600 AFY, which is approximately 400 AFY lower than the estimated sustainable yield of the North Bench, Calimesa, and Western Heights Management Areas. These extraction rates are approximately 800 AFY less than the historical average (Appendix 2-C, Table 2-C13).

Groundwater discharges to streams, subsurface discharges to adjacent subbasins, and evapotranspiration from shallow groundwater all occurred at higher rates in the Future Baseline simulation compared to their corresponding historical averages. Under the Future Baseline conditions, the YIHM calculates that approximately 4,800 AFY of groundwater will be consumed by evapotranspiration, approximately 18,600 AFY of groundwater will discharge to adjacent subbasins, consolidated bedrock, or the San Timoteo Badlands, and approximately 6,300 AF of groundwater will discharge to streams annually (Appendix 2-C, Tables 2-C13 and 2-C14). These estimates of evapotranspiration, subsurface discharges, and groundwater discharges to streams are higher than the historical average by approximately 1,400 AFY, 2,400 AFY, and 2,300 AFY, respectively. The increase in evapotranspiration, subsurface discharges, and groundwater discharges to streams is attributable to an increase in groundwater levels compared to historical low conditions across the Subbasin as a result of groundwater extractions that remain at the sustainable yield.

Although groundwater extractions are approximately 800 AFY less than the historical average under the Future Baseline conditions, the YIHM calculates that average annual groundwater discharges from the Subbasin will exceed historical conditions by approximately 5,400 AFY. As noted above, the increased outflows from the Subbasin are driven by subsurface outflows, evapotranspiration, and groundwater discharges to streams.

Changes in Groundwater in Storage

The YIHM simulation results indicate that operation of the Subbasin under the Future Baseline conditions results in an average increase in groundwater in storage of approximately 800 AFY (Appendix 2-C, Tables 2-C13 and 2-C14). Over the 51-year simulation period, this resulted in a net storage increase of approximately 42,300 AF. Combining this with YIHM simulation results for the current and historical conditions suggests that groundwater in storage in the Subbasin will be approximately 34,000 AF higher than the groundwater in storage at the beginning of the 1965 WY (Figure 2-62, Historical, Current, and Projected Storage Change in the Yucaipa Subbasin).

2.8.7.3.2 Future Baseline with Climate Change I

Groundwater Inflows

Under the Future Baseline with Climate Change I scenario, the YIHM estimates that the Yucaipa Subbasin will receive an average of approximately 39,900 AFY of recharge (Appendix 2-C, Table 2-C15). This is approximately 5,000 AFY higher than historical condition in the Basin and approximately 1,600 AFY lower than Future Baseline conditions without climate change (Appendix 2-C, Table 2-C14).

Application of the DWR 2030 Central Tendency climate change factors to the precipitation and temperature data measured at the NOAA Redlands station results in a decrease in average annual precipitation recharge, subsurface inflows, and stream leakage into the Subbasin compared to the Future Baseline scenario without climate change. Under the Future Baseline with Climate Change I conditions, the YIHM predicts that precipitation will provide approximately 7,300 AFY of recharge to the Subbasin, which is approximately 600 AFY less than the historical and Future Baseline average (Appendix 2-C, Table 2-C14). Reduced precipitation in the surrounding mountains, hills, and adjacent Subbasins resulted in an average subsurface inflows to the Subbasin of approximately 13,200 AFY, which is lower than subsurface inflow recharge rates simulated in both the Historical and Future Baseline simulations (Appendix 2-C, Table 2-C14). The YIHM simulation results indicate that operations under the Climate Change I scenario will result in approximately 13,300 AFY of stream leakage recharge to the Subbasin; this is approximately 2,200 AFY higher than the historical average and approximately 800 AFY lower than the Future Baseline estimate of stream leakage.

Groundwater Outflows

Groundwater extractions under the Future Baseline with Climate Change I scenario were held constant at 10,600 AFY (Appendix 2-C, Tables 2-C14 and 2-C15). The pumping distribution across the Subbasin in this scenario is equivalent to the extraction conditions described under Groundwater Outflows in Section 2.8.7.3.1, Future Baseline Scenario.

Simulation results from the YIHM indicate that average annual groundwater outflows from the Subbasin are approximately 1,200 AFY less than Future Baseline conditions (Appendix 2-C, Table 2-C14). The YIHM predicts that the reduction in average annual groundwater outflows from the Subbasin is caused by a decrease in groundwater discharges to streams (Appendix 2-C, Table 2-C14). The reduction in groundwater discharges to streams is driven by lowering of groundwater elevations that result from a reduction in the average annual recharge from stream leakage, precipitation recharge, and subsurface inflows.

Changes in Groundwater in Storage

The YIHM simulation results indicate that reduced recharge under the Future Baseline with Climate Change I scenario results in an average annual increase in groundwater in storage of approximately 450 AFY. This is approximately half the rate of groundwater storage increase predicted by the YIHM under the Future Baseline conditions and results in a cumulative increase of groundwater in storage of approximately 23,300 AF between the 2019 WY and 2069 WY. Under these conditions, the YIHM predicts that groundwater in storage in the Subbasin will be approximately 19,300 AF higher than the volume in storage at the start of the 1965 WY (Figure 2-62).

2.8.7.3.3 Future Baseline with Climate Change II

Groundwater Inflows

Under the Future Baseline with Climate Change II scenario, the YIHM estimates that the Yucaipa Subbasin will receive an average of approximately 37,800 AFY of recharge (Appendix 2-C, Table 2-C16). This is approximately 2,900 AFY higher than historical conditions in the Basin and approximately 3,700 AFY lower than Future Baseline conditions without climate change (Appendix 2-C, Table 2-C14).

Similar to the Future Baseline with Climate Change I scenario, the application of the DWR 2070 Central Tendency climate change factors to the precipitation and temperature data measured at the NOAA Redlands station resulted in a reduction of average annual precipitation recharge, subsurface inflows, and stream leakage into the Subbasin compared to the Future Baseline scenario without climate change. Under the Future Baseline with Climate Change II conditions, the YIHM predicts that precipitation will provide approximately 6,500 AFY of recharge to the Subbasin, which is approximately 500 AFY higher than the historical average and approximately 1,400 AFY lower than the Future Baseline without climate change average (Appendix 2-C, Table 2-C14). Reduced precipitation in the surrounding mountains, hills, and adjacent Subbasins results in an average annual recharge from subsurface inflows to the Subbasin of approximately 12,800 AFY. The historical and Future Baseline estimates of subsurface inflows from the YIHM are approximately 13,800 AFY and 13,500 AFY, respectively. The YIHM simulation results indicate that operations under the Climate Change I scenario will result in approximately 12,300 AFY of stream leakage recharge to the Subbasin; this is approximately 500 AFY higher than the historical average and 1,700 AFY lower than the Future Baseline average.

Groundwater Outflows

Groundwater extractions under the Future Baseline with Climate Change II scenario were held constant at 10,600 AFY (Appendix 2-C, Table 2-C16). The pumping distribution across the Subbasin in this scenario is equivalent to the extraction conditions described in Section 2.8.7.3.1.

Simulation results from the YIHM indicate that average annual groundwater outflows from the Subbasin are approximately 2,800 AFY less than Future Baseline scenario (Appendix 2-C, Table 2-C14). The YIHM predicts that the reduction in average annual groundwater outflows from the Subbasin is largely caused by a decrease in groundwater discharges to streams (Appendix 2-C, Table 2-C14). The reduction in groundwater discharges to streams is driven by reduced groundwater elevations that result from a reduction in the average annual recharge contribution from stream leakage, precipitation recharge, and subsurface inflows described in Section 2.8.2, Inflows to the Groundwater System. In addition to causing a reduction of groundwater discharges to streams, the lowering of groundwater levels under the Future Baseline with Climate Change II scenario causes a reduction of approximately 900 AFY in subsurface outflows.

Changes in Groundwater in Storage

The YIHM simulation results indicate the reduced recharge under the Future Baseline with Climate Change II scenario results in an average annual decline in groundwater in storage of approximately 80 AFY. This results in a cumulative loss of groundwater in storage of approximately 4,200 AF between water years 2019 and 2069. Under these conditions, the YIHM predicts that groundwater in storage in the Subbasin will be approximately 12,600 AF lower than the volume in storage at the start of the 1965 WY (Figure 2-62).

2.8.8 Characterization of Model Sensitivity and Predictive Uncertainty

The YIHM was calibrated using a two-step approach that relied on three different toolsets to generate parameters that characterize watershed processes, groundwater flow, and storage within the surface water domain, soil zone, unsaturated zone, and principal aquifer underlying the Subbasin. The three calibration tools included (1) the use of an Ensemble Smoother, which is a global optimization method that employs Bayes' Theorem to identify parameter values that have the highest likelihood of reproducing measured data; (2) the automated Parameter ESTimation software (PEST), a linear optimization solver that was used to refine estimates generated from the Ensemble Smoother; and (3) manual parameter adjustments. The application of these three approaches is described briefly in this GSP to contextualize the appropriateness of the YIHM for the development of historical, current, and projected water budgets and for assessment of projected conditions in relation to the sustainable management criteria outlined in Chapter 3. Further, the sensitivity analysis and parameter evaluation performed by Cromwell and Alzraiee (2022) during development of the YIHM is briefly discussed here to characterize model uncertainty and uniqueness.

Prior to calibration of the fully coupled GSFLOW model, Cromwell and Alzraiee (2022) calibrated the watershed model employed by the YIHM using manual parameter adjustment. The watershed model was calibrated in two steps; first, the model was calibrated by adjusting parameters in parameter group A (Appendix 2-C, Table 2-C17) to match average monthly measurements of PET and solar radiation collected at four stations monitored as part of the CIMIS. PET and solar radiation parameters were calibrated to measurements collected for the period from 2003 to 2015. Parameters characterizing soil zone storage and conductivity (parameter group B in Appendix 2-C, Table 2-C17) were then manually adjusted following the PET and solar radiation calibration to generate reasonable estimates of precipitation recharge to the watershed.

The second step in the YIHM calibration process involved estimating aquifer and boundary condition properties that control groundwater flow, surface water-groundwater interactions, migration rates through the unsaturated zone, and groundwater storage fluctuations (parameter groups C through H in Appendix 2-C, Table 2-C17) across the Yucaipa watershed. These parameters were estimated down to the grid-cell level using a combination of the Ensemble Smoother and PEST. The initial ensemble estimates of aquifer parameters analyzed with the Ensemble Smoother were conditioned using well-texture data and generated using the Geostatistical Library (GeoLib) software (Deutsch and Journel 1997). These aquifer properties were refined using PEST's pilot point and kriging packages following the initial parameter estimation produced using the Ensemble Smoother. Both PEST and the Ensemble Smoother were used to minimize the weighted error between modeled and measured values of streamflow, groundwater elevations, drawdown, and pumping. Because streamflow measurements collected by SBCFCD are uncertain (e.g., see discussion in Section 2.8.2.4), the YIHM's ability to match measured flows at the five stream gauging stations within the model boundary was down-weighted throughout calibration.

Model-scale calibration residuals and scatter plot maps of model error demonstrate that the YIHM is highly accurate in simulating groundwater conditions in the Subbasin. The normalized root mean square error for the YIHM is 0.85%, which is well below the acceptable normalized root mean square error threshold of 10% (Anderson and Woessner 1992). Further, scatter plot maps of model error show that the YIHM error is relatively randomly distributed across the model domain, indicating that the development and calibration of the YIHM has not resulted in regional, systematic biases in model results. These simulation and calibration results provide confidence in the YIHM's ability to both characterize historical water budgets and project conditions within the Subbasin under various management and climate scenarios.

To further characterize confidence in the YIHM's construction and parameterization, Cromwell and Alzraiee (2022) performed a sensitivity and parameter identifiability analysis of the YIHM following calibration. Parameters included in the sensitivity and identifiability analyses included all parameters within parameter groups C through H shown in Appendix 2-C, Table 2-C17. The parameter sensitivity and identifiability analysis was performed using PEST to identify the sensitivity of the YIHM's predictions of stream flows, groundwater elevations, drawdown, and pumping to each parameter in parameter groups C through H (Appendix 2-C, Table 2-C17). Cromwell and Alzraiee (2022) report 20 parameters to which the YIHM's estimates of stream flow, groundwater elevations, drawdown, and pumping are most sensitive (Appendix 2-C, Table 2-C17). The top 10 of these parameters are composed predominantly of parameters that define streambed conductance along Oak Glen Creek, Wilson Creek, Yucaipa Creek, and smaller tributaries that convey water from the San Bernardino Mountains into the Subbasin. Following the streambed conductance parameters, the YIHM is most sensitive to parameter values that characterize groundwater flow across the Casa Blanca Barrier and the barrier that separates the Wilson Creek Subarea and Gateway Subarea. As an aggregate, these 10 parameters control (1) the volume, rate, and direction of surface water-groundwater interactions across the Subbasin and (2) the flow of groundwater in regions of the Subbasin where surface water-groundwater interactions are largest.

Characterization of parameter uniqueness and uncertainty was performed using PEST's parameter identifiability suite. Parameter identifiability is a metric that describes how well a parameter value is constrained by the set of data used for model calibration and parameter estimation. Results from this analysis indicate that the measured calibration data provide sufficient confidence in the calibrated streambed conductance values along the Oak Glen Creek and Wilson Creek. Streambed conductance values along the Yucaipa Creek and tributaries that drain the San Bernardino Mountains have a lower identifiability, indicating that estimates of surface water-groundwater interactions along these creeks are uncertain. The fault conductance parameters across the South Mesa Barrier and within the Crafton Hills Fault Zone are of similar identifiability as the streambed conductance parameters along the Yucaipa Creek and small tributaries that drain into the Subbasin.

The relatively low identifiability of these parameters compared to the YIHM's sensitivity to each parameter is driven by a correlation between parameters that arises during calibration. To assess the degree of parameter correlation, Cromwell and Alzraiee (2022) used PEST to compute the parameter correlation coefficient matrix for all parameters included in parameter groups C through H (Appendix 2-C, Table 2-C17). Results from the parameter correlation analysis indicate that the streambed conductance values along the Yucaipa Creek, San Gorgonio Creek, and Wallace Creek are strongly correlated to calibrated parameter values for the South Mesa Barrier conductance and calibrated estimates of specific yield across the Subbasin. Because these parameters are strongly correlated and have a lower identifiability than the model's sensitivity to each parameter, these sets of parameters should be interpreted as non-unique and uncertain.

The results from the sensitivity analyses largely identify the need to collect accurate stream flow measurements across the Subbasin. The fact that streambed conductance, specific yield, and fault conductance are strongly correlated indicates that the use of groundwater elevations as the primary calibration metric does not provide sufficient information to decouple the effects of surface water-groundwater interactions and flow across management area boundaries on storage change across the Subbasin. While the approach of down-weighting stream flow measurements during model calibration is appropriate given the quality and uncertainty in the corresponding measurements, additional data collection, incorporation into the model, and refinement of both the watershed and aquifer properties to reproduce stream flows will likely reduce uncertainty in the calibrated parameter estimates and corresponding model predictions.

2.8.8.1 Potential Groundwater Losses Associated with Native Vegetation and Managed Wetlands

As part of the water budget development, each GSP is required to characterize total groundwater outflows for all water use sectors present in the Basin (23 CCR, Section 354.18 [b][3]). Water use sectors include groundwater extraction, groundwater discharge to surface water sources, subsurface groundwater flow, and ET that may include losses from managed wetlands and native vegetation. Groundwater outflows are described in Section 2.8.3.

The water budget analysis for the Yucaipa Subbasin was conducted with the YIHM. One of the groundwater outflows simulated by the YIHM is water usage via ET by vegetation types based on land-use maps. The major outflow component of the YIHM is total ET, which is the sum of ET from the soil, unsaturated and saturated zones, evaporation from impervious surfaces, sublimation from the snowpack, and interception evaporation from the tree canopy and low-lying vegetation (Cromwell and Alzraiee 2022). Evapotranspiration of shallow groundwater by native vegetation may contribute to the total ET. The losses by native vegetation are not explicitly modeled by the YIHM but were implicitly accounted for during model development and calibration. Annual ET losses were highest along San Timoteo Creek, Wilson Creek, and Oak Glen Creek where GDEs were identified, and lowest in the Calimesa, Gateway, Wilson Creek, Crafton, and Western Heights subareas (the majority area of the Plan Area) where no confirmed GDEs were identified. In these areas the depths to water exceeded the rooting zones of the natural vegetation communities identified by the NCCAG (Section 2.7.8). There are no managed wetlands in the Plan Area.

2.9 Management Areas

SGMA allows GSAs to define management areas within a Plan Area "if the Agency [GSA] has determined that creation of management areas will facilitate implementation of the Plan [GSP]" (Section 354.20, CCR Title 23). In order to sustainably manage the groundwater resources of the Yucaipa Subbasin, the Subbasin was divided into four management areas (Figure 2-63, Geologic Map and Management Area Boundaries in the Yucaipa Subbasin). The boundaries of the management areas were based on the geologic structures (i.e., faults, hydraulic barriers) that influence groundwater flow and defined the hydrogeologic subareas in the Subbasin (Section 2.5.1), the distribution of water supply wells by the different water purveyors, and the identification and location of GDEs in the Subbasin. The geologic structures, or faults and hydraulic barriers, that influence groundwater flow across them (e.g., Chicken Hill Fault and South Mesa Barrier) are effective boundaries to establish management areas as groundwater production on one side of the structure will not significantly affect groundwater levels at wells located on the other side. Each management area will be assigned different minimum thresholds and measurable objectives that will define sustainability within their individual boundaries.

The following management areas, listed in order from the highest to lowest along the hydraulic gradient in the Subbasin, are based on the geologic structures that defined the hydrogeologic subareas in the Subbasin, the distribution of public water supply wells, and presence of GDEs:

1. North Bench Management Area
2. Calimesa Management Area
3. Western Heights Management Area
4. San Timoteo Management Area

The boundaries of the management areas in relation to the boundary of the Subbasin, the boundaries of the hydrogeologic subareas in the Subbasin, and the boundaries of the Groundwater Management Zones in the vicinity of the Subbasin are depicted on Figure 2-64. Groundwater Management Areas, Subareas, and Groundwater Management Zones in the Yucaipa Subbasin.

2.9.1 North Bench Management Area

The North Bench Management Area includes the subareas located north of the South Mesa Barrier: Crafton, Wilson Creek, Gateway, Oak Glen and Triple Falls Creek (Section 2.5.1; Figure 2-63). YVWD is the only public water purveyor that owns and operates municipal water supply wells in this management area. YVWD also produces groundwater under the direct influence of surface water from Oak Glen Creek and diverts surplus SWP water to the Wilson Creek and Oak Glen Creek spreading basins within this management area.

The downward displacement of the South Mesa Barrier likely affects groundwater flow (Cromwell et al. 2022). The South Mesa Barrier's influence on flow is evidenced by groundwater levels measured at YVWD-06 (approximately 1,300 feet north of the South Mesa Barrier) and the USGS 6th Street and E nested monitoring well cluster (approximately 1,200 feet south of the South Mesa Barrier). Water levels measured between 2005 and 2010 at YVWD-06 and the shallowest monitoring well in the USGS 6th Street and E cluster indicate that groundwater elevations north of the South Mesa Barrier are approximately 150 feet higher than elevations south of the Barrier (Figure 2-65, Groundwater Elevations across the South Mesa Barrier). This offset in static water levels indicates that the South Mesa Barrier influences flow within the Subbasin.

Simulation results from the YIHM indicate that recharge to the North Bench Management Area was an average 15,230 AFY (Appendix 2-C, Table 2-C22). The largest and most consistent sources of recharge to the North Bench Management Area are mountain front recharge and subsurface interactions with the San Bernardino Subbasin and San Timoteo Subbasin. Combined, these sources of recharge historically provided an average 6,174 AFY. Precipitation recharge fluctuates, on average, between 931 AFY to 7,853 AFY depending on the water year type. Critically dry water year types provided an average 931 AFY of precipitation recharge, whereas wet water year types provided an average 7,853 AFY. These sources of recharge are supplemented by surface water spreading at the Wilson Creek and Oak Glen Creek spreading basins (Appendix 2-C, Table 2C-19).

The average annual outflow from the North Bench Management Area is 14,739 AFY (Appendix 2-C, Table 2C-19). Groundwater in the North Bench Management Area is a source of groundwater recharge as subsurface flow to the Western Heights and Calimesa Management Areas (Appendix 2-C, Table 2-C22). Between the 1965 WY and 2014 WY, approximately 2,586 AFY and 286 AFY of groundwater flowed out of the North Bench Management Area to the Calimesa and Western Heights Management Areas, respectively. These underflows, on average, accounted for 35% of the total annual inflows to the Calimesa Management Area and 15% of the total annual inflows to the Western Heights Management Area (Appendix 2-C, Table 2-C22).

Between 1965 and 2014, groundwater was extracted from the North Bench Management Area at an average rate of 3,444 AFY (Appendix 2-C, Table 2-C22). **The estimated sustainable yield for the North Bench Management Area is 3,940 AFY** (subtracting the difference of 14,737 – 3,444 AFY from the average annual inflow of 15,231 AFY and accounting for surface water diversions). The average annual extraction rate of 3,444 AFY is approximately 490 AFY lower than the estimated sustainable yield for the Management Area, which resulted in an average annual increase in groundwater in storage of approximately 490 AFY (Appendix 2-C, Table 2C-19).

The water balance for the North Bench Management Area is greatly influenced by climate because of its higher elevation and being adjacent to the San Bernardino Mountains, the Crafton Hills and the Yucaipa Hills. This management area receives more rainfall and, therefore, runoff from the adjacent mountains and hills that include the headwaters for Wilson Creek and Oak Glen Creek. The influence of climate on groundwater levels and the volume in storage in this management area are evident in Figures 2-66 and 2-67, respectively. Figure 2-66 shows groundwater elevations observed since 1945, which experienced increasing trends during wet periods (e.g., 1978–1983, 1993–1998) and decreasing trends during droughts (e.g., 1984–1990, 1999–2004). The historical low in groundwater elevations was observed at the end of the 2007 WY (Figure 2-66). The historical high in groundwater elevation was observed either in 1985 or currently in 2018 (Figure 2-66). The simulated annual change in storage indicated a historical low in storage in 1965 at 220,000 AF; the historical high in storage was at approximately 257,000 AF at the end of the 1998 WY (Figure 2-67).

The North Bench Management Area contains two distinct groundwater dependent ecosystems that rely on shallow groundwater to maintain habitat health. These communities are located in the northern and southern reaches of the Oak Glen subarea, along Oak Glen Creek and along Yucaipa Creek near Wildwood Canyon. Historical operations in the North Bench Management Area did not impact the health of these communities (see Section 2.7.8).

Groundwater sustainability in the North Bench Management Area will be achieved by avoiding significant and unreasonable impacts to four sustainability criteria:

- Chronic declines in groundwater elevations
- Reduction of groundwater in storage
- Depletion of interconnected surface water-groundwater that sustains GDEs
- Potential land subsidence should groundwater levels fall below the historical low

Historical and projected water budgets and impacts to these sustainability indicators will be described in Chapter 3 of this GSP.

2.9.2 Calimesa Management Area

The Calimesa Management Area includes the Calimesa subarea, the Singleton subarea, and the northeastern portion of the Live Oak subarea (Section 2.5.1; Figure 2-63). The management area is structurally bound by geologic flow barriers to the west and north, and by the Yucaipa Hills on the east. The southwestern boundary of the Calimesa Management Area is defined by an extension of the San Gorgonio Fault Splay to the Banning Fault. YVWD, South Mesa, and South Mountain actively extract groundwater from the Calimesa Management Area to supplement municipal supplies in their respective service areas. Yucaipa Creek conveys surface water.

The Calimesa Management Area is bordered to the north and west by the South Mesa Barrier and Chicken Hill Fault, which both influence groundwater flow within the Subbasin. The Banning Fault runs through the southern section of the Calimesa Management Area and separates the Calimesa subarea from the Singleton and Live Oak subareas. The western portion of the Banning Fault predates deposition of the Live Oak formation and only affects the underlying crystalline bedrock (Cromwell et al. 2022).

Static groundwater levels measured across the Banning Fault within the Calimesa Management Area indicate that the fault does not act as a barrier to groundwater flow. Static groundwater levels are actively measured at South Mesa-05 (1,400 feet south of the Banning Fault), South Mesa-07 (100 feet south of the Banning Fault), South Mesa-09 (1,000 feet north of the Banning Fault), and South Mesa-16 (700 feet north of the Banning Fault). Water level measurements collected at these four wells between 1990 and 2018 show that groundwater elevations differ by approximately 40 feet across the Banning Fault (Figure 2-68, Groundwater Elevations across the Banning Fault in the Calimesa Management Area). These declines are likely attributable to the natural hydraulic gradient within the principal aquifer. Because the Banning Fault does not affect groundwater flow within the Subbasin, the southern boundary of the Calimesa Management Area was extended south to the boundary between the Yucaipa Subbasin and San Timoteo Subbasin.

Simulation results from the YIHM indicate that the average annual recharge to the Calimesa Management Area is 7,481 AFY (Appendix 2-C, Table 2-C20). The largest sources of recharge to the Calimesa Management Area are subsurface inflows from the North Bench Management area and the adjudicated Beaumont basin, precipitation recharge, and return flows (Appendix 2-C, Tables 2-C20, 2-C22). Results from the YIHM indicate that subsurface inflows from the North Bench Management Area and the adjudicated Beaumont basin are not correlated with water year type, while average annual precipitation recharge varies from approximately 1,100 AFY during critically dry water years to approximately 2,800 AFY during wet water years (Appendix 2-C, Table 2-C20).

Simulation results from the YIHM indicate that the average annual outflow from the Calimesa Management Area is 7,802 AFY (Appendix 2-C, Table 2-C20). Outside of groundwater extractions, subsurface outflows are the largest component of outflow from the Calimesa Management Area. Most of the subsurface outflow is to the Western Heights Management Area, the adjudicated Beaumont basin, and the San Timoteo Management Area (Appendix 2-C, Tables 2-C20 and 2-C22). Between 1965 and 2014, groundwater was extracted from the Calimesa Management Area at an average rate of approximately 5,280 AFY (Appendix 2-C, Table 2-C22). **The estimated sustainable yield for the Calimesa Management Area is 4,955 AFY** (subtracting the difference of 7,802 – 5,276 AFY from the average annual inflow of 7,481 AFY). The average annual extraction rate of 5,276 AFY is approximately 320 AFY higher than the estimated sustainable yield for the Management Area, which resulted in an average annual decrease in groundwater in storage of approximately 320 AFY (Appendix 2-C, Table 2-C20).

The water balance for the Calimesa Management Area is not as influenced by climate as the North Bench Management Area. Figure 2-69, Historical Groundwater Elevations in the Calimesa Management Area, shows groundwater elevations observed since 1965. The management area experienced an increasing trend in groundwater levels during the wet period from 1978 to 1983, but then experienced a declining trend from 1987 to 2008. The declining trend in groundwater levels occurred during the wet period from 1993 to 1998 because groundwater extractions exceeded the estimated sustainable yield. The historical low in groundwater elevation was observed at the end of the 2008 WY at approximately 2,000 to 2,050 feet above NAVD88 (Figure 2-69). The historical high in groundwater elevation was observed at the end of the 2007 WY at approximately 2,200 feet above NAVD88 (Figure 2-69). The simulated annual change in storage indicated a historical low in storage in the 2015 WY at 798,800 AF; the historical high in storage was at approximately 850,000 AF at the end of the 1989 WY (Figure 2-70, Historical and Current Volume of Groundwater in Storage in the Calimesa Management Area).

The Calimesa Management Area contains one potential GDE that is located more than 0.5 miles away from active groundwater production wells (Figure 2-57). Because this habitat is not proximal to groundwater extractions within the Management Area, it is not anticipated that future production within the Calimesa Management Area will impact habitat health at this mapped environment. Accordingly, sustainability within the Calimesa Management Area will be assessed by avoiding significant and unreasonable chronic declines in groundwater elevations and reduction of groundwater in storage. Historical and projected water budgets and impacts to these sustainability indicators will be described in Chapter 3 of this GSP.

2.9.3 Western Heights Management Area

The Western Heights Management Area is the Western Heights Subarea (Section 2.5.1.7). The boundary for this management area includes the South Mesa Barrier to the north, the Chicken Hill Fault to the east, the Banning Fault to the south, and the Crafton Hills to the west (Figure 2-63). WHWC is the only water purveyor with municipal water supply wells operating in the management area. No active private wells have been identified in this management area.

The Chicken Hill Fault has a significant influence on groundwater flow across it. Groundwater elevations measured at wells WHWC-11 and WHWC-12, which are located in the Western Heights subarea and approximately 2,500 feet and 4,000 feet, respectively, west of the Chicken Hill Fault, had static groundwater levels consistently measured at 300 to 350 feet lower than static groundwater elevations measured at well YVWD-49 and the South Mountain Chicken Hill and Hog Canyon 2 wells (Figure 2-15). Groundwater Elevation contour maps indicate a steep hydraulic head difference across the Chicken Hill Fault, with a hydraulic depression centered at wells WHWC-02A, WHWC-11, WHWC-12, and WHWC-14 (Figure 2-33). There appears to be no hydraulic influence on groundwater elevations in the Calimesa subarea east of the Chicken Hill Fault.

Simulation results from the YIHM indicate that the Western Heights Management Area receives little recharge from sources of water derived outside of the Subbasin (Appendix 2-C, Table 2-C18). Throughout the 1965–2014 historical period, the YIHM indicates that the Western Heights Management Area was recharged at an average rate of 2,011 AFY. The major component of recharge was subsurface inflow from the Calimesa, North Bench and San Timoteo Management Areas. Recharge from direct precipitation ranged from 183 AFY in normal water year types to 602 AFY in wet water year types (Appendix 2-C, Table 2-C22).

The average annual outflow, which included subsurface flows to the adjacent Calimesa Management Area and the San Timoteo Management Area, was 2,691 AFY (Appendix 2-C, Table 2-C18). The average annual groundwater extraction from the Western Heights Management Area was 2,443 AFY (Appendix 2-C, Table 2-C22). **The estimated sustainable yield for the Western Heights Management Area is 1,760 AFY** (subtracting the difference of 2,691 – 2,443 AFY from the average annual inflow of 2,011 AFY).

Between 1965 and 2014, pumping by private extractors and WHWC municipal water supply wells exceeded the estimated sustainable yield of 1,760 AFY for the Western Heights subarea (Appendix 2-C, Table 2-C18). Consequently, groundwater elevations in the subarea steadily declined by approximately 150 feet in that period (Figure 2-71, Historical Groundwater Elevations in the Western Heights Management Area). Groundwater production in the subarea declined to or below the estimated sustainable yield beginning in 2015 (Appendix 2-C, Table 2-C18), which ended the declining trend in groundwater levels. The historical low in groundwater elevation was observed at approximately 1,749 feet above NAVD88 in 2015 (Figure 2-71). The volume in storage as simulated by the YIHM declined from approximately 441,360 AF in the 1965 WY to approximately 408,800 AF in the 2015 WY, which is the historical low in groundwater in storage (Figure 2-72, Historical and Current Volume of Groundwater in Storage in the Western Heights Management Area). The volume in storage has recovered to approximately 409,300 AF in the 2018 WY.

The Western Heights Management Area does not contain shallow groundwater connected to the principal aquifer that supports overlying habitats. Because of this, sustainability within the Western Heights Management Area will be characterized by assessing operation strategies that avoid significant and unreasonable chronic lowering of groundwater levels, reduction of groundwater in storage and the potential for land subsidence should groundwater levels fall below the historical low.

2.9.4 San Timoteo Management Area

The San Timoteo Management Area is defined by the portion of the Live Oak subarea that extends south from the Western Heights and Calimesa Management Areas (Figure 2-63). The management area is structurally bound to the north by the Banning Fault. The degree to which the Banning Fault affects flow in this region of the Subbasin is not well-constrained by measured groundwater levels. The remaining boundary of the San Timoteo Management Area is the boundary of the Yucaipa Subbasin. Municipal water suppliers do not own or operate groundwater production wells within this management area.

Groundwater levels are actively measured within the management area along San Timoteo Creek (Figure 2-73, Groundwater Elevations Measured in the San Timoteo Management Area). Recent water level measurements from these wells indicate that groundwater conditions are locally artesian. Shallow groundwater conditions along San Timoteo Creek also support a community of Willow and Freemont Cotton that rely on shallow groundwater as a source of water supply. These communities compose the largest network of groundwater dependent ecosystems within the Subbasin. The YIHM estimates that groundwater evapotranspiration from these habitats averages approximately 1,450 AFY (Appendix 2-C, Table 2-C21). Evapotranspiration losses along the San Timoteo Creek corridor are largest during critically dry water years; under these conditions, the YIHM estimates that the local groundwater dependent ecosystems consume approximately 1,800 AFY of shallow groundwater. During wet water years, the YIHM estimates that evapotranspiration results in the loss of approximately 1,300 AF of groundwater annually (Appendix 2-C, Table 2-C21).

Throughout the 1965-2014 historical period, the YIHM indicates that the San Timoteo Management Area was recharged at an average rate of 14,895 AFY. The major components of recharge included stream leakage and subsurface inflow from the San Timoteo subbasin (Appendix 2-C, Table 2-C21). Recharge from direct precipitation ranged from 213 AFY in normal water year types to 923 AFY in wet water year types. The average annual outflow from this management area is 14,753 AFY. In addition to ET, the other largest components of outflow include subsurface outflows to the San Timoteo subbasin and the San Bernardino Basin Area (Appendix 2-C, Table 2-C21). The YIHM indicates that an average of approximately 9,000 AFY leaves the Subbasin to the San Timoteo subbasin and approximately 3,500 AF to the San Bernardino Basin Area. The average annual groundwater extraction from the San Timoteo Management Area was 183 AFY (Appendix 2-C, Table 2-C21). **The estimated sustainable yield for the San Timoteo Management Area is 325 AFY** (subtracting the difference of 14,753 – 183 AFY from the average annual inflow of 14,895 AFY). The YIHM indicates that the historical low in the volume in storage in the San Timoteo Management Area was approximately 879,000 AF in the 1966 WY, and the historical high was approximately 889,000 AF in the 1998 WY (Figure 2-74, Historical and Current Volume of Groundwater in Storage in the San Timoteo Management Area).

Groundwater production estimates produced by the YIHM indicate that production within the management area ceased in the 2007 WY. However, there are private well owners that produce groundwater for agricultural or domestic purposes. The Yucaipa GSA will make efforts to contact the private well owners to obtain information on their wells, including construction details, production history and current production, and groundwater level and quality information if made available to ascertain their influences on groundwater conditions in the Subbasin. Because groundwater is not actively produced for municipal water supply from this management area, sustainability at this time will largely be guided by avoiding undesirable results associated with a depletion of interconnected surface water-groundwater systems that sustain GDEs along San Timoteo Creek. The degree to which production in upgradient management areas impact GDE health within the San Timoteo Management Area will be described in Chapter 3 of this GSP.

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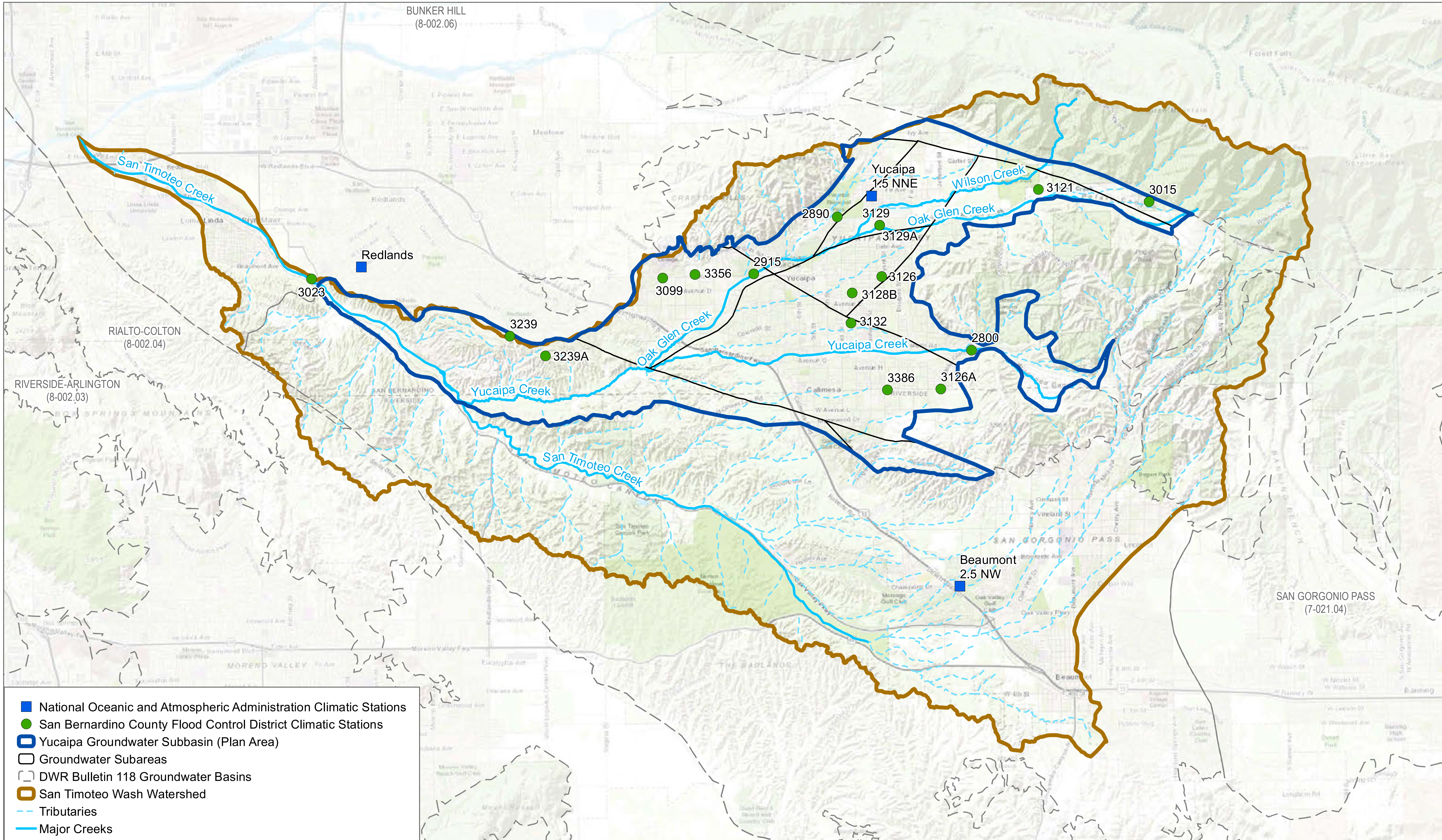

SOURCE: ESRI, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordanance Survey, ESRI Japan, METI, ESRI China (Hong Kong), swisstopo, OpenStreetMap contributors, and the GIS User Community; DWR 2015; USGS NHD 2017; Geoscience 2017

DUDEK 0 0.5 1 Miles

FIGURE 2-1

Climate Station Locations in the San Timoteo Wash Watershed

Groundwater Sustainability Plan for the Yucaipa Valley Subbasin

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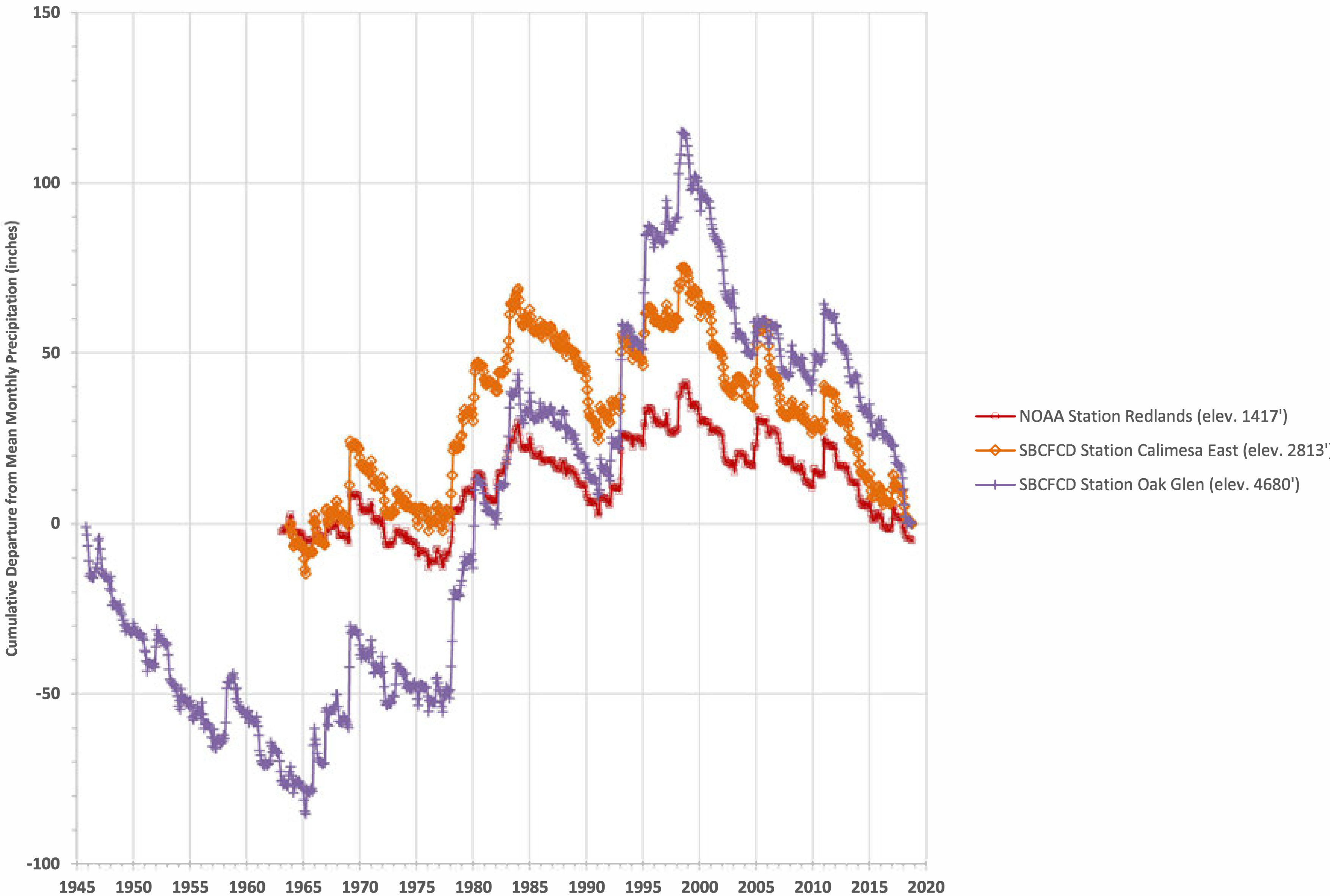
Figure 2-2. Cumulative Departure from Mean Monthly Precipitation at the SBCFCD Oak Glen and Calimesa East Climatic Stations and the NOAA Redlands Climatic Station



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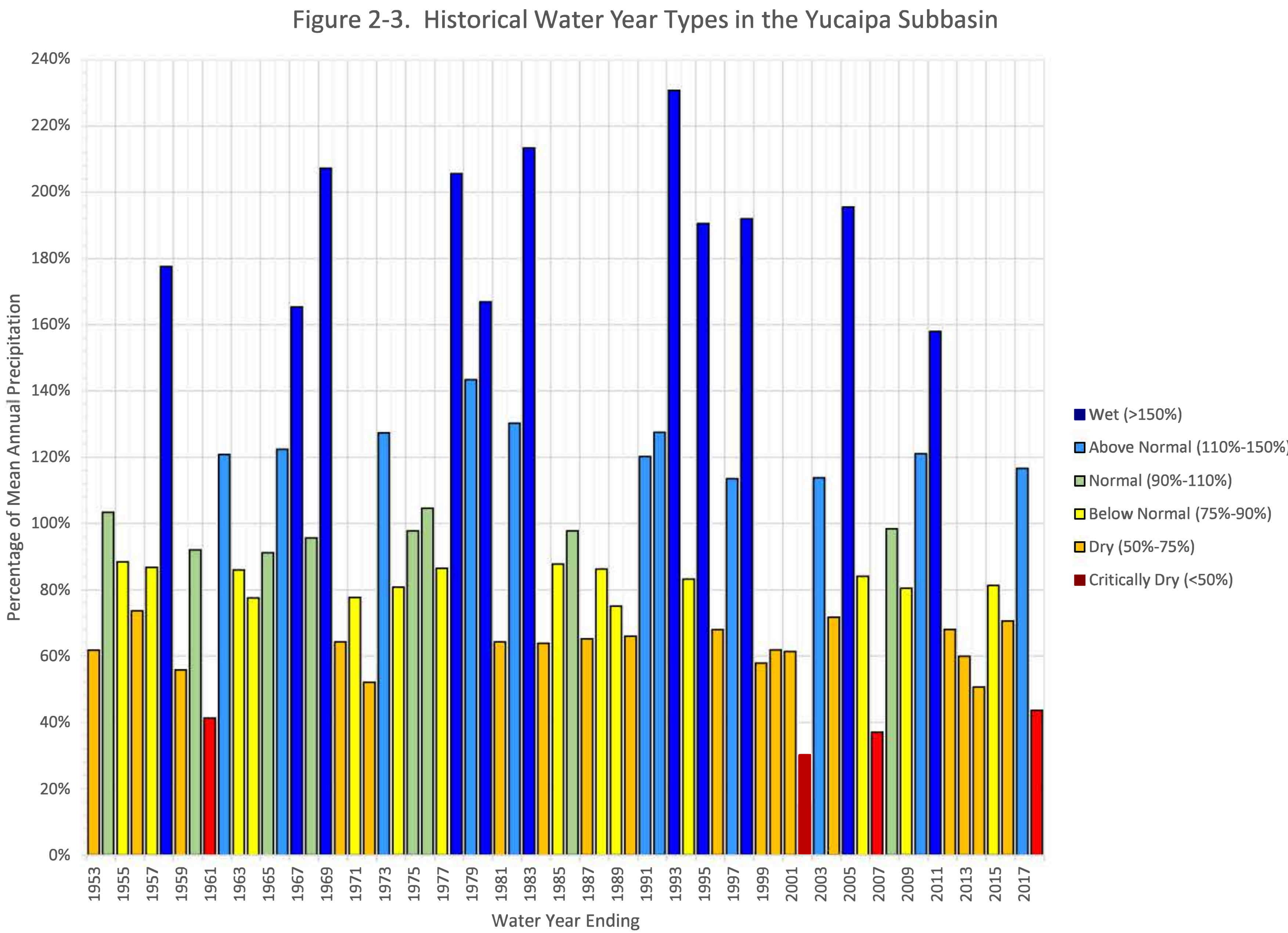
Figure 2-3. Historical Water Year Types in the Yucaipa Subbasin
240%
220%
200%
180%
160%
140%
120%
100%
80%
60%
40%
20%
0%
Percentage of Mean Annual Precipitation
1953
1955
1957
1959
1961
1963
1965
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
Water Year Ending
Wet (>150%)
Above Normal (110%-150%)
Normal (90%-110%)
Below Normal (75%-90%)
Dry (50%-75%)
Critically Dry (<50%)

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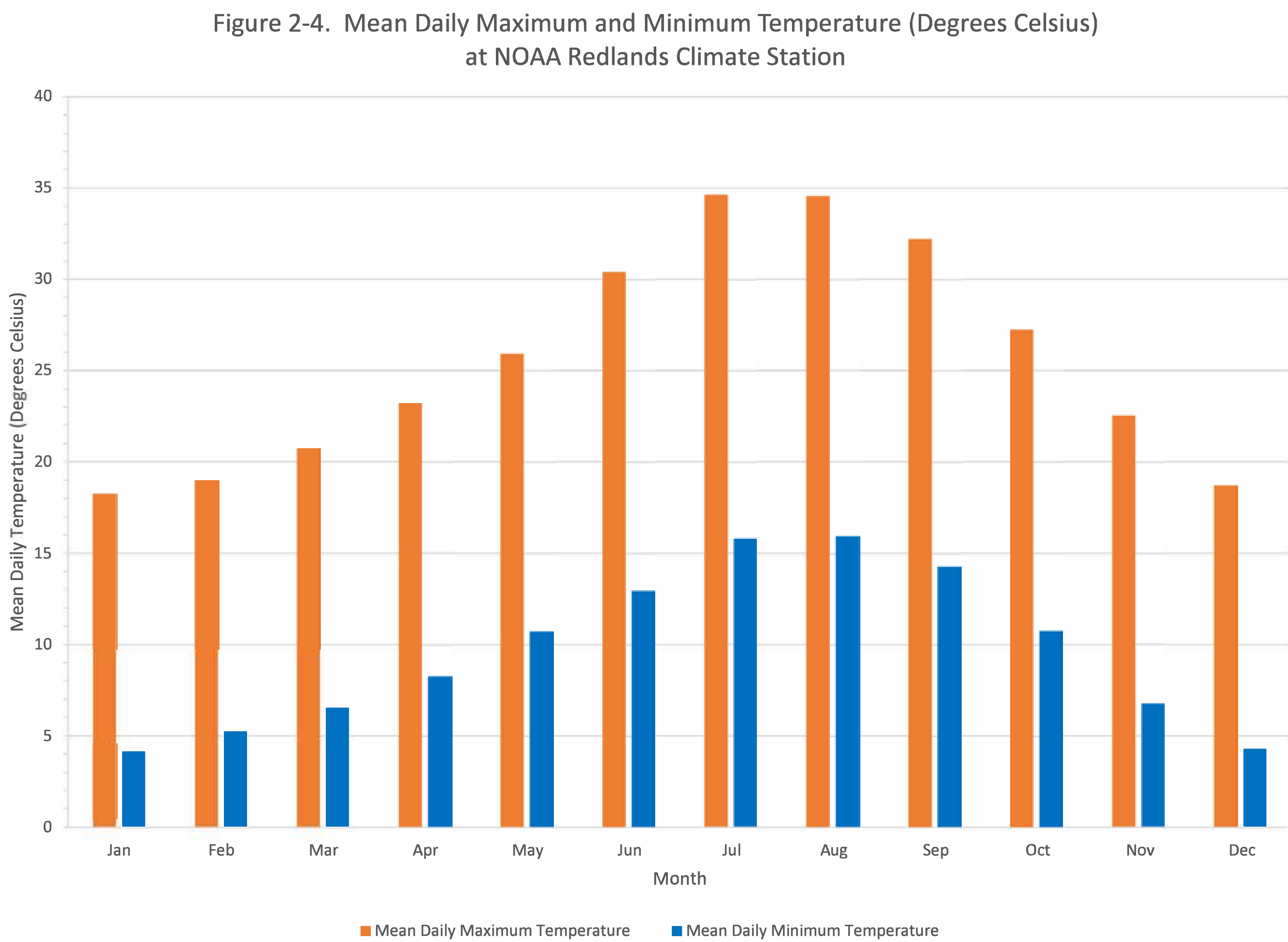
Figure 2-4. Mean Daily Maximum and Minimum Temperature (Degrees Celsius)
at NOAA Redlands Climate Station
Mean Daily Temperature (Degrees Celsius)
0
5
10
15
20
25
30
35
40
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
Mean Daily Maximum Temperature
Mean Daily Minimum Temperature

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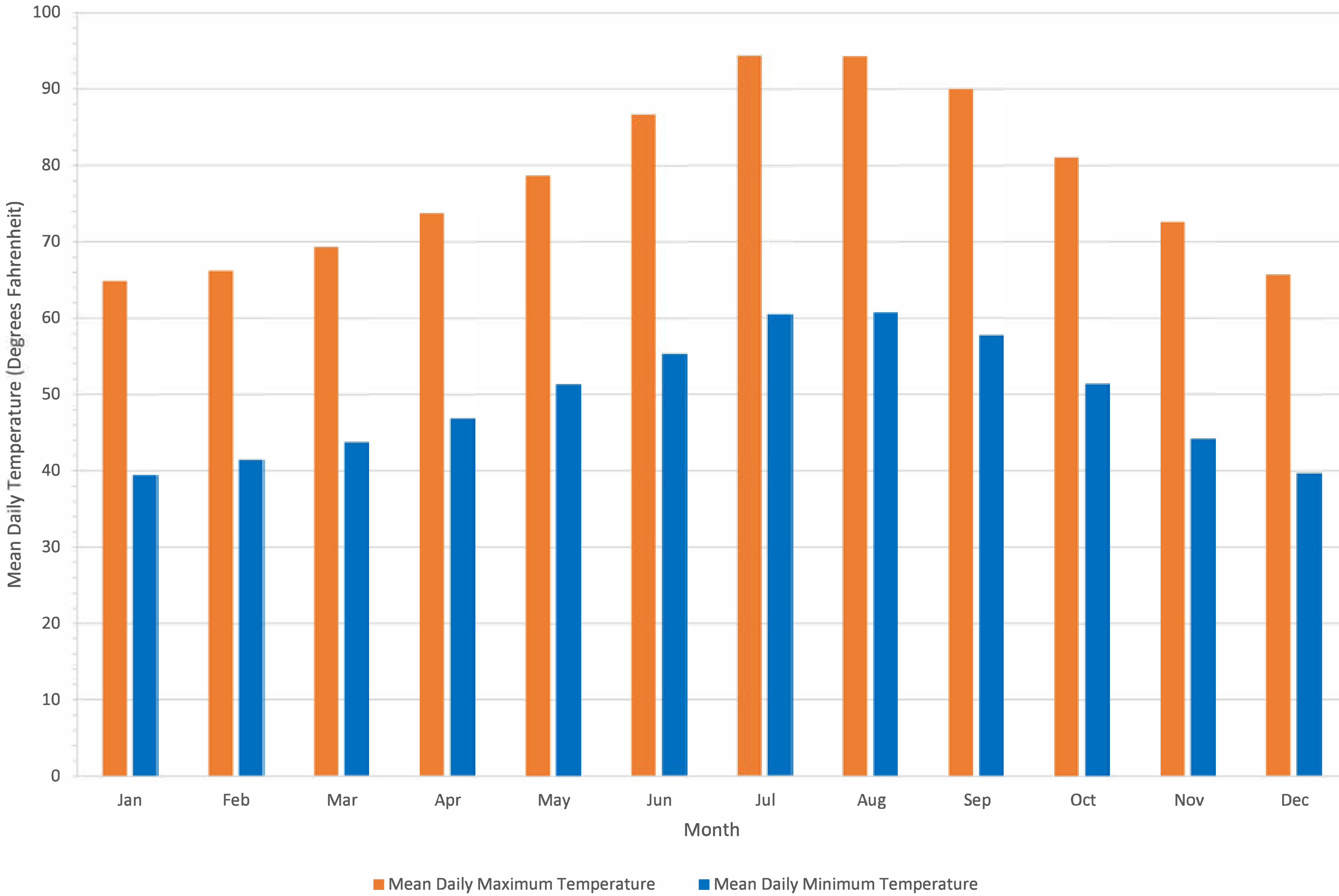
Figure 2-5. Mean Daily Maximum and Minimum Temperature (Degrees Fahrenheit) at NOAA Redlands Climate Station



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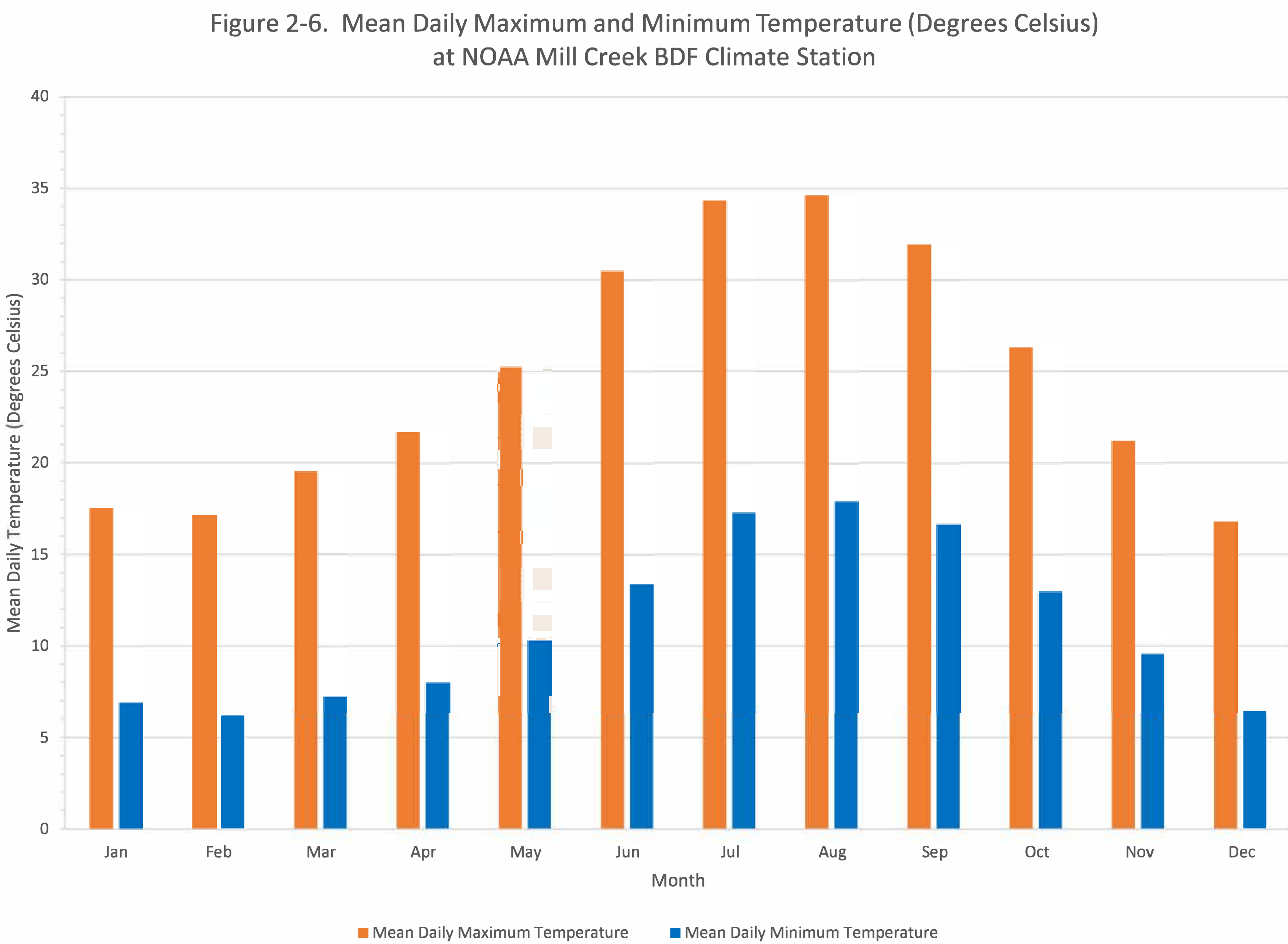
Figure 2-6. Mean Daily Maximum and Minimum Temperature (Degrees Celsius)
at NOAA Mill Creek BDF Climate Station
Mean Daily Temperature (Degrees Celsius)
40
35
30
25
20
15
10
5
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
Mean Daily Maximum Temperature
Mean Daily Minimum Temperature

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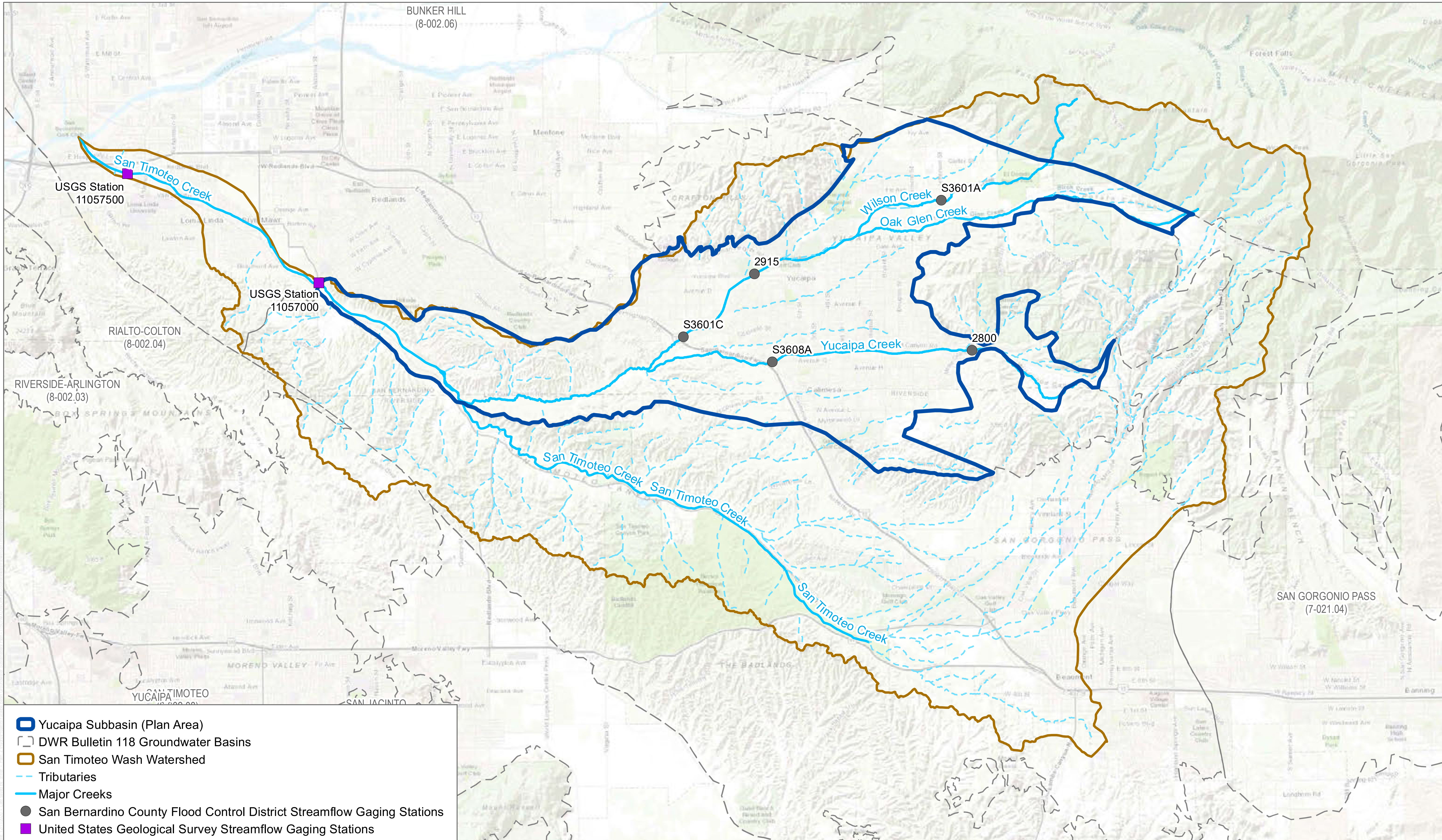

SOURCE: DWR; USGS; San Bernardino County Flood Control District

DUDEK

0 0.5 1 Miles

FIGURE 2-7

Surface Water Flow in San Timoteo Wash Watershed

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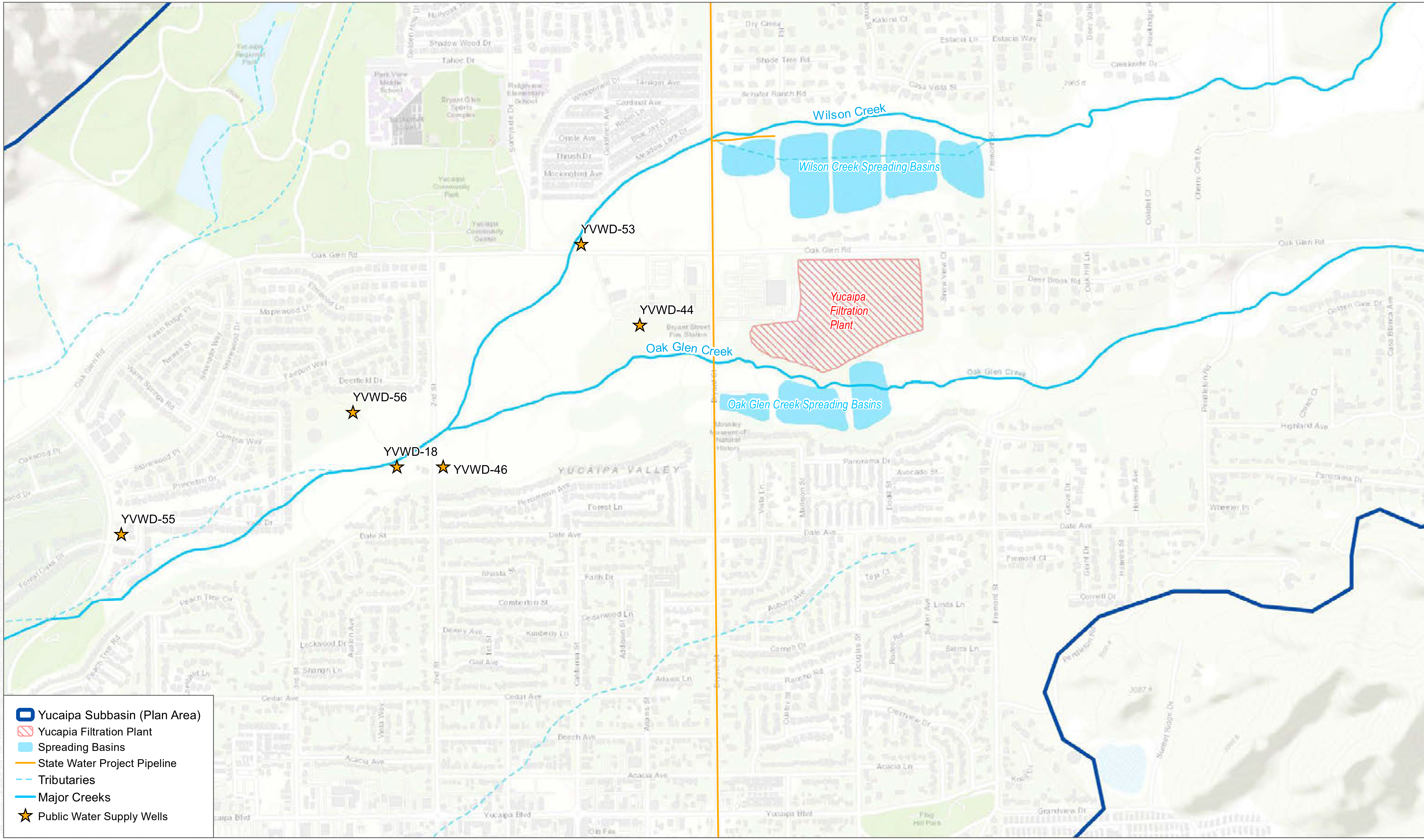

SOURCE: DWR

DUDEK 0 500 1,000 Feet

FIGURE 2-8

Locations of the Wilson Creek and Oak Glen Creek Spreading Basins in the Yucaipa Subbasin

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Figure 2-9. Cumulative Stream Flow at
SBCFCD Stations 2915 and S3601C on Oak Glen Creek

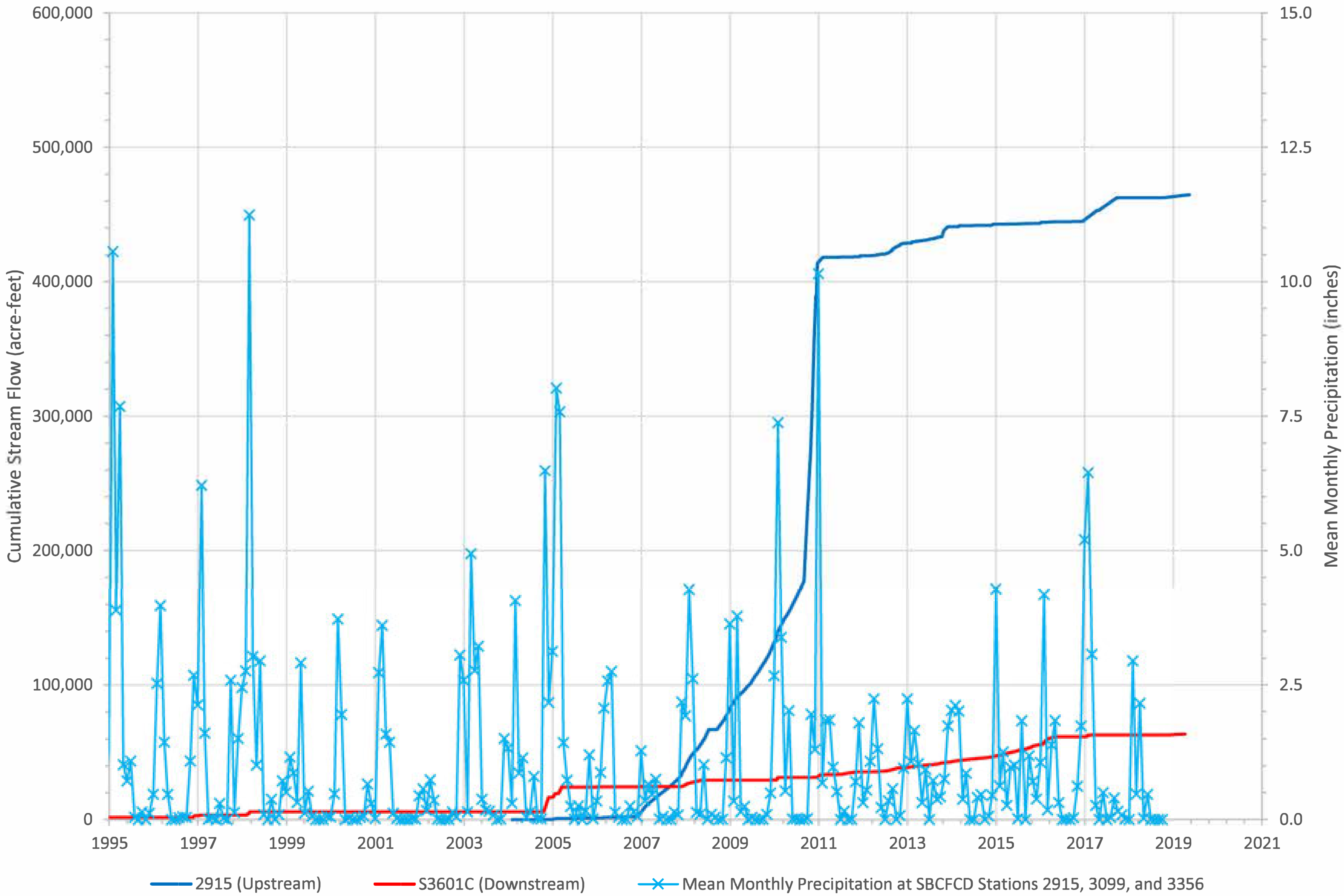

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Figure 2-10. Cumulative Stream Flow at
SBCFCD Stations 2800 and S3608A on Yucaipa Creek

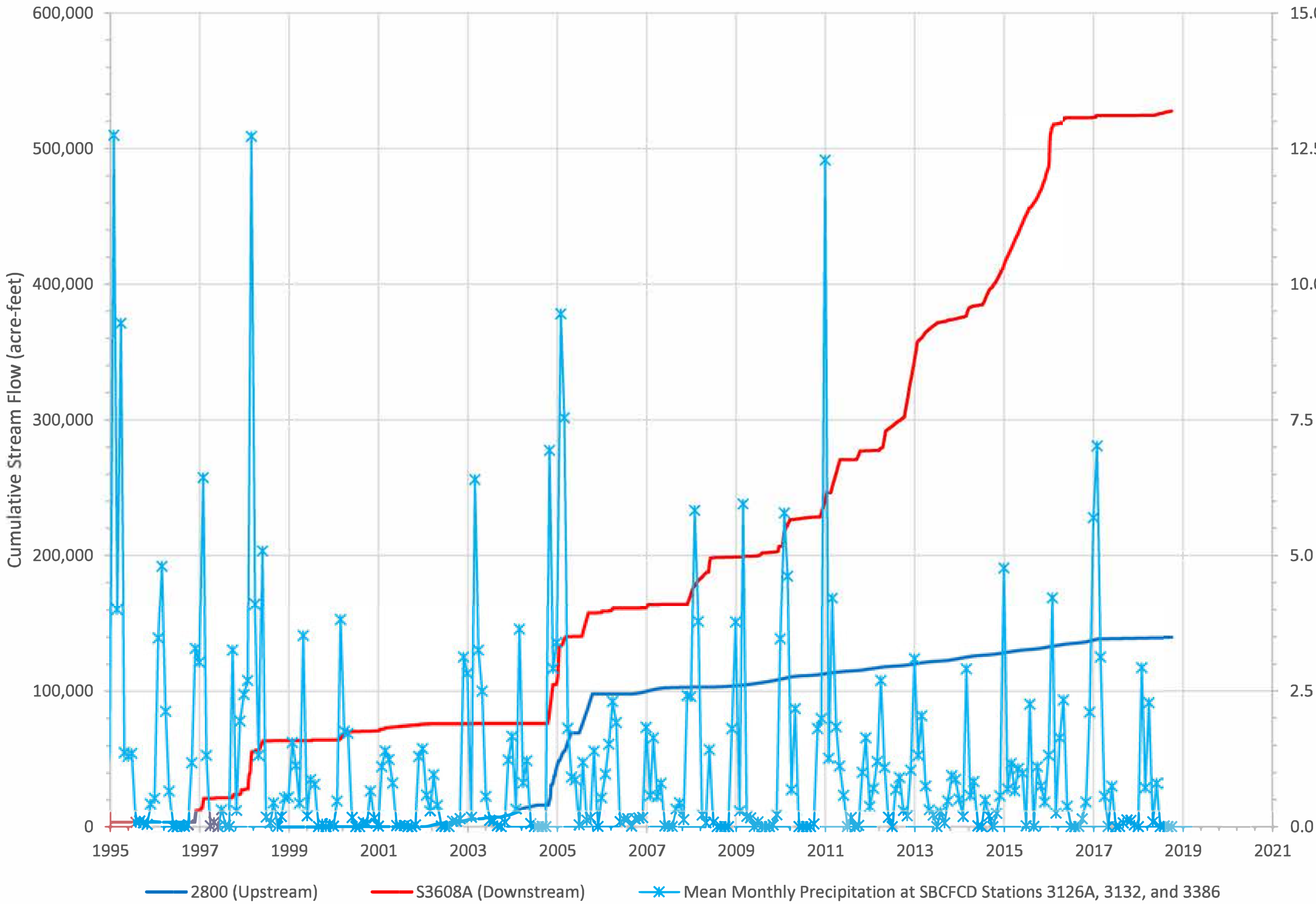

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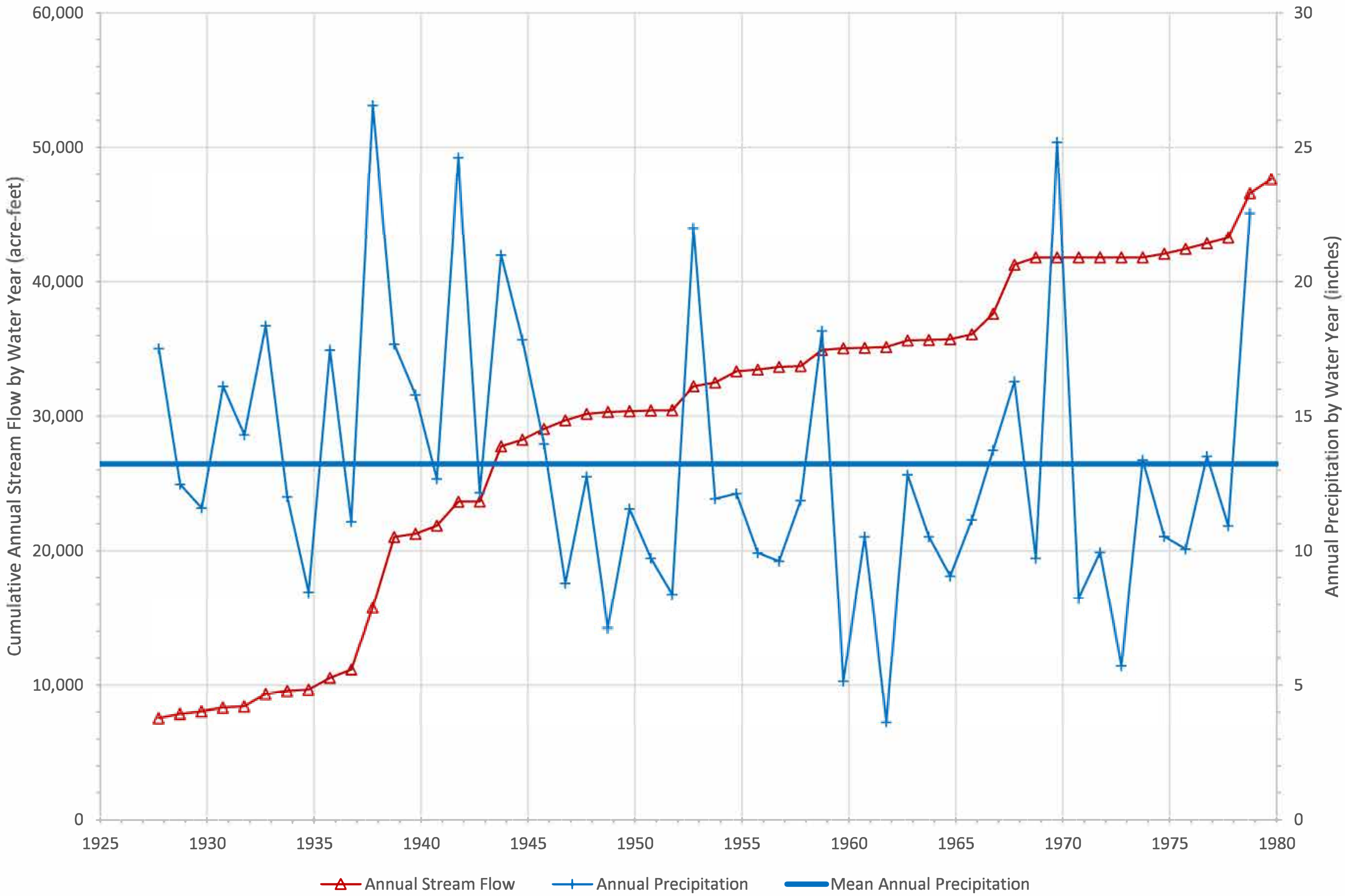
Figure 2-11. Stream Flow Measured at USGS Station 11057000 and Precipitation at NOAA Redlands



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Yucaipa Groundwater Subbasin
Groundwater Subareas

Geologic Units (CGS 2012)

Quaternary

- Qa, Young
- Qsdloc, Sedimentary Deposits of Live Oak Formation

Tertiary

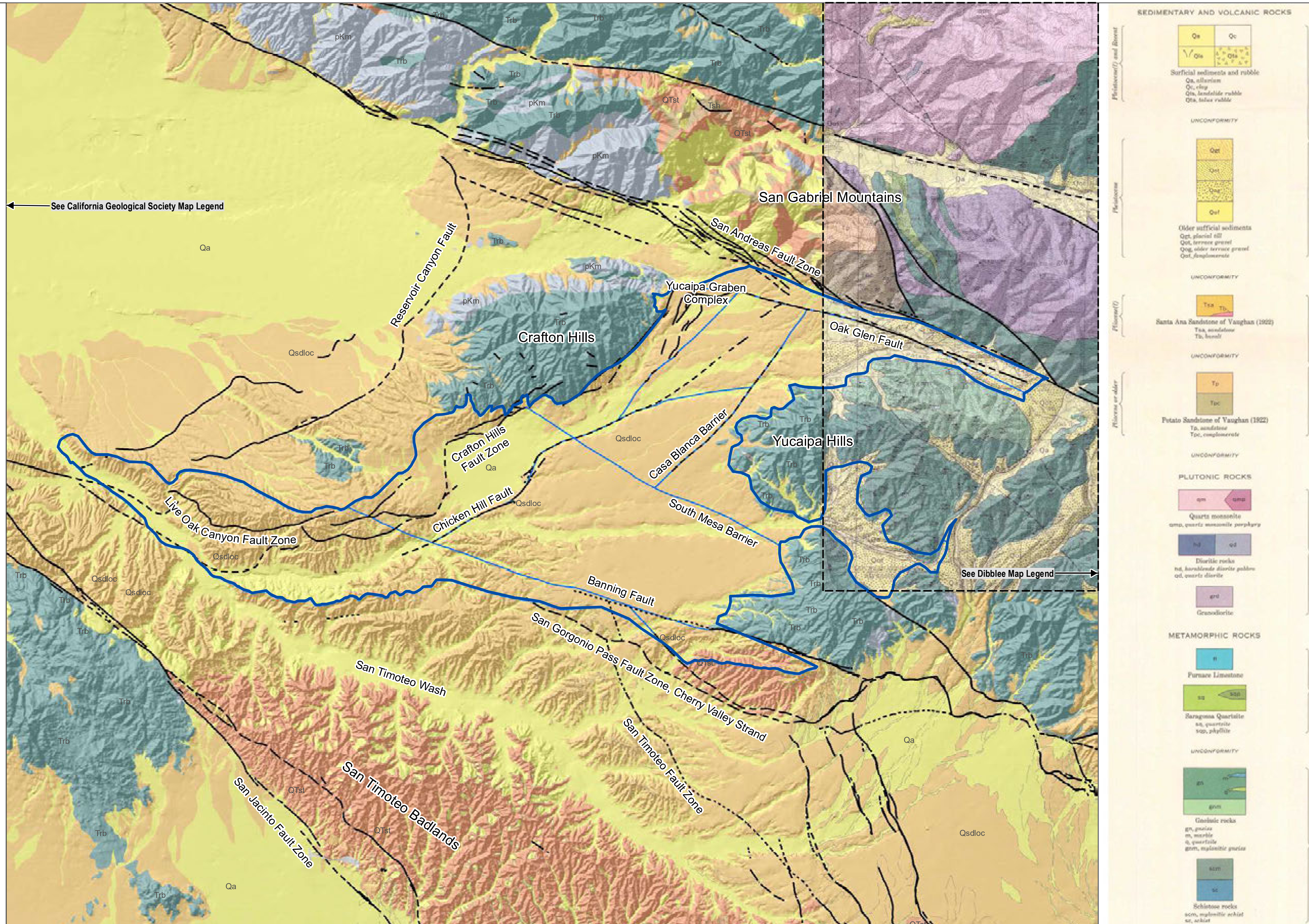
- QTst, San Timoteo Formation (Middle Member)
- Tsh, Mill Creek Formation
- Tv, Dacite Dikes

Mesozoic and Older

- pKm, Cretaceous and Pre-Cretaceous Metamorphic Formations of Sedimentary and Volcanic Origin
- Trb, Granitic and Other Intrusive Crystalline Rocks, San Gabriel Mountains-type

Faults and Geologic Contacts

- contact, identity and existence certain, location accurate
- contact, identity and existence certain, location approximate
- fault, identity and existence certain, location accurate
- fault, identity and existence certain, location approximate
- fault, identity and existence certain, location concealed
- fault, identity and existence certain, location inferred



SOURCE: CGS 2012, USGS 1999

DUDEK

0 0.5 1 2 Miles

FIGURE 2-12

Geologic Map of the Yucaipa Subbasin

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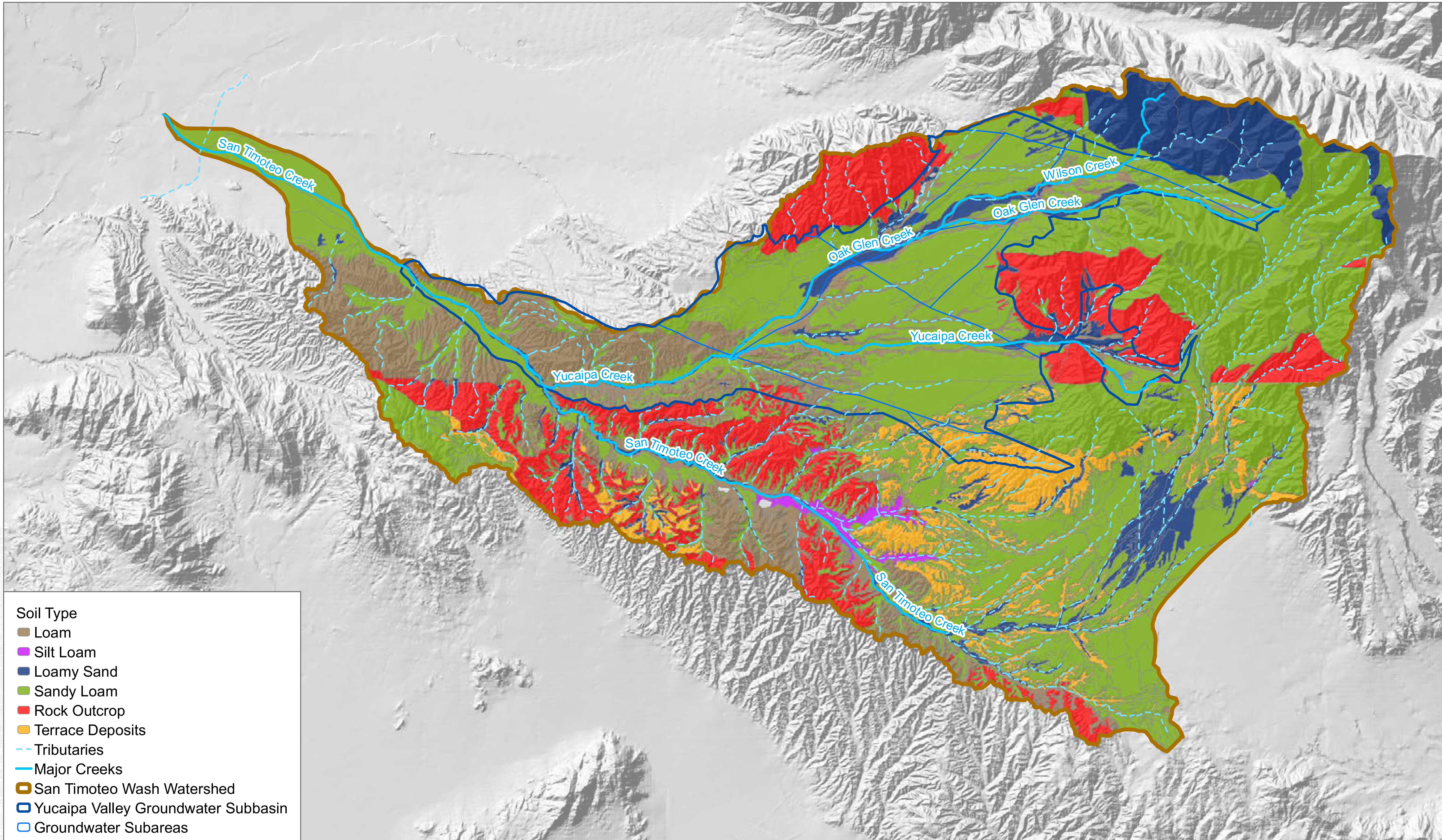

SOURCE: Source: USDA 2020

DUDEK

0 4,200 8,400 Feet

FIGURE 2-13

Soils within the San Timoteo Wash Watershed

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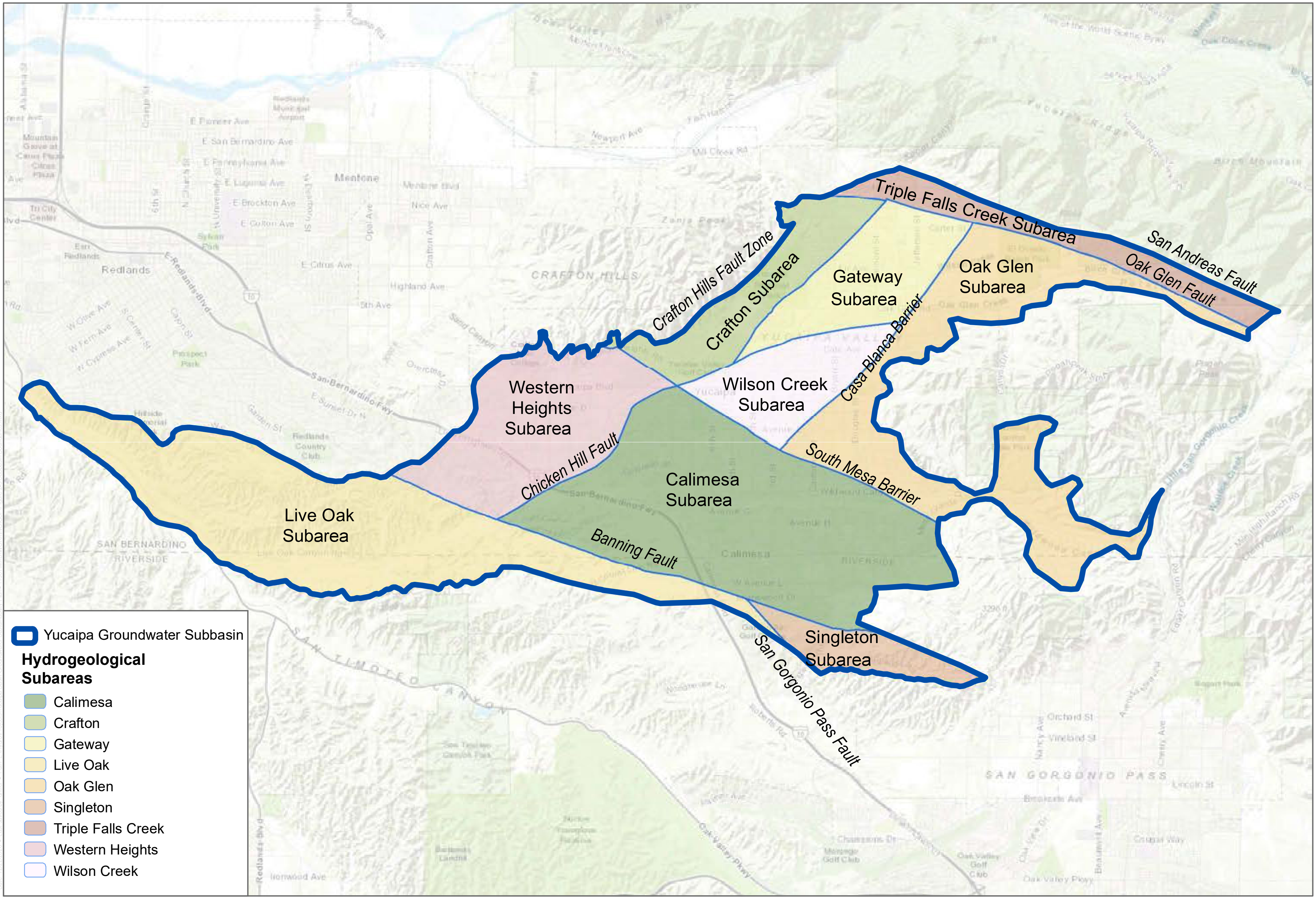

SOURCE: ESRI; Geoscience 2018

DUDEK

0 0.5 1 Miles

FIGURE 2-14

Hydrogeological Subareas in the Yucaipa Subbasin

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Figure 2-15. Hydraulic Heads across the Chicken Hill Fault

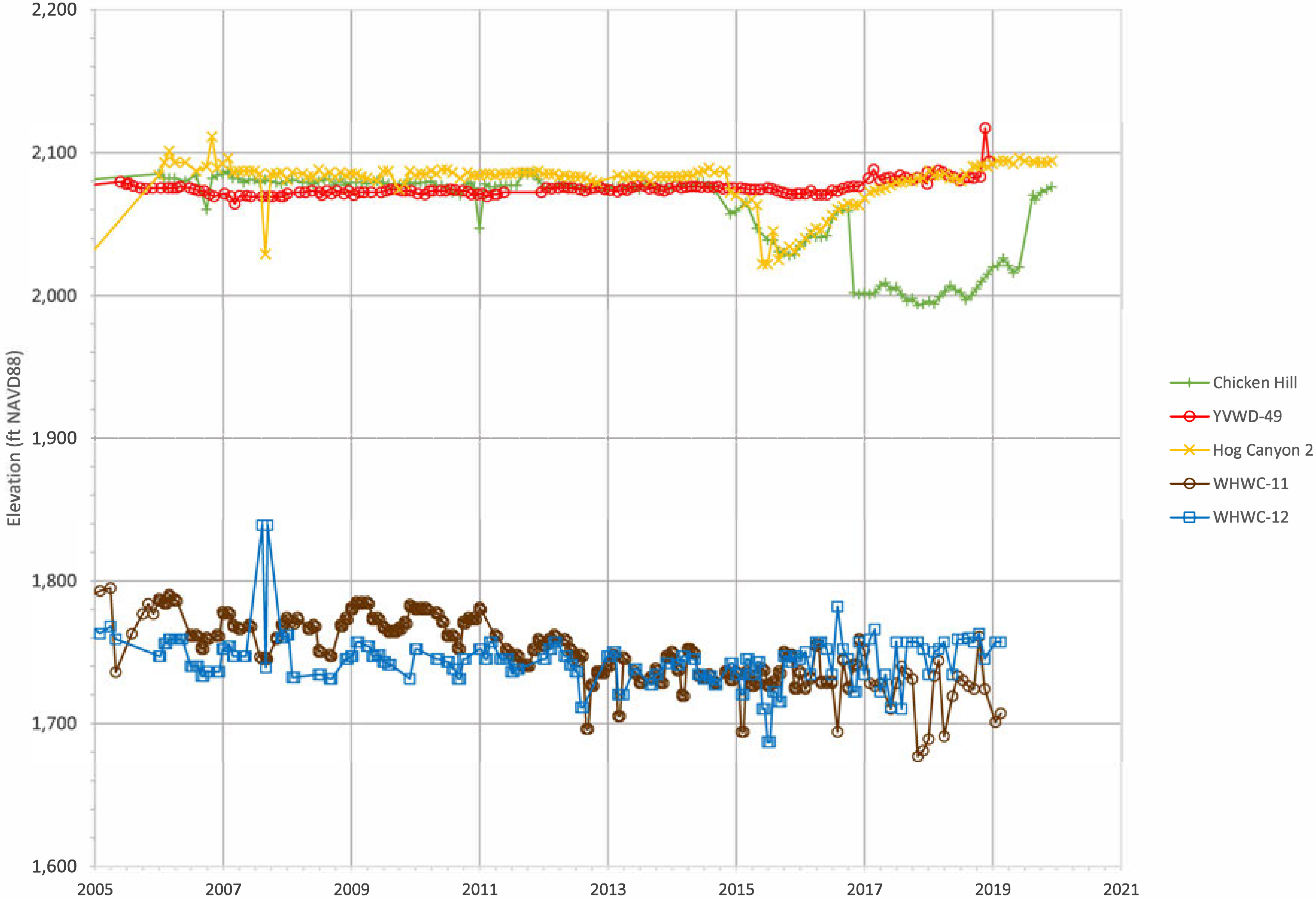

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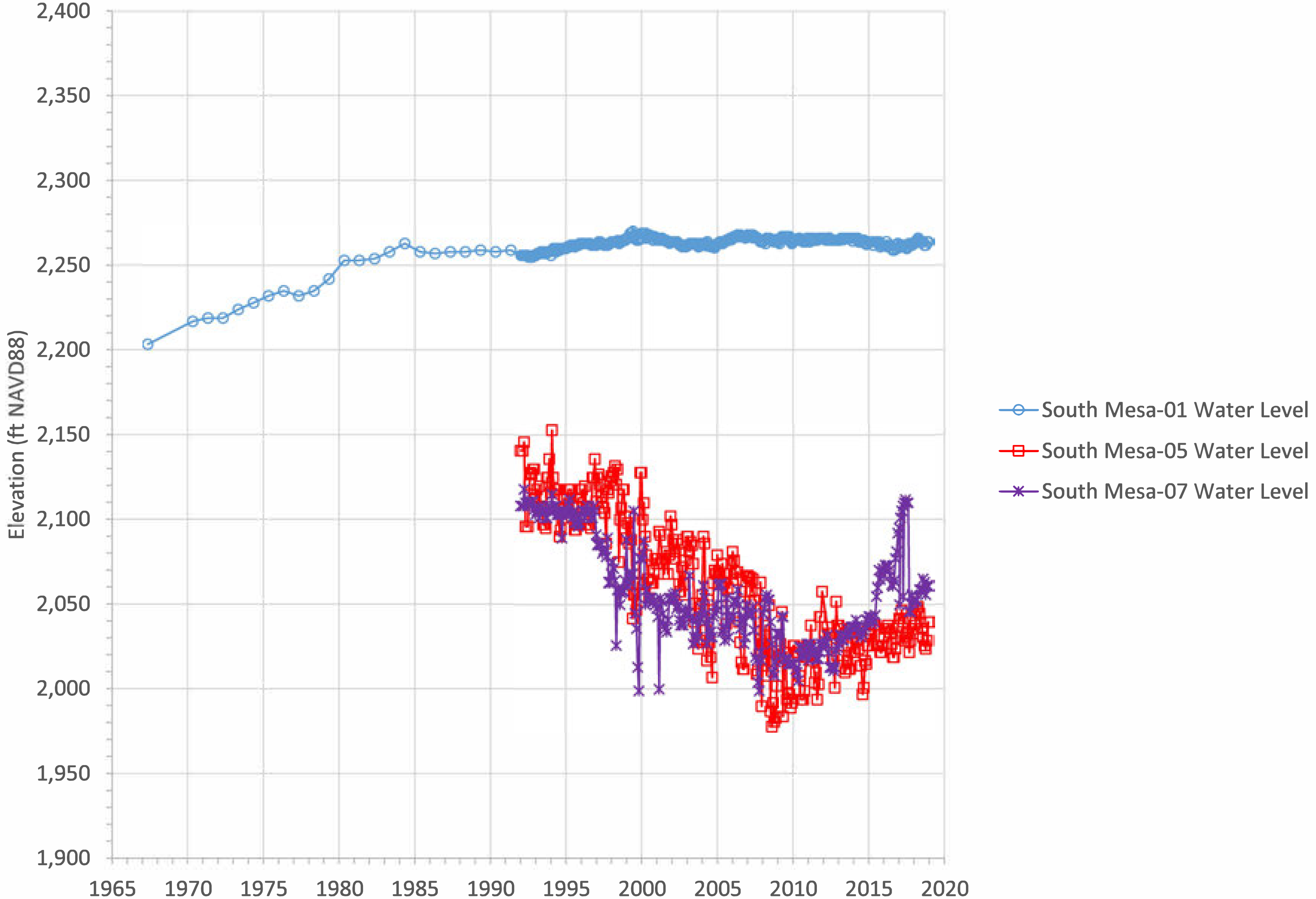
Figure 2-16. Hydraulic Heads at South Mesa Wells 1, 5, and 7



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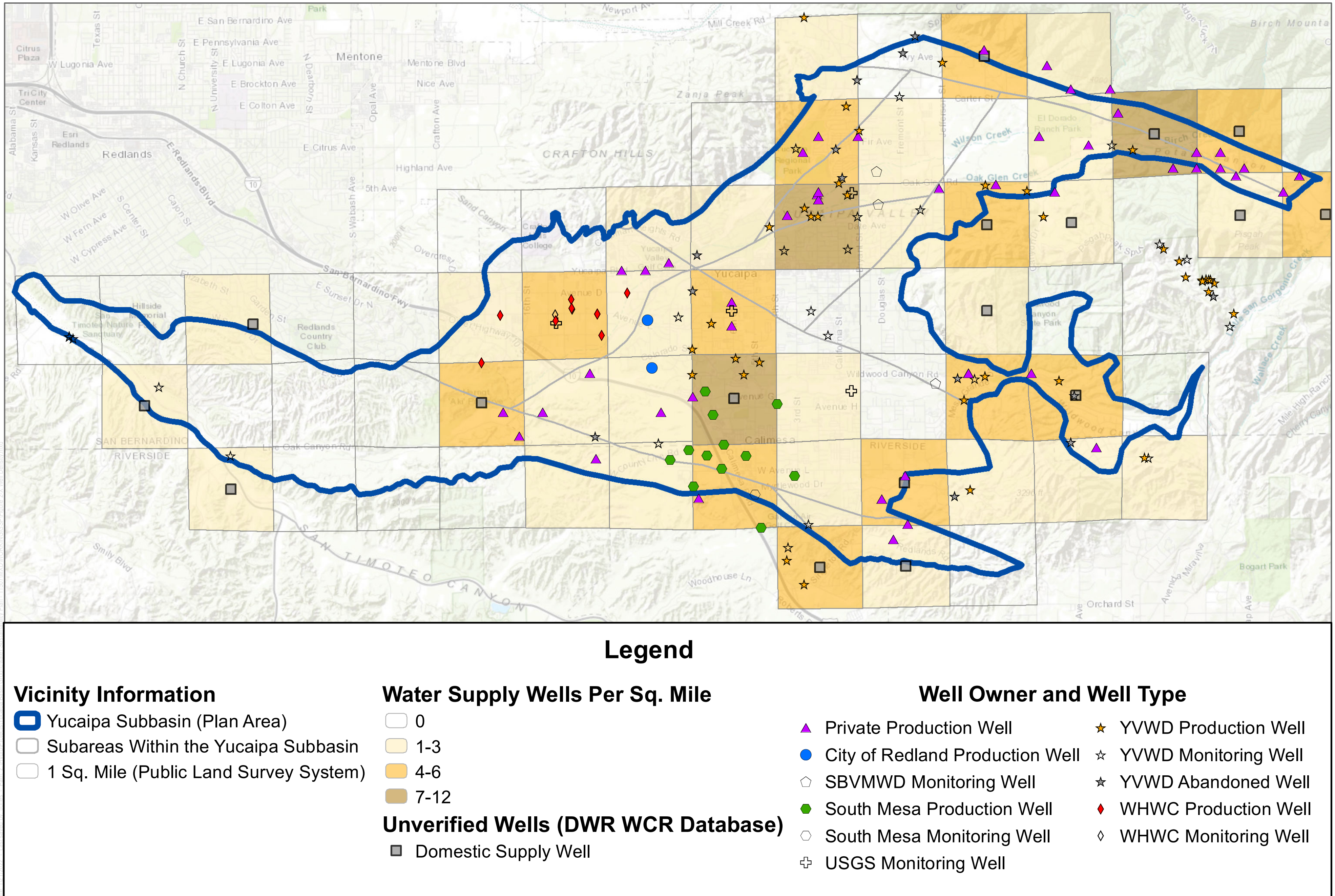

SOURCE: DWR; YVWD; City of Redlands; South Mesa; WHWC; USGS

DUDEK

0 0.5 1 Miles

FIGURE 2-17

Well Density, Well Owner, and Use Type Within the Yucaipa Subbasin

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Figure 2-18. Annual Groundwater Production by Water Agency in the Yucaipa Subbasin

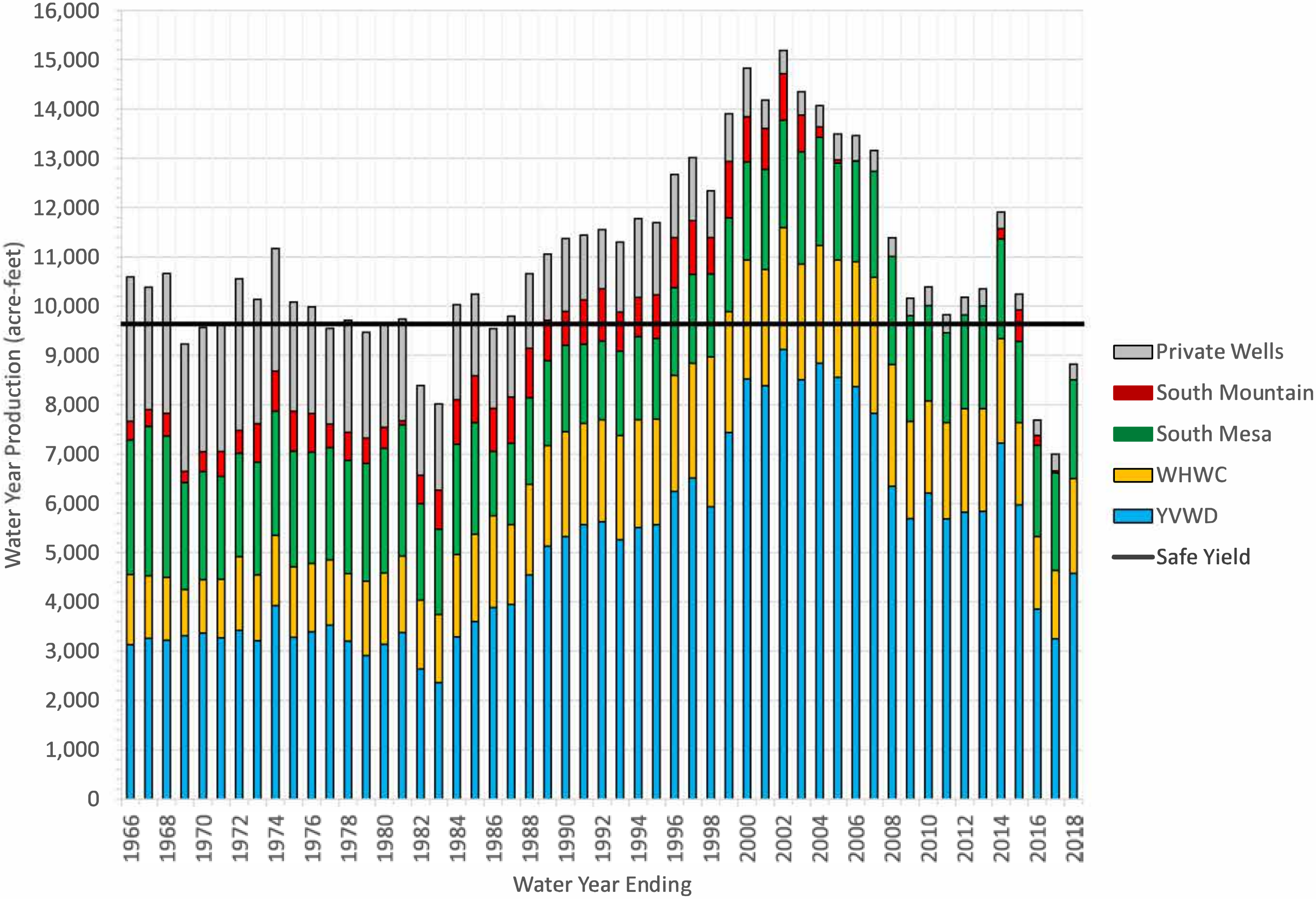

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Figure 2-19. Annual Groundwater Production by Hydrogeologic Subarea in the Yucaipa Subbasin

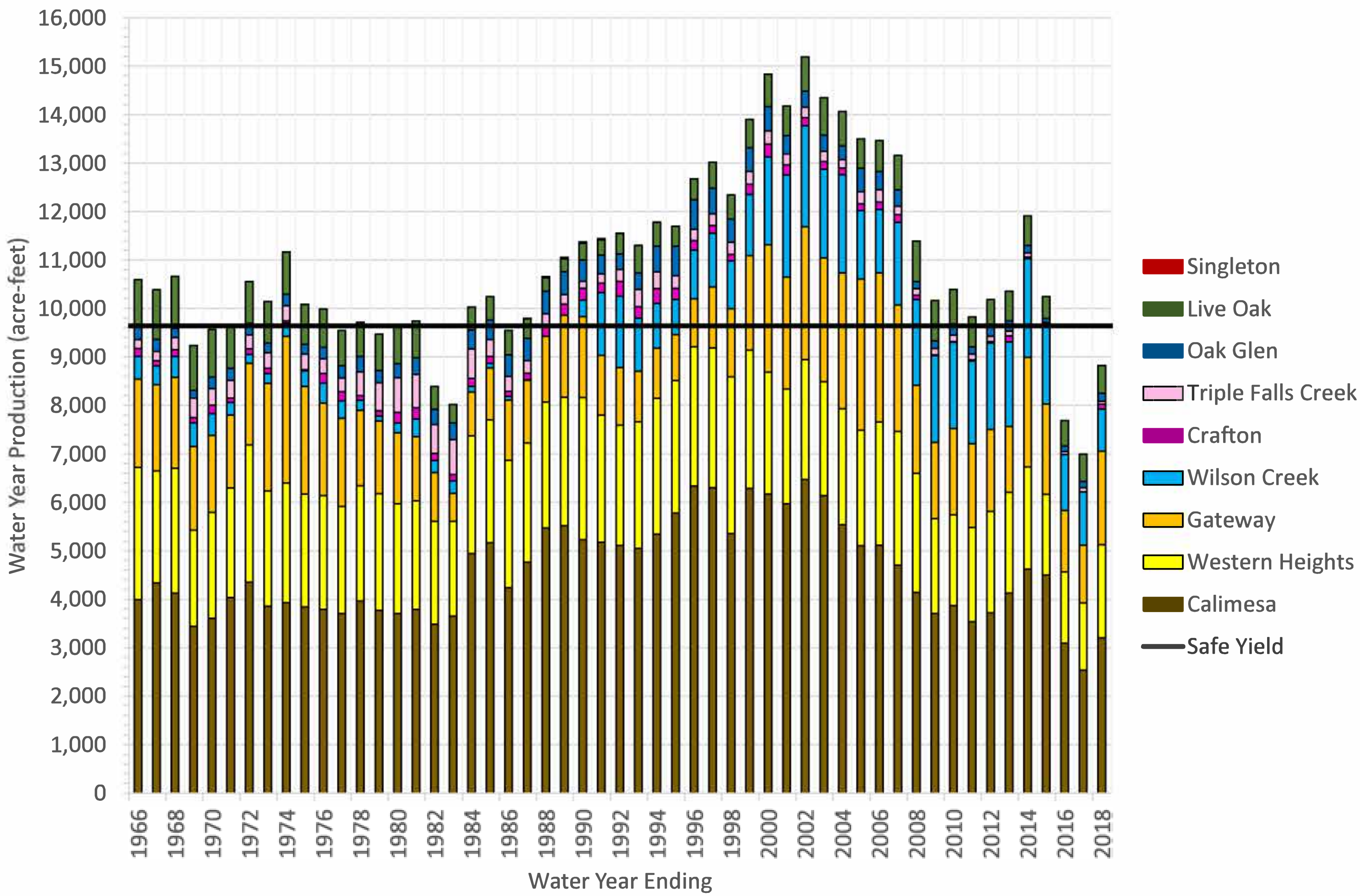

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Figure 2-20. Groundwater under the Influence of Surface Water

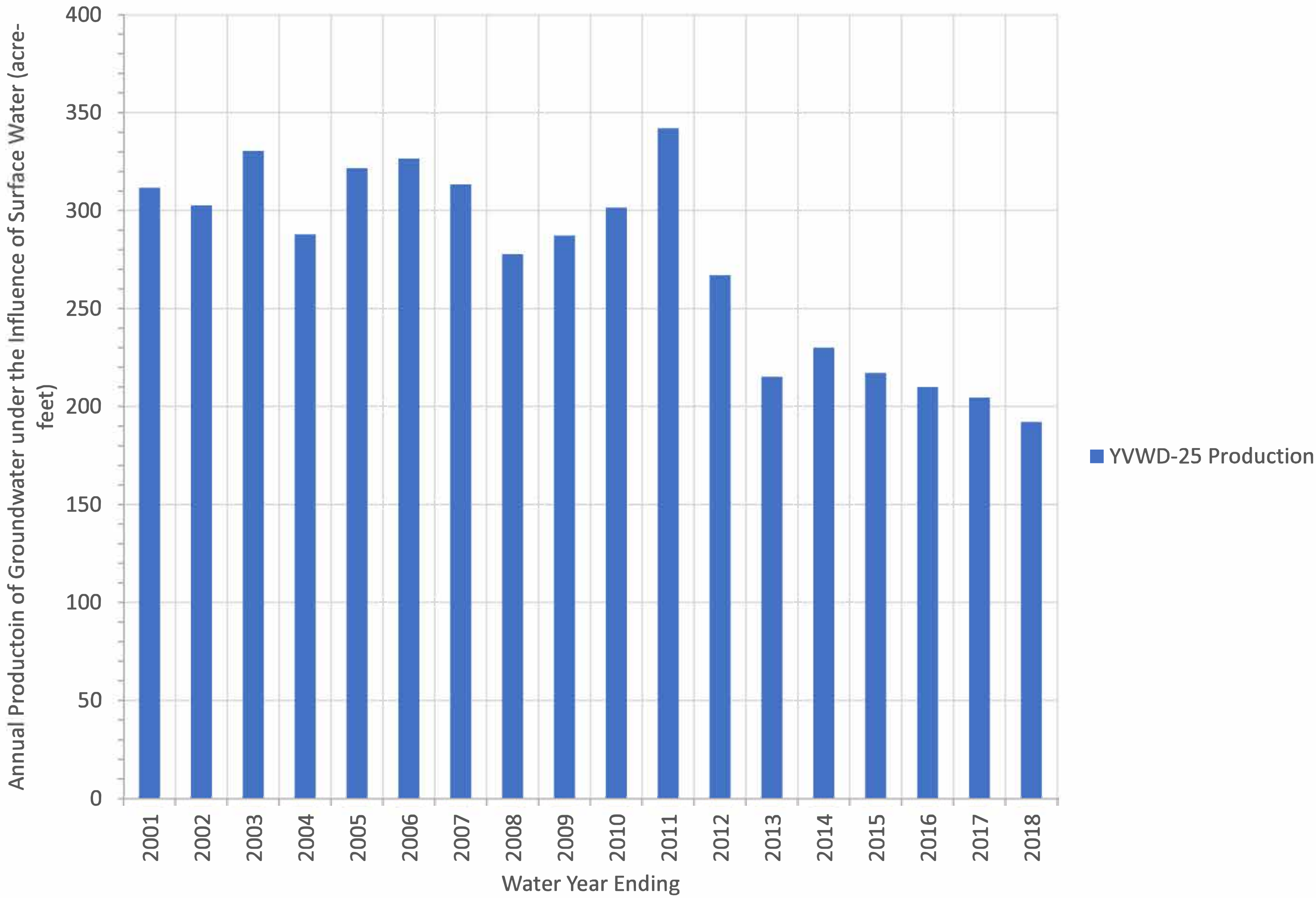

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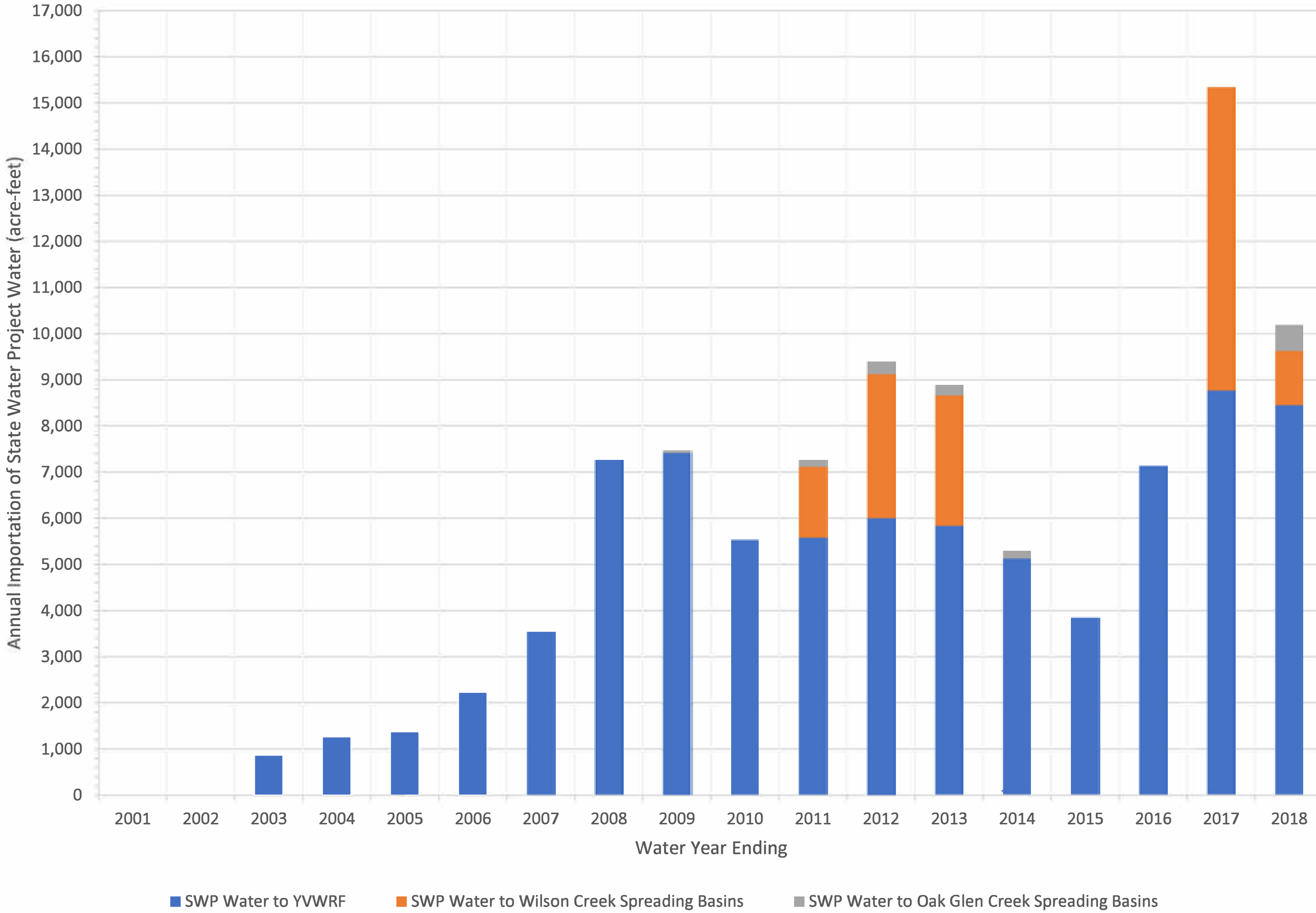
Figure 2-21. Annual Distribution of State Water Project Water in the Yucaipa Subbasin



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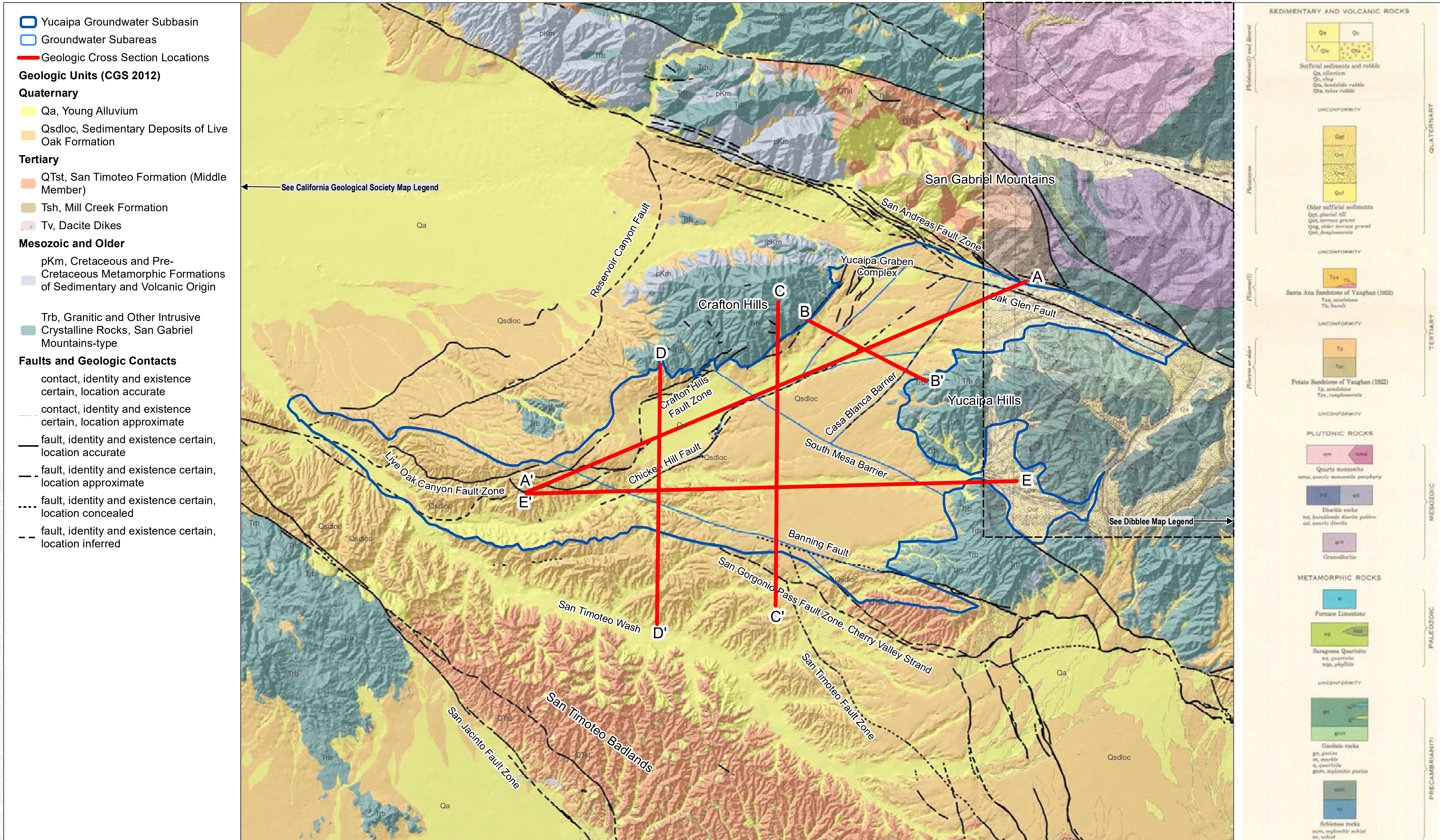

SOURCE: CGS 2012, USGS 1999

DUDEK

0 0.5 1 2 Miles

FIGURE 2-22

Geologic Map with Delineations of Geologic Cross Sections

Yucaipa Subbasin Groundwater Sustainability Plan

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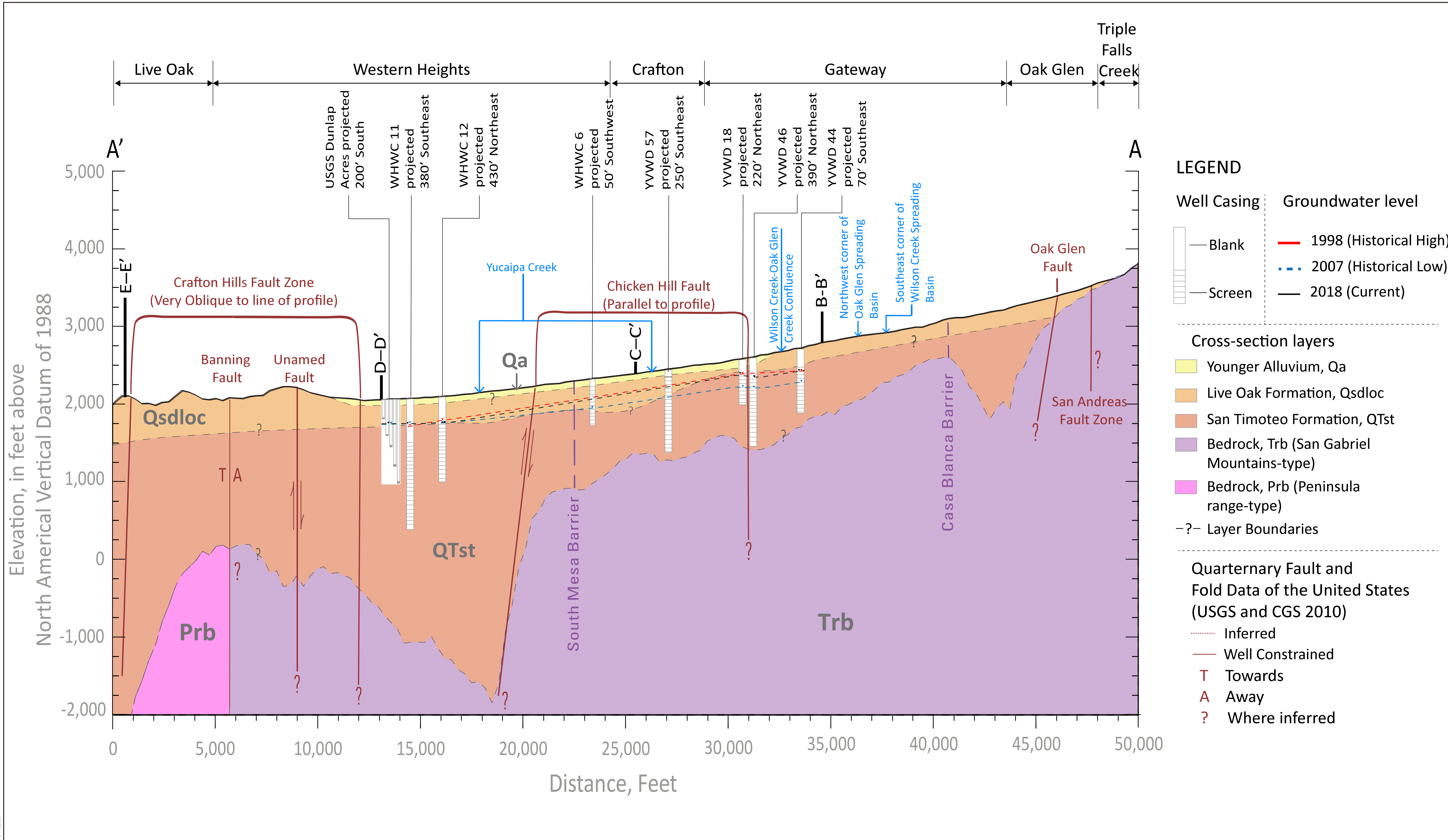

SOURCE: Geophysical Logs and Preliminary Data from Mendez (2013), Geoscience (2014), Motron and Miller (2006), Jennings, Strand, and Rogers (1977)

DUDEK

FIGURE 2-23

Geologic Cross Section A-A’

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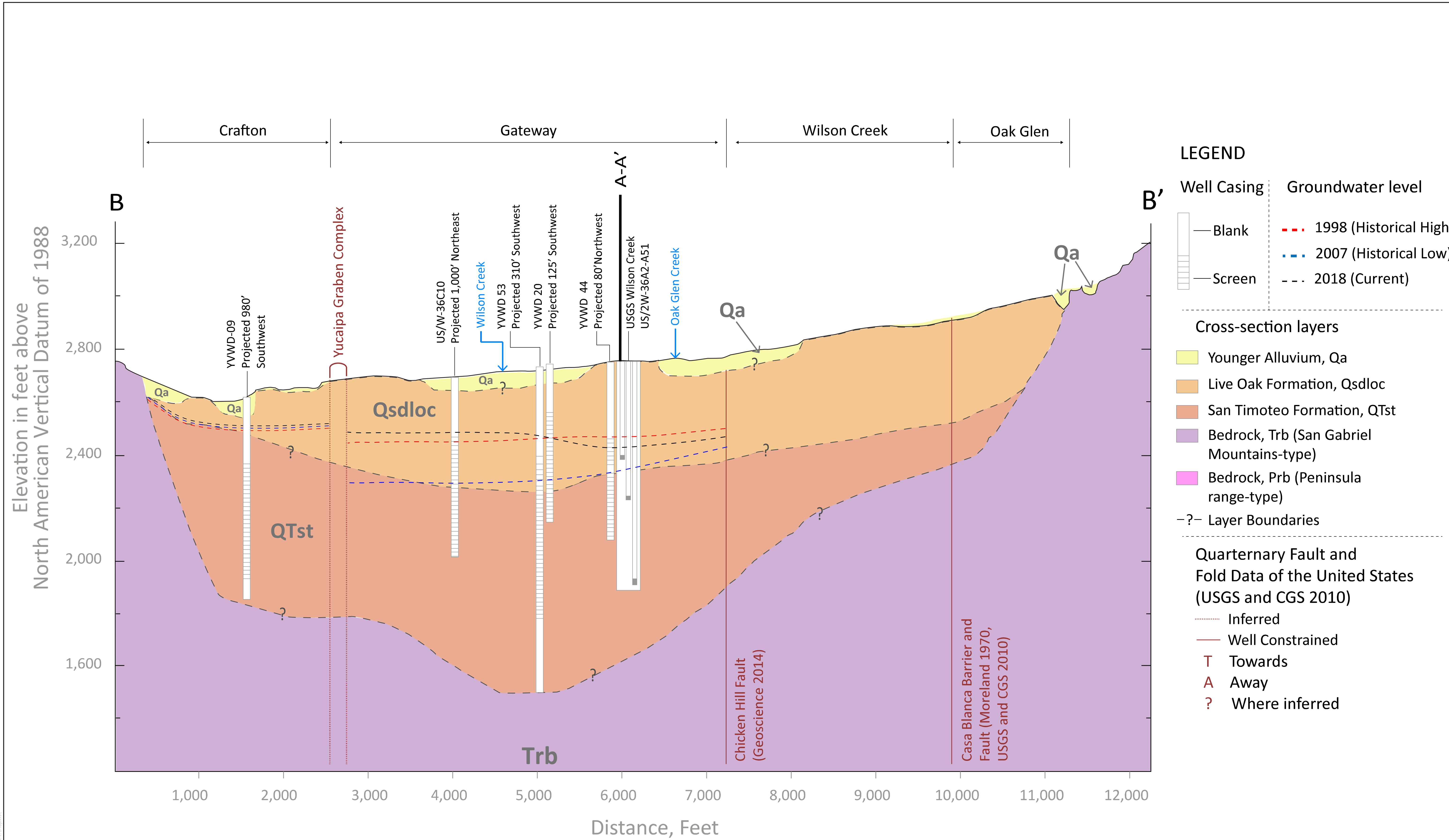

SOURCE: Geophysical Logs and Preliminary Data from Mendez (2013), Motron and Miller (2006), Jennings, Strand, and Rogers (1977)

DUDEK

Figure 2-24

Geologic Cross Section B-B'

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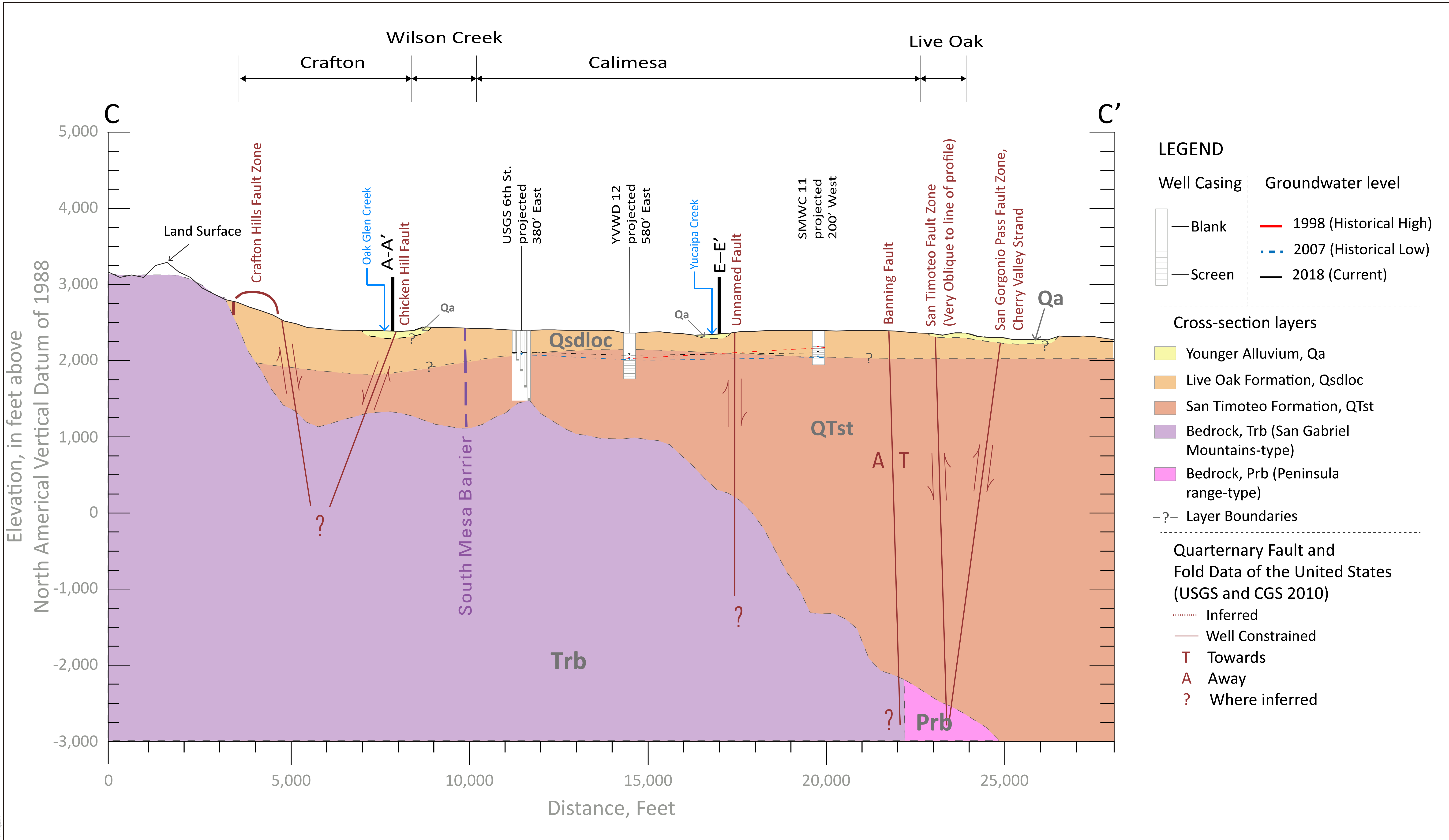

SOURCE: Geophysical Logs and Preliminary Data from Mendez (2013), Geoscience (2014), Motron and Miller (2006), Jennings, Strand, and Rogers (1977)

DUDEK

FIGURE 2-25

Geologic Cross Section C-C'

Yucaipa Subbasin Groundwater Sustainability Plan

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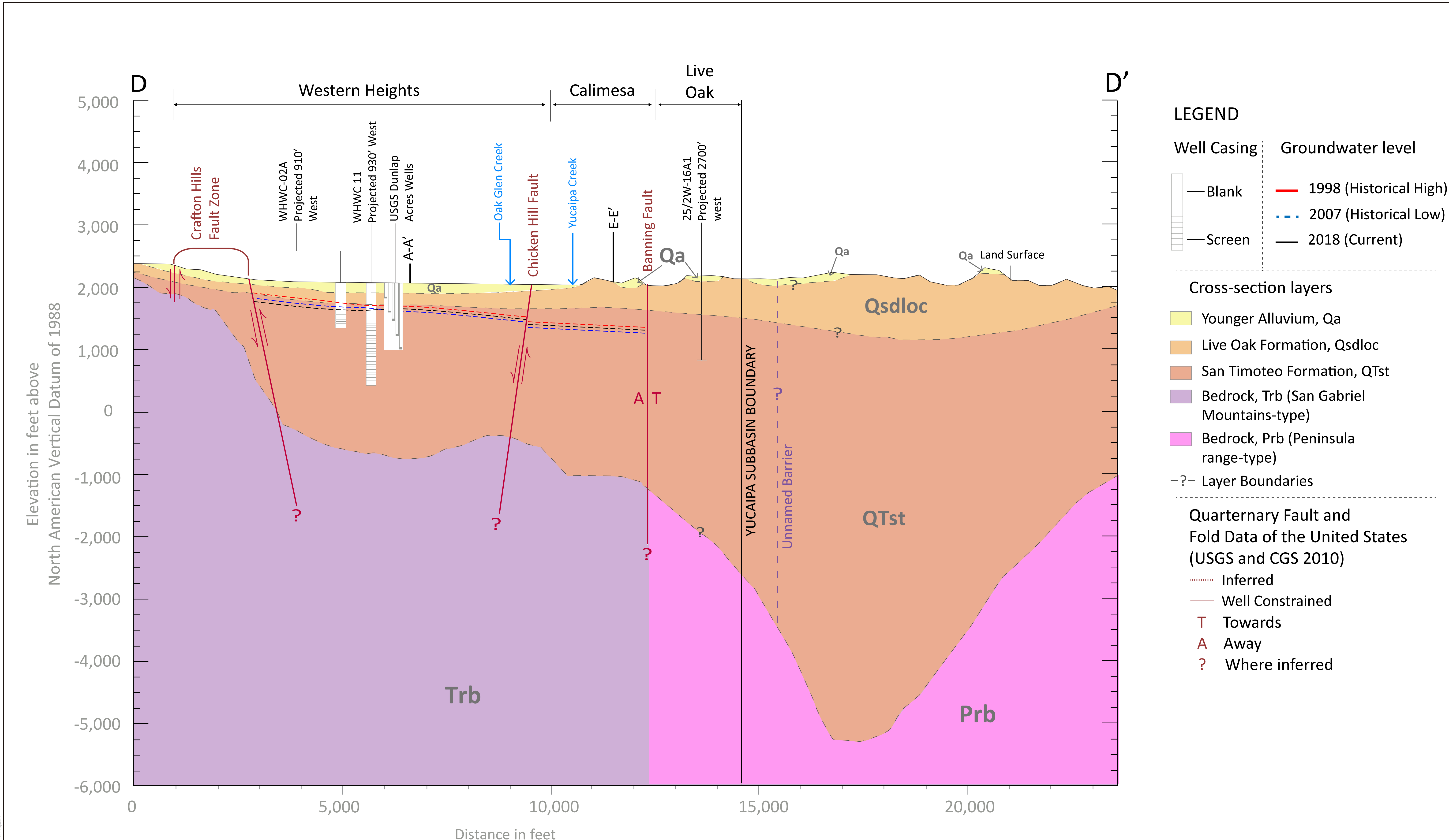

SOURCE: Geophysical Logs and Preliminary Data from Mendez (2013), Geoscience (2014), Motron and Miller (2006), Jennings, Strand, and Rogers (1977)

FIGURE 2-26
Geologic Cross Section D-D'

DUDEK

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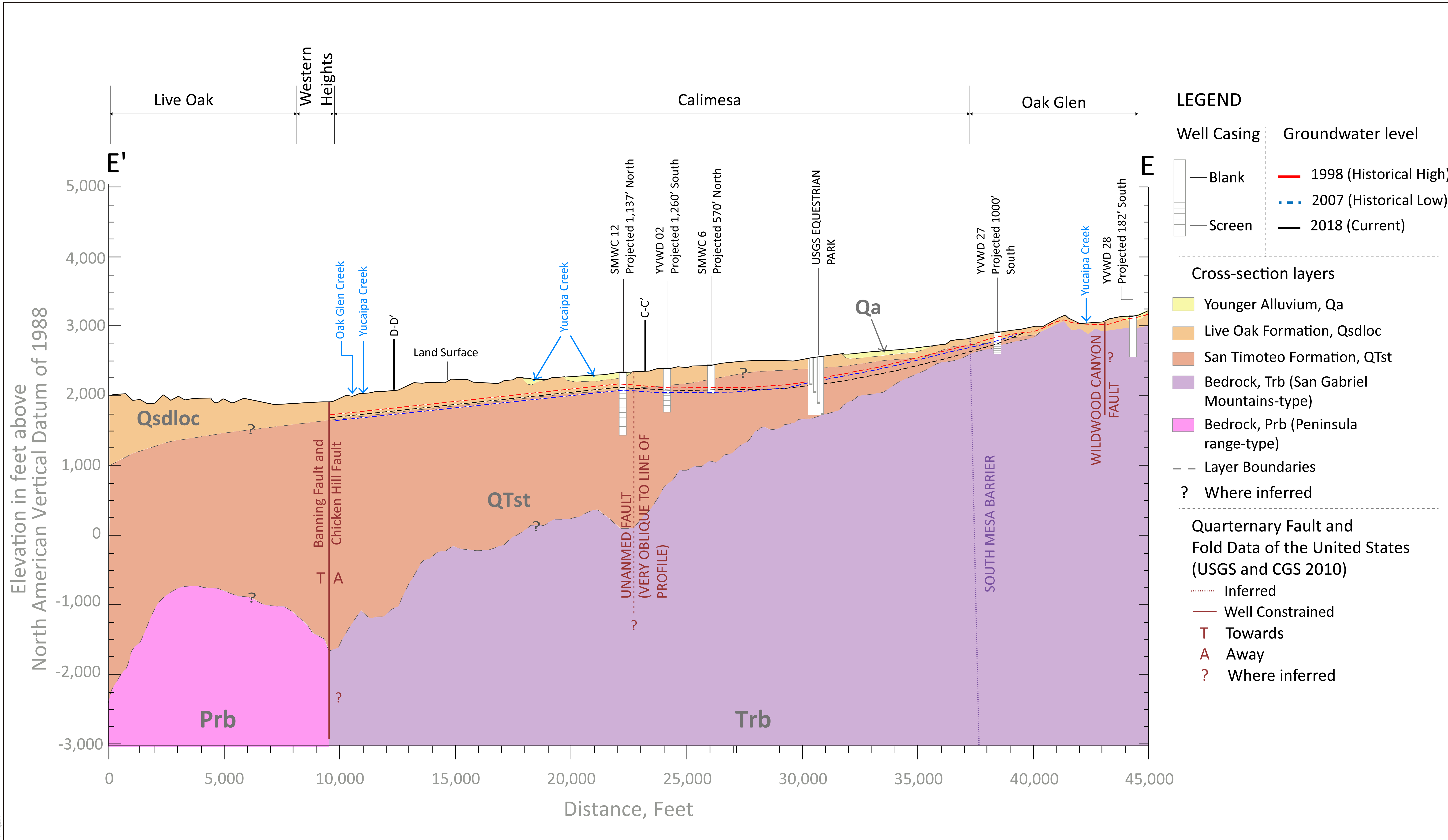

SOURCE: Geophysical Logs and Preliminary Data from Mendez (2013), Geoscience (2014), Motron and Miller (2006), Jennings, Strand, and Rogers (1977)

DUDEK

FIGURE 2-27
Geologic Cross Section E-E'

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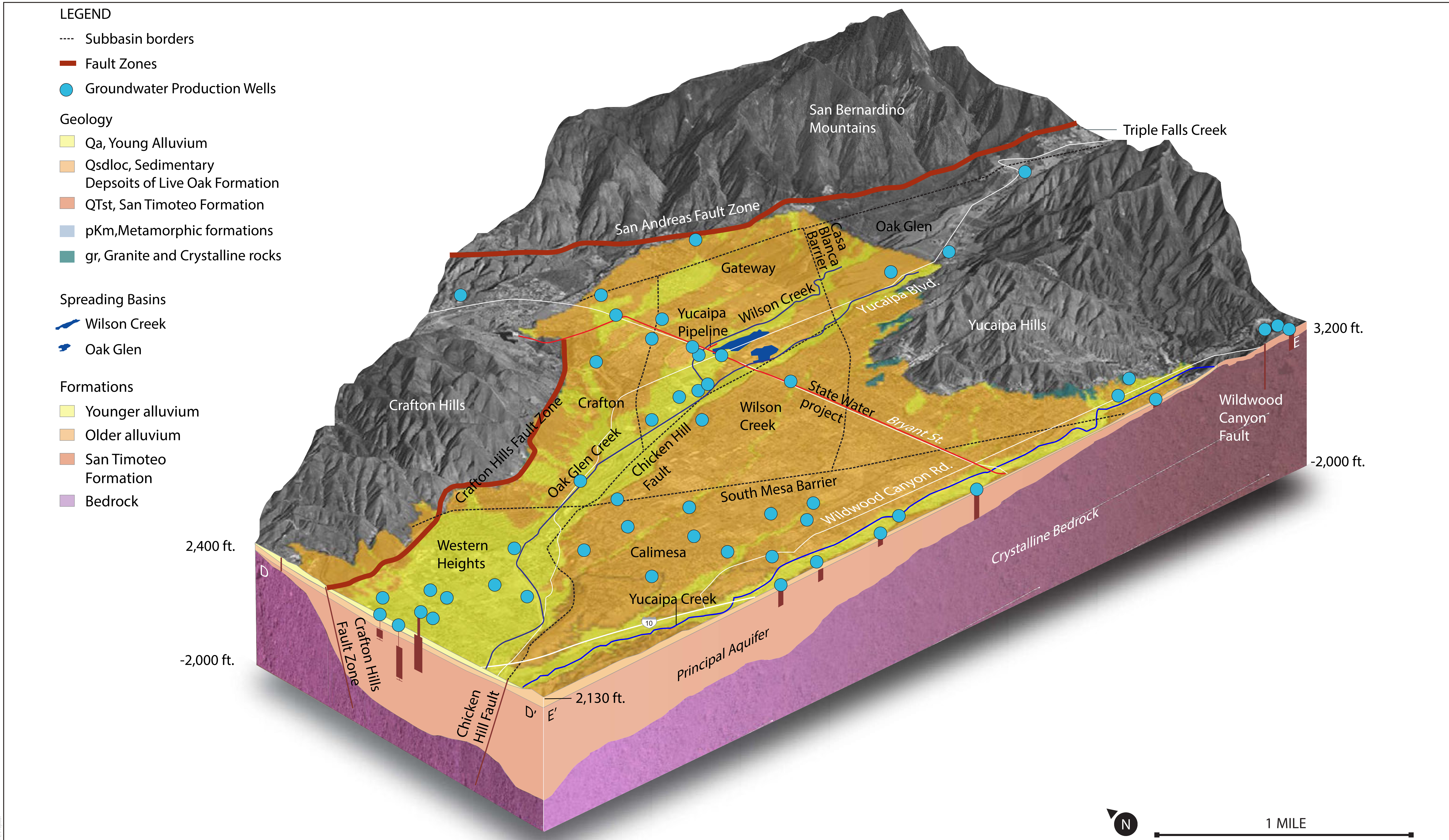

SOURCE: USGS, DWR, Google Earth

DUDEK

FIGURE 2-28

Hydrogeologic Conceptual Model of the Yucaipa Subbasin

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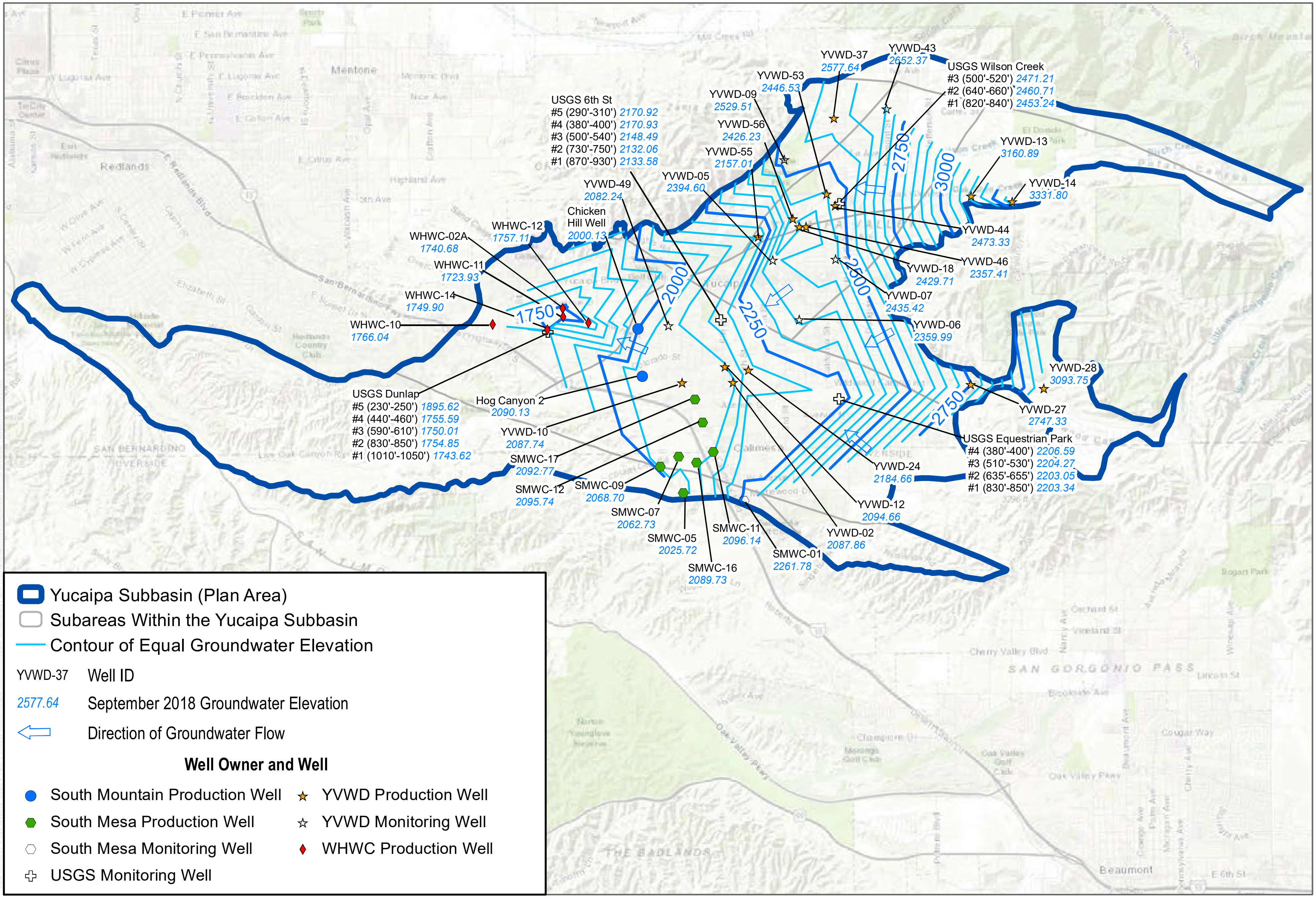

SOURCE: YVWD, WHWC, South Mesa, City of Redlands, USGS

DUDEK

0 0.5 1 Miles

FIGURE 2-29

September 2018 Groundwater Elevations within the Yucaipa Subbasin

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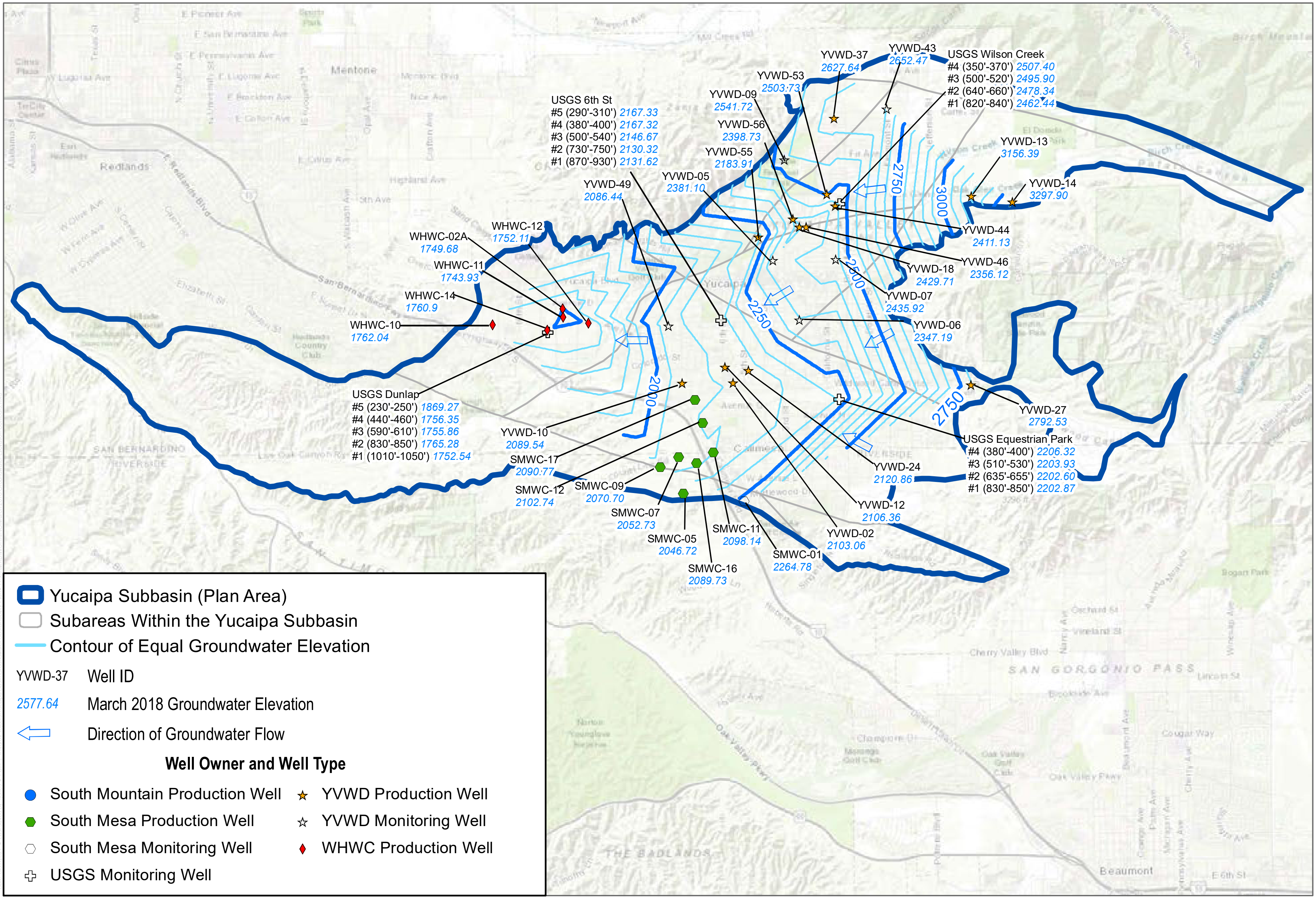

SOURCE: YVWD, WHWC, South Mesa, City of Redlands, USGS

DUDEK

FIGURE 2-30

March 2018 Groundwater Elevations within the Yucaipa Subbasin

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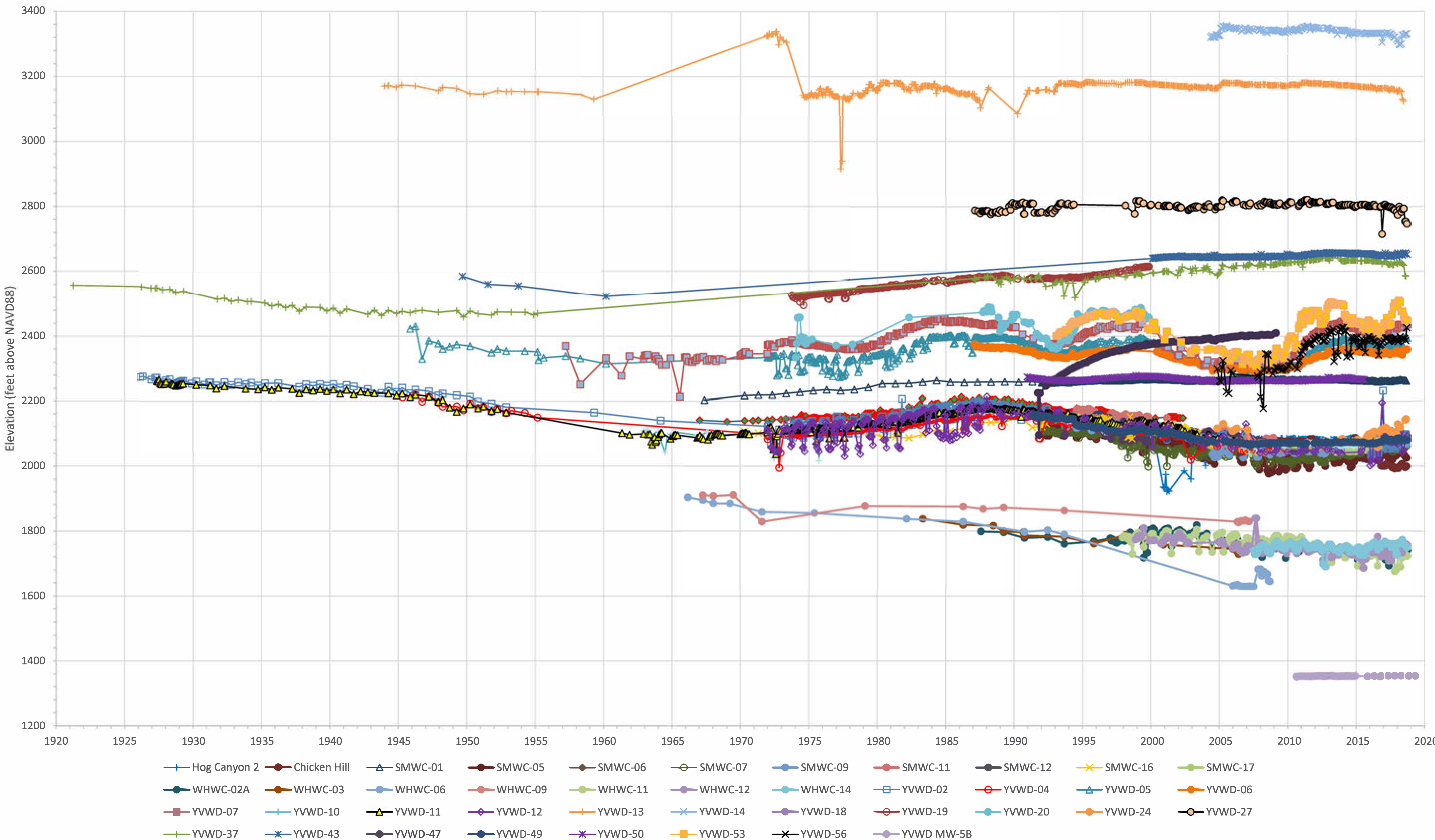
Figure 2-31. Historical Groundwater Elevations in the Yucaipa Subbasin



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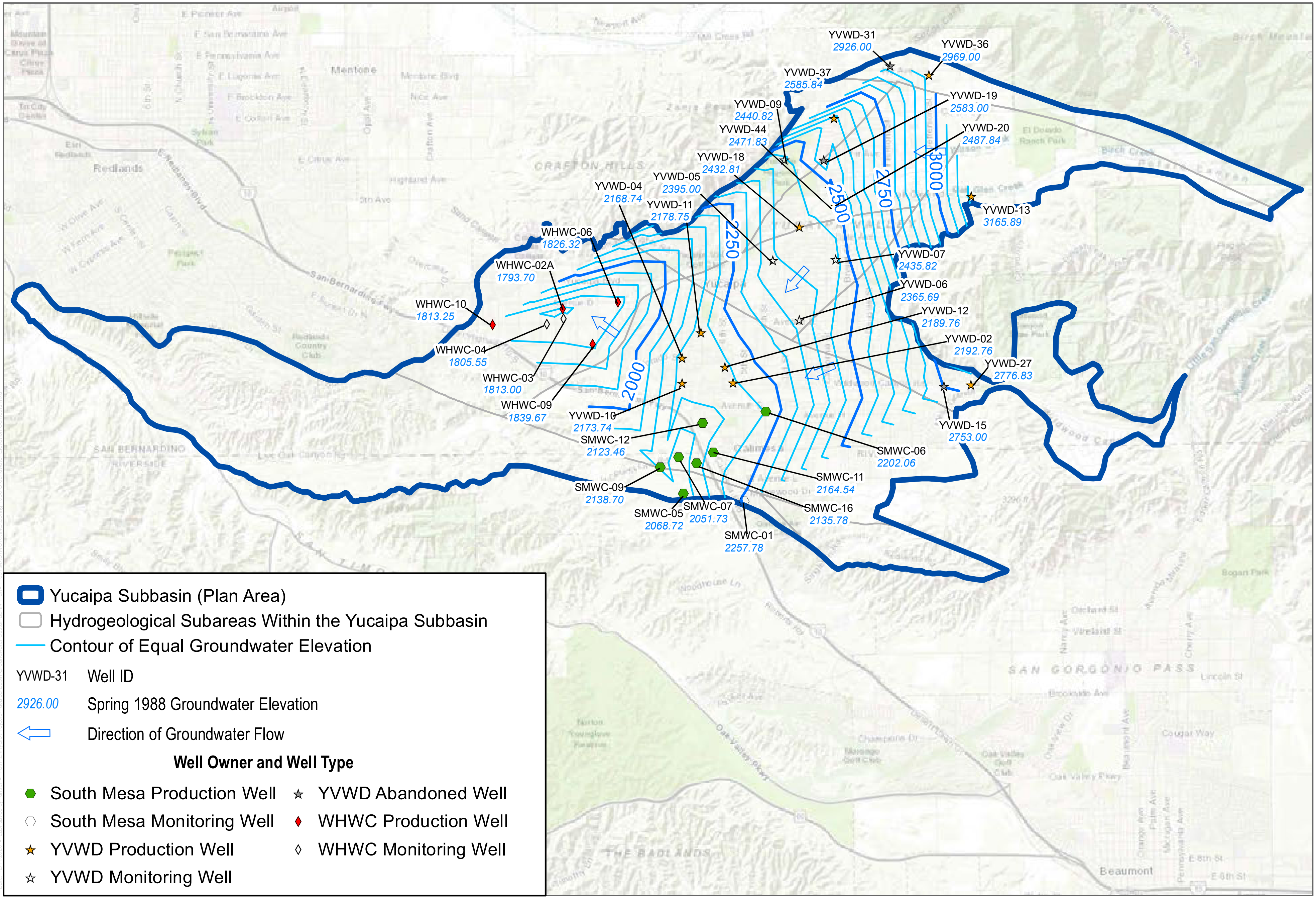

SOURCE: YVWD, WHWC, South Mesa

DUDEK

0 0.5 1 Miles

FIGURE 2-32

Historical High (Spring 1998) Groundwater Elevations in the Yucaipa Subbasin

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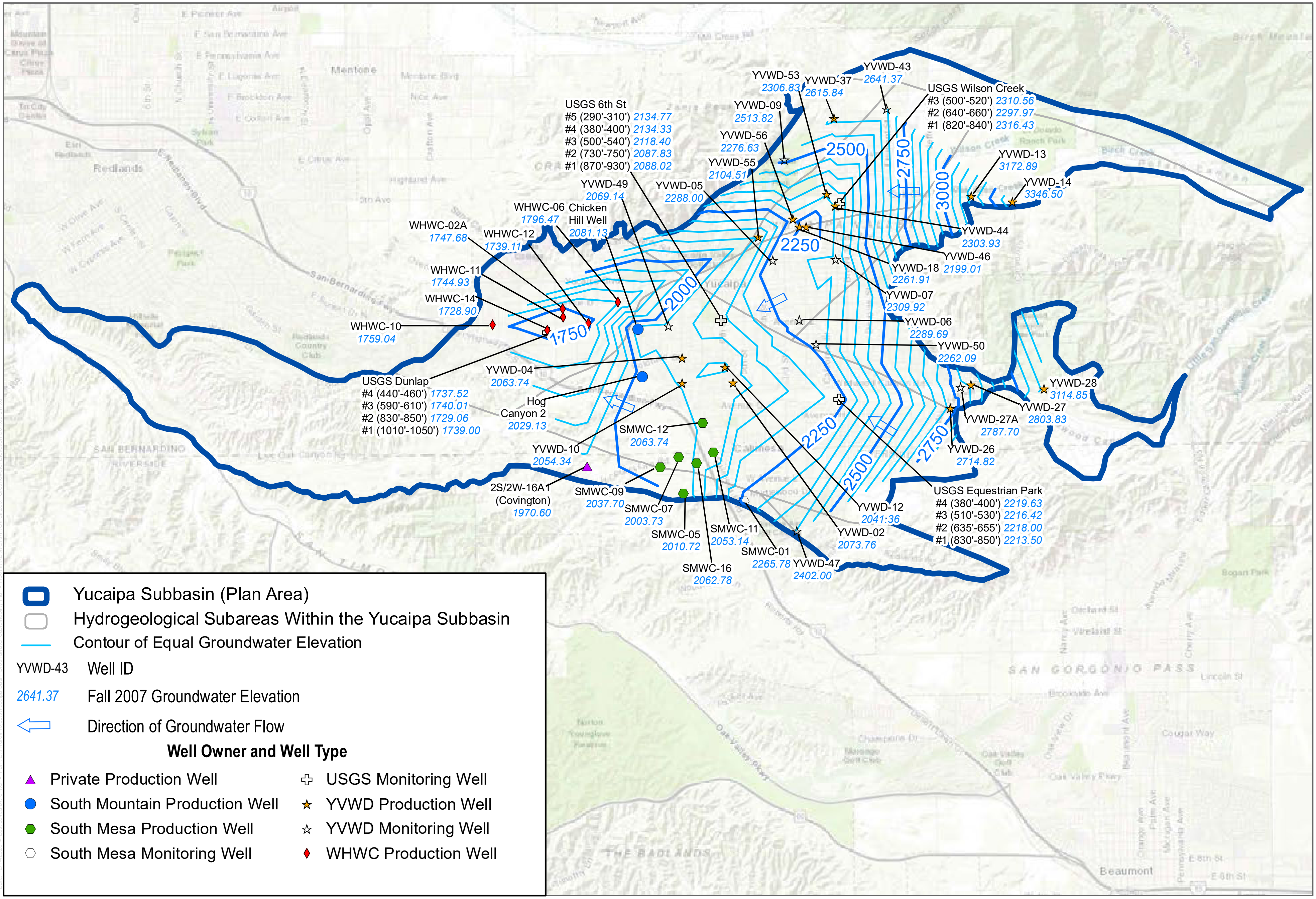

SOURCE: YVWD, WHWC, South Mesa, City of Redlands

DUDEK

0 0.5 1 Miles

FIGURE 2-33

Historical Low (Fall 2007) Groundwater Elevations in the Yucaipa Subbasin

Yucaipa Subbasin Groundwater Sustainability Plan

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Figure 2-34. Annual Groundwater Production by Water Year and Groundwater Elevations in the Calimesa Subarea

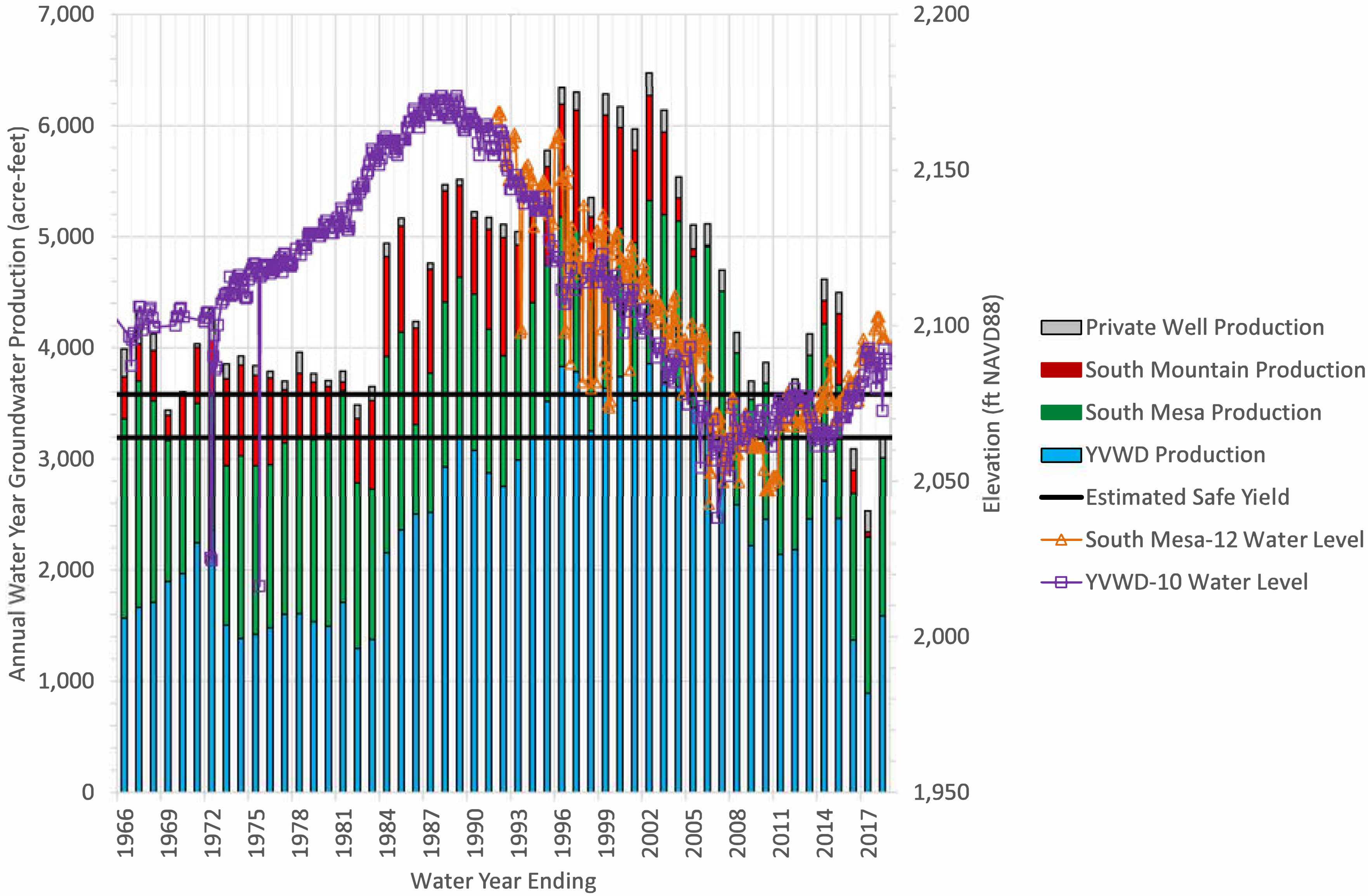

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Figure 2-35. Historical Groundwater Elevations vs. Water Year Type in the Yucaipa Subbasin

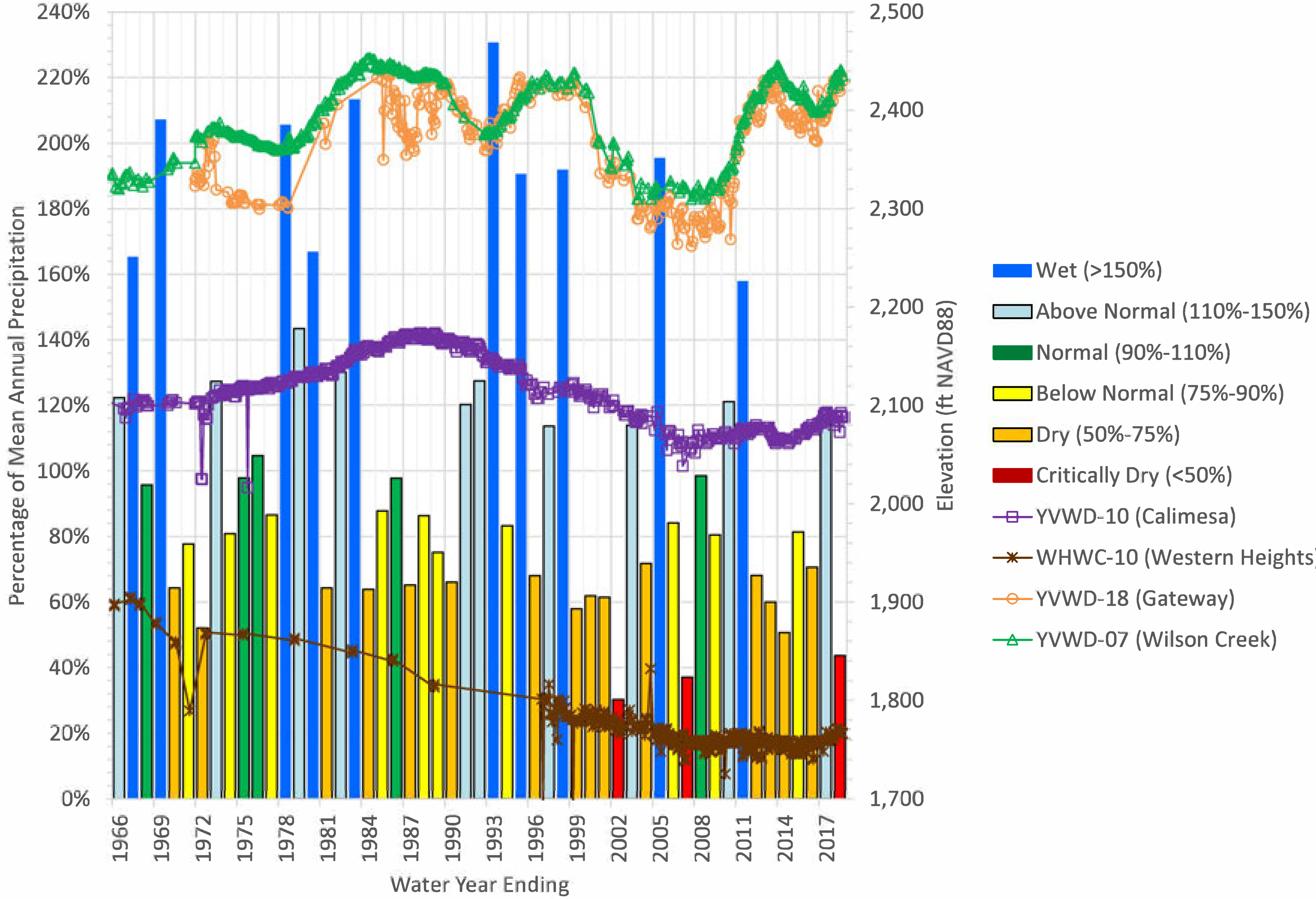

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Figure 2-36. Annual Groundwater Production by Water Year and Groundwater Elevations in the Wilson Creek Subarea

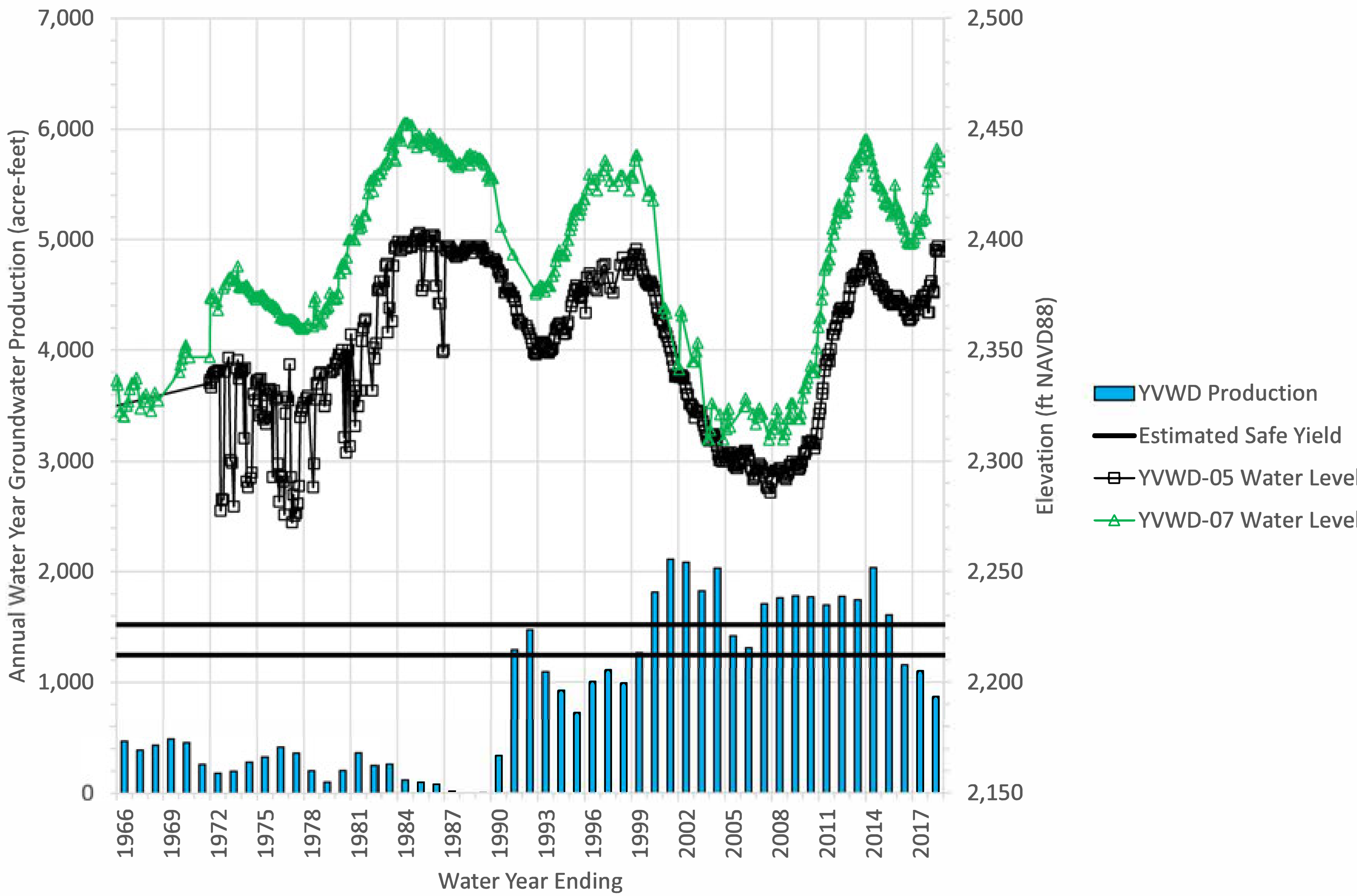

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Figure 2-37. Annual Groundwater Production by Water Year and Groundwater Elevations in the Gateway Subarea

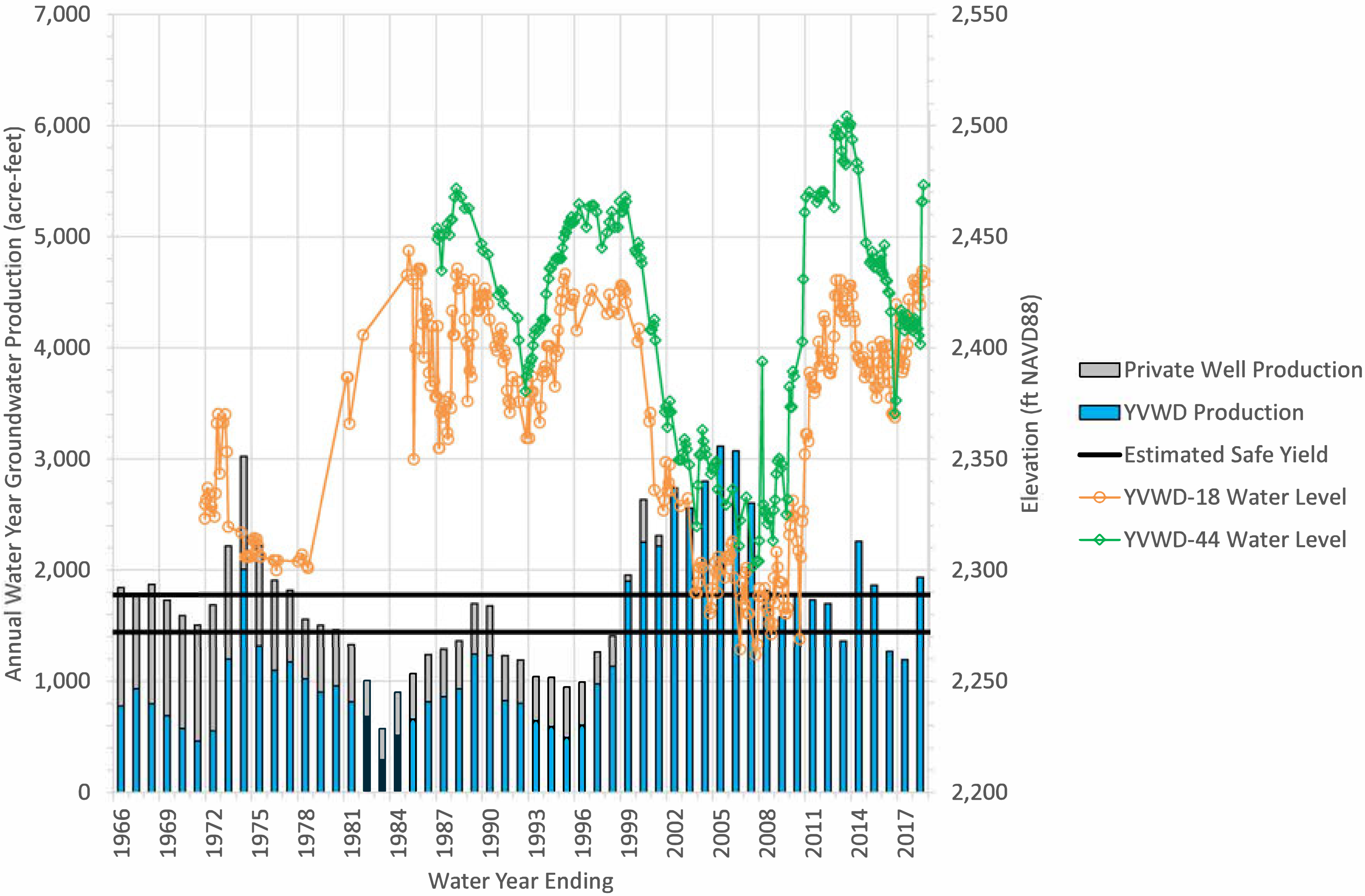

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Figure 2-38. Annual Groundwater Production by Water Year and Groundwater Elevations in the Western Heights Subarea

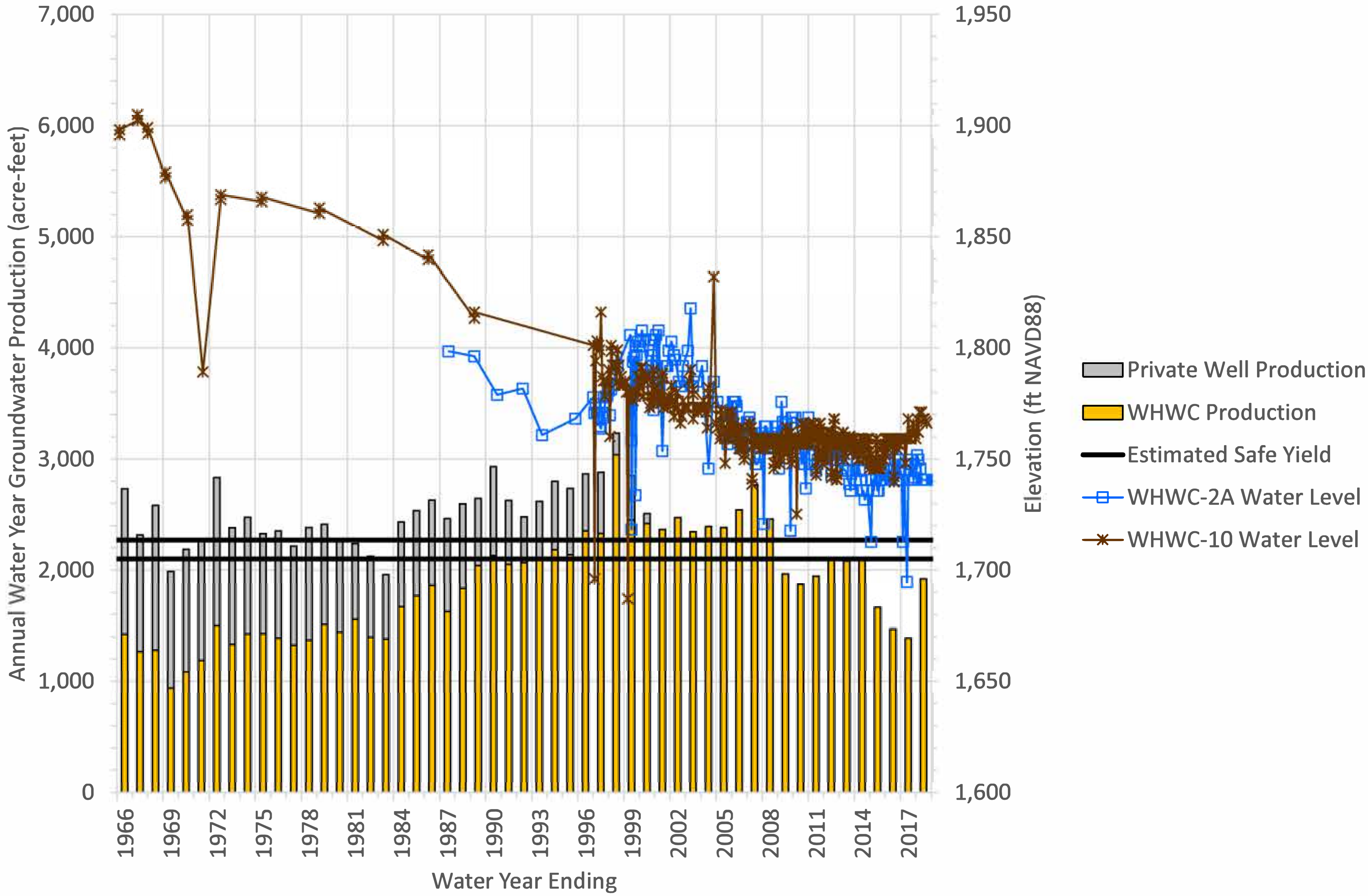

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Figure 2-39. Concentrations of Total Dissolved Solids at the Former Yucaipa Landfill in the Yucaipa Subbasin

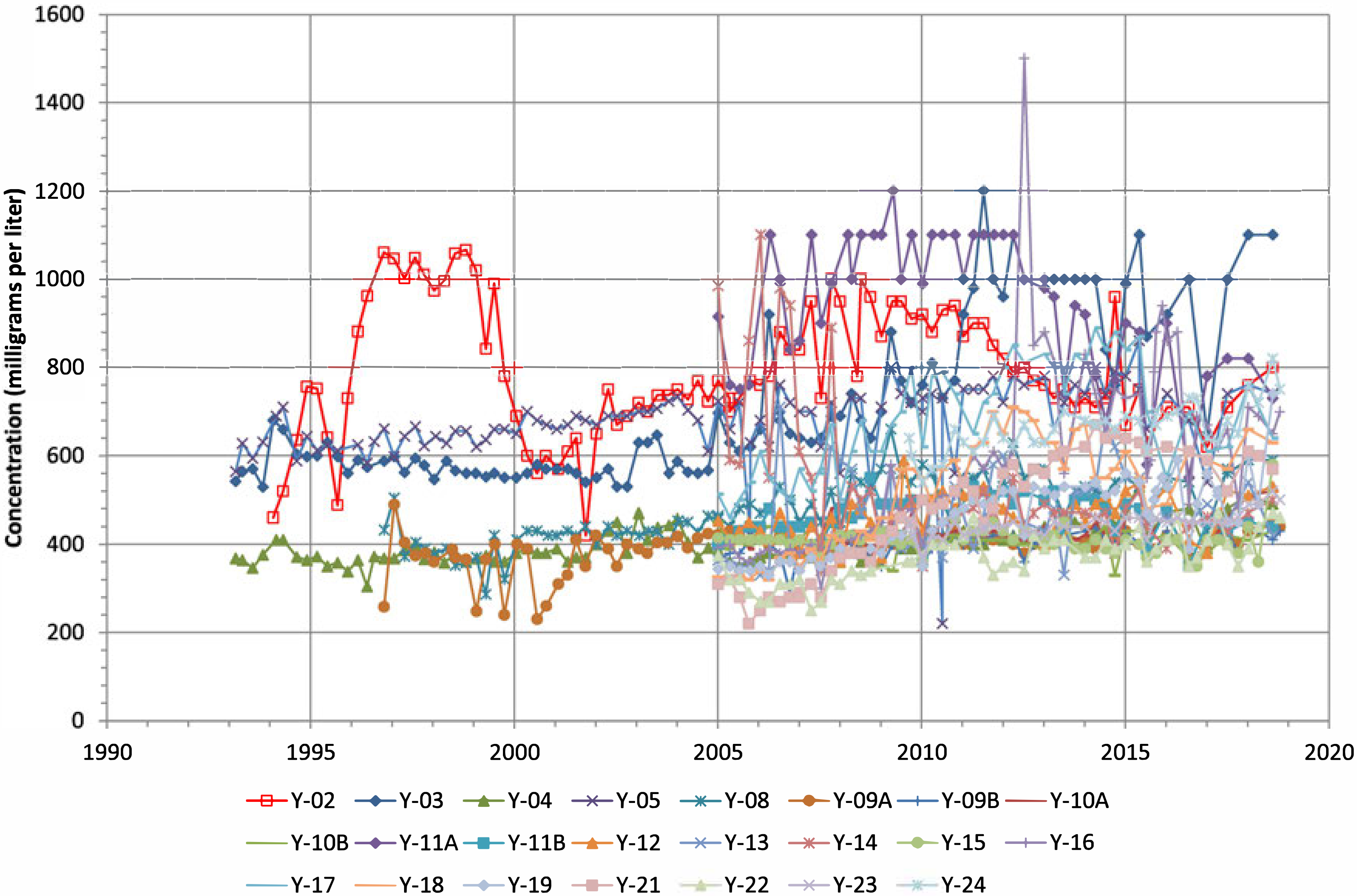

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Figure 2-40. Concentrations of Total Dissolved Solids at USGS Observation Wells in the Yucaipa Subbasin

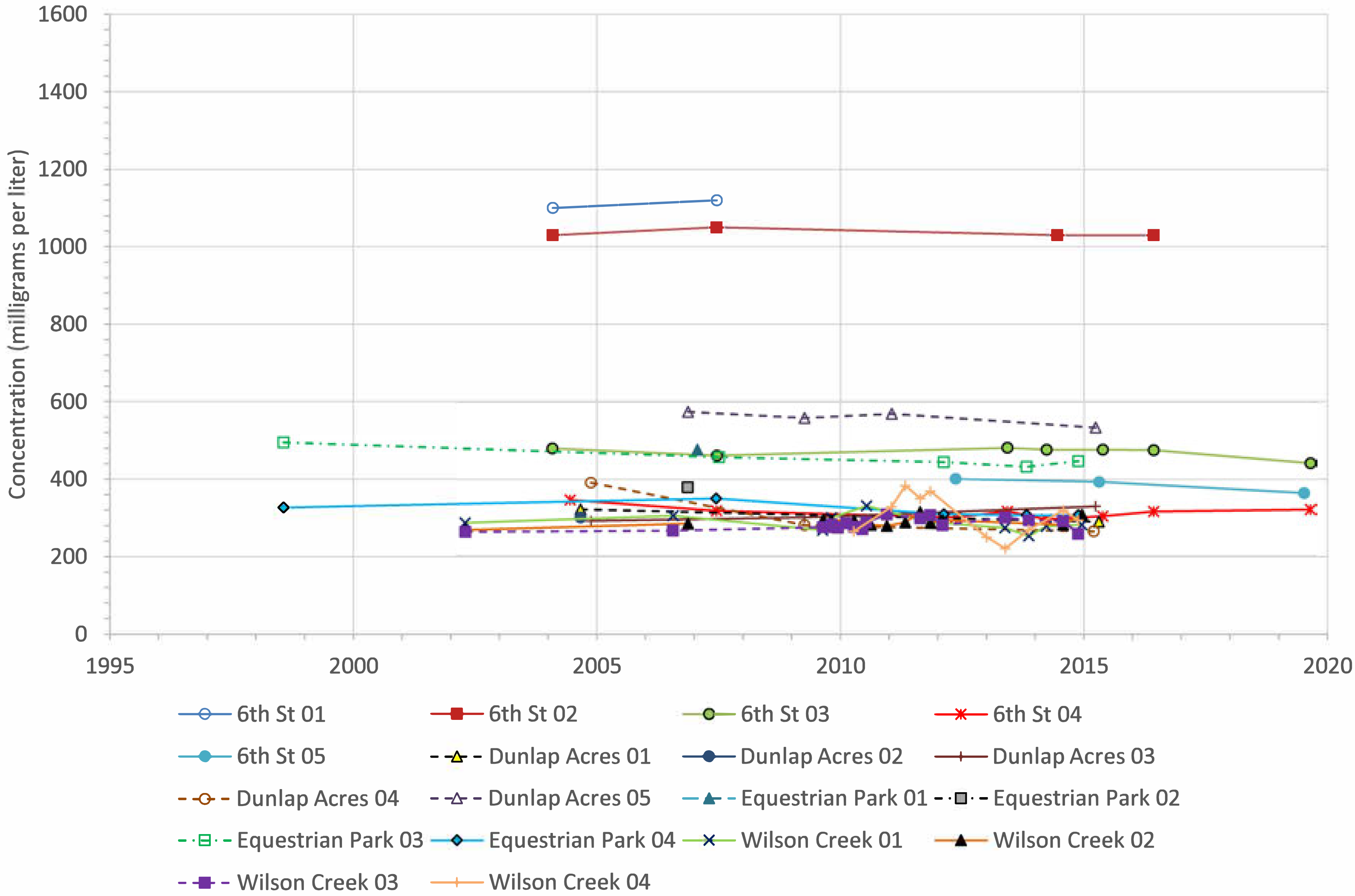

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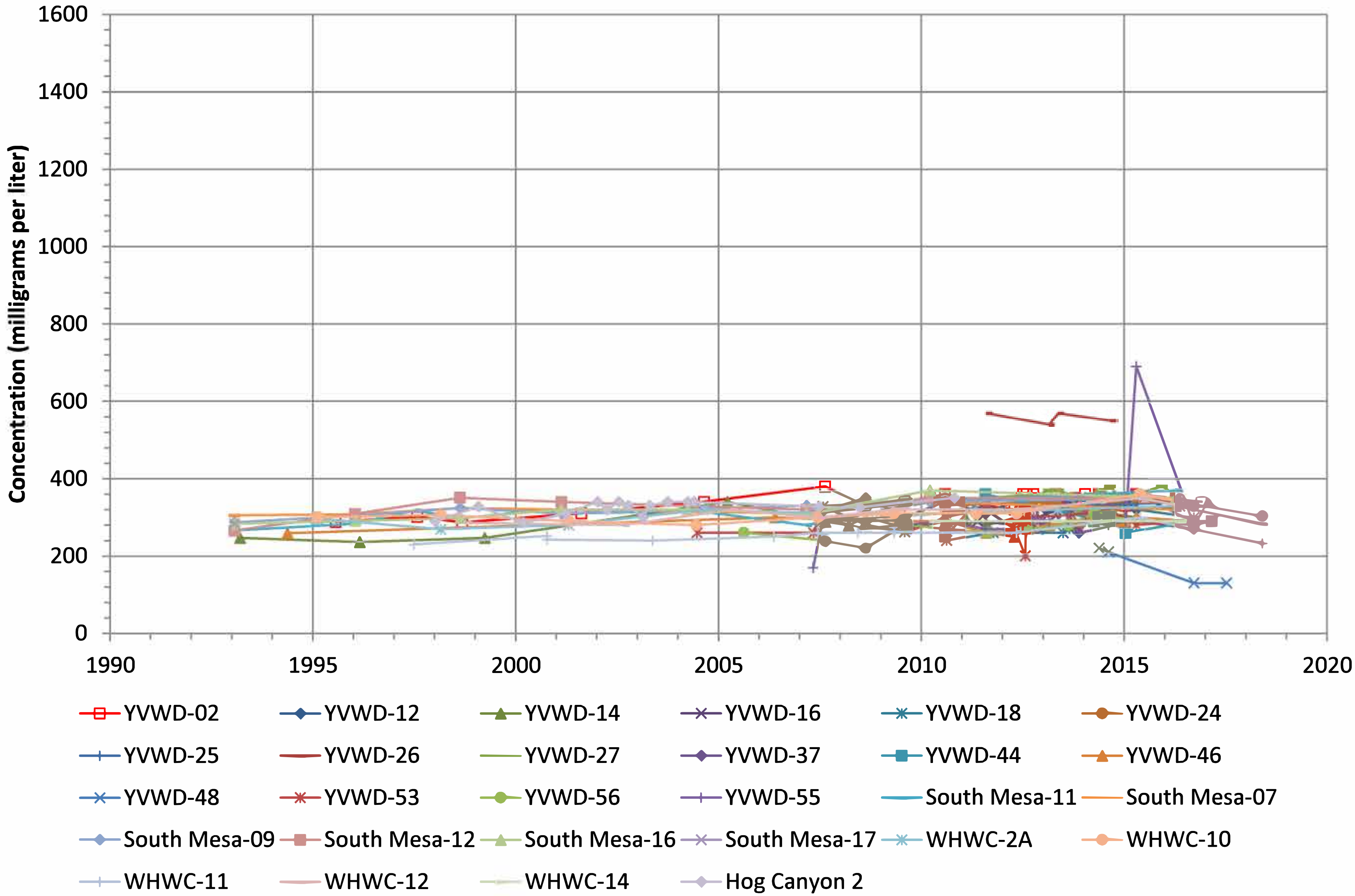
Figure 2-41. Concentrations of Total Dissolved Solids at Public Water Supply Wells in the Yucaipa Subbasin



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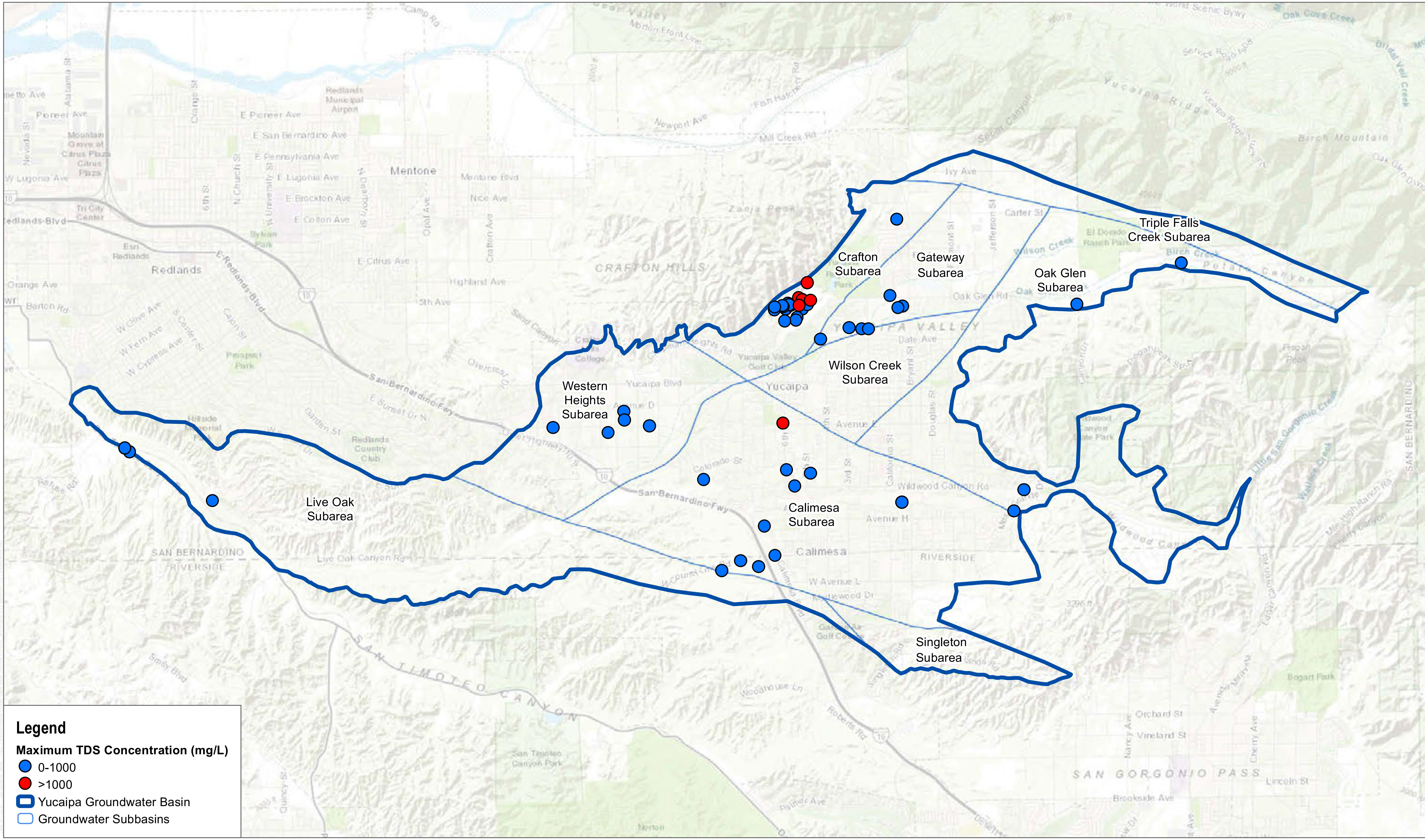

SOURCE: ESRI

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0 0.5 1 Miles

FIGURE 2-42

Maximum Total Dissolved Solids Concentrations Detected Above the MCL in Groundwater Wells

Yucaipa Subbasin Groundwater Sustainability Plan

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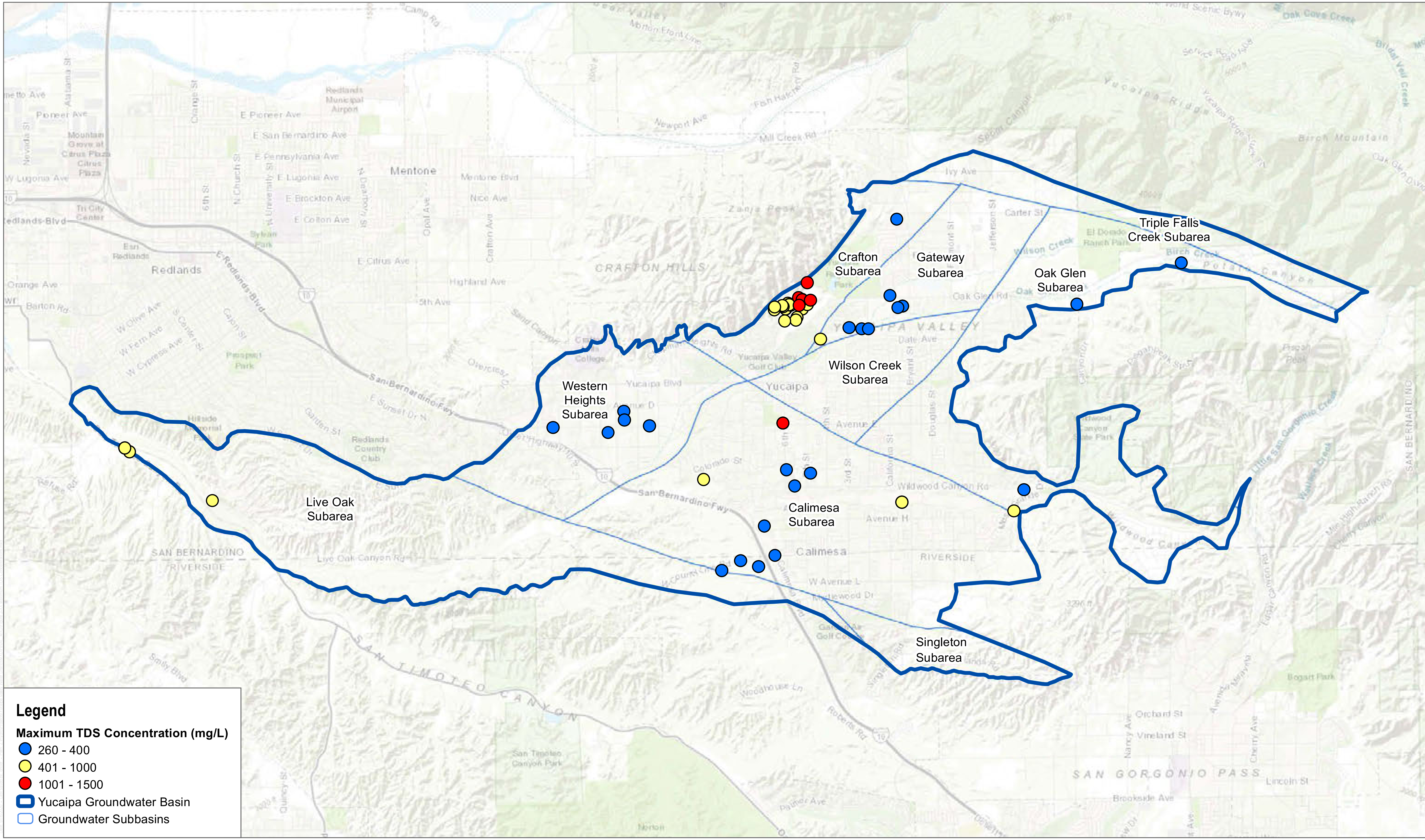

SOURCE: ESRI

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FIGURE 2-43

Maximum Total Dissolved Solids Concentrations Detected in Groundwater Wells Relative to Maximum Benefit Water Quality Objectives

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Figure 2-44. Total Dissolved Solids and Monthly Discharges of Recycled Water at WRWRF OutFall

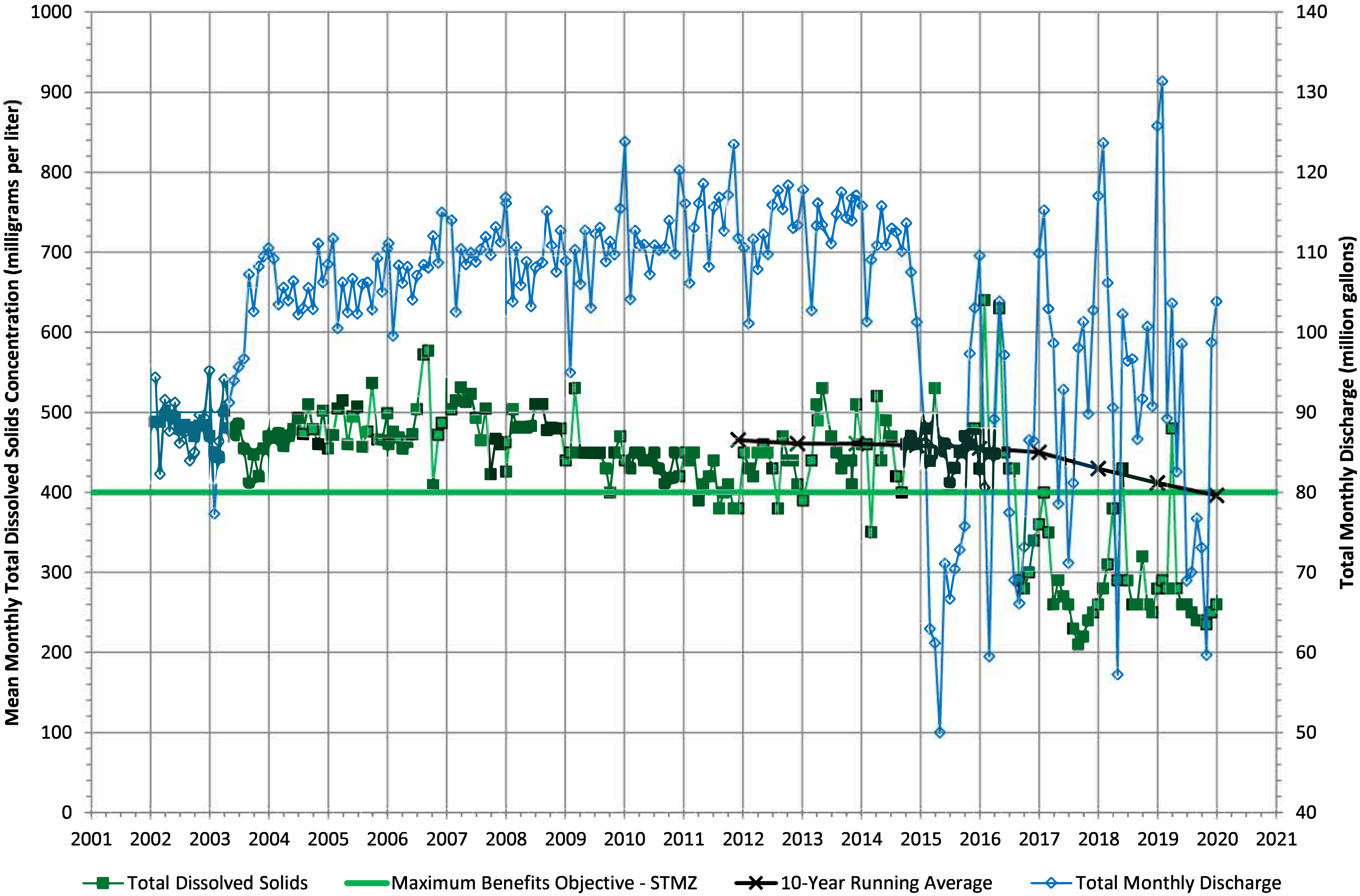

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Figure 2-45. Concentrations of Nitrate (as Nitrogen) at the Former Yucaipa Landfill in the Yucaipa Subbasin

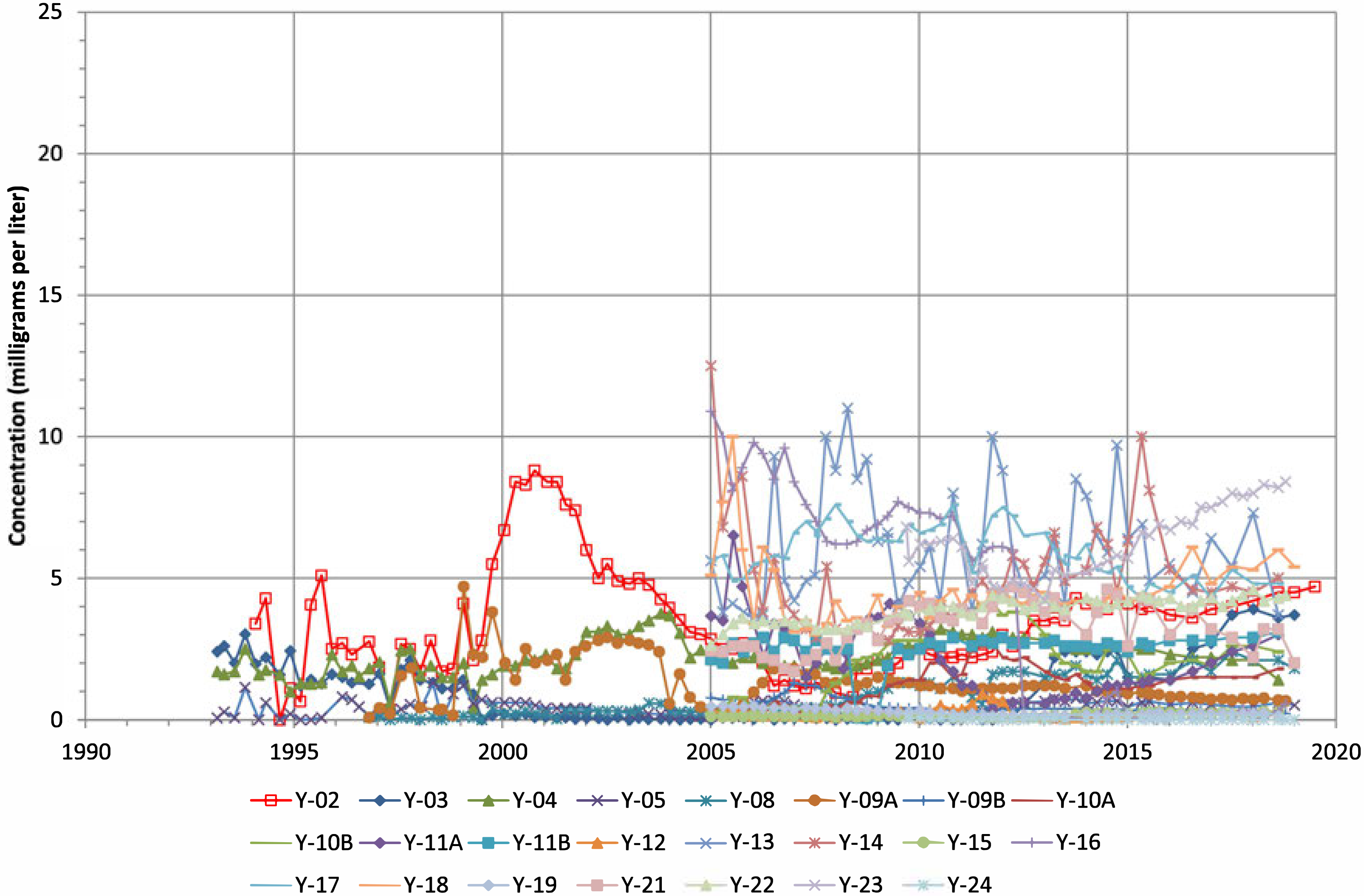

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Figure 2-46. Concentrations of Nitrate (as Nitrogen) at USGS Observation Wells in the Yucaipa Subbasin

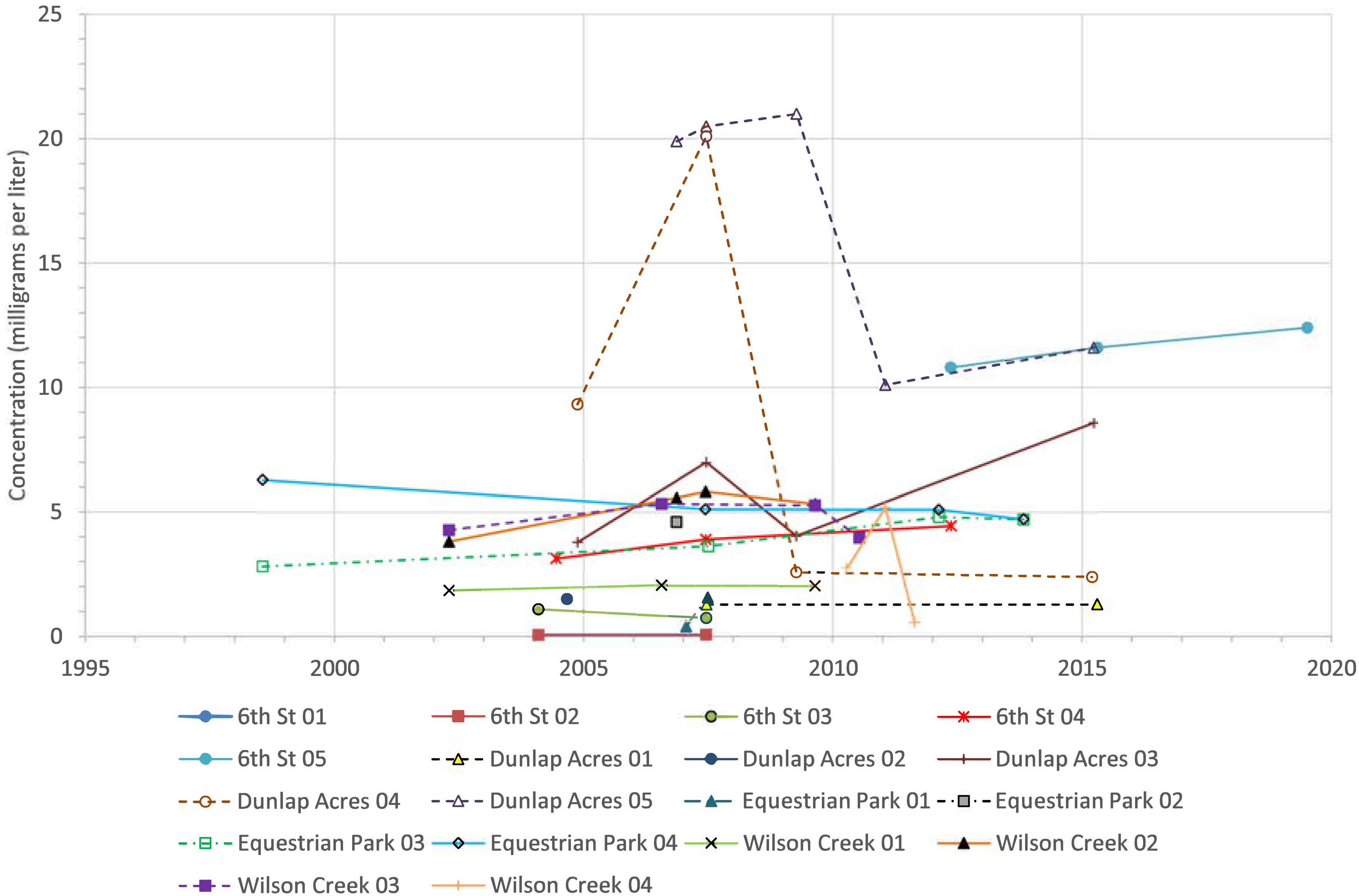

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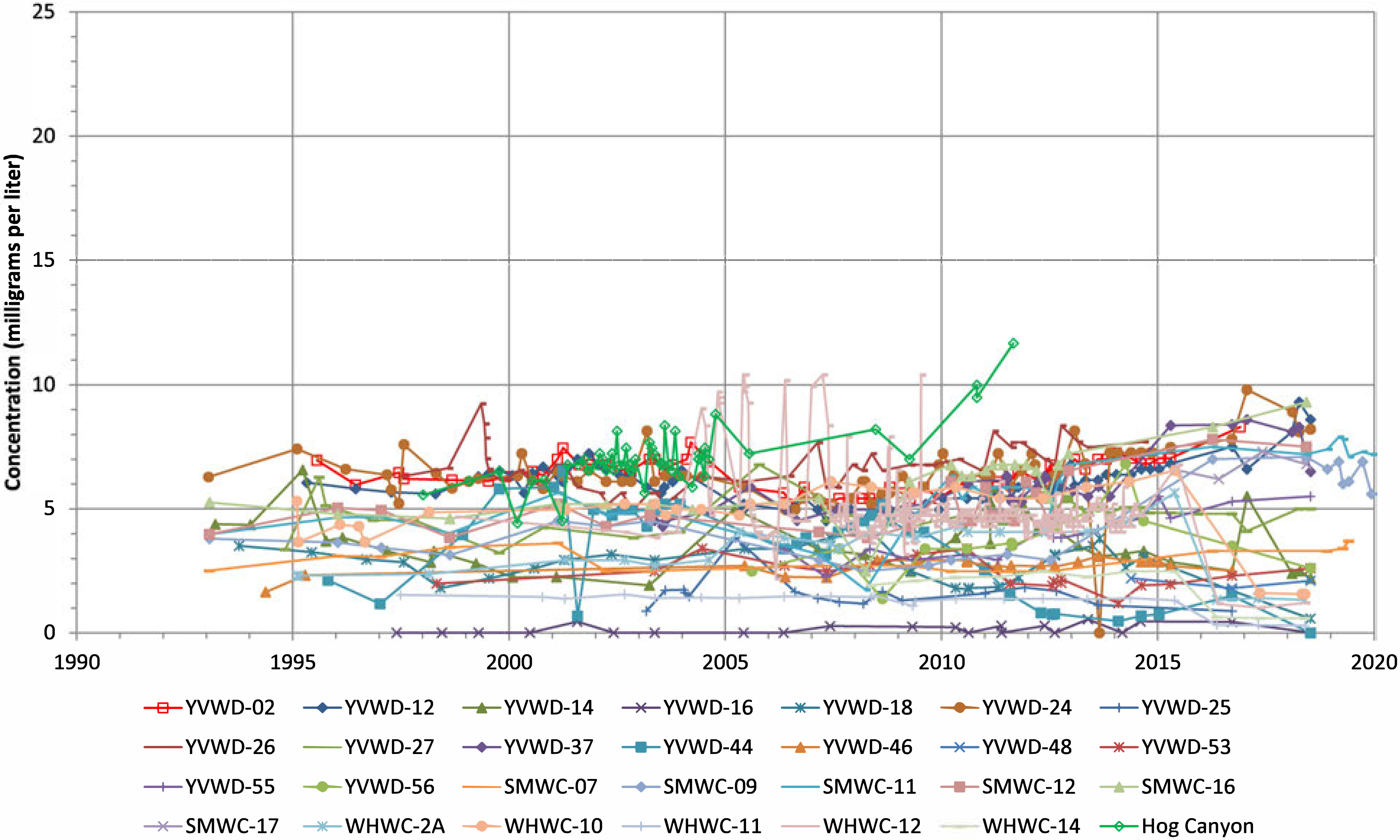
Figure 2-47. Concentrations of Nitrate (as Nitrogen) at Public Water Supply Wells in the Yucaipa Subbasin



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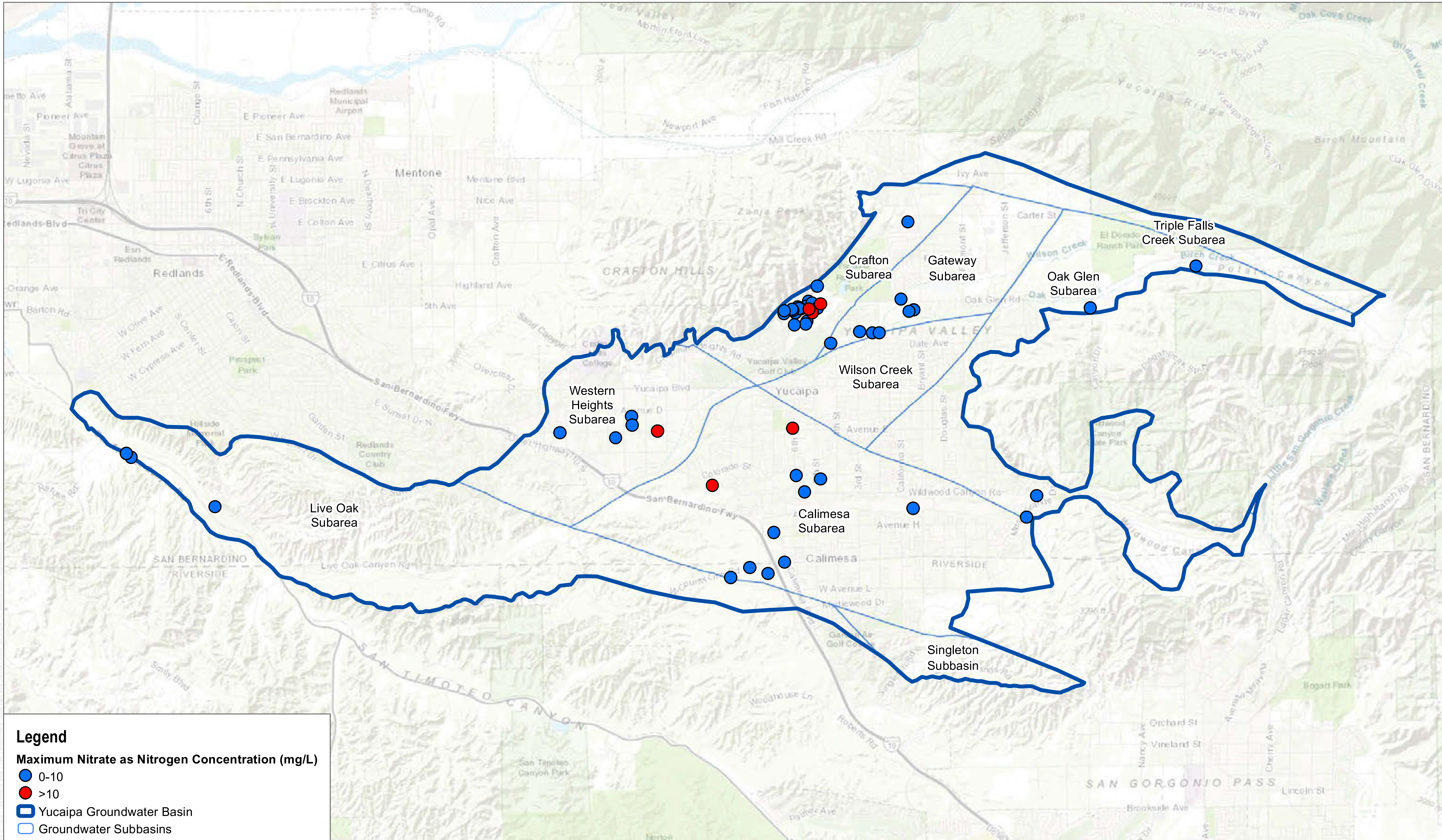

SOURCE: ESRI

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FIGURE 2-48

Maximum Nitrate Concentrations Detected in Groundwater Wells

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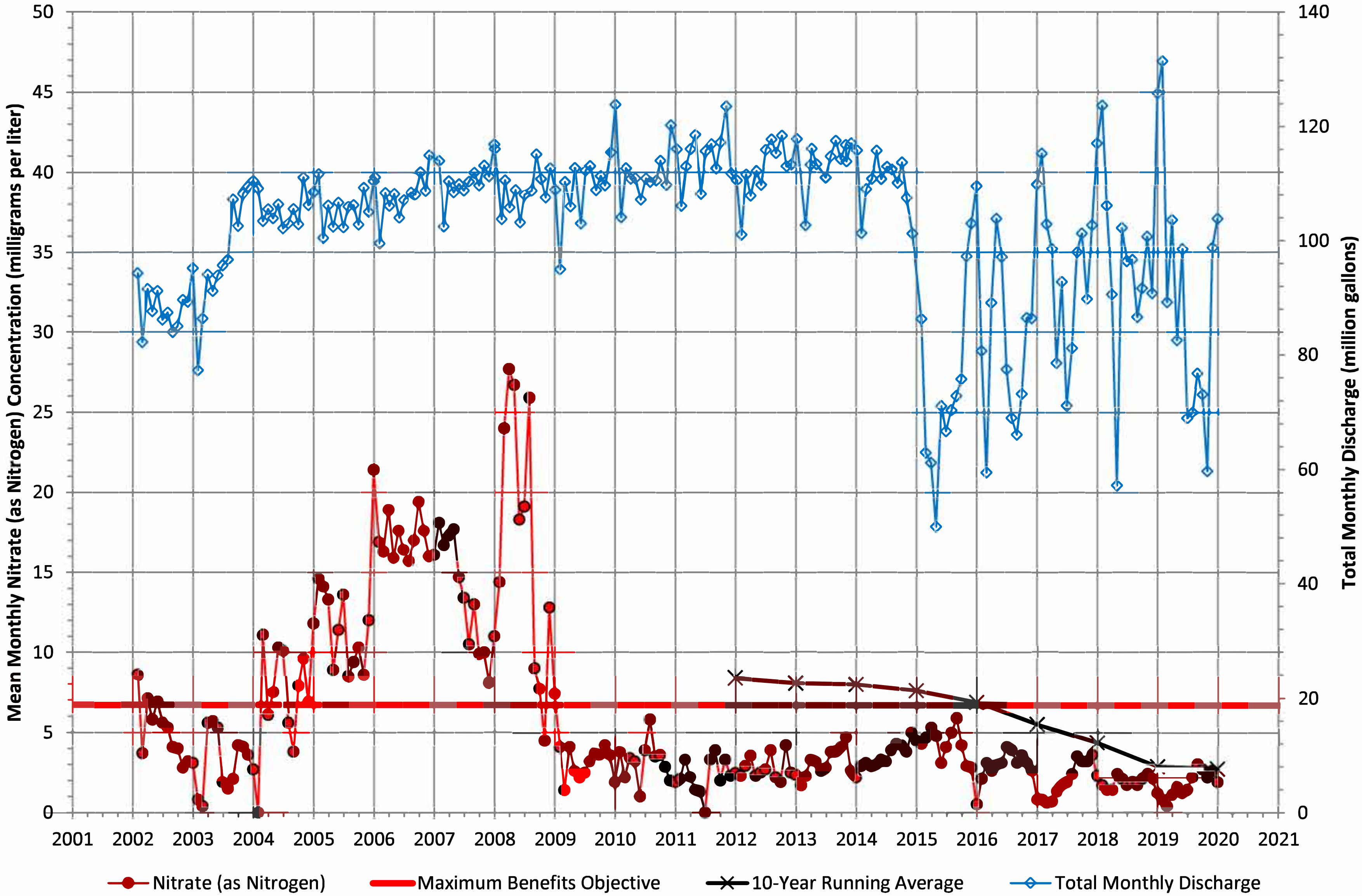
Figure 2-49. Nitrate (as Nitrogen) and Monthly Discharges of Recycled Water from WRWRF to San Timoteo Creek



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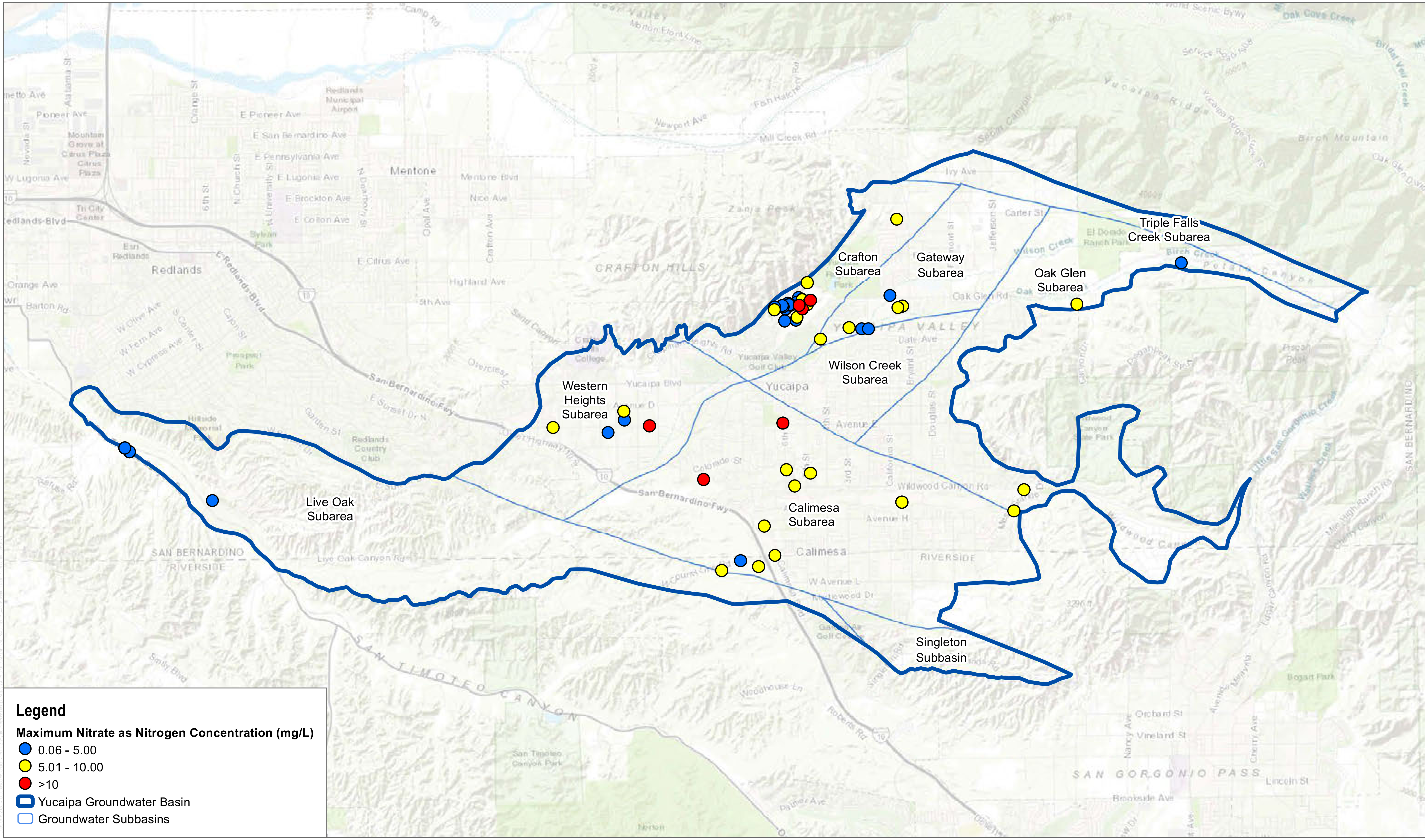

SOURCE: ESRI

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FIGURE 2-50

Maximum Nitrate Concentrations Detected in Groundwater Wells

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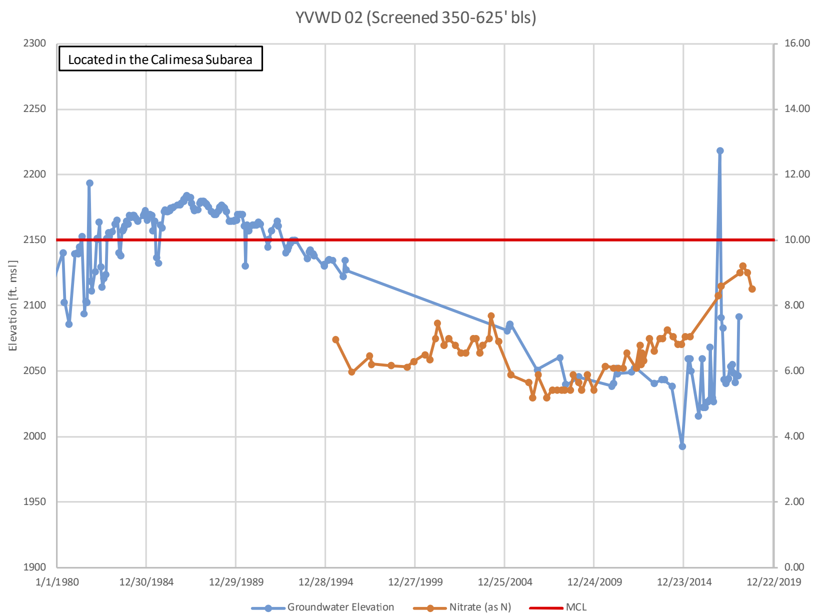

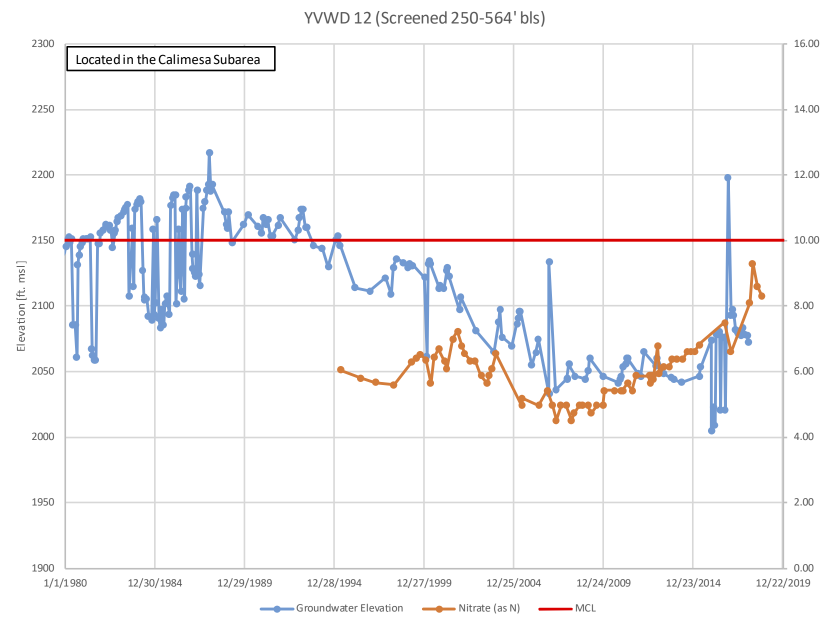

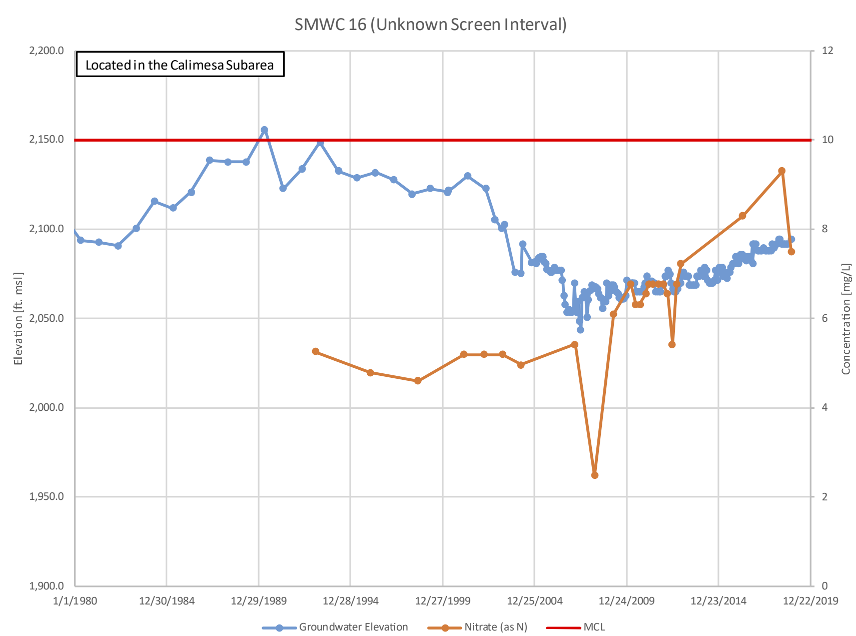

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FIGURE 2-51

Water Quality Hydrographs - Calimesa Subarea

Yucaipa Subbasin Groundwater Sustainability Plan

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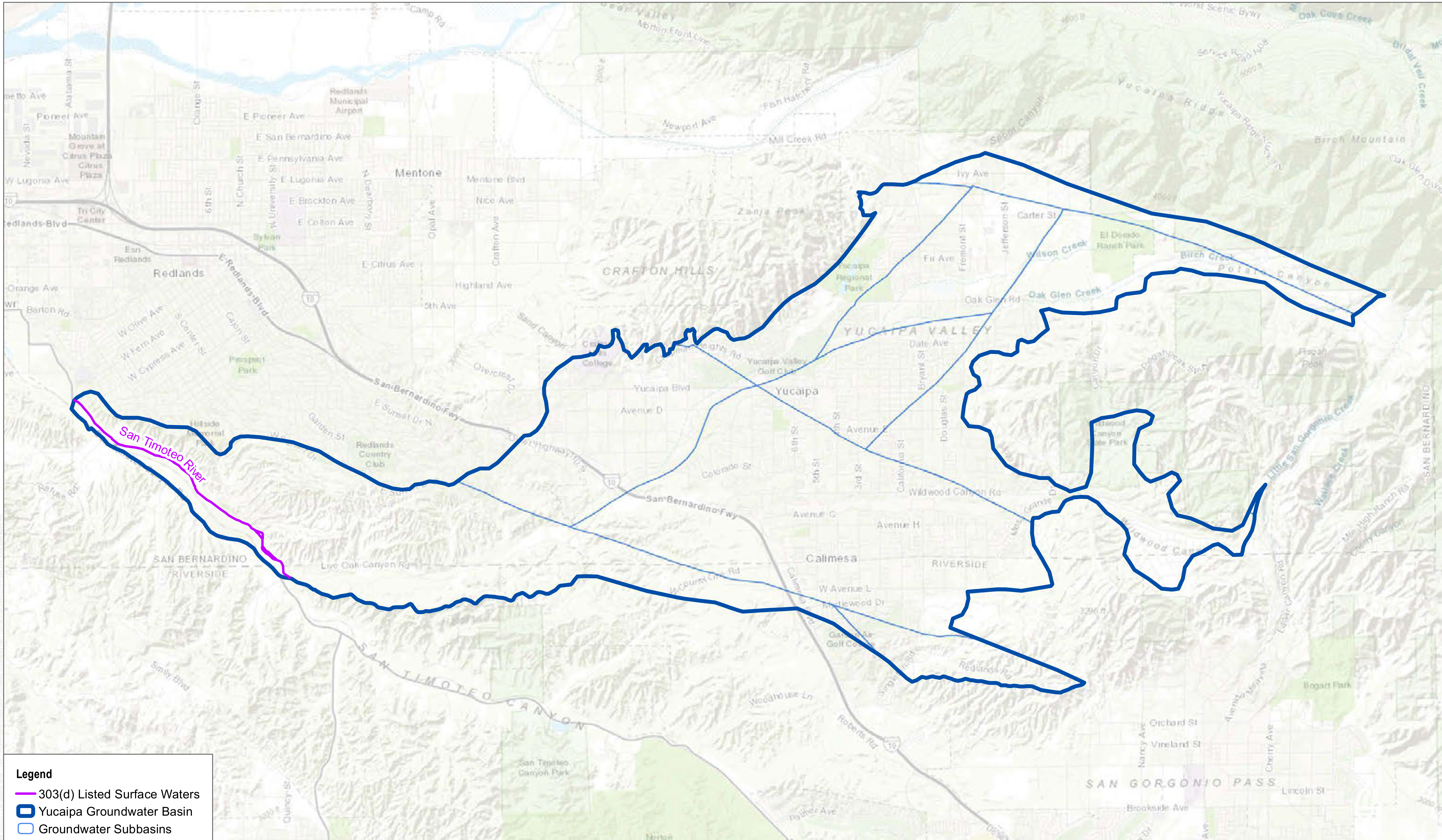

SOURCE: ESRI, RWQCB 2016

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FIGURE 2-52

303(d) Listed Waters

Yucaipa Subbasin Groundwater Sustainability Plan

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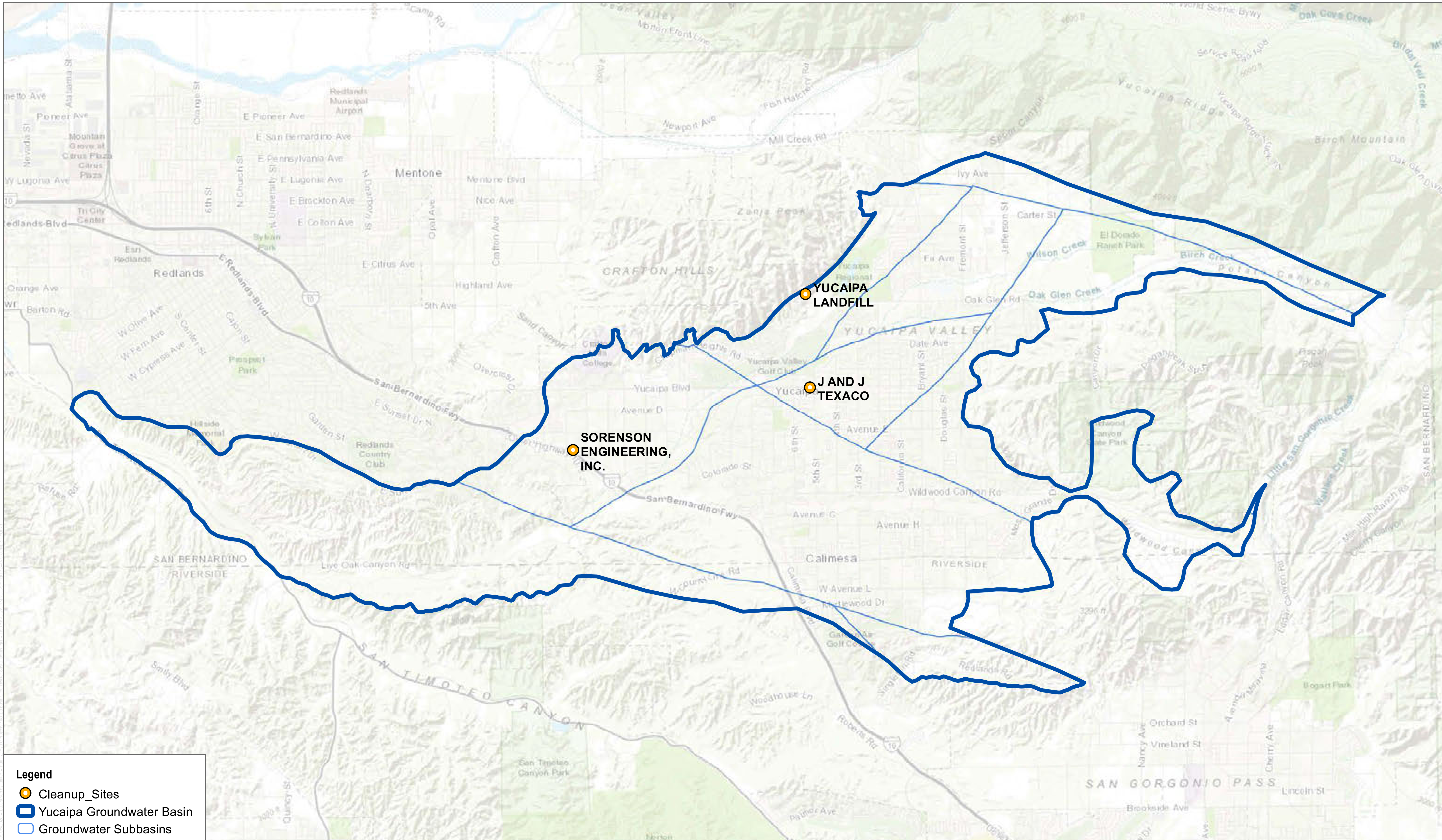

SOURCE: ESRI,

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FIGURE 2-53

Cleanup Sites

Yucaipa Subbasin Groundwater Sustainability Plan

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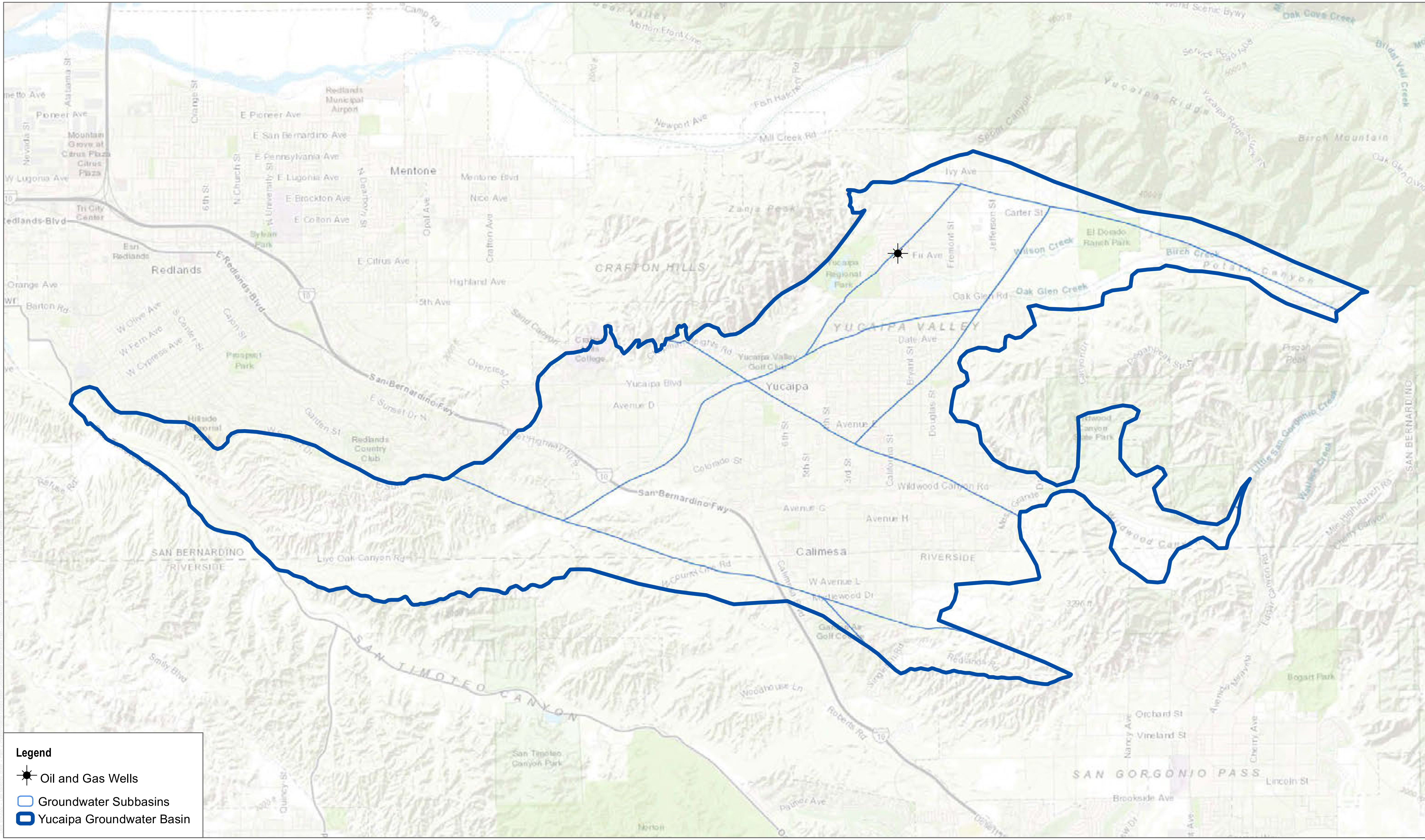

SOURCE: ESRI, DOGGR 2020

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FIGURE 2-54

Oil and Gas Wells

Yucaipa Subbasin Groundwater Sustainability Plan

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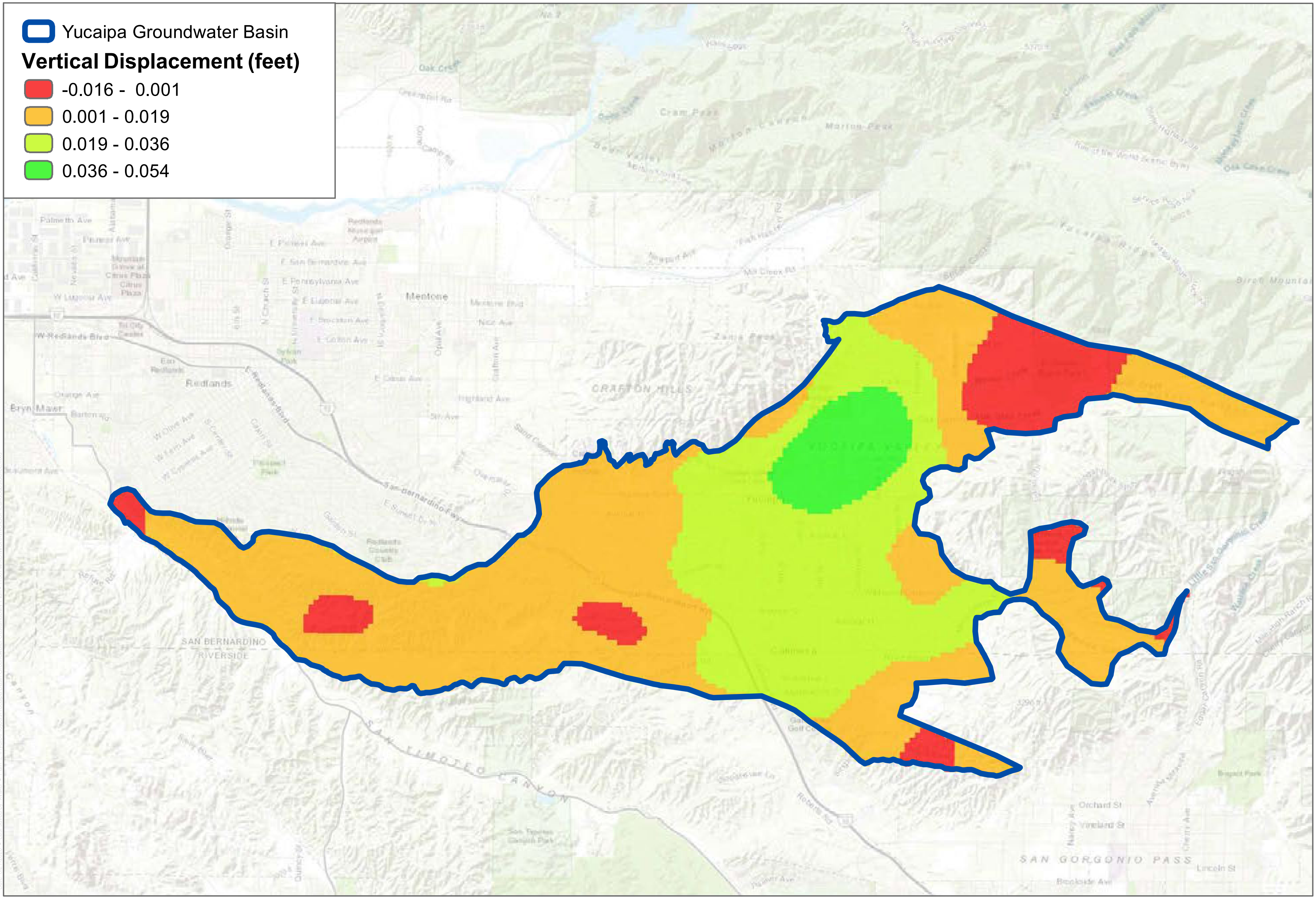

SOURCE: ESRI; SGMA TRE ALTAMIRA InSAR

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FIGURE 2-55

Land Subsidence

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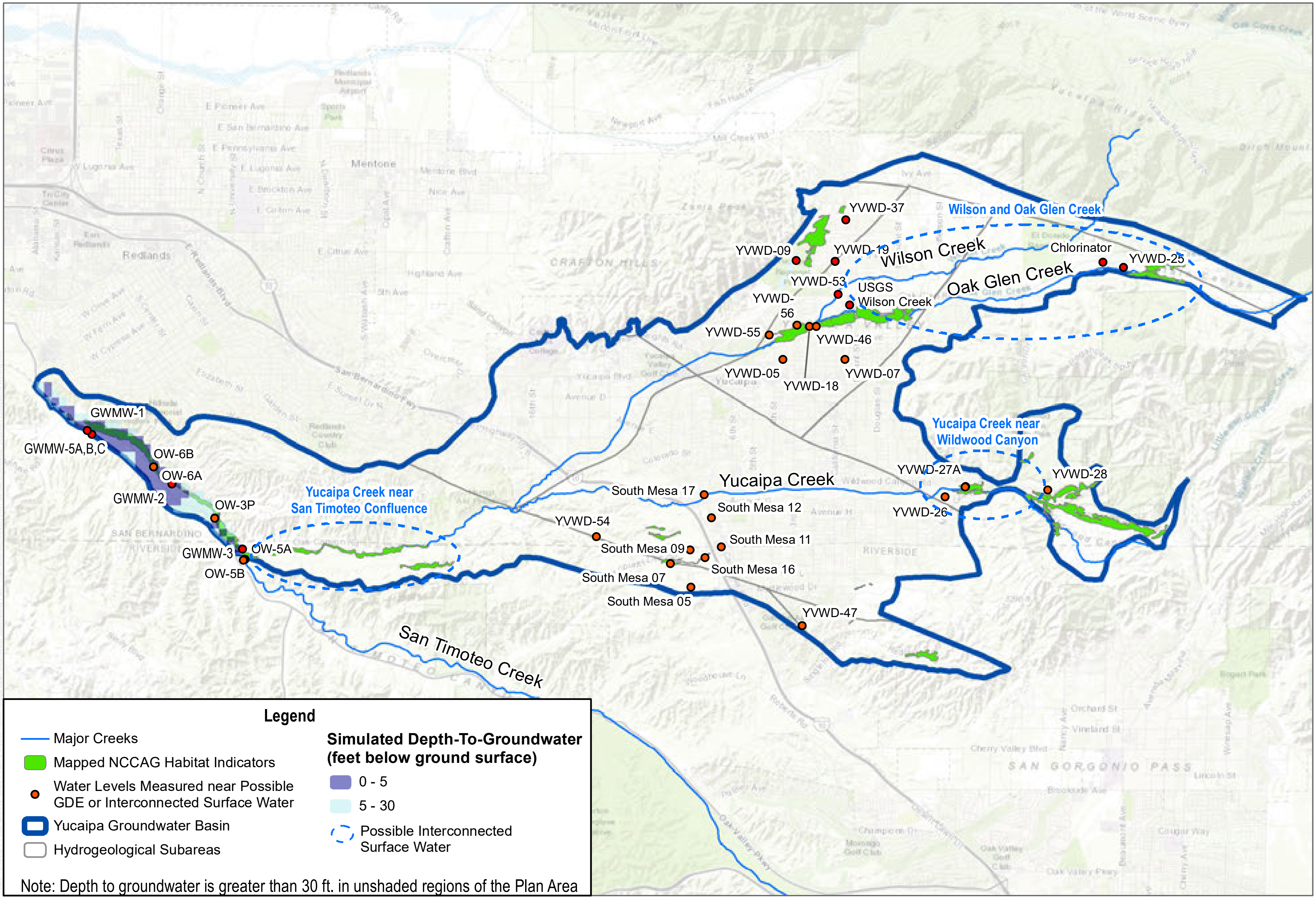

SOURCE: ESRI; DWR 2018; TNC 2019; USGS 2021

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FIGURE 2-56

Possible Interconnected Surface Water and Mapped Groundwater Dependent Ecosystems in the Plan Area

Yucaipa Subbasin Groundwater Sustainability Plan

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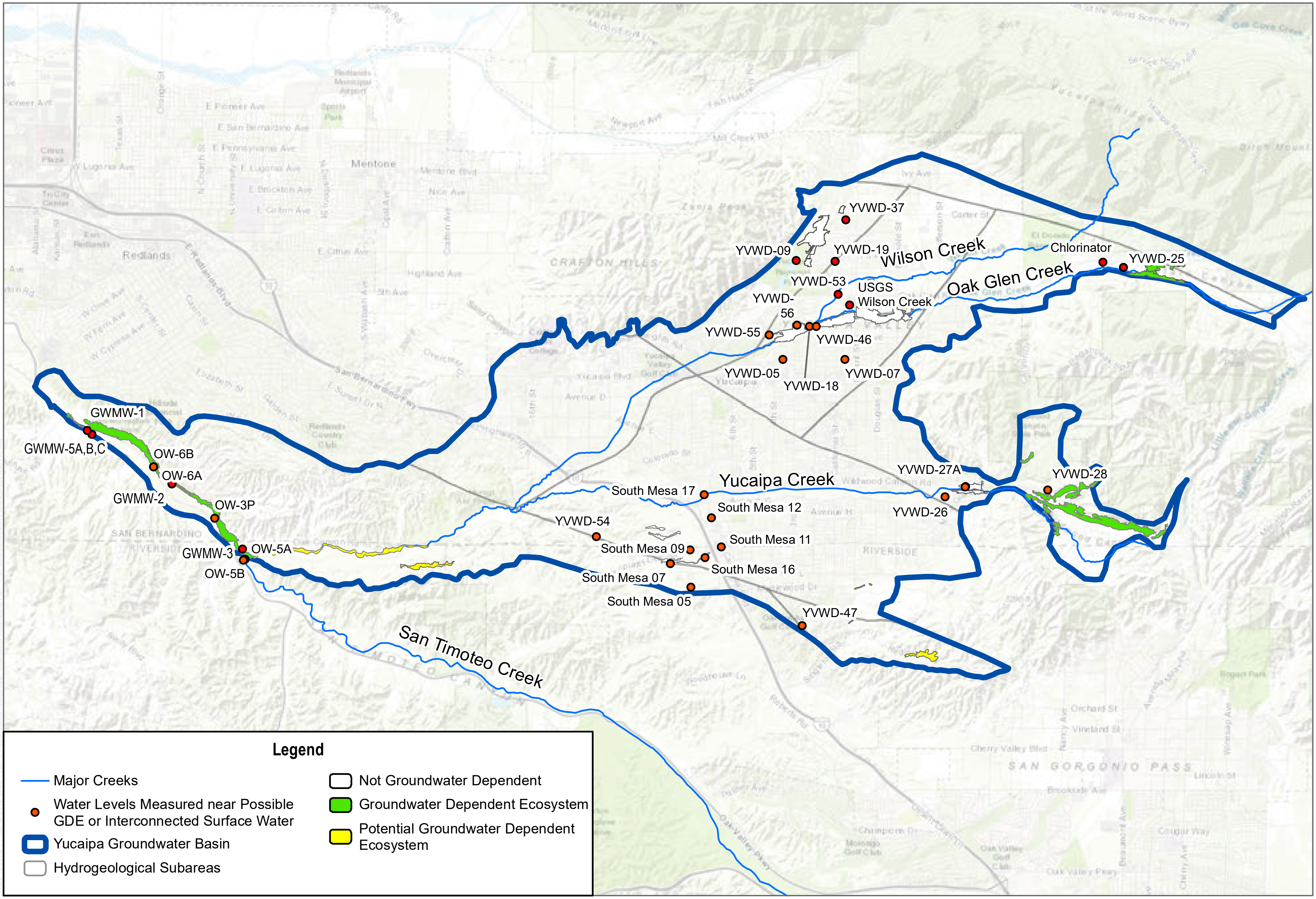

SOURCE: ESRI; DWR 2018; TNC 2019; USGS 2021

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FIGURE 2-57

Characterization of Groundwater Dependent Ecosystems in the Plan Area

Yucaipa Subbasin Groundwater Sustainability Plan

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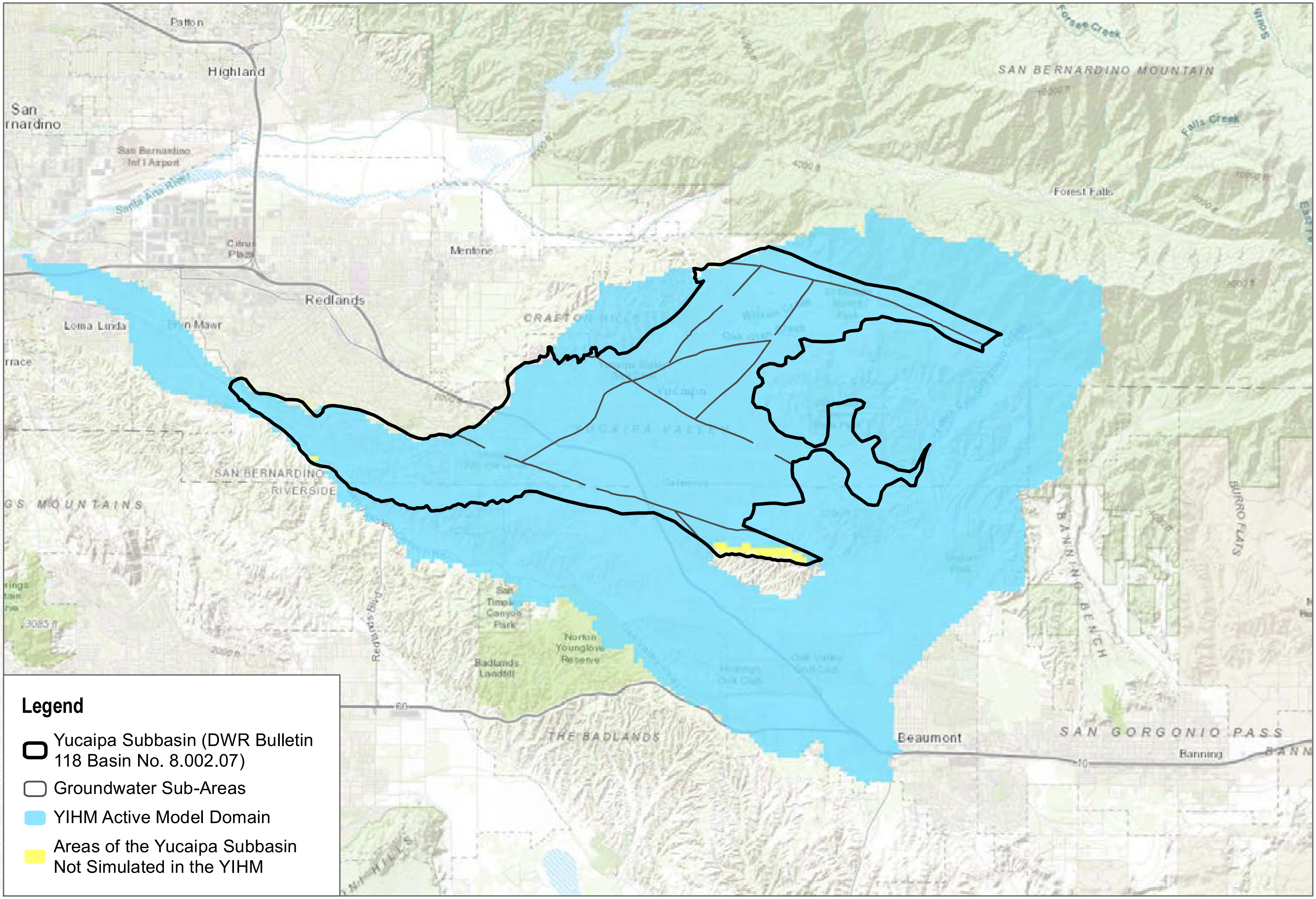

SOURCE: DWR, USGS

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FIGURE 2-58

Yucaipa Integrated Hydrologic Model Active Model Domain

Yucaipa Subbasin Groundwater Sustainability Plan

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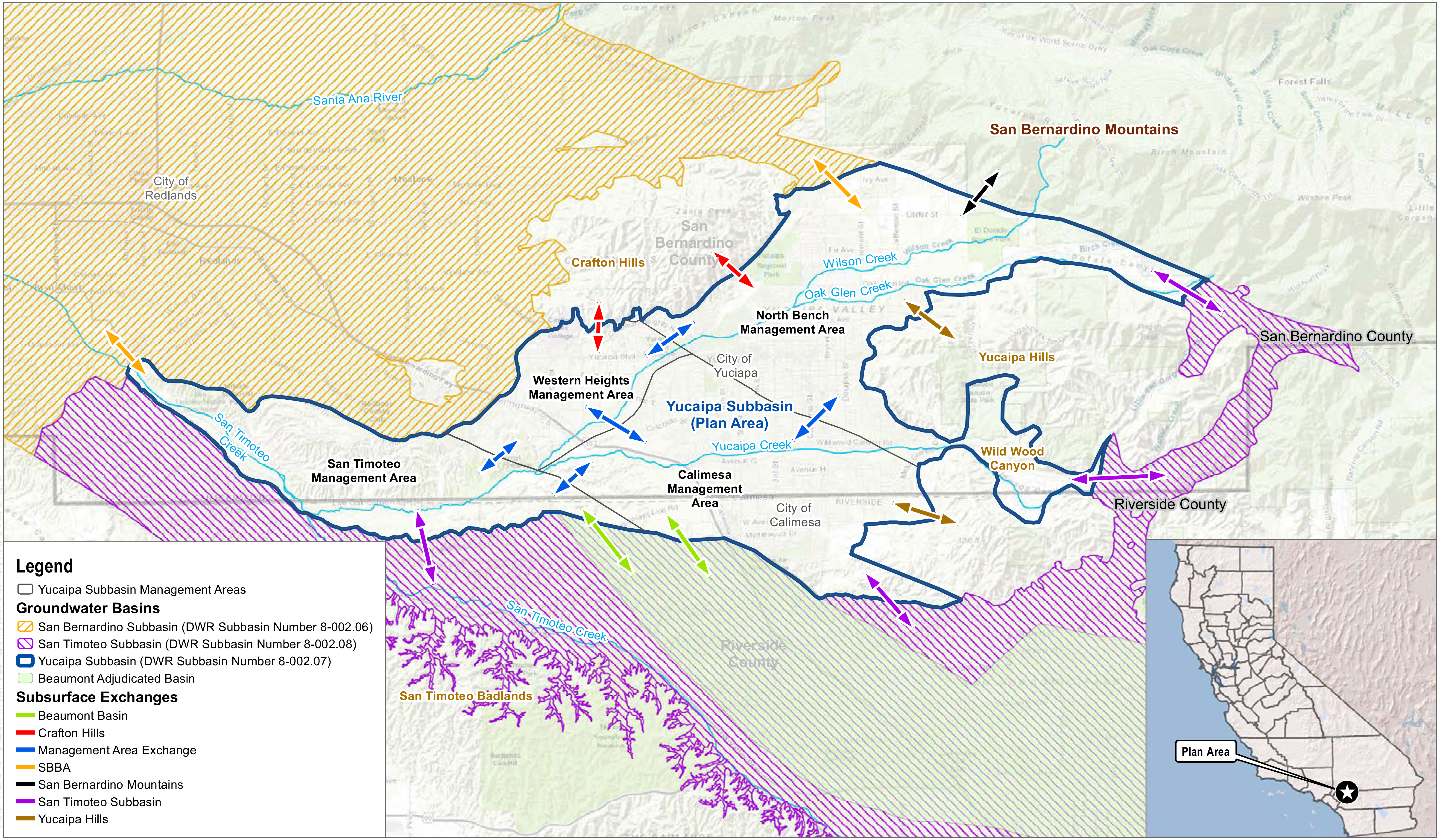

SOURCE: ESRI, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordanance Survey, ESRI Japan, METI, ESRI China (Hong Kong), swisstopo, OpenStreetMap contributors, and the GIS User Community; DWR 2015; USGS NHD 2017

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0 0.5 1 Miles

FIGURE 2-59

Subsurface Inflows and Outflows Simulated by the YIHM

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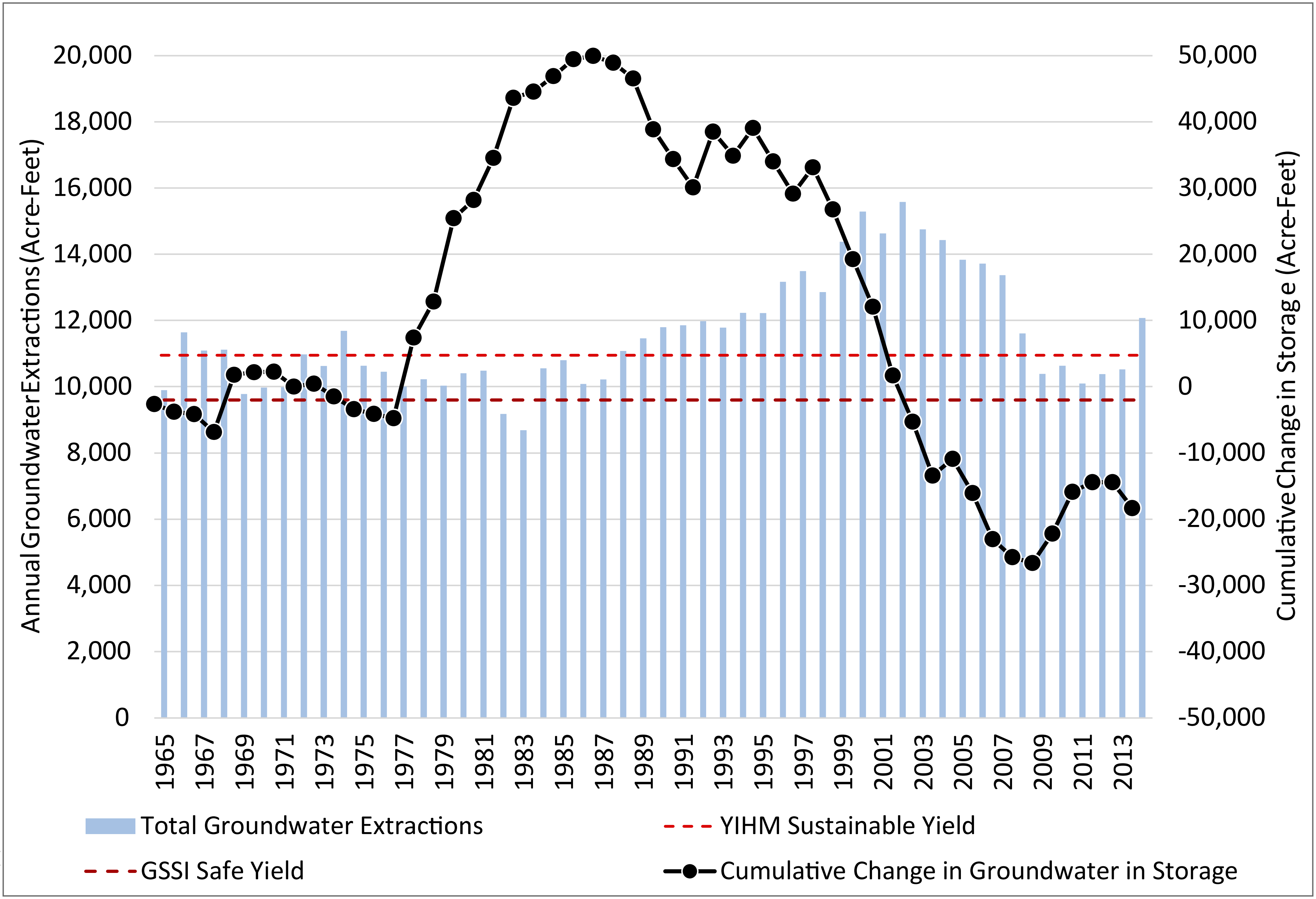

FIGURE 2-60

Historical Cumulative Change in Storage and Groundwater Production in the Yucaipa Subbasin

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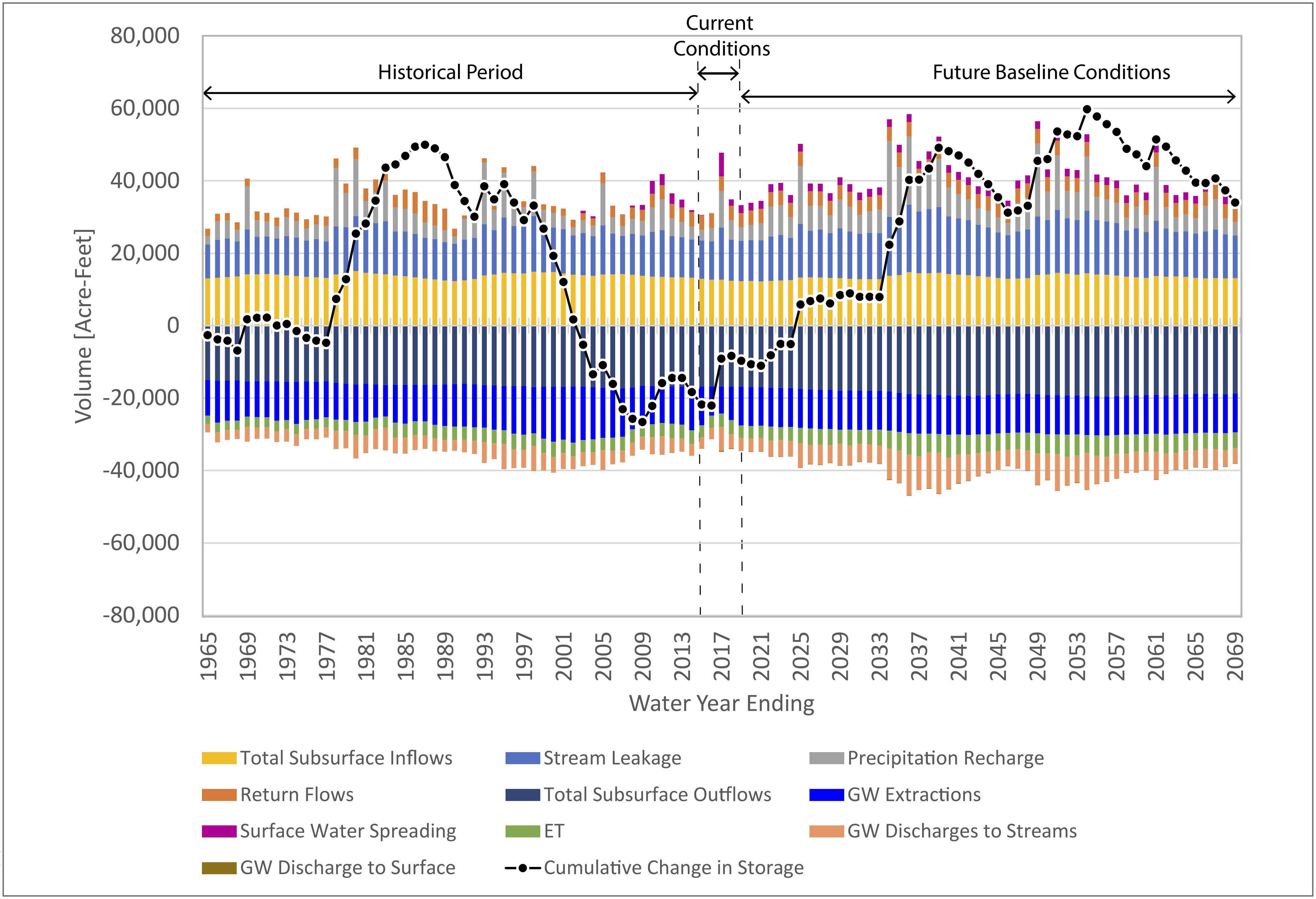

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FIGURE 2-61

Historical, Current, and Future Baseline Water Budget for the Yucaipa Subbasin

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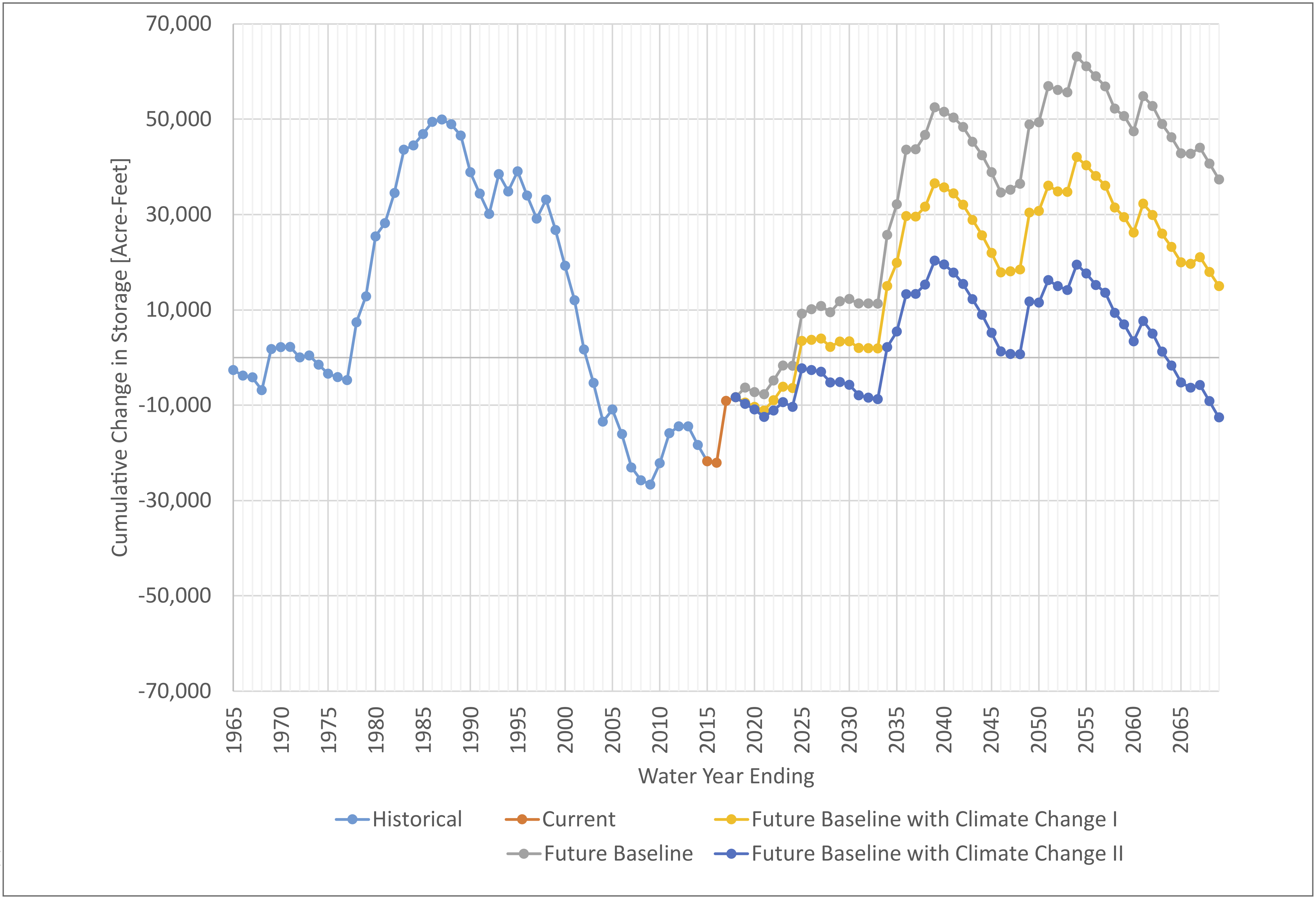

FIGURE 2-62

Historical, Current, and Projected Storage Change in the Yucaipa Subbasin

Yucaipa Subbasin Groundwater Sustainability Plan

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Yucaipa Groundwater Subbasin
Management Area Boundaries
Hydrogeologic Subareas

Geologic Units (CGS 2012)

Quaternary

Qa, Young Alluvium
Qsdloc, Sedimentary Deposits of Live Oak Formation

Tertiary

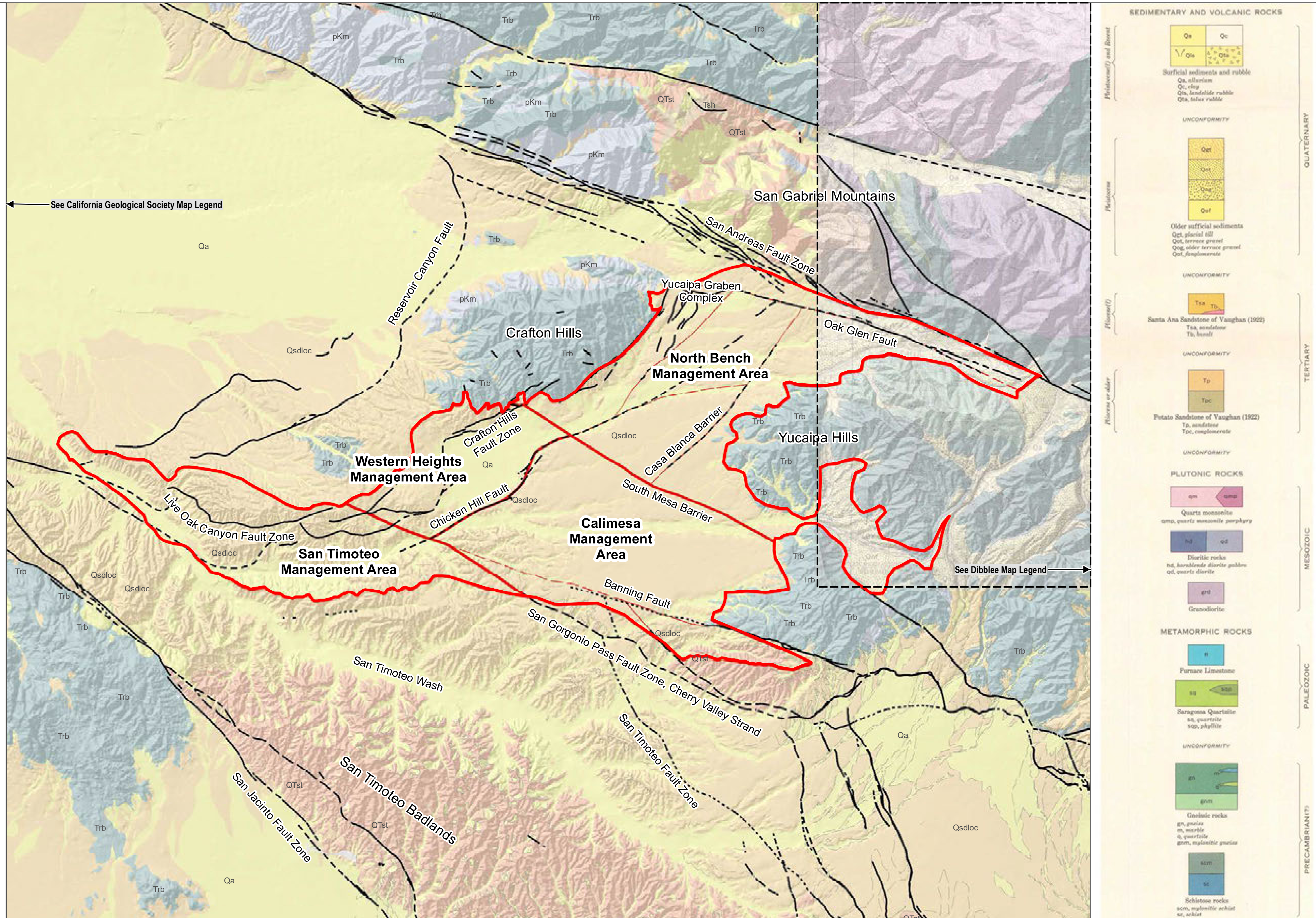
QTst, San Timoteo Formation (Middle Member)
Tsh, Mill Creek Formation
Tv, Dacite Dikes

Mesozoic and Older

pKm, Cretaceous and Pre-Cretaceous Metamorphic Formations of Sedimentary and Volcanic Origin
Trb, Granitic and Other Intrusive Crystalline Rocks, San Gabriel Mountains-type

Faults and Geologic Contacts

contact, identity and existence certain, location accurate
contact, identity and existence certain, location approximate
fault, identity and existence certain, location accurate
fault, identity and existence certain, location approximate
fault, identity and existence certain, location concealed
fault, identity and existence certain, location inferred



SOURCE: CGS 2012, USGS 1999

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0 0.5 1 2 Miles

FIGURE 2-63

Geologic Map and Management Area Boundaries in the Yucaipa Subbasin

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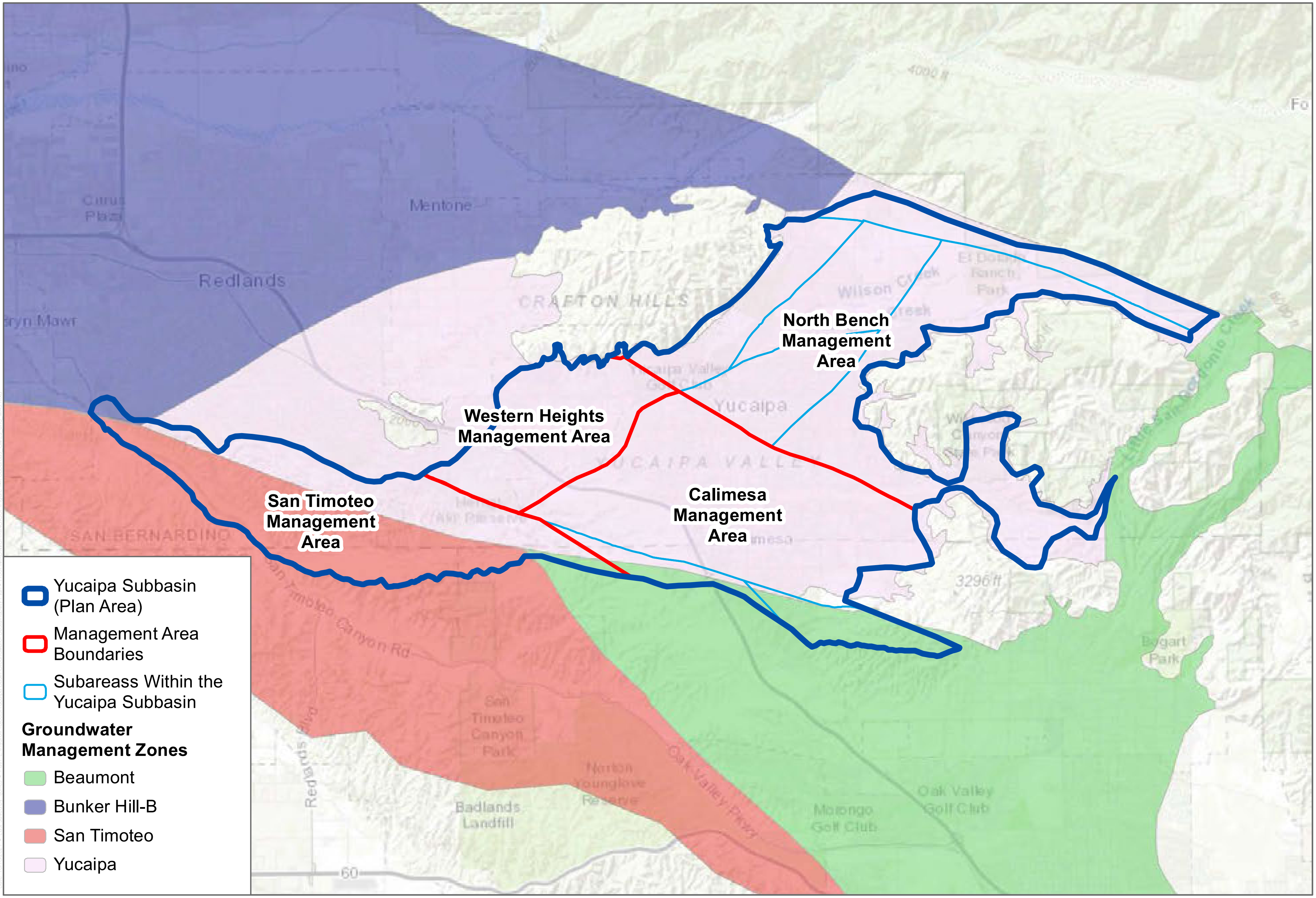

SOURCE: ESRI, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordanance Survey, ESRI Japan, METI, ESRI China (Hong Kong), swisstopo, OpenStreetMap contributors, and the GIS User Community; DWR 2015; USGS NHD 2017

DUDEK

FIGURE 2-64

Groundwater Management Areas, Subareas, and Groundwater Management Zones in the Yucaipa Subbasin

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Figure 2-65. Groundwater Elevations across the South Mesa Barrier

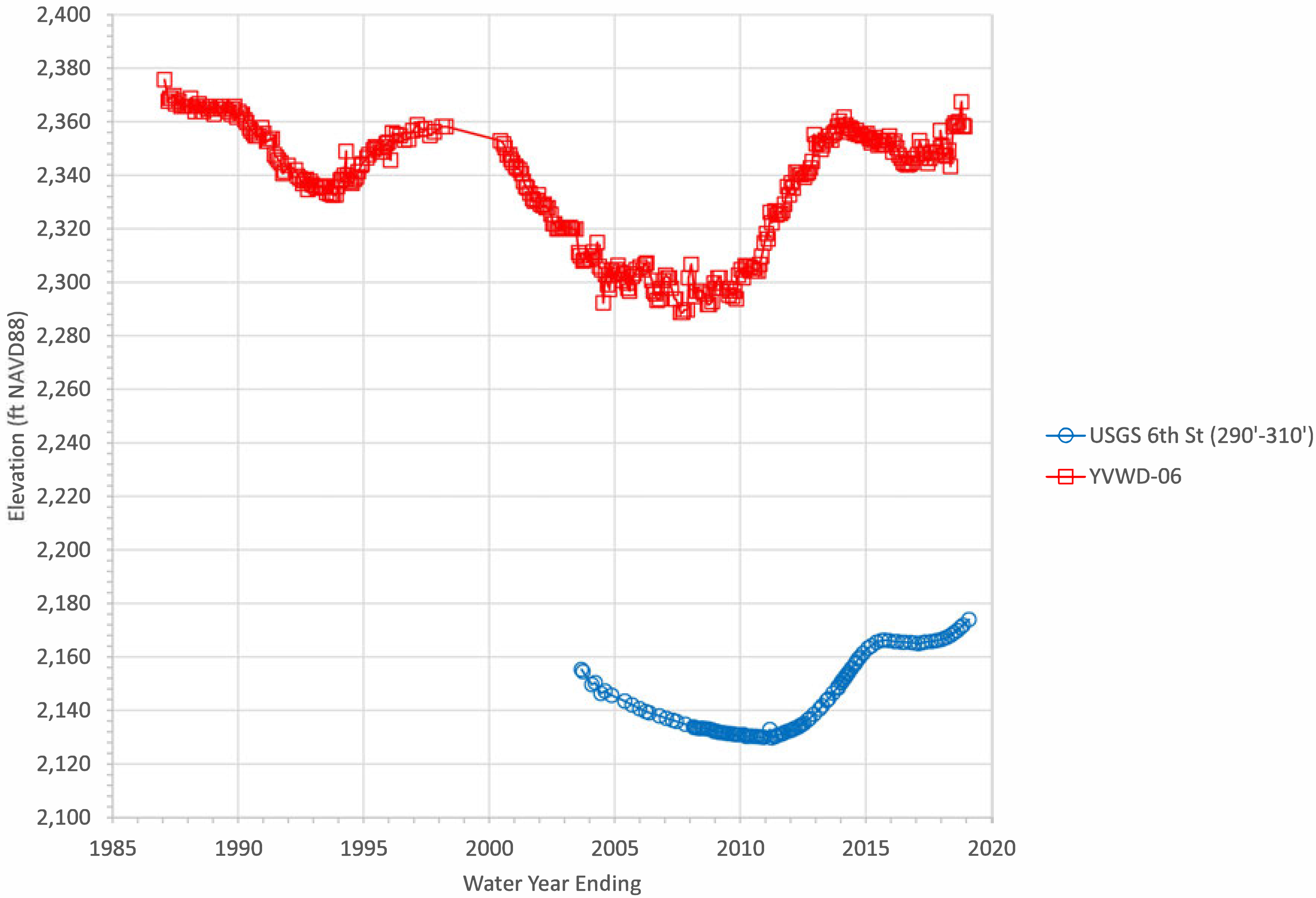

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Figure 2-66. Historical Groundwater Elevations in the North Bench Management Area

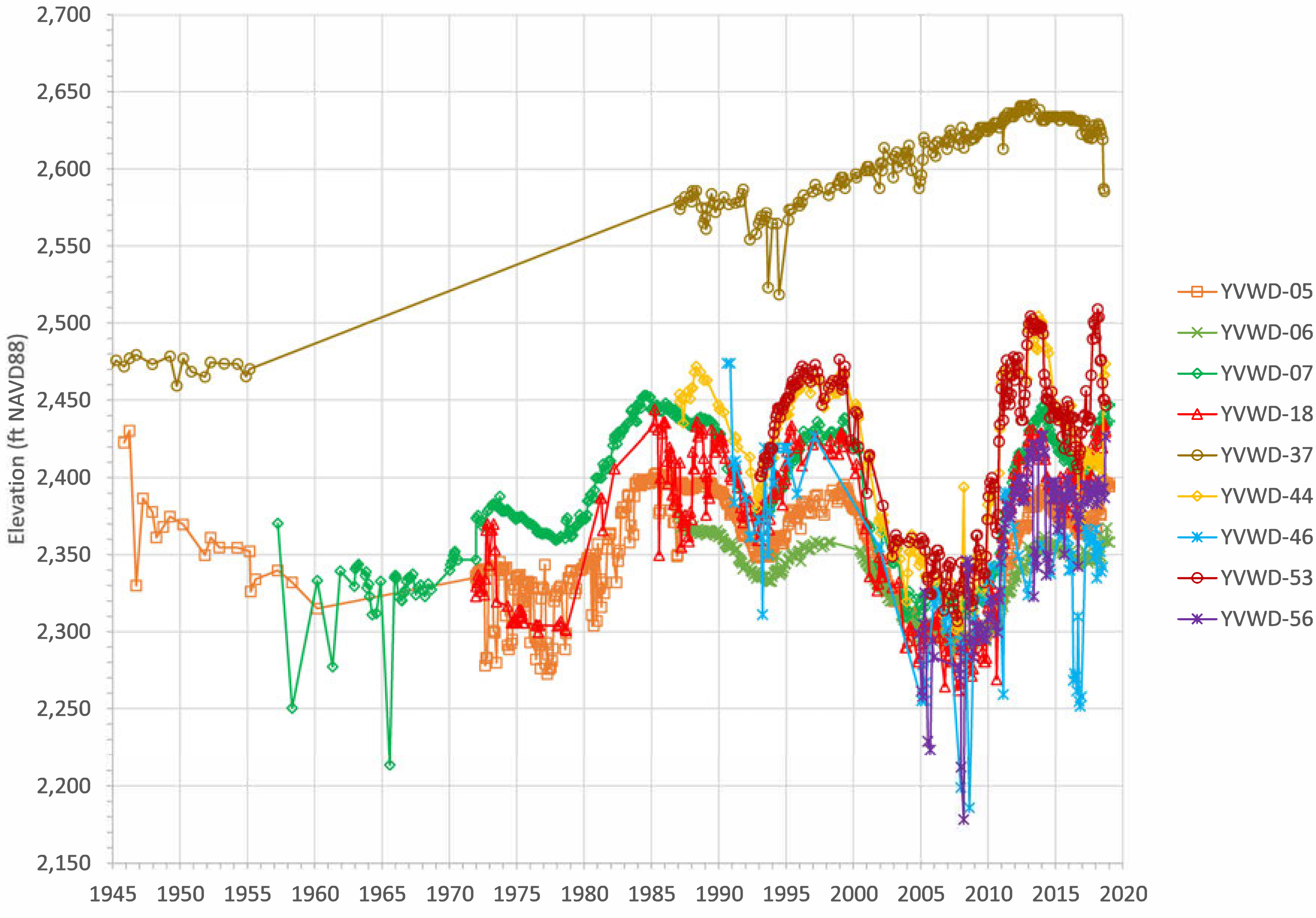

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Figure 2-67. Historical and Current Volume of Groundwater in Storage in the North Bench Management Area

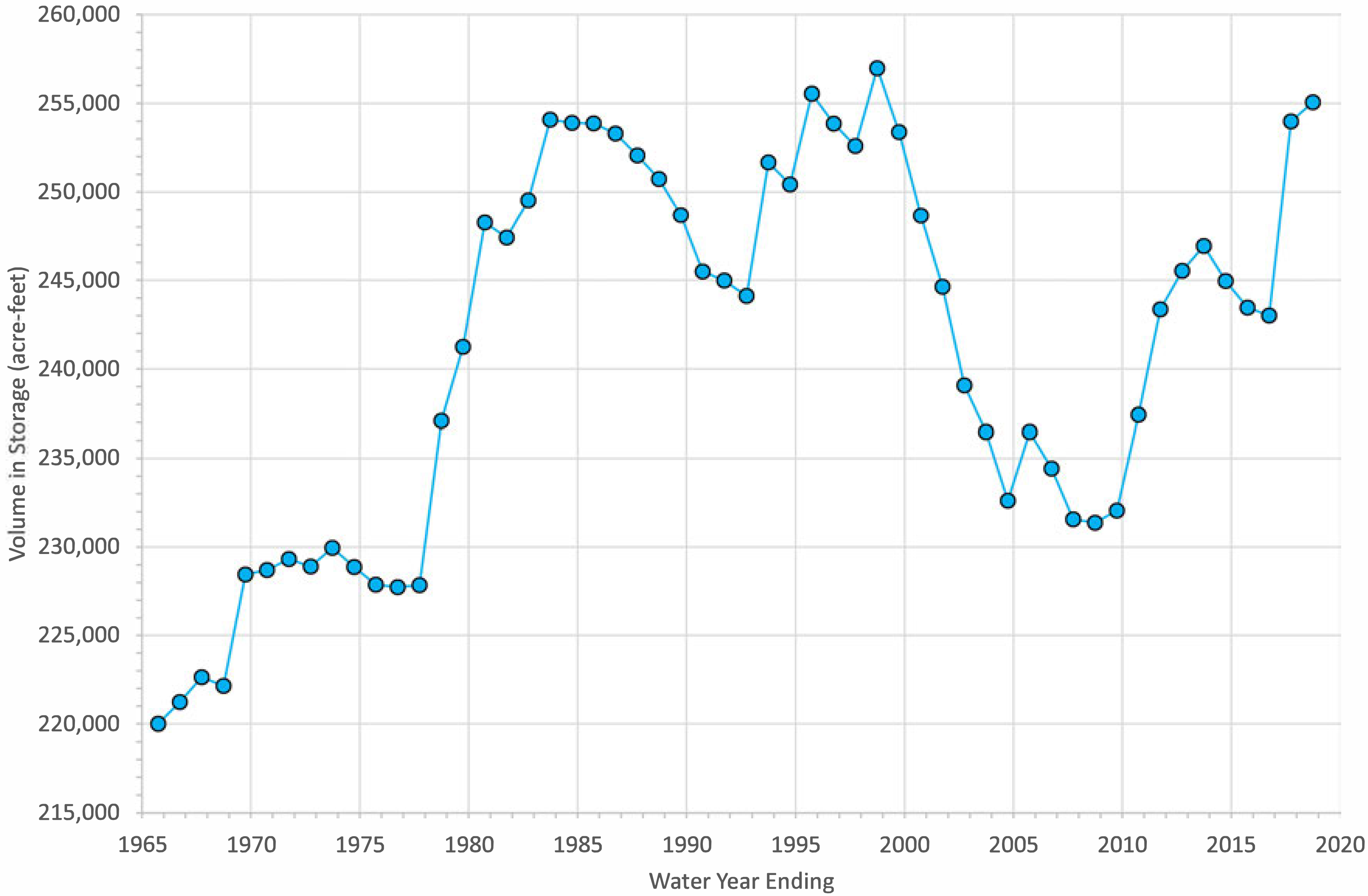

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Figure 2-68. Groundwater Elevations across the Banning Fault
in the Calimesa Management Area

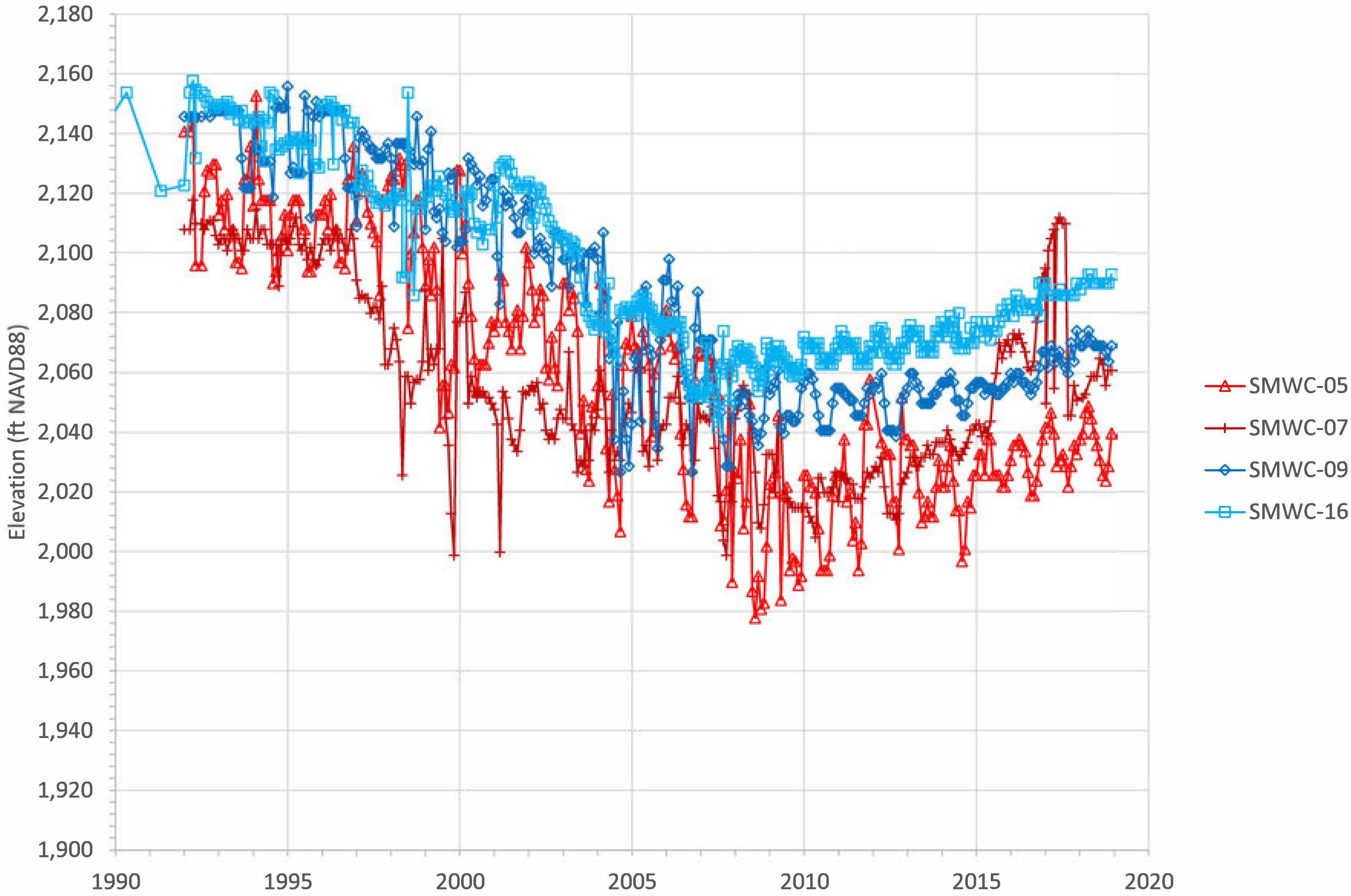

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Figure 2-69. Historical Groundwater Elevations in the Calimesa Management Area

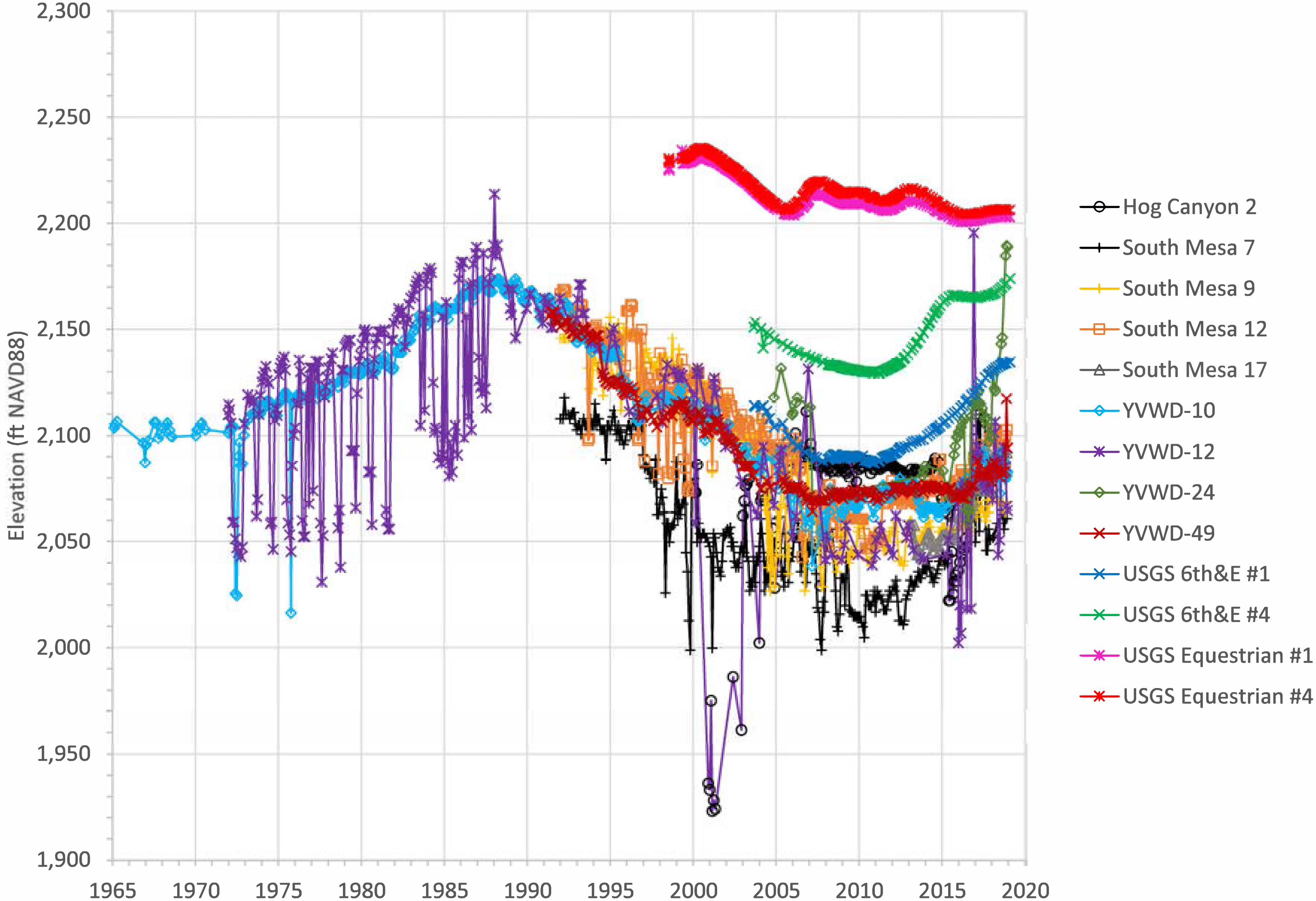

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Figure 2-70. Historical and Current Volume of Groundwater in Storage in the Calimesa Management Area

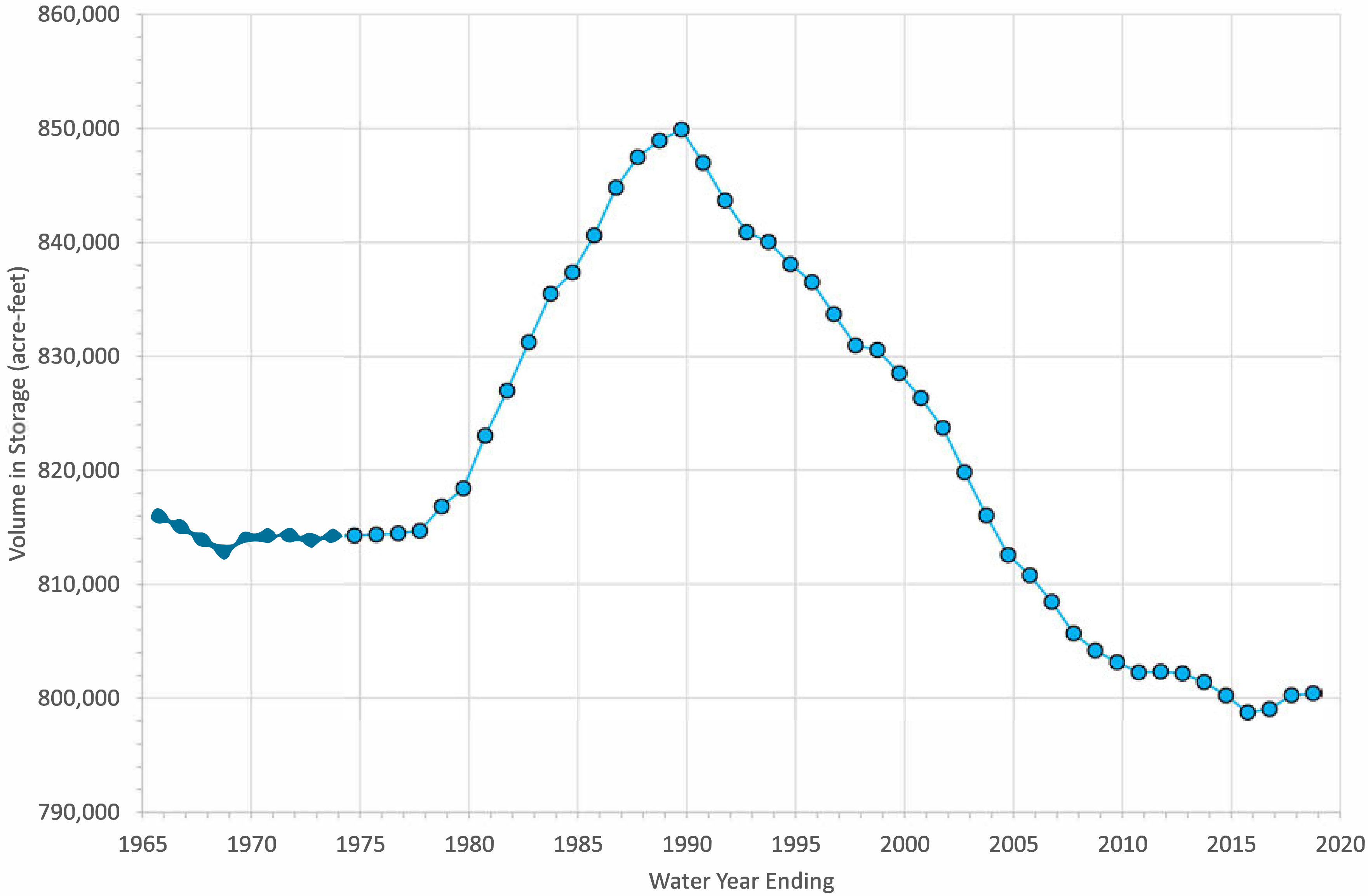

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Figure 2-71. Historical Groundwater Elevations in the Western Heights Management Area

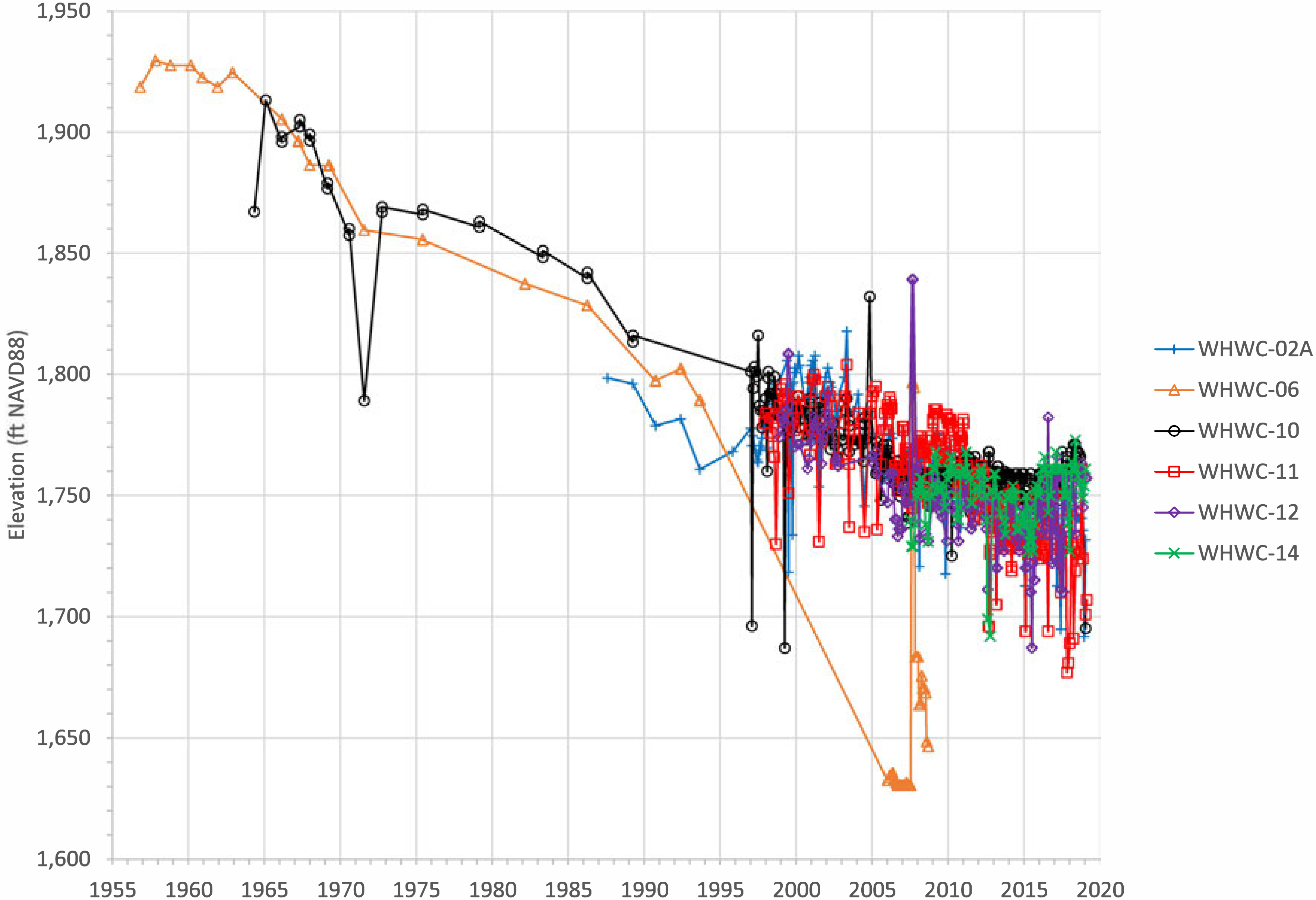

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Figure 2-72. Historical and Current Volume of Groundwater in Storage in the Western Heights Management Area

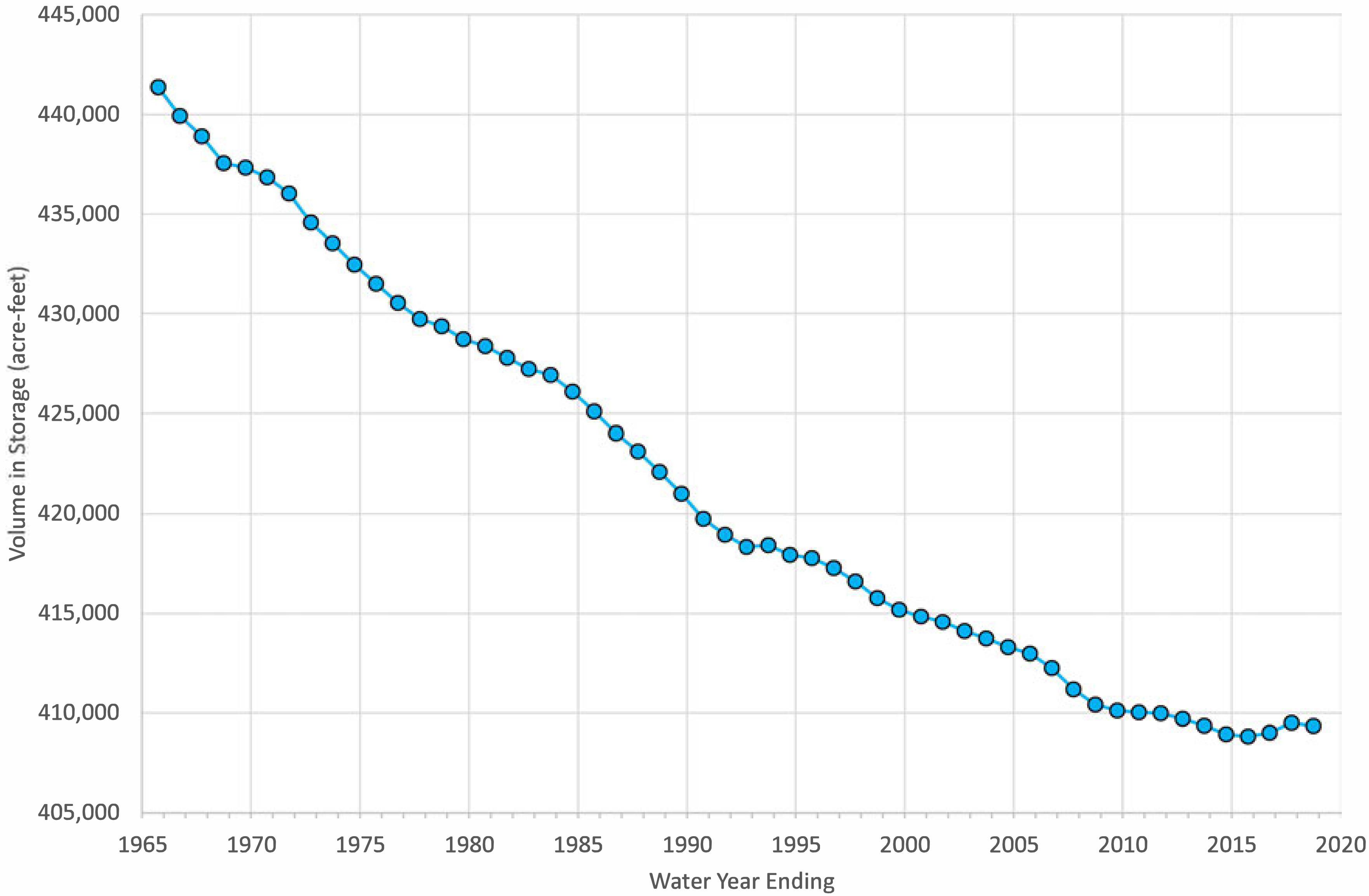

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Figure 2-73. Groundwater Elevations Measured in the San Timoteo Management Area

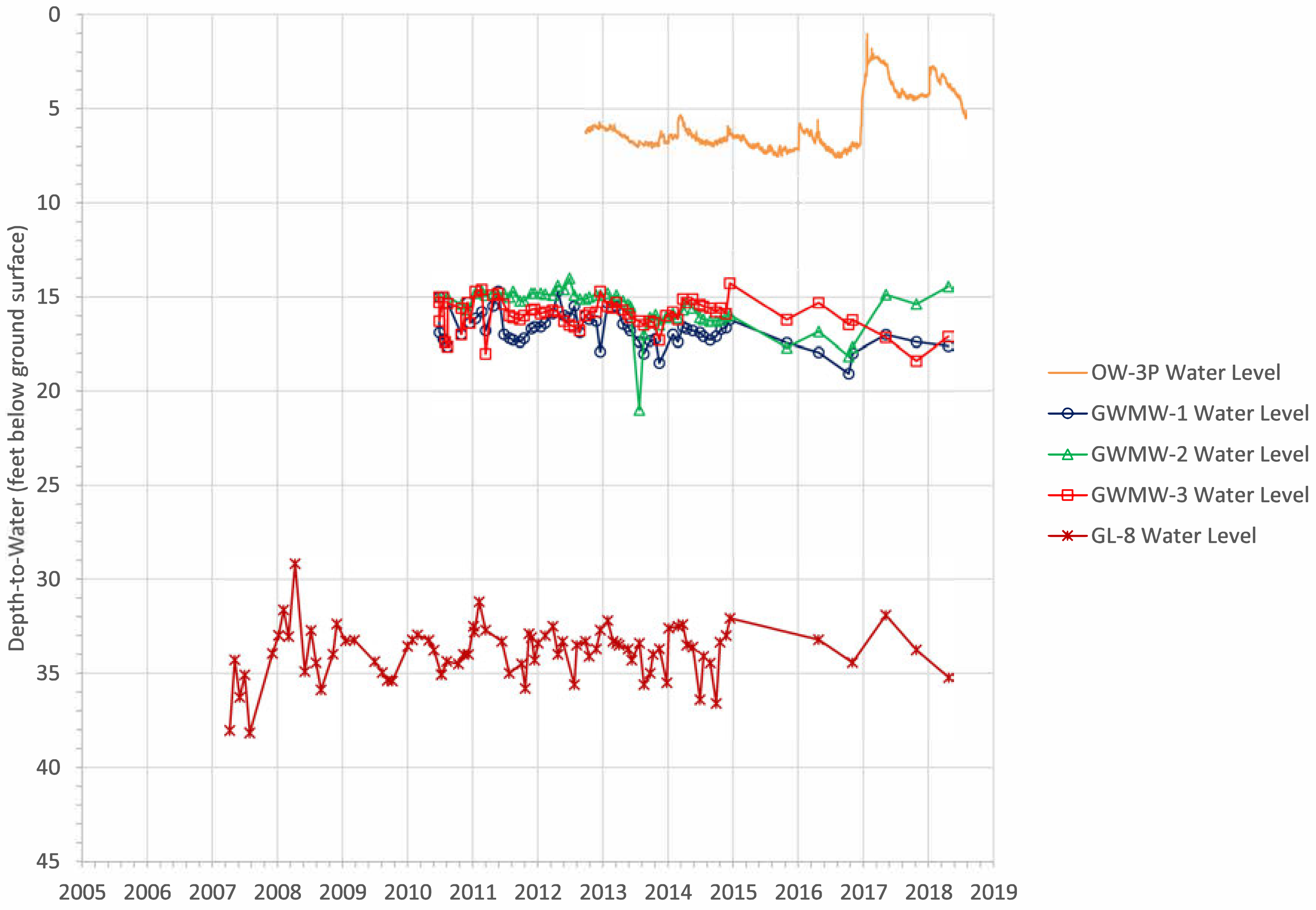

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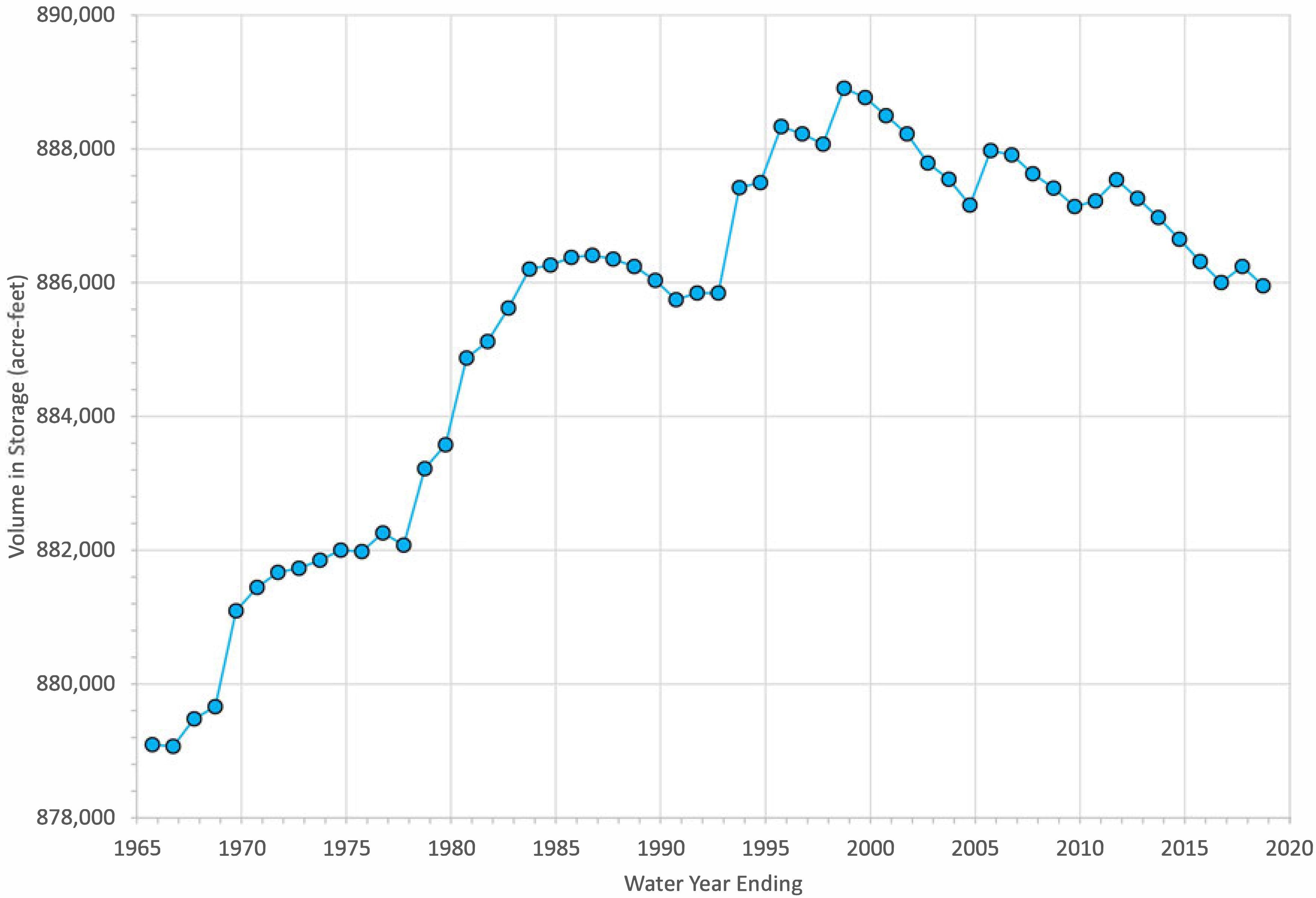
Figure 2-74. Historical and Current Volume of Groundwater in Storage
in the San Timoteo Management Area



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3 Sustainable Management Criteria

3.1 Introduction to Sustainable Management Criteria

Subarticle 3 of Article 5 of the California Code of Regulations (CCR) Division 2 Chapter 1.5 (23 CCR, Sections 354.22–354.30) describes the criteria by which a Groundwater Sustainability Agency (GSA) will define conditions in a Groundwater Sustainability Plan (GSP) that constitute sustainable groundwater management. The following terms (in **bold**) were defined in the Sustainable Groundwater Management Act to guide a GSA in defining sustainability and the criteria used to evaluate whether a basin is being managed sustainably. A **sustainability goal** is defined by a GSA as a goal "that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline" (23 CCR, Section 354.24). **Undesirable results** are defined by a GSA and represent condition(s) in the basin when "significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin" (23 CCR, Section 354.26). **Minimum thresholds** are quantifiable measures or conditions in a basin that "represent a point in the basin that, if exceeded, may cause undesirable results" (23 CCR, Section 354.28). A minimum threshold is defined for each sustainability indicator applicable to the groundwater basin. **Measurable objectives** are interim milestones or quantifiable thresholds established to "achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin of the planning and implementation horizon" (23 CCR, Section 354.30). Measurable objectives shall be defined to "provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty" (23 CCR, Section 354.30).

3.2 Sustainability Goal

The sustainability goal for the Plan Area is to manage groundwater resources in a way that facilitates long-term sustainable use of groundwater in the Yucaipa Subbasin. Long-term sustainable management includes the following:

- Maintaining sufficient groundwater in storage to allow for ongoing groundwater production that meets the operational demands of South Mesa, South Mountain, Western Heights Water Company (WHWC), Yucaipa Valley Water District (YVWD), and private well users, and the regulatory commitments established in the Plan Area.
- Ensuring that groundwater production does not result in significant and unreasonable loss of groundwater-dependent ecosystems (GDEs).

The sustainability goal for the Plan Area was developed using historical groundwater elevations, groundwater in storage, and the identification of GDEs in the Plan Area as discussed in Chapter 2 of this GSP. The importation of State Water Project (SWP) water into the Yucaipa Subbasin (Subbasin) in 2003 has provided a supplemental source of water, which led to a reduction in groundwater production in the Yucaipa Subbasin. This supplemental source of water, which averaged approximately 8,000 acre-feet per year (AFY) since 2008, has led to an average reduction in groundwater production by 3,000 AFY. Consequently, groundwater levels have recovered between 50 feet in the Calimesa Management Area and 200 feet in the North Bench Management Area in the past 10 years, with the volume of groundwater in storage in the Subbasin increasing by approximately 18,000 AF. The cessation of the decline in groundwater levels observed from 1997 to 2007, and observed storage increase over the last 10 years, indicates that the Yucaipa GSA member agencies have been managing the groundwater resources in the Plan Area sustainably.

In 2017, nine agencies entered into an agreement to form the Yucaipa GSA, the GSA for the Plan Area. The nine agencies included four water purveyors (South Mesa, South Mountain, WHWC and YVWD), three municipalities (City of Calimesa, City of Redlands, and City of Yucaipa – the City Calimesa withdrew from the Yucaipa GSA in 2019), and two regionals (SBVMWD and SGPWA). The Yucaipa GSA, acting as the Yucaipa Subbasin GSA, has the authority to ensure long-term sustainable management of the groundwater resources within its jurisdiction. This authority includes adjusting groundwater production from all wells, not just municipal water supply wells in the Plan Area. The undesirable results, minimum thresholds, and measurable objectives discussed in this chapter (Sections 3.3 through 3.5) are intended to provide the metrics by which the Yucaipa GSA will decide whether pumping adjustments are necessary. The Yucaipa GSA will continue to work with stakeholders and regulatory agencies to further improve groundwater conditions within the Plan Area throughout the 50-year GSP planning and implementation horizon.

3.3 Undesirable Results

Under the Sustainable Groundwater Management Act (SGMA), undesirable results occur when groundwater conditions in the Plan Area cause significant and unreasonable effects to any of the six sustainability indicators:

- Chronic Lowering of Groundwater Levels
- Reduction of Groundwater Storage
- Degraded Water Quality
- Land Subsidence
- Depletions of Interconnected Surface Water
- Seawater Intrusion

The definition of significant and unreasonable for each of the six indicators is determined by the Yucaipa SGMA using the processes and criteria described in this GSP. The Yucaipa GSA is required to characterize undesirable results for each indicator, unless “undesirable results to one or more sustainability indicators are not present and are not likely to occur in the basin” (23 CCR, Section 354.26 [d]).

Based on the characterization of groundwater elevations, groundwater production, groundwater quality, and the hydrogeology of the principal aquifer in the Subbasin, the following sustainability indicators do not apply to the Plan Area:

- **Seawater Intrusion.** Seawater intrusion does not apply to the Plan Area because the Pacific Ocean is approximately 50 miles west of the Plan Area. The lowest elevation of the base of the principal aquifer (contact with the underlying crystalline bedrock) is 1,000 feet above North American Vertical Datum of 1988 (NAVD88), which is approximately 1,000 feet above mean sea level. Therefore, the Yucaipa Subbasin is not threatened by seawater intrusion nor the potential for seawater intrusion in the future.
- **Degradation of Water Quality.** Degradation of groundwater quality does not apply to the Plan Area as agriculture use has declined markedly since the 1950s to approximately 7% of the total land use, and the concerted efforts by the Yucaipa GSA member agencies to convert from septic systems to sanitary sewer systems has decreased nitrate and salt contributions to the aquifer. Limited contamination at some active remediation sites and the cessation of operations at the former Yucaipa Landfill have limited contamination to shallow, perched groundwater that has not impacted water quality in the principal aquifer.

The four sustainability indicators that do apply to the Yucaipa Subbasin, and which will be used to evaluate sustainable management in the Subbasin, include (1) chronic lowering of groundwater levels, (2) reduction of groundwater storage, (3) land subsidence, and (4) interconnected surface water. Descriptions of the undesirable results applicable to these four sustainability indicators are provided in Sections 3.3.1 through 3.3.6. Each section describes the cause of groundwater conditions throughout the Plan Area that would lead to undesirable results and the potential effects of undesirable results on the beneficial uses and users of groundwater in the Plan Area.

The criteria used to define groundwater conditions at which undesirable results occur is described in Section 3.3.7. These criteria are based on a quantitative combination of minimum threshold exceedances for each sustainability indicator.

3.3.1 Chronic Lowering of Groundwater Levels

Chronic lowering of groundwater levels indicating a depletion of supply is an undesirable result applicable to the Plan Area. The primary cause leading to chronic lowering of groundwater levels is groundwater production in excess of natural and artificial recharge over a period that contains both wet and dry water years. Chronic lowering of groundwater levels is also associated with a reduction of groundwater storage, potential significant and unreasonable effects to GDEs and land subsidence.

A chronic lowering of groundwater levels was observed in the Calimesa Management Area from 1988 to 2007 when annual groundwater production exceeded the estimated sustainable yield of 4,955 AFY in this management area (Figure 2-69). The average groundwater level in 1988 was approximately 2,180 feet above NAVD88. The average groundwater level in 2007 was approximately 2,060 feet above NAVD88, a decline of approximately 120 feet over 19 years at a rate of 6.3 feet per year. A chronic lowering of groundwater levels was observed in the Western Heights Management Area from the late 1960s to 2008 when annual groundwater production exceeded the estimated sustainable yield of 1,760 AFY for the management area (Figure 2-71). Groundwater levels declined from approximately 1,900 feet above NAVD88 in 1965 to approximately 1,750 feet above NAVD88 in 2010, a rate of decline of approximately 5.6 feet per year. The chronic lowering of groundwater levels observed in these two management areas occurred in periods with wet water years having annual precipitation ranging from 167% to 231% of mean annual rainfall (Figure 2-35).

Groundwater levels in the North Bench Management Area fluctuated in response to the climatic variations observed between wet and dry water year types. However, groundwater levels markedly declined from 1999 to 2007 when groundwater production exceeded the estimated sustainable yield of 3,940 AFY for the North Bench Management Area, a period when six of the nine water years were characterized as dry and critically dry water year types (Figure 2-66). During this period, groundwater levels fell from an average 2,450 feet above NAVD88 to 2,300 feet above NAVD88, a rate of decline of approximately 18 feet per year. Groundwater levels after 2007 recovered to levels observed in 1999 or higher as the importation of SWP water supplemented the water supply in the Plan Area and groundwater production subsequently declined to less than the estimated sustainable yield of 3,940 AFY for the North Bench Management Area.

There are no municipal supply wells in the San Timoteo Management Area. Groundwater levels in San Timoteo Canyon are shallow and sustain the riparian GDE along San Timoteo Creek. A deeper, confined aquifer unit is artesian. No chronic lowering of groundwater levels has been observed in the San Timoteo Management Area.

Chronic lowering of groundwater levels may impact beneficial uses of groundwater in the Plan Area. Chronic lowering of groundwater levels may impact well operations in the Subbasin and cause undesirable results if groundwater levels drop to elevations below which:

- The volume of groundwater available in storage is insufficient to meet public water supply demands.
- Subsidence that substantially interferes with land use is induced.
- Depletion of interconnected surface water that leads to a decline of the water table that threatens GDEs.

Well construction information, production history, and historical water levels were used to develop sustainable management criteria for the Calimesa, North Bench, San Timoteo, and Western Heights Management Areas. The minimum thresholds defined for the Calimesa, North Bench, and Western Heights Management Areas were based on the condition when groundwater elevations declined below a drought buffer established for each management area (Section 3.4, Minimum Thresholds). Therefore, the criterion used to define undesirable results associated with a chronic lowering of groundwater levels is a groundwater elevation measured below a drought buffer at a network of representative monitoring points (RMPs). The undesirable result defined for the San Timoteo Management Area was based on the condition when shallow groundwater levels supporting GDEs fell below 30 feet below ground surface (bgs) as a result of pumping from the principal aquifer.

Groundwater elevations that decline below a drought buffer or to levels that threaten GDEs are lower than historical low water levels. However, groundwater elevations that drop below historical low water levels may be required to ensure ongoing beneficial use of groundwater for municipal supplies. The sustainability criteria established in this GSP allow for groundwater levels to fall below the historical lows observed in the four management areas in the Plan Area, but under such conditions the Yucaipa GSA will implement management actions to reduce the net loss of groundwater from the management areas by reducing groundwater extractions, supplement the groundwater supply with other sources of water (e.g., SWP water, recycled water, increased stormwater capture for recharge), or a combination of both (Section 4.2, Management Actions).

3.3.2 Reduction of Groundwater Storage

Significant and unreasonable reduction of groundwater storage is an undesirable result applicable to the Plan Area. Reduction of groundwater storage is associated with a chronic lowering of groundwater levels, and potential significant and unreasonable effects to GDEs and land subsidence. The primary cause for a reduction of groundwater storage is groundwater production in excess of natural and artificial recharge during a period containing both wet and dry water years. Significant and unreasonable reduction of groundwater storage would impact beneficial uses and users of groundwater in the Plan Area by limiting the volume of groundwater available for municipal, private and agricultural uses.

Groundwater elevations in the Plan Area will be used to evaluate whether significant and unreasonable reduction of groundwater storage occurs. Groundwater elevations, and the corresponding volume of groundwater storage, have either stabilized or increased in the Plan Area since 2007 with the importation of SWP water as a supplemental water supply and subsequent reduction in groundwater production (see Section 2.7). The Yucaipa Integrated Hydrologic Model (YIHM) indicates that groundwater management from 2009 to 2014 resulted in an increase in groundwater storage of approximately 8,300 AF in the Yucaipa Subbasin.

Under projected operations, groundwater in storage is estimated to increase by approximately 23,300 AF to 42,300 AF under the Future Baseline and Future Baseline with Climate Change I scenarios, or decrease by approximately 4,200 AF under the Future Baseline with Climate Change II scenario over the 50-year planning and implementation horizon for this GSP (see Section 2.8.7).

Well construction information, production history, and historical water levels were used to develop sustainable management criteria for the Western Heights, North Bench, Calimesa and San Timoteo Management Areas to indicate when significant and unreasonable reduction of groundwater in storage would occur. The criterion used to define an undesirable result associated with reduction of groundwater storage for each management area is when groundwater levels fall below a drought buffer established for each management area. Groundwater elevations that represent the condition below the drought buffer are lower than historical low water levels. However, reduction of groundwater storage beyond that previously experienced in the Plan Area may be required to maintain operational flexibility to ensure ongoing beneficial use of groundwater.

3.3.3 Land Subsidence

Land subsidence resulting from groundwater withdrawal is an undesirable result applicable to the Plan Area. Groundwater levels that fall below historical low levels may cause subsidence because groundwater acts to reduce the effective stress needed to maintain pore-structures in the aquifer. As groundwater levels decline, pressure on the aquifer matrix increases, which may cause the pore-structure to collapse, causing the land surface to subside. Land subsidence resulting from groundwater withdrawals that substantially interferes with surface land uses has the potential to impact beneficial uses and users of groundwater in the Plan Area by negatively impacting surface infrastructure including roads, pipelines, and buildings.

Historical records of land subsidence in the Plan Area do not indicate that land subsidence resulting from past groundwater production from the principal aquifer has caused an undesirable result. Land subsidence data obtained from the SGMA Data Portal (sgma.water.ca.gov) indicated a range of subsidence for the Plan Area from 0.0 feet to 0.054 feet, or 0.65 inches, from June 2015 to October 1, 2018 (Figure 2-55). This does not constitute a significant and unreasonable vertical displacement of land surface that “substantially interferes with surface land uses and may lead to undesirable results” (23 CCR, Section 354.28[c][5]). Land subsidence observed in the Plan Area was attributed to past geological activity and displacement (Section 2.7.7). For instance, land displacement data obtained from a GPS station located at the Crafton Hills College in the Western Heights Management Area from January 1996 through September 2018 indicated a positive displacement of 0.18 feet (Figure 3-1, 31-Day Running Average of Vertical Displacement Measured at the Crafton Hills College). This displacement represents a possible uplift of the Crafton Hills as a result of tectonic activity associated with the Crafton Hills Fault Zone. No land subsidence associated with groundwater production was indicated by this GPS station.

Because the minimum thresholds established in Section 3.4 are based on groundwater elevations at or below the historical low groundwater elevations observed in the Plan Area, there exists the potential for land subsidence to occur should groundwater levels fall below the historical lows over a long period. Subsidence related to declining groundwater levels as a result of groundwater withdrawals cannot be directly measured in the Plan Area, so the minimum thresholds established for the chronic lowering of groundwater levels will be used as a surrogate for direct measurements of land subsidence. Should groundwater levels fall below the historical lows and persist at such a level for more than 12 months, then the Yucaipa GSA will refer to the InSAR data set included in the SGMA Data Portal and periodically obtain future data to compare to the baseline dataset compiled from June 2015 to October 1, 2018. This evaluation will determine if land subsidence has occurred as a result of groundwater withdrawals from the principal aquifer (Section 2.7.7).

3.3.4 Depletions of Interconnected Surface Water

Loss of interconnected surface water is an undesirable result that may be applicable to the Plan Area if groundwater level declines result in a significant and unreasonable reduction in the rate of the volume of surface water caused by groundwater production and/or the loss of GDEs. Observation wells set in the principal aquifer in the reach of San Timoteo Creek in the Plan Area are under artesian conditions, indicating an upward hydraulic gradient, and are interconnected to surface water and groundwater. There are no municipal water supply wells operating in the San

Timoteo Creek area. There are two known irrigation supply wells. Historical groundwater elevations measured at observation wells and one of the irrigation wells indicate that groundwater elevations have been consistent. Any future new production from the principal aquifer in the San Timoteo Creek area will include aquifer testing to evaluate whether such production will cause a significant and unreasonable depletion in surface water flow.

The NCCAG dataset reviewed for this GSP identified 37 habitats within the Plan Area that consist of common phreatophytes. These habitats were grouped into "GDE Evaluation Units" based on the locations of the habitats. Three GDE Evaluation Units were identified as having GDEs within the Plan Area (Section 2.7.8). These habitats lie along the banks of Oak Glen Creek in the northern part of the Oak Glen subarea, Wildwood Canyon Creek in the southeastern part of the Oak Glen subarea, and San Timoteo Creek in the Live Oak subarea (Figure 2-56). The GDEs adjacent to Oak Glen Creek and Wildwood Canyon Creek occur along the upstream reaches of these creeks. The GDE located along San Timoteo Creek is located downstream of its confluence with Yucaipa Creek. Other GDE Evaluation Units were characterized as either potential GDEs or ecosystems not dependent on groundwater.

Groundwater level declines have the potential to negatively impact the GDEs along the banks of Oak Glen Creek, Wildwood Canyon Creek, and San Timoteo Creek. These GDEs cover an area of approximately 268 acres. A significant and unreasonable loss of GDE habitat may occur if there is a long-term decline in groundwater levels below 30 feet bgs. Historical groundwater level data collected at shallow groundwater observation wells completed adjacent to Oak Glen Creek and San Timoteo Creek have demonstrated seasonal fluctuations in response to major precipitation events and subsequent runoff. Long-term trends in groundwater levels have been stable. The San Timoteo Habitat Monitoring Program (see Section 1.5.1.2) includes a management action to maintain shallow groundwater at 10 feet bgs, which is more stringent and protective of the GDE habitat than the 30 feet bgs characterizing undesirable results.

The GDEs located in the upper elevations of Wildwood Canyon and Oak Glen are sustained by shallow groundwater not influenced by pumping. The remaining potential GDEs in the Plan Area are not adjacent to current groundwater production wells, and groundwater levels in the vicinity of these potential GDEs are not known. Because the potential GDEs are not located near existing or currently planned groundwater extraction wells, it is not anticipated that they will be impacted by future extractions within the Plan Area. However, in the event that future groundwater production is planned within a mile of a potential GDE, additional investigations will be performed to identify whether the potential GDE relies on groundwater, and whether the planned production may negatively impact the potential GDE. If the potential GDE is found to rely on groundwater and planned production may impact groundwater levels in the vicinity of the potential GDE, sustainability criteria related to the depletion of interconnected surface water will be established to protect against the significant and unreasonable loss of GDE habitat.

3.3.5 Degraded Water Quality

Impacts to groundwater supplies as a result of degradation of groundwater quality is not an undesirable result applicable to the Plan Area. The Yucaipa GSA member agencies have implemented programs to reduce the use of fertilizers, self-generating water softeners, and septic systems to improve groundwater quality, while at the same time increasing the capacities of wastewater treatment facilities to reduce TDS and nitrate concentrations of tertiary treated effluent (i.e., recycled water) discharged to surface waters and used for irrigation purposes (Section 2.7.4).

YVWD implemented a program in the 1980s and 1990s to provide sanitary sewer service throughout the Yucaipa Subbasin, which included an incentive program to abandon septic systems and connect to a collector sewer main. YVWD issued an ordinance to prohibit the use of self-generating water softeners. The goal of these two efforts was to reduce the concentrations of TDS and nitrate in the wastewater directly to the Subbasin via septic systems and to the sanitary sewer systems. Some septic systems remain in the Western Heights Management Area, but wastewater flows from those systems impact groundwater quality in a shallow, perched aquifer and have not impaired water quality in the principal aquifer.

Agricultural use in the Plan Area has declined from a peak in the 1930s and 1940s (approximately 4,000 AFY) to approximately 400 AFY in the 2000s over 7% of the land use in the Plan Area. Other occurrences of groundwater quality degradation were localized and confined to shallow groundwater in a perched zone in the Western Heights subarea and at the former Yucaipa Landfill in the Crafton subarea (Section 2.7.5). Contamination observed in the shallow groundwater at these locations has not impaired water quality in the principal aquifer.

The Regional Board adopted order number R8-2014-0005 in 2014, an amendment to the Basin Plan that revised the maximum benefit commitments in the Yucaipa, San Timoteo and Beaumont GMZs. The Yucaipa GMZ includes the North Bench, Western Heights and most of the Calimesa (area north of the Banning Fault) Management Areas. The San Timoteo GMZ includes the San Timoteo Management Area and a portion of the Live Oak and Singleton hydrogeological subareas in the Calimesa Management Area (Figure 2-64). The maximum benefit water quality objectives established for TDS and nitrate (as N) for these GMZs were defined as the water quality objectives in the Basin Plan.

YVWD has implemented reverse osmosis and denitrification treatment processes at the WRWRF that have markedly reduced TDS and nitrate concentrations in the tertiary treated effluent (i.e., recycled water) discharged to San Timoteo Creek or served via YVWD's recycled water distribution system. The implementation of RO and denitrification treatment at the YVWD WRWRF facility has reduced the TDS and nitrate concentrations in recycled water to an average <300 mg/L and 2.8 mg/L, respectively. The maximum benefit water quality objectives (and Basin Plan water quality objectives) for TDS and nitrate (as N) are 370 mg/L and 5.0 mg/L, respectively, in the Yucaipa GMZ. The maximum benefit water quality objectives (and Basin Plan water quality objectives) for TDS and nitrate (as N) in the San Timoteo GMZ are 400 mg/L and 5.0 mg/L, respectively. The application of recycled water for irrigation purposes has not increased TDS and nitrate (as N) concentrations in the principal aquifer.

In summary, concerted efforts by the Yucaipa GSA member agencies to improve water quality by removing septic systems and connecting users to sanitary sewer systems, increasing wastewater treatment capacities and implementing advanced treatment technologies, along with a marked reduction in water use for agricultural purposes, has improved water quality throughout the Subbasin. Water quality issues only occur in localized areas (e.g., former Yucaipa landfill, active remediation of shallow groundwater in the Western Heights Management Area) that have not impacted water quality in the principal aquifer. Therefore, there are no water quality issues that may affect the long-term supply and beneficial uses of groundwater produced from the principal aquifer.

3.3.6 Seawater Intrusion

The Plan Area is approximately 50 miles inland and approximately 1,300 feet higher in elevation at its lowest point to the Pacific Ocean. Because operations in the Plan Area do not impact groundwater elevations near the coast, seawater intrusion is not defined as an undesirable result in the Plan Area.

3.3.7 Defining Undesirable Results

Groundwater conditions in the Plan Area are currently monitored with a network of 77 wells (Table 3-1; Section 3.6, Monitoring Network). In total, 36 of these wells were selected as RMPs for the Plan Area (Section 3.6.5, Representative Monitoring). The Plan Area is divided into four Management Areas: North Bench, Calimesa, Western Heights, and San Timoteo (Section 2.9). Eight YVWD wells and two USGS wells (Wilson Creek nested wells) were selected as the RMPs for the North Bench Management Area. Four YVWD wells, four South Mesa wells, one South Mountain well, and four USGS wells (two from the 6th Street and two from the Equestrian Park nested wells) were selected as the RMPs for the Calimesa Management Area. Five WHWC wells and two USGS wells (Dunlap nested wells) were selected as the RMPs for the Western Heights Management Area. The San Timoteo Management Area does not currently have municipal supply wells operating within it but does include six shallow groundwater observation wells that have been designated as RMPs to evaluate conditions relative to the GDEs identified within it (Table 3-2).

The 36 wells selected to evaluate the sustainable management criteria in the North Bench, Calimesa, Western Heights, and San Timoteo Management Areas will be used to measure static groundwater levels to characterize conditions in the four management areas. Although groundwater elevation measurements will continue to be collected from the broader monitoring network, minimum thresholds used to assess whether the Plan Area is experiencing undesirable results were only selected at the 36 RMPs.

Undesirable results in the Plan Area will be identified by comparing groundwater elevation measurements from these 36 RMPs to their respective minimum thresholds for the applicable sustainability indicators established in each management area. Undesirable results related to chronic declines in groundwater levels and significant and unreasonable loss of groundwater storage because of groundwater withdrawals from the principal aquifer will be evaluated for each management area using the 36 RMPs. The undesirable results related to significant and unreasonable loss of surface water interconnection in the San Timoteo Management area will be evaluated using groundwater levels measured at five shallow observation wells owned by YVWD and one private irrigation well. An undesirable result is characterized when groundwater elevations at 50% or more of the RMPs in a management area for two consecutive years decline below their associated minimum threshold levels. Section 4.2 details the management actions that will be implemented when conditions decline below the measurable objective and minimum threshold in each management area.

Table 3-1. Wells in the Groundwater Monitoring Network for the Yucaipa Subbasin

Well ID	State Well Number (from DWR)	Latitude	Longitude	Well Owner	Well Use Type	Well Status	Management Area	Hydrogeological Subarea	GSP Monitoring Network	Groundwater Elevation Data Collection	Groundwater Quality Data Collection	Groundwater Production Data Collection
Chicken Hill	—	34.02536	−117.078245	South Mountain	Irrigation	Active	Calimesa	Calimesa	Yes	Yes	Yes	Yes
Chlorinator	—	34.054666	−116.982175	YVWD	Monitoring	Active	North Bench	Oak Glen	Yes	Yes	No	No
GL-8	—	34.019697	−117.189954	Private Owner	Irrigation	Active	San Timoteo	Live Oak	Yes	Yes	No	No
GWMW-1	02S03W14xxx	34.023129	−117.19702	YVWD	Monitoring	Active	San Timoteo	Live Oak	Yes	Yes	Yes	No
GWMW-2	02S03W14xxx	34.01425	−117.179388	YVWD	Monitoring	Active	San Timoteo	Live Oak	Yes	Yes	Yes	No
GWMW-3	02S03W04xxx	34.002819	−117.16431	YVWD	Monitoring	Active	San Timoteo	Live Oak	Yes	Yes	Yes	No
GWMW-5A	02S03W04xxx	34.0235	−117.197459	YVWD	Monitoring	Active	San Timoteo	Live Oak	Yes	Yes	Yes	No
GWMW-5B	02S03W04xxx	34.0235	−117.197459	YVWD	Monitoring	Active	San Timoteo	Live Oak	Yes	Yes	Yes	No
GWMW-5C	02S03W04xxx	34.0235	−117.197459	YVWD	Monitoring	Active	San Timoteo	Live Oak	Yes	Yes	Yes	No
Hog Canyon 2	02S02W10B002S	34.017388	−117.077507	South Mountain	Irrigation	Active	Calimesa	Calimesa	Yes	Yes	Yes	Yes
South Mesa 01	02S02W14xxx	33.995246	−117.056387	South Mesa	Municipal	Inactive, Measure Only	Calimesa	Live Oak	Yes	Yes	No	No
South Mesa 04	02S02W14R03	33.989679	−117.055096	South Mesa	Municipal	Active	Outside Subbasin	Outside Subbasin	Yes	No	No	Yes
South Mesa 05	02S02W15H	33.996753	−117.069131	South Mesa	Municipal	Active	Calimesa	Live Oak	Yes	Yes	Yes	Yes
South Mesa 07	02S02W15A03	34.000936	−117.073543	South Mesa	Municipal	Active	Calimesa	Live Oak	Yes	Yes	Yes	Yes
South Mesa 09	02S02W15A04	34.003344	−117.069334	South Mesa	Municipal	Active	Calimesa	Calimesa	Yes	Yes	Yes	Yes
South Mesa 11	02S02W14C01	34.003878	−117.062745	South Mesa	Municipal	Active	Calimesa	Calimesa	Yes	Yes	Yes	Yes
South Mesa 12	02S02W11M01	34.00902	−117.064891	South Mesa	Municipal	Active	Calimesa	Calimesa	Yes	Yes	Yes	Yes
South Mesa 16	02S02W14D01	34.002029	−117.066197	South Mesa	Municipal	Active	Calimesa	Calimesa	Yes	Yes	Yes	Yes
South Mesa 17	02S02W11xxx	34.013077	−117.066467	South Mesa	Municipal	Active	Calimesa	Calimesa	Yes	Yes	Yes	Yes
USGS 6th St #1 (870′–930′)	02S02W02F02	34.02676944	−117.0608778	USGS	Monitoring	Active	Calimesa	Calimesa	Yes	Yes	No	No
USGS 6th St #2 (730′–750′)	02S02W02F03	34.02676944	−117.0608778	USGS	Monitoring	Active	Calimesa	Calimesa	Yes	Yes	No	No
USGS 6th St #3 (500′–540′)	02S02W02F04	34.02676944	−117.0608778	USGS	Monitoring	Active	Calimesa	Calimesa	Yes	Yes	No	No
USGS 6th St #4 (380′–400′)	02S02W02F05	34.02676944	−117.0608778	USGS	Monitoring	Active	Calimesa	Calimesa	Yes	Yes	No	No
USGS 6th St #5 (290′–310′)	02S02W02F06	34.02676944	−117.0608778	USGS	Monitoring	Active	Calimesa	Calimesa	Yes	Yes	No	No
USGS Dunlap #1 (1010′–1050′)	02S02W04L02	34.0249778	−117.0970917	USGS	Monitoring	Active	Western Heights	Western Heights	Yes	Yes	No	No
USGS Dunlap #2 (830′–850′)	02S02W04L03	34.0249778	−117.0970917	USGS	Monitoring	Active	Western Heights	Western Heights	Yes	Yes	No	No
USGS Dunlap #3 (590′–610′)	02S02W04L04	34.0249778	−117.0970917	USGS	Monitoring	Active	Western Heights	Western Heights	Yes	Yes	No	No
USGS Dunlap #4 (440′–460′)	02S02W04L05	34.0249778	−117.0970917	USGS	Monitoring	Active	Western Heights	Western Heights	Yes	Yes	No	No
USGS Dunlap #5 (230′–250′)	02S02W04L06	34.0249778	−117.0970917	USGS	Monitoring	Active	Western Heights	Western Heights	Yes	Yes	No	No
USGS Equestrian Park #1 (830′–850′)	02S02W12H01	34.01291667	−117.0363917	USGS	Monitoring	Active	Calimesa	Calimesa	Yes	Yes	No	No

Table 3-1. Wells in the Groundwater Monitoring Network for the Yucaipa Subbasin

Well ID	State Well Number (from DWR)	Latitude	Longitude	Well Owner	Well Use Type	Well Status	Management Area	Hydrogeological Subarea	GSP Monitoring Network	Groundwater Elevation Data Collection	Groundwater Quality Data Collection	Groundwater Production Data Collection
USGS Equestrian Park #2 (635′–655′)	02S02W12H02	34.01291667	−117.0363917	USGS	Monitoring	Active	Calimesa	Calimesa	Yes	Yes	No	No
USGS Equestrian Park #3 (510′–530′)	02S02W12H03	34.01291667	−117.0363917	USGS	Monitoring	Active	Calimesa	Calimesa	Yes	Yes	No	No
USGS Equestrian Park #4 (380′–400′)	02S02W12H04	34.01291667	−117.0363917	USGS	Monitoring	Active	Calimesa	Calimesa	Yes	Yes	No	No
USGS Wilson Creek #1 (820′–840′)	01S02W36A02S	34.046825	−117.0358778	USGS	Monitoring	Active	North Bench	Gateway	Yes	Yes	No	No
USGS Wilson Creek #2 (640′–660′)	01S02W36A03	34.046825	−117.0358778	USGS	Monitoring	Active	North Bench	Gateway	Yes	Yes	No	No
USGS Wilson Creek #3 (500′–520′)	01S02W36A04S	34.046825	−117.0358778	USGS	Monitoring	Active	North Bench	Gateway	Yes	Yes	No	No
USGS Wilson Creek #4 (350′–370′)	01S02W36A05S	34.046825	−117.0358778	USGS	Monitoring	Active	North Bench	Gateway	Yes	Yes	No	No
WHWC-06	02S02W03E01	34.030084	−117.082361	WHWC	Municipal	Inactive	Western Heights	Western Heights	Yes	Yes	No	No
WHWC-09	02S02W04R01	34.022838	−117.087701	WHWC	Municipal	Inactive	Western Heights	Western Heights	Yes	Yes	No	No
WHWC-10	02S02W05K01	34.026377	−117.108623	WHWC	Municipal	Active	Western Heights	Western Heights	Yes	Yes	Yes	Yes
WHWC-11	02S02W04G04	34.027037	−117.093769	WHWC	Municipal	Active	Western Heights	Western Heights	Yes	Yes	Yes	Yes
WHWC-12	02S02W04J03	34.026399	−117.088647	WHWC	Municipal	Active	Western Heights	Western Heights	Yes	Yes	Yes	Yes
WHWC-14	02S02W04Lxx	34.02535	−117.097185	WHWC	Municipal	Active	Western Heights	Western Heights	Yes	Yes	Yes	Yes
WHWC-02A	02S02W04G03	34.029065	−117.093859	WHWC	Municipal	Inactive; Measure Only	Western Heights	Western Heights	Yes	Yes	Yes	Yes
Y-13	—	34.0465	−117.057	County of San Bernardino	Monitoring	Active	North Bench	Crafton	Yes	Yes	Yes	No
Y-21	—	34.0446	−117.058	County of San Bernardino	Monitoring	Active	North Bench	Crafton	Yes	Yes	Yes	No
Y-22	—	34.0444	−117.06	County of San Bernardino	Monitoring	Active	North Bench	Crafton	Yes	Yes	Yes	No
Y-29	—	34.0449	−117.0611	County of San Bernardino	Monitoring	Active	North Bench	Crafton	Yes	Yes	Yes	No
YRP-EX1 (YRP-PZ1)	—	34.050759	−117.03081	SBVMWD	Monitoring	Active	North Bench	Gateway	Yes	Yes	Yes	No
YRP-EX2 (YRP-PZ2)	—	34.044864	−117.030476	SBVMWD	Monitoring	Active	North Bench	Wilson Creek	Yes	Yes	Yes	No
YRP-PZ3	—	34.014110	−117.018992	SBVMWD	Monitoring	Active	North Bench	Oak Glen	Yes	Yes	Yes	No
YVWD-02	02S02W11B01S	34.015932	−117.058511	YVWD	Municipal	Active	Calimesa	Calimesa	Yes	Yes	Yes	Yes
YVWD-05	01S02W36N001S	34.037156	−117.049895	YVWD	Municipal	Inactive – Monitoring Well	North Bench	Wilson Creek	Yes	Yes	No	No
YVWD-06	02S02W01F001S	34.026767	−117.044495	YVWD	Municipal	Inactive – Monitoring Well	North Bench	Wilson Creek	Yes	Yes	No	No
YVWD-07	01S02W36R001S	34.03722	−117.036785	YVWD	Municipal	Inactive – Monitoring Well	North Bench	Wilson Creek	Yes	Yes	No	No
YVWD-09	01S02WS5M1S	34.054618	−117.047336	YVWD	Municipal	Inactive – Monitoring Well	North Bench	Crafton	Yes	Yes	No	No

Table 3-1. Wells in the Groundwater Monitoring Network for the Yucaipa Subbasin

Well ID	State Well Number (from DWR)	Latitude	Longitude	Well Owner	Well Use Type	Well Status	Management Area	Hydrogeological Subarea	GSP Monitoring Network	Groundwater Elevation Data Collection	Groundwater Quality Data Collection	Groundwater Production Data Collection
YVWD-10	02S02W11D01S	34.015967	−117.069083	YVWD	Municipal	Inactive – Monitoring Well	Calimesa	Calimesa	Yes	Yes	No	No
YVWD-12	02S02W11B02S	34.018738	−117.06019	YVWD	Municipal	Active	Calimesa	Calimesa	Yes	Yes	Yes	Yes
YVWD-13	01S01W32C01S	34.048028	−117.008331	YVWD	Municipal	Inactive	North Bench	Oak Glen	Yes	Yes	No	No
YVWD-14	01S01W32A01S	34.046973	−116.999753	YVWD	Municipal	Active	North Bench	Oak Glen	Yes	Yes	Yes	Yes
YVWD-16	01S01W33E02S	34.0425	−116.996	YVWD	Municipal	Active	Outside Subbasin	Outside Subbasin	Yes	No	No	Yes
YVWD-18	01S02W36F01S	34.042922	−117.044347	YVWD	Municipal	Active	North Bench	Gateway	Yes	Yes	Yes	Yes
YVWD-24	02S02W11A01S	34.018067	−117.055283	YVWD	Municipal	Active	Calimesa	Calimesa	Yes	Yes	Yes	Yes
YVWD-25	01S01W27I01S	34.053821	−116.977864	YVWD	Municipal	Active	North Bench	Oak Glen	Yes	Yes	Yes	Yes
YVWD-27	02S01W08F01S	34.014848	−117.01104	YVWD	Municipal	Active	North Bench	Oak Glen	Yes	Yes	Yes	Yes
YVWD-27A	02S01W08F02S	34.014711	−117.011137	YVWD	Monitoring	Active	North Bench	Oak Glen	Yes	Yes	No	No
YVWD-28	02S01W09G01S	34.0144	−116.994	YVWD	Municipal	Abandoned/ Capped	North Bench	Oak Glen	Yes	Yes	No	No
YVWD-37	01S02W25A01S	34.061818	−117.036858	YVWD	Municipal	Active	North Bench	Crafton	Yes	Yes	Yes	Yes
YVWD-43	01S01W19P001S	34.06314	−117.026002	YVWD	Municipal	Inactive – Monitoring Well	North Bench	Gateway	Yes	Yes	No	No
YVWD-44	01S02W36A03S	34.046549	−117.036751	YVWD	Municipal	Active	North Bench	Gateway	Yes	Yes	Yes	Yes
YVWD-46	01S02W36G05S	34.042926	−117.042911	YVWD	Municipal	Active	North Bench	Wilson Creek	Yes	Yes	Yes	Yes
YVWD-48	02S02W24L02S	33.9799	−117.046	YVWD	Municipal	Active	Outside Subbasin	Outside Subbasin	Yes	No	No	Yes
YVWD-49	02S02W03J001S	34.025913	−117.07187	YVWD	Municipal	Inactive – Monitoring Well	Calimesa	Calimesa	Yes	Yes	No	No
YVWD-53	01S02W25R04S	34.048641	−117.0384	YVWD	Municipal	Active	North Bench	Gateway	Yes	Yes	Yes	Yes
YVWD-55	01S02W35H03S	34.041256	−117.052936	YVWD	Municipal	Active	North Bench	Gateway	Yes	Yes	Yes	Yes
YVWD-56	01S02W36F02S	34.043191	−117.046995	YVWD	Municipal	Active	North Bench	Gateway	Yes	Yes	Yes	Yes
YVWD-61	02S01W15F01S	34.0009	−116.975	YVWD	Municipal	Active	Outside Subbasin	Outside Subbasin	Yes	No	No	Yes

Notes: DWR = California Department of Water Resources; GSP = Groundwater Sustainability Plan; South Mountain = South Mountain Water Company; YVWD = Yucaipa Valley Water District; South Mesa = South Mesa Water Company; USGS = U.S. Geological Survey; WHWC = Western Heights Water Company; SBVWMD = San Bernardino Valley Municipal Water District.

Table 3-2. Representative Monitoring Points in the Yucaipa Subbasin

Well ID	State Well Number (from DWR)	Latitude	Longitude	Well Owner	Well Use Type	Well Status	Management Area	Hydrogeological Subarea	GSP Monitoring Network	Groundwater Elevation Data Collection	Groundwater Quality Data Collection	Groundwater Production Data Collection	RMP
GWMW-1	02S03W14xxx	34.023129	−117.19702	YVWD	Monitoring	Active	San Timoteo	Live Oak	Yes	Yes	Yes	No	Yes
GWMW-2	02S03W14xxx	34.01425	−117.179388	YVWD	Monitoring	Active	San Timoteo	Live Oak	Yes	Yes	Yes	No	Yes
GWMW-3	02S03W04xxx	34.002819	−117.16431	YVWD	Monitoring	Active	San Timoteo	Live Oak	Yes	Yes	Yes	No	Yes
GWMW-5A	02S03W04xxx	34.0235	−117.197459	YVWD	Monitoring	Active	San Timoteo	Live Oak	Yes	Yes	Yes	No	Yes
GWMW-5B	02S03W04xxx	34.0235	−117.197459	YVWD	Monitoring	Active	San Timoteo	Live Oak	Yes	Yes	Yes	No	Yes
GWMW-5C	02S03W04xxx	34.0235	−117.197459	YVWD	Monitoring	Active	San Timoteo	Live Oak	Yes	Yes	Yes	No	Yes
Hog Canyon 2	02S02W10B002S	34.017388	−117.077507	South Mountain	Irrigation	Active	Calimesa	Calimesa	Yes	Yes	Yes	Yes	Yes
South Mesa 07	02S02W15A03	34.000936	−117.073543	South Mesa	Municipal	Active	Calimesa	Live Oak	Yes	Yes	Yes	Yes	Yes
South Mesa 09	02S02W15A04	34.003344	−117.069334	South Mesa	Municipal	Active	Calimesa	Calimesa	Yes	Yes	Yes	Yes	Yes
South Mesa 12	02S02W11M01	34.00902	−117.064891	South Mesa	Municipal	Active	Calimesa	Calimesa	Yes	Yes	Yes	Yes	Yes
South Mesa 17	02S02W11xxx	34.013077	−117.066467	South Mesa	Municipal	Active	Calimesa	Calimesa	Yes	Yes	Yes	Yes	Yes
USGS 6th St #1 (870′–930′)	02S02W02F02	34.02676944	−117.0608778	USGS	Monitoring	Active	Calimesa	Calimesa	Yes	Yes	No	No	Yes
USGS 6th St #4 (380′–400′)	02S02W02F05	34.02676944	−117.0608778	USGS	Monitoring	Active	Calimesa	Calimesa	Yes	Yes	No	No	Yes
USGS Dunlap #2 (830′–850′)	02S02W04L03	34.0249778	−117.0970917	USGS	Monitoring	Active	Western Heights	Western Heights	Yes	Yes	No	No	Yes
USGS Dunlap #4 (440′–460′)	02S02W04L05	34.0249778	−117.0970917	USGS	Monitoring	Active	Western Heights	Western Heights	Yes	Yes	No	No	Yes
USGS Equestrian Park #1 (830′–850′)	02S02W12H01	34.01291667	−117.0363917	USGS	Monitoring	Active	Calimesa	Calimesa	Yes	Yes	No	No	Yes
USGS Equestrian Park #4 (380′–400′)	02S02W12H04	34.01291667	−117.0363917	USGS	Monitoring	Active	Calimesa	Calimesa	Yes	Yes	No	No	Yes
USGS Wilson Creek #1 (820′–840′)	01S02W36A02S	34.046825	−117.0358778	USGS	Monitoring	Active	North Bench	Gateway	Yes	Yes	No	No	Yes
USGS Wilson Creek #4 (350′–370′)	01S02W36A05S	34.046825	−117.0358778	USGS	Monitoring	Active	North Bench	Gateway	Yes	Yes	No	No	Yes
WHWC-10	02S02W05K01	34.026377	−117.108623	WHWC	Municipal	Active	Western Heights	Western Heights	Yes	Yes	Yes	Yes	Yes
WHWC-11	02S02W04G04	34.027037	−117.093769	WHWC	Municipal	Active	Western Heights	Western Heights	Yes	Yes	Yes	Yes	Yes
WHWC-12	02S02W04J03	34.026399	−117.088647	WHWC	Municipal	Active	Western Heights	Western Heights	Yes	Yes	Yes	Yes	Yes
WHWC-14	02S02W04Lxx	34.02535	−117.097185	WHWC	Municipal	Active	Western Heights	Western Heights	Yes	Yes	Yes	Yes	Yes
WHWC-02A	02S02W04G03	34.029065	−117.093859	WHWC	Municipal	Inactive, Measure Only	Western Heights	Western Heights	Yes	Yes	Yes	Yes	Yes
YVWD-06	02S02W01F001S	34.026767	−117.044495	YVWD	Municipal	Inactive – Monitoring Well	North Bench	Wilson Creek	Yes	Yes	No	No	Yes
YVWD-07	01S02W36R001S	34.03722	−117.036785	YVWD	Municipal	Inactive – Monitoring Well	North Bench	Wilson Creek	Yes	Yes	No	No	Yes
YVWD-10	02S02W11D01S	34.015967	−117.069083	YVWD	Municipal	Inactive – Monitoring Well	Calimesa	Calimesa	Yes	Yes	No	No	Yes

Table 3-2. Representative Monitoring Points in the Yucaipa Subbasin

Well ID	State Well Number (from DWR)	Latitude	Longitude	Well Owner	Well Use Type	Well Status	Management Area	Hydrogeological Subarea	GSP Monitoring Network	Groundwater Elevation Data Collection	Groundwater Quality Data Collection	Groundwater Production Data Collection	RMP
YVWD-12	02S02W11B02S	34.018738	−117.06019	YVWD	Municipal	Active	Calimesa	Calimesa	Yes	Yes	Yes	Yes	Yes
YVWD-24	02S02W11A01S	34.018067	−117.055283	YVWD	Municipal	Active	Calimesa	Calimesa	Yes	Yes	Yes	Yes	Yes
YVWD-25	01S01W27I01S	34.053821	−116.977864	YVWD	Municipal	Active	North Bench	Oak Glen	Yes	Yes	Yes	Yes	Yes
YVWD-28	02S01W09G01S	34.0144	−116.994	YVWD	Municipal	Abandoned/ Capped	North Bench	Oak Glen	Yes	Yes	No	No	Yes
YVWD-37	01S02W25A01S	34.061818	−117.036858	YVWD	Municipal	Active	North Bench	Crafton	Yes	Yes	Yes	Yes	Yes
YVWD-46	01S02W36G05S	34.042926	−117.042911	YVWD	Municipal	Active	North Bench	Wilson Creek	Yes	Yes	Yes	Yes	Yes
YVWD-49	02S02W03J001S	34.025913	−117.07187	YVWD	Municipal	Inactive – Monitoring Well	Calimesa	Calimesa	Yes	Yes	No	No	Yes
YVWD-53	01S02W25R04S	34.048641	−117.0384	YVWD	Municipal	Active	North Bench	Gateway	Yes	Yes	Yes	Yes	Yes
YVWD-56	01S02W36F02S	34.043191	−117.046995	YVWD	Municipal	Active	North Bench	Gateway	Yes	Yes	Yes	Yes	Yes

Notes: DWR = California Department of Water Resources; GSP = Groundwater Sustainability Plan; RMP = representative monitoring point; YVWD = Yucaipa Valley Water District; South Mountain = South Mountain Water Company; South Mesa = South Mesa Water Company; USGS = U.S. Geological Survey; WHWC = Western Heights Water Company.

3.4 Minimum Thresholds

This section describes the minimum thresholds established for chronic lowering of groundwater levels, reduction of groundwater storage, land subsidence, and interconnected surface water/groundwater for each management area. Minimum thresholds for degradation of water quality and seawater intrusion are not established in this GSP (see Sections 3.3.5 and 3.3.6).

3.4.1 North Bench Management Area

The North Bench Management Area comprises the Triple Falls Creek, Oak Glen, Gateway, Crafton, and Wilson Creek hydrogeological subareas and includes municipal water supply wells owned and operated by YVWD. Minimum thresholds for this management area were established for chronic lowering of groundwater levels, reduction of groundwater storage, land subsidence, and depletion of interconnected surface water. The minimum threshold for interconnected surface water was established to protect GDEs that were identified in Wildwood Canyon and the upper elevations of the Oak Glen subarea near the Triple Falls Creek subarea (Figure 2-57). No other GDEs, potential GDEs, or interconnected surface waters were identified in the other four subareas in the North Bench Management Area.

The undesirable result applicable to the chronic lowering of groundwater levels, reduction in groundwater storage, and land subsidence is the condition when the volume of groundwater in storage falls below a drought buffer established in this management area. Using the YIHM, the drought buffer was based on the simulated decline in storage from the 1984 WY to the 1992 WY, a period when the volume of groundwater in storage declined approximately 10,000 AF (Figure 3-2, Drought Buffer in the North Bench Management Area). During this period, the average annual rainfall in the Subbasin was 14 inches, or 88% of normal. This period included three “dry” and three “below normal” water year types, with one “normal” water year type and two “above normal” water year types (Figure 2-3). Groundwater levels declined 50 to 75 feet from 1984-1992 (Figure 2-66). Pumping averaged approximately 2,600 AFY, which was approximately 66% of the estimated sustainable yield of 3,940 AFY (Figure 3-3, Historical and Current Volume of Groundwater in Storage in the North Bench Management Area). This period was selected because groundwater elevations declined when pumping was below the estimated sustainable yield, which was more of a function of climate than groundwater withdrawals.

The Yucaipa GSA identified a decline of 10,000 AF from storage over a 9-year period as a significant and unreasonable decline in the storage of groundwater in this management area. The drought buffer provides a reasonable margin of operational flexibility under adverse conditions, by allowing for changes to groundwater production or the implementation of projects and/or programs to prevent a net loss of groundwater that results in the undesirable result of the volume in storage declining below the drought buffer.

The bottom of the drought buffer was established at the historical low in the volume in storage at 220,000 AF (Figure 3-4, Minimum Threshold and Measurable Objective in the North Bench Management Area). **The minimum threshold is established at the historical low for groundwater in storage at 220,000 AF.** The top of the drought buffer is at a volume in storage of 230,000 AF, 10,000 AF above the minimum threshold. This represents the measurable objective (Section 3.5.1) and provides operational flexibility to implement management actions and/or programs to prevent undesirable results when conditions decline below the minimum threshold. The RMPs identified for the North Bench Management Area are: USGS Wilson Creek nested wells No. 1 and No. 4, YVWD-06, YVWD-07, YVWD-37, YVWD-46, YVWD-53, and YVWD-56 (Figure 3-5, Representative Monitoring Points). Static groundwater levels measured at these wells will be used to characterize conditions in this management area. The simulated groundwater levels at these wells at the end of the 1965 WY, which represented the historical low in groundwater in storage, or the minimum threshold, ranged from 2,276 to 2,529 feet above NAVD88 (Table 3-3).

The simulated static groundwater elevations at the end of the 2018 WY (i.e., the current condition) ranged from 2,381 to 2,602 feet above NAVD88 (Table 3-3). Corresponding static groundwater elevations measured at the RMPs ranged from 2,357 to 2,578 feet above NAVD88 (Table 3-3). The YIHM tended to overestimate the groundwater elevations at the RMPs by an average 48 feet. Therefore, the groundwater elevations at each RMP that represent the minimum threshold in the North Bench Management Area are the simulated groundwater elevations corrected by the differences between the simulated and measured groundwater elevations in September 2018. The minimum threshold groundwater elevations at the RMPs range from 2,209 to 2,504 feet above NAVD88 (Table 3-3).

Table 3-3. Groundwater Elevations Pertaining to the Measurable Objective and Minimum Threshold in the North Bench Management Area

RMP	Simulated Groundwater Elevation at Sep. 30, 1965 (ft NAVD88)	Simulated Groundwater Elevation at Sep. 30, 2018 (ft NAVD88)	Measured Groundwater Elevation near Sep. 30, 2018 (ft NAVD88)	Measured – Simulated Groundwater Elevation at Sep. 2018 (feet)	Groundwater Elevations at the Minimum Threshold (ft NAVD88)	Groundwater Elevations at the Measurable Objective (ft NAVD88)
YVWD-06	2,276.74	2,381.26	2,359.99	−21.27	**2,255.47**	**2,276.91**
YVWD-07	2,276.08	2,472.12	2,435.42	−36.70	**2,239.38**	**2,318.07**
YVWD-37	2,528.67	2,602.40	2,577.64	−24.75	**2,503.91**	**2,527.68**
YVWD-46	2,329.04	2,477.14	2,357.42	−119.73	**2,209.32**	**2,228.73**
YVWD-53	2,341.22	2,472.20	2,446.53	−25.67	**2,315.55**	**2,337.17**
YVWD-56	2,329.10	2,475.09	2,415.23	−59.86	**2,269.24**	**2,291.03**
USGS Wilson Creek No. 1 (820′–840′)	2,354.52	2,507.52	2,453.24	−54.28	**2,300.24**	**2,329.25**
USGS Wilson Creek#4 (350′–370′)	2,357.at 38	2,515.57	2,475.28	−40.29	**2,317.09**	**2,349.27**
Average	2,349.09	2,487.91	2,440.09	−47.82	**2,301.27**	**2,332.26**

Notes: RMP = representative monitoring point; ft NAVD88 = feet above the North American Vertical Datum of 1988.

3.4.1.1 Chronic Lowering of Groundwater Levels

Groundwater elevations in the North Bench Management Area are influenced by climate. Groundwater elevations markedly increased following periods with “above normal” and “wet” water year types, and markedly declined during periods with “below normal” and “critically dry” water year types. Groundwater elevations at the RMPs declined approximately 170 feet at a rate of approximately 21 feet per year from 1999 to 2007, a period when pumping in the management area exceeded the estimated sustainable yield of 3,940 AFY (Figure 3-6, Historical Groundwater Elevations and Pumping in the North Bench Management Area). The declining trend in groundwater levels ceased in 2008 when YVWD increased its importation of SWP water from approximately 3,500 AF in 2007 to 7,300 AF in 2008, which subsequently led to a decline in groundwater production by YVWD from 4,800 AF in 2007 to 3,800 AF in 2008. Groundwater production in the North Bench Management Area averaged approximately 3,600 AFY from 2008 to 2018 (Figure 3-6).

Predicted groundwater elevations calculated using the YIHM indicate that future operations in the North Bench Management Area with pumping constrained to the estimated sustainable yield of 3,940 AFY will result in groundwater elevations remaining above the minimum threshold (Figures 3-7 to 3-14). The YIHM predicts that groundwater elevations in the Future Baseline and Future Baseline with Climate Change I and II (i.e., 2030 and 2070 change factors) scenarios will increase from 2018 to peak levels in 2040 (climate scenarios similar to the wet 1978-1983 period), and then generally decline in all three scenarios after 2040. The climate record from 1984 to 2012 was used to simulate climatic conditions from 2041 through 2069, when the median annual precipitation was 84% of the mean annual and this period included more “dry” and “critically dry” water year types than the earlier climatic record from 1962 to 1983 that was used to simulate conditions from 2019 to 2040.

The Future Baseline and Future Baseline with Climate Change I and II scenarios predict that groundwater elevations at the end of the 2069 WY will range from approximately 135 feet to 158 feet higher than the minimum threshold levels established at each RMP (Figures 3-7 to 3-14).

Over the 50-year planning and implementation horizon, the groundwater elevation minimum threshold allows for groundwater extractions to exceed historical levels while protecting against long-term aquifer supply depletion. Historical production from 1999 to 2007 averaged 5,200 AFY, which led to a groundwater level decline of 21 feet per year. If, beginning with the current condition, pumping increased from the estimated sustainable yield of 3,940 AFY to an average of 5,200 AFY, then this historical rate may be sustained for approximately 6 years before groundwater levels fall to the minimum threshold established at an average elevation of 2,301 feet above NAVD88 (Table 3-3).

3.4.1.2 Reduction of Groundwater Storage

The YIHM indicated a net increase of approximately 35,000 AF in groundwater storage from 1965 to 2018 (Figure 2-67). As demonstrated by the fluctuating groundwater levels observed in the management area since 1965, increases in groundwater storage occurred following periods with “above normal” and “wet” water year types, and declined during periods dominated by “below normal” and “critically dry” water year types. Marked increases in storage occurred from the 1977 WY through 1983 WY, and during the 2017 WY when the area experienced predominantly “above normal” to “wet” water year types.

The YIHM predicts, with pumping constrained to the estimated sustainable yield of 3,940 AFY of the management area, a net increase in the volume of groundwater in storage of 2,250 AF (Future Baseline with Climate Change II scenario) to 12,200 AF (Future Baseline scenario) from the current condition (Figure 3-15, Predicted Volume in Storage by the Future Baseline and Future Baseline with Climate Change I and II Scenarios in the North Bench Management Area). A peak volume in storage is predicted between 275,000 AF and 285,500 AF in the 2039 WY, followed by a general declining trend to the end of the 2069 WY (Figure 3-15). The volume in storage is not predicted to fall below the minimum threshold of 220,000 AF, or the measurable objective of 230,000 AF, during the 50-year planning and implementation horizon.

A decline in groundwater elevation from the current level to the minimum threshold represents a net decline in groundwater storage of approximately 35,000 AF (Figure 3-15). The minimum threshold represents a volume in storage at approximately 220,000 AF, which is 86% of the volume in storage (255,000 AF) estimated under current conditions. This analysis indicates that maintaining an average aquifer saturation that is at least 86% of current conditions will protect against long-term aquifer supply depletion and provide necessary operational flexibility for municipal and private groundwater users.

3.4.1.3 Land Subsidence

The minimum threshold established to assess chronic lowering of groundwater levels and reduction of groundwater storage is the historical low groundwater elevation. Long-term declines below the historical low groundwater elevation may introduce the potential for future land subsidence. DWR has designated the Plan Area has having a medium to low risk for future land subsidence (DWR 2014). The subsurface geology below the historical low groundwater elevation of 2,301 feet above NAVD88 is, based on driller's logs for the YVWD wells, characterized as having relatively thin, discontinuous lenses of clay interbedded between thicker layers of coarse-grained sand and gravel (Appendix 3-A). This presents a low risk for future subsidence, and land subsidence related to groundwater withdrawal was not induced when historical water levels were lower than current water levels. No interference or damage to infrastructure and surface land uses were observed in 2007 and 2008 when groundwater elevations at this time were comparable to the historical lows simulated at the end of the 1965 WY (Figure 2-66; Table 3-3).

The minimum threshold for chronic declines in groundwater level and reduction of groundwater storage were adopted for land subsidence as well. The use of the groundwater elevation minimum threshold as a surrogate for land subsidence will be reviewed with each 5-year GSP evaluation to ensure that they adequately protect the Plan Area from experiencing undesirable results related to land subsidence. Each 5-year GSP evaluation will include InSAR data obtained from the SGMA Data Portal, which will be compared to previous InSAR data (including the baseline dataset collected from 2015 to 2018) to evaluate potential land subsidence as a result of groundwater levels falling below historical lows in the principal aquifer.

3.4.1.4 Depletion of Interconnected Surface Water

Surface water flows in the upper reaches of Wilson Creek and Oak Glen are ephemeral (Section 2.3). Groundwater level measurements indicate that surface water and groundwater along the upper reach of Oak Glen Creek in the northeast section of the North Bench Management Area may experience periods of interconnectedness, but these conditions are not persistent. Groundwater elevations decline downgradient of this area to depths that have historically ranged from 22 to 200 feet bgs. These measurements indicate that surface water and groundwater are not interconnected downgradient of YVWD-25 (Figure 2-56).

GDEs were identified along Wildwood Canyon Creek near Wildwood Canyon State Park, and the upper elevations of the Oak Glen subarea near the Triple Falls Creek subarea (Figure 2-56). No other GDEs and no potential GDEs were identified in the other four hydrogeological subareas in the North Bench Management Area. Wells YVWD-25 and YVWD-28 are identified as RMPs to characterize and assess groundwater conditions in the areas of the GDEs.

3.4.1.4.1 Oak Glen Creek near the Triple Falls Creek Subarea

Groundwater levels are measured at two wells within 1 kilometer (0.6 miles) of the mapped habitats in this part of the management area: YVWD-25 (screened 45 to 55 feet bgs) and the Chlorinator Well, a groundwater observation well (unknown screen interval). Historical static water levels at YVWD-25 have ranged from 7 feet bgs to 43 feet bgs (Figure 3-16, Depths-to-Groundwater at the Chlorinator Well and YVWD-25 in the North Bench Management Area). Static groundwater levels measured at the Chlorinator well since January 1987 have ranged from 13 feet bgs to 60 feet bgs (Figure 3-16). Since 2015, the average depth-to-water measured at the Chlorinator well was approximately 49 feet bgs. The chlorinator well is not an RMP at this time because the well construction details are unknown. This well may be considered an RMP when the screen interval is determined and water levels measured at this well represent shallow groundwater conditions.

YVWD-25 has produced an average 270 AFY since 2001 (Figure 2-20). Between 2001 and 2013, the normalized difference vegetation index (NDVI) and normalized difference moisture index (NDMI) increased; this increase was correlated with above average annual precipitation for this 12-year period (Section 2.7.8). The fact that NDVI and NDMI increased between 2001 and 2013, a period when YVWD-25 was actively producing approximately 270 AFY, suggests that continued production at YVWD-25 at current extraction rates will not adversely impact the health of these mapped habitats.

YVWD-25 is designated as an RMP to evaluate conditions at the GDE mapped in this area of the North Bench management area. The minimum threshold to protect GDEs in the North Bench Management Area is the condition when the shallow groundwater table sustaining the GDE falls below 30 feet bgs for 2 consecutive years. Additionally, under such conditions, an analysis of the NDVI and NDMI trends over the same 2 years will be conducted to confirm whether the decline in groundwater level below the minimum threshold correlates with a declining trend in NDVI and NDMI. If a correlation is found between declining groundwater level (as a result of groundwater extractions more than the historical average of 270 AFY) and NDVI and NDMI, then the net removal of groundwater from the area will be reduced until groundwater levels recover above the minimum threshold for two consecutive years.

If future groundwater extractions planned in this region are expected to exceed historical extractions in the region, additional field work will be required to characterize the impact that proposed pumping rates will have on the habitats along Oak Glen Creek near the Triple Falls Creek subarea. This would include installing one or more shallow groundwater observation wells screened from the historical high groundwater level to approximately 35 feet bgs. Groundwater elevation data collected from the shallow groundwater observation well(s) will be analyzed to evaluate whether the local habitat is sustained by shallow groundwater (<30 feet bgs) and will be used to evaluate potential influences by nearby pumping in the principal aquifer.

3.4.1.4.2 Wildwood Canyon State Park

The mapped habitats in this part of the management area predominantly border Wildwood Canyon Creek, but also extend south into undeveloped lands that border the local residential community (Figure 2-56). NDVI moderately increased across the majority of this habitat between 2009 and 2018, while NDMI moderately decreased. During this period, annual precipitation was generally lower than the 33-year average of 14 inches between 1985 and 2018.

Static groundwater levels have been measured within 1 kilometer (0.6 miles) of this habitat at YVWD-28 since May 2004. The static depths-to-water measured at this well have ranged from 36 feet bgs to 8 feet bgs (Figure 3-17, Static Depths-to-Groundwater at YVWD-28 in the North Bench Management Area). There are no active groundwater extraction wells (YVWD has not pumped groundwater since 2007) within 1 kilometer of this habitat that may impact future health of the Coast Live Oak.

YVWD-28 is designated as an RMP to evaluate conditions at the GDE mapped in this area of the North Bench management area. The minimum threshold to protect GDEs in the North Bench Management Area is the condition when the shallow groundwater table sustaining the GDE falls below 30 feet bgs for 2 consecutive years. Additionally, under such conditions, an analysis of the NDVI and NDMI trends over the same 2 years will be conducted to confirm whether the decline in groundwater level below the minimum threshold correlates with a declining trend in NDVI and NDMI. If a correlation is found between declining groundwater level (as a result of groundwater extractions more than the historical average) and NDVI and NDMI, then the net removal of groundwater from the area will be reduced until groundwater levels recover above the minimum threshold for 2 consecutive years.

If future extractions planned in this region are expected to exceed historical extractions, additional field work will be required to characterize the impact that proposed pumping rates will have on the habitats along Wildwood Canyon Creek. This would include installing one or more shallow groundwater observation wells screened from the historical high groundwater level to approximately 35 feet bgs. Groundwater elevation data collected from the shallow groundwater observation well(s) will be analyzed to evaluate whether the local habitat is sustained by shallow groundwater (<30 feet bgs), and will be used to evaluate seasonal fluctuations and potential influences by nearby pumping in the principal aquifer.

3.4.1.5 Degradation of Water Quality

No minimum threshold relative to the significant and unreasonable degradation of water quality was established for the North Bench Management Area. Only one groundwater remediation program is active in the management area: the former Yucaipa landfill. Groundwater contamination is located in the shallow alluvial aquifer unit above the principal aquifer, which has not been influenced by contamination originating at the landfill.

YVWD implemented a program to replace septic systems in the management area with sanitary sewer services that subsequently led to a marked decline in contributions of nitrate and TDS to groundwater. YVWD implemented reverse osmosis and denitrification treatment at the WRWRF, which produces tertiary treated wastewater for recycled water purposes. The recycled water includes concentrations of TDS and nitrate below the maximum benefits water quality objectives established in the 2014 Basin Plan Amendment (Section 2.7.4).

3.4.1.6 Seawater Intrusion

The North Bench Management Area is approximately 53 miles northeast of the Pacific Ocean and is, at its lowest elevation, approximately 2,300 feet above NAVD88, which is approximately 2,300 feet above mean sea level. No minimum threshold was established for the North Bench Management Area with regard to seawater intrusion.

3.4.2 Calimesa Management Area

The Calimesa Management Area comprises the Calimesa and Singleton subareas, and the upper northeast portion of the Live Oak subarea (Figure 2-63). This management area includes municipal water supply wells owned and operated by YVWD and South Mesa. South Mountain owns and operates two irrigation supply wells that supply water to the Crafton Hills community college that is partly in the northern section of the Western Heights Management Area. A minimum threshold for this management area was established for chronic lowering of groundwater levels, reduction of groundwater storage, and land subsidence. No GDEs were identified in this management area (Section 2.7.8). One potential GDE was identified in the Singleton subarea (Section 2.7.8).

The undesirable result identified for the Calimesa Management Area is the condition when groundwater in storage falls below a drought buffer established in this management area. Using the YIHM, the drought buffer was based on the simulated decline in storage from the 1995-WY to the 2004 WY, a period when the volume of groundwater in storage declined approximately 26,000 AF (Figure 3-18, Drought Buffer in the Calimesa Management Area). This period was selected because the management area experienced the highest rate of decline in storage at 2,600 AFY over the 50-year historical period. Groundwater production from the management area from the 1995 WY to the 2004 WY averaged approximately 6,600 AFY, which was approximately 133% of the estimated sustainable yield of 4,955 AFY (Figure 3-19, Historical and Current Volume of Groundwater in

Storage in the Calimesa Management Area). During this period, the average annual rainfall in the Subbasin was 15 inches, or 96% of normal. This period included five “dry” and one “critically dry” water year types, with two “above normal” and two “wet” water year types (Figure 2-3). Groundwater levels declined approximately 50 feet from 1994 to 2004 (Figure 2-69).

The Yucaipa GSA identified a decline of 26,000 AF from storage over a 10-year period as a significant and unreasonable decline in the storage of groundwater in this management area. The drought buffer provides a reasonable margin of operational flexibility under adverse conditions, by allowing for changes to groundwater production or the implementation of projects and/or programs to prevent a net loss of groundwater that results in the undesirable result of the volume in storage declining below the drought buffer.

The drought buffer begins at the historical low in volume in storage at 798,700 AF and ends 26,000 AF below that mark at 772,700 AF (Figure 3-20, Minimum Threshold and Measurable Objective in the Calimesa Management Area). Undesirable results were not experienced at the historical low storage condition in that groundwater supply was not impacted. **The minimum threshold is established at the bottom of the drought buffer at 772,700 AF.** The RMPs for the Calimesa Management Area are: South Mesa wells 7, 9, 12 and 17; YVWD wells YVWD-10, YVWD-12, YVWD-24, and YVWD-49; South Mountain well Hog Canyon 2, and the USGS 6th Street #1 and #4 and Equestrian Park #1 and #4 nested wells (Figure 3-5). Static groundwater levels measured at the RMPs will be used to evaluate conditions against the minimum threshold and measurable objective related to the undesirable results of chronic lowering of groundwater levels, reduction of groundwater storage, and land subsidence.

3.4.2.1 Chronic Lowering of Groundwater Levels

Groundwater elevations in the Calimesa Management Area experienced a declining trend from 1988 to 2007 (Figure 2-69). Groundwater levels declined at an approximate rate of 6.1 feet per year during that period. Groundwater production from the management area in that period averaged 6,100 AFY, which is above the estimated sustainable yield of 4,955 AFY. The declining trend in groundwater levels ceased in 2008 when YVWD markedly increased its importation of SWP water as a supplemental water source. Subsequently, YVWD reduced its groundwater production in the management area from an annual average 3,400 AFY (1988-2007) to 2,100 AFY from 2008 to 2018 (Figure 3-21, Annual Groundwater Production and Historical Groundwater Elevations in the Calimesa Management Area). South Mesa has averaged an annual groundwater production rate of 2,000 AFY from the management area from 1988 to 2018 (Figure 3-21). South Mountain has averaged 100 AFY from 2008 to 2018 (Figure 3-21). The average annual production from the management area from 2008 to 2018 was approximately 4,400 AFY, which is below the estimated sustainable yield of 4,955 AFY. Consequently, groundwater elevations in the management area have either stabilized or been recovering since 2008 (Figure 3-21).

The static measured groundwater elevations in the Calimesa Management Area at the end of the 2018 WY (i.e., the current condition) ranged from 2,056 to 2,207 feet above NAVD88 (Table 3-4). The simulated groundwater elevations at the end of the 2018 WY ranged from 2,012 to 2,193 feet above NAVD88 (Table 3-4). The differences between the observed and simulated groundwater levels ranged from −15.9 to 64.8 feet, or an average of 19.3 feet, meaning the YIHM tended to underestimate groundwater elevations in the Calimesa Management Area. To associate groundwater levels at each RMP to the minimum threshold, the YIHM was used to simulate conditions at the minimum threshold. The simulated groundwater elevations at the minimum threshold for each RMP range from 1,912 to 2,164 feet above NAVD88 (Table 3-4). Applying the difference between measured and simulated groundwater levels at the end of the

2018 WY, the minimum threshold established at 772,700 AF in storage is represented by groundwater elevations at the RMPs that range from 1,959 to 2,177 feet above NAVD88 (Table 3-4).

Projected water levels calculated using the YIHM indicate that future operations in the Calimesa Management Area with pumping constrained to the estimated sustainable yield of 4,955 AFY will result in groundwater elevations remaining above the minimum threshold (Figures 3-22 to 3-34). The Future Baseline scenario predicts that groundwater elevations at the RMPs will increase by the end of the 2069 WY by approximately 2 to 38 feet (Figures 3-22 to 3-34). The Future Baseline with Climate Change I scenario predicts that groundwater elevations, on average, will be comparable to levels observed at the end of the 2018 WY (Figures 3-22 to 3-34). The Future Baseline with Climate Change II scenario predicts that groundwater elevations, on average, will be approximately 22 feet below the 2018 WY levels (Figures 3-22 to 3-34). Predicted groundwater elevations will not decline below the minimum threshold at any of the RMPs.

Over the 50-year planning and implementation horizon, the groundwater elevation minimum threshold allows for groundwater extractions to exceed historical levels while protecting against long-term aquifer supply depletion. Historical production from 1988 to 2007 averaged 6,100 AFY, which led to a groundwater level decline of 6.1 feet per year (Figure 3-21). If, beginning with the current condition, pumping increased from the estimated sustainable yield of 4,955 AFY to an average of 6,100 AFY, then this historical rate may be sustained for approximately 12 years before groundwater levels fall to the average minimum threshold established at 2,044 feet above NAVD88.

3.4.2.2 Reduction of Groundwater Storage

The YIHM indicated a net decrease of approximately 16,000 AF in groundwater storage from 1965 to 2018 (Figure 2-70). From 1965 to 1977, the volume in storage remained consistent at approximately 814,000 AF when rainfall averaged 104% of normal annual precipitation and pumping averaged 4,800 AFY, or 97% of the estimated sustainable yield (Figure 3-19). From 1978 to 1989, the volume in storage increased approximately 35,000 AF when rainfall averaged 118% of normal annual precipitation and pumping averaged 4,900 AFY, or 99% of the estimated sustainable yield. (Figure 3-19). From 1990 to 2008, groundwater production averaged 6,100 AFY (or 123% of the estimated sustainable yield) and the YIHM calculated a net loss of approximately 46,000 AF. The historical low in the volume of groundwater in storage was simulated at the end of the 2015 WY at 798,700 AF. Since the historical low in the volume of groundwater in storage, the management area has recovered approximately 1,700 AF (Figure 3-19).

Simulation results of future projected conditions using the YIHM indicate that the volume in storage is expected to remain above the minimum threshold throughout the 50-year planning and implementation horizon (Figure 3-35, Predicted Volume in Storage by the Future Baseline and Future Baseline with Climate Change I and II Scenarios in the Calimesa Management Area). The YIHM predicted a net increase of 7,500 AF in the volume in storage by the end of the 2069 WY in the Future Baseline scenario, and net decreases of 1,500 AF and 14,000 AF for the Future Baseline with Climate Change I and II scenarios, respectively (Figure 3-35).

The decline in groundwater elevation from the current level to the minimum threshold represents a net decline in groundwater storage of approximately 27,700 AF (Figure 3-20). The volume in groundwater storage at the minimum threshold is approximately 772,700 AF, which is 97% of the current volume in storage at 800,400 AF. The reduction in groundwater storage to 772,700 AF would be an undesirable result. Groundwater elevations that result in a reduction in groundwater storage of approximately 27,700 AF from the current condition are lower than the historical low groundwater levels. This analysis indicates that maintaining an average aquifer saturation that is at least 97% of current conditions will protect against long-term aquifer supply depletion and provide necessary operational flexibility for municipal and private groundwater users.

3.4.2.3 Land Subsidence

The minimum threshold static groundwater elevation established to assess chronic lowering of groundwater levels and reduction of groundwater storage is lower than the historical low observed between 2010 and 2015, and therefore introduces the potential for future land subsidence. DWR has designated the Plan Area has having a medium to low risk for future land subsidence (DWR 2014). The subsurface geology below the historical low groundwater elevation of 2,097 feet above NAVD88 is, based on driller's logs for the South Mesa and YVWD wells, characterized as having relatively thin, discontinuous lenses of clay interbedded between thicker layers of coarse-grain sand and gravel (Appendix 3-A). This presents a low risk for future subsidence, and land subsidence related to groundwater withdrawal was not induced when historical water levels were lower than current water levels. No interference or damage to infrastructure and surface land uses were observed when the historical lows in groundwater elevations were observed in this management area.

The minimum threshold for chronic declines in groundwater level and reduction of groundwater storage were adopted for land subsidence as well. The use of the groundwater elevation minimum threshold as a surrogate for land subsidence will be reviewed with each 5-year GSP evaluation to ensure that they adequately protect the Plan Area from experiencing undesirable results related to land subsidence. Each 5-year GSP evaluation will include InSAR data obtained from the SGMA Data Portal, which will be compared to previous InSAR data (including the baseline dataset collected from 2015 to 2018) to evaluate potential land subsidence as a result of groundwater levels falling below historical lows in the principal aquifer.

Table 3-4. Groundwater Elevations Pertaining to the Measurable Objective and Minimum Threshold in the Calimesa Management Area

Representative Monitoring Point	Simulated Groundwater Elevation at Sep. 30, 2015 (ft NAVD88)	Measured Static Groundwater Elevation at Sept. 30, 2015 (ft NAVD88)	Measured – Simulated Groundwater Elevation at Sep. 2015 (feet)	Simulated Groundwater Elevation at Sep. 30, 2018 (ft NAVD88)	Measured Groundwater Elevation near Sep. 30, 2018 (ft NAVD88)	Measured – Simulated Groundwater Elevation at Sep. 2018 (feet)	Simulated Groundwater Elevations at the Minimum Threshold (ft NAVD88)	Estimated Measured Groundwater Elevationsat the Minimum Threshold (ft NAVD88)	Measured Groundwater Elevations at the Measurable Objective (ft NAVD88)
Hog Canyon 2	2,053.55	2,067.13	13.57	2,079.54	2,090.13	10.59	2,009.74	2,021.82	2,067.13
South Mesa 07	2,063.24	2,039.73	−23.51	2,071.67	2,055.73	-15.93	2,001.86	1,982.14	2,039.73
South Mesa 09	2,014.06	2,052.70	38.64	2,011.53	2,066.70	55.17	1,911.67	1,958.58	2,052.70
South Mesa 12	2,067.87	2,068.46	0.59	2,079.01	2,095.74	16.73	2,009.61	2,018.27	2,068.46
South Mesa 17	2,067.34	2,050.77	−16.57	2,079.49	2,088.77	9.28	2,009.94	2,006.30	2,050.77
USGS 6th St #1 (870′–930′)	2,073.38	2,107.94	34.56	2,086.58	2,133.89	47.31	2,017.67	2,058.61	2,107.94
USGS 6th St #4 (380′–400′)	2,150.61	2,165.27	14.66	2,154.56	2,170.93	16.37	2,112.19	2,127.70	2,165.27
USGS Equestrian Park #1 (830′–850′)	2,193.59	2,201.62	8.03	2,193.29	2,203.28	9.99	2,164.36	2,173.37	2,201.62
USGS Equestrian Park #4 (380′–400′)	2,190.36	2,205.51	15.15	2,190.21	2,206.59	16.38	2,161.10	2,176.87	2,205.51
YVWD-10	2,068.33	2,065.84	−2.49	2,081.09	2,087.74	6.65	2,012.08	2,014.16	2,065.84
YVWD-12	2,068.67	2,071.38	2.70	2,081.33	2,094.66	13.33	2,012.25	2,020.26	2,071.38
YVWD-24	2,069.97	2,099.36	29.39	2,081.30	2,146.06	64.76	2,014.56	2,061.63	2,099.36
YVWD-49	2,068.54	2,070.64	2.11	2,081.55	2,082.24	0.69	2,012.63	2,014.03	2,070.64
Average	2,088.42	2,097.41	8.99	2,097.78	2,117.11	19.33	2,034.59	2,048.75	2,097.41

Note: ft NAVD88 = feet above the North American Vertical Datum of 1988.

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3.4.2.4 Depletion of Interconnected Surface Water

No GDEs or interconnected surface water bodies were identified in the Calimesa Management Area. One potential GDE was identified in the Singleton subarea, located in the southeastern corner of the management area (Section 2.7.8). No existing wells are within 1 kilometer (0.6 miles) of the potential GDE, so no water levels have been measured to characterize the depth to groundwater. The natural community of this potential GDE has not been impacted by historical groundwater extractions from the principal aquifer, so no minimum threshold was established relative to this undesirable result.

If future extractions planned in this region are expected to exceed historical extractions in the region, additional field work will be required to characterize the impact that proposed pumping rates will have on the potential GDE in the Singleton subarea. This would include installing one or more shallow groundwater observation wells screened from the historical high groundwater level to approximately 35 feet bgs. Groundwater elevation data collected from the shallow groundwater observation well(s) will be analyzed to evaluate whether the local habitat is sustained by shallow groundwater (<30 feet bgs) and will be used to evaluate seasonal fluctuations and potential influences by nearby pumping in the principal aquifer. Additionally, a spring survey is recommended for the upstream reach of the drainage above the potential GDE. Spring flow may be another potential source of water to the GDE, which may be influenced by groundwater production in the principal aquifer. If spring flow is identified, then a surface water flow monitoring program will be implemented to monitor spring flow should a new production well be installed within 1 kilometer (0.6 miles) of the potential GDE.

3.4.2.5 Degradation of Water Quality

No minimum threshold relative to the significant and unreasonable degradation of water quality was established for the Calimesa Management Area. There are no active groundwater remediation programs in the management area.

YVWD implemented a program to replace septic systems in the management area with sanitary sewer services that subsequently led to a marked decline in contributions of nitrate and TDS to groundwater. YVWD implemented reverse osmosis and denitrification treatment at the WRWRF, which produces tertiary treated wastewater for recycled water purposes. The recycled water includes concentrations of TDS and nitrate below the maximum benefits water quality objectives established in the 2014 Basin Plan Amendment (Section 2.7.4).

3.4.2.6 Seawater Intrusion

The Calimesa Management Area is approximately 51 miles northeast of the Pacific Ocean and approximately 2,000 feet above NAVD88 at its lowest elevation, which is approximately 2,300 feet above mean sea level. No minimum threshold was established for the Calimesa Management Area with regard to seawater intrusion.

3.4.3 Western Heights Management Area

The Western Heights Management Area comprises the Western Heights hydrogeological subarea and includes all municipal water supply wells owned and operated by WHWC (Figure 2-63). The USGS installed one nested observation well, identified as the Dunlap Acres well, approximately 55 feet from WHWC-14. A minimum threshold for this management area was established for chronic lowering of groundwater levels, reduction of groundwater storage, and land subsidence. No GDEs and no potential GDEs were identified in this management area. Therefore, no sustainable management criteria were established for the depletion of interconnected surface water in this management area.

The undesirable result associated with chronic lowering of groundwater levels, reduction in groundwater storage, and land subsidence is the condition when groundwater levels fall below a drought buffer established in this management area. The drought buffer was based on the simulated decline in storage from the 1983 WY to the 1992 WY, a period when the volume of groundwater in storage declined approximately 10,000 AF (Figure 3-36, Drought Buffer in the Western Heights Management Area). This period was selected to define a drought buffer because the management area experienced the highest rate of decline in storage at 900 AFY over the 50-year historical period. Groundwater production from the 1983 WY to the 1992 WY averaged approximately 2,500 AFY, which was approximately 142% of the estimated sustainable yield of 1,760 AFY (Figure 3-37, Annual Groundwater Production and Historical Groundwater Elevations in the Western Heights Management Area). During this period, the average annual rainfall in the Subbasin was 16 inches, or 101% of normal. This period included three “dry” and three “below normal” water year types, with two “above normal” and one “wet” water year types (Figure 2-3). Groundwater levels declined approximately 35 feet from 1982 to 1992 (Figure 3-37).

The Yucaipa GSA identified a decline of 10,000 AF from storage over a 10-year period as a significant and unreasonable decline in the storage of groundwater in this management area. The drought buffer provides a reasonable margin of operational flexibility under adverse conditions, by allowing for changes to groundwater production or the implementation of projects and/or programs to prevent a net loss of groundwater that results in the undesirable result of the volume in storage declining below the drought buffer.

The drought buffer begins at the historical low in volume in storage at 408,800 AF and ends 10,000 AF below that mark at 398,800 AF (Figure 3-38, Minimum Threshold and Measurable Objective in the Western Heights Management Area). Undesirable results were not experienced at the historical low storage condition in that groundwater supply was not impacted. **The minimum threshold is established at 398,800 AF.** The RMPs for the Western Heights Management Area are WHWC wells WHWC-2A, WHWC-10, WHWC-11, WHWC-12, and WHWC-14, and the USGS Dunlap Acres nested monitoring wells No. 2 and No. 4 (Figure 3-5). Static groundwater elevations measured at these wells will be used to evaluate conditions against the minimum threshold and measurable objective related to the undesirable results of chronic lowering of groundwater levels, reduction of groundwater storage, and land subsidence.

3.4.3.1 Chronic Lowering of Groundwater Levels

Groundwater elevations in the Western Heights Management Area experienced a long-term declining trend from the mid-1960s to 2015 (Figure 2-71). Groundwater levels declined at an approximate rate of 3.2 feet per year during that period. The cause of the long-term declining trend was groundwater production that exceeded the estimated sustainable yield of 1,760 AFY (Figure 3-37). The declining trend in groundwater levels ceased in 2015 when WHWC increased its purchase of supplemental water from YVWD in 2016 and, subsequently, WHWC reduced groundwater production from an average 2,300 AFY (1990–2015) to 1,600 AFY (2016–2018), a rate less than the estimated sustainable yield (Figure 3-39, Groundwater Production and Supplemental Water Purchased in the Western Heights Management Area).

The current average static groundwater elevation in the Western Heights Management Area is 1,753 feet above NAVD88 (Table 3-5). This is approximately 11 feet higher than the average static groundwater elevation of 1,742 feet above NAVD88 measured at the historical low condition between the RMPs in September 2015 (Table 3-5). The YIHM was used to simulate conditions at the minimum threshold. The simulated groundwater elevations at the minimum threshold for each RMP range from 1,705 to 1,713 feet above NAVD88 (Table 3-5). On average, the YIHM overestimated groundwater elevations in the Western Heights Management Area by approximately 5.3 feet between 2015 and 2018. Therefore, the minimum threshold will be characterized by measured groundwater elevations at the RMPs that range from 1,695 to 1,714 feet above NAVD88 (Table 3-5). The average groundwater elevation between the RMPs representing the minimum threshold is 1,705 feet above NAVD88.

Projected groundwater elevations calculated by the YIHM indicate that future operations in the Western Heights Management Area with pumping constrained to the estimated sustainable yield of 1,760 AFY will result in groundwater level increases from 2019 to 2070. Under the Future Baseline scenario, and the Future Baseline with Climate Change I and II (i.e., 2030 and 2070 climate change factors) scenarios, the YIHM predicts that groundwater elevations will increase at rates of approximately 1.5 foot per year (ft/yr), 1.2 ft/yr, and 0.8 ft/yr, respectively. Groundwater elevations are projected to be approximately 73 feet, 59 feet, and 39 feet higher than the groundwater elevations observed in September 2018 (Figures 3-40 to 3-46). Projected groundwater elevations at the RMPs will be above the groundwater elevations characterizing the minimum threshold in the management area.

Over the 50-year planning and implementation horizon, the groundwater elevation minimum thresholds allow for groundwater extractions to exceed historical levels while protecting against long-term aquifer supply depletion. Historical production at an average 2,500 AFY from 1966 to 2015 led to a groundwater level decline of approximately 2.7 feet per year. If, beginning with the current condition, pumping increased from the estimated sustainable yield of 1,760 AFY to the historical average of 2,500 AFY, then this historical rate may be sustained for approximately 18 years before groundwater levels fall to the minimum threshold established at an average elevation of 1,705 feet above NAVD88.

3.4.3.2 Reduction of Groundwater Storage

The YIHM indicated a net decrease of approximately 32,500 AF in groundwater storage from 1965 to 2018 (Figure 2-72). In this period, the average annual rate of groundwater production from the management area was approximately 2,400 AFY. Groundwater production was, on average, 136% of the estimated sustainable yield of 1,760 AFY. The rate of groundwater production consistently exceeded the natural recharge over this period despite the relatively wet periods observed from 1978-1983, 1993-1998, 2005, and 2011 (Figure 2-3). The decline in storage stopped in 2016 when WHWC markedly increased its purchase of supplemental water from YVWD, which subsequently led to a decline in groundwater production to below the estimated sustainable yield (Figures 3-37 and 3-39).

Simulation results of future projected conditions using the YIHM indicate that the volume in storage will, by the end of the 50-year planning and implementation horizon, increase by approximately 19,000 AF to 29,000 AF above the minimum threshold (Figure 3-47, Predicted Volume in Storage by the Future Baseline and Future Baseline with Climate Change I and II Scenarios in the Western Heights Management Area).

The decline in groundwater elevation from the current level to the minimum threshold represents a net decline in groundwater storage of approximately 10,500 AF (Figure 3-38). The volume in groundwater storage at the minimum threshold is approximately 398,800 AF, which is 97% of the current volume in storage at 409,300 AF. The reduction in groundwater storage to 398,800 AF would be an undesirable result. Groundwater elevations that result in a reduction in groundwater storage of approximately 10,500 AF from the current condition are lower than the historical low groundwater levels. This analysis indicates that maintaining an average aquifer saturation that is at least 97% of current conditions will protect against long-term aquifer supply depletion and provide necessary operational flexibility for municipal and private groundwater users.

3.4.3.3 Land Subsidence

The minimum threshold static groundwater elevation established to assess chronic lowering of groundwater levels and reduction of groundwater storage is lower than the historical low condition, and therefore introduces the potential for future land subsidence. DWR has designated the Plan Area has having a medium to low risk for future land subsidence (DWR 2014). The subsurface geology below the average historical low groundwater elevation of 1,742 feet above NAVD88 is, based on driller's logs for the WHWC wells, characterized as having relatively thin, discontinuous lenses of clay interbedded between thicker layers of coarse-grained sand and gravel (Appendix 3-A). This presents a low risk for future subsidence, and land subsidence related to groundwater withdrawal was not induced when historical water levels were lower than current water levels.

Groundwater elevations declined from 1996 to the historical low observed in 2015, a period when the GPS station located at Crafton Hills College indicated a net increase in vertical displacement (Figure 3-1). No significant and unreasonable land subsidence that would substantially interfere with land surface uses or infrastructure was experienced during this period. Despite no occurrence of land subsidence due to past groundwater withdrawals, there is a potential for land subsidence when groundwater levels fall below the historical low condition. Therefore, the minimum threshold for chronic declines in groundwater level and reduction of groundwater storage were adopted for land subsidence as well. The use of the groundwater elevation minimum threshold as a surrogate for land subsidence will be reviewed with each 5-year GSP evaluation to ensure that they adequately protect the Plan Area from experiencing undesirable results related to land subsidence. Each 5-year GSP evaluation will include InSAR data obtained from the SGMA Data Portal, which will be compared to previous InSAR data (including the baseline dataset collected from 2015 to 2018 – a time when groundwater levels were recovering from the historical lows) to evaluate potential land subsidence as a result of groundwater levels falling below historical lows in the principal aquifer.

3.4.3.4 Depletion of Interconnected Surface Water

No GDEs, potential GDEs, or interconnected surface waters were identified in the Western Heights Management Area, so no minimum threshold was established relative to this undesirable result.

3.4.3.5 Degradation of Water Quality

No minimum threshold relative to the significant and unreasonable degradation of water quality was established for the Western Heights Management Area. Active groundwater remediation programs in the Western Heights Management Area are addressing shallow groundwater contamination issues in a perched aquifer hydraulically disconnected from the underlying principal aquifer. Water quality at the active WHWC municipal supply wells has not been influenced by groundwater contamination observed in the shallow perched aquifer (see Section 2.7.5).

WHWC continues to participate in the Maximum Benefits Monitoring Program and submits groundwater level and groundwater quality (i.e., TDS and nitrate concentrations) data to YVWD, the acting data manager for the Maximum Benefits Monitoring Program, which is included in annual reports submitted to the RWQCB.

3.4.3.6 Seawater Intrusion

The Western Heights Management Area is approximately 50 miles northeast of the Pacific Ocean and approximately 1,700 feet above NAVD88. No minimum threshold was established for the Western Heights Management Area with regard to seawater intrusion.

3.4.4 San Timoteo Management Area

The San Timoteo Management Area comprises the portion of the Live Oak hydrogeological subarea that is not in the Calimesa Management Area (Figure 2-63). There are no municipal water supply wells in this management area. There are two known private agricultural supply wells in the lower portion of the management area on the westside of San Timoteo Creek. One of the wells, GL-8, supplies water to the citrus groves located near the well. The other agricultural well, the Knight Well, is used to irrigate a small field adjacent to the San Timoteo Creek. YVWD installed shallow groundwater observation wells to monitor groundwater elevations in San Timoteo Canyon. Some of these wells were set approximately 15 to 20 feet below grade and were screened to monitor fluctuations in the shallow groundwater table near San Timoteo Creek.

A minimum threshold for this management area was established for the GDEs identified along San Timoteo Creek. At this time, no sustainability criteria are established for the other sustainability indicators because there are no existing municipal water supply wells that extract groundwater from the principal aquifer. If a water purveyor plans to install and operate a municipal water supply well and produce from the principal aquifer, then the water purveyor must investigate the potential influences of pumping from the principal aquifer on the shallow groundwater table sustaining the GDEs identified along San Timoteo Creek and the potential GDEs identified along Yucaipa Creek upstream of its confluence with San Timoteo Creek. Additionally, the average long-term groundwater production from the principal aquifer in the San Timoteo Management Area will be held at or below the estimated sustainable yield of 325 AFY.

The undesirable result identified for the San Timoteo Management Area is the condition when the shallow groundwater table sustaining the GDEs falls below 30 feet bgs as a result of groundwater production from the principal aquifer. Static groundwater levels measured at YVWD shallow wells OW-3P, OW-6A and OW-6B indicated a water table above 10 feet bgs (Figure 3-48, Groundwater Elevations and Sustainability Criteria for the San Timoteo Management Area). These wells no longer exist, but were previously screened from 5 to 20 feet bgs. Deeper wells GWMW-1, GWMW-2, and GWMW-3, which are screened approximately 45 to 70 feet bgs, each had static groundwater elevations at 15 to 20 feet bgs. These groundwater elevations, or hydraulic heads, measured approximately 25 to 30 feet higher than the top of their respective well screens indicate that the alluvial aquifer is confined (Figure 3-49, Historical Groundwater Elevations Measured in the San Timoteo Management Area).

YVWD installed a deeper nested well, GWMW-5, near GWMW-1 with three well casings set at 120 to 140 feet bgs (GWMW-5A), 285 to 305 feet bgs (GMWMW-5B), and 340 to 360 feet bgs (GWMW-5C). Static groundwater elevations at the shallowest well, GWMW-5A, ranged between 15 and 25 feet bgs, and between ground surface and 5 feet bgs at GWMW-5B (Figure 3-50, Groundwater Elevations at Nested Well GWMW-5 in the San Timoteo Management Area). The deepest well, GWMW-5C, has been artesian, with flow continuously discharged to land surface. The static groundwater elevations observed at these nested wells indicated an upward vertical hydraulic gradient estimated at 0.115 feet per foot.

The RMPs for the San Timoteo Management Area are GWMW-1, GWMW-2, GWMW-3, GWMW-5A, GWMW-5B, and GWMW-5C (Figure 3-5).

3.4.4.1 Chronic Lowering of Groundwater Levels

At this time, no minimum threshold is established for the chronic lowering of groundwater levels in the San Timoteo Management Area. Static depths-to-water measured at the GL-8 agricultural well ranged from 29.17 to 38.16 feet bgs (average of 33.88 feet bgs) from 2006 to 2018 (Figure 3-49). The groundwater level dropped to an average 99.73 feet bgs when the well pumped groundwater, but subsequent groundwater level measurements when the well was idle indicated full recovery to previously observed static levels at approximately 34 feet bgs. There was no chronic lowering of groundwater levels in the principal aquifer.

The well construction and groundwater production details for the GL-8 well are unknown. The Yucaipa SGMA will request the installation of a flow meter and installation of a dedicated pressure transducer, if feasible, at GL-8 to begin recording pumping data and measuring water level data on an hourly frequency. If a water purveyor plans to install a water supply well in this management area to produce water from the principal aquifer, then aquifer testing and instrumentation of the new well, plus increased monitoring at existing wells (e.g., GL-8, GWMW-5A, GWMW-5B, GWMW-5C) will be conducted to evaluate the potential influences of pumping by the new well on other wells and the shallow groundwater sustaining the GDEs in proximity.

3.4.4.2 Reduction of Groundwater Storage

Static groundwater levels measured at GL-8, GWMW-1, GWMW-2 and GWMW-3 have been consistent since 2010, indicating no significant and unreasonable reduction in groundwater storage (Figure 3-49). At this time, no minimum threshold is established for a reduction in groundwater storage.

The YIHM predicted a net increase in groundwater in storage of approximately 4,200 to 1,600 AF by the end of the 50-year planning and implementation horizon for the Future Baseline and Future Baseline with Climate Change I scenarios, respectively (Figure 3-51, Predicted Volume in Storage by the Future Baseline and Future Baseline with Climate Change I and II Scenarios in the San Timoteo Management Area). The YIHM predicted a net decrease of 1,600 AF for the Future Baseline with Climate Change II scenario (Figure 3-51). No future pumping in the principal aquifer was simulated in these scenarios. The model will be updated with pumping data for GL-8 and the Knight well should their respective construction details indicate that the wells are producing groundwater from the principal aquifer.

Table 3-5. Groundwater Elevations Pertaining to the Measurable Objective and Minimum Threshold in the Western Heights Management Area

Representative Monitoring Point	Simulated Groundwater Elevation at Sep. 30, 2015 (ft NAVD88)	Measured Groundwater Elevation near Sep. 30, 2015 (ft NAVD88)	Measured – Simulated Groundwater Elevation at Sep. 2015 (feet)	Simulated Groundwater Elevation at Sep. 30, 2018 (ft NAVD88)	Measured Groundwater Elevation near Sep. 30, 2018 (ft NAVD88)	Measured – Simulated Groundwater Elevation at Sep. 2018 (feet)	Simulated Groundwater Elevations at the Minimum Threshold (ft NAVD88)	Groundwater Elevations at the Minimum Threshold (ft NAVD88)	Groundwater Elevations at the Measurable Objective (ft NAVD88)
WHWC-2A	1,752.75	1,735.68	−17.07	1,756.69	1,740.68	−16.01	1,711.78	1,695.24	1,735.68
WHWC-10	1,754.44	1,750.04	−4.40	1,758.57	1,766.04	7.47	1,712.73	1,714.26	1,750.04
WHWC-11	1,747.23	1,748.93	1.70	1,748.33	1,760.93	12.60	1,705.09	1,712.24	1,748.93
WHWC-12	1,751.15	1,747.11	−4.04	1,749.20	1,757.11	7.91	1,706.91	1,708.84	1,747.11
WHWC-14	1,752.21	1,726.90	−25.31	1,754.80	1,749.90	−4.90	1,711.23	1,696.12	1,726.90
USGS Dunlap #2 (830′–850′)	1,753.21	1,748.40	−4.81	1,756.60	1,754.85	−1.75	1,712.25	1,708.97	1,748.40
USGS Dunlap #4 (440′–460′)	1,753.18	1,740.32	−12.86	1,756.46	1,743.89	−12.57	1,712.25	1,699.54	1,740.32
Average	1,752.03	1,742.48	−9.54	1,754.38	1,753.34	−1.04	1,710.32	1,705.03	1,742.48

Note: ft NAVD88 = feet above the North American Vertical Datum of 1988.

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3.4.4.3 Land Subsidence

At this time, no minimum threshold for land subsidence was established for the San Timoteo Management Area because there are no known existing water supply wells producing water from the principal aquifer, there is an upward vertical hydraulic gradient to where deep observation wells screened in the principal aquifer are artesian, and shallow groundwater levels have been consistently above 30 feet bgs.

3.4.4.4 Depletion of Interconnected Surface Water

GDEs were identified along the reach of San Timoteo Creek from its confluence with Yucaipa Creek downstream to where the flood control basins installed by SBCFCD begin (Figure 2-56). These GDEs were identified based on shallow groundwater levels observed at the water table observation wells OW-3P, OW-6A and OW-6B (Figure 3-48), and the vertical hydraulic gradient observed at the nested well, GWMW-5 (Figure 3-50). Potential GDEs were identified on the lower reach of Yucaipa Creek running 2.6 miles upstream from near its confluence with San Timoteo Creek. These GDEs were identified as potential GDEs due to the lack of groundwater level data in the area to confirm whether the GDEs were dependent on shallow groundwater.

If future extractions from the principal aquifer are planned in this region, then additional field work will be required to evaluate the potential influence of pumping on the shallow groundwater table sustaining the GDEs along San Timoteo Creek and the potential GDEs along Yucaipa Creek. The evaluation would include installing one or more shallow groundwater observation wells screened from the historical high groundwater level to approximately 35 feet bgs. Groundwater elevation data collected from the shallow groundwater observation well(s) will be analyzed to evaluate whether the potential GDEs along Yucaipa Creek are sustained by shallow groundwater (<30 feet bgs) and will be used to evaluate seasonal fluctuations and potential influences by pumping in the principal aquifer.

3.4.4.5 Degradation of Water Quality

No minimum threshold relative to the significant and unreasonable degradation of water quality was established for the San Timoteo Management Area.

3.4.4.6 Seawater Intrusion

The San Timoteo Management Area is approximately 48 miles northeast of the Pacific Ocean and approximately 1,300 feet above NAVD88, which is approximately 1,300 feet above mean sea level. No minimum threshold was established for the San Timoteo Management Area with regard to seawater intrusion.

3.5 Measurable Objectives

Measurable objectives are "specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin" (23 CCR, Section 351, Definitions). Based on the sustainability goal (Section 3.2) and undesirable results (Section 3.3) in the Plan Area, measurable objectives were set for chronic declines in groundwater levels, reduction of groundwater in storage, land subsidence and depletion of interconnected surface water.

3.5.1 North Bench Management Area

A measurable objective was established in the North Bench Management Area to sustainably manage the groundwater resource currently and into the future by the Yucaipa GSA. **The measurable objective was established at a volume in storage of 230,000 AF**, which is 10,000 AF above the minimum threshold (Figure 3-4). The measurable objective represents the condition when the groundwater resource in the management area is managed sustainably and no undesirable results are experienced. It also represents the top end of the drought buffer. The drought buffer provides the Yucaipa GSA operation flexibility where management actions and/or programs may be implemented to prevent undesirable results should conditions fall below the minimum threshold. The measurable objective is below current conditions and projections by the YIHM indicate that future conditions will not approach the measurable objective (Figure 3-15).

3.5.1.1 Chronic Lowering of Groundwater Levels

The groundwater elevations at the RMPs that correspond to the measurable objective for the North Bench Management Area range from 2,229 to 2,528 feet above NAVD88 (Table 3-3). Since the 2007 WY, groundwater levels have exhibited an increasing trend because of the importation of SWP water as a supplemental source of water and the subsequent reduction in groundwater production by YVWD to below the estimated sustainable yield for the North Bench Management Area (Figure 3-6). Current groundwater levels in the management area are approximately 100 feet above the measurable objective.

Future predictions of groundwater elevations at each RMP in the management area by the YIHM will remain above the measurable objective (Figures 3-7 to 3-14). If, however, groundwater elevations fall below the measurable objective, the Yucaipa GSA will implement actions and/or programs to avoid the undesirable result of groundwater elevations declining below the drought buffer. The groundwater level difference of approximately 30 feet between the measurable objective and the minimum threshold provides a reasonable margin of operational flexibility under adverse conditions, by allowing for changes to groundwater production or the implementation of projects and/or programs to prevent a net loss of groundwater from the management area before groundwater levels fall to the minimum threshold.

3.5.1.2 Reduction of Groundwater Storage

The measurable objective defined for the chronic lowering of groundwater levels (Section 3.5.1.1) applies to the reduction of groundwater storage. The groundwater elevations at the RMPs that correspond to the measurable objective range from 2,229 feet above NAVD88 to 2,528 feet above NAVD88 (Table 3-3). This marks the condition when approximately 230,000 AF of groundwater is in storage, which is approximately 90% of the volume in storage under current conditions.

Future predictions of the volume in storage by the YIHM, with groundwater production constrained to the estimated sustainable yield of 3,940 AFY, indicate a net increase in storage over the 50-year planning and implementation horizon. The volume in storage in the management area at the end of the 2069 WY will range from approximately 257,000 AF to 267,000 AF, or 27,000 AF to 37,000 AF above the measurable objective (Figure 3-15). The measurable objective also marks the beginning of the drought buffer, which allows an operational flexibility of 10,000 AF for the Yucaipa GSA to implement actions and/or programs to avoid undesirable results should conditions decline to the minimum threshold (i.e., the bottom of the drought buffer).

3.5.1.3 Land Subsidence

The measurable objective defined for the chronic lowering of groundwater levels at an average elevation of 2,332 feet above NAVD88 is approximately 30 feet above the minimum threshold, or historical low (Table 3-3). The measurable objective defined at this average elevation provides operational flexibility to implement actions and/or programs to avoid undesirable results should groundwater elevations fall below the minimum threshold. Land subsidence may be induced if the average static groundwater level declines below the historical low level for a long period of time. Static groundwater level measurements at the RMPs for this management area will act as a surrogate for direct measurements of land subsidence as a function of groundwater withdrawals from the principal aquifer. InSAR data obtained from the SGMA Data Portal will be compared to previous InSAR data (including the baseline dataset collected from 2015 to 2018) to evaluate potential land subsidence as a result of groundwater levels falling below historical lows in the principal aquifer.

3.5.1.4 Depletion of Interconnected Surface Water

One measurable objective related to the protection of GDEs is defined for the North Bench Management Area, which corresponds to a shallow groundwater level measured at 20 feet bgs. This measurable objective is 10 feet higher than the minimum threshold, which provides a reasonable margin of operational flexibility under adverse conditions by allowing for changes to groundwater production (if demonstrated to influence shallow groundwater) or the implementation of projects and/or programs before groundwater levels fall to an elevation at which an undesirable result would occurs.

If future extractions planned in this region are expected to exceed historical extractions in the region, additional field work may be required to characterize the potential impact that proposed pumping rates will have on the habitats along Oak Glen Creek and Wildwood Canyon Creek. This would include installing one or more shallow groundwater observation wells screened from the historical high groundwater level to approximately 35 feet bgs. Groundwater elevation data collected from the shallow groundwater observation well(s) will be analyzed to evaluate whether the local habitat is sustained by shallow groundwater (<30 feet bgs).

3.5.1.5 Degradation of Water Quality

No measurable objectives were established relative to the significant and unreasonable degradation of water quality for the Western Heights Management Area.

3.5.1.6 Seawater Intrusion

No measurable objectives were established relative to seawater intrusion for the Western Heights Management Zone.

3.5.2 Calimesa Management Area

A measurable objective was established in the Calimesa Management Area to sustainably manage the groundwater resource currently and into the future by the Yucaipa GSA. **The measurable objective was established at the historical low volume in storage of 798,700 AF**, which is 26,000 AF above the minimum threshold (Figure 3-20). The measurable objective represents the condition when the groundwater resource in the management area is managed sustainably and no undesirable results are experienced. It also represents the beginning of the drought buffer (Figure 3-20). The drought buffer provides the Yucaipa GSA operational flexibility where management actions and/or programs may be implemented to prevent undesirable results should conditions fall below the minimum threshold.

3.5.2.1 Chronic Lowering of Groundwater Levels

The groundwater elevations at the RMPs that correspond to the measurable objective for the Calimesa Management Area are based on the historical low conditions, which range from 2,040 to 2,206 feet above NAVD88 (Table 3-4). Groundwater levels have exhibited an increasing trend since the historical low because of the importation of SWP water as a supplemental source of water and the subsequent reduction in groundwater production by YVWD, which led to a decline in the total production in the Calimesa Management Area to below the estimated sustainable yield of 4,955 AFY (Figures 2-69 and 3-19).

Future predictions of groundwater elevations in the management area by the YIHM indicate that groundwater levels will be above the measurable objective in the Future Baseline and Future Baseline with Climate Change I scenarios, but will fall below the measurable objective under the Future Baseline with Climate Change II scenario at the end of the 50-year planning and implementation horizon (Figures 3-22 to 3-34).

When the groundwater elevation falls below the measurable objective, the Yucaipa GSA will implement actions and/or programs to avoid the undesirable result of groundwater elevations declining below the drought buffer (Section 4.2.1). The drought buffer provides a reasonable margin of operational flexibility under adverse conditions, by allowing for changes to groundwater production or the implementation of projects and/or programs to prevent undesirable results.

3.5.2.2 Reduction of Groundwater Storage

The measurable objective defined for the chronic lowering of groundwater levels (Section 3.5.2.1) applies to the reduction of groundwater storage. The groundwater elevations at the RMPs that correspond to the measurable objective range from 2,040 feet above NAVD88 to 2,206 feet above NAVD88 (Table 3-4). This marks the condition when approximately 798,700 AF of groundwater is in storage. The measurable objective is approximately 1,700 AF below the current condition and marks the upper level of the drought buffer. The drought buffer provides operational flexibility for the Yucaipa GSA to implement actions and/or programs to avoid undesirable results should conditions decline to the minimum threshold (i.e., the bottom of the drought buffer).

The YIHM indicates that future conditions, with groundwater production constrained to the estimated sustainable yield of 4,955 AFY, will fluctuate above and below the measurable objective depending on climate (Figure 3-35). The Future Baseline scenario indicates that the volume in storage will be approximately 807,900 AF, which is 7,500 AF above the current condition. The Future Baseline with Climate Change I and II scenarios indicate that from the 2058 WY to 2069 WY, a period represented by the relatively dry period observed from 2002 to 2013, the volume in storage will approach the measurable objective or decline below the measurable objective by 12,000 AF, respectively (Figure 3-35).

3.5.2.3 Land Subsidence

The groundwater elevations representing the measurable objective are the historical lows in groundwater elevations observed between 2010 and 2015. There is no potential for land subsidence when groundwater elevations are at or above the measurable objective. However, land subsidence may be induced if the static groundwater levels measured at the RMPs decline below the historical low condition (i.e., the beginning of the drought buffer) for a long period of time. Static groundwater level measurements at the RMPs for this management area will act as a surrogate for direct measurements of land subsidence as a function of groundwater withdrawals from the principal aquifer. InSAR data obtained from the SGMA Data Portal will be compared to previous InSAR data (including the baseline dataset collected from 2015 to 2018) to evaluate potential land subsidence as a result of groundwater levels falling below historical lows in the principal aquifer.

3.5.2.4 Depletion of Interconnected Surface Water

No measurable objectives are defined relative to the significant and unreasonable effect of depleting interconnected surface water in the management area. No GDEs were identified in the Calimesa Management Area. One potential GDE was identified in the Singleton subarea. If a new water supply well is installed within 1 kilometer (0.6 miles) of this potential GDE and pumping from the principal aquifer lowers shallow groundwater levels that sustain the GDE, then sustainability criteria will be developed to prevent an undesirable result related to the significant and unreasonable decline in the shallow water table that may cause adverse impacts to the GDE.

3.5.2.5 Degradation of Water Quality

No measurable objectives were established relative to the significant and unreasonable degradation of water quality for the Calimesa Management Area.

3.5.2.6 Seawater Intrusion

No measurable objectives were established relative to seawater intrusion for the Calimesa Management Zone.

3.5.3 Western Heights Management Area

A measurable objective was established in the Western Heights Management Area to sustainably manage the groundwater resource currently and into the future by the Yucaipa GSA. **The measurable objective was established at a volume in storage of 408,800 AF**, which is the historical low in volume in storage observed in 2015 (Figure 3-38). The measurable objective represents the condition when the groundwater resource in the management area is managed sustainably and no undesirable results are experienced. It also represents the beginning of the drought buffer (Figure 3-38). The drought buffer provides the Yucaipa GSA operation flexibility where management actions and/or programs may be implemented to prevent undesirable results should conditions fall below the minimum threshold.

3.5.3.1 Chronic Lowering of Groundwater Levels

The groundwater elevations at the RMPs that correspond to the measurable objective for the Western Heights Management Area are based on the historical low groundwater levels, which range from 1,727 to 1,750 feet above NAVD88 (Table 3-5). Groundwater levels have exhibited an increasing trend since the historical low because WHWC purchases supplemental water from YVWD that, subsequently, decreases the groundwater production from the management area.

The YIHM predicts that groundwater elevations under the Future Baseline and Future Baseline with Climate Change I and II scenarios will be higher than the measurable objective by approximately 39 to 80 feet at the end of the 50-year planning and implementation horizon (Figures 3-40 to 3-46). If groundwater elevations fall below the measurable objective, the Yucaipa GSA will implement actions and/or programs to avoid the undesirable result of groundwater elevations declining below the drought buffer (Section 4.2.1). The drought buffer provides a reasonable margin of operational flexibility under adverse conditions, by allowing for changes to groundwater production or the implementation of projects and/or programs to prevent undesirable results.

3.5.3.2 Reduction of Groundwater Storage

The measurable objective defined for the chronic lowering of groundwater levels (Section 3.5.3.1) apply to the reduction of groundwater storage. The groundwater elevations at the RMPs that correspond to the measurable objective range from 1,727 to 1,750 feet above NAVD88 (Table 3-5. This marks the condition when approximately 408,800 AF of groundwater is in storage (Figure 3-38). The measurable objective is approximately 500 AF below the current condition and marks the beginning of the drought buffer. The drought buffer provides operational flexibility for the Yucaipa GSA to implement actions and/or programs to avoid undesirable results should conditions decline to the minimum threshold (i.e., the bottom of the drought buffer).

The YIHM indicates that, with groundwater production constrained to the estimated sustainable yield of 1,760 AFY, the volume of groundwater in storage will increase to approximately 9,500 AF to 19,000 AF above the measurable objective (Figure 3-47).

3.5.3.3 Land Subsidence

The measurable objective defined for the chronic lowering of groundwater levels (Section 3.5.3.1) applies to land subsidence in that static groundwater levels below the historical low level for a long period of time may induce land subsidence. Static groundwater level measurements at the RMPs for this management area will act as a surrogate for direct measurements of land subsidence as a function of groundwater withdrawals from the principal aquifer. InSAR data obtained from the SGMA Data Portal will be compared to previous InSAR data (including the baseline dataset collected from 2015 to 2018) to evaluate potential land subsidence as a result of groundwater levels falling below historical lows in the principal aquifer.

3.5.3.4 Depletion of Interconnected Surface Water

No GDEs and no potential GDEs were identified in the Western Heights Management Area, so no measurable objective was established relative to this undesirable result.

3.5.3.5 Degradation of Water Quality

No measurable objectives were established relative to the significant and unreasonable degradation of water quality in the principal aquifer for the Western Heights Management Area.

3.5.3.6 Seawater Intrusion

No measurable objectives were established relative to seawater intrusion for the Western Heights Management Zone.

3.5.4 San Timoteo Management Area

A measurable objective for this management area was established for the GDEs identified along San Timoteo Creek. At this time, no sustainability criteria were established for the other sustainability indicators because there are no existing municipal water supply wells and historical groundwater elevations indicate that private well use did not cause long-term declines in shallow groundwater levels. If a water purveyor plans to install and operate a municipal water supply well and produce from the principal aquifer, then the water purveyor must investigate the potential influences of pumping from the principal aquifer on the relationship between shallow groundwater and surface water in San Timoteo Creek and Yucaipa Creek.

3.5.4.1 Chronic Lowering of Groundwater Levels

At this time, no measurable objectives were established for the chronic lowering of groundwater levels. Static groundwater levels measured at GL-8, GWMW-1, GWMW-2 and GWMW-3 have been consistent since 2010, indicating no significant and unreasonable decline in groundwater elevations (Figure 3-49).

3.5.4.2 Reduction of Groundwater Storage

At this time, no measurable objectives were established for reduction in groundwater storage. Static groundwater levels measured at GL-8, GWMW-1, GWMW-2 and GWMW-3 have been fairly consistent since 2010, indicating no significant and unreasonable reduction in groundwater storage.

3.5.4.3 Land Subsidence

At this time, no measurable objectives for land subsidence were established for the San Timoteo Management Area because there are no existing water supply wells producing water from the principal aquifer, there is an upward vertical hydraulic gradient to where deep observation wells screened in the principal aquifer are artesian, and shallow groundwater levels have been consistently above 30 feet bgs.

3.5.4.4 Depletion of Interconnected Surface Water

One measurable objective is defined for the San Timoteo Management Area, which corresponds to a shallow groundwater level measured at 20 feet bgs (Figure 3-48). This measurable objective is 10 feet higher than the minimum threshold, and it provides a reasonable margin of operational flexibility under adverse conditions by allowing for changes to groundwater production (if demonstrated to influence shallow groundwater) or the implementation of projects and/or programs before groundwater levels fall to an elevation at which undesirable results would occur.

3.5.4.5 Degradation of Water Quality

No measurable objectives were established relative to the significant and unreasonable degradation of water quality for the San Timoteo Management Area.

3.5.4.6 Seawater Intrusion

No measurable objectives were established relative to seawater intrusion for the San Timoteo Management Area.

3.6 Monitoring Network

The objective of a monitoring network is to track and monitor parameters that demonstrate "short-term, seasonal, and long-terms trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate Plan implementation," (23 CCR §354.34). In order to accomplish this objective, the monitoring network must be capable of:

- Monitoring changes in groundwater and surface water conditions that may impact the beneficial uses or users of groundwater,
- Monitoring groundwater conditions relative to the sustainable management criteria, and
- Quantifying annual changes in water budget components.

The water purveyors operating in the Yucaipa Subbasin have been monitoring groundwater conditions through their respective networks of water supply and monitoring wells by collecting groundwater elevation, groundwater quality and groundwater production data since the 1920s. The current network of water supply wells and monitoring wells is capable of characterizing groundwater conditions in the Plan Area. The network will continue to be used to monitor groundwater conditions to assess long-term and short-term trends in groundwater elevations, production, and groundwater quality.

SBCFCD maintains five stream flow gauging stations in the Plan Area. These gauging stations were designed to measure peak flow events in Oak Glen Creek and Yucaipa Creek; they were not designed to measure low flows. SBCFCD reported issues with the stream flow measuring systems at three of the five locations and does not have confidence that the data collected is representative of actual flows (Section 2.3.1). The USGS has one active stream flow gauging station (110575000 located approximately 4.2 miles downstream of the farthest downstream end of the Plan Area. Flows measured at this gauging station include runoff from the San Timoteo watershed, and other drainages downstream of the watershed that contribute flow in addition to flows from the Plan Area. Flows measured at the USGS gauging station are not considered representative of surface water flow leaving the Plan Area. The unreliable low-flow data collected by the SBCFCD gauging stations was recognized as a data gap (Section 2.6.3). The Yucaipa GSA will evaluate the feasibility of installing new gauging stations, if funding becomes available, or work with SBCFCD to improve the existing stations to more accurately measure stream flows in the Plan Area.

3.6.1 Description of Existing Groundwater Network

The existing network of wells to assess groundwater conditions in the Yucaipa Subbasin includes the majority of water supply wells operated by South Mesa, South Mountain, WHWC, and YVWD. Monitoring wells installed by YVWD, the USGS and SBVMWD also provide data characterizing groundwater conditions in the Subbasin. The groundwater monitoring network includes 77 wells (Figure 3-52, Yucaipa Subbasin Groundwater Monitoring Network; Table 3-1). Groundwater elevation data is collected at 73 of these wells; water quality data is collected at 40 of these wells; and groundwater production data is collected at 31 wells. Four of the municipal wells in the monitoring network are located outside the Plan Area and supply water to the Subbasin. This water supply is characterized as an imported groundwater supply to the Subbasin. The majority of the wells are municipal supply and monitoring wells; however, the network does include two irrigation wells operated by South Mountain. Table 3-6 presents the number and type of wells located in each management area.

Table 3-6. Types of Wells in the Existing Monitoring Network

Management Area	Municipal	Monitoring	Private/ Domestic	Agricultural/ Irrigation
All wells	41	33	0	3
Calimesa	13	9	0	2
North Bench	17	13	0	0
San Timoteo	0	6	0	1
Western Heights	7	5	0	0
Outside Subbasin	4	0	0	0

Of the 77 wells incorporated into the monitoring network, 13 lack well construction information, such as screen intervals and depths. Since there is only one principal aquifer in the Plan Area, well construction information is not critical for understanding general groundwater conditions. However, any projects implemented in the Plan Area may include the construction of new wells that may be designed to provide additional data on depth discrete groundwater conditions within the principal aquifer. Table 3-7 describes the maximum depth of the screens of the wells by production areas.

Table 3-7. Maximum Screen Depth of Wells in the Monitoring Network

Management Area	Wells with No Screening Information	Bottom of Screen (feet bgs)				
		<100	*100–300*	*300–500*	*500–1,000*	*>1,000*
Calimesa	2	0	0	6	15	1
North Bench	7	1	5	5	10	2
San Timoteo	1	3	1	2	0	0
Western Heights	1	0	1	1	5	4
Outside Subbasin	2	0	0	1	1	0
Total	**13**	**4**	**7**	**15**	**31**	**7**

Note: bgs = below ground surface.

3.6.1.1 Groundwater Monitoring

The monitoring network tracks groundwater elevations, groundwater quality, and groundwater extractions on a monthly to annual basis. The types of measurements collected at each well are divided into seven categories: Extraction, Extraction-Level, Extraction-Level-Quality, Extraction-Quality, Level, Level-Quality, and Quality (Table 3-8). The four water purveyors participate in the Maximum Benefits Monitoring Program (MBMP), which includes the collection of groundwater elevation data and water quality data from a select list of municipal and monitoring wells in the Plan Area (see Sections 1.5.1 and 2.7.4).

At a minimum for the MBMP, static groundwater level data is collected every April/May (i.e., seasonal high) and October/November (i.e., seasonal low) and groundwater quality data is collected annually or every three years. The municipal water suppliers also adhere to the provisions of Title 22 regarding water quality monitoring of municipal water supply wells. In general, TDS, chloride, and sulfate samples are collected once every three years and nitrate samples are collected annually. The water purveyors have collected groundwater level data on a monthly basis since the 1990s. Groundwater production data is collected monthly by the water purveyors.

Table 3-8. Monitoring Network Wells by Measurement Type

Management Area	Number of Wells by Measurement Types							
	Extraction	*Extraction Level*	*Extraction Level Quality*	*Extraction Quality*	*Level*	*Level Quality*	*Quality*	*Total*
Calimesa	0	0	12	0	12	0	0	24
North Bench	0	0	10	0	13	7	0	30
San Timoteo	0	0	0	0	1	6	0	7
Western Heights	0	0	5	0	7	0	0	12
Outside Subbasin	4	0	0	0	0	0	0	4
Total	**4**	**0**	**27**	**0**	**33**	**13**	**0**	**77**

3.6.1.1.1 Groundwater Elevations

Groundwater levels are measured, at a minimum, semi-annually in the spring and fall to characterize conditions at the end of the wet and dry seasons, respectively, and to evaluate hydraulic gradients in the Plan Area. The water purveyors collect groundwater elevation data on a monthly basis, and that data will be incorporated into the data management system (DMS) and reported in the annual and periodic evaluation reports as part of the implementation of the GSP. Static groundwater elevations are measured at 73 of the 77 wells (or 95%) in the monitoring network (Figure 3-53, Monitoring Network Wells Designated to Measure Groundwater Elevations). The coverage of the static groundwater level measurements by management area is summarized in Table 3-9.

Table 3-9. Well Distribution and Coverage for Water Level Measurements in the Plan Area

Management Area	First Water Level Record	No. of Wells Measured in 2018	% of Area Within 1 mile of Water Level Measurement	No. of 2018 Wells Regularly Measured between 2007 and 2017	No. of 2018 Wells Regularly Measured within the Same Quarter	No. of 2018 Wells Measured Seasonally
Calimesa	1926	24	60%	22	24	24
North Bench	1926	26	80%	25	26	26
San Timoteo	2010	6	40%	6	6	6
Western Heights	1950	10	90%	10	10	10

Table 3-9. Well Distribution and Coverage for Water Level Measurements in the Plan Area

Management Area	First Water Level Record	No. of Wells Measured in 2018	% of Area Within 1 mile of Water Level Measurement	No. of 2018 Wells Regularly Measured between 2007 and 2017	No. of 2018 Wells Regularly Measured within the Same Quarter	No. of 2018 Wells Measured Seasonally
Outside Subbasin	1956	1	N/A	1	1	1

Note: N/A = not applicable.

Based on the density of the monitoring network wells in each management area, the length of the historical record at each well, the spatial and temporal coverage of the existing monitoring network is sufficient to characterize groundwater conditions in the Plan Area. The current network will be used to demonstrate continued sustainable use of the groundwater resources in a way that is consistent with the sustainability goal.

3.6.1.1.2 Groundwater Extraction

Groundwater extraction in the Plan Area has been monitored by the four water purveyors since 1965. In 2018, 31 municipal water supply wells, or approximately 40% of the wells in the monitoring network, were monitored for groundwater extractions (Figure 3-54, Monitoring Network Wells Designated to Measure Groundwater Production). All of these wells had meters in 2018. There are two irrigation supply wells, GL-8 and Knight, in the San Timoteo management area that are not metered. The Yucaipa GSA will make attempts to contact the individual private well owners and inquire about the installation of meters at these wells and include them as additional RMPs to the San Timoteo Management Area. The coverage of groundwater extractions by management area is summarized in Table 3-10.

Table 3-10. Well Distribution and Coverage for Groundwater Production in the Plan Area

Management Area	First Extraction Record	No. of Wells with Recorded Extractions in 2018	% of Area within 1 Mile of Extraction	No. of 2018 Wells Measured between 2007 and 2017	No. of 2018 Wells Measured within the Same Quarter
Calimesa	1948	12	60%	12	12
North Bench	1965	10	80%	10	10
San Timoteo	N/A	0	N/A	0	0
Western Heights	1965	5	90%	5	5
Outside Subbasin	1956	4	N/A	4	4

Note: N/A = not applicable.

3.6.1.1.3 Groundwater Quality

Groundwater quality sampling is performed quarterly to annually. Samples are collected from active municipal supply wells that have pumped at least three casing volumes and from inactive and/or monitoring wells that were purged at least three casing volumes using a dedicated pump or portable submersible pump. The water quality samples are collected using standardized procedures established by the various member agencies and analyzed for a variety of parameters per Title 22 requirements for municipal supply wells and the MBMP for monitoring wells (Wildermuth, 2014). Groundwater quality samples are collected at 52% of the wells in the monitoring network (Figure 3-55 and Table 3-11).

Table 3-11. Well Distribution and Coverage for Water Quality Measurements in the Plan Area

Management Area	First Water Quality Record	No. of Wells Measured in 2018	% of Area within 1 Mile of Water Quality Measurement	No. of 2018 Wells Measured between 2007 and 2017	No. of 2018 Wells Measured within the Same Quarter
Calimesa	1993	12	60%	12	12
North Bench	1994	17	80%	17	17
San Timoteo	2010	6	50%	6	6
Western Heights	1995	5	90%	5	5
Outside Subbasin	N/A	0	0%	0	0

Note: N/A = not applicable.

3.6.1.2 Surface Water Monitoring Conditions

In addition to monitoring groundwater conditions in the Plan Area, Yucaipa GSA uses surface water flow and precipitation data collected by other agencies, including the USGS and the SBCFCD, to monitor the parameters that influence groundwater recharge in the Subbasin.

3.6.1.2.1 Surface Water Flow

SBCFCD manages five stream gauges within the Plan Area (Figure 2-7). Two stream gauges are located on Yucaipa Creek, one is located on Wilson Creek upstream of the confluence with Oak Glen Creek, and two stream gauges are located on Oak Glen Creek upstream of its confluence with Yucaipa Creek. Surface water flow is also manually measured in San Timoteo Creek downstream of its confluence with Yucaipa Creek (see Section 2.3.1). These stream gauges record mean daily flow rates. These stations were designed to measure peak flow events. SBCFCD stated that for "95% of the year the creeks do not contain significant quantities of water" and, therefore, do not accurately measure flow outside of those peak events (personnel communication with SBCFCD, July 2019). SBCFCD has confidence in measurements collected at stations 3601C and 3608A, the two farthest downstream gauging stations in the Subbasin. The Yucaipa GSA will evaluate the feasibility of installing new gauging stations, if funding becomes available, or work with SBCFCD to improve the existing stations to more accurately measure stream flows in the Subbasin. No historical records exist for identifying the locations where ephemeral or intermittent flowing streams cease to flow. The Yucaipa GSA will make efforts in the first 5 years of the implementation period to identify where and when these flows cease to improve the characterization of interconnected surface water.

3.6.1.2.2 Precipitation

The precipitation monitoring program currently utilizes 17 precipitation stations managed by SBCFCD within the Plan Area and three NOAA stations with one in the Plan Area, one in the City of Redlands, and one in Beaumont (Section 2.2.1; Figure 2-1). Daily precipitation is recorded at these stations, which provides adequate temporal resolution to evaluate short-term and seasonal impacts of precipitation on groundwater conditions in the Plan Area.

Of the currently active precipitation stations in the Plan Area, the Redlands-Roth and Oak Glen stations, both maintained by SBCFCD, have the longest continuous records of daily precipitation, with measurements dating back to 1932 and 1945, respectively. The lengths of these records, plus long-term records for other stations, are adequate to evaluate long-term trends in precipitation within the Plan Area.

3.6.2 Monitoring Network Relationship to Sustainability Indicators

The existing groundwater network will be used to monitor and document changes in groundwater conditions related to the four sustainability indicators relevant to the Plan Area. This network includes the wells that have been designated as RMPs for reporting purposes to DWR. Minimum thresholds and measurable objectives were established for the RMPs. An assessment of groundwater conditions and the potential for undesirable results will be based on the conditions measured at the RMPs. The broader groundwater monitoring network, including the RMPs, will be used to document conditions in the Plan Area and provide support for recommendations and findings based on the conditions recorded at the RMPs.

3.6.2.1 Chronic Lowering of Groundwater Levels

The groundwater monitoring network must accomplish the following to adequately monitor conditions related to chronic lowering of groundwater levels:

- Track short-term, seasonal, and long-term trends in groundwater elevations.
- Characterize groundwater elevations in mid-March and mid-October for the principal aquifer.
- Record groundwater elevations at RMPs for which minimum thresholds and measurable objectives have been identified.
- Provide data from which hydraulic gradients within the principal aquifer can be calculated.

Spatial Coverage

The groundwater elevation monitoring well density in the Plan Area is approximately 2.1 wells per square mile (Figure 3-53). The highest density of wells occurs in the Western Heights (3.1 wells/sq. mi.) and Calimesa (2.3 wells/sq. mi.) management areas. The majority of wells in Western Heights Management Area are located in the central part of the management area. The majority of wells in the Calimesa Management area are located in the western half of the management area. The density of groundwater level wells in the North Bench Management and San Timoteo Management Areas are 2.1 and 1.2 wells/sq. mi., respectively (Figure 3-53).

DWR guidelines recommend a well network with a density of one observation per 16 square miles (DWR 2016a). The monitoring well density recommended by CASGEM Groundwater Elevation Monitoring Guidelines ranges from one to 10 wells per 100 square miles (DWR 2010). The density of monitoring wells in the Plan Area exceeds the guidance and provides adequate spatial coverage to assess whether the Plan Area is experiencing chronic lowering of groundwater levels.

Temporal Coverage

Groundwater elevation data will be collected, at a minimum, in the spring and fall of each year to characterize groundwater elevation conditions. Further discussion of the monitoring schedule is provided in Section 3.6.3, Monitoring Network Implementation.

3.6.2.2 Reduction of Groundwater Storage

The groundwater monitoring network must accomplish the following to monitor conditions related to reduction of groundwater storage:

- Track short-term, seasonal, and long-term trends in groundwater storage.
- Calculate year-over-year (mid-March to mid-March) changes in storage.

The requirements for evaluating a reduction in groundwater storage are similar to those for chronic lowering of groundwater levels (Section 3.3.2) because these two sustainability indicators are linked. The spatial and temporal density of groundwater elevation data necessary to evaluate a reduction in groundwater storage in the Plan Area is the same for groundwater elevation changes. The current network of wells is capable of documenting changes to both sustainability indicators.

3.6.2.3 Land Subsidence

The groundwater monitoring network must be able to track long-term trends in groundwater elevation in order to adequately monitor conditions related to land subsidence that may result from groundwater elevations falling below historical low levels for a long period of time. Groundwater elevations will be used as a surrogate for direct measurements of land subsidence in the Plan Area (see Section 3.3.3). Because fine grained sediments prone to subsidence tend to occur in thin discontinuous layers in the subsurface of the Plan Area, direct monitoring of subsidence rates is not currently required in the Plan Area. Instead, the network of groundwater monitoring wells discussed in Section 3.6.1 will be used to evaluate whether groundwater level declines in the principal aquifer to below historical lows for a long period may potentially induce land subsidence. If these conditions develop, then the Yucaipa GSA will obtain InSAR data from the SGMA Data Portal to evaluate conditions relative to the baseline (2015 to 2018) when groundwater levels in the Plan Area were recovering from historical lows.

3.6.2.4 Depletions of Interconnected Surface Water

The groundwater monitoring network includes shallow groundwater observation wells completed in San Timoteo Canyon near San Timoteo Creek, and two wells completed near confirmed GDEs in the North Bench Management Area. Groundwater elevations will be monitored at these wells to characterize seasonal conditions in the shallow aquifer, and whether pumping from the principal aquifer influences the shallow groundwater levels. Under the MBMP, surface water flows are measured manually in San Timoteo Creek on a biweekly basis and following major precipitation events. This data will be incorporated into the GSP dataset to evaluate surface water flow conditions relative to climate and groundwater conditions monitored in the San Timoteo Management Area. Other GDEs identified in the North Bench Management Area were not influenced by existing pumping conditions, but any planned new wells in proximity to these GDEs, or increases in groundwater withdrawals that exceed historical averages, will require an investigation to determine if groundwater production from the principal aquifer will influence shallow groundwater levels that may adversely impact the GDEs.

3.6.3 Monitoring Network Implementation

3.6.3.1 Groundwater Elevation Monitoring Schedule

Following the guidance provided by DWR (DWR 2016a), groundwater elevation measurements will be collected, at a minimum, two times per year from all accessible wells in the monitoring network to characterize the spring high and fall low groundwater levels. Spring groundwater levels will be collected during the month of April and fall groundwater levels will be collected during the month of October. By collecting groundwater elevation data within a single month, the groundwater elevation data will be used to characterize groundwater conditions during the seasonal highs (i.e. spring at the end of the wet season) and lows (i.e., fall at the end of the dry season).

3.6.3.2 Groundwater Storage Monitoring Schedule

Groundwater storage is directly linked to groundwater elevation. Therefore, the groundwater elevation monitoring network and schedule will be used to monitor changes in groundwater storage.

3.6.3.3 Groundwater Production Monitoring Schedule

Groundwater production data will be collected on a monthly basis and reported as monthly totals.

3.6.4 Monitoring Protocols

To monitor groundwater conditions in the Plan Area and evaluate sustainable management of the Subbasin with an acceptable level of confidence, the Yucaipa GSA adopted and slightly modified monitoring protocols already in place for the MBMP and those recommended in the Monitoring Protocols, Standards, and Sites Best Management Practices BMP published by DWR (DWR 2016b). The GSP Regulations require that GSPs include monitoring protocols that are (1) developed according to best management practices; (2) adhere to protocols recommended by DWR, or comparable protocols, that will yield quality data; and (3) shall be reviewed at least every 5 years as part of the periodic evaluation of the GSP and modified as necessary (23 CCR, Section 352.2).

The four water purveyors operating in the Plan Area are currently participating in the MBMP, which was implemented following the 2014 amendment to the Water Quality Control Plan for the Santa Ana River Basin (RWQCB 2019). The amendment included modifications to the Maximum Benefit Salt Management Plan in the San Timoteo Watershed, and specifically modified the maximum-benefit commitments in the Beaumont, San Timoteo and Yucaipa Groundwater Management Zones (GMZs), to which the Yucaipa and part of the San Timoteo GMZs are included in the Plan Area (Figure 2-64). The draft Maximum Benefit Monitoring Report 2015 Work Plan provided monitoring protocols to collect representative groundwater and surface water data in the watershed (Wildermuth, 2014). The monitoring protocols were adopted by all participating agencies in the MBMP, which includes the four water purveyors in the Yucaipa GSA. Additionally, groundwater level data collected at the USGS groundwater nested monitoring wells, and monitoring wells installed by YVWD, SBVMWD, and the County of San Bernardino, is collected for the MBMP and will be incorporated into the groundwater level dataset for the GSP. The monitoring protocols established for the MBMP are adopted in this GSP, plus additional protocols and reporting standards detailed in the GSP Regulations under 23 CCR, Section 352.4, Data and Reporting Standards.

3.6.4.1 Groundwater Level Monitoring

Consistent with the groundwater level monitoring program described in the MBMP Draft 2015 Work Plan and the Monitoring Protocols, Standards, and Sites BMPs, the following groundwater level monitoring protocols will be implemented by the Yucaipa GSA:

1. Static depths-to-water (DTW) will be measured, at a minimum, at all wells in the monitoring network within a 1- to 2-week period every spring (middle April) and fall (middle October) to characterize the seasonal highs and seasonal lows, respectively, in groundwater elevations in the Plan Area. The period of data collection will be centered on the middle of the month. Currently, and for the last ten years, the Yucaipa GSA member agencies have provided groundwater level data on a more frequent basis (e.g., monthly to quarterly).
2. The static DTW measurements are collected relative to an established Reference Point (RP) elevation surveyed on the well casing or other established measuring point. The elevations of the RPs are referenced to the North American Vertical Datum of 1988 (NAVD88). The elevation of the RP is accurate to within 0.5 foot. DTW measurements are accurate to 0.1 foot but will be measured to an accuracy of 0.01 when possible.
3. All groundwater level data will be recorded on standardized field monitoring forms, either paper or digital, that will be utilized by all member agencies in the Yucaipa GSA. The following information will be recorded for each groundwater level measurement:
   a. Agency name and field personnel name(s) measuring and recording the DTW measurement.
   b. Well name or other standard identifier.
   c. Type of equipment used to measure the DTW (e.g., electric sounder, steel tape, airline).
   d. A description of the measuring point (e.g., sounding tube, top of well casing, access port).
   e. Date and time of the DTW measurement.
   f. Status of the well measured (e.g., static, offline for # of hours but recovering, pumping). If the status of the well is “recovering” or “pumping”, then subsequent attempts will be made within the 1- to 2-week data collection period to measure a static DTW.
   g. Depth in feet from the RP to the groundwater level (accurate to 0.1 foot at a minimum).
   h. If the well is not accessible to collect a static DTW, then an explanation will be documented in the field form.
4. Some wells in the monitoring network are extraction wells. For these wells, the pump will be turned off for at least 24 hours before determining if the water level in the well is at a static condition. If operational constraints prevent shutting the pump off for 24 hours in April or October, a DTW measurement will not be collected at that well during the monitoring event. This will be documented in the accompanying field form for the well.
5. The equipment used to measure the DTW will be decontaminated after use at each well. This includes using a PFAS-free detergent (e.g., Alconox) and deionized water to clean the equipment.
6. Some wells in the monitoring network are instrumented with dedicated pressure transducers for higher temporal resolution monitoring. The groundwater elevation data recorded by the transducers will be downloaded on a monthly to quarterly basis.

7. All DTW data and associated information collected during the monitoring events will be processed into standard formats, checked for quality assurance and quality control (QA/QC), and uploaded to the Data Management System (DMS) within 1 week of collection. The QA/QC process will include calibrating the DTW measuring equipment prior to the monitoring event, reviewing historical DTW measurements to compare to the current measurement, and review climatic conditions or other factors that may potentially influence groundwater levels.
8. A copy of the field monitoring form and monitoring protocol to be used by the Yucaipa GSA member agencies when collecting groundwater elevation data is in Appendix 3-B.

3.6.4.2 Groundwater Production Monitoring

The four water purveyors will provide monthly production data for their respective municipal and/or irrigation wells operating in the Plan Area, and for the wells operating outside the Plan Area that provide an imported groundwater supply. As part of the GSP implementation, the Yucaipa GSA will request production data from private well users in the Plan Area. All wells are equipped with a calibrated flow meter and totalizer to gauge the instantaneous pumping rate and record the total gallons (or acre-feet) pumped. All pumping data recorded in gallons will be converted to acre-feet, as per 23 CCR, Section 352.4.

Pumping data will be recorded for each well using the standard well name or identifier, the date of record (preferably the last day of the calendar month), the instantaneous pumping rate when the total volume pumped is recorded, and operational issues or conditions during the month of record that influenced pumping (e.g., pump was offline for 2 weeks for maintenance reasons). A copy of the groundwater production monitoring record is included in Appendix 3-B. All production data and associated information will undergo QA/QC procedures (e.g., compare to previous monthly totals, well operations, DTW measurements that may indicate a change in operation) to ensure that accurate pumping information is uploaded to the DMS.

3.6.4.3 Groundwater Quality Monitoring

Even though degraded water quality is not a sustainability indicator applicable to the Plan Area, the Yucaipa GSA member agencies collect water quality data per the monitoring requirements under Title 22 for municipal water supply wells and the MBMP. The water quality data collected under these monitoring requirements will be incorporated into the DMS for this GSP and evaluated to characterize water quality conditions in the Plan Area.

Consistent with the groundwater level monitoring program described in the MBMP Draft 2015 Work Plan and the Monitoring Protocols, Standards, and Sites BMPs, the following groundwater level monitoring protocols will be implemented by the Yucaipa GSA:

1. Water quality samples will be collected at all municipal water supply wells per Title 22 regulations and at all wells included in the MBMP sampling schedule. These wells are sampled on a semi-annual basis every March/April and October/November.
2. All information pertinent to the collection of representative water quality samples will be recorded in standardized forms by the field crew collecting the sample(s). This information will include the well identifier, status of well, sampling method utilized (e.g., operation of dedicated pump, portable submersible pump), static DTW (if pump not operating), calculation of three casing volumes, duration of pumping prior

to and/or during purging process, measurements of water quality parameters (pH, temperature, electrical conductivity) and times of measurements.

3. All water quality samples will be collected in the appropriate containers supplied by the state certified analytical laboratory that will conduct the analyses. All sample containers will include a label detailing the well identifier, date/time of sample collection, name of the analytical laboratory conducting the analysis, the type of analysis, and initials of the individual(s) collecting the sample(s).
4. The water quality samples will be placed in an ice chest to be chilled and maintained at 4°C from the moment of collection to delivery to the analytical laboratory.
5. A chain-of-custody (COC) form will be filled out at the time of each sample collection. The COC will be included with the samples upon delivery to the analytical laboratory for analysis. The COC will be signed by the sampling crew and the analytical laboratory at the time of transfer.
6. The analytical laboratory will be instructed to use reporting limits that are equal to or less than the applicable water quality objectives established under the Basin Plan.
7. All water quality data, including water quality parameters recorded during the purging process, will be documented in the DMS.
8. A copy of the field monitoring form and monitoring protocol to be used by the Yucaipa GSA member agencies when collecting groundwater quality data is in Appendix 3-B.

3.6.5 Representative Monitoring

Representative monitoring points (RMPs) for each management area were selected from the wider network of municipal and monitoring wells in the Plan Area (Figure 3-5; Table 3-2). These RMPs represent point locations in their respective management areas where sustainability indicators are evaluated and were used to define the quantitative values for the minimum thresholds and measurable objectives established in Sections 3.4 and 3.5 (23 CCR, Section 354.36).

The criteria used for selection of the RMPs were:

- Municipal water supply wells active in the last 5 years to characterize groundwater production, and inactive municipal supply wells and monitoring wells to characterize static groundwater elevations
- Length of historical groundwater level and production data, where applicable, at the RMP
- Inclusion of the RMP in other monitoring programs (e.g., MBMP)
- Long-term accessibility and well ownership considerations.

Using the criteria listed above, 36 RMPs were selected from the wells in the monitoring network (Table 3-2). Groundwater elevation data is collected from the 36 RMPs (28 are single completion wells and 8 are nested wells) to characterize groundwater conditions in their respective management areas. Groundwater production data will be collected from all active wells that produced groundwater in the corresponding water year, including the RMPs. The RMPs in the San Timoteo management area are monitoring wells and do not produce water. Groundwater quality data is collected at 23 RMPs.

3.6.5.1 Groundwater Elevation RMPs

Groundwater elevations are directly related to groundwater in storage. Therefore, the use of groundwater elevation data to characterize changes in groundwater storage is adequate to assess groundwater conditions in the Plan Area. Figure 3-C1 in Appendix 3-C shows the RMPs in relation to the disadvantaged and severely disadvantaged communities identified in the Plan Area (see Section 1.8.8). The distribution of the RMPs relative to the disadvantaged communities is appropriate to characterize groundwater conditions for South Mesa and YVWD, the two water purveyors that supply water to these disadvantaged communities. YVWD-25, the RMP located in the upper reaches of the North Bench management area, provides characterization of groundwater conditions where some private well users have been identified. Figure 3-C2 in Appendix 3-C shows the RMPs in relation to GDEs identified in the Plan Area. YVWD-25 and YVWD-28 provide characterization of groundwater conditions at the confirmed GDEs located in the upper reaches of the Oak Glen subarea and Wildwood Canyon. The monitoring wells, GWMW-1 to GWMW-5C, provide characterization of groundwater conditions for the confirmed GDEs along the reach of San Timoteo Creek in the Plan Area. No groundwater level information is available at this time to characterize conditions for the potential GDEs identified along Yucaipa Creek (just upstream of its confluence with San Timoteo Creek in the San Timoteo management area) and in the Singleton subarea. These areas are identified as a data gap in characterizing groundwater conditions and the interconnection of surface water.

Groundwater elevation data is also used as a surrogate for direct measurements of land subsidence as groundwater levels that fall below historical lows for a long period of time may induce subsidence. Land subsidence in the Plan Area has the potential to occur both as a result of tectonic forcing and as a result of groundwater level declines (see Section 2.7.7). Therefore, measuring groundwater elevations is a better proxy for evaluating land subsidence induced by groundwater withdrawals than measuring total land subsidence, because the tectonic and groundwater elevation components of the total subsidence measurement cannot be separated from each other.

Groundwater elevations measured at each of the RMPs will be reported to DWR in the annual reports that will follow the submittal of this GSP. Each of these wells may be instrumented with a pressure transducer capable of recording groundwater levels at a higher frequency (e.g., daily) if there is access to securely install the transducer. Groundwater elevations measured at the RMPs will be compared to their respective measurable objective and minimum threshold levels for each management area to evaluate whether groundwater conditions are approaching or experiencing undesirable results associated with the chronic lowering of groundwater levels, reduction in groundwater storage, and the depletion of interconnected surface water that may adversely impact GDEs. The criteria characterizing conditions below the measurable objective or minimum threshold in a management area are for groundwater elevations measured at 50% or more of the RMPs below their respective measurable objective or minimum threshold levels for two consecutive years.

The Yucaipa GSA will evaluate the ongoing representativeness of the current RMPs during the 5-year GSP evaluation and update process. RMPs may be added to the monitoring network to enhance characterization of the Subbasin and evaluation of groundwater conditions relative to the sustainability criteria established in this GSP. Current RMPs may be removed in the event that groundwater elevations at that RMP are found to no longer represent groundwater conditions in the principal aquifer, or if changes are made to access agreements or well construction. In the event that an RMP must be removed from the monitoring program, Yucaipa GSA will evaluate existing wells as a replacement RMP or potential sites to install a new replacement well. Any existing well that is added to the current groundwater elevation RMPs must have a record of sufficient length to establish that groundwater conditions at that well are representative of groundwater conditions measured at other nearby wells.

3.6.6 Monitoring Network Improvements

The GSP Regulations call for each GSA to review and evaluate the monitoring network established for the Plan Area in the GSP and every 5-year assessment. Specifically, "each agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency" (23 CCR, Section 354.38). While the existing monitoring network satisfies the requirements to "demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions" (23 CCR, Section 354.34), there are improvements that can be made to improve local spatial coverage. Section 2.6.3 identified data gaps in characterizing the hydrogeology of the Subbasin, a few of which related to monitoring activities.

3.6.6.1 Stream Flow Gauging

The existing stream flow gauging stations maintained by SBCFCD were designed to measure peak flows in Wilson Creek, Oak Glen Creek and Yucaipa Creek; they were not designed to measure low to normal flows. The lack of flow data under these conditions limits the Yucaipa GSA understanding of recharge to the groundwater basin as a result of leakage from stream beds. The Yucaipa GSA has initiated discussions with DWR in installing additional stream flow gauging stations in Yucaipa Creek. The Yucaipa GSA may also reach out to SBCFCD to potentially modify the existing gauging stations or install new ones; and may contact the USGS about installing new gauges in the Plan Area.

3.6.6.2 Interconnected Surface Water

The YIHM suggests that surface water in the upper reaches of Wilson Creek, Oak Glen Creek, and Yucaipa Creek in the North Bench Management Area may be interconnected with shallow groundwater. However, there are no existing shallow groundwater wells to confirm this relationship. The Yucaipa GSA will investigate the feasibility of installing shallow groundwater observation wells to characterize the relationship between surface water and groundwater, in conjunction with additional stream flow gauging stations to enhance the characterization of interconnected surface water in the upper reaches of the North Bench Management Area. The Yucaipa GSA will also document when and where ephemeral and intermittent flowing streams cease to flow.

3.6.6.3 Information for Private Wells

The status of private wells in the Yucaipa Subbasin, including information on well construction, pumping operations, and the ability to measure groundwater levels, are mostly unknown. The Yucaipa GSA recognizes this lack of information as a data gap in evaluating conditions in the Subbasin. The Yucaipa GSA will make efforts to contact the known and potential private well users to obtain the pertinent information needed to evaluate and preserve their beneficial use of groundwater in the Plan Area.

3.6.6.4 Spatial Data Gaps in Groundwater Level Measurements

No known wells exist in the eastern half of the Calimesa Management Area, with the exception of the USGS nested well, Equestrian Park, to provide groundwater elevation data. The Yucaipa GSA will evaluate the feasibility of installing an additional monitoring well in the eastern portion of the Calimesa Management Area to address the data gap in groundwater elevations in that part of the Plan Area.

A lack of knowledge of existing private wells serving domestic and/or irrigation purposes in the Subbasin is a data gap for groundwater elevations and groundwater production. The Yucaipa-SGAM is making efforts to contact the private well owners to obtain information about their wells, including depths-to-waters and groundwater production.

3.6.6.5 Temporal Data Gaps in Groundwater Level Measurements

The DWR Monitoring Protocol BMP (DWR 2016a) states the following:

> Groundwater elevation data … should approximate conditions at a discrete period in time. Therefore, all groundwater levels in a basin should be collected within as short a time as possible, preferably within a 1- to 2-week period.

The DWR Monitoring Networks BMP (DWR 2016b) states the following:

> Groundwater levels will be collected during the middle of October and March for comparative reporting purposes.

Groundwater elevation data collection, at a minimum, every April/May and October/November for the MBMP, or every month on either the beginning of the month or near the end. The protocol for measuring groundwater elevations throughout the Plan Area will establish a schedule of collecting this data within a 1- to 2-week window centered on the middle of the month.

Installation of pressure transducers capable of recording hourly or daily groundwater conditions in key monitoring wells would reduce the need for staff to take manual measurements from wells in the monitoring network within a 2-week window. Pressure transducers could be downloaded after the 2-week window has passed and recorded data from within the 2-week window would be incorporated into groundwater elevation maps and calculations of groundwater in storage. The recommended 2-week window during which groundwater elevations should be collected is March 9 to 22 for the spring and October 9 to 22 for the fall.

3.6.7 Monitoring Network Modifications

The GSP Regulations (23 CCR, Section 354.38 [e]) require that each GSA "adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances," including the following:

1. **Minimum threshold exceedances.** The status of RMPs and the frequency of data collection will be evaluated following an exceedance of a minimum threshold established at an RMP. This evaluation will include an assessment of the methodology and integrity of the data collected, and determination of its representativeness of conditions in the management area to which it is monitoring. Any errors or deficiencies in the data will be identified and corrected, if possible, and other potential sites will be assessed that may replace the RMP. Section 4.2.1, Management Action No. 1, also details the steps in implementing management actions when minimum thresholds are exceeded and undesirable results are experienced in a management area. This section also calls for a reevaluation of the YIHM to assess its accuracy in predicting conditions representative of undesirable results.
2. **Highly variable spatial and temporal conditions.** Substantial variations in spatial and temporal conditions will be assessed to determine if they are the results of real conditions, or if the specific monitoring point or station is experiencing issues that affect its ability to accurately collect representative data. If a monitoring

point or station is found unreliable, a replacement monitoring point or station will be identified, or a new one designed, to provide accurate data to effectively characterize conditions in the Subbasin and appropriate management area.

3. **Adverse impacts to beneficial uses and users of groundwater.** The monitoring network suffices in providing information to characterize conditions in the Subbasin and for each management area. However, should adverse conditions impact the beneficial uses and/or users of groundwater while the monitoring network fails to characterize these conditions, then the Yucaipa GSA will reevaluate the monitoring network and, within a 1-year period, conduct a feasibility study of modifying and/or expand the monitoring network to improve its ability to characterize conditions so that the appropriate management actions may be implemented to protect and sustainably manage the groundwater resources.
4. **The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.** This circumstance is not applicable because the adjacent basins are either exempt from the SGMA or are a low-priority basin with no established sustainability criteria.

3.7 References

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DWR. 2014. *Summary of Recent, Historical, and Estimated Potential for Future Land Subsidence in California*.

DWR. 2016a. *Best Management Practices for the Sustainable Management of Groundwater: Monitoring Networks and Identification of Data Gaps.* December 2016.

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Wildermuth (Wildermuth Environmental Inc.). 2014. *Maximum Benefit Monitoring Report 2015 Work Plan*. Prepared for City of Beaumont, Yucaipa Valley Water District, San Gorgonio Pass Water Agency, Beaumont Cherry Valley Water District, and City of Banning. September 30, 2014. Updated December 22, 2014.

Figure 3-1. 31-Day Running Average of Vertical Displacement Measured at the Crafton Hills College

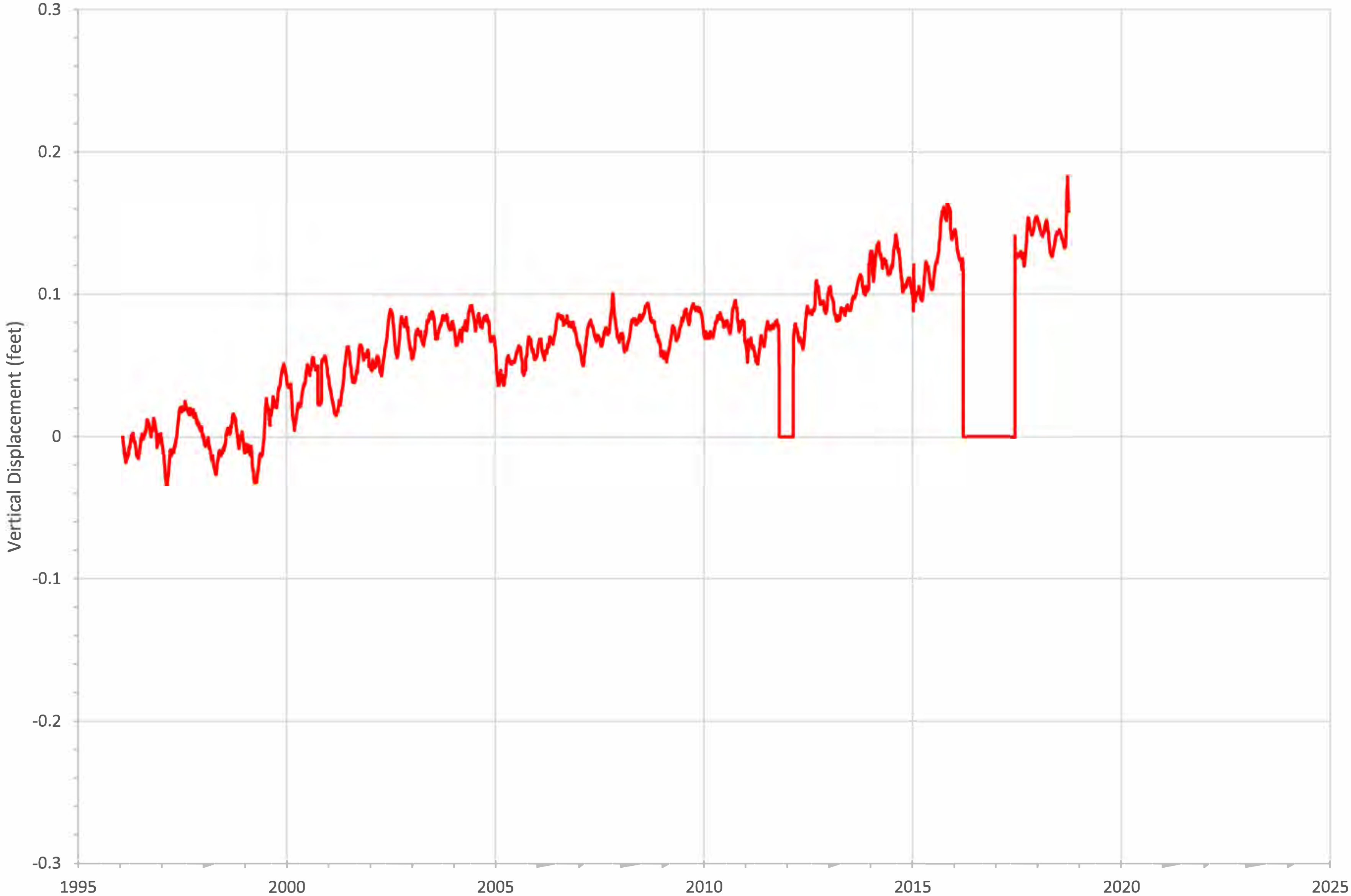

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Figure 3-2. Drought Buffer in the North Bench Management Area

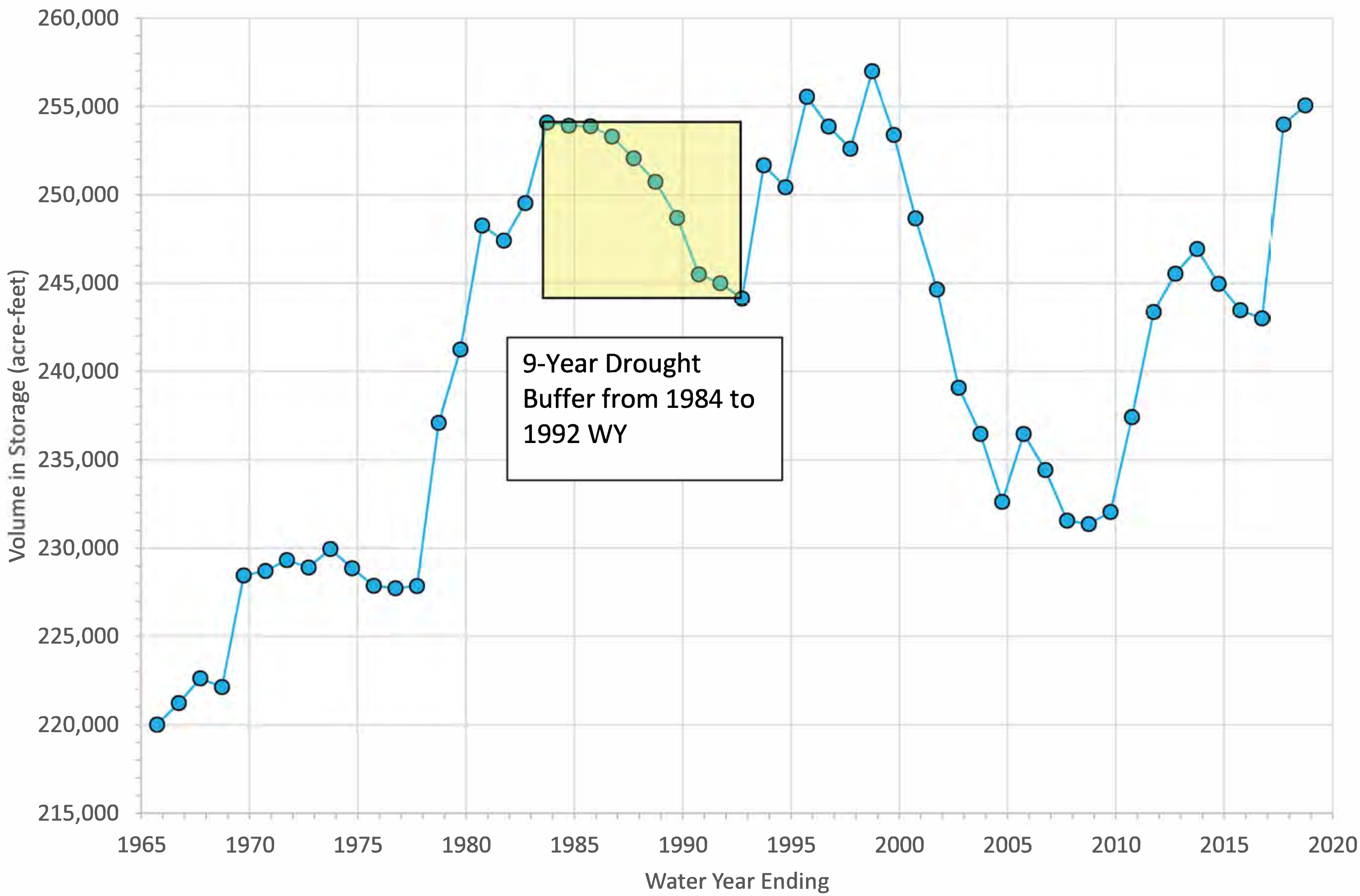

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Figure 3-3. Historical and Current Volume of Groundwater in Storage
in the North Bench Management Area

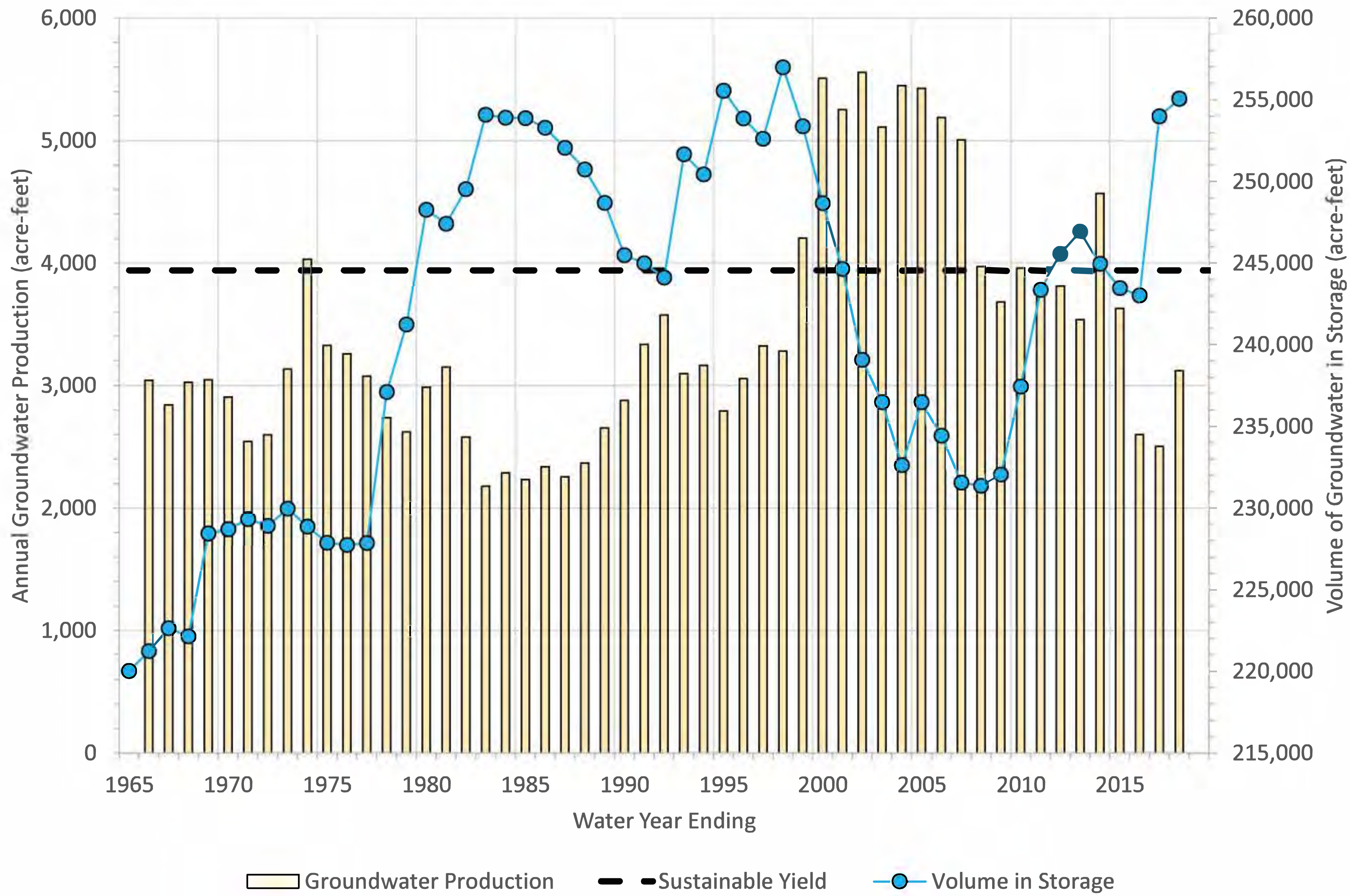

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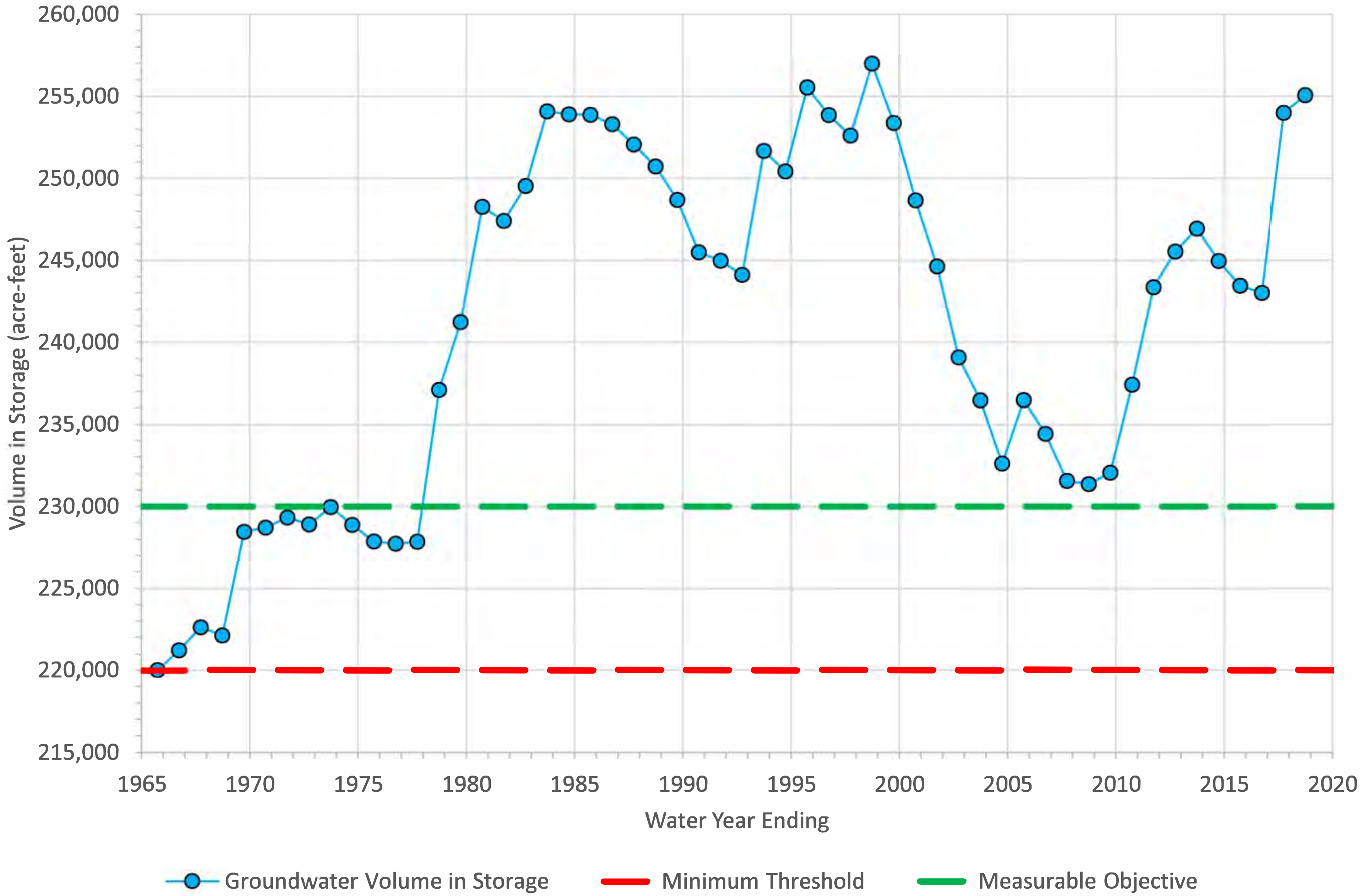
Figure 3-4. Minimum Threshold and Measurable Objective in the North Bench Management Area



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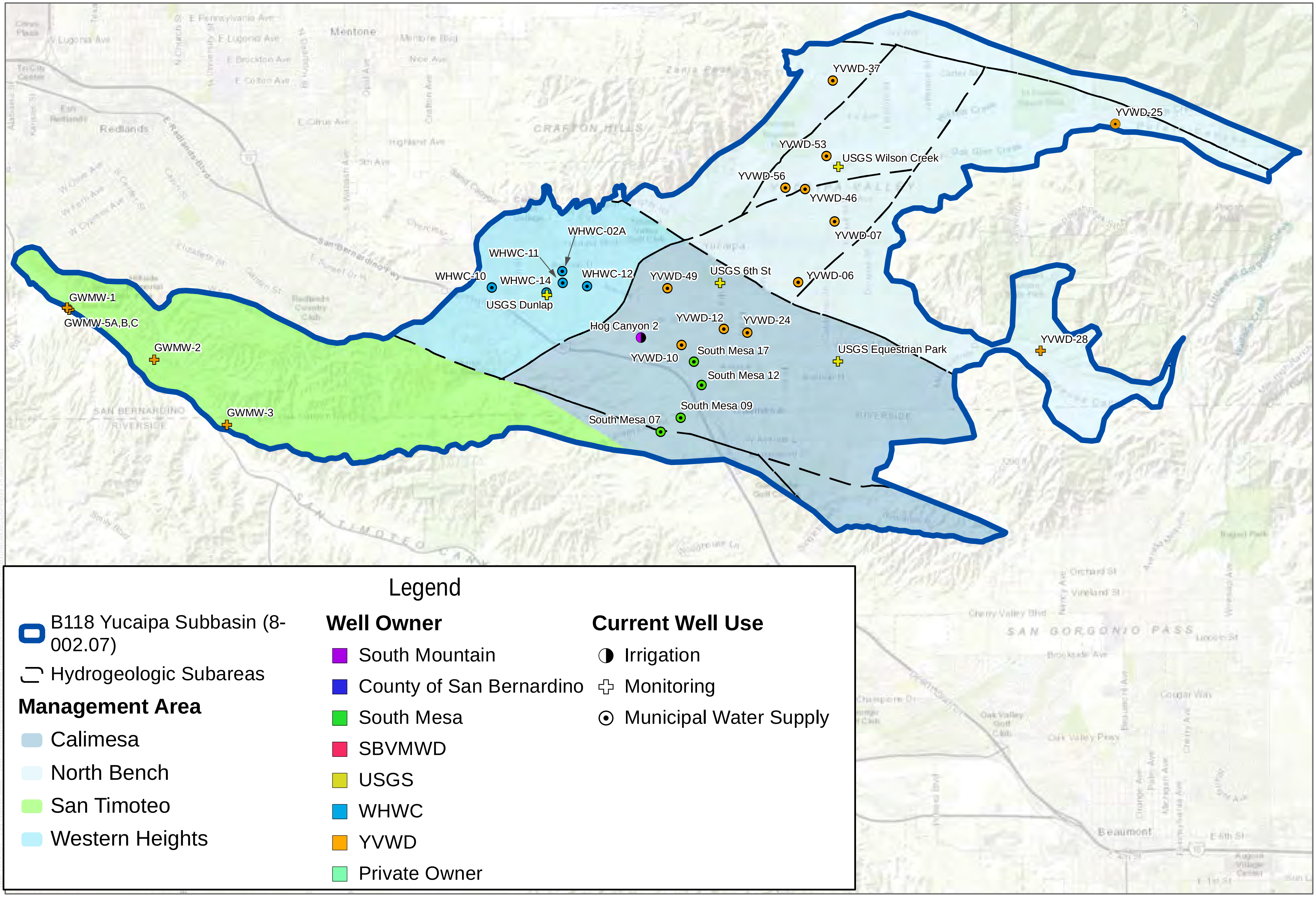

SOURCE: SBVMWD, YVWD, WHWC, SMWC, City of Redlands, USGS

DUDEK

FIGURE 3-5

Representative Monitoring Points

Yucaipa Subbasin Groundwater Sustainability Plan

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Figure 3-6. Historical Groundwater Elevations and Pumping in the North Bench Management Area

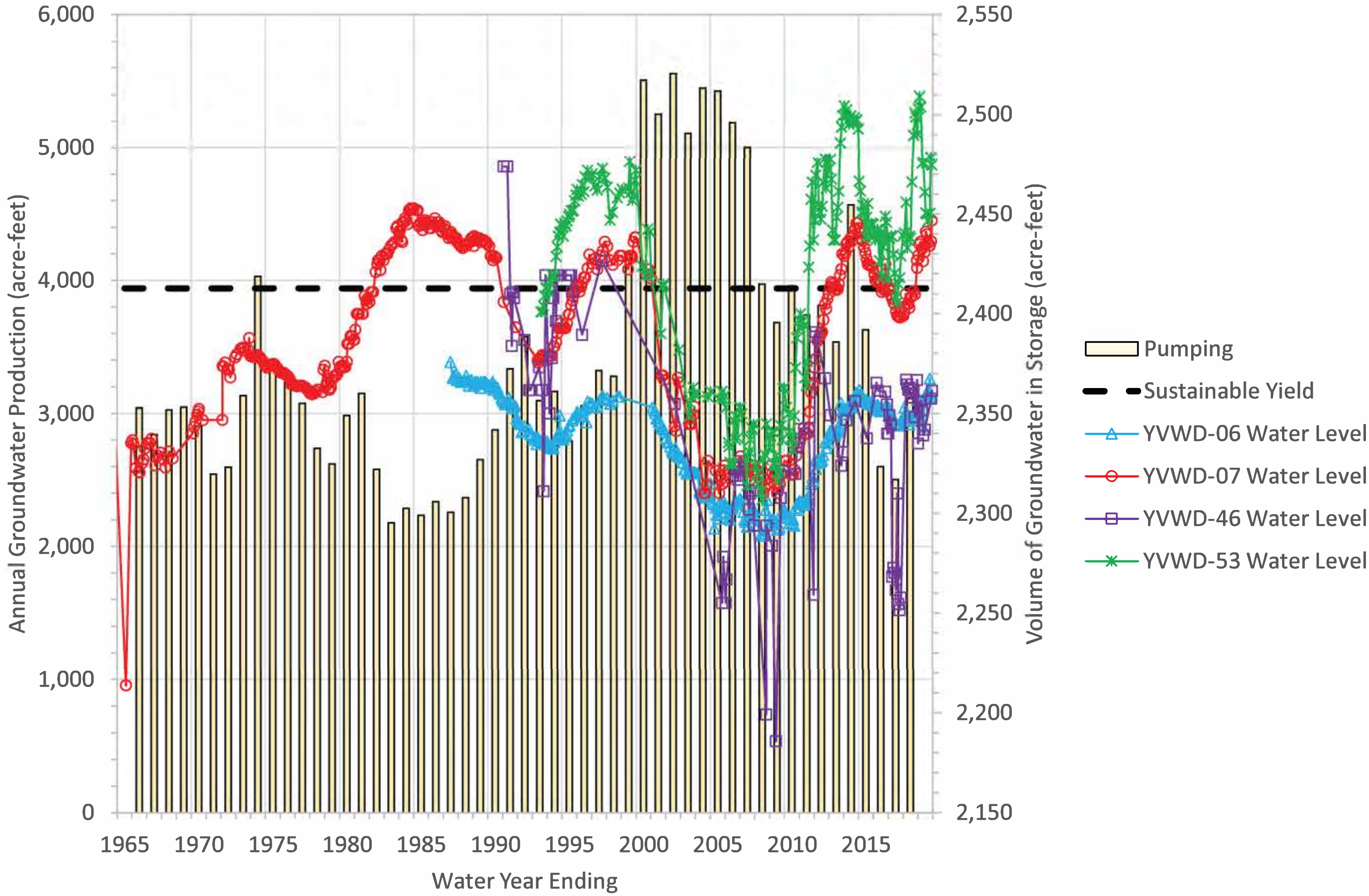

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Figure 3-7. Predicted Hydraulic Heads at YVWD-06 in the North Bench Management Area

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Figure 3-8. Predicted Hydraulic Heads at YVWD-07 in the North Bench Management Area

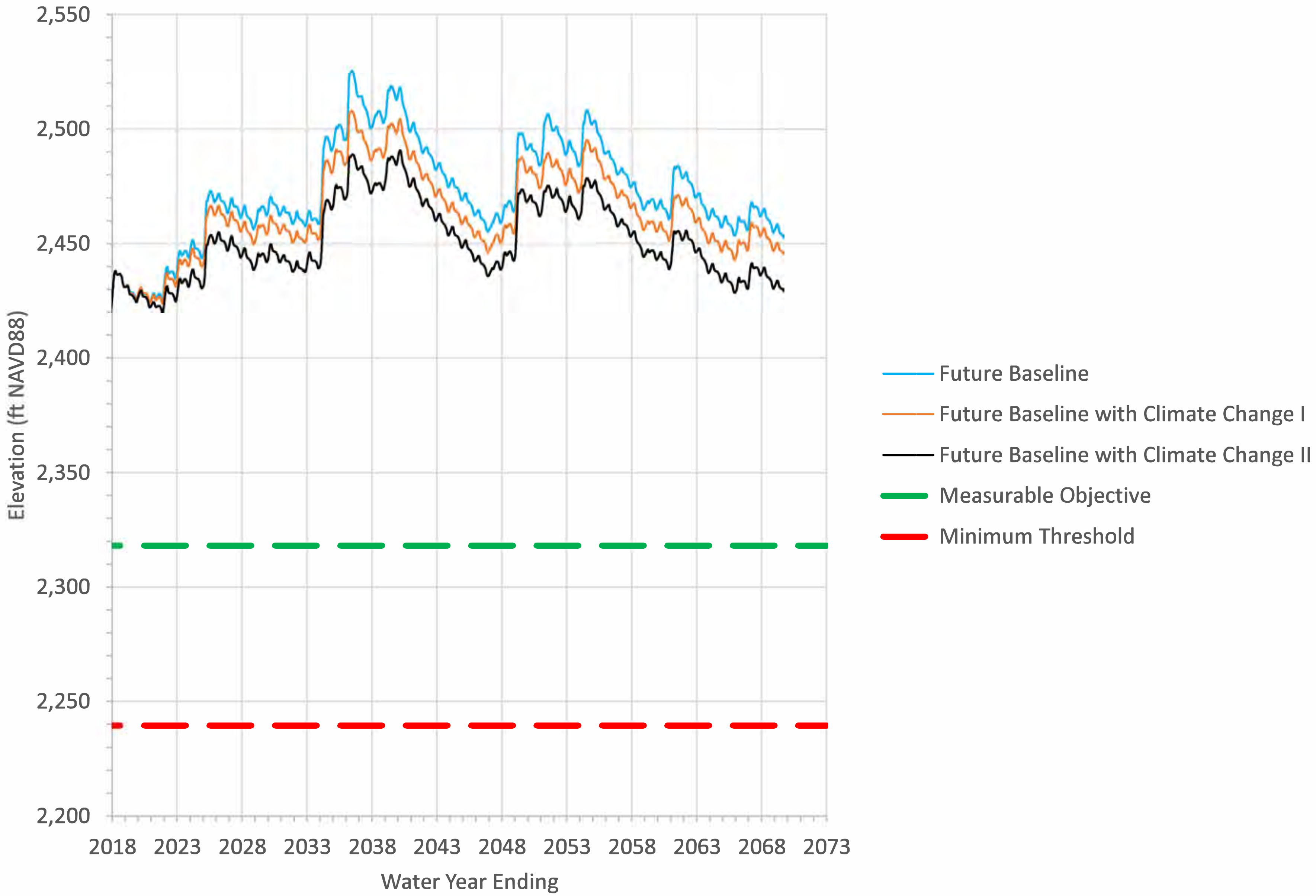

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Figure 3-9. Predicted Hydraulic Heads at YVWD-37 in the North Bench Management Area

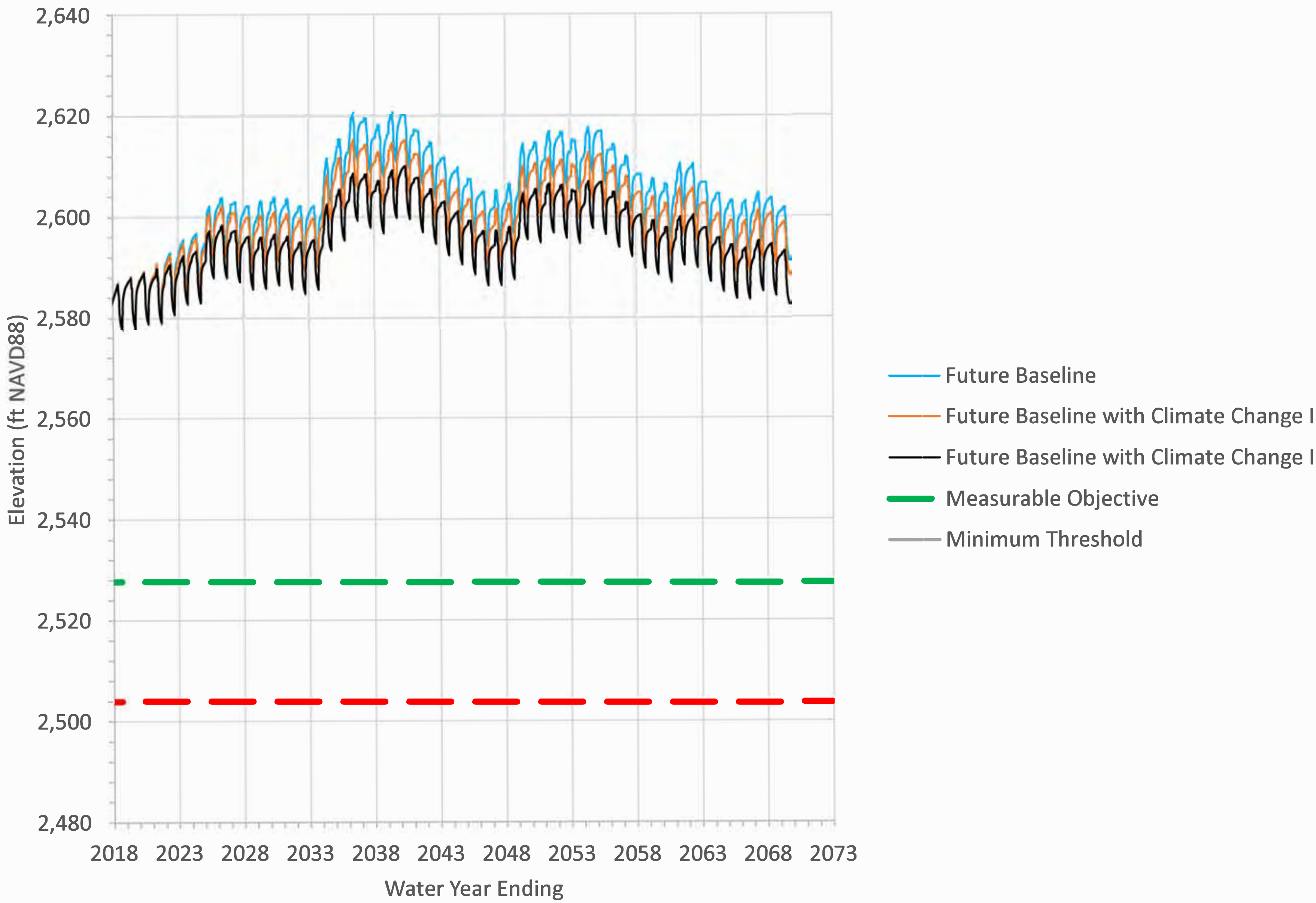

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Figure 3-10. Predicted Hydraulic Heads at YVWD-46 in the North Bench Management Area

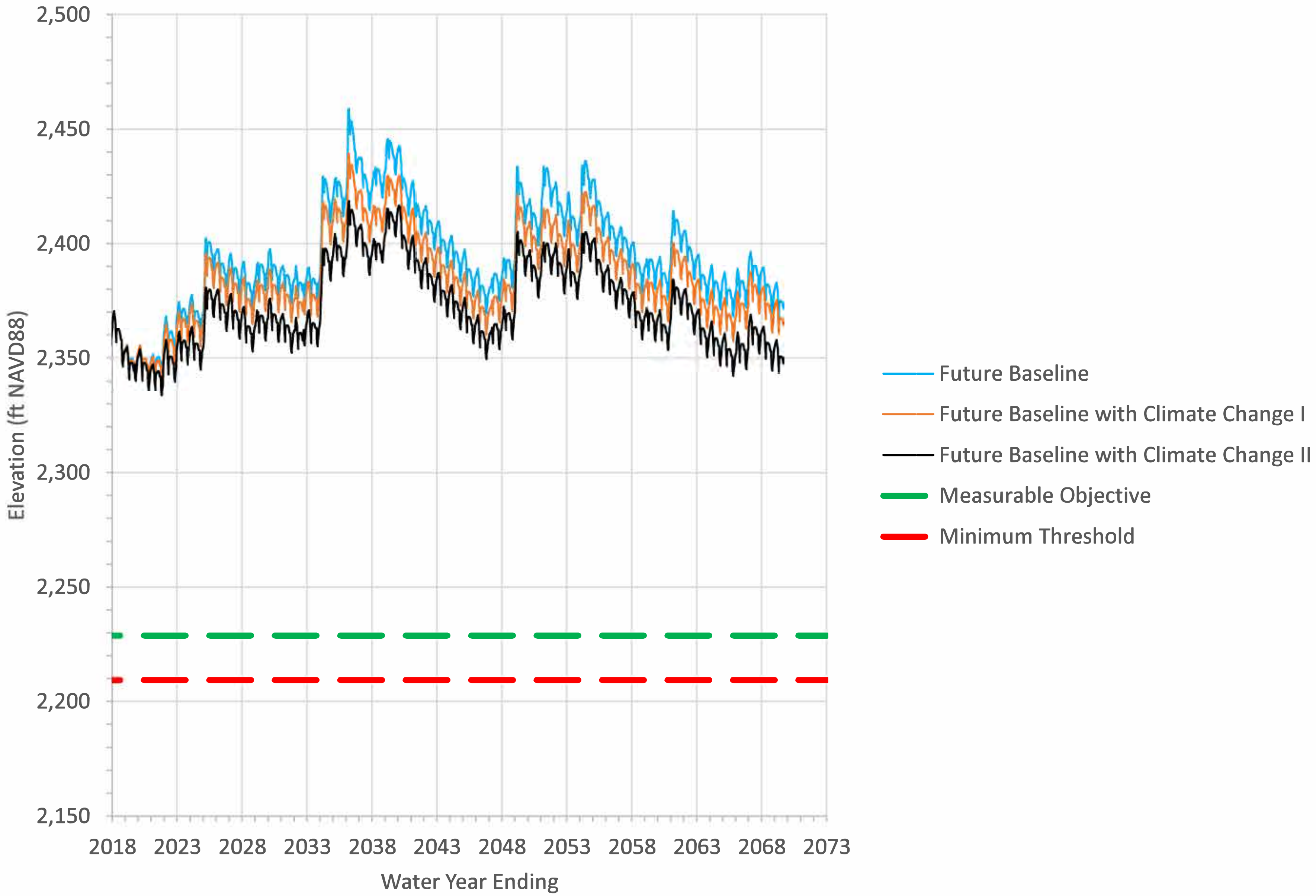

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Figure 3-11. Predicted Hydraulic Heads at YVWD-53 in the North Bench Management Area

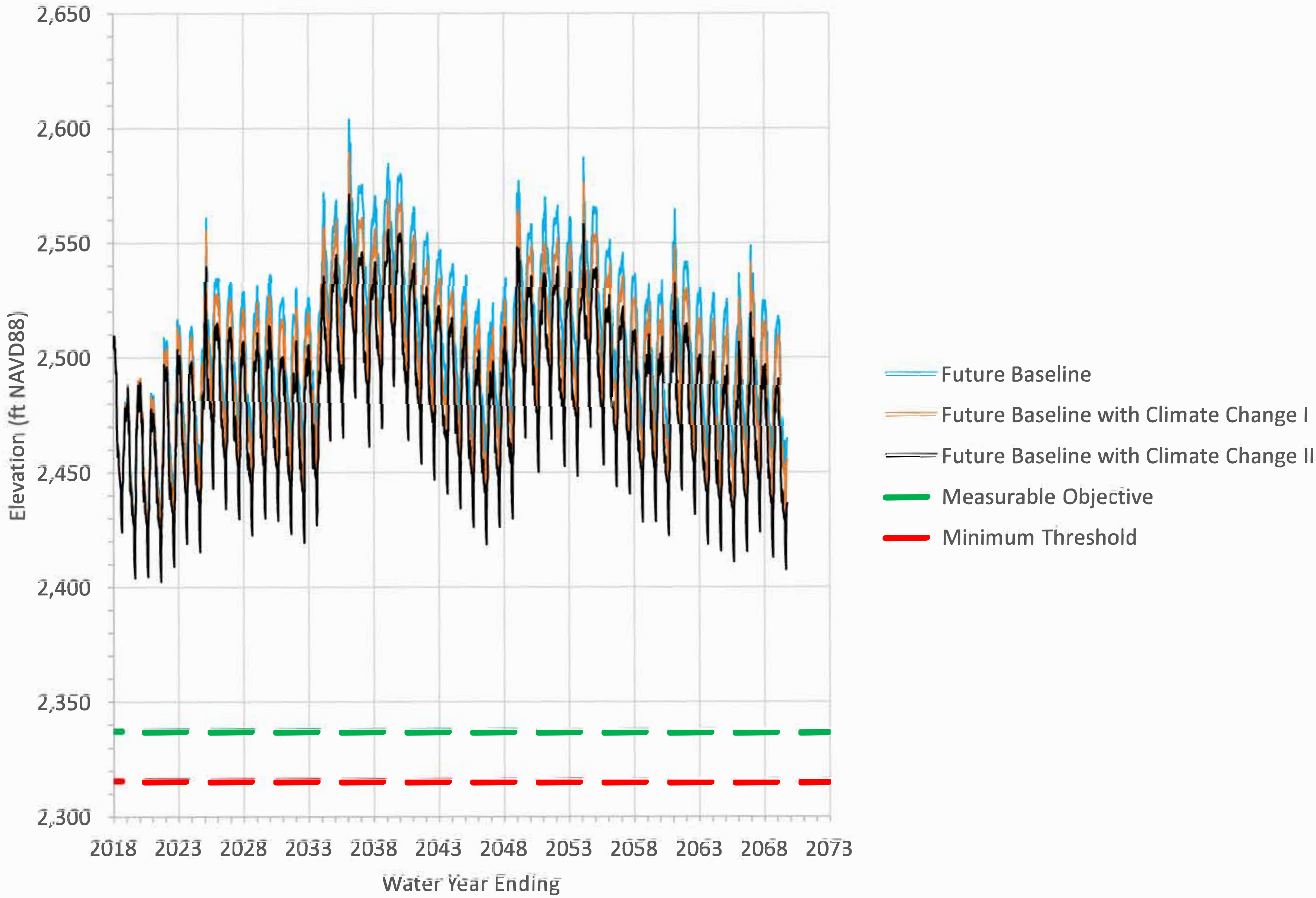

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Figure 3-12. Predicted Hydraulic Heads at YVWD-56 in the North Bench Management Area

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Figure 3-13. Predicted Hydraulic Heads at USGS Wilson Creek #1
in the North Bench Management Area

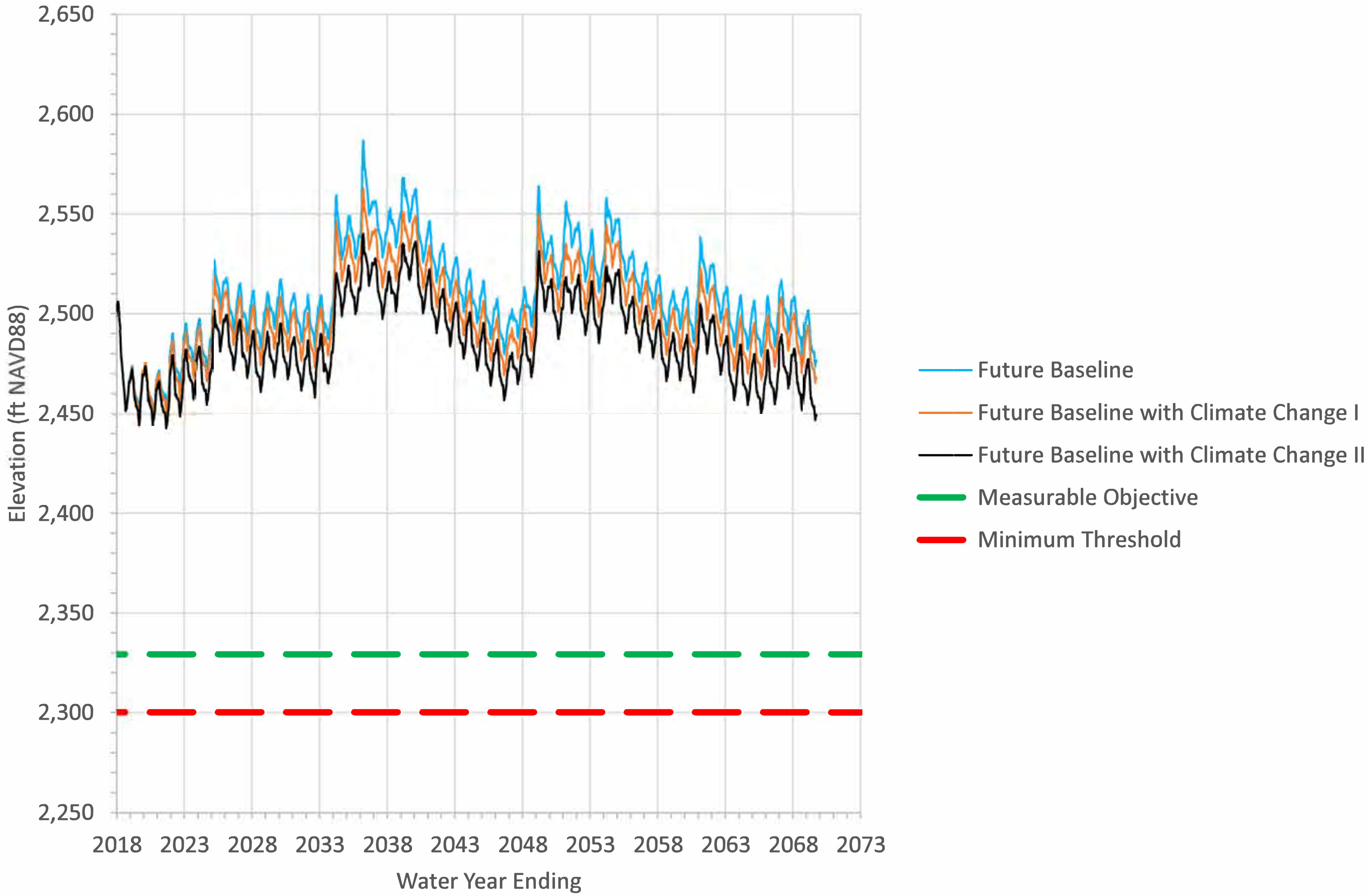

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Figure 3-14. Predicted Hydraulic Heads at USGS Wilson Creek #4
in the North Bench Management Area

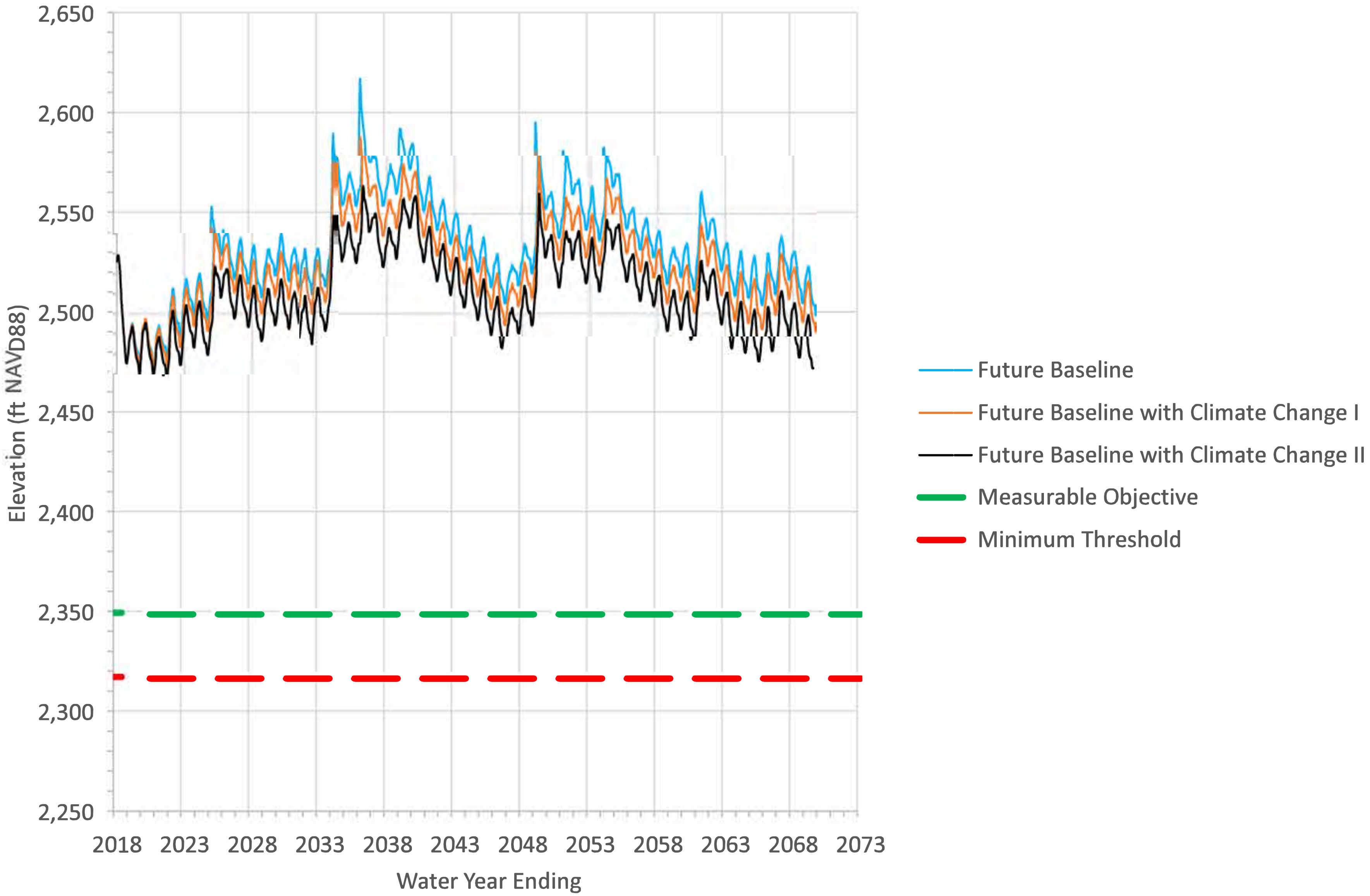

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Figure 3-15. Predicted Volume in Storage by the Future Baseline and Future Baseline with Climate Change I and II Scenarios in the North Bench Management Area

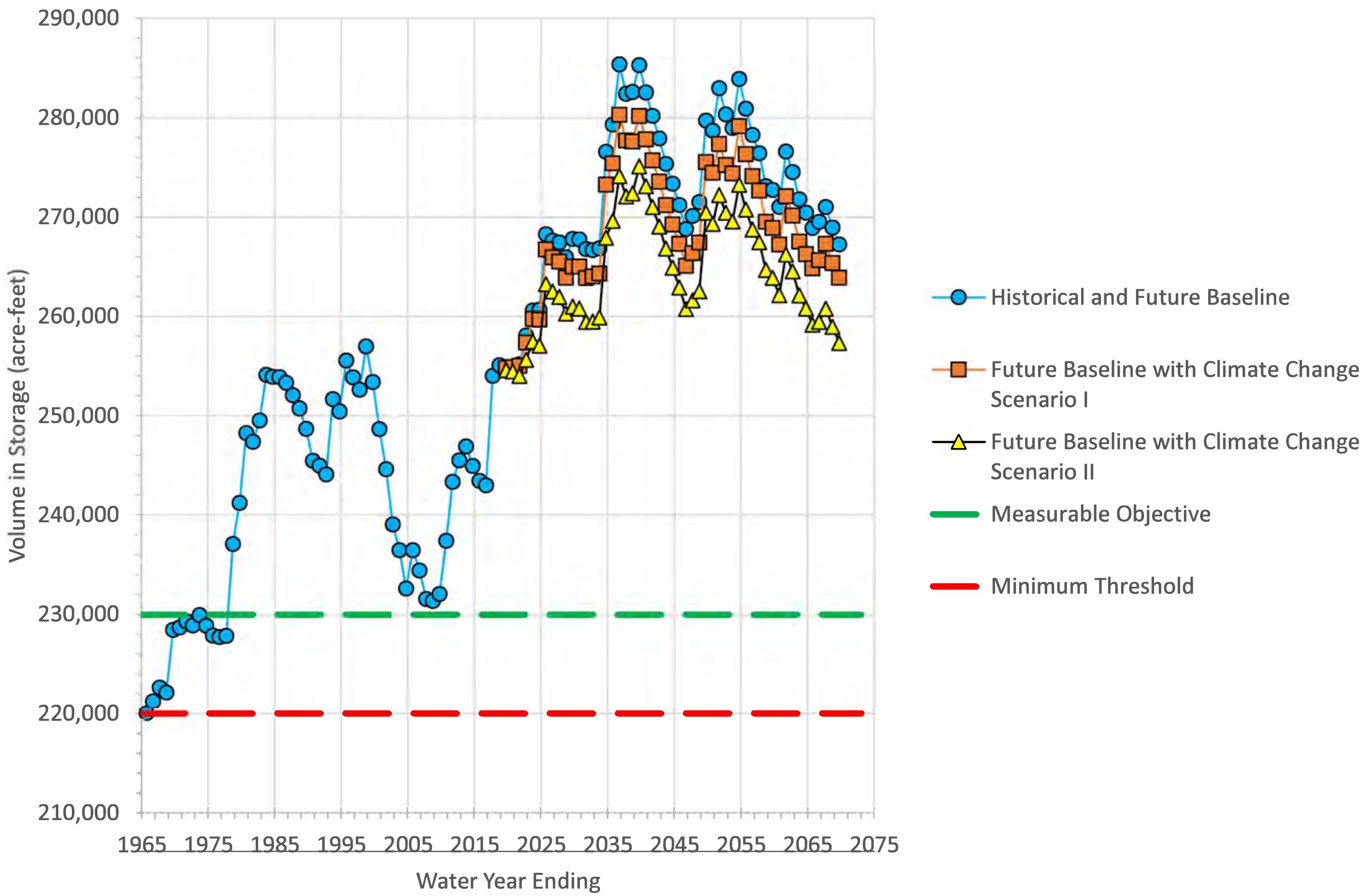

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Figure 3-16. Depths-to-Groundwater at the Chlorinator Well and YVWD-25
in the North Bench Management Area

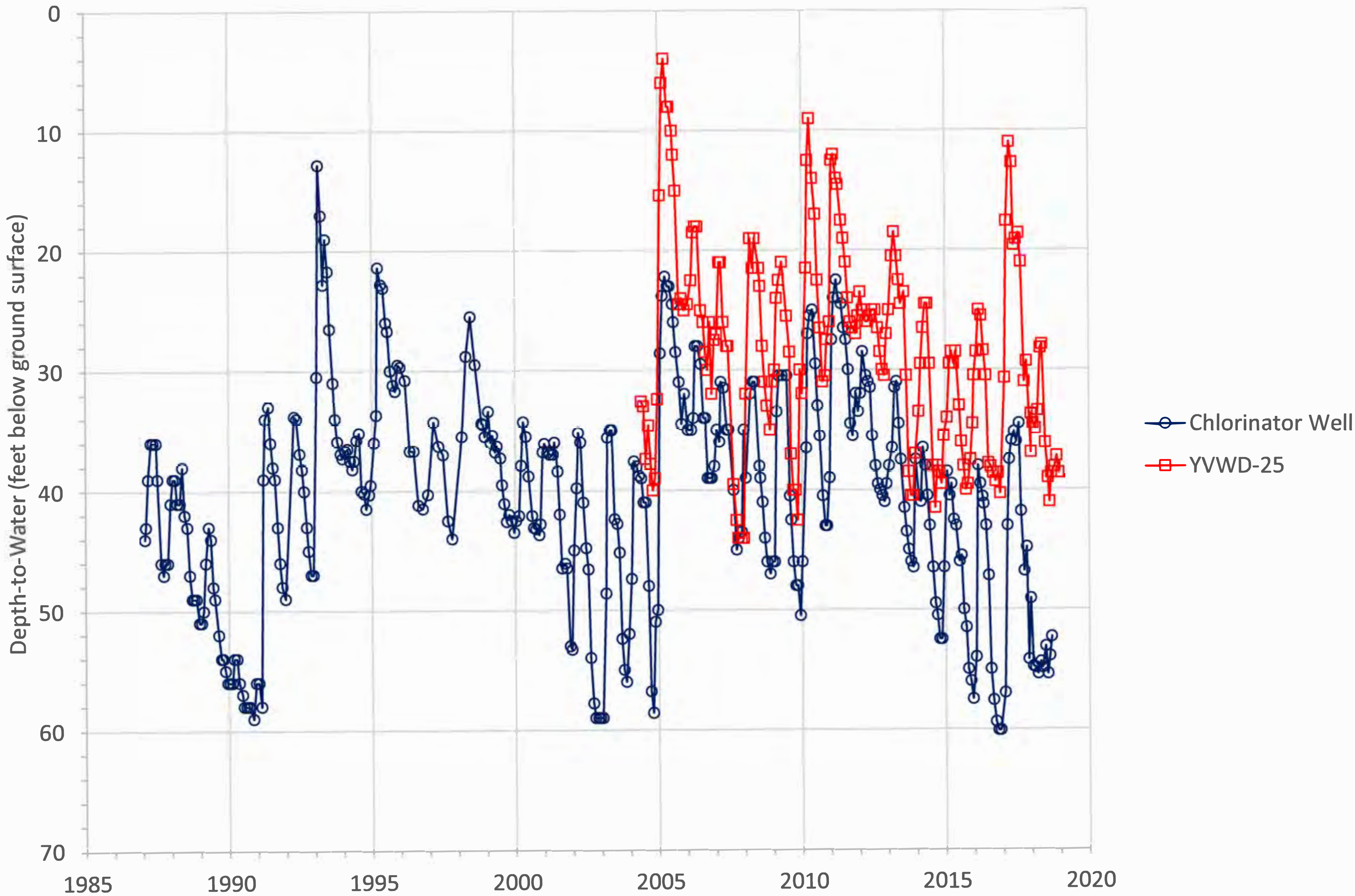

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Figure 3-17. Static Depths-to-Groundwater at YVWD-28
in the North Bench Management Area

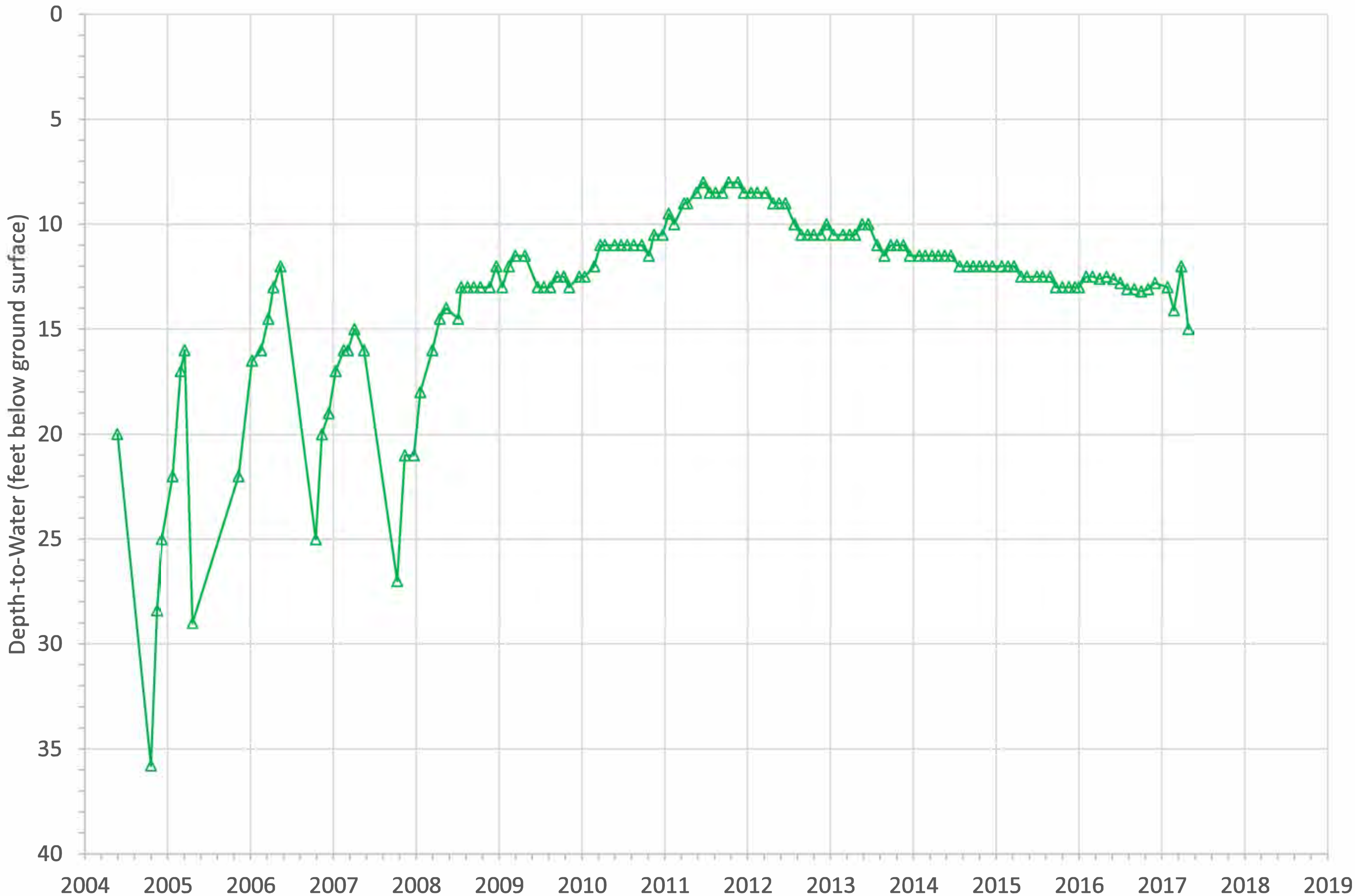

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Figure 3-18. Drought Buffer in the Calimesa Management Area

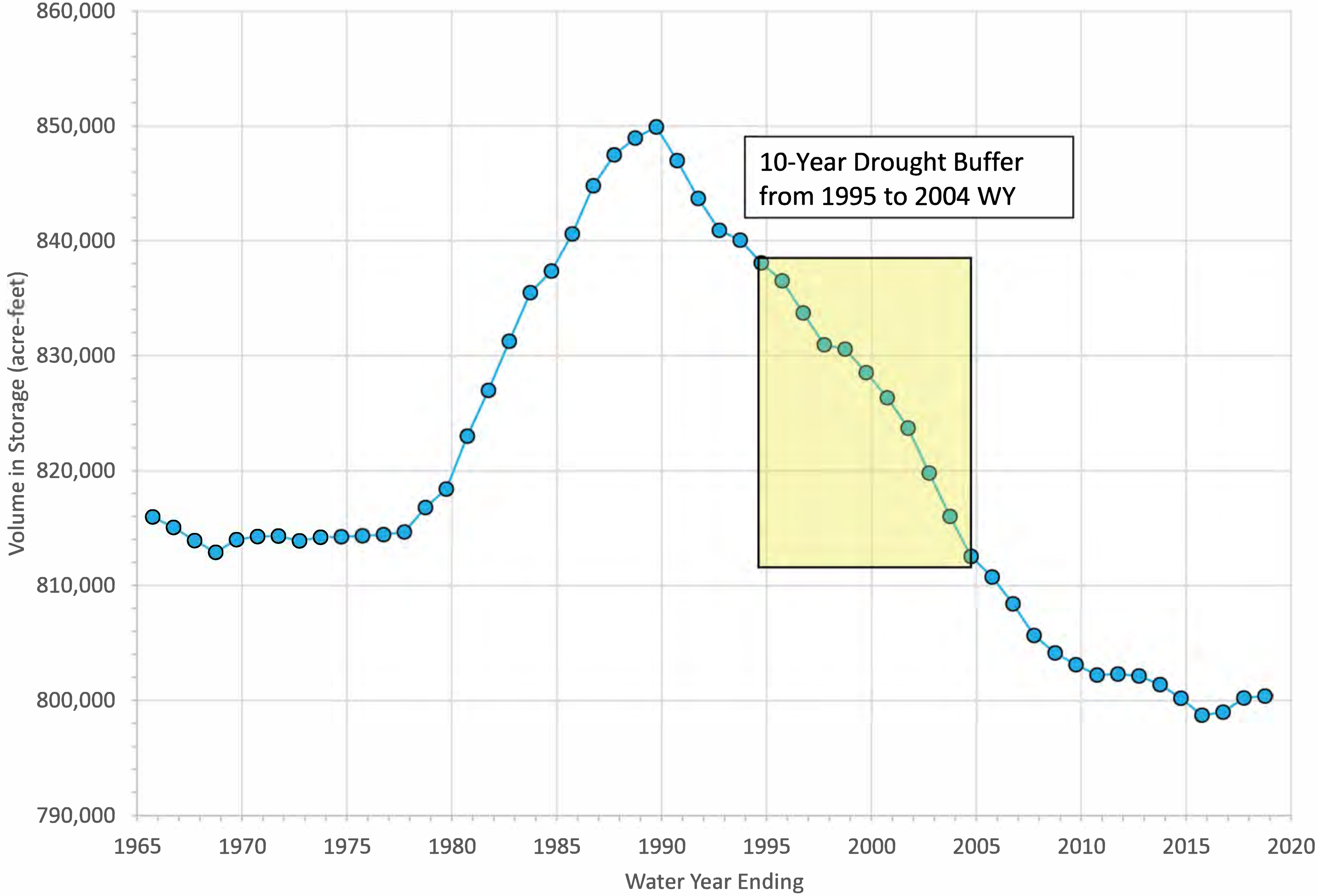

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Figure 3-19. Historical and Current Volume of Groundwater in Storage in the Calimesa Management Area

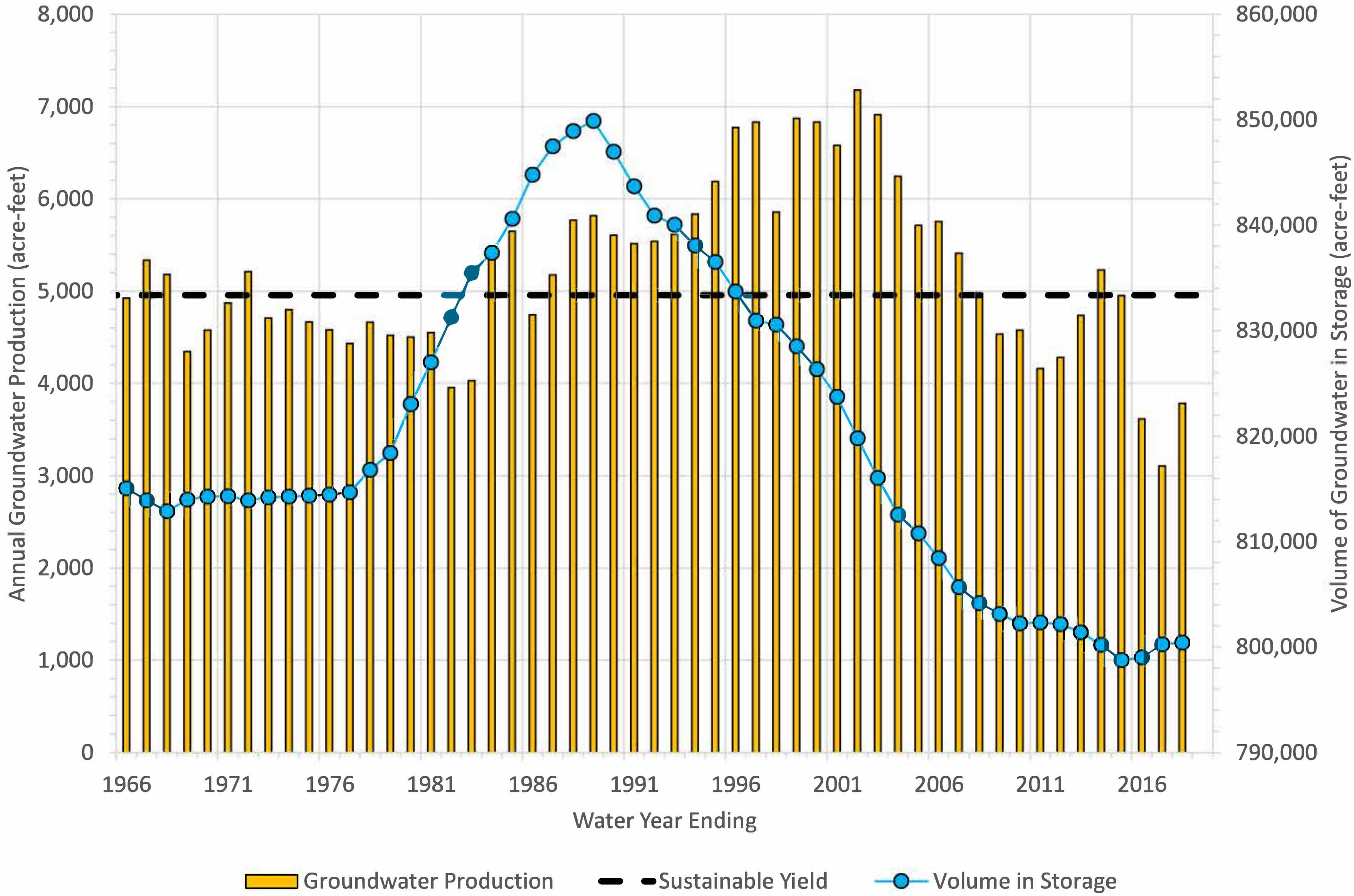

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Figure 3-20. Minimum Threshold and Measurable Objective in the Calimesa Management Area

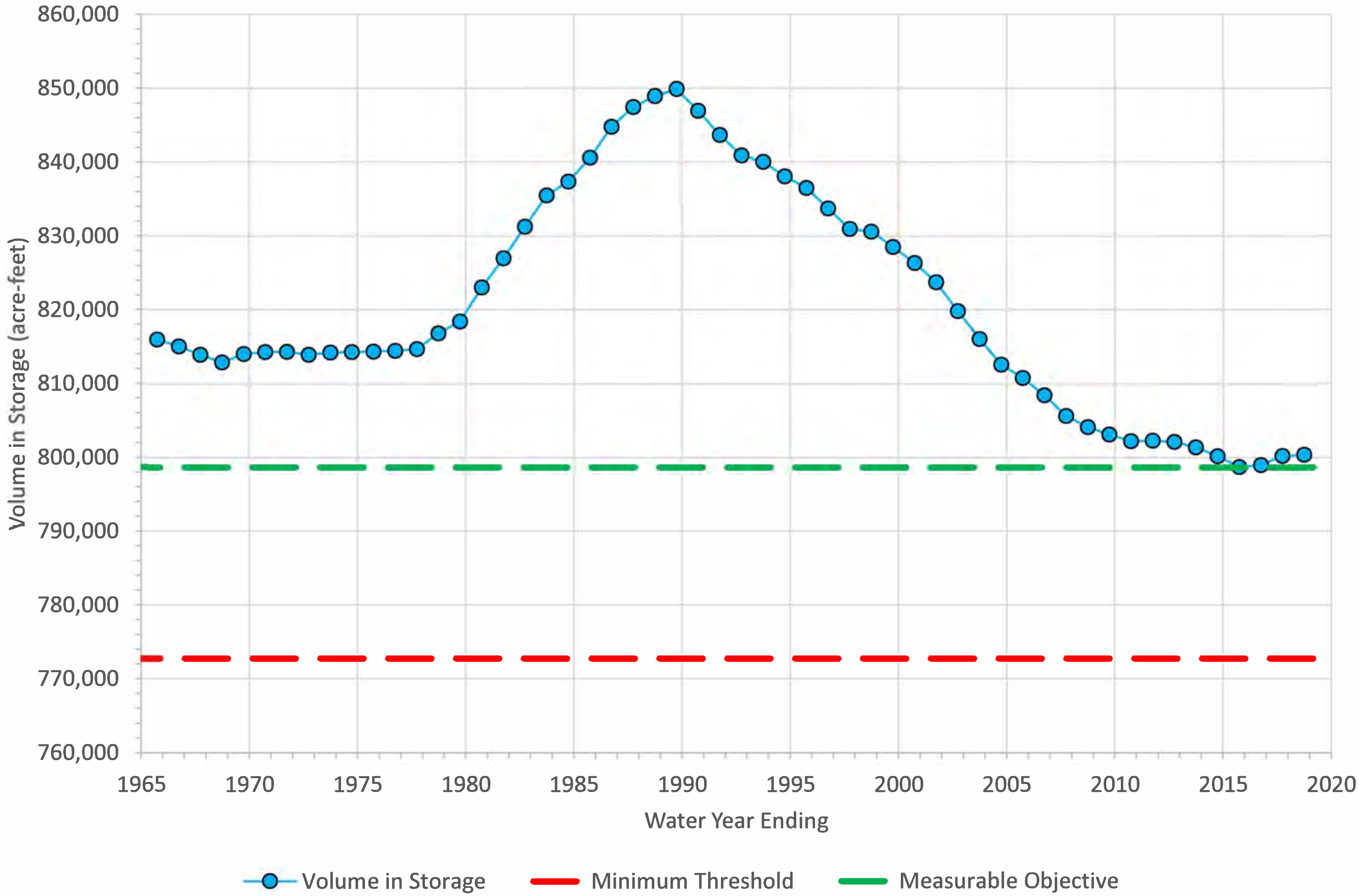

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Figure 3-21. Annual Groundwater Production and Historical Groundwater Elevations in the Calimesa Management Area

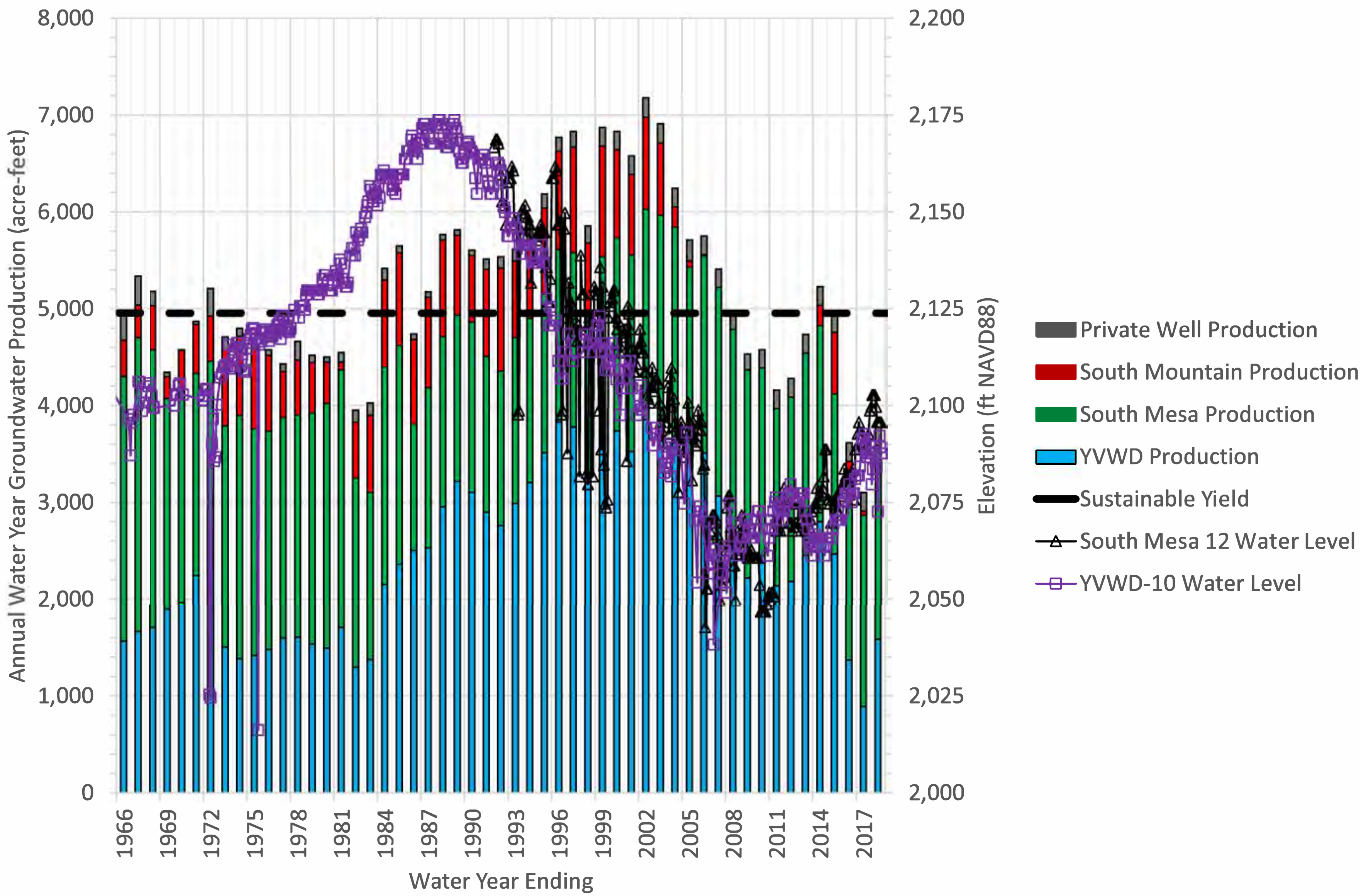

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Figure 3-22. Predicted Hydraulic Heads at South Mesa 7 in the Calimesa Management Area

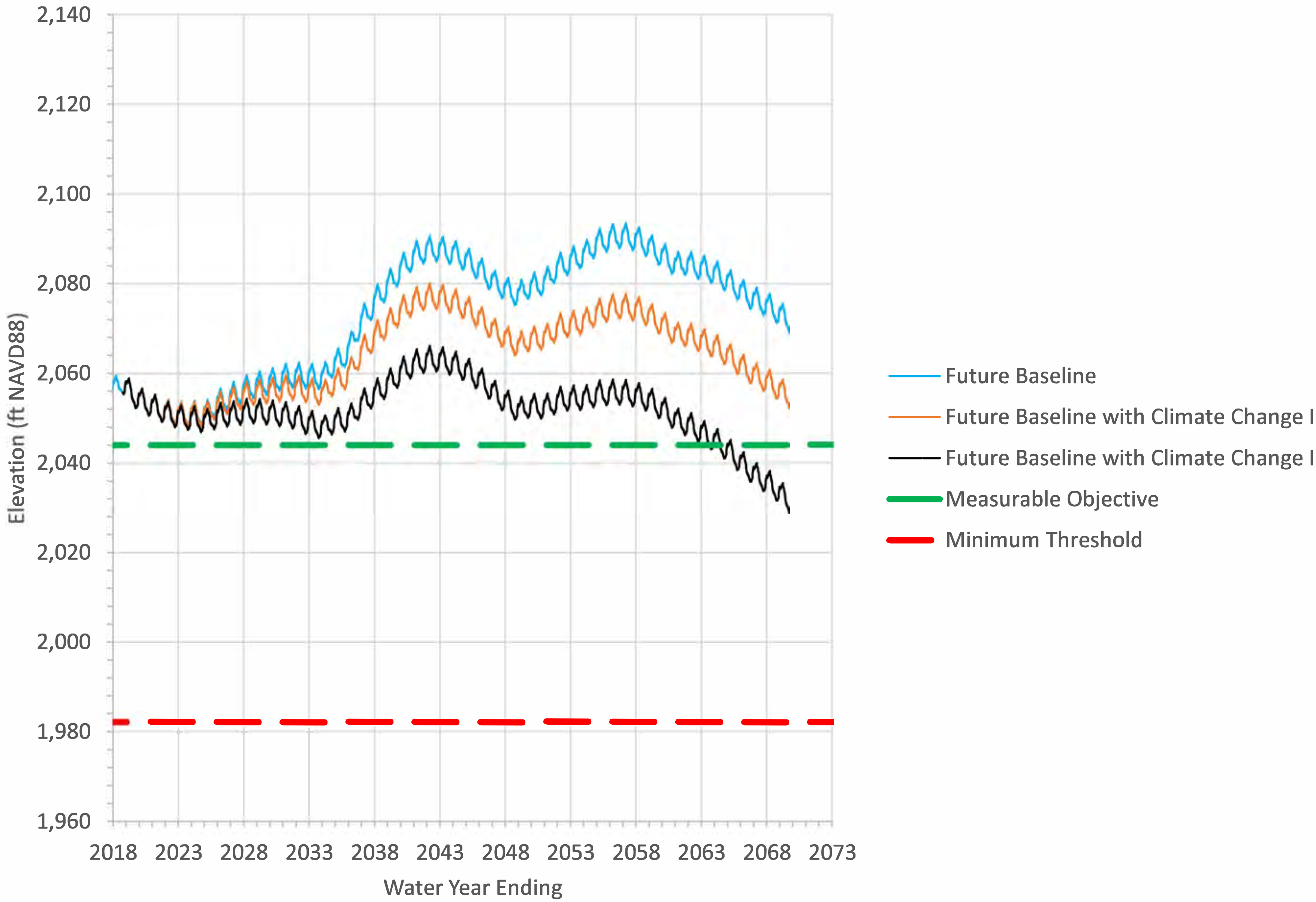

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Figure 3-23. Predicted Hydraulic Heads at South Mesa 9 in the Calimesa Management Area

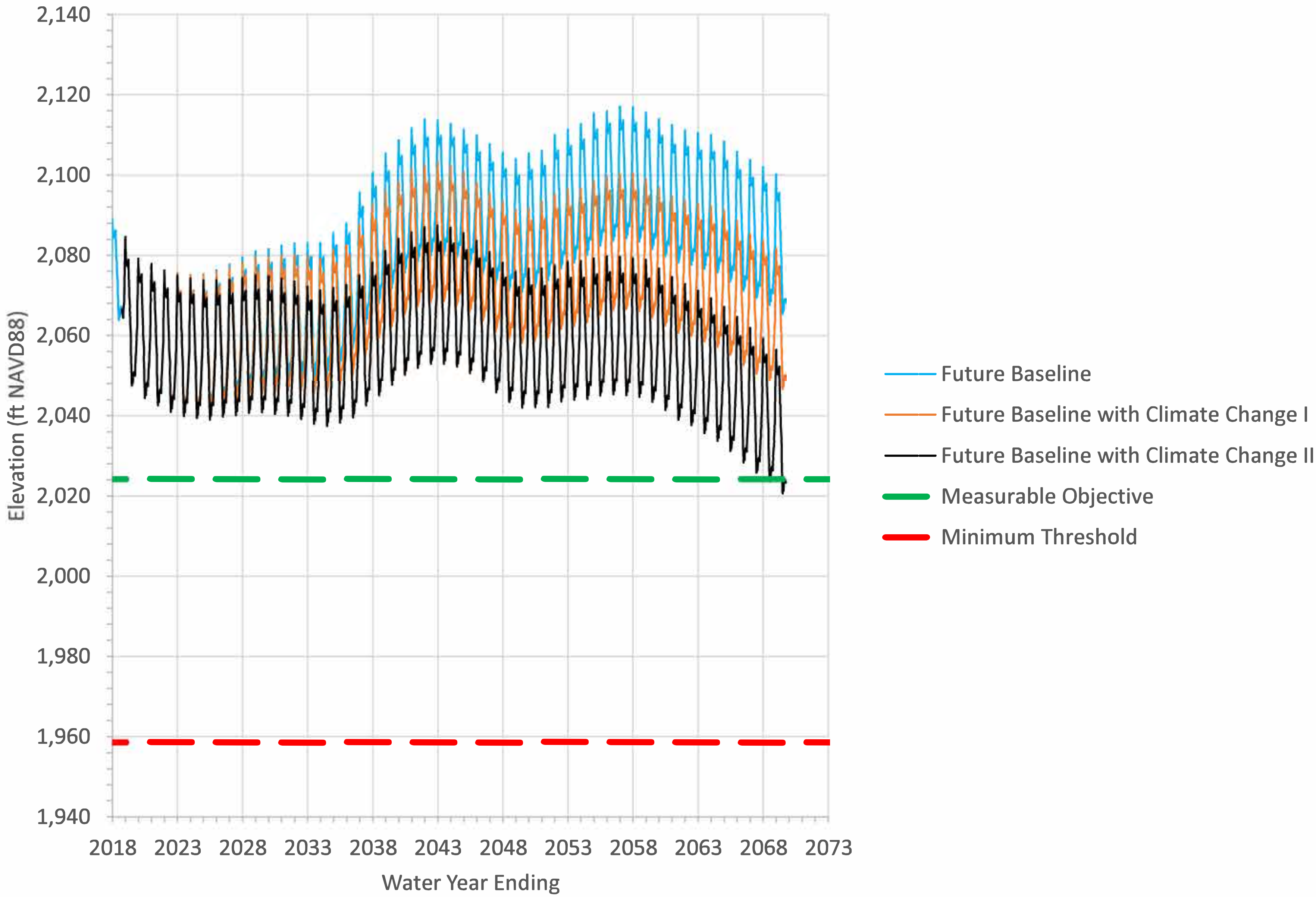

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Figure 3-24. Predicted Hydraulic Heads at South Mesa 12 in the Calimesa Management Area

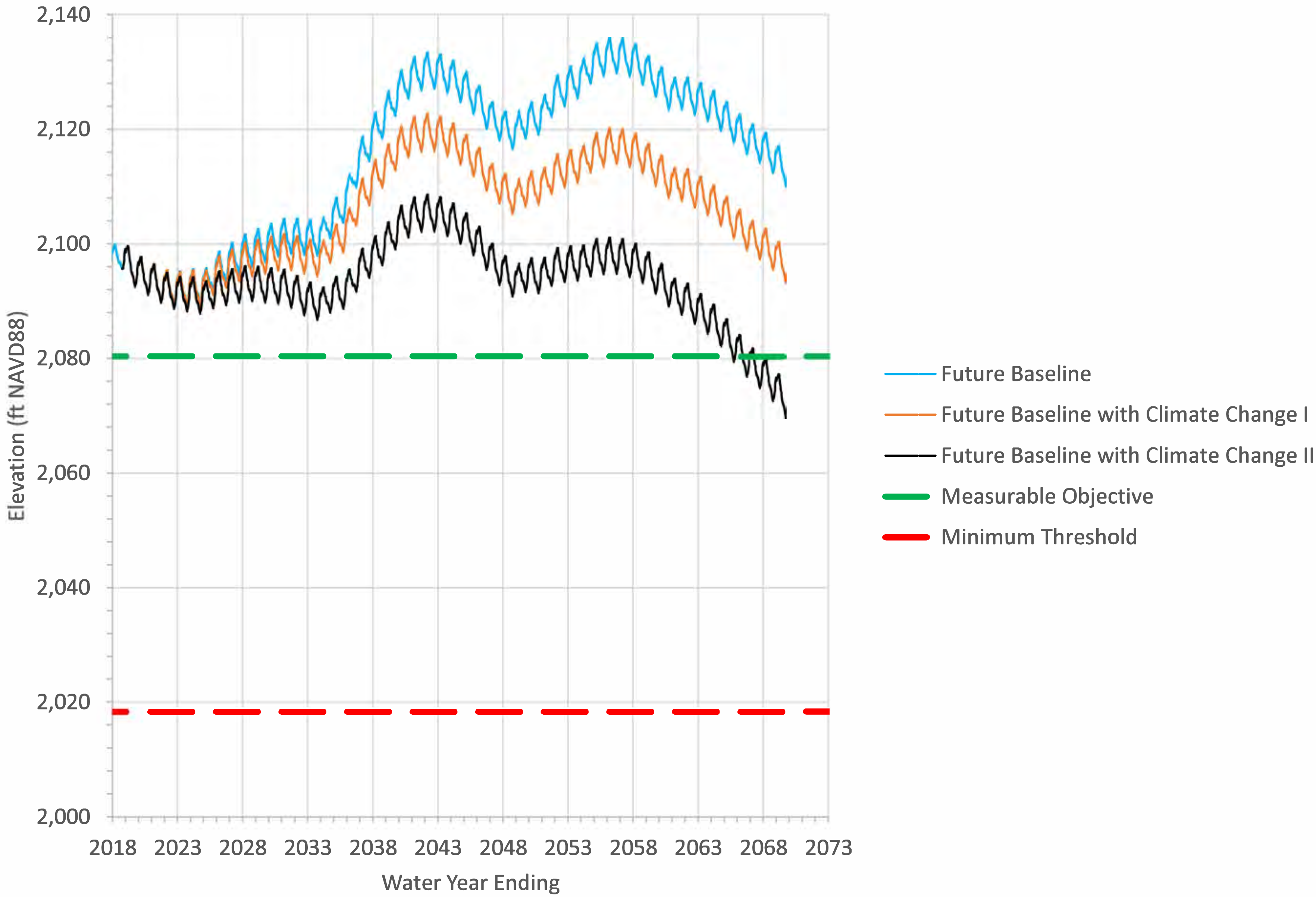

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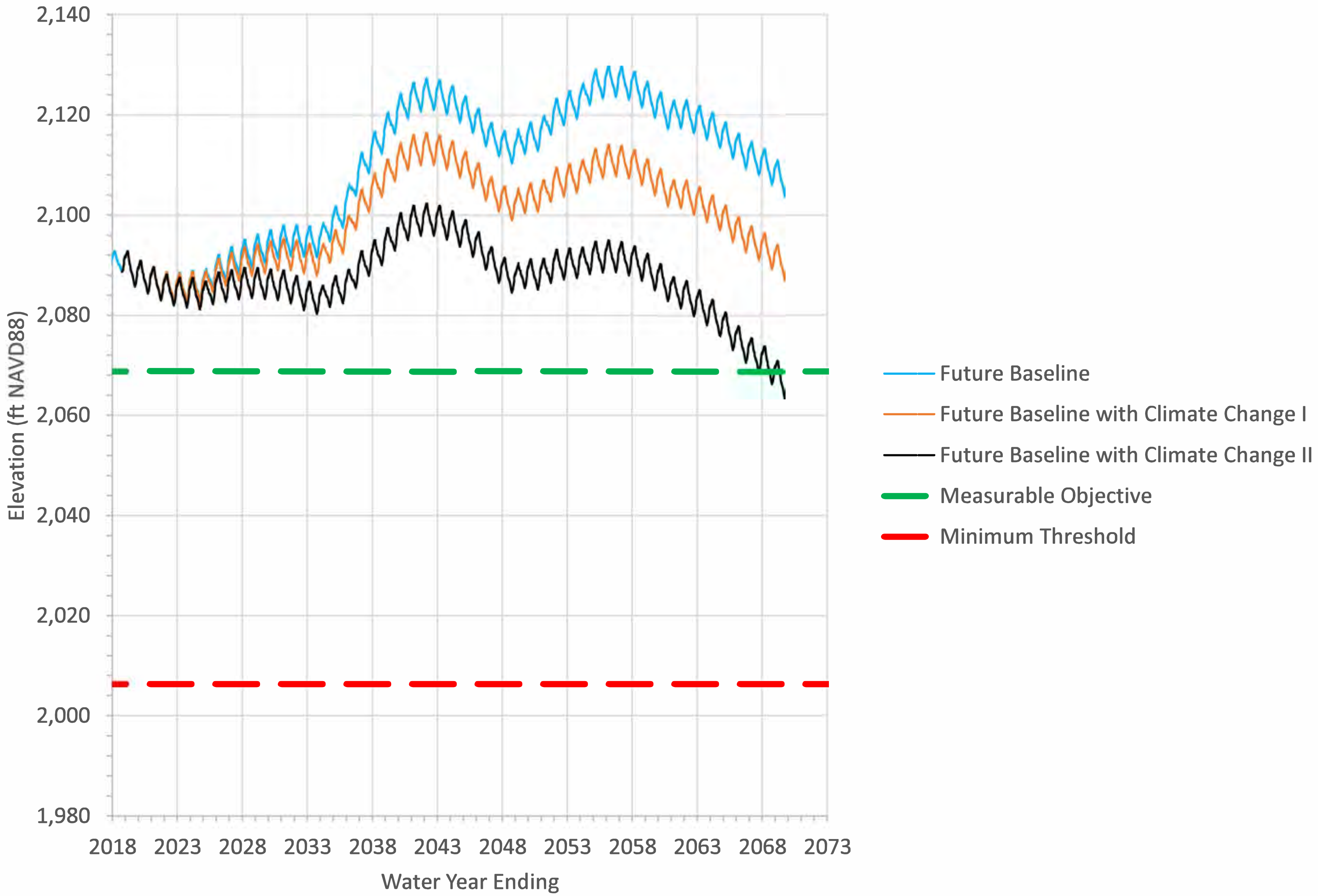
Figure 3-25. Predicted Hydraulic Heads at South Mesa 17 in the Calimesa Management Area



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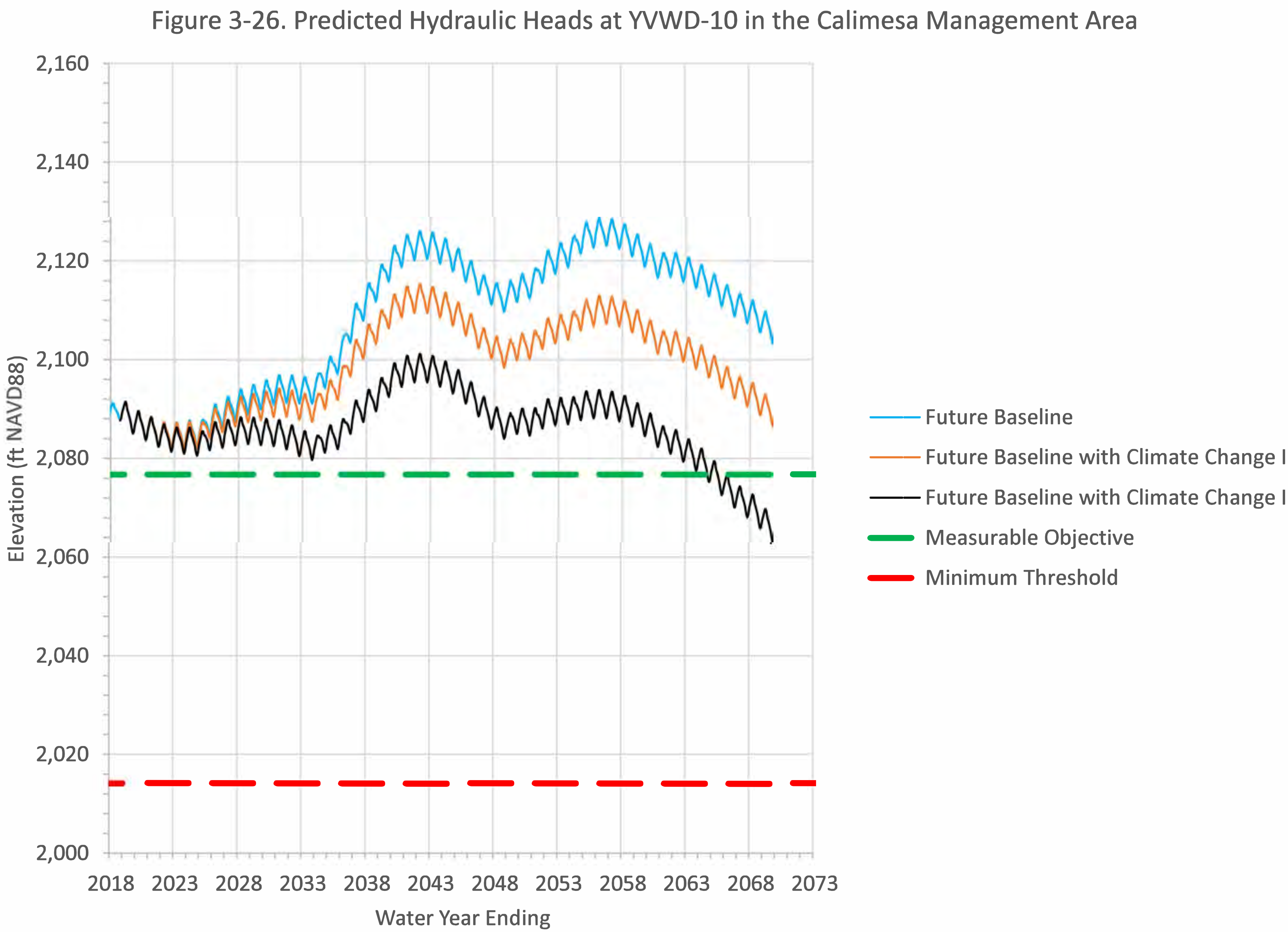
Figure 3-26. Predicted Hydraulic Heads at YVWD-10 in the Calimesa Management Area
Elevation (ft NAVD88)
2,160
2,140
2,120
2,100
2,080
2,060
2,040
2,020
2,000
2018
2023
2028
2033
2038
2043
2048
2053
2058
2063
2068
2073
Water Year Ending
Future Baseline
Future Baseline with Climate Change I
Future Baseline with Climate Change II
Measurable Objective
Minimum Threshold

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Figure 3-27. Predicted Hydraulic Heads at YVWD-12 in the Calimesa Management Area

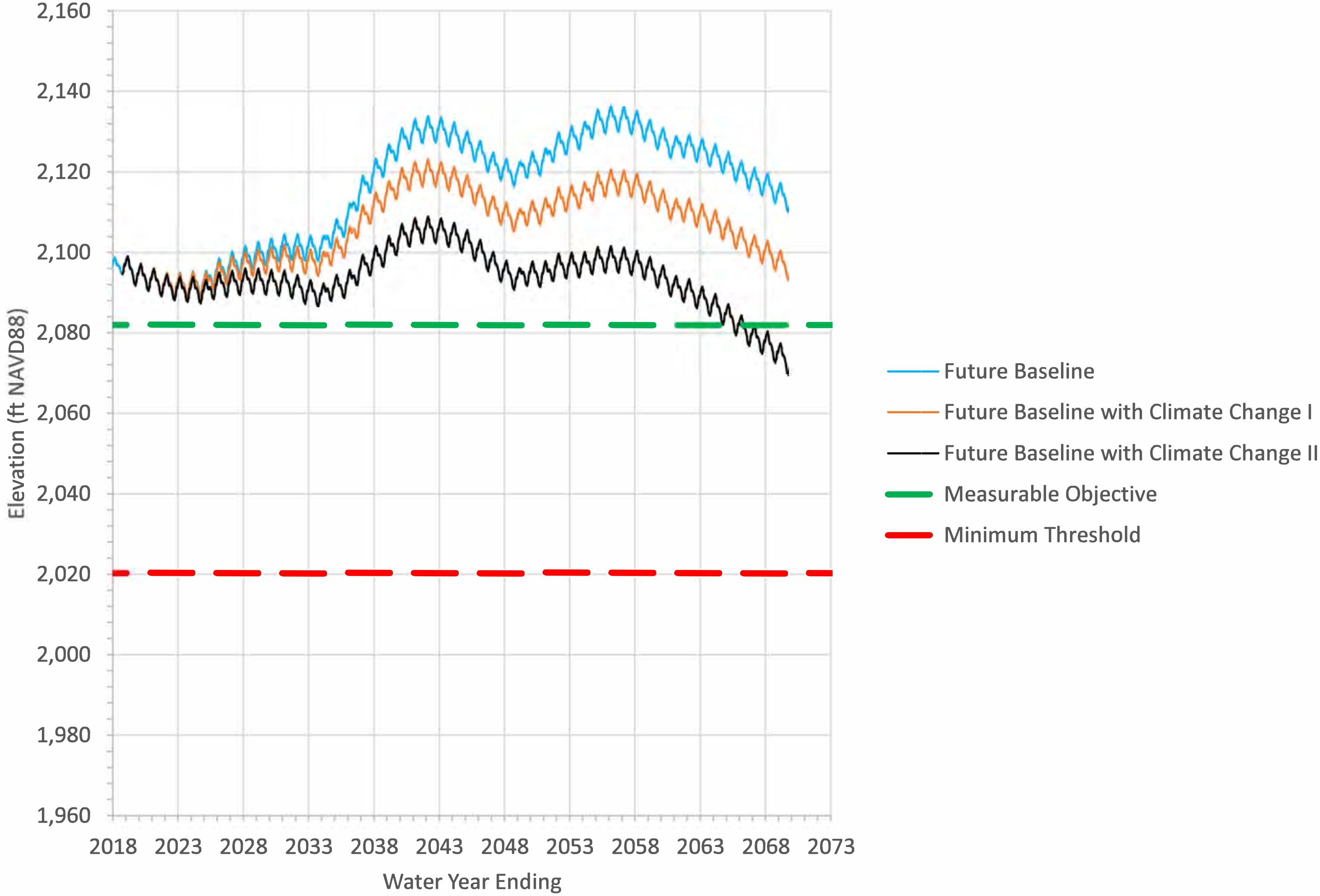

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Figure 3-28. Predicted Hydraulic Heads at YVWD-24 in the Calimesa Management Area

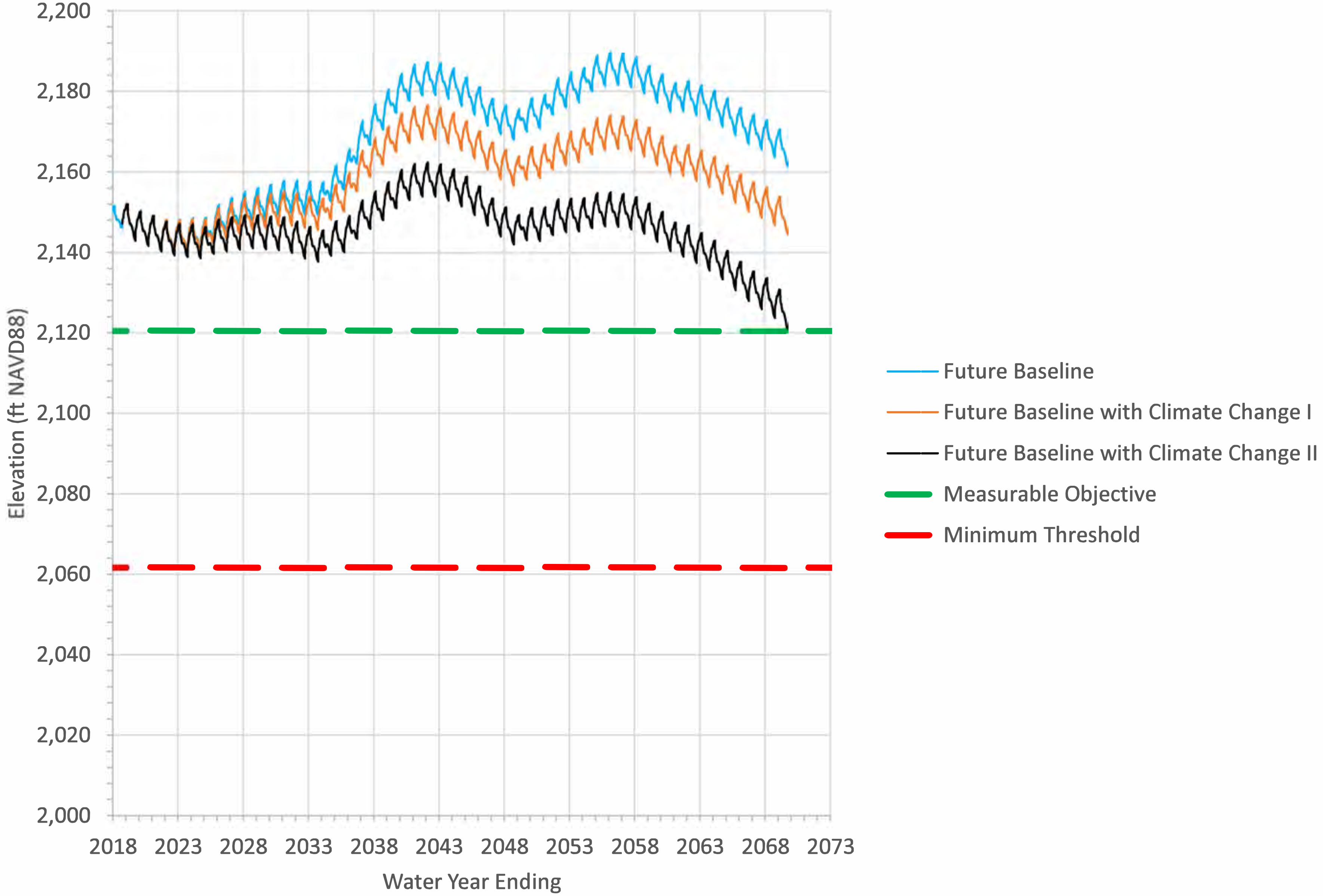

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Figure 3-29. Predicted Hydraulic Heads at YVWD-49 in the Calimesa Management Area

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Figure 3-30. Predicted Hydraulic Heads at Hog Canyon 2 in the Calimesa Management Area

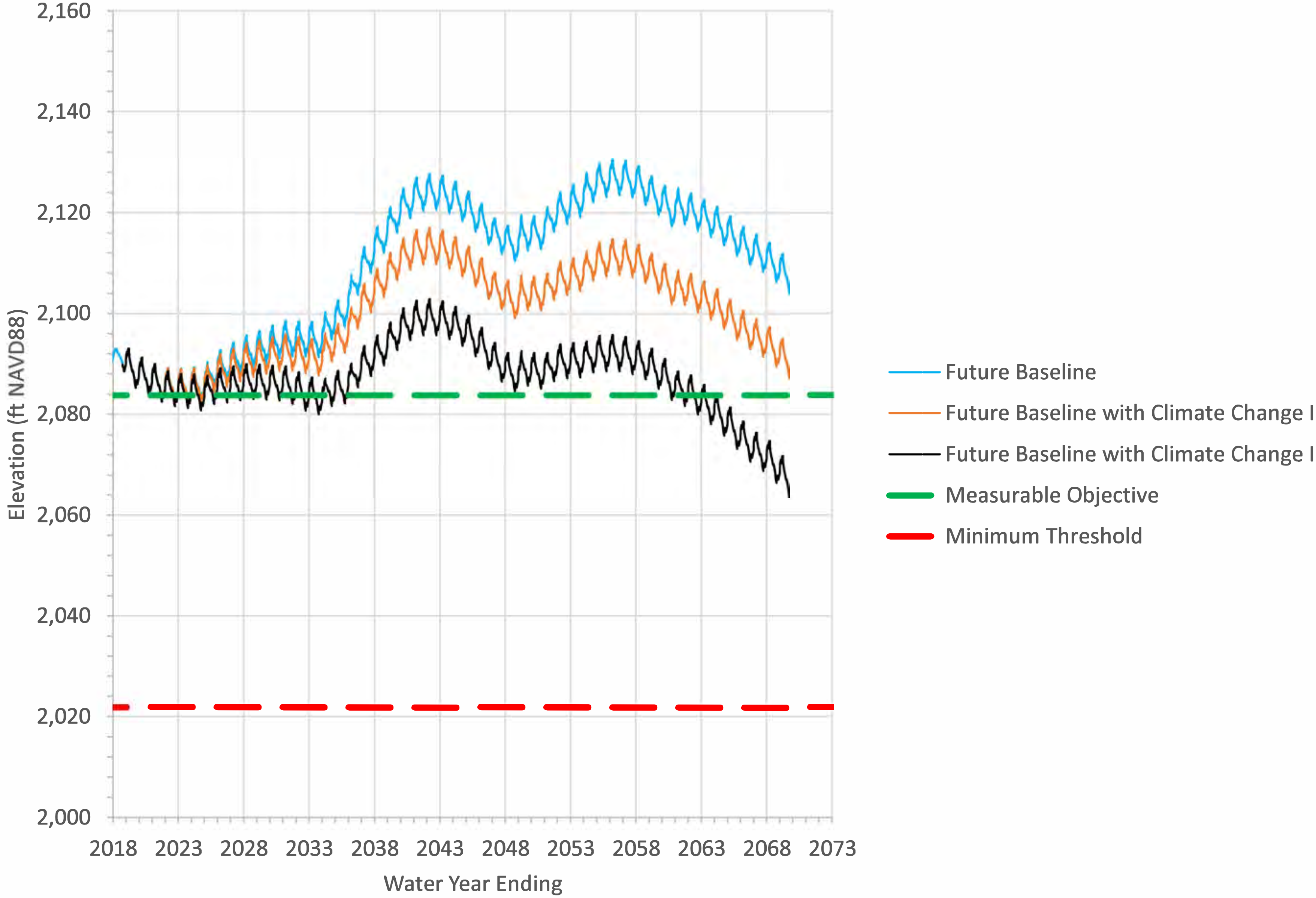

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Figure 3-31. Predicted Hydraulic Heads at USGS Equestrian Park #1 Well in the Calimesa Management Area

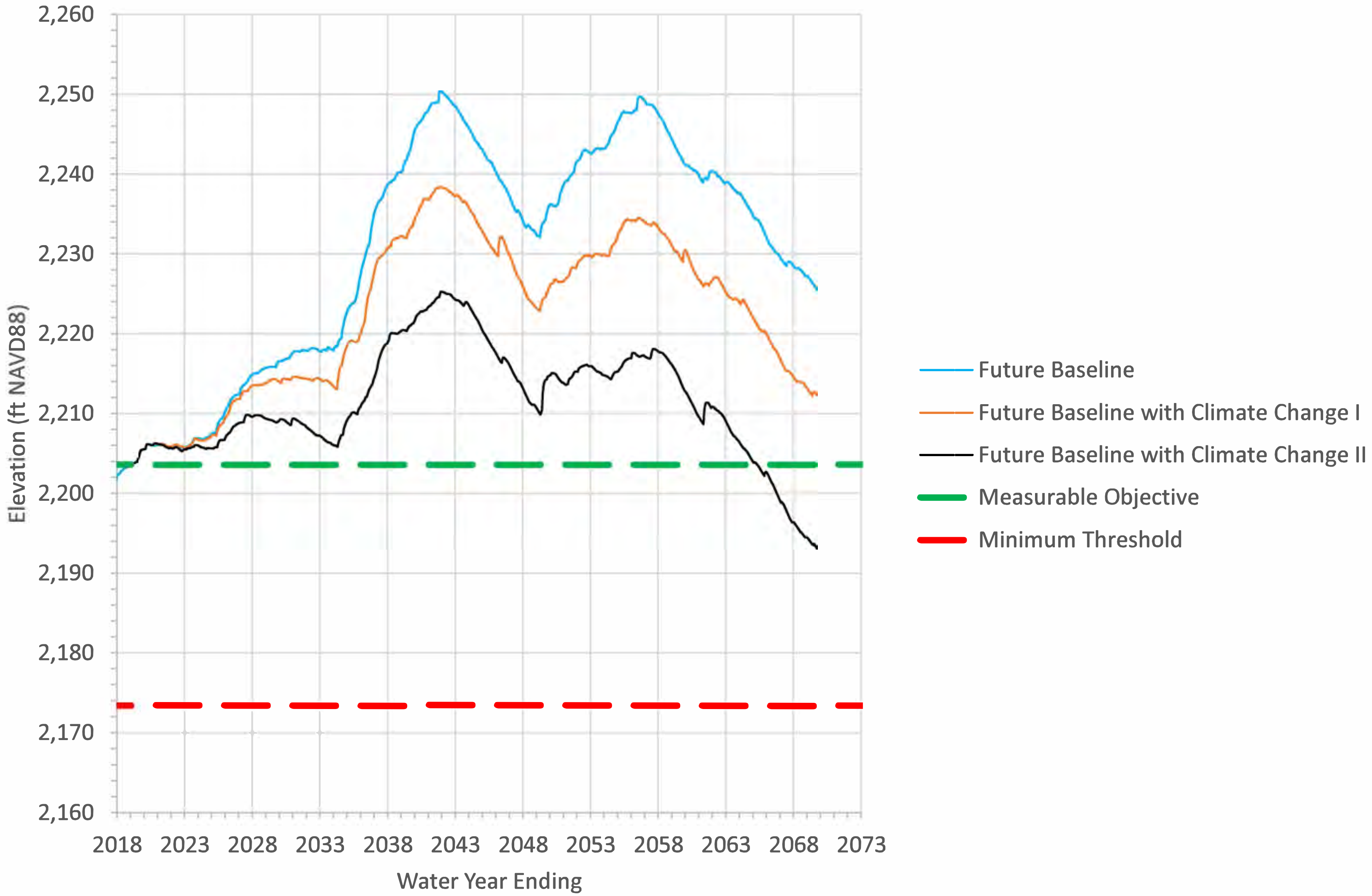

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Figure 3-32. Predicted Hydraulic Heads at USGS Equestrian Park #4 Well in the Calimesa Management Area

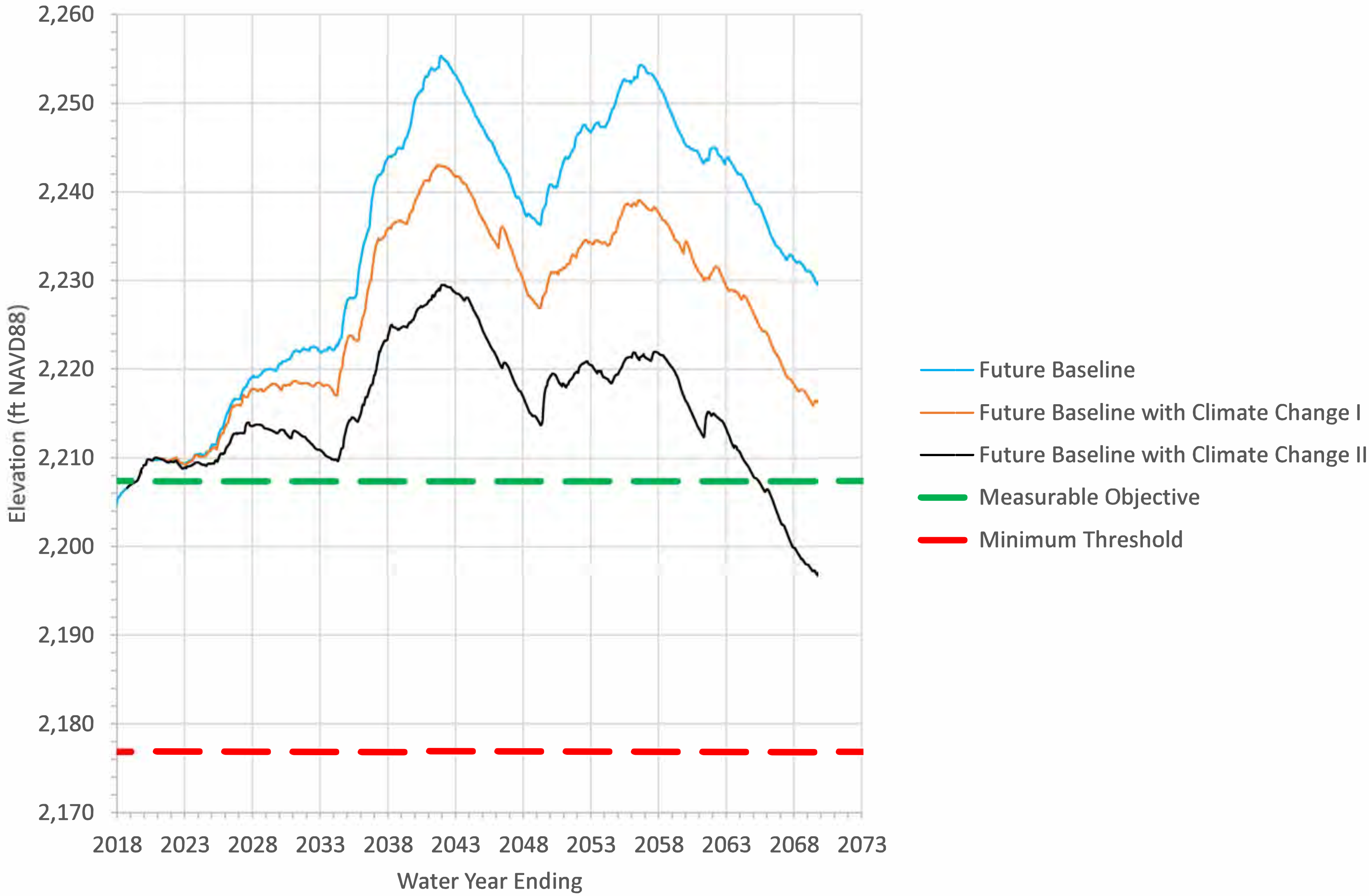

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Figure 3-33. Predicted Hydraulic Heads at USGS 6th Street #1 Well in the Calimesa Management Area

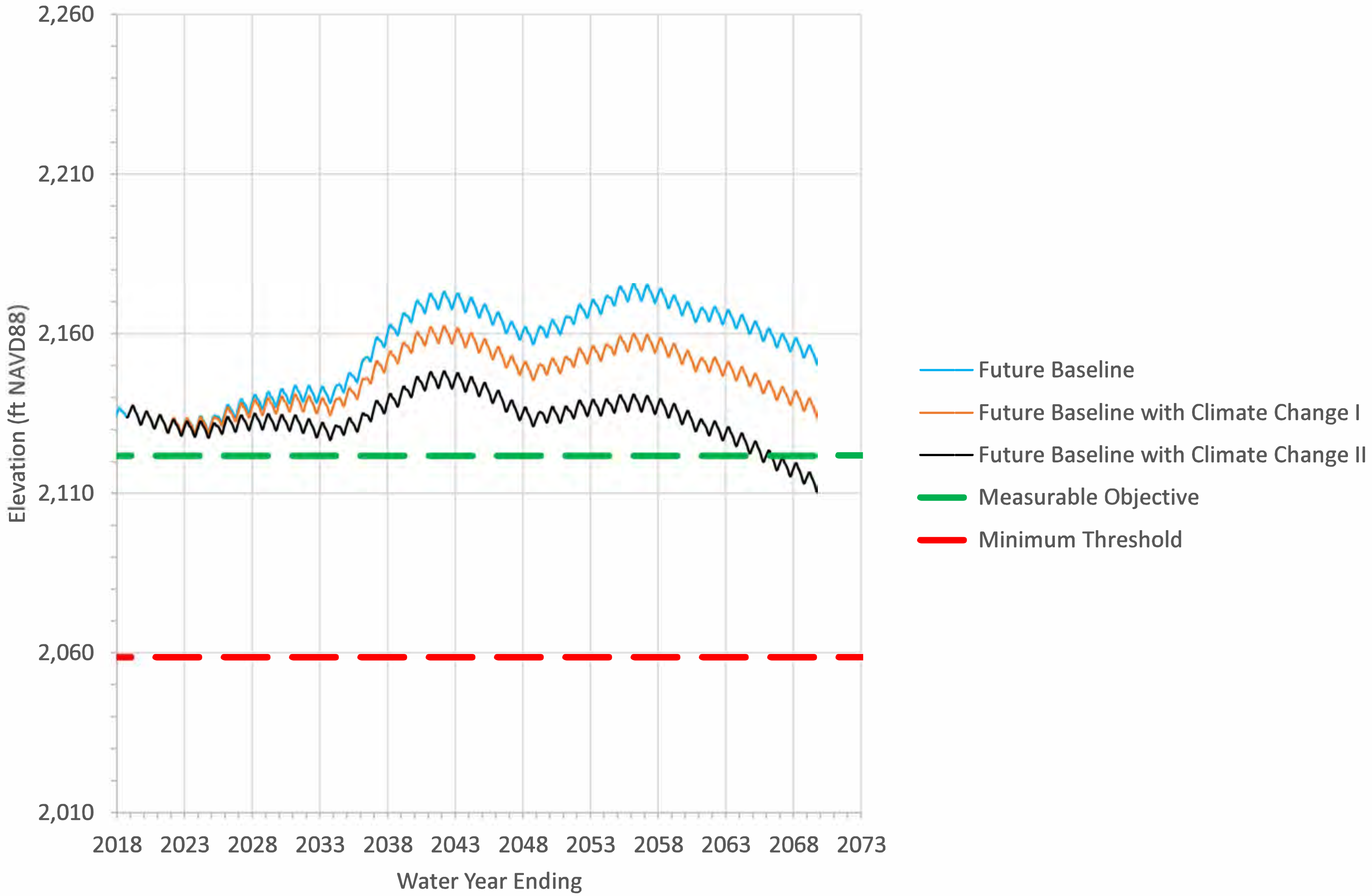

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Figure 3-34. Predicted Hydraulic Heads at USGS 6th Street #4 Well
in the Calimesa Management Area

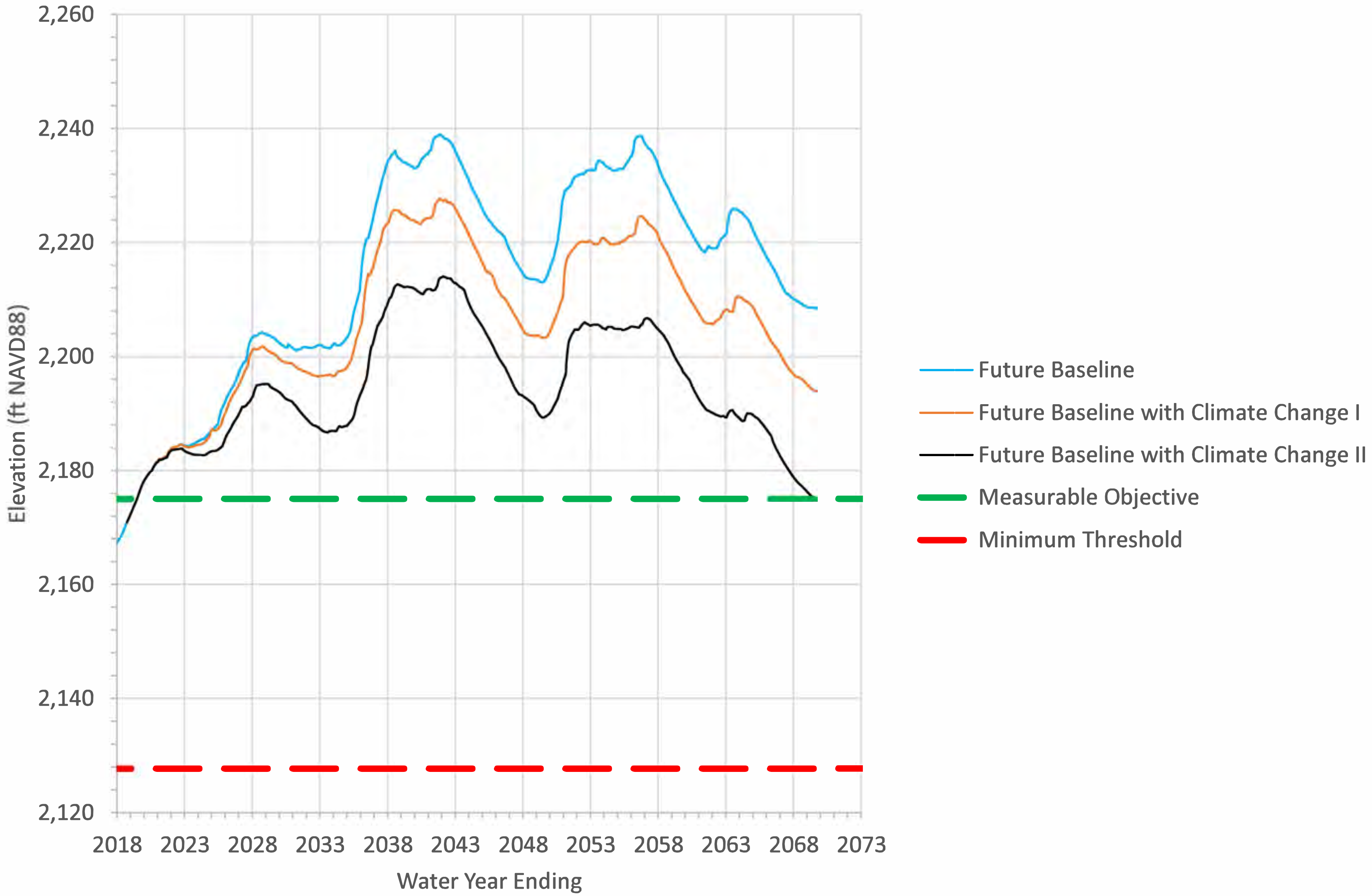

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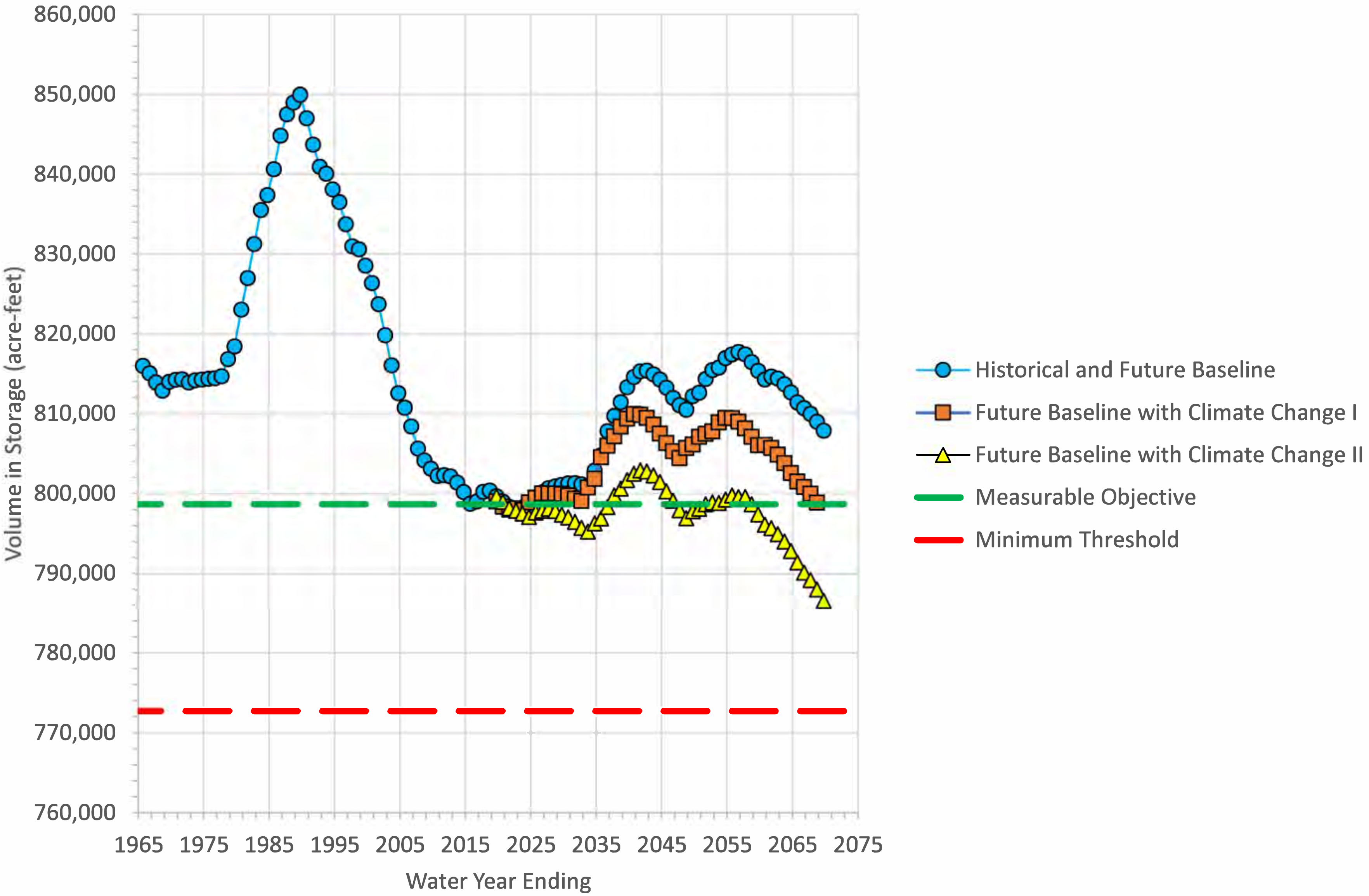
Figure 3-35. Predicted Volume in Storage by the Future Baseline and Future Baseline with Climate Change I and II Scenarios in the Calimesa Management Area



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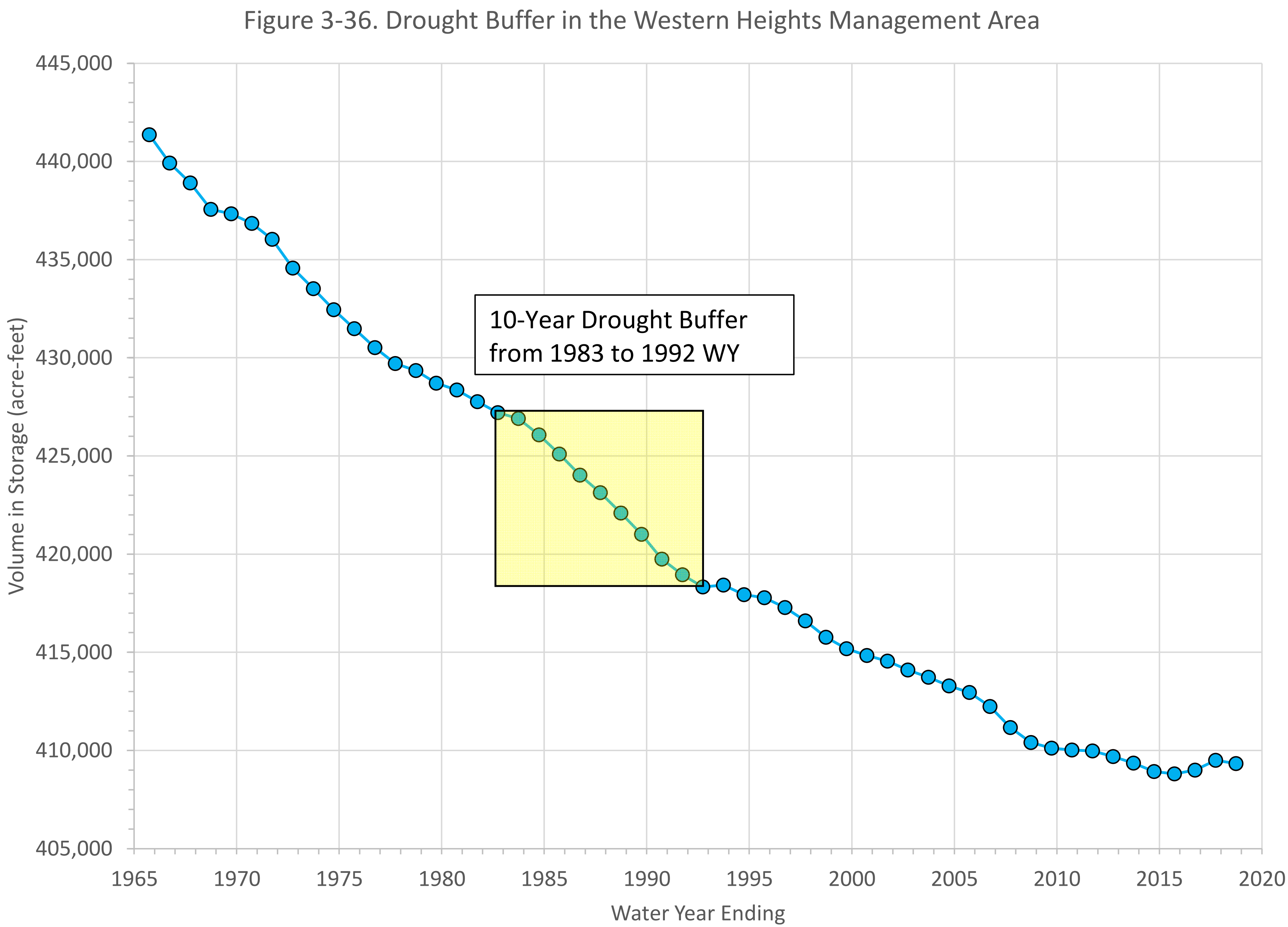
Figure 3-36. Drought Buffer in the Western Heights Management Area
445,000
440,000
435,000
430,000
425,000
420,000
415,000
410,000
405,000
Volume in Storage (acre-feet)
10-Year Drought Buffer
from 1983 to 1992 WY
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Water Year Ending

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Figure 3-37. Annual Groundwater Production and Historical Groundwater Elevations in the Western Heights Management Area

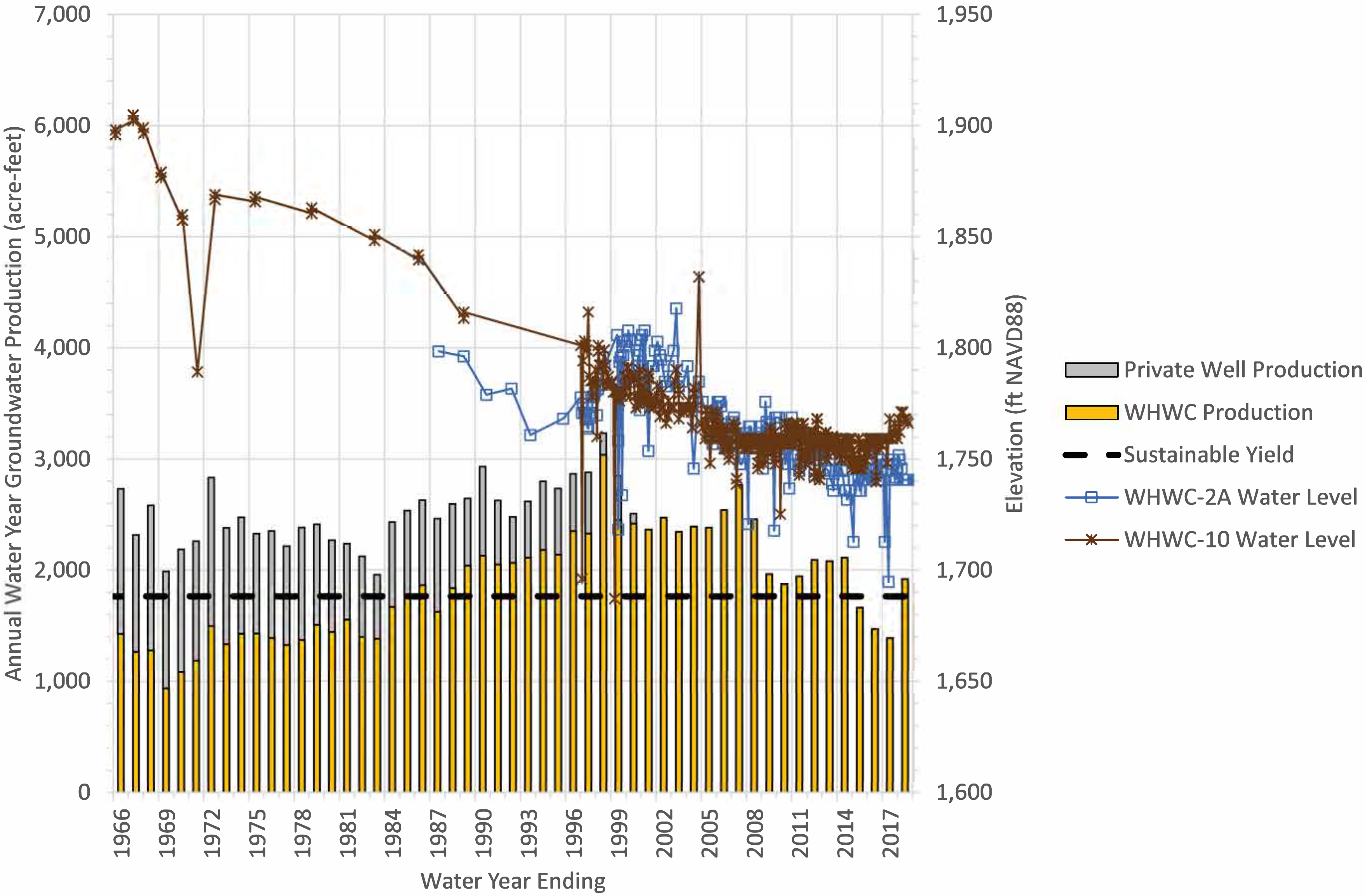

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Figure 3-38. Minimum Threshold and Measurable Objective in the Western Heights Management Area

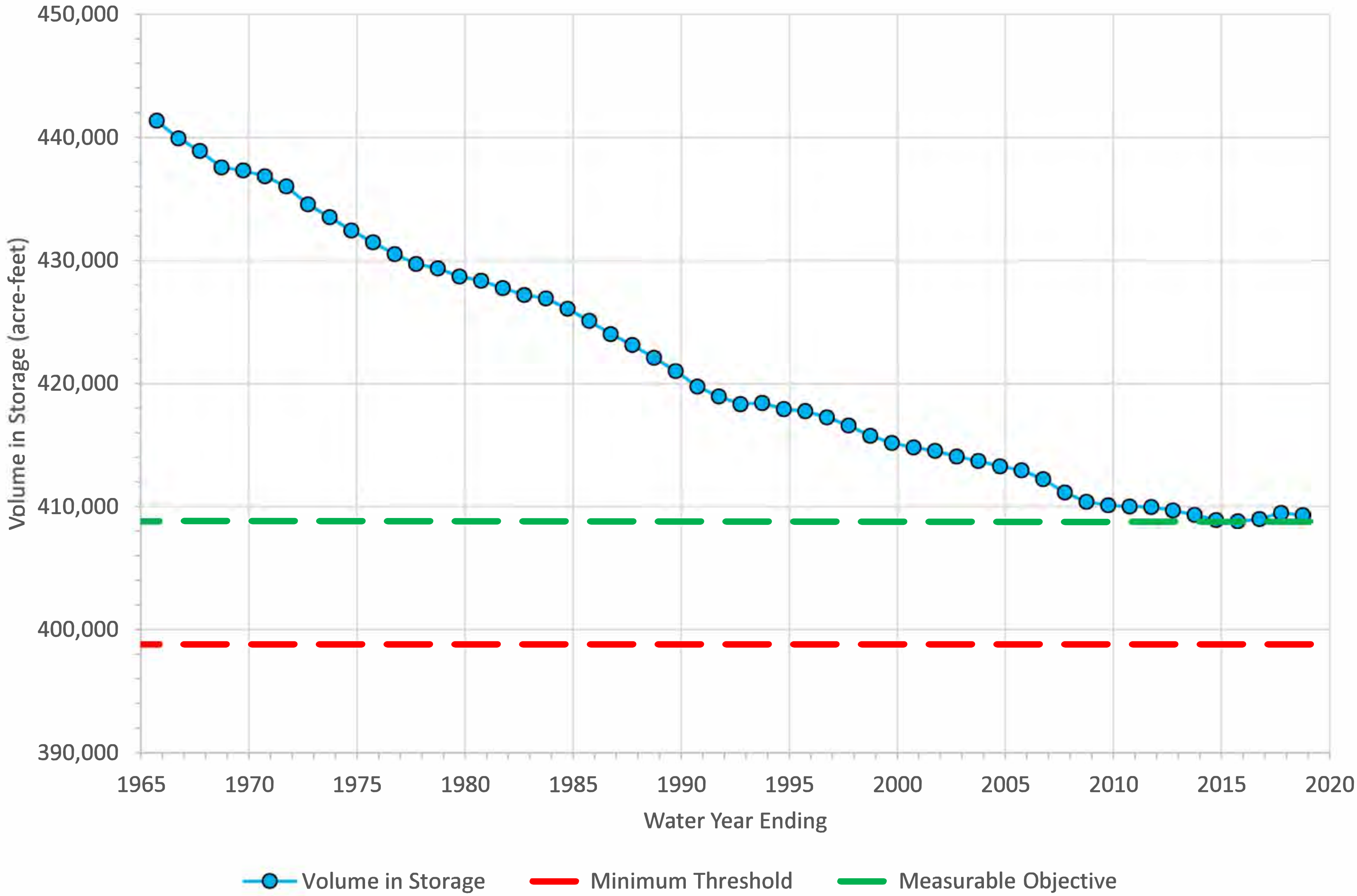

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Figure 3-39. Groundwater Production and Supplemental Water Purchased in the Western Heights Management Area

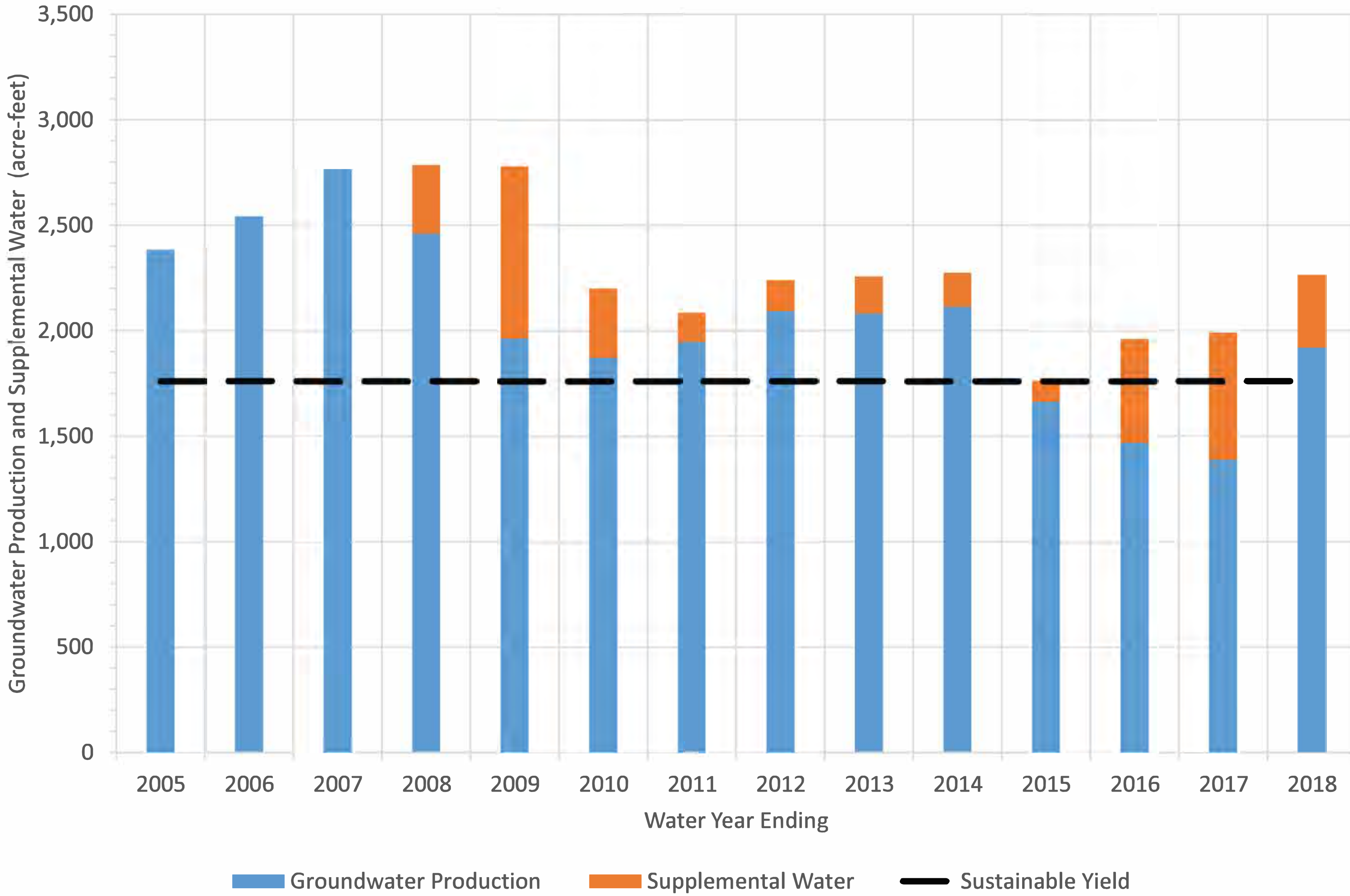

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Figure 3-40. Predicted Simulated Hydraulic Heads at WHWC-02A in the Western Heights Management Area

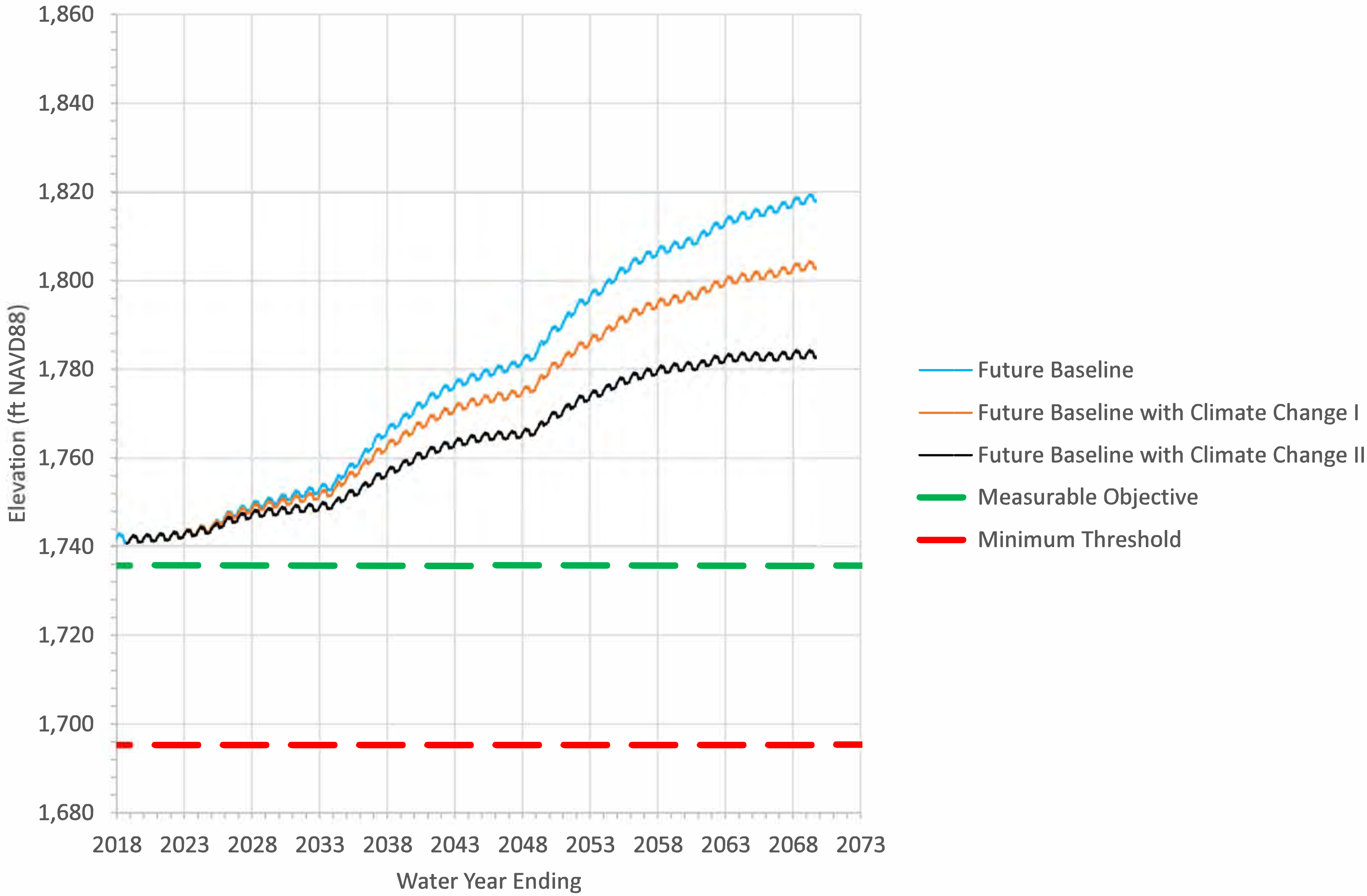

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Figure 3-41. Predicted Simulated Hydraulic Heads at WHWC-10
in the Western Heights Management Area

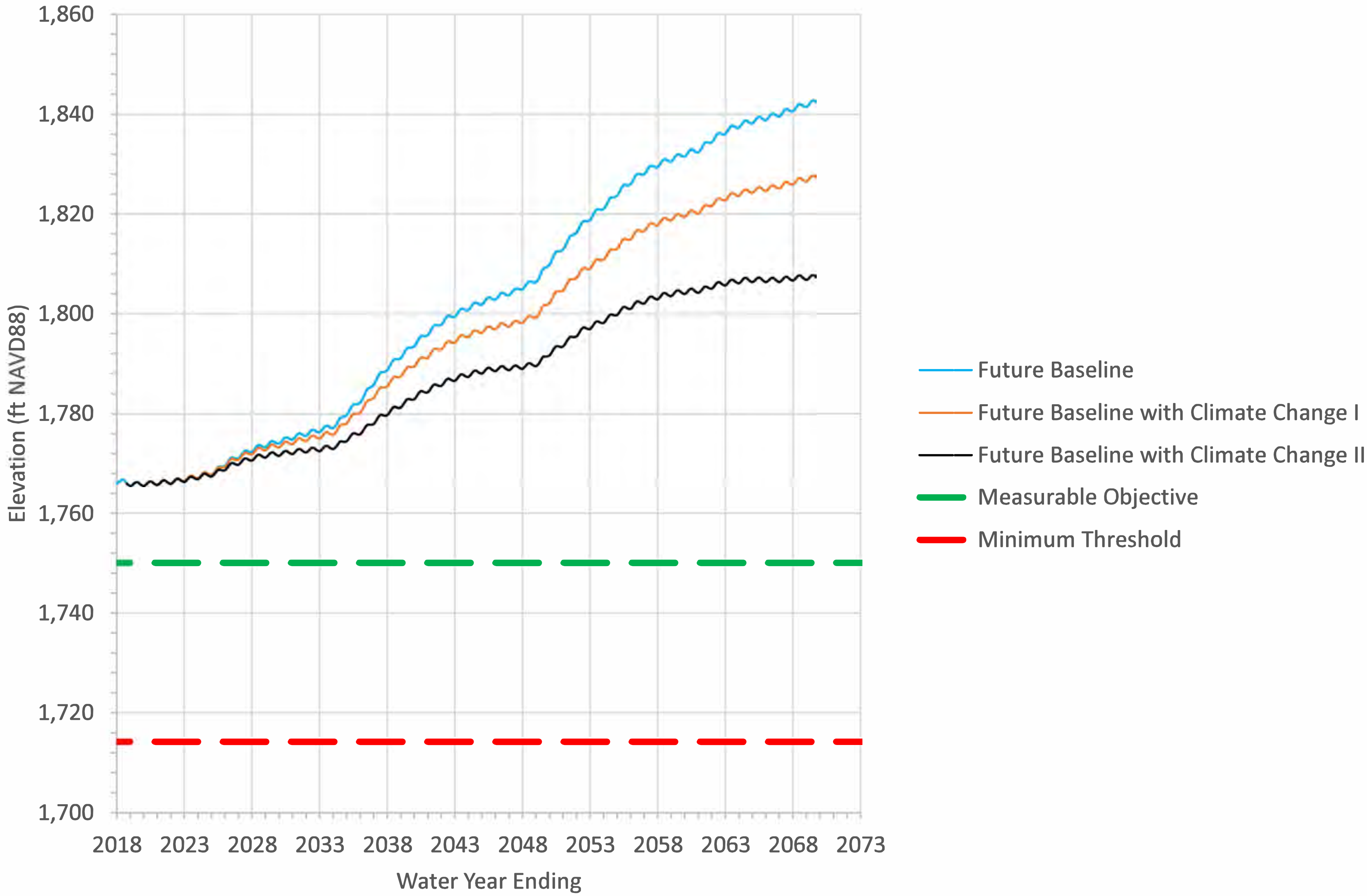

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Figure 3-42. Predicted Simulated Hydraulic Heads at WHWC-11
in the Western Heights Management Area

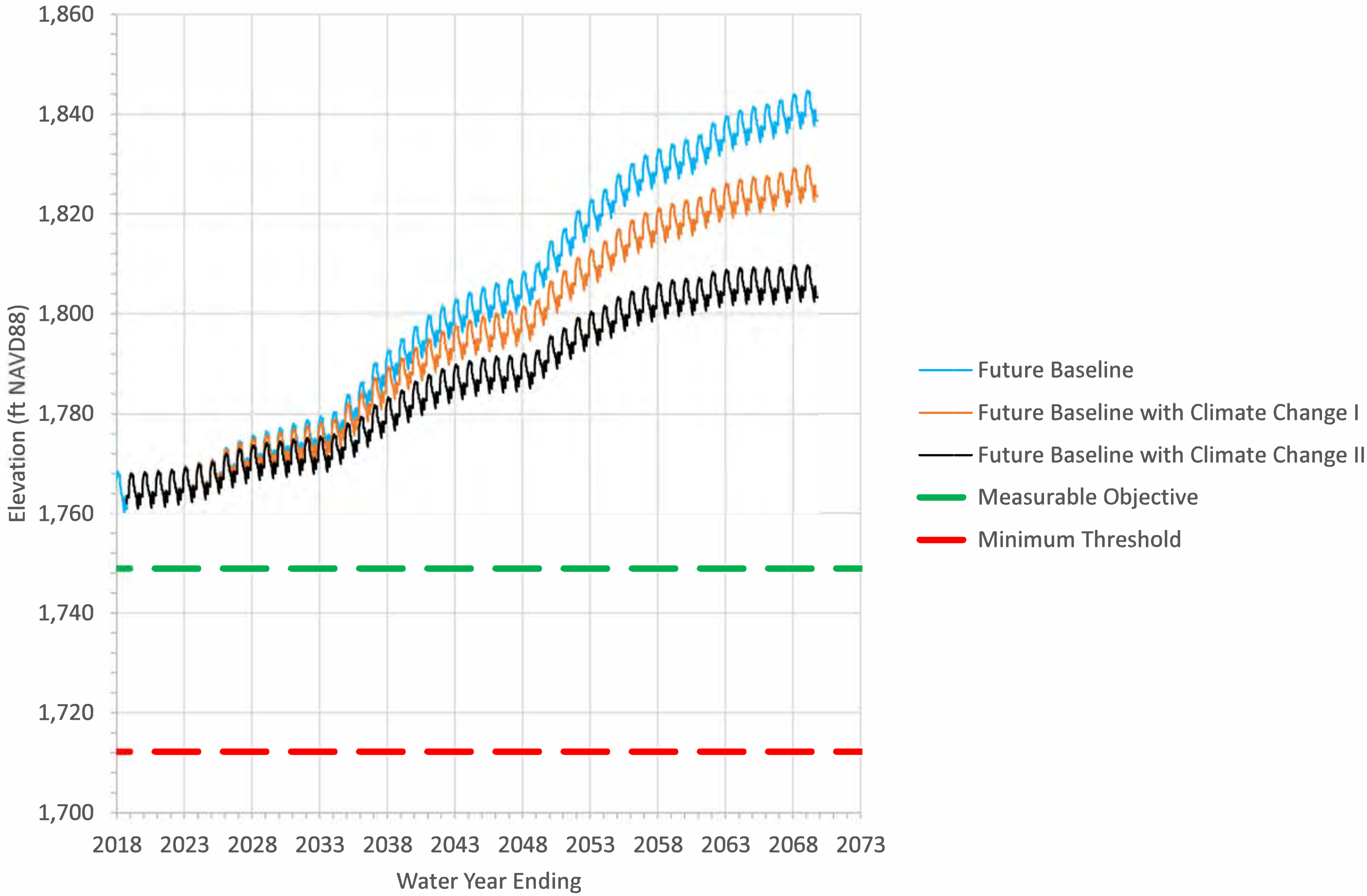

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Figure 3-43. Predicted Simulated Hydraulic Heads at WHWC-12
in the Western Heights Management Area

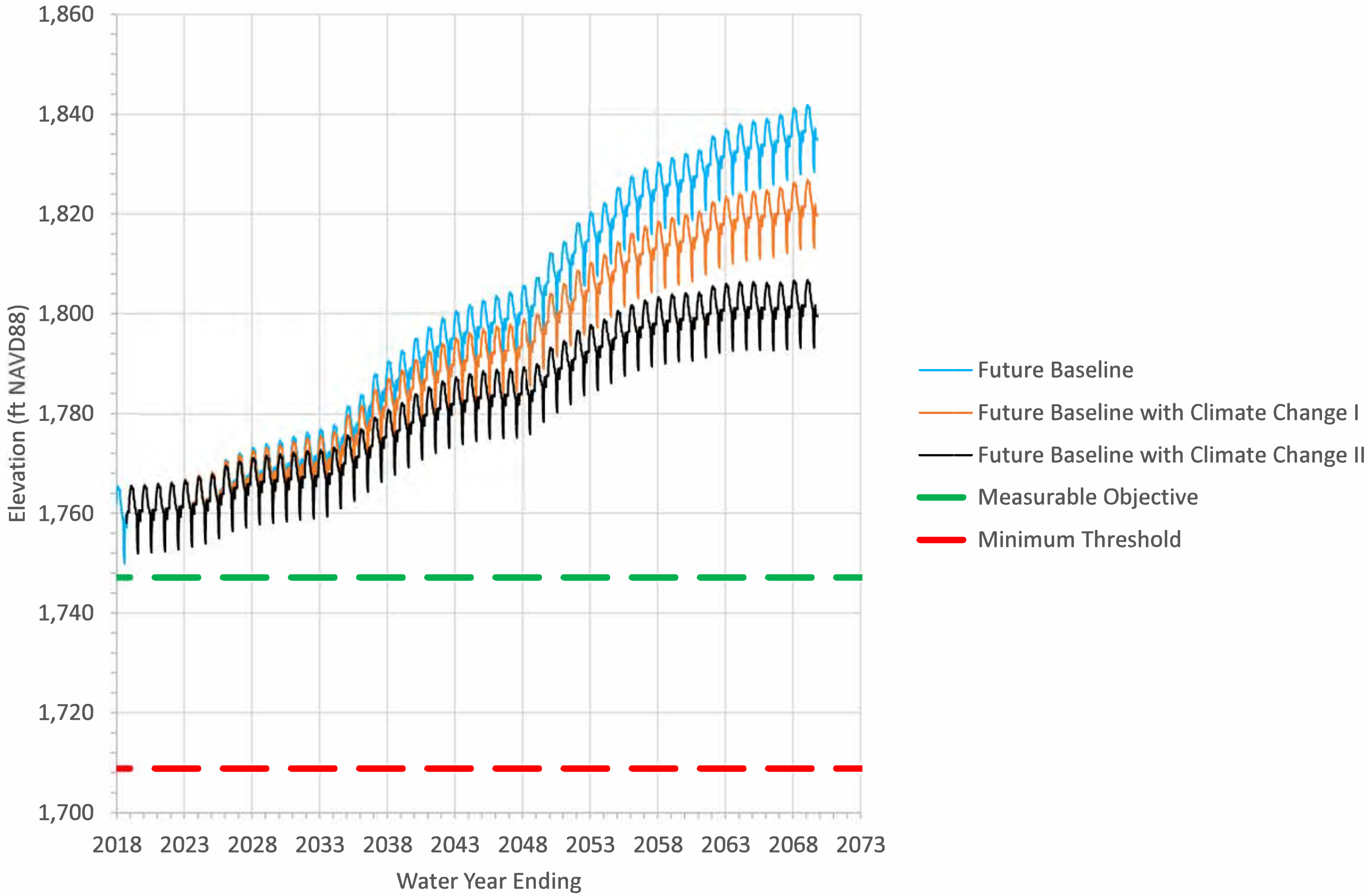

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Figure 3-44. Predicted Simulated Hydraulic Heads at WHWC-14
in the Western Heights Management Area

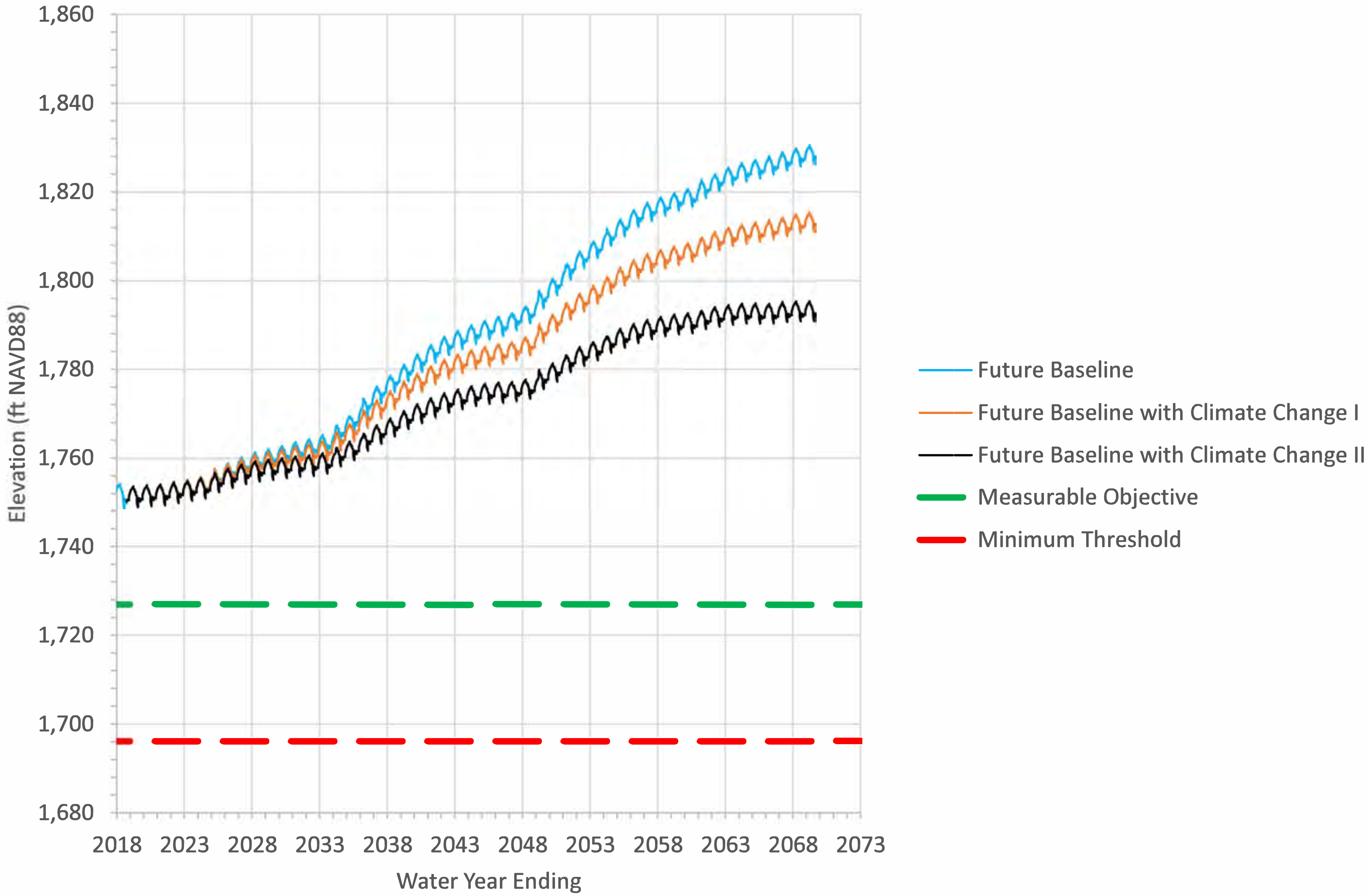

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Figure 3-45. Predicted Simulated Hydraulic Heads at USGS Dunlap #2 Well
in the Western Heights Management Area

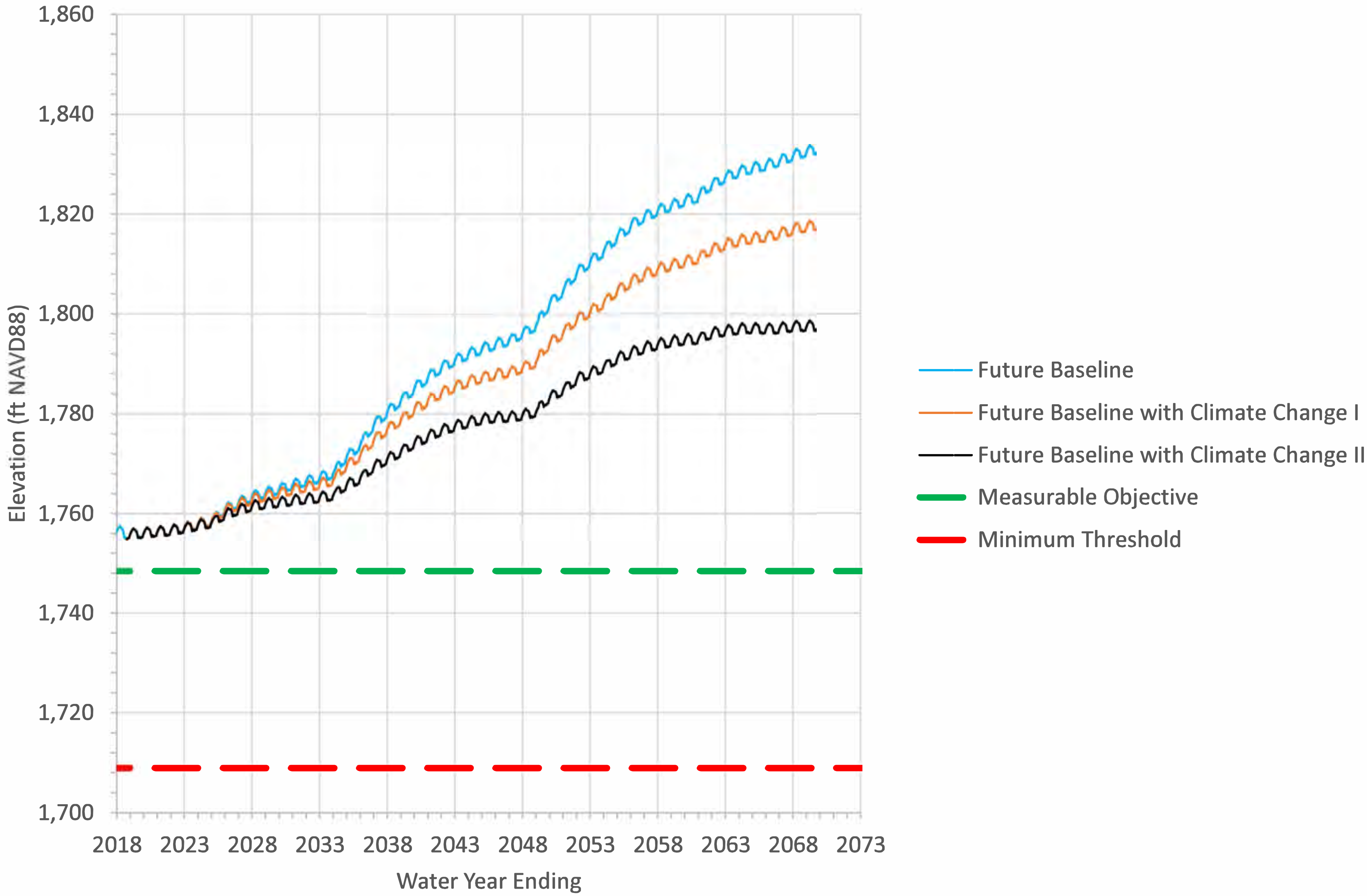

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Figure 3-46. Predicted Simulated Hydraulic Heads at USGS Dunlap #4 Well in the Western Heights Management Area

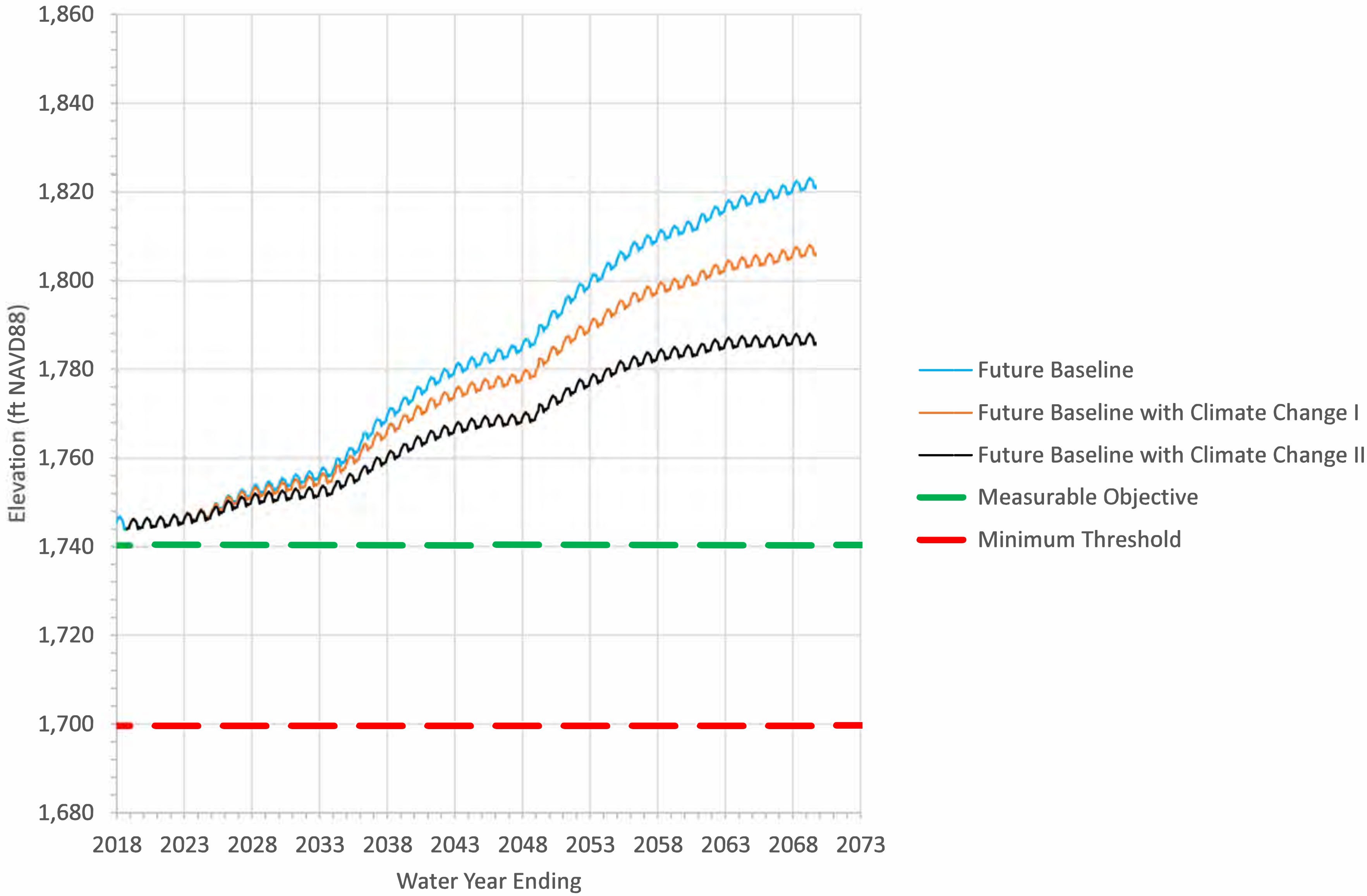

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Figure 3-47. Predicted Volume in Storage by the Future Baseline and Future Baseline with Climate Change I and II Scenarios in the Western Heights Management Area

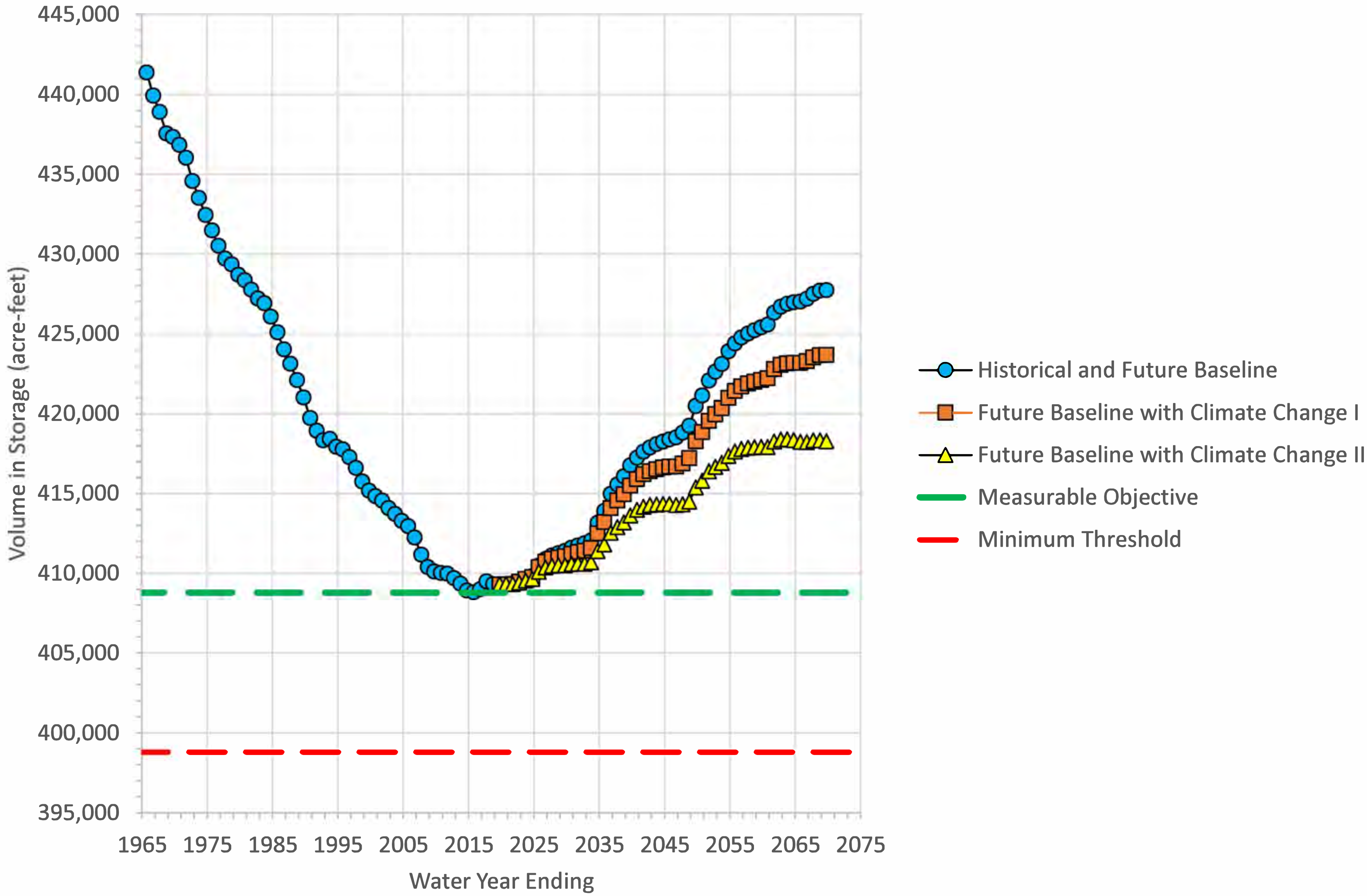

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Figure 3-48. Groundwater Elevations and Sustainability Criteria for the San Timoteo Management Area

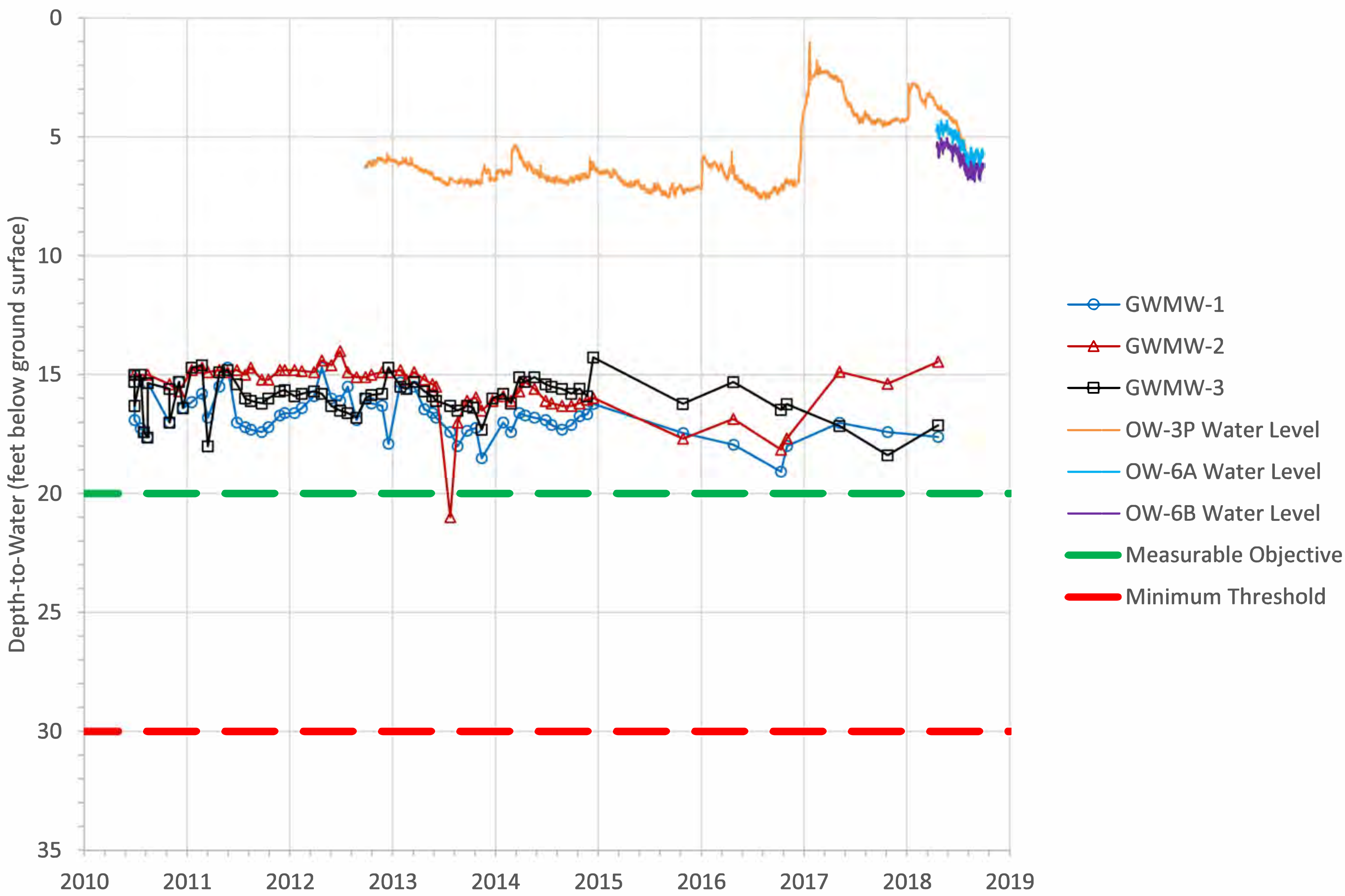

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Figure 3-49. Historical Groundwater Elevations Measured in the San Timoteo Management Area

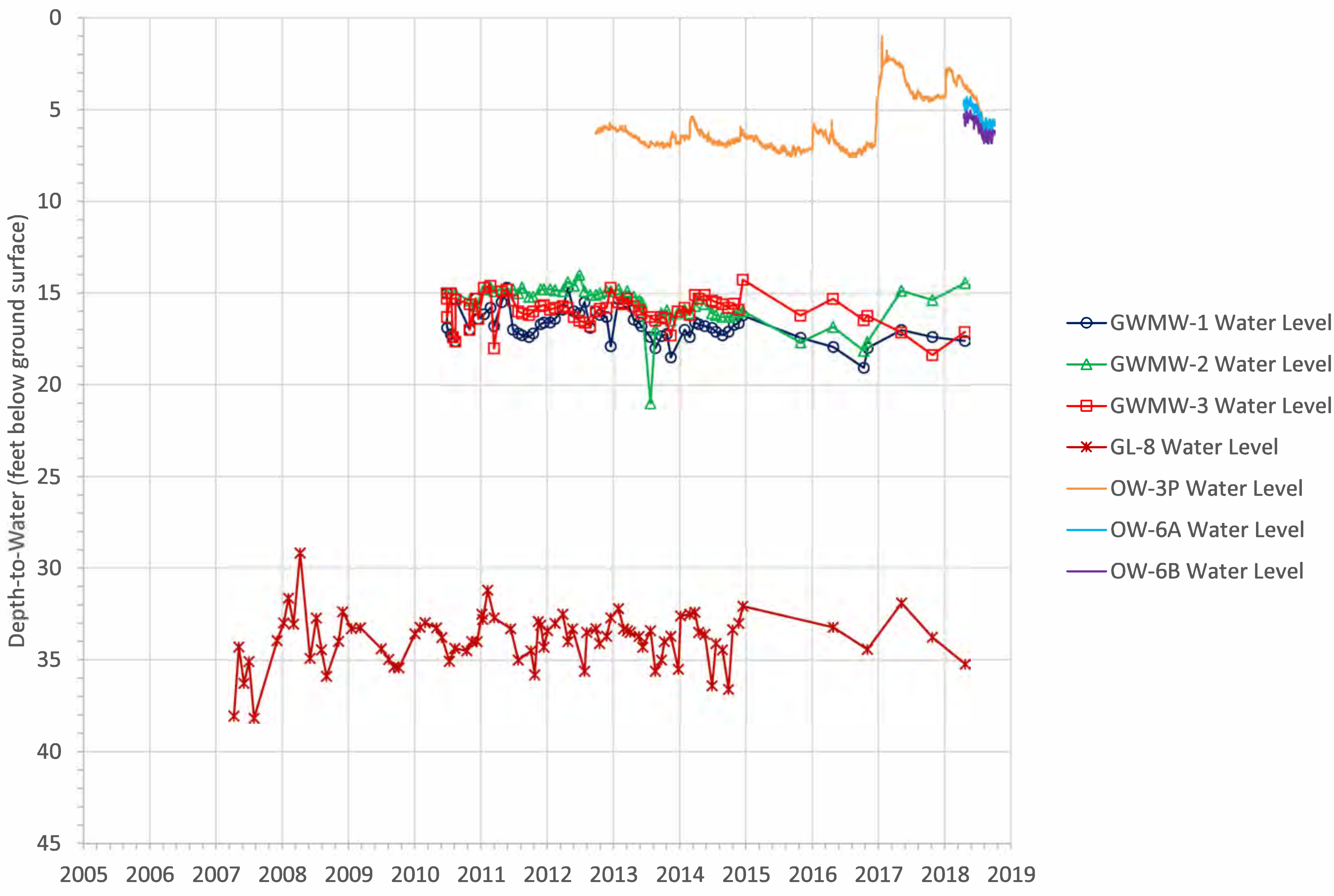

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Figure 3-50. Groundwater Elevations at Nested Well GWMW-5
in the San Timoteo Management Area

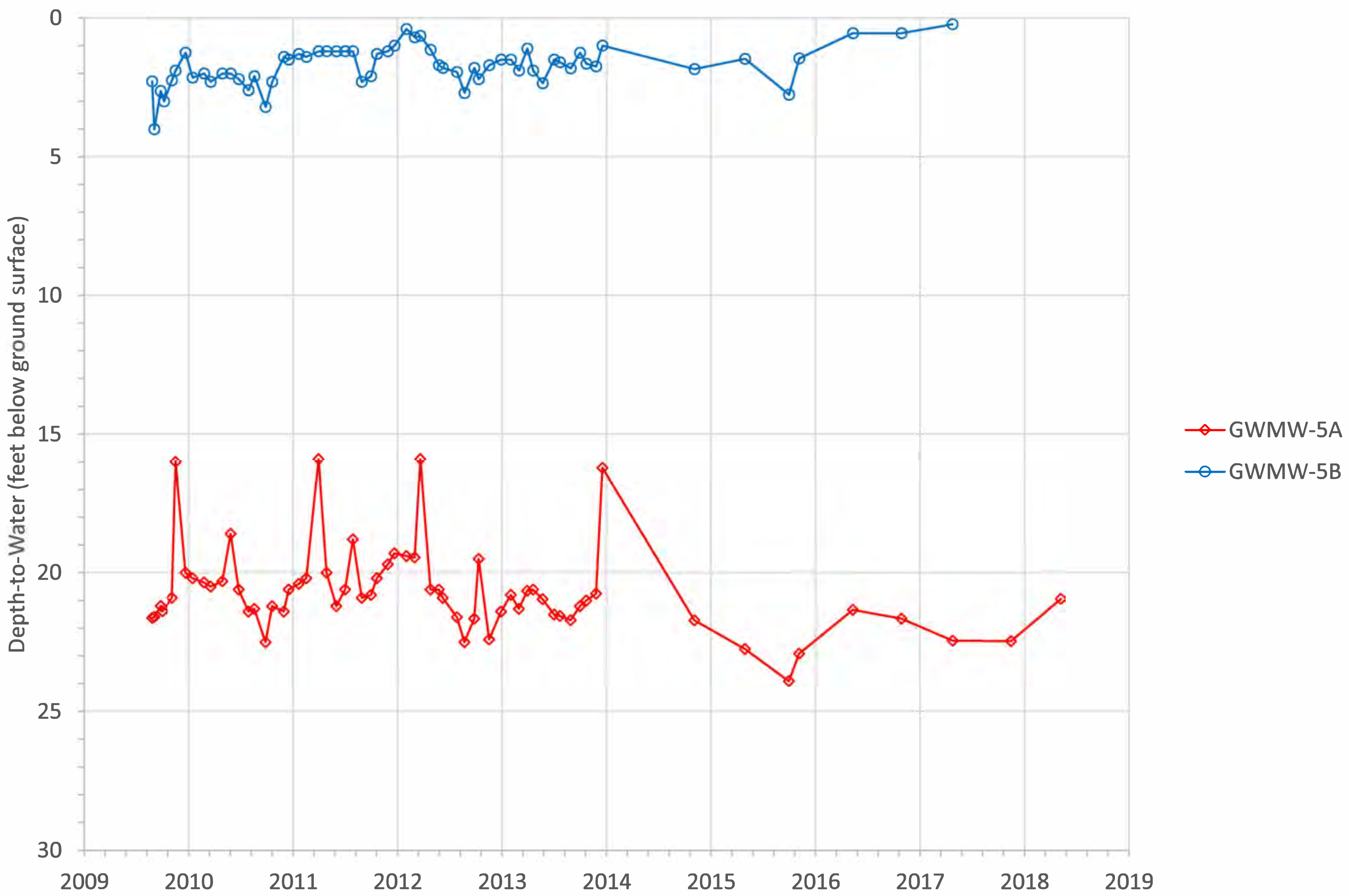

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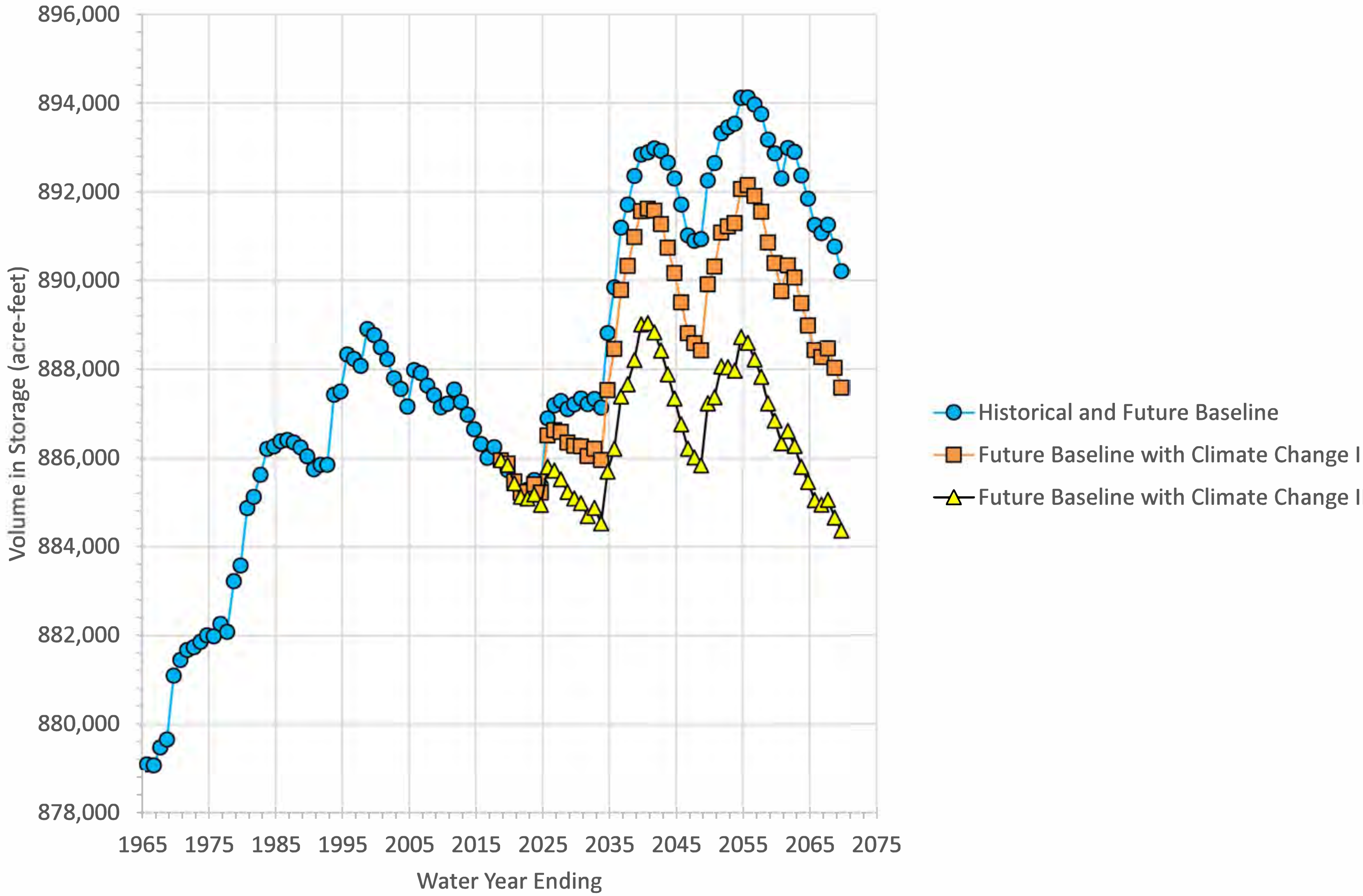
Figure 3-51. Predicted Volume in Storage by the Future Baseline and Future Baseline with Climate Change I and II Scenarios in the San Timoteo Management Area



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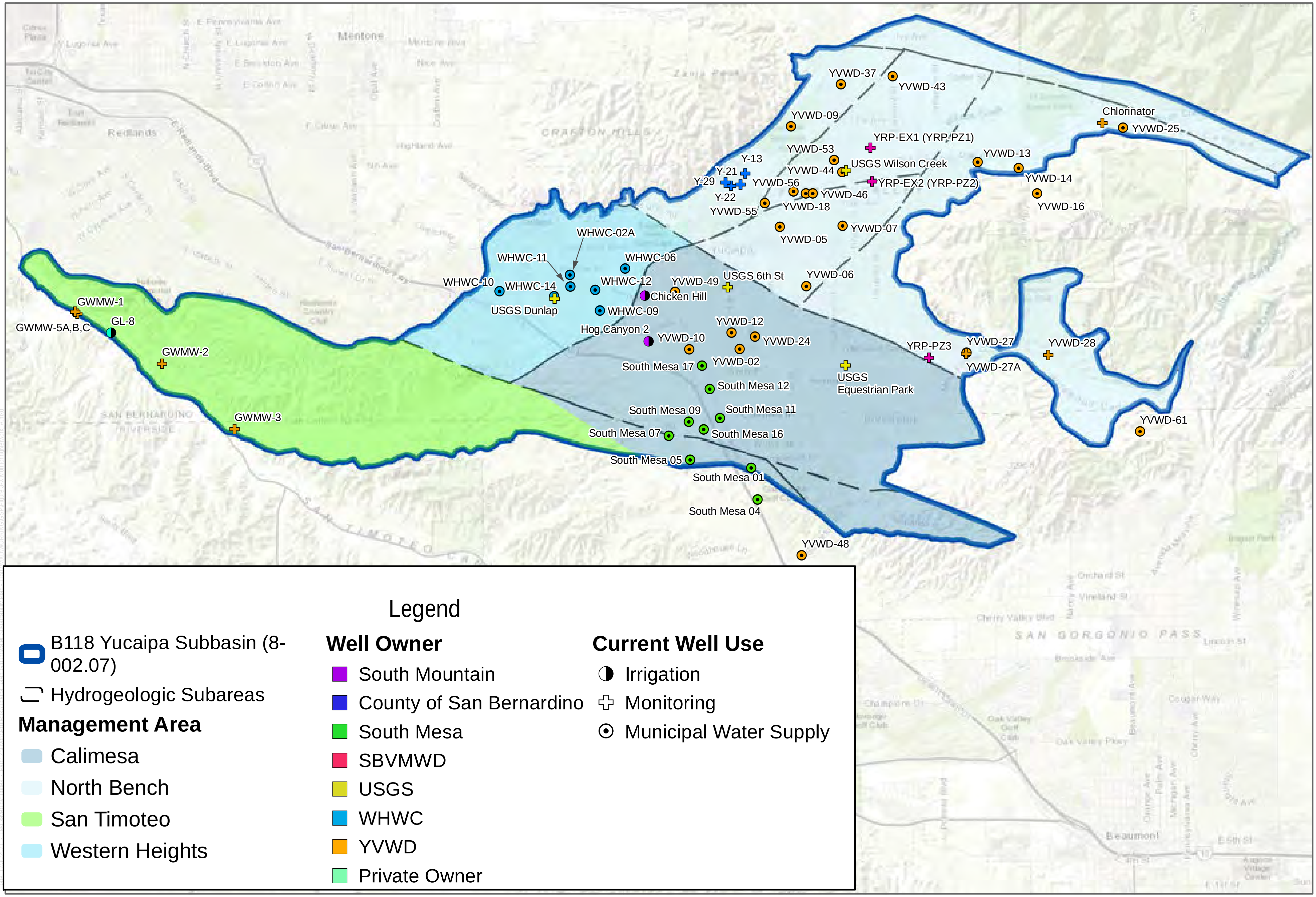

SOURCE: SBVMWD, YVWD, WHWC, SMWC, City of Redlands, USGS

DUDEK

FIGURE 3-52

Yucaipa Subbasin Groundwater Monitoring Network

Yucaipa Subbasin Groundwater Sustainability Plan

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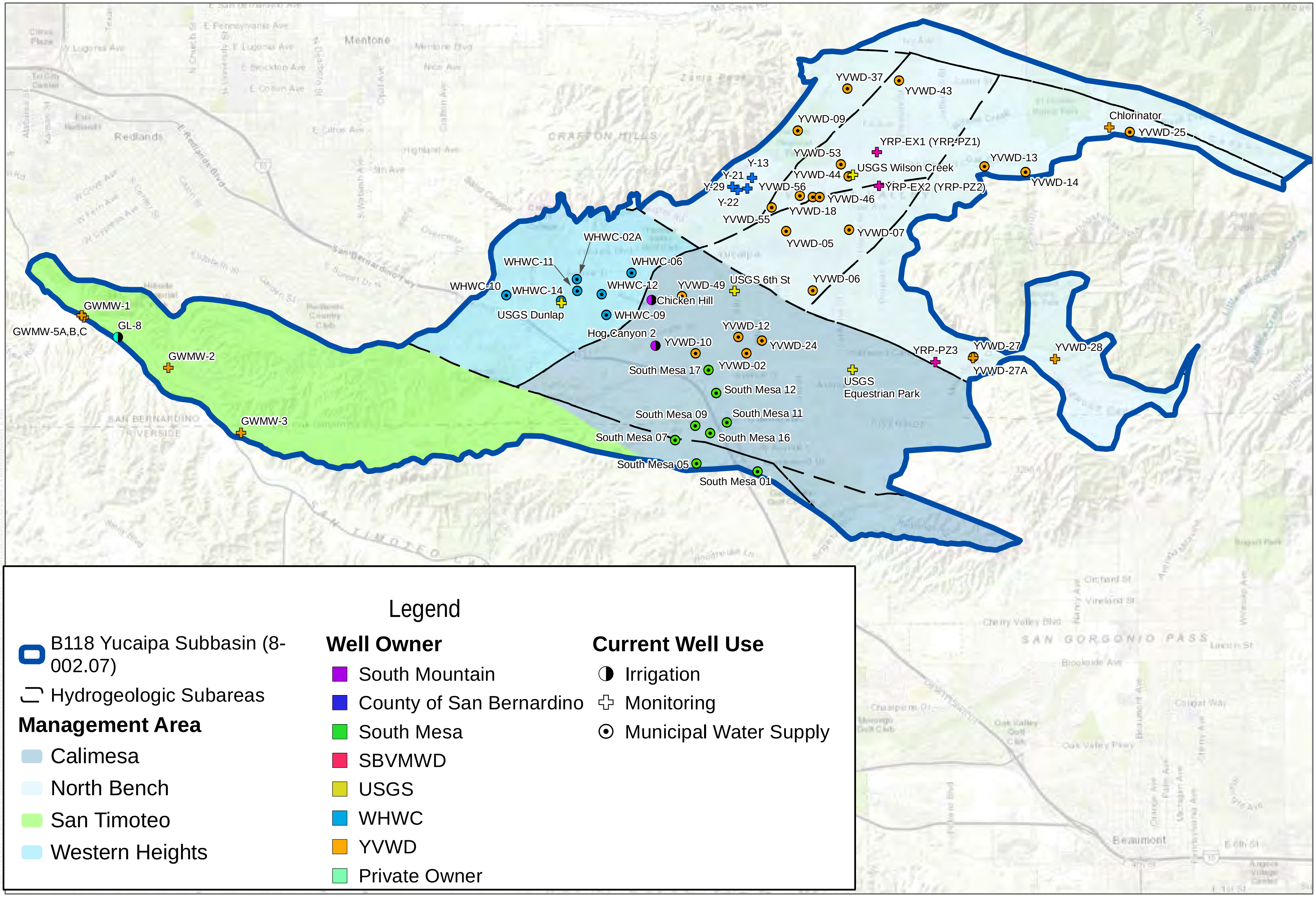

SOURCE: SBVMWD, YVWD, WHWC, SMWC, City of Redlands, USGS

DUDEK

0 0.5 1 Miles

FIGURE 3-53

Monitoring Network Wells Designated to Measure Groundwater Elevations

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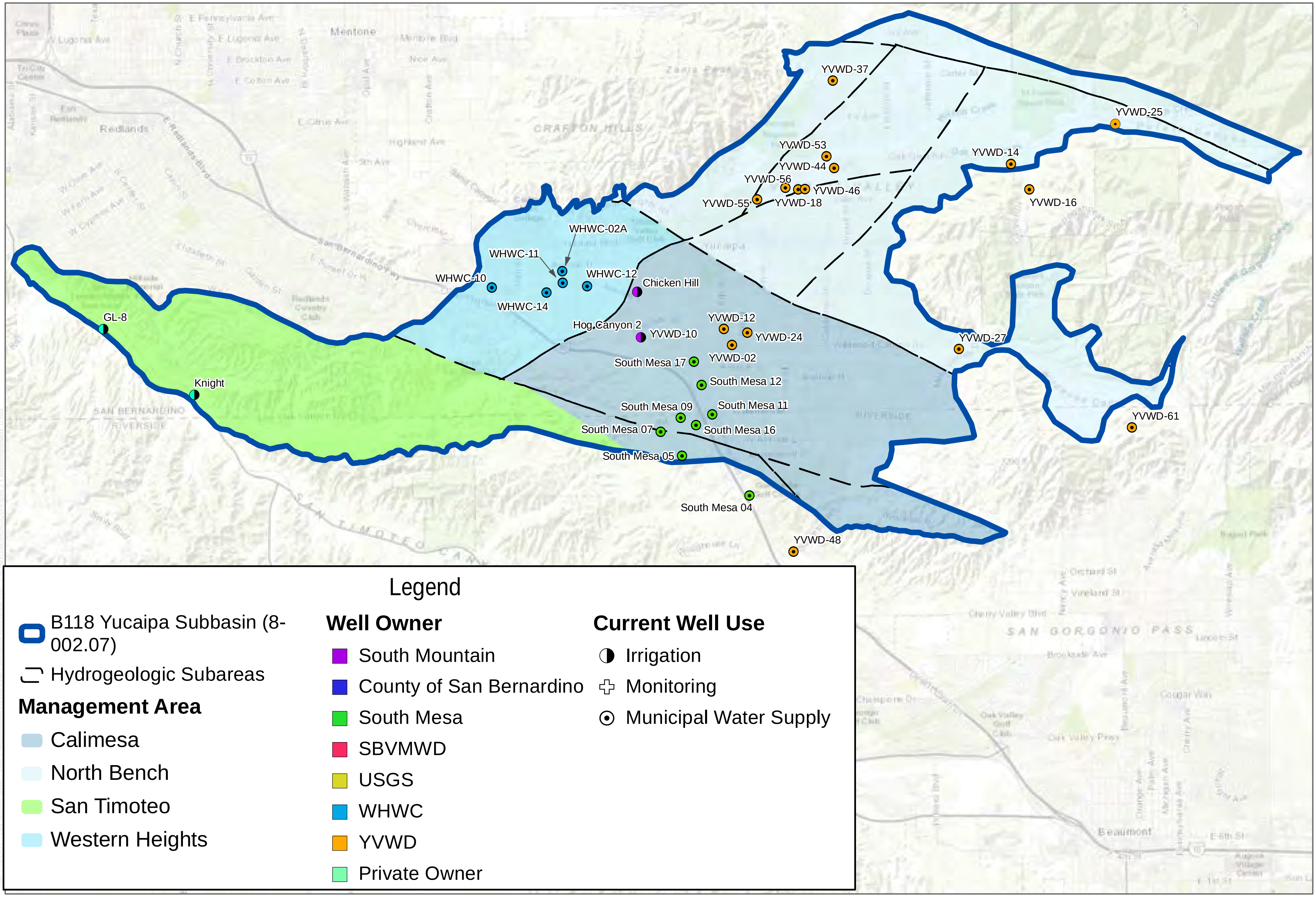

SOURCE: SBVMWD, YVWD, WHWC, SMWC, City of Redlands, USGS

DUDEK

0 0.5 1 Miles

FIGURE 3-54

Monitoring Network Wells Designated to Measure Groundwater Production

Yucaipa Subbasin Groundwater Sustainability Plan

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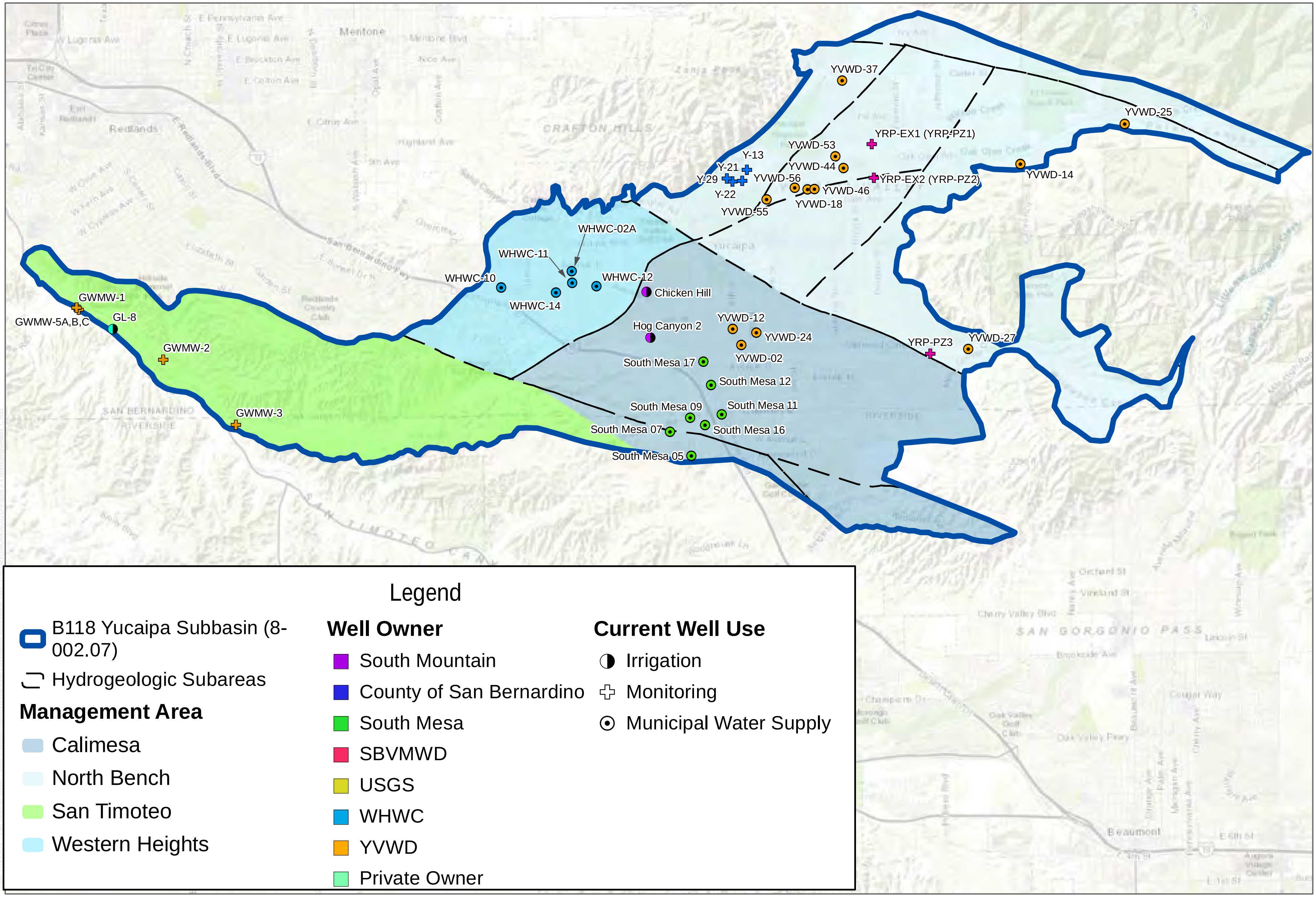

SOURCE: SBVMWD, YVWD, WHWC, SMWC, City of Redlands, USGS

DUDEK

0 0.5 1 Miles

FIGURE 3-55

Monitoring Network Wells Designated to Measure Groundwater Quality

Yucaipa Subbasin Groundwater Sustainability Plan

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4 Projects and Management Actions

4.1 Introduction to Projects and Management Actions

Sub-article 5 of Article 5 of the California Code of Regulations (CCR) Division 2 Chapter 1.5 (23 CCR, Section 354.42–354.44) describes the criteria for projects and management actions to be included in a Groundwater Sustainability Plan (GSP) that will help achieve the sustainability goal established for the Plan Area over the planning and implementation horizon. Currently, the Yucaipa Subbasin is being managed sustainably. The importation of State Water Project (SWP) water as a supplemental source of water has allowed the water purveyors to reduce groundwater production in the Subbasin to below the estimated sustainable yield. Consequently, groundwater levels have recovered 50 to 200 feet in the past 10 years with groundwater storage increasing by approximately 18,000 acre-feet (AF) (Section 2.8, Water Budget Analysis).

Future projections with groundwater production constrained to the estimated sustainable yield of 10,980 acre-feet per year (AFY), which is higher than the average annual extraction of 9,100 AFY observed from the 2014 water year (WY) to the-2018 WY period, indicate that the Yucaipa Subbasin will not experience undesirable results over the 50-year planning and implementation period. The simulated Future Baseline with Climate Change II scenario using the U.S. Geological Survey (USGS) Yucaipa Integrated Hydrologic Model (YIHM) indicated that conditions in the Calimesa Management Area may decline below the measurable objective and trend toward the minimum threshold (Figure 3-35). Under such conditions that may be experienced in the Calimesa Management Area and throughout the Subbasin, the Yucaipa Groundwater Sustainability Agency (GSA) has defined management actions that will be implemented to prevent undesirable results.

The management actions included in this chapter document the actions that the Yucaipa GSA will implement in the event that groundwater elevations in one or more management areas decline below their respective measurable objectives and minimum thresholds. The management actions are not currently necessary to achieve sustainability in the Plan Area, which has experienced rising groundwater levels and increased groundwater in storage since 2008 (Section 2.7, Current and Historical Groundwater Conditions). However, the following management actions will be implemented, as necessary, to respond to declining conditions that deviate from the future predictions by the YIHM.

Currently, no new projects have been identified as necessary to achieve groundwater sustainability in the Plan Area during the 50-year planning and implementation period. Member agencies of the Yucaipa GSA have constructed spreading basins and stormwater capture basins and are in the process of designing and constructing new ones to enhance recharge to the Subbasin, thereby reducing dependence on imported water. The Wilson Creek and Oak Glen Creek spreading basins were designed to receive SWP water from the East Branch Extension and to capture major stormwater flows. Storage of imported water during wet years helps to achieve the objective of importing all of Valley District's SWP entitlement water into the basin.

4.2 Management Actions

Minimum thresholds and measurable objectives were defined for the four management areas in the Plan Area. For the North Bench, Calimesa, and Western Heights Management Areas, minimum thresholds were defined at either the historical low in groundwater elevations in the North Bench Management Area, or below historical lows in the Calimesa and Western Heights Management Areas. The minimum threshold and measurable objective for the San

Timoteo Management Area were defined to prevent significant and unreasonable effects on groundwater-dependent ecosystems (GDEs) identified along San Timoteo Creek. A drought buffer was defined for the North Bench, Calimesa, and Western Heights Management Areas to provide operational flexibility between their respective measurable objectives and minimum thresholds.

4.2.1 Management Action No. 1 – Reduce Net Use of Groundwater When Groundwater Levels Decline below Measurable Objectives

The drought buffers established for the North Bench, Calimesa, and Western Heights Management Areas provide operational flexibility to implement management actions when groundwater conditions decline below their respective measurable objectives (Section 3.4, Minimum Thresholds). The drought buffers were developed based on observed historical conditions and the uncertainty in model predictions (see Section 2.8.8, Characterization of Model Sensitivity and Predictive Uncertainty). The following management actions for these three management areas will prevent undesirable results related to the chronic lowering of groundwater levels, reduction in groundwater storage, and land subsidence. The management action implemented when groundwater levels decline below the measurable objective for the San Timoteo Management Area will prevent significant and unreasonable effects resulting in a loss in surface water interconnected with shallow groundwater that sustain GDEs.

4.2.1.1 North Bench Management Area

The North Bench Management Area includes eight representative monitoring points (RMPs), each associated with a groundwater elevation representing the measurable objective at 230,000 AF in storage and the minimum threshold at 220,000 AF in storage (Table 3-3). Currently, groundwater levels are 50 feet to 130 feet above the measurable objective levels designated at the RMPs (Table 4-1).

Table 4-1. Groundwater Elevations Pertaining to Management Actions for the North Bench Management Area

Representative Monitoring Point	Current Groundwater Elevations (feet NAVD88)	Groundwater Elevations at the Minimum Threshold (feet NAVD88)	Groundwater Elevations at the Measurable Objective (feet NAVD88)
YVWD-06	2,359.99	2,255.47	2,276.91
YVWD-07	2,435.42	2,239.38	2,318.07
YVWD-37	2,585.64	2,503.91	2,527.68
YVWD-46	2,357.42	2,209.32	2,228.73
YVWD-53	2,446.53	2,315.55	2,337.17
YVWD-56	2,426.23	2,269.24	2,291.03
USGS Wilson Creek #1 (820′–840′)	2,455.55	2,300.24	2,329.25
USGS Wilson Creek #4 (350′–370′)	2,482.04	2,317.09	2,349.27
Average	**2,443.60**	**2,301.27**	**2,332.26**

The YIHM predicts that future groundwater elevations with groundwater production constrained to the estimated sustainable yield of 3,940 AFY will remain above the measurable objective levels associated with each RMP (Figures 3-7 to 3-14). However, the following conditions will trigger management actions to be implemented by the Yucaipa GSA:

1) If groundwater elevations decline below the measurable objective levels at 50% or more of the RMPs (Table 4-1) for 2 consecutive years, then the following management action will be implemented:
   a) The net use of groundwater from the North Bench Management Area will decrease by 25% of the estimated sustainable yield of 3,940 AFY, or by 990 AFY. The Yucaipa GSA will implement this management action by either reducing groundwater production by 990 AFY, artificially recharging the aquifer with an additional 990 AFY of supplemental water, enacting water conservation programs or other programs that result in a net reduction of groundwater use by 990 AFY, or any combination of these actions that result in a net reduction of groundwater use by 990 AFY. Because the management area is not experiencing or is expected to experience conditions below the measurable objective through the 50-year planning and implementation horizon, no interim milestones are defined in this GSP. However, if conditions do develop and this management action is implemented, then the Yucaipa GSA will identify interim milestones at that time to evaluate progress in achieving groundwater sustainability.
   b) The 25% net reduction in groundwater use, which may be achieved with a reduction in groundwater production from 3,940 AFY to 2,950 AFY, was selected because historical data indicated that, when groundwater production was at 3,000 AFY or less, groundwater levels and the volume in storage were stable or increased during periods of "below normal" to "wet" water year types (Figures 2-3, 3-3, and 3-6). The Yucaipa GSA, at its discretion, may modify the 25% reduction (e.g., implement a higher percentage of reduction) if this rate is not sufficient to improve conditions in the management area and avoid undesirable results.
   c) Implementing this management action will also require the Yucaipa GSA to reevaluate and, possibly, recalibrate the YIHM to improve the accuracy of the model in predicting future conditions. This action will be implemented if the occurrence is outside the scheduled 5-year evaluation, which already includes a reevaluation of the YIHM.
2) If conditions continue to decline and groundwater elevations at 50% or more of the RMPs fall below their respective minimum threshold levels (Table 4-1) for 2 consecutive years, then the following management action will be implemented:
   a) The net use of groundwater from the North Bench Management Area will decrease by 35% of the estimated sustainable yield of 3,940 AFY, or by 1,380 AFY. The Yucaipa GSA will achieve this management action by either reducing groundwater production by 1,380 AFY, artificially recharge the aquifer with an additional 1,390 AFY of supplemental water, enact water conservation programs or other programs that result in a net reduction of groundwater withdrawal by 1,380 AFY, or any combination of these actions that result in a net reduction of groundwater withdrawal by 1,380 AFY. Because the management area is not experiencing or is expected to experience conditions below the minimum threshold through the 50-year planning and implementation horizon, no interim milestones are defined in this GSP. However, if conditions do fall below the minimum threshold and this management action is implemented, then the Yucaipa GSA will identify interim milestones at that time to evaluate progress in improving conditions to achieve groundwater sustainability.
   b) The 35% net reduction in groundwater use, which may represent a reduction in groundwater production to 2,560 AFY, was selected because historical data indicated that, when groundwater production was at 2,600 AFY or less, groundwater levels and the volume in storage were stable or increased during periods

of "dry" to "wet" water year types (Figures 2-3, 3-3, and 3-6). The Yucaipa GSA, at its discretion, may modify the 35% reduction (e.g., implement a higher percentage of reduction) if this rate is not sufficient to improve conditions in the management area.

4.2.1.1.1 Measurable Objective Expected to Benefit

The measurable objective established for the sustainability indicators of chronic lowering of groundwater levels, reduction in groundwater storage, and land subsidence would benefit from the implementation of this management action. The goal of the management action is to reduce the net use of groundwater from the management area by 25% to 35% of the estimated sustainable yield until conditions improve to the measurable objective where the management area is managed sustainably.

4.2.1.1.2 Expected Benefits and Evaluation

The sustainability criteria established for the North Bench Management Area were designed to protect the long-term groundwater supply and maintain production for the existing wells operated by YVWD and private users. The establishment of a drought buffer, represented by a range in the volume in storage from 220,000 to 230,000 AF, provides operational flexibility for the Yucaipa GSA to implement these management actions to avoid or improve conditions from undesirable results. These actions allow the management area to recover during "dry" to "wet" water year types when recharge, either naturally or artificially, or both, will exceed the net withdrawal of groundwater.

Groundwater in storage will increase and chronic declines in groundwater elevation will cease or reverse with a net reduction in groundwater withdrawal from the management area. Groundwater in storage will be measured using groundwater elevations as a proxy. If groundwater elevations stabilize, or rise at the groundwater level RMPs, the management action will have succeeded in increasing the volume of groundwater in storage and prevented the chronic decline in groundwater levels. Conditions at the measurable objective or higher are at or above the historical low, which will negate the undesirable result of land subsidence potentially occurring due to a long-term groundwater level decline below the historical low.

4.2.1.1.3 Circumstances for Implementation

This management action would be implemented under the following circumstances:

1. When groundwater levels measured at 50% or more of the RMPs fall below their respective measurable objective levels for 2 consecutive years, or
2. When groundwater levels measured at 50% or more of the RMPs fall below their respective minimum threshold levels for 2 consecutive years.

4.2.1.1.4 Public Noticing

Public noticing is not required for this management action, which would be undertaken under the Yucaipa GSA's authority to control groundwater withdrawals from the Plan Area, including the North Bench Management Area. The Yucaipa GSA will notify private well owners that will be affected by the implementation of this management action if it requires a reduction in their respective groundwater production.

4.2.1.1.5 Permitting and Regulatory Process

No additional permitting or regulatory oversight is necessary to implement this management action, which would be undertaken under the Yucaipa GSA's authority per the California Water Code, Section 10726.4.

4.2.1.1.6 Implementation Schedule

There is no specific implementation schedule for this management action as projected groundwater levels indicate this management action will not be required. The Yucaipa GSA will implement this management action within 6 months of determining that one of the criteria for implementation described in Section 4.2.1.1.3, Circumstances for Implementation has been met.

4.2.1.1.7 Legal Authority

The Yucaipa GSA has the legal authority to operate and regulate the production from water supply wells in the Plan Area per the California Water Code, Section 10726.4; and to import surface water (e.g., SWP water) or other supplemental water to artificially recharge the Subbasin per the California Water Code, Section 10726.2. No additional legal authority is required.

4.2.1.1.8 Estimated Costs

The costs associated with the implementation of this management action have not yet been estimated. However, if this management action is implemented and groundwater production is decreased, then additional costs may be incurred by YVWD (the only water purveyor operating in the North Bench Management Area), or its respective customers, to supply additional supplemental water, enact water conservation programs, or other actions to meet water demands.

4.2.1.2 Calimesa Management Area

The Calimesa Management Area includes 13 RMPs; each is associated with groundwater elevations representing the measurable objective at 798,700 AF and the minimum threshold at 772,700 AF in storage (Table 3-4; Table 4-2). The measurable objective is represented by the historical low condition and indicates that no undesirable results are occurring in the management area.

Table 4-2. Groundwater Elevations Pertaining to Management Actions for the Calimesa Management Area

Representative Monitoring Point	Current Groundwater Elevations (feet NAVD88)	Groundwater Elevations at the Measurable Objective (Tier 1 in the Drought Buffer) (feet NAVD88)	Groundwater Elevations at Tier 2 in the Drought Buffer (feet NAVD88)	Groundwater Elevations at Tier 3 in the Drought Buffer (feet NAVD88)	Estimated Measured Groundwater Elevations at the Minimum Threshold (feet NAVD88)
Hog Canyon 2	2,090.13	2,083.77	2,063.66	2,040.10	2,021.82
South Mesa 07	2,062.73	2,044.08	2,022.66	2,000.74	1,982.14
South Mesa 09	2,068.70	2,024.19	1,993.77	1,972.09	1,958.58

Table 4-2. Groundwater Elevations Pertaining to Management Actions for the Calimesa Management Area

Representative Monitoring Point	Current Groundwater Elevations (feet NAVD88)	Groundwater Elevations at the Measurable Objective (Tier 1 in the Drought Buffer) (feet NAVD88)	Groundwater Elevations at Tier 2 in the Drought Buffer (feet NAVD88)	Groundwater Elevations at Tier 3 in the Drought Buffer (feet NAVD88)	Estimated Measured Groundwater Elevations at the Minimum Threshold (feet NAVD88)
South Mesa 12	2,095.74	2,080.33	2,059.58	2,036.88	2,018.27
South Mesa 17	2,092.77	2,068.72	2,048.20	2,024.96	2,006.30
USGS 6th St #1 (870′–930′)	2,133.89	2,121.89	2,101.45	2,078.07	2,058.61
USGS 6th Street #4 (380′–400′)	2,170.93	2,175.05	2,165.66	2,146.93	2,127.70
USGS Equestrian Park #1 (830′–850′)	2,203.28	2,203.61	2,197.82	2,186.96	2,173.37
USGS Equestrian Park #4 (380′–400′)	2,206.59	2,207.39	2,201.74	2,190.86	2,176.87
YVWD-10	2,087.74	2,076.79	2,056.62	2,033.14	2,014.16
YVWD-12	2,094.66	2,081.92	2,062.26	2,037.96	2,020.26
YVWD-24	2,184.66	2,120.42	2,100.29	2,075.90	2,061.63
YVWD-49	2,082.24	2,076.94	2,056.68	2,033.31	2,014.03
Average	**2,121.08**	**2,105.01**	**2,086.95**	**2,065.99**	**2,048.75**

The YIHM predicts that future groundwater elevations with groundwater production constrained to the estimated sustainable yield of 4,955 AFY will remain above the minimum threshold levels associated with each RMP, but will fall below the measurable objective levels under the Future Baseline with Climate Change II scenario (Figures 3-22 to 3-34). The following conditions will trigger management actions to be implemented by the Yucaipa GSA:

1) If groundwater elevations decline at 50% or more of the RMPs below their respective measurable objective levels for two consecutive years, then the following management action will be implemented:
   a) The net use of groundwater from the Calimesa Management Area will be reduced under a three-tier structure depending on the volume of groundwater in storage below the historical low of 798,700 AF. Actions to be implemented under the three-tier structure are as follows:
      i) The first tier extends from 798,700 to 790,700 AF, or the top 8,000 AF in the drought buffer (Figure 4-1). Groundwater elevations at the RMPs that represent the historical low (i.e., the top of tier 1) range from 2,024 to 2,204 feet NAVD88 (Table 4-2). If groundwater elevations decline at 50% or more of the RMPs below their respective tier 1 levels for two consecutive years, then a net reduction in groundwater use by 5% of the estimated sustainable yield of 4,955 AFY, or by 250 AFY, is required. The Yucaipa GSA

will implement this management action by either reducing groundwater production by 250 AFY, artificially recharging the aquifer with an additional 250 AFY of supplemental water, enacting water conservation programs or other programs that result in a net reduction of groundwater use by 250 AFY, or any combination of these actions that result in a net reduction of groundwater use by 250 AFY. Currently, no interim milestones are defined because the management area is managed sustainably and conditions are at or above the measurable objective. However, if conditions decline to this first tier in the drought buffer, then this management action would be implemented and the Yucaipa GSA will identify interim milestones at that time to evaluate progress in achieving groundwater sustainability.

ii) The second tier extends from 790,700 to 781,700 AF, or for 9,000 AF below the first tier in the drought buffer (Figure 4-1). Groundwater elevations at the RMPs that represent the top of tier 2 range from 1,994 to 2,202 feet NAVD88 (Table 4-2). If groundwater elevations decline at 50% or more of the RMPs below their respective tier 2 levels for two consecutive years, then a net reduction in groundwater use by 10% of the estimated sustainable yield of 4,955 AFY, or by 500 AFY, is required. The Yucaipa GSA will implement this management action by either reducing groundwater production by 500 AFY, artificially recharge the aquifer with an additional 500 AFY of supplemental water, enact water conservation programs or other programs that result in a net reduction of groundwater use by 500 AFY, or any combination of these actions that result in a net reduction of groundwater use by 500 AFY. Currently, no interim milestones are defined because the management area is managed sustainably and conditions are at or above the measurable objective. However, if conditions decline to this second tier in the drought buffer, then this management action would be implemented and the Yucaipa GSA will identify interim milestones at that time to evaluate progress in achieving groundwater sustainability.

iii) The third tier extends from 781,700 to 772,700 AF, or the bottom 9,000 AF in the drought buffer (Figure 4-1). Groundwater elevations at the RMPs that represent the top of tier 3 range from 1,972 to 2,191 feet NAVD88 (Table 4-2). If groundwater elevations decline at 50% or more of the RMPs below their respective tier 3 levels for two consecutive years, then a net reduction in groundwater use by 15% of the estimated sustainable yield of 4,955 AFY, or by 750 AFY, is required. The Yucaipa GSA will implement this management action by either reducing groundwater production by 750 AFY, artificially recharge the aquifer with an additional 750 AFY of supplemental water, enact water conservation programs or other programs that result in a net reduction of groundwater use by 750 AFY, or any combination of these actions that result in a net reduction of groundwater use by 750 AFY. Currently, no interim milestones are defined because the management area is managed sustainably and conditions are at or above the measurable objective. However, if conditions decline to this third tier in the drought buffer, then this management action would be implemented and the Yucaipa GSA will identify interim milestones at that time to evaluate progress in achieving groundwater sustainability.

b) The 5% to 15% net reduction in groundwater use was selected because historical data indicated that, when groundwater production was at these rates or less, groundwater levels and the volume in storage were stable or increased during periods of “dry” to “wet” water year types (Figures 2-3, 3-19 and 3-21). The Yucaipa GSA, at its discretion, may modify the 5% to 15% reduction (e.g., implement a higher percentage of reduction) if these rates are not sufficient to improve conditions in the management area and avoid undesirable results.

c) Implementing this management action will also require the Yucaipa GSA to reevaluate and, possibly, recalibrate the YIHM to improve the accuracy of the model in predicting future conditions. This action will be implemented if the occurrence is outside the scheduled 5-year evaluation, which already includes a reevaluation of the YIHM.

2) If conditions continue to decline and groundwater elevations at 50% or more of the RMPs fall below their respective minimum threshold levels for two consecutive years, then the following management action will be implemented:
    a) Groundwater elevations at the RMPs that represent the minimum threshold range from 1,959 to 2,177 feet NAVD88 (Table 4-2). The net use of groundwater from the Calimesa Management Area will be reduced by 20% of the estimated sustainable yield of 4,955 AFY, or by 990 AFY. The Yucaipa GSA will achieve this management action by either reducing groundwater production by 990 AFY, artificially recharging the aquifer with an additional 990 AFY of supplemental water, enacting water conservation programs or other programs that result in a net reduction of groundwater use by 990 AFY, or any combination of these actions that result in a net reduction of groundwater use by 990 AFY. Because the management area is not experiencing or is expected to experience conditions below the minimum threshold through the 50-year planning and implementation horizon, no interim milestones are defined in this GSP. However, if conditions do fall below the minimum threshold and this management action is implemented, then the Yucaipa GSA will identify interim milestones at that time to evaluate progress in improving conditions to achieve groundwater sustainability.
    b) The 20% net reduction in groundwater use, which may be achieved with a reduction in groundwater production by 990 AFY to 3,955 AFY, was selected because historical data indicated that, when groundwater production was at 4,000 AFY or less, groundwater levels and the volume in storage were stable or increased during periods of "dry" to "wet" water year types (Figures 2-3, 3-19 and 3-21). The Yucaipa GSA, at its discretion, may modify the 20% reduction (e.g., implement a higher percentage of reduction) if this rate is not sufficient to improve conditions in the management area.

4.2.1.2.1 Measurable Objective Expected to Benefit

The measurable objective established for the sustainability indicators of chronic lowering of groundwater levels, reduction in groundwater storage, and land subsidence would benefit from the implementation of this management action. The goal of the management action is to reduce the net use of groundwater from the management area by 5% to 20% of the estimated sustainable yield until conditions improve to the measurable objective where the management area is managed sustainably and no undesirable results are experienced. Currently, groundwater conditions in the Calimesa Management Area are managed sustainably.

4.2.1.2.2 Expected Benefits and Evaluation

The sustainability criteria established for the Calimesa Management Area were designed to protect the long-term groundwater supply and maintain production for the existing wells operated by South Mountain, South Mesa, YVWD, and private users. The establishment of a drought buffer, represented by a range in the volume in storage from 798,700 to 772,700 AF, provides operational flexibility for the Yucaipa GSA to implement these management actions to avoid or improve conditions from undesirable results. These actions allow the management area to recover during "dry" to "wet" water year types when recharge will exceed the net withdrawal of groundwater.

Groundwater in storage will increase and chronic declines in groundwater elevations will cease or reverse with a net reduction in groundwater use from the management area. Groundwater in storage will be measured using groundwater elevations as a proxy. If groundwater elevations stabilize, or rise at the groundwater level RMPs, the management action will have succeeded in increasing the volume of groundwater in storage and prevented the chronic decline in groundwater levels. Conditions at the measurable objective or higher are at or above the historical low, which will negate the undesirable result of land subsidence potentially occurring due to a long-term groundwater level decline below the historical low.

4.2.1.2.3 Circumstances for Implementation

This management action would be implemented under the following circumstances:

1. When groundwater levels measured at 50% or more of the RMPs fall below their respective measurable objective levels and drought buffer tiers for 2 consecutive years, or
2. When groundwater levels measured at 50% or more of the RMPs fall below their respective minimum threshold levels for 2 consecutive years.

4.2.1.2.4 Public Noticing

Public noticing is not required for this management action, which would be undertaken under the Yucaipa GSA's authority to control groundwater withdrawals from the Calimesa Management Area. The Yucaipa GSA will notify private well owners that will be affected by the implementation of this management action if it requires a reduction in their respective groundwater production.

4.2.1.2.5 Permitting and Regulatory Process

No additional permitting or regulatory oversight is necessary to implement this management action, which would be undertaken under the Yucaipa GSA's authority per the California Water Code, Section 10726.4.

4.2.1.2.6 Implementation Schedule

The YIHM predicts long-term fluctuations of groundwater elevations at the RMPs above the measurable objective until approximately 2058 when drier conditions prevail and groundwater levels experience a declining trend to the end of the 50-year planning and implementation horizon (Figures 4-2 to 4-14). The circumstance for implementing this management action when groundwater elevations at 50% or more of the RMPs decline below their respective tier 1 levels is predicted in 2066. This is based on predicted groundwater elevations at Hog Canyon 2, South Mesa 7, YVWD-10, YVWD-12, YVWD-49, USGS Equestrian Park #1, and USGS 6th Street #1 falling below their respective tier 1 levels by 2065 and remaining below those levels into 2067 (Figures 4-2, 4-6, 4-7, 4-9, 4-10, 4-11, and 4-13). The Yucaipa GSA will implement this management action within 6 months from confirming the predicted declines in groundwater levels by reducing the net use of groundwater from the management area by 5%.

4.2.1.2.7 Legal Authority

Yucaipa GSA has the legal authority to operate and regulate the production from water supply wells in the Plan Area per the California Water Code, Section 10726.4; and to import surface water (e.g., SWP water) or other supplemental water to artificially recharge the Subbasin per the California Water Code, Section 10726.2. No additional legal authority is required.

4.2.1.2.8 Estimated Costs

The costs associated with the implementation of this management action have not yet been estimated. However, if this management action is implemented, then additional costs may be incurred by South Mountain, South Mesa, YVWD, or their respective customers, and private users to supply additional supplemental water, enact water conservation programs, or other actions to meet water demands. The responsibilities for covering costs between the water purveyors and private users, if applicable, will be determined at the time of implementation and will depend on their respective action and/or program implemented to achieve the overall goal of reducing the net use of groundwater from the management area.

4.2.1.3 Western Heights Management Area

The Western Heights Management Area includes seven RMPs, each associated with groundwater elevations representing the measurable objective at 408,800 AF and the minimum threshold at 398,800 AF in storage (Table 3-5; Table 4-3). The measurable objective is represented by the historical low condition and indicates that no undesirable results are occurring in the management area.

Table 4-3. Groundwater Elevations Pertaining to Management Actions for the Western Heights Management Area

Representative Monitoring Point	Current Groundwater Elevations (feet NAVD88)	Groundwater Elevations at the Measurable Objective (Tier 1 of Drought Buffer) (feet NAVD88)	Groundwater Elevations at Tier 2 of Drought Buffer (feet NAVD88)	Groundwater Elevations at the Minimum Threshold (feet NAVD88)
WHWC-2A	1,740.68	1,735.68	1,716.00	1,695.24
WHWC-10	1,766.04	1,750.04	1,734.04	1,714.26
WHWC-11	1,723.93	1,748.93	1,735.76	1,712.24
WHWC-12	1,757.11	1,747.11	1,732.52	1,708.84
WHWC-14	1,749.90	1,726.90	1,717.20	1,696.12
USGS Dunlap #2 (830′–850′)	1,754.85	1,748.40	1,729.36	1,708.97
USGS Dunlap #4 (440′–460′)	1,743.89	1,740.32	1,720.05	1,699.54
Average	**1,748.06**	**1,742.48**	**1,726.42**	**1,705.03**

The YIHM predicts that future groundwater elevations with groundwater production constrained to the estimated sustainable yield of 1,760 AFY will remain above the measurable objective levels associated with each RMP (Figures 3-40 to 3-46). However, the following conditions will trigger management actions to be implemented by the Yucaipa GSA should conditions decline below the measurable objective:

1) If groundwater elevations decline at 50% or more of the RMPs below their respective measurable objective levels for two consecutive years, then the following management action will be implemented:
   a) The net use of groundwater from the Western Heights Management Area will be reduced under a two-tier structure depending on the volume of groundwater in storage below the historical low of 408,800 AF. Actions to be implemented under the two-tier structure are as follows:
      i) The first tier, which begins at the historical low, extends from 408,800 to 403,800 AF, or the top 5,000 AF in the drought buffer (Figure 4-15). Groundwater elevations at the RMPs that represent the historical

low (i.e., the top of tier 1) range from 1,727 to 1,750 feet NAVD88 (Table 4-3). If groundwater elevations decline at 50% or more of the RMPs below their respective tier 1 levels for two consecutive years, then a net reduction in groundwater use by 5% of the estimated sustainable yield of 1,760 AFY, or 90 AFY, is required. The Yucaipa GSA will implement this management action by either reducing groundwater production by 90 AFY, artificially recharging the aquifer with an additional 90 AFY of supplemental water, enacting water conservation programs or other programs that result in a net reduction of groundwater use by 90 AFY, or any combination of these actions that result in a net reduction of groundwater use by 90 AFY. Currently, no interim milestones are defined because the management area is managed sustainably and conditions are at the measurable objective. However, if conditions decline to this first tier in the drought buffer, then this management action would be implemented and the Yucaipa GSA will identify interim milestones at that time to evaluate progress in achieving groundwater sustainability.

ii) The second tier extends from 403,800 to 398,800 AF, or the bottom 5,000 AF in the drought buffer (Figure 4-15). Groundwater elevations at the RMPs that represent the top of tier 2 range from 1,716 to 1,736 feet NAVD88 (Table 4-3). If groundwater elevations decline at 50% or more of the RMPs below their respective tier 2 levels for two consecutive years, then a net reduction in groundwater use by 10% of the estimated sustainable yield of 1,760 AFY, or by 180 AFY, is required. The Yucaipa GSA will implement this management action by either reducing groundwater production by 180 AFY, artificially recharging the aquifer with an additional 180 AFY of supplemental water, enacting water conservation programs or other programs that result in a net reduction of groundwater use by 180 AFY, or any combination of these actions that result in a net reduction of groundwater use by 180 AFY. Currently, no interim milestones are defined because the management area is managed sustainably and conditions are at the measurable objective. However, if conditions decline to this second tier in the drought buffer, then this management action would be implemented and the Yucaipa GSA will identify interim milestones at that time to evaluate progress in achieving groundwater sustainability.

b) The 5% to 10% net reduction in groundwater use, which may be achieved with a reduction in groundwater production from 1,760 AFY to 1,670 AFY (5% less) or 1,580 AFY (10% less), was selected because historical data indicated that when groundwater production was at these rates or less groundwater levels and the volume in storage were stable or increased during periods of “dry” to “wet” water year types (Figures 2-35, 3-37, and 3-38). The Yucaipa GSA, at its discretion, may modify the 5% to 10% reduction (e.g., implement a higher percentage of reduction) if these rates are not sufficient to improve conditions in the management area and avoid undesirable results.

c) Implementing this management action will also require the Yucaipa GSA to reevaluate and, possibly, recalibrate the YIHM to improve the accuracy of the model in predicting future conditions. This action will be implemented if the occurrence is outside the scheduled 5-year evaluation, which already includes a reevaluation of the YIHM.

2) If conditions continue to decline and groundwater elevations at 50% or more of the RMPs fall below their respective minimum threshold levels for two consecutive years, then the following management action will be implemented:

a) The net use of groundwater from the Western Heights Management Area will be reduced by 15% of the estimated sustainable yield of 1,760 AFY, or by 260 AFY. Groundwater elevations at the RMPs that represent the minimum threshold range from 1,695 to 1,714 feet NAVD88 (Table 4-3). The Yucaipa GSA will achieve this management action by either reducing groundwater production by 260 AFY, artificially recharge the aquifer with an additional 260 AFY of supplemental water, enact water conservation programs or other programs that result in a net reduction of groundwater use by 260 AFY, or any combination of these actions that result in a net reduction of groundwater use by 260 AFY. Because the management area is not experiencing or is expected to experience conditions below the minimum threshold through the 50-year planning and implementation horizon, no interim milestones are defined in this GSP. However, if conditions do fall below the minimum threshold and this management action is implemented, then the Yucaipa GSA will identify interim milestones at that time to evaluate progress in improving conditions to achieve groundwater sustainability.

b) The 15% net reduction in groundwater use, which may be achieved with a reduction in groundwater production by 260 AFY from 1,760 AFY to 1,500 AFY, was selected because historical data indicated that, when groundwater production was at 1,500 AFY or less, groundwater levels and the volume in storage were stable or increased during periods of “dry” to “wet” water year types (Figures 2-35, 3-37, and 3-38). The Yucaipa GSA, at its discretion, may modify the 15% reduction (e.g., implement a higher percentage of reduction) if this rate is not sufficient to improve conditions in the management area.

4.2.1.3.1 Measurable Objective Expected to Benefit

The measurable objective established for the sustainability indicators of chronic lowering of groundwater levels, reduction in groundwater storage, and land subsidence would benefit from the implementation of this management action. The goal of the management action is to reduce the net use of groundwater from the management area by 5% to 15% of the estimated sustainable yield until conditions improve to the measurable objective where the management area is managed sustainably and no undesirable results are experienced. Currently, groundwater conditions in the Western Heights Management Area are managed sustainably.

4.2.1.3.2 Expected Benefits and Evaluation

The sustainability criteria established for the Western Heights Management Area were designed to protect the long-term groundwater supply and maintain production for the existing wells operated by WHWC and private users. The establishment of a drought buffer, represented by a range in the volume in storage from 408,800 to 398,800 AF, provides operational flexibility for the Yucaipa GSA to implement these management actions to avoid or improve conditions from undesirable results. These actions allow the management area to recover during “dry” to “wet” water year types when recharge will exceed the net withdrawal of groundwater.

Groundwater in storage will increase and chronic declines in groundwater elevation will cease or reverse with a net reduction in groundwater use from the management area. Groundwater in storage will be measured using groundwater elevations as a proxy. If groundwater elevations stabilize, or rise at the groundwater level RMPs, the management action will have succeeded in increasing the volume of groundwater in storage and prevented a chronic decline in groundwater levels. Conditions at the measurable objective or higher are at or above the historical low, which will negate the undesirable result of land subsidence potentially occurring due to a long-term groundwater level decline below the historical low.

4.2.1.3.3 Circumstances for Implementation

This management action would be implemented under the following circumstances:

1. when groundwater levels measured at 50% or more of the RMPs fall below their respective measurable objective levels and drought buffer tiers for two consecutive years, or
2. when groundwater levels measured at 50% or more of the RMPs fall below their respective minimum threshold levels for two consecutive years.

4.2.1.3.4 Public Noticing

Public noticing is not required for this management action, which would be undertaken under the Yucaipa GSA's authority to control groundwater withdrawals from the Western Heights Management Area. The Yucaipa GSA will notify private well owners that will be affected by the implementation of this management action if it requires a reduction in their respective groundwater production.

4.2.1.3.5 Permitting and Regulatory Process

No additional permitting or regulatory oversight is necessary to implement this management action, which would be undertaken under the Yucaipa GSA's authority per the California Water Code, Section 10726.4.

4.2.1.3.6 Implementation Schedule

The YIHM predicts that groundwater elevations at the RMPs will not decline to tier 1 of the drought buffer through the 50-year planning and implementation horizon (Figures 4-16 to 4-22). Predicted groundwater elevations will not decline to tier 1 levels at more than 50% of the RMPs; therefore, there is no specific implementation schedule for this management action. However, the Yucaipa GSA will implement this management action within 6 months of determining that one of the criteria for implementation described in Section 4.2.1.3.3, Circumstances for Implementation, has been met.

4.2.1.3.7 Legal Authority

Yucaipa GSA has the legal authority to operate and regulate the production from water supply wells in the Plan Area per the California Water Code, Section 10726.4; and to import surface water (e.g., SWP water) or other supplemental water to artificially recharge the Subbasin per the California Water Code, Section 10726.2. No additional legal authority is required.

4.2.1.3.8 Estimated Costs

The costs associated with the implementation of this management action have not yet been estimated. However, if this management action is implemented, then additional costs may be incurred by WHWC, or its respective customers, to supply additional supplemental water, enact water conservation programs, or other actions to meet water demands while reducing the net use of groundwater from the management area.

4.2.1.4 San Timoteo Management Area

The San Timoteo Management Area includes six RMPs to characterize shallow groundwater elevations and evaluate whether groundwater production from the principal aquifer will cause significant and unreasonable effects on the interconnection between surface water and groundwater. GDEs have been identified along the reach of San Timoteo Creek in the Plan Area and the following management actions are intended to protect the habitat sustained by surface water in the creek and the underlying shallow groundwater. No management actions were developed for the chronic lowering of groundwater elevations, reduction in groundwater storage, and land subsidence because no sustainability criteria were developed for these indicators (Sections 3.4.4 and 3.5.4).

A measurable objective was established for shallow groundwater levels at 20 feet below ground surface (bgs) (Figure 3-48). The following management action will be implemented to prevent the significant and unreasonable effects to the interconnection of surface water and groundwater and to protect the GDEs sustained in the management area:

1) If groundwater levels decline at 50% or more of the RMPs below 20 feet bgs for two consecutive years, then the following management action will be implemented:
   a) Confirm that the decline in the water table is a result of groundwater production from the principal aquifer. This may include observing groundwater levels at the RMPs and measuring stream flow when the principal aquifer well(s) is operating, or designing and implementing an aquifer test to confirm the influence of groundwater production from the principal aquifer on stream flow and the groundwater table. Currently, only private users are extracting groundwater from this management area. The Yucaipa GSA will contact the private well owners to obtain information to assess whether pumping at a private well is the cause for the observed surface water flow and/or groundwater level declines. The Yucaipa GSA will request historical and projected pumping demands to better characterize conditions in this subarea and determine the extent of influence of pumping at the private well(s) on stream flow and shallow groundwater.
   b) If an aquifer test is conducted and confirms the influence of production from the principal aquifer on the surface water/groundwater interconnection and a subsequent drawdown of the water table, then production from the principal aquifer will be reduced to the extent that it no longer causes a significant and unreasonable effect.

4.2.1.4.1 Measurable Objective Expected to Benefit

The measurable objective established for the sustainability indicator of surface water/groundwater interconnection would benefit from the implementation of this management action. The goal of the management action is to prevent significant and unreasonable effects on GDEs sustained by the interaction of surface water and the underlying shallow groundwater. Currently, groundwater conditions in the San Timoteo Management Area are not experiencing undesirable results.

4.2.1.4.2 Expected Benefits and Evaluation

The sustainability criteria established for the San Timoteo Management Area were designed to protect the GDEs along San Timoteo Creek. This includes reducing groundwater production from the principal aquifer that directly influences stream flow in the creek and the underlying shallow groundwater that sustains the GDEs. YVWD monitors stream flow and shallow groundwater conditions along this reach of San Timoteo Creek as part of the HMP implemented in 2011 (Section 1.5.1). Monitoring includes collecting groundwater elevation data at shallow wells and evaluating habitat conditions via NDVI analysis along this reach of the creek. To date, HMP monitoring has indicated that significant fluctuations in groundwater levels and habitat conditions result from climatic conditions (i.e., prolong drought, large storm events) rather than by other potential factors like local groundwater production.

4.2.1.4.3 Circumstances for Implementation

This management action would be implemented under the following circumstances:

1. when groundwater levels measured at 50% of the RMPs fall below the measurable objective for two consecutive years.

4.2.1.4.4 Public Noticing

Public noticing is not required for this management action, which would be undertaken under the Yucaipa GSA's authority to control groundwater withdrawals from the principal aquifer in the San Timoteo Management Area. The Yucaipa GSA will notify private well owners that will be affected by the implementation of this management action.

4.2.1.4.5 Permitting and Regulatory Process

No additional permitting or regulatory oversight is necessary to implement this management action, which would be undertaken under the Yucaipa GSA's authority per the California Water Code, Section 10726.4.

4.2.1.4.6 Implementation Schedule

There is no specific implementation schedule for this management action. There is no indication of declining groundwater levels and stress on GDEs from the extraction of groundwater from the principal aquifer. The Yucaipa GSA will reach out to known and potential private well owners to obtain information on pumping schedules and volumes to better characterize conditions in this management area. This information will help inform the management action taken should groundwater elevations at three or more of the RMPs decline below the measurable objective.

4.2.1.4.7 Legal Authority

Yucaipa GSA has the legal authority to operate and regulate the production from water supply wells in the Plan Area per the California Water Code, Section 10726.4; and to import surface water (e.g., SWP water) or other supplemental water to artificially recharge the Subbasin per the California Water Code, Section 10726.2. No additional legal authority is required.

4.2.1.4.8 Estimated Costs

The costs associated with the implementation of this management action have not yet been estimated. Costs may be incurred by the Yucaipa GSA to reach out to the private well owners to collect the necessary information to better characterize conditions in this management area. If aquifer tests are required, then additional costs will be incurred by the Yucaipa GSA to conduct the tests, collect and analyze the test data, and develop an appropriate action or response based on the test data to ensure that no undesirable results occur in the management area. These costs will be assessed at the time such action is identified.

4.2.2 Management Action No. 2 –Sustainable Yield Pumping Allocations and Groundwater Replenishment

Groundwater sustainable yield pumping allocations will be assigned to YVWD and private water users in the North Bench Management Area, to South Mountain, South Mesa, YVWD and private water users in the Calimesa Management Area, and to WHWC in the Western Heights Management Area per the subsections below when this GSP is adopted. No sustainable yield pumping allocations were assigned in the San Timoteo management area at this time because the Yucaipa GSA needs to confirm the location and volume of private pumping from the principal aquifer and determine whether sustainable yield pumping allocations are appropriate to manage groundwater production in this management area. The pumping allocations are designed to regulate the annual volume of groundwater produced by each groundwater user and maintain the total groundwater produced at or below the estimated sustainable yields for these management areas. The sustainable yield pumping allocations will be reevaluated within three months (i.e., every December) of the end of a water year.

As an incentive to manage groundwater production at or below the sustainable yield pumping allocation, a groundwater user may earn pumping credits in the amount of the sustainable yield pumping allocation less the groundwater pumped. For example, if water purveyor A pumped 1,000 AF in a water year and the sustainable yield pumping allocation is 1,200 AFY, then water purveyor A earned a 200 AF pumping credit. The Yucaipa GSA will apply a 5-year rolling pumping credit system to keep account of the pumping credits earned by each water purveyor, meaning pumping credits that are earned and not used after 5 years will be lost. Pumping credits, if available, may be used to offset the volume of groundwater produced in excess of the sustainable yield pumping allocation to the extent that the credits equal the pumping exceedance. Any remaining deficit will be charged a replenishment fee. Any pumping credits remaining will carry over into the next water year under the 5-year rolling pumping credit system.

The assessment for pumping credits will begin with the 2022 WY. The volume of water pumped per user will be accounted for on a monthly basis beginning October 1, 2021. Pumping credits will be earned by users that pump less than their respective sustainable yield pumping allocations for the 2022 WY. The Yucaipa GSA is continuing discussions on implementing a policy that will allow the transferability of pumping credits between groundwater users within a given management area or within the Subbasin.

As an alternative to using pumping credits to offset a pumping exceedance, a water purveyor may use surplus supplemental water that directly recharged the Subbasin (see Management Action No. 3, Section 4.2.3). If such water is available and accessible to the water purveyor, then this water may be used instead of pumping credits to offset the pumping exceedance.

The following provides a description of how the pumping allocations were assigned to each purveyor, and the management actions that will be implemented when a groundwater user exceeds their respective sustainable yield pumping allocation.

4.2.2.1 North Bench Management Area

YVWD and private users are the two groundwater users in the North Bench Management Area. From the 1966 WY to the 2018 WY, the average annual production rates for YVWD and private users were 2,647 AFY and 778 AFY, respectively (Figure 4-23, Table 4-4). Groundwater production by YVWD accounted for 77.3% of the total production, private users accounted for 22.7%. Applying these allocations to the estimated sustainable yield of 3,940 AFY for the North Bench Management Area, the sustainable yield pumping allocations for YVWD and private users are 3,045 AFY and 895 AFY, respectively (Table 4-4).

Table 4-4. Sustainable Yield Pumping Allocations in the North Bench Management Area

Groundwater User	Average Historical Pumping (AFY)	Historical Pumping Allocation (%)	Sustainable Yield Pumping Allocation (AFY)
YVWD	2,647	77.3%	3,045
Private	778	22.7%	895
Total	**3,425**	**100.0%**	**3,940**

Notes: AFY = acre-feet per year; YVWD = Yucaipa Valley Water District.

The volume of groundwater produced will be quantified per water year (October 1 to September 30) with the total volumes reported to the Yucaipa GSA by the end of the calendar year. If a groundwater user exceeds their respective sustainable yield pumping allocation, then the groundwater user will be charged a replenishment fee equivalent to the volume of groundwater that exceeds the sustainable yield pumping allocation multiplied by the rate per AF to purchase supplemental water at San Bernardino Valley Municipal Water District (SBVMWD) rates for imported SWP water. If the groundwater user has accrued pumping credits or has surplus supplemental water available in the aquifer, then the pumping credits or surplus supplemental water may be applied up to the pumping exceedance. If there continues to be a deficit, then a replenishment fee will be charged to the groundwater user. The supplemental water required under this management action will be purchased in the subsequent water year, if available, and used to artificially recharge and replenish the Subbasin at the Wilson Creek spreading basins.

The historical production by private users was based on data from the USGS that was incorporated into the YIHM. Figure 4-23 indicates that groundwater production by private users has been steadily declining since the early 1980s to where the average rate over the last 10 years has been approximately 160 AFY. The Yucaipa GSA will make efforts to contact private well users in this management area to confirm the estimated rate of groundwater production per private user. This will provide the Yucaipa GSA with information to characterize the influence of each individual private user on conditions in the management area, and to apply the appropriate pumping allocation. The sustainable yield pumping allocations between YVWD and private users will be reassessed when data on the current and projected usage by private users is collected and analyzed.

4.2.2.1.1 Measurable Objective Expected to Benefit

The measurable objective established for the sustainability indicators of chronic lowering of groundwater levels, reduction in groundwater storage, and land subsidence would benefit from the implementation of this management action.

4.2.2.1.2 Expected Benefits and Evaluation

The goal of this management action is to replenish the management area when groundwater withdrawals exceed the sustainable yield pumping allocation assigned to a groundwater user. This action will prevent long-term declines in groundwater elevations and storage due to groundwater production above the sustainable yield, and help prevent conditions from falling below the historical low in groundwater levels that potentially cause significant and unreasonable effects due to land subsidence. Currently, groundwater extractions from the North Bench Management Area are below the estimated sustainable yield of 3,940 AFY (Figure 3-3).

The benefit of this management action will be evaluated after the purchase of replenishment water and subsequent discharge to the Wilson Creek and Oak Glen Creek spreading basins to replenish the Subbasin.

4.2.2.1.3 Circumstances for Implementation

This management action would be implemented when the volume of groundwater produced by a water purveyor and/or private user per water year exceeds their respective sustainable yield pumping allocation, and the use of pumping credits and/or surplus supplemental water (Section 4.2.3) was insufficient to offset the pumping exceedance. The groundwater user will be required to purchase supplemental water in the subsequent water year for replenishment purposes via the Wilson Creek and Oak Glen Creek spreading basins. If no supplemental water is available, then the volume to replenish will be held in account for up to 5 years until water is available or the groundwater user has earned pumping credits to offset this exceedance. If after 5 years there is no supplemental water available to replenish the management area and the groundwater user has not earned pumping credits to offset the exceedance, then a reassessment of the sustainable yield and pumping allocations will be conducted for the management area.

4.2.2.1.4 Public Noticing

Public noticing is not required for this management action, which would be undertaken under the Yucaipa GSA's authority to control groundwater production from the North Bench Management Area and acquire surface water to direct to spreading basins and/or other purposes per the California Water Code Sections 10726.2 and 10726.4.

4.2.2.1.5 Permitting and Regulatory Process

No additional permitting or regulatory oversight is necessary to implement this management action, which would be undertaken under the Yucaipa GSA's authority per the California Water Code Sections 10726.2 and 10726.4.

4.2.2.1.6 Implementation Schedule

This management action requires the purchase of supplemental water for replenishment purposes in the subsequent water year after the management action is implemented and the application of pumping credits and/or surplus supplemental water, if any, do not offset the pumping exceedance. If no supplemental water is available to replenish the Subbasin in the subsequent water year, then the replenishment water volume will be held in account for up to 5 years until there is supplemental water available or pumping credits are earned to offset the pumping exceedance.

4.2.2.1.7 Legal Authority

Yucaipa GSA has the legal authority to operate and regulate the production from water supply wells in the Plan Area per the California Water Code, Section 10726.4; and to import surface water (e.g., SWP water) or other supplemental water per the California Water Code, Section 10726.2. No additional legal authority is required.

4.2.2.1.8 Estimated Costs

The costs associated with the implementation of this management action are based on the volume of groundwater in excess of the sustainable yield pumping allocation and the rate of SWP water by SBVMWD per acre-foot. Additional costs may be incurred for the distribution and delivery to the Wilson Creek and Oak Glen Creek spreading basins. The estimated costs may vary annually depending on the rate charged by SBVMWD for supplemental water to replenish the Subbasin.

4.2.2.2 Calimesa Management Area

The four groundwater users in the Calimesa Management Area are South Mountain, South Mesa, YVWD and private users. From the 1966 WY to the 2018 WY, the average annual production rates for South Mountain, South Mesa, YVWD and private users were 544 AFY, 2,056 AFY, 2,457 AFY and 143 AFY, respectively (Figure 4-24; Table 4-5). Historically, groundwater production by South Mountain, South Mesa, YVWD and private users accounted for 10.5%, 39.5%, 47.2%, and 2.8%, respectively, of the average annual production of 5,200 AFY. Applying these allocations to the estimated sustainable yield of 4,955 AFY for the Calimesa Management Area, the sustainable yield pumping allocations for South Mountain, South Mesa, YVWD and private users are 518 AFY, 1,959 AFY, 2,341 AFY, and 137 AFY, respectively[1] (Table 4-5).

Table 4-5. Sustainable Yield Pumping Allocations in the Calimesa Management Area

Groundwater User	Average Historical Pumping (AFY)	Historical Pumping Allocation (%)	Sustainable Yield Pumping Allocation (AFY)
YVWD	2,457	47.2%	2,341
South Mesa	2,056	39.5%	1,959
South Mountain	544	10.5%	518
Private	143	2.8%	137
Total	**5,200**	**100.0%**	**4,955**

Notes: AFY = acre-feet per year; YVWD = Yucaipa Valley Water District.

The volume of groundwater produced will be quantified per water year (October 1 to September 30) with the total volumes reported to the Yucaipa GSA by the end of the calendar year. If a groundwater user exceeds their respective sustainable yield pumping allocation, then the groundwater user will be charged a fee equivalent to the volume of groundwater that exceeds their respective sustainable yield pumping allocation multiplied by the rate per AF of supplemental water supplied by SBVMWD and/or San Gorgonio Pass Water Agency (SGPWA) depending on the availability of supplemental water for purchase. The Calimesa Management Area straddles the boundary between San Bernardino County and Riverside County, which includes the service areas of SBVMWD and SGPWA. SWP water supplied by these two regionals may be available as a supplemental water source under this management action. If a groundwater user has accrued pumping credits and/or surplus supplemental water that directly recharged the Calimesa Management Area, then the pumping credits and/or surplus supplemental water may be applied to offset the pumping exceedance. If there continues to be a deficit, then a fee will be charged to the groundwater user to purchase supplemental water. The supplemental water will be purchased in the subsequent water year, if available, and used to artificially replenish the Calimesa Management Area, if applicable, or as in lieu use to offset the

[1] In accordance with Water Code Section 10720.5, the sustainable yield allocations set forth in Management Action No. 2 are neither intended to nor actually comprise any determination of water rights.

pumping exceedance. If no supplemental water is available, then the groundwater user may reduce pumping, implement programs (e.g., water conservation programs) and/or projects that will reduce the net use of groundwater from the Calimesa Management Area to offset the pumping exceedance above their respective sustainable yield pumping allocation.

Currently, there are no spreading basins in the Calimesa Management Area, but the Yucaipa GSA member agencies are evaluating two potential sites to develop surface water spreading basins for the purposes of artificially recharging the Subbasin. The Yucaipa GSA will utilize the YIHM as a tool to evaluate the feasibility of operating spreading basis at the two proposed sites. The feasibility studies will evaluate the beneficial impact of recharging the aquifer at these two potential locations.

The historical production by private users was based on data from the USGS that was incorporated into the YIHM. Figure 4-24 indicates that groundwater production by private users has been steady at approximately 200 AFY since 2000. The Yucaipa GSA will make efforts to contact private well users in this management area to confirm the locations and estimated rates of groundwater extraction for the active private groundwater users. The sustainable yield pumping allocations between the water purveyors and individual private users will be reassessed when data on the current and projected usage by private users is collected and analyzed.

4.2.2.2.1 Measurable Objective Expected to Benefit

The measurable objective established for the sustainability indicators of chronic lowering of groundwater levels, reduction in groundwater storage, and land subsidence would benefit from the implementation of this management action.

4.2.2.2.2 Expected Benefits and Evaluation

The goal of this management action is to replenish the management area or reduce groundwater withdrawals when groundwater production exceeds the sustainable yield pumping allocation assigned to a groundwater user. This action will prevent long-term declines in groundwater elevations and storage due to groundwater production above the sustainable yield, and help prevent conditions from falling below the historical low in groundwater levels that potentially cause significant and unreasonable effects due to land subsidence. Currently, groundwater extractions from the Calimesa Management Area are below the sustainable yield of 4,955 AFY (Figure 3-19). Because there are no spreading basins in the Calimesa Management Area, the supplemental water may be used as in lieu use to offset the pumping exceedance. If no supplemental water is available, then the groundwater user may reduce pumping, implement programs (e.g., water conservation programs) and/or projects that will reduce the net use of groundwater from the Calimesa Management Area to offset the pumping exceedance above their respective sustainable yield pumping allocation.

4.2.2.2.3 Circumstances for Implementation

This management action would be implemented when the volume of groundwater produced by a water purveyor and/or private user per water year exceeds their respective sustainable yield pumping allocation. The groundwater user will be assessed a fee to purchase supplemental water if the application of pumping credits and/or surplus supplemental water, if available, do not offset the production exceedance. If no supplemental water is available to replenish the aquifer, then the volume to replenish will be held in account for up to 5 years until water is available or the groundwater user has earned pumping credits to offset this exceedance. If after 5 years there is no supplemental water available and the groundwater user has not earned pumping credits to offset the exceedance, then a reassessment of the sustainable yield and pumping allocations will be conducted for the management area.

4.2.2.2.4 Public Noticing

Public noticing is not required for this management action, which would be undertaken under the Yucaipa GSA's authority to control groundwater production from the Calimesa Management Area and acquire surface water to import into the Plan Area per California Water Code Sections 10726.2 and 10726.4.

4.2.2.2.5 Permitting and Regulatory Process

No additional permitting or regulatory oversight is necessary to implement this management action, which would be undertaken under the Yucaipa GSA's authority per California Water Code Sections 10726.2 and 10726.4.

4.2.2.2.6 Implementation Schedule

This management action requires the purchase of supplemental water in the subsequent water year after the management action is implemented and the application of pumping credits and/or surplus supplemental water, if any, do not offset the pumping exceedance. If no supplemental water is available in the subsequent water year to replenish the aquifer, then the supplemental water volume will be held in account for up to 5 years until there is supplemental water available or pumping credits are earned to offset the pumping exceedance.

4.2.2.2.7 Legal Authority

Yucaipa GSA has the legal authority to operate and regulate the production from water supply wells in the Plan Area per the California Water Code, Section 10726.4; and to import surface water (e.g., SWP water) or other supplemental water per the California Water Code, Section 10726.2. No additional legal authority is required.

4.2.2.2.8 Estimated Costs

The costs associated with the implementation of this management action are based on the volume of supplemental water required to offset the pumping exceedance after pumping credits and/or surplus supplemental water, if any, have been applied. The cost for supplying supplemental water for replenishment purposes or as in lieu water will be based on the rate of SWP water per AF by SBVMWD and/or SGPWA. Additional costs may be incurred for the distribution and delivery of supplemental water to the management area. The estimated costs may vary annually depending on the rate charged by the Regionals for supplemental water.

4.2.2.3 Western Heights Management Area

WHWC is the only groundwater user in the Western Heights Management Area. The sustainable yield pumping allocation to WHWC is the sustainable yield of 1,760 AFY. The volume of groundwater produced will be quantified per water year (October 1 to September 30) with the total volume reported to the Yucaipa GSA by the end of the calendar year. If WHWC exceeds the sustainable yield, then WHWC will be charged a fee equivalent to the volume of groundwater that exceeds the sustainable yield multiplied by the rate per AF to purchase supplemental water at SBVMWD rates for imported SWP water. The supplemental water will be purchased in the subsequent water year, if available, and used as in lieu water to offset the pumping exceedance in the subsequent water year. There are no spreading basins in the Western Heights Management Area to receive SWP water.

4.2.2.3.1 Measurable Objective Expected to Benefit

The measurable objective established for the sustainability indicators of chronic lowering of groundwater levels, reduction in groundwater storage, and land subsidence would benefit from the implementation of this management action.

4.2.2.3.2 Expected Benefits and Evaluation

The goal of this management action is to replenish the management area or reduce groundwater withdrawals when groundwater production exceeds the sustainable yield. This action will prevent long-term declines in groundwater elevations and storage due to groundwater production above the sustainable yield, and help prevent conditions from falling below the historical low in groundwater levels that potentially cause significant and unreasonable effects due to land subsidence. Currently, groundwater extractions from WHWC in the Western Heights Management Area are below the sustainable yield of 1,760 AFY (Figure 3-37).

4.2.2.3.3 Circumstances for Implementation

This management action would be implemented when the volume of groundwater produced by WHWC per water year exceeds the sustainable yield. WHWC will be assessed a fee to purchase supplemental water if WHWC cannot apply pumping credits to offset the production exceedance. If no supplemental water is available, then the volume of supplemental water will be held in account for up to 5 years until water is available or the groundwater user has earned pumping credits to offset this exceedance. If after 5 years there is no supplemental water available and the groundwater user has not earned pumping credits to offset the exceedance, then a reassessment of the sustainable yield and pumping allocations will be conducted for the management area.

4.2.2.3.4 Public Noticing

Public noticing is not required for this management action, which would be undertaken under the Yucaipa GSA's authority to control groundwater production and acquire surface water to import into the Plan Area per California Water Code Sections 10726.2 and 10726.4.

4.2.2.3.5 Permitting and Regulatory Process

No additional permitting or regulatory oversight is necessary to implement this management action, which would be undertaken under the Yucaipa GSA's authority per California Water Code Sections 10726.2 and 10726.4.

4.2.2.3.6 Implementation Schedule

This management action requires the purchase of supplemental water as in lieu water in the subsequent water year after the management action is implemented. If no supplemental water is available, then the volume of supplemental water will be held in account for up to 5 years until there is supplemental water available or a reevaluation of the sustainable yield is conducted at the end of the 5-year limit.

4.2.2.3.7 Legal Authority

Yucaipa GSA has the legal authority to operate and regulate the production from water supply wells in the Plan Area per the California Water Code, Section 10726.4; and to import surface water (e.g., SWP water) or other supplemental water per the California Water Code, Section 10726.2. No additional legal authority is required.

4.2.2.3.8 Estimated Costs

The costs associated with the implementation of this management action are based on the volume of groundwater produced in excess of the sustainable yield and the rate of SWP water by SBVMWD per acre-foot. Additional costs may be incurred for the distribution and delivery to the Western Heights Management Area. The estimated costs may vary annually depending on the rate charged by SBVMWD for supplemental water to replenish the Subbasin.

4.2.2.4 San Timoteo Management Area

This management action does not apply to the San Timoteo Management Area.

4.2.3 Management Action No. 3 – Surplus Supplemental Water Spreading

YVWD has purchased SWP water, when available, to artificially recharge the Subbasin via the Wilson Creek and Oak Glen Creek spreading basins (Section 2.5.4; Figure 2-21). This water has helped contribute to the recovery of the North Bench Management Area since it was first used to artificially recharge the Subbasin in 2009. The Yucaipa GSA will continue to obtain, when available, surplus supplemental water to artificially recharge the Subbasin to help maintain groundwater in storage above historical lows.

Surplus supplemental water discharged directly to a spreading basin to facilitate the artificial recharge of the Subbasin will have a separate accounting by the Yucaipa GSA. The surplus supplemental water will be accessible to the water purveyor that purchased the water and percolated it at a spreading basin. This water will be available to help offset production exceedances above the sustainable yield pumping allocations instead of pumping credits earned via Management Action No. 2.

The Yucaipa GSA will conduct a study within the first year of adopting the GSP to estimate the amount of water lost from the point of discharge at a spreading basin to the water table. This study will estimate monthly losses due to evaporation of water from a spreading basin to water retained in the soil column between the bottom of a spreading basin and the underlying water table. The estimate of water loss will be applied to the volume of surplus supplemental water discharged on a monthly basis to a spreading basin. Monthly estimates of water loss are appropriate because evaporative losses in the summer are higher than in the winter. The remaining water will directly recharge the aquifer and be available to the water purveyor that purchased the water. The study will include the existing spreading basins and stormwater capture basins, and proposed basins that may be constructed in the Subbasin. Potential basins in the Calimesa Management Area would be evaluated to assess the effect of artificial recharge on the projected declines in groundwater in storage under the Future Baseline with Climate Change II scenario.

The YIHM was used to simulate the flow of water from the Wilson Creek and Oak Glen Creek spreading basins over the 50-year implementation and planning horizon. The YIHM indicated that water originating from these two spreading basins will remain in the North Bench Management Area over the 50-year period. The YIHM also indicated that water originating at the locations of two potential basins in the Calimesa Management Area would remain in the management area. Consequently, the accounting of surplus supplemental water that directly recharges the aquifer does not include additional losses when the water is in the aquifer.

4.2.3.1 Measurable Objective Expected to Benefit

The measurable objective established for the sustainability indicators of chronic lowering of groundwater levels, reduction in groundwater storage, and land subsidence would benefit from the implementation of this management action.

4.2.3.2 Expected Benefits and Evaluation

This management action provides the Yucaipa GSA with an accounting methodology to purchase surplus supplemental water and directly recharge the Subbasin. This water will be accessible to the water purveyor that purchased the water and directed it to a spreading basin. The water may be used to help offset pumping exceedances over the sustainable yield pumping allocation.

4.2.3.3 Circumstances for Implementation

This management action will be implemented when a water purveyor purchases surplus supplemental water and directly recharges the Subbasin. This management action already applies to YVWD in that YVWD has discharged surplus SWP to the Wilson Creek and/or Oak Glen Creek spreading basins in the North Bench Management Area since 2009 (Figure 2-21). The amount of surplus water available to YVWD will be calculated following the study estimating water losses from the point of discharge to the water table and retroactively applied to the initial discharge of 48 AF to the Oak Glen Creek spreading basin in 2009.

4.2.3.4 Public Noticing

Public noticing is not required for this management action, which would be undertaken under the Yucaipa GSA's authority to acquire surface water to import into the Plan Area per the California Water Code Section 10726.2.

4.2.3.5 Permitting and Regulatory Process

No additional permitting or regulatory oversight is necessary to implement this management action at existing spreading basins, which would be undertaken under the Yucaipa GSA's authority per the California Water Code Section 10726.2. New spreading basins or direct injection wells would require permitting and regulatory process services before installation and use. The Yucaipa GSA will complete the appropriate permitting and regulatory requirements to facilitate the design, installation, and operation of new facilities to enhance the recharge of surplus supplemental water in the Subbasin.

4.2.3.6 Implementation Schedule

This management action will be implemented when surplus supplemental water is available and purchased to directly recharge the Subbasin.

4.2.3.7 Legal Authority

Yucaipa GSA has the legal authority to import surface water (e.g., SWP water) or other supplemental water per the California Water Code, Section 10726.2. No additional legal authority is required.

4.2.3.8 Estimated Costs

The costs associated with the implementation of this management action are based on the volume of surplus supplemental water purchased from the regionals and the costs for directing the water to spreading basins to artificially recharge the Subbasin. The estimated costs may vary annually depending on the rate charged by SBVMWD and/or SGPWA for surplus supplemental water to replenish the Subbasin.

4.3 Projects

Currently, the Plan Area is not experiencing undesirable results with regard to the chronic lowering of groundwater elevations, reduction of groundwater in storage, land subsidence, and depletion of surface water as a result of groundwater production from the principal aquifer that threatens GDEs. The importation of SWP water as a supplemental source of water, both as direct use and through artificial recharge in the various spreading basins, has allowed the Yucaipa GSA member agencies to reduce groundwater production in the North Bench, Calimesa, and Western Heights Management Areas to levels below their respective estimated sustainable yields. Groundwater production by private well owners in the San Timoteo Management Area has not caused significant and unreasonable effects related to the sustainability indicators per the Sustainable Groundwater Management Act. The Subbasin is currently managed sustainably.

Measurable objectives defined for the North Bench, Calimesa, and Western Heights Management Areas were based on volumes of groundwater in storage that represent historical low conditions in the Calimesa and Western Heights Management Areas or conditions that are above historical lows in the North Bench Management Area. The measurable objective defined for the San Timoteo Management Area was based on the presence of GDEs and maintaining a water table elevation within 20 feet bgs to sustain the GDEs.

Management actions (Section 4.2) were defined to achieve sustainable management of the groundwater resources in the Plan Area should groundwater elevations decline below measurable objectives. These actions will be implemented if groundwater levels decline to the drought buffers established for the North Bench, Calimesa, and Western Heights Management Areas. The drought buffers provide operational flexibility for the Yucaipa GSA to implement these management actions and/or other programs to prevent undesirable results.

Some of the member agencies of the Yucaipa GSA have constructed stormwater capture basins to enhance recharge to the Subbasin (Table 4-6). The Wilson Creek and Oak Glen Creek spreading basins are designed to capture stormwater and are used to artificially recharge the Subbasin using surplus SWP water delivered by the SWP East Branch Extension. These basins are included in the YIHM to simulate their contributions to recharge to the Subbasin. The Wilson Creek and Oak Glen Creek basins have contributed an average 1,900 AFY and 170 AFY, respectively, of SWP water since 2011 (Table 2C-5). The other existing stormwater capture basins are estimated to capture approximately 1,800 AFY. Recharge at these basins was not included in the future water budget analyses for the North Bench and Western Heights Management Areas using the YIHM, because these management areas are sustainably managed and are projected to not experience undesirable results over the 50-year planning and implementation horizon. However, these planned projects will provide additional opportunities to capture and recharge stormwater flows, thereby reducing the reliance on imported water to meet the basin measurable objectives.

The Yucaipa GSA identified proposed projects that have been designed, permitted, and are undergoing development or will in the near future. These include the Wilson Creek III Basins, the Pendleton Avenue Low Water Crossing, and the Upper Wildwood Creek Basin (Table 4-7). These basins are designed to capture stormwater flows and enhance recharge to the Subbasin. The estimated average annual recharge contribution is approximately 1,500 AF. These basins will be located in the North Bench Management Area. As with the existing basins, these planned basins were not included in the future water budget analyses for the North Bench Management Area using the YIHM, because the North Bench Management Area is not projected to experience undesirable results over the 50-year planning and implementation horizon.

The Yucaipa GSA is evaluating potential sites to construct and operate spreading basins to enhance recharge in the Calimesa Management Area. The YIHM predicts that groundwater elevations will decline below the measurable objective under the Future Baseline with Climate Change II scenario within the 50-year planning and implementation horizon. Therefore, in addition to the management actions described in Section 4.2.1.2, Calimesa Management Area, the potential construction of one or two spreading basins will benefit users in this management area. The Yucaipa GSA will evaluate the proposed basin(s) after more details of their construction and operation are developed. The basins will be included in the YIHM and evaluated during the 5-year evaluation study after this GSP is adopted.

Table 4-6. Existing Surface Water Spreading Basins in the Yucaipa Subbasin

Existing Projects	Lead Agency/ Designer	Latitude	Longitude	Management Area	Hydrogeologic Subarea	Source Water	Estimated Annual Increase in Groundwater Recharge (AFY)
Tennessee St. Basins	City of Yucaipa	34.034215°	−117.105489°	Western Heights	Western Heights	Stormwater	300
Fremont Avenue Low Water Crossing	City of Yucaipa	34.051403°	−117.026008°	North Bench	Gateway	Stormwater	300
Dunlap Channel Basins	City of Yucaipa	34.030576°	−117.096333°	Western Heights	Western Heights	Stormwater	600
Oak Glen Creek Basins	City of Yucaipa	34.044545°	−117.031828°	North Bench	Wilson Creek/ Gateway	Stormwater	170
Wildwood Creek Basins	City of Yucaipa	34.014461°	−117.018201°	North Bench	Oak Glen	Stormwater	600
Wildwood Channel	City of Yucaipa	34.01292°	−117.04551°	Calimesa	Calimesa	Stormwater	
Wilson Creek Spreading Basins	City of Yucaipa	34.05°	−117.03°	North Bench	Gateway	Stormwater/ SWP Water	1,900

Notes: AFY = acre-feet per year; SWP = State Water Project.

Table 4-7. Planned Surface Water Spreading Basins in the Yucaipa Subbasin

Existing/ Proposed Projects	Lead Agency/ Designer	Latitude	Longitude	Management Area	Hydrogeological Subarea	Source Water	Estimated Annual Increase in Groundwater Recharge (AFY)	Estimated Decrease in Annual Groundwater Production (AF)
Wilson Creek III Basins	City of Yucaipa	34.044446°	−117.042468°	North Bench	Gateway	SWP Water / Stormwater	750	—
Pendleton Avenue Low Water Crossing	City of Yucaipa	34.046855°	−117.018298°	North Bench	Oak Glen	Stormwater	500	—
Upper Wildwood Creek Basin	City of Yucaipa	34.014126°	−116.999070°	North Bench	Oak Glen	Stormwater	250	—
Salinity and Groundwater Enhancement	YVWD	34.006887°	−117.095094°	—	—	Recycled Water	—	5,000

Notes: AFY = acre-feet per year; AF = acre-feet; SWP = State Water Project; YVWD = Yucaipa Valley Water District.

Figure 4-1. Predicted Volume in Storage by the Future Baseline and Future Baseline with Climate Change I and II Scenarios and Drought Buffer in the Calimesa Management Area

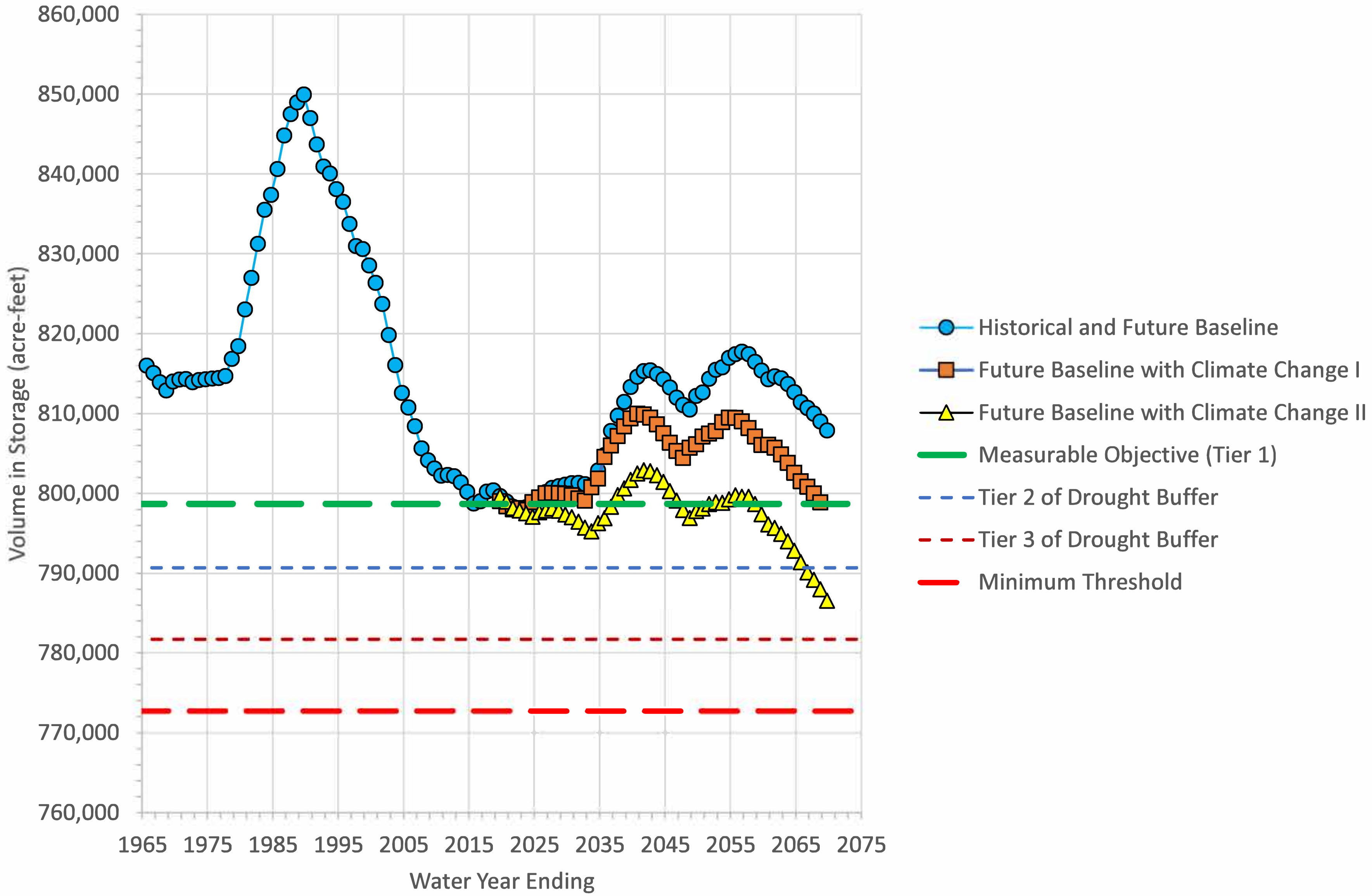

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Figure 4-2. Predicted Hydraulic Heads and Management Action Tiers at South Mesa 7 in the Calimesa Management Area

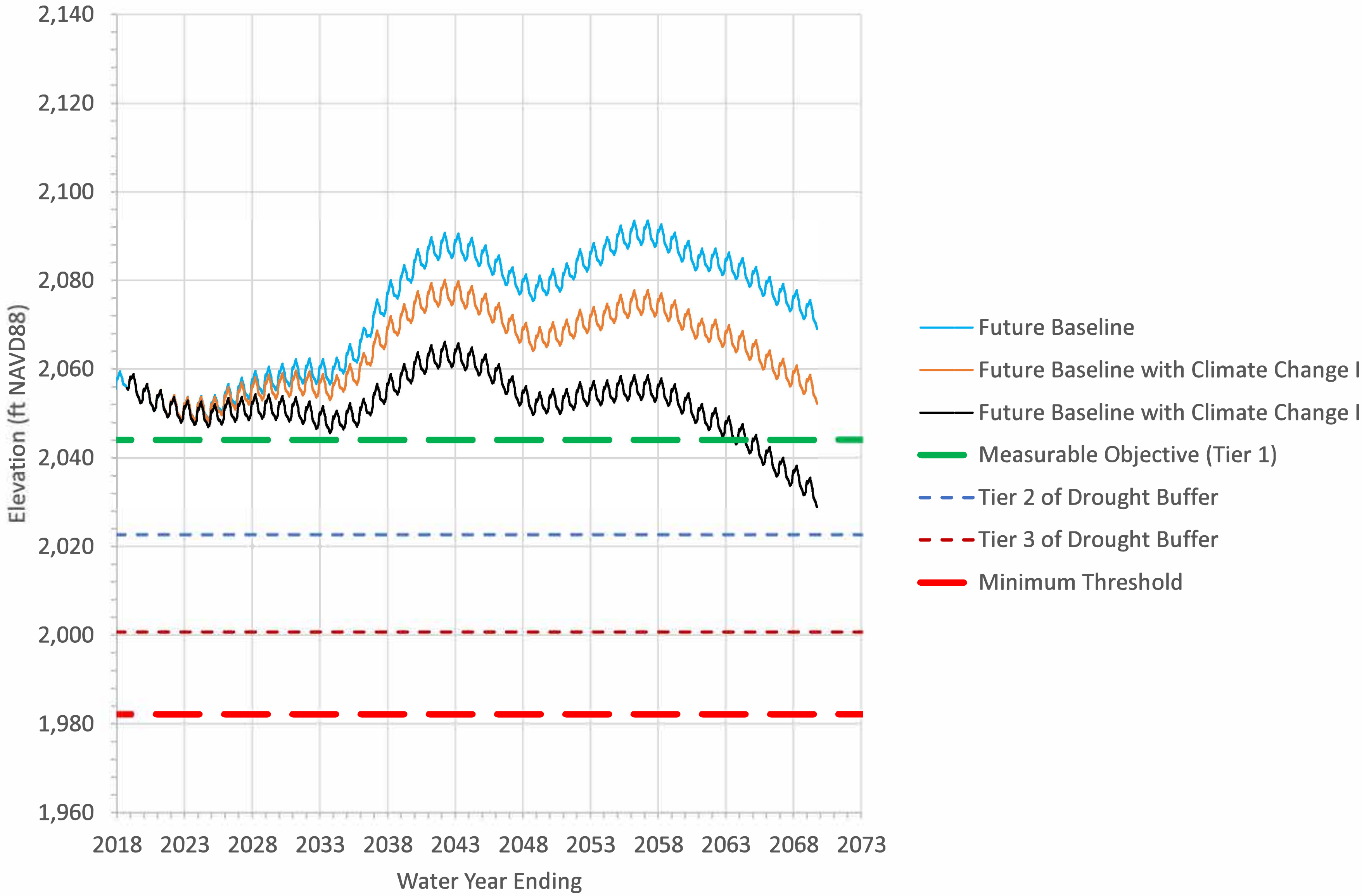

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Figure 4-3. Predicted Hydraulic Heads and Management Action Tiers at South Mesa 9 in the Calimesa Management Area

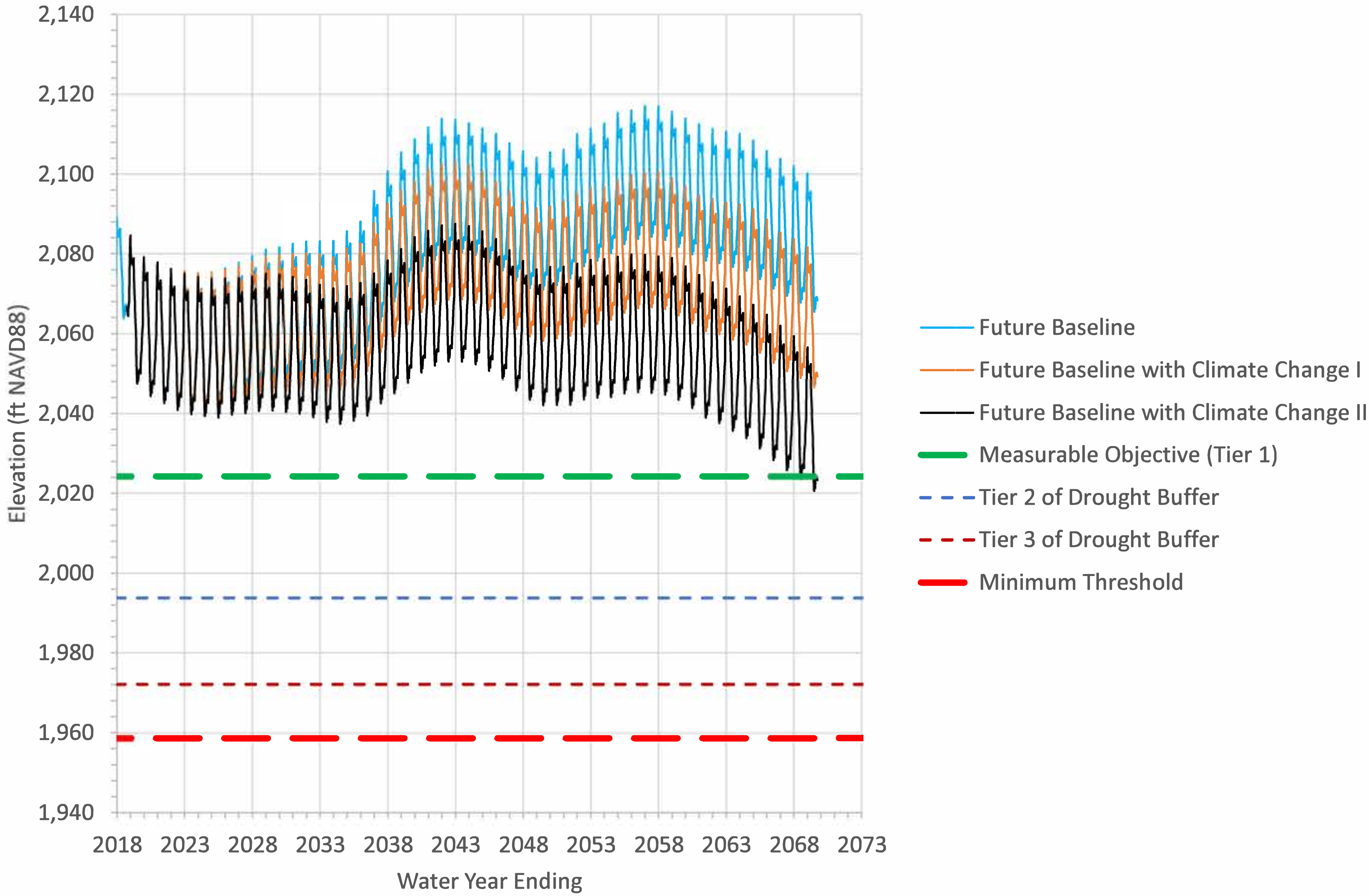

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Figure 4-4. Predicted Hydraulic Heads and Management Action Tiers at South Mesa 12 in the Calimesa Management Area

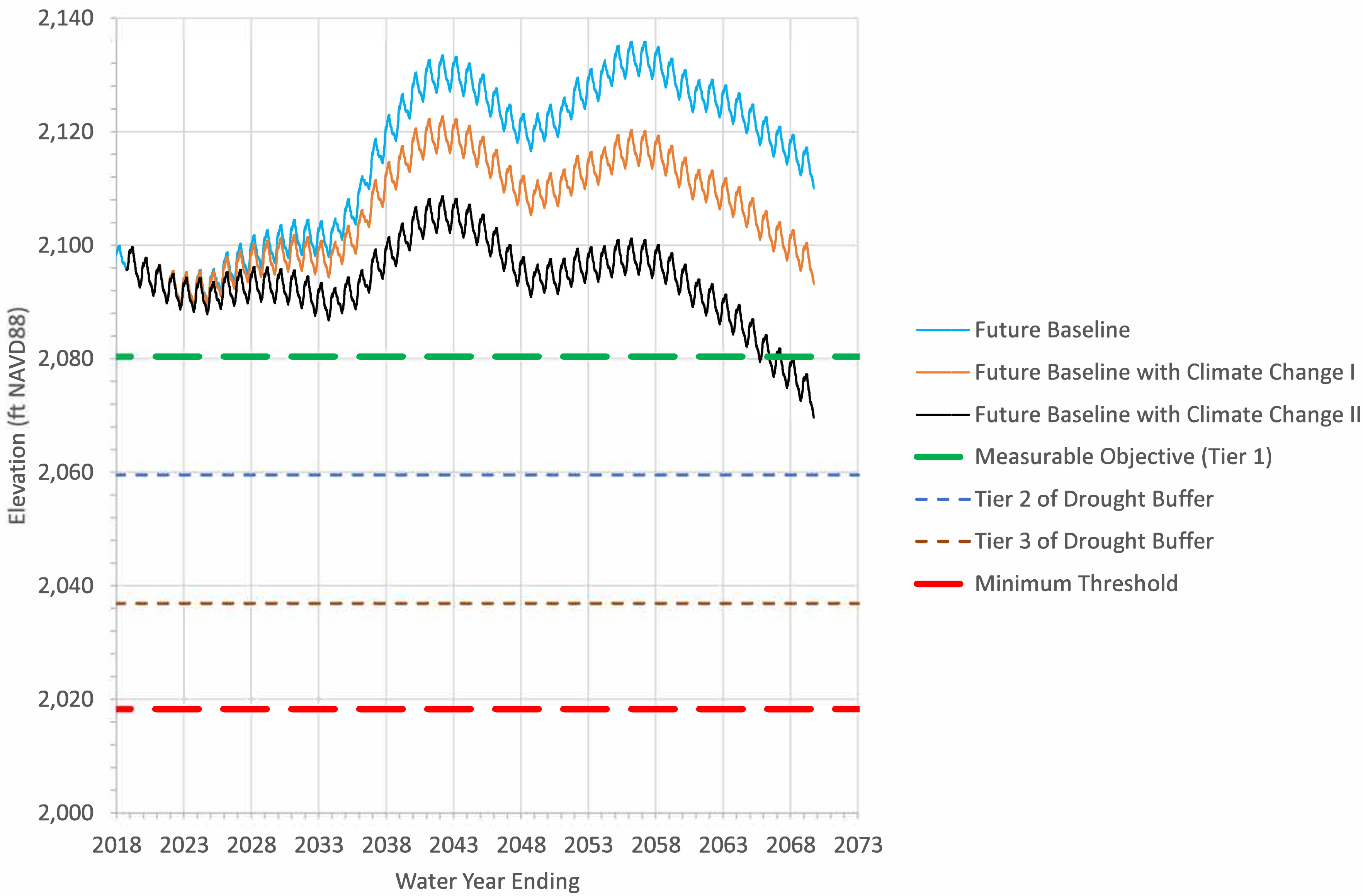

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Figure 4-5. Predicted Hydraulic Heads and Management Action Tiers at South Mesa 17 in the Calimesa Management Area

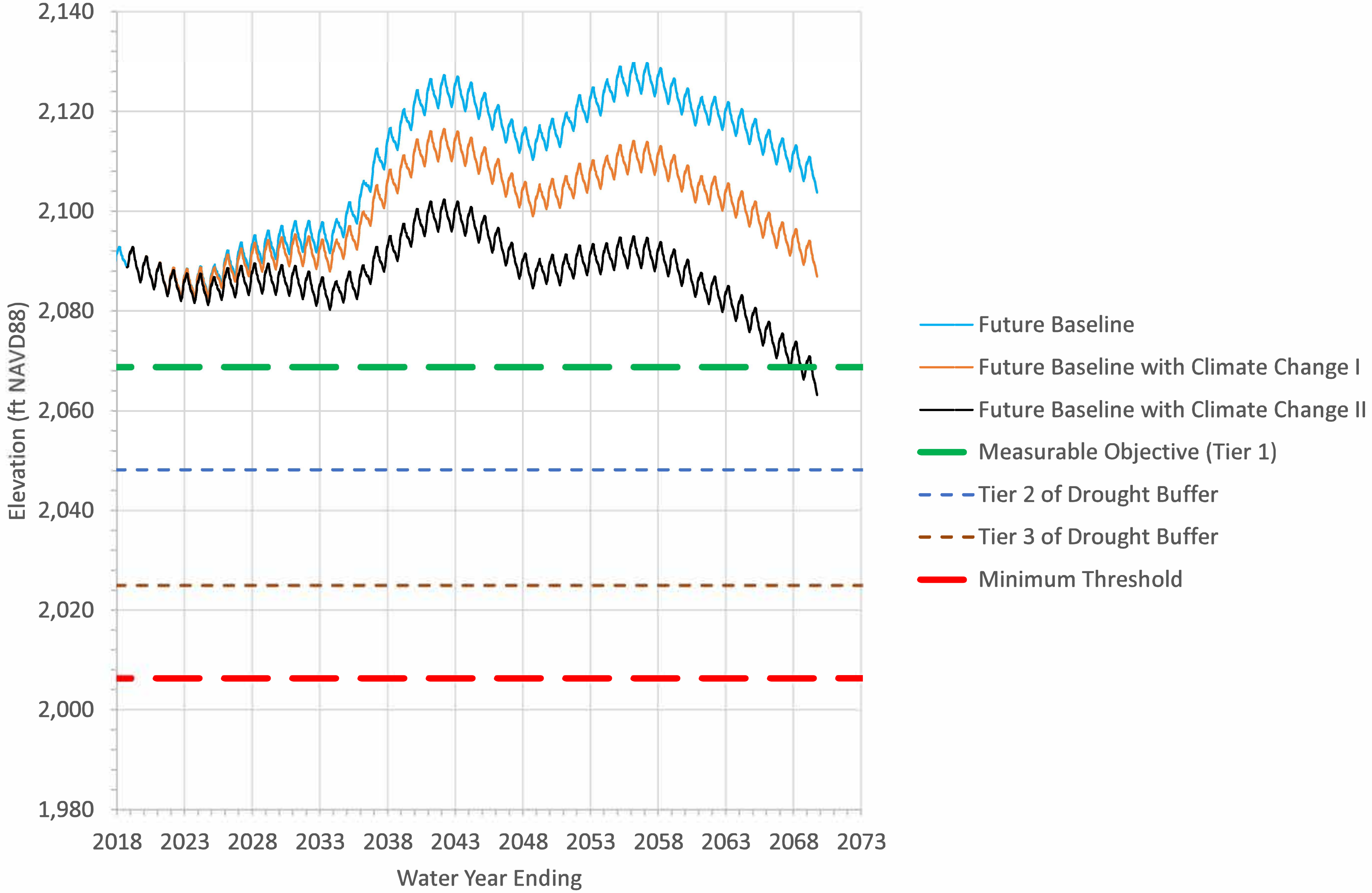

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Figure 4-6. Predicted Hydraulic Heads and Management Action Tiers at YVWD-10
in the Calimesa Management Area

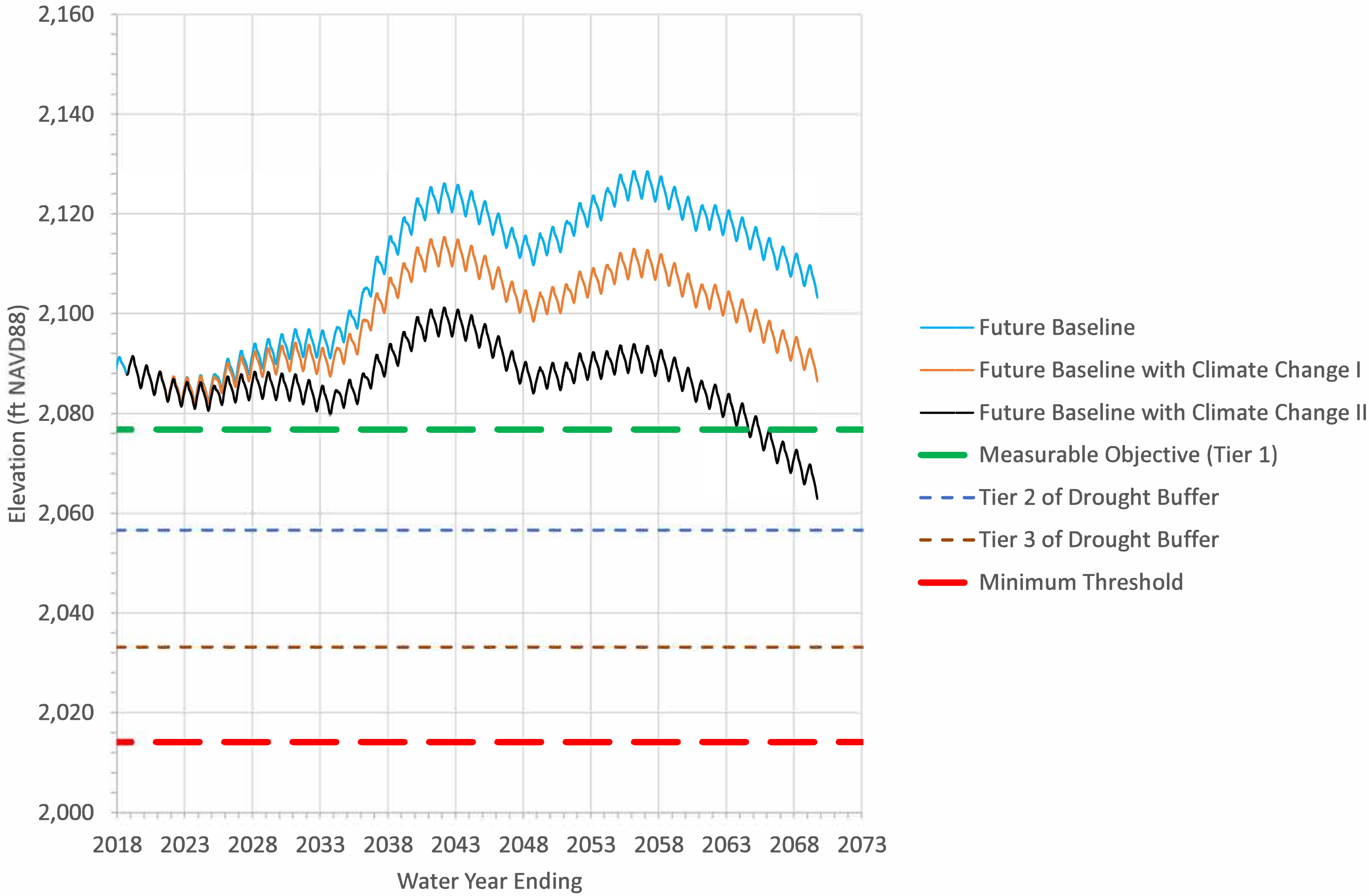

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Figure 4-7. Predicted Hydraulic Heads and Management Action Tiers at YVWD-12
in the Calimesa Management Area

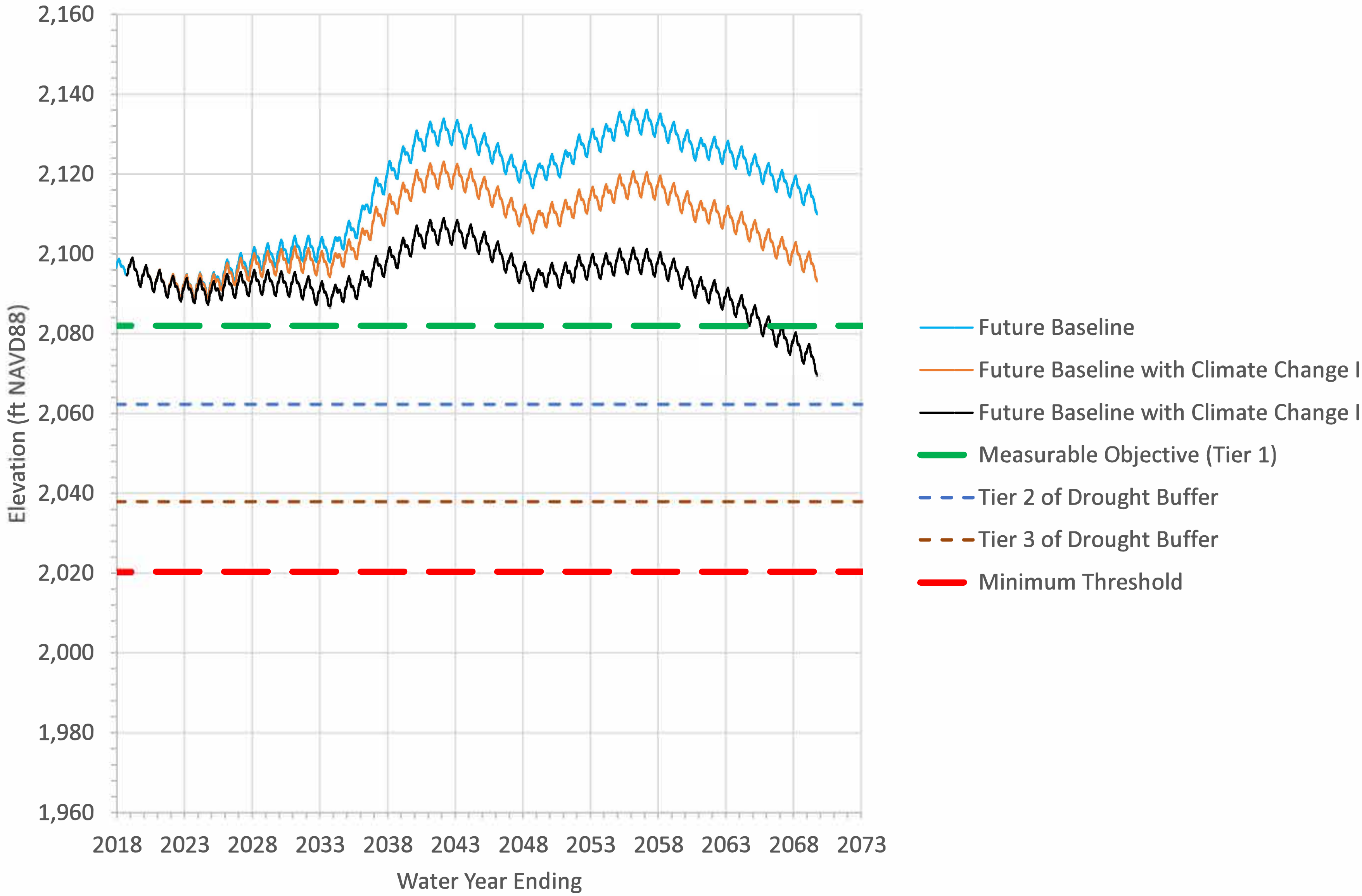

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Figure 4-8. Predicted Hydraulic Heads and Management Action Tiers at YVWD-24 in the Calimesa Management Area

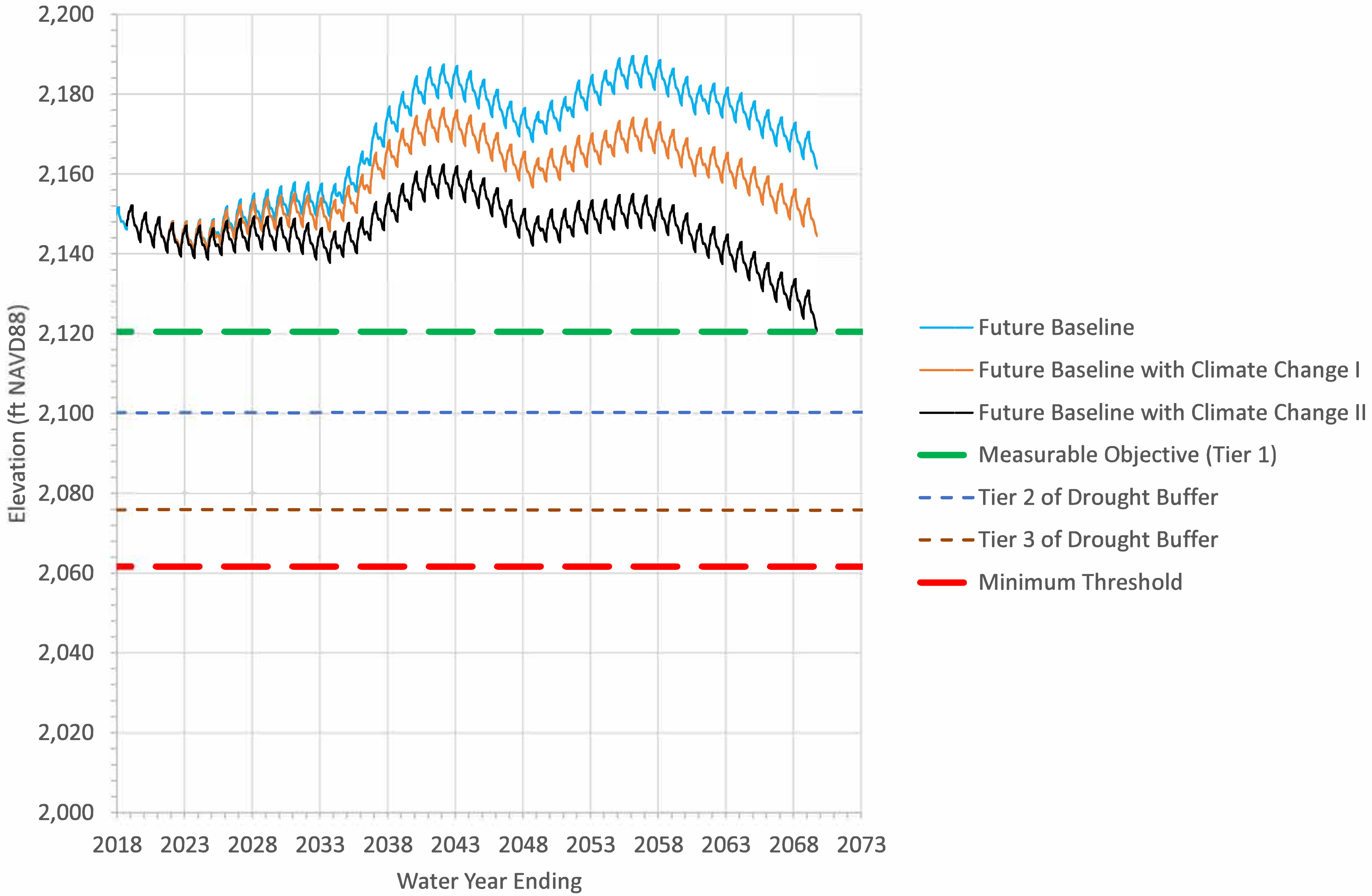

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Figure 4-9. Predicted Hydraulic Heads and Management Action Tiers at YVWD-49 in the Calimesa Management Area

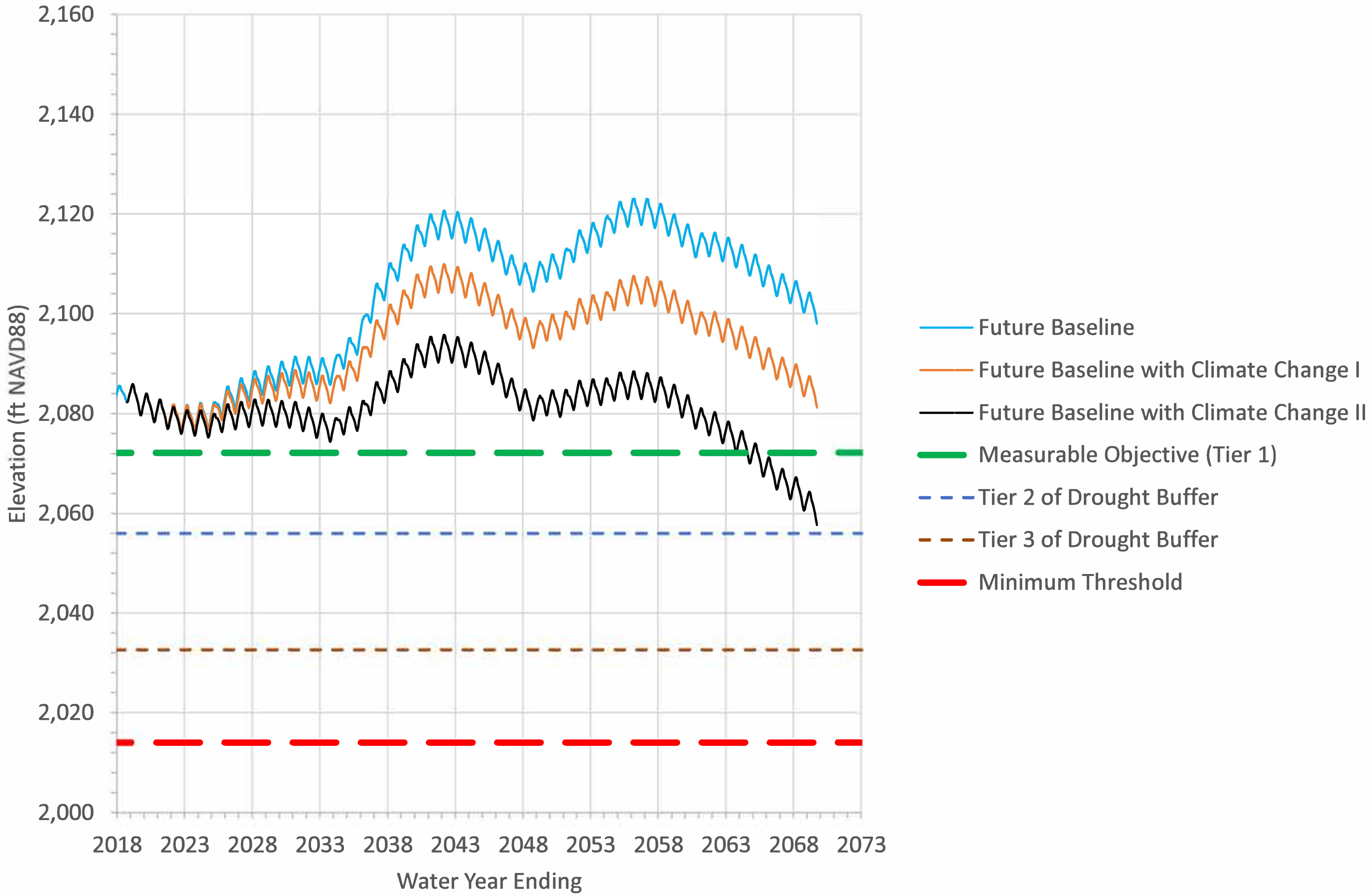

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Figure 4-10. Predicted Hydraulic Heads and Management Action Tiers at Hog Canyon 2 in the Calimesa Management Area

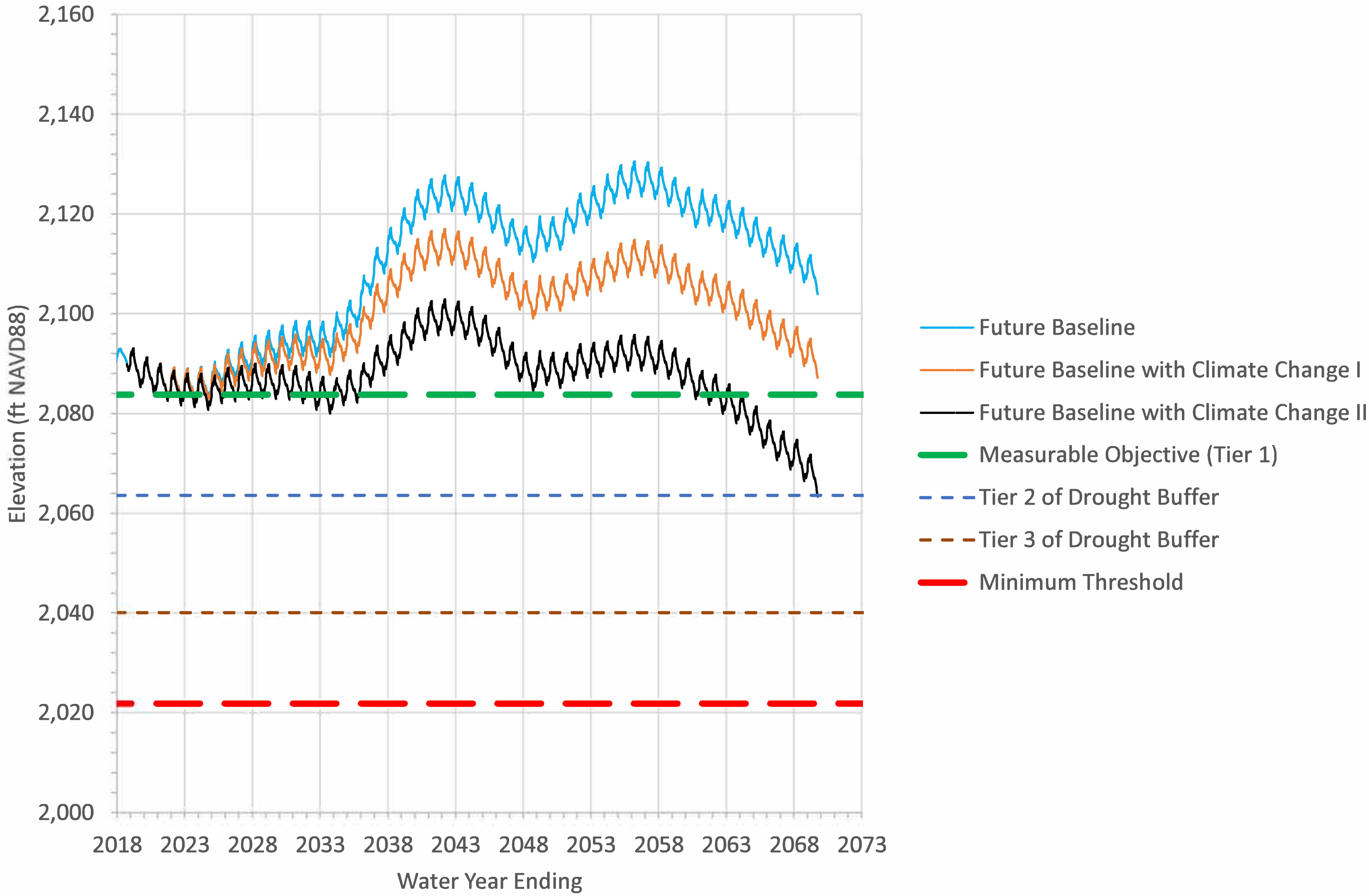

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Figure 4-11. Predicted Hydraulic Heads and Management Action Tiers at USGS Equestrian Park #1 Well in the Calimesa Management Area

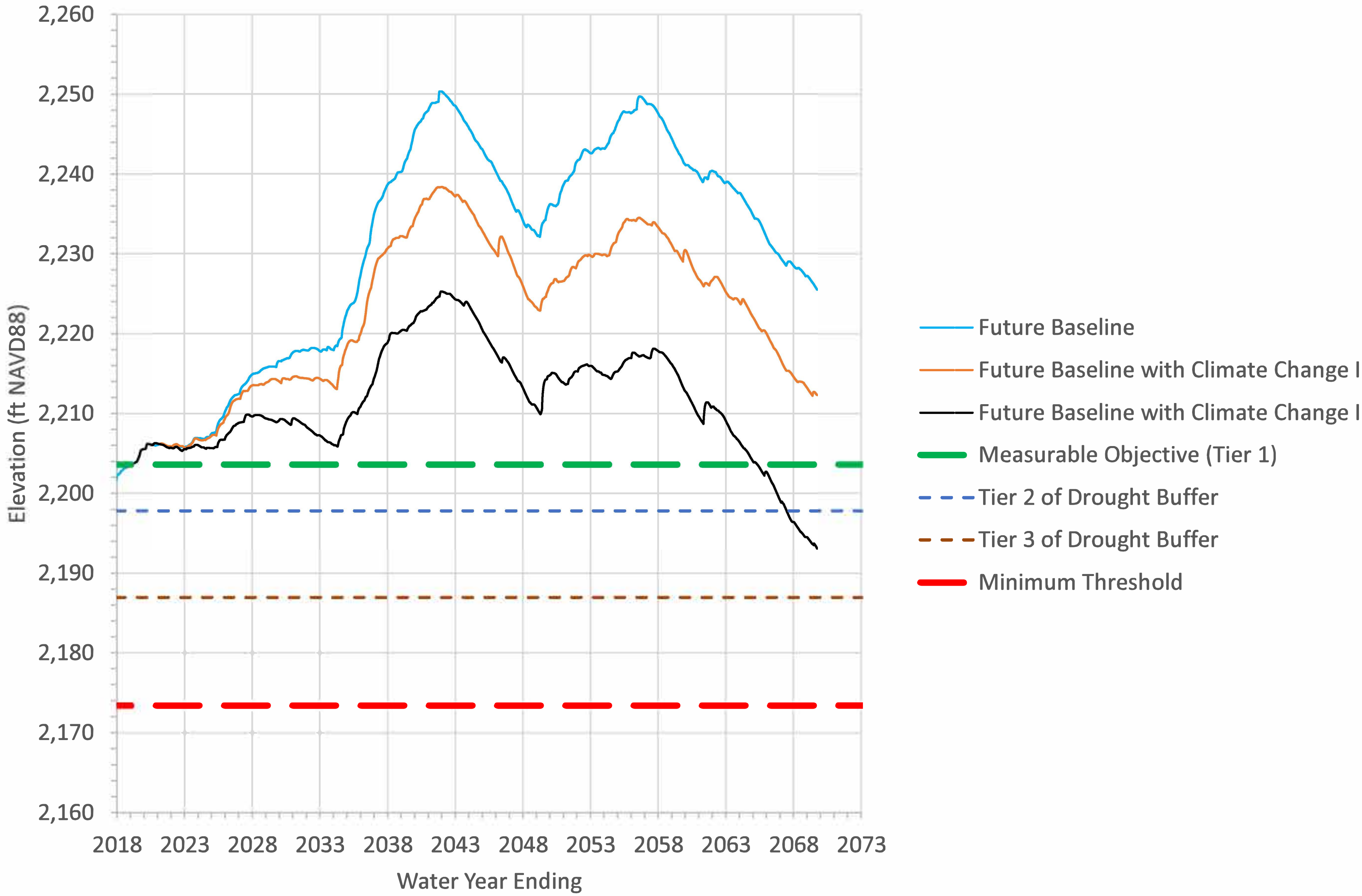

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Figure 4-12. Predicted Hydraulic Heads and Management Action Tiers
at USGS Equestrian Park #4 Well in the Calimesa Management Area

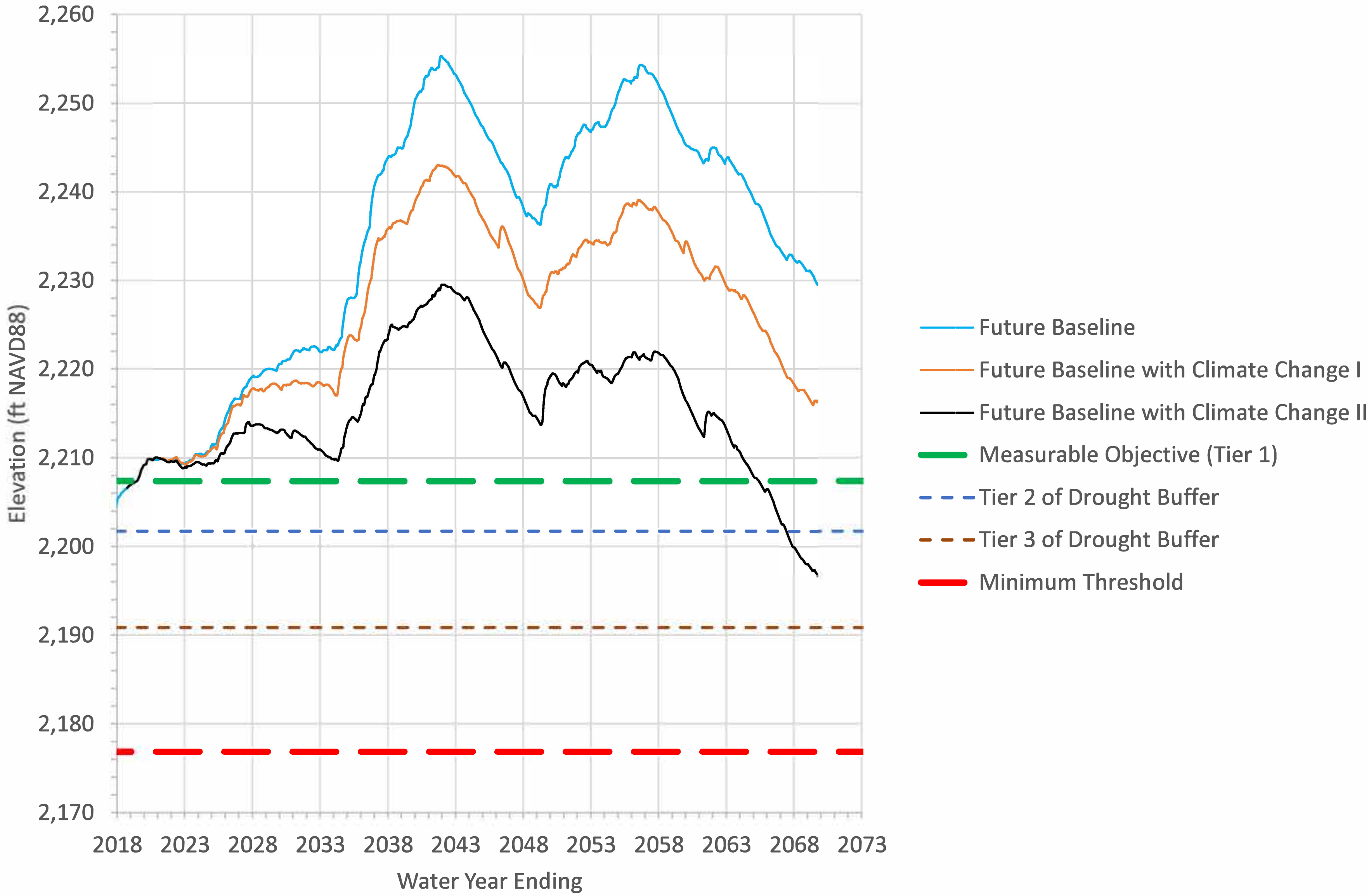

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Figure 4-13. Predicted Hydraulic Heads and Management Action Tiers
at USGS 6th Street #1 Well in the Calimesa Management Area

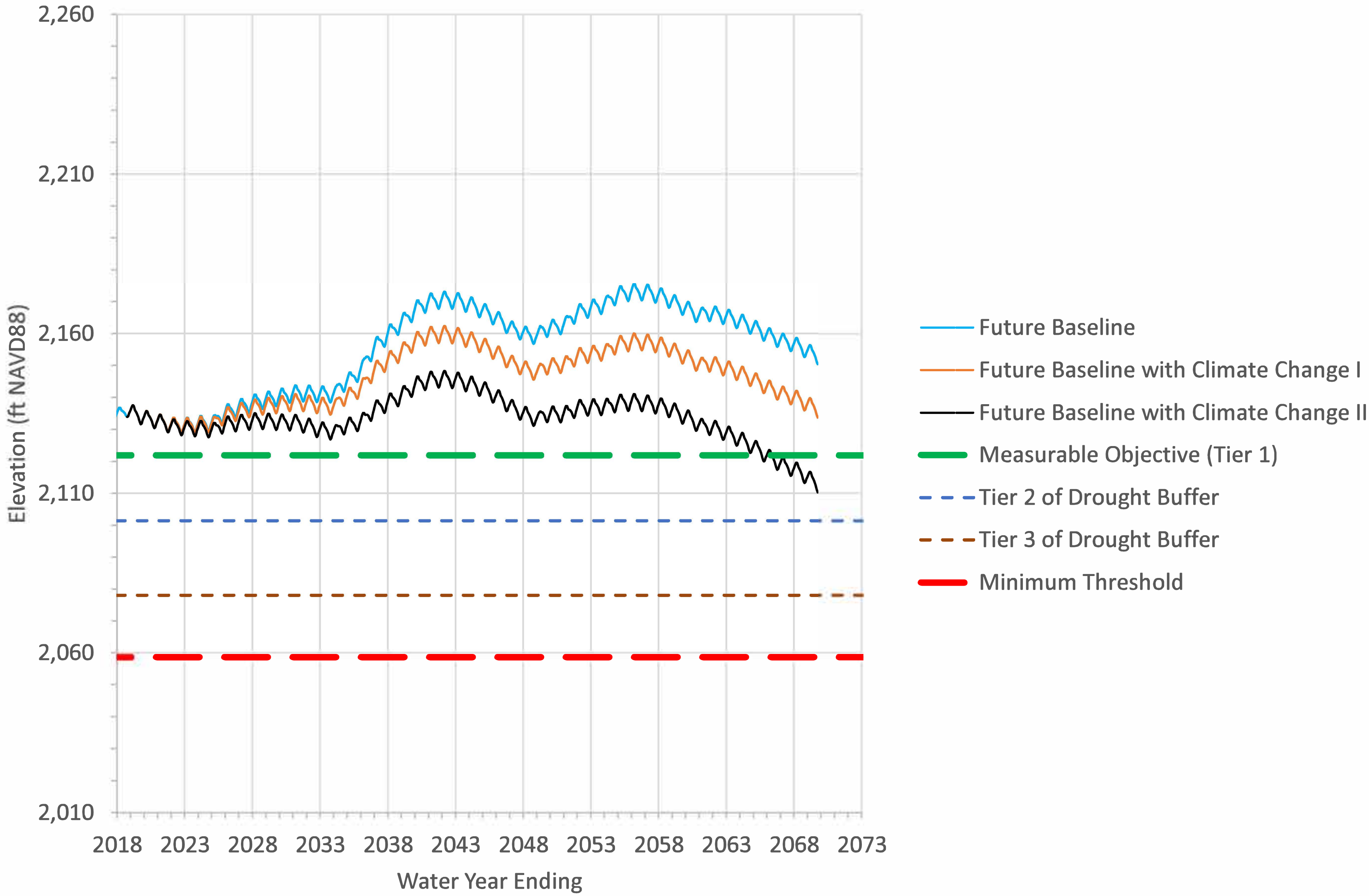

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Figure 4-14. Predicted Hydraulic Heads and Management Action Tiers at USGS 6th Street #4 Well in the Calimesa Management Area

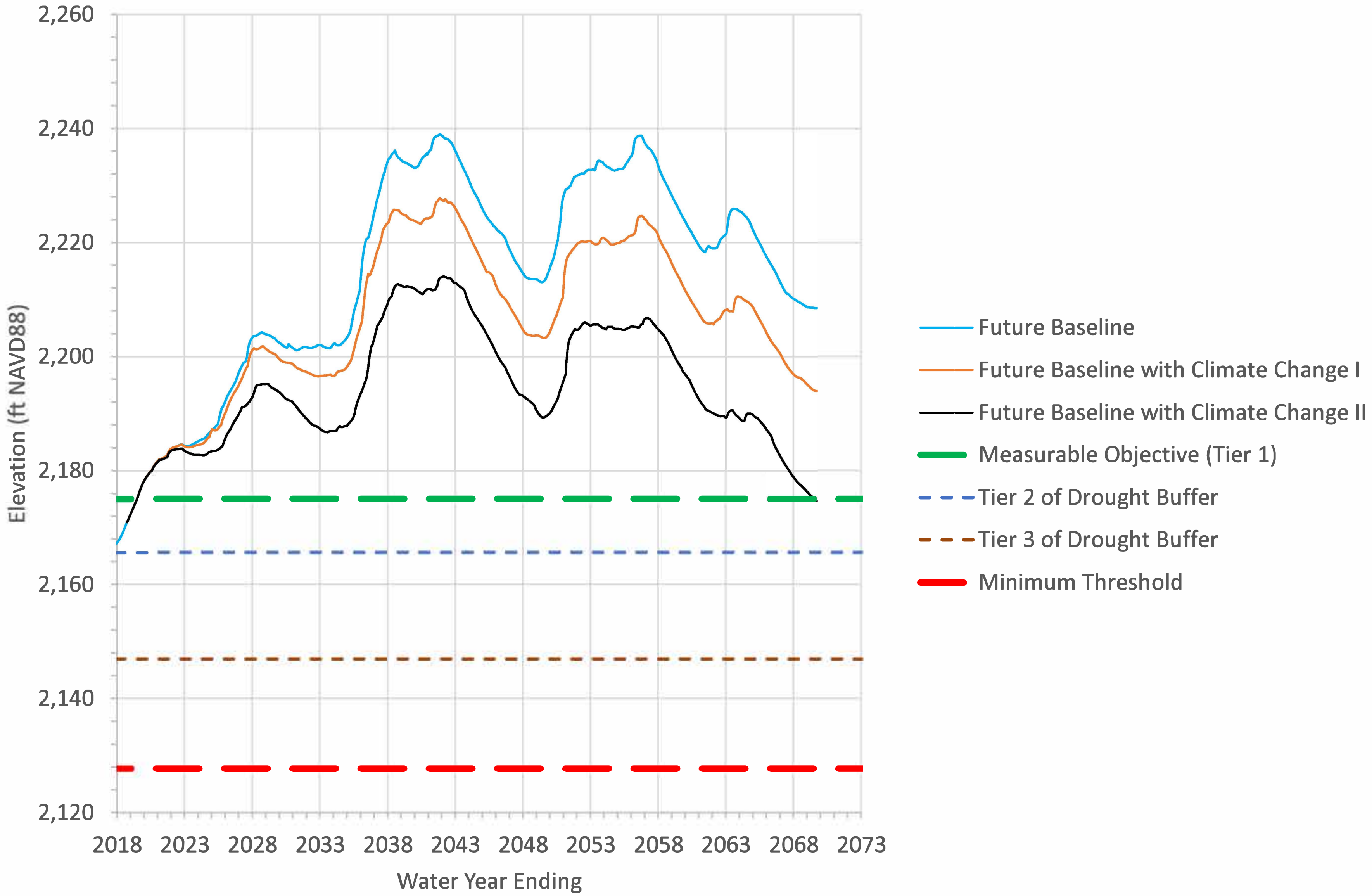

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Figure 4-15. Predicted Volume in Storage by the Future Baseline and Future Baseline with Climate Change I and II Scenarios and Management Action Tiers in the Western Heights Management Area

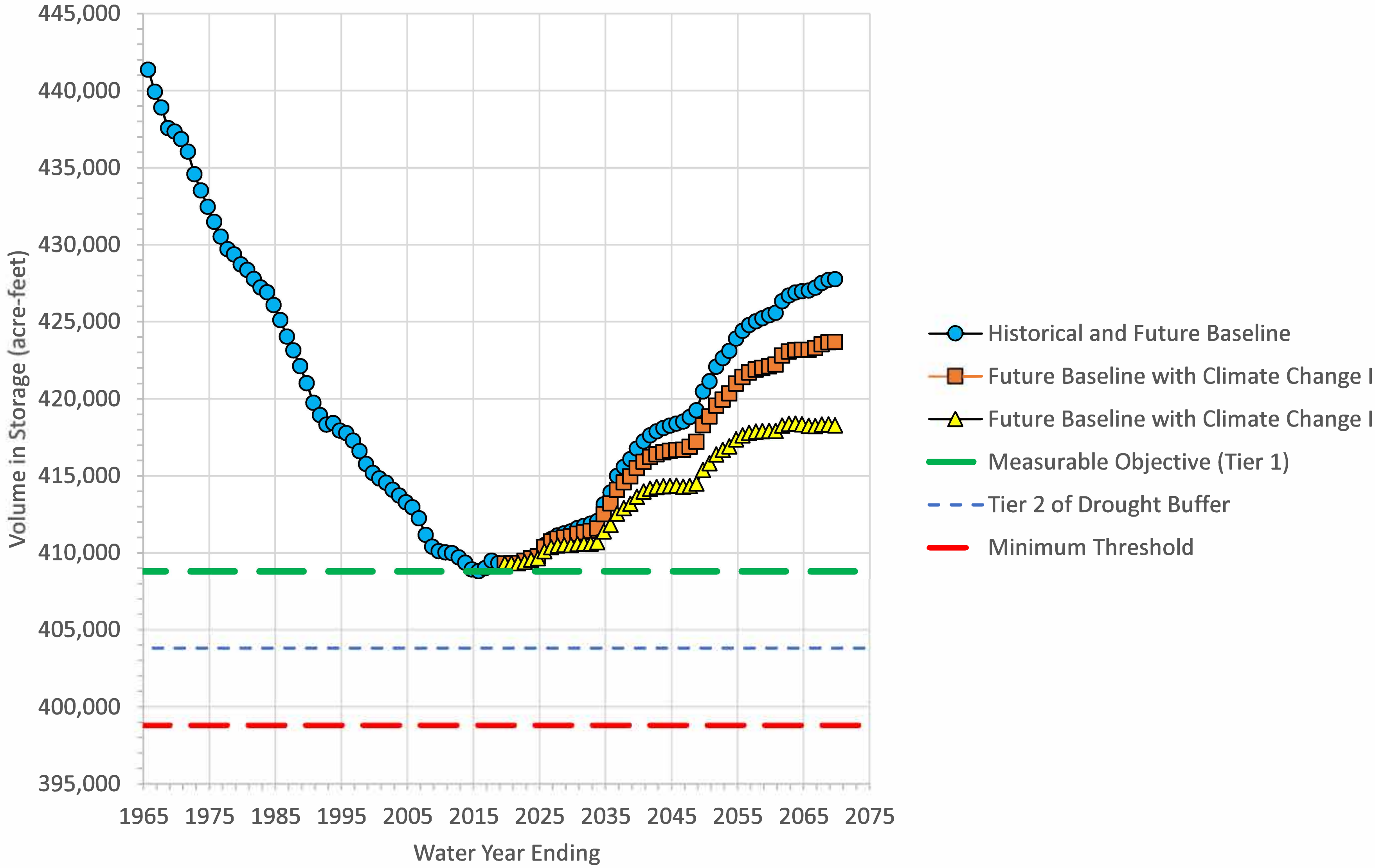

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Figure 4-16. Predicted Simulated Hydraulic Heads and Management Action Tiers
at WHWC-02A in the Western Heights Management Area

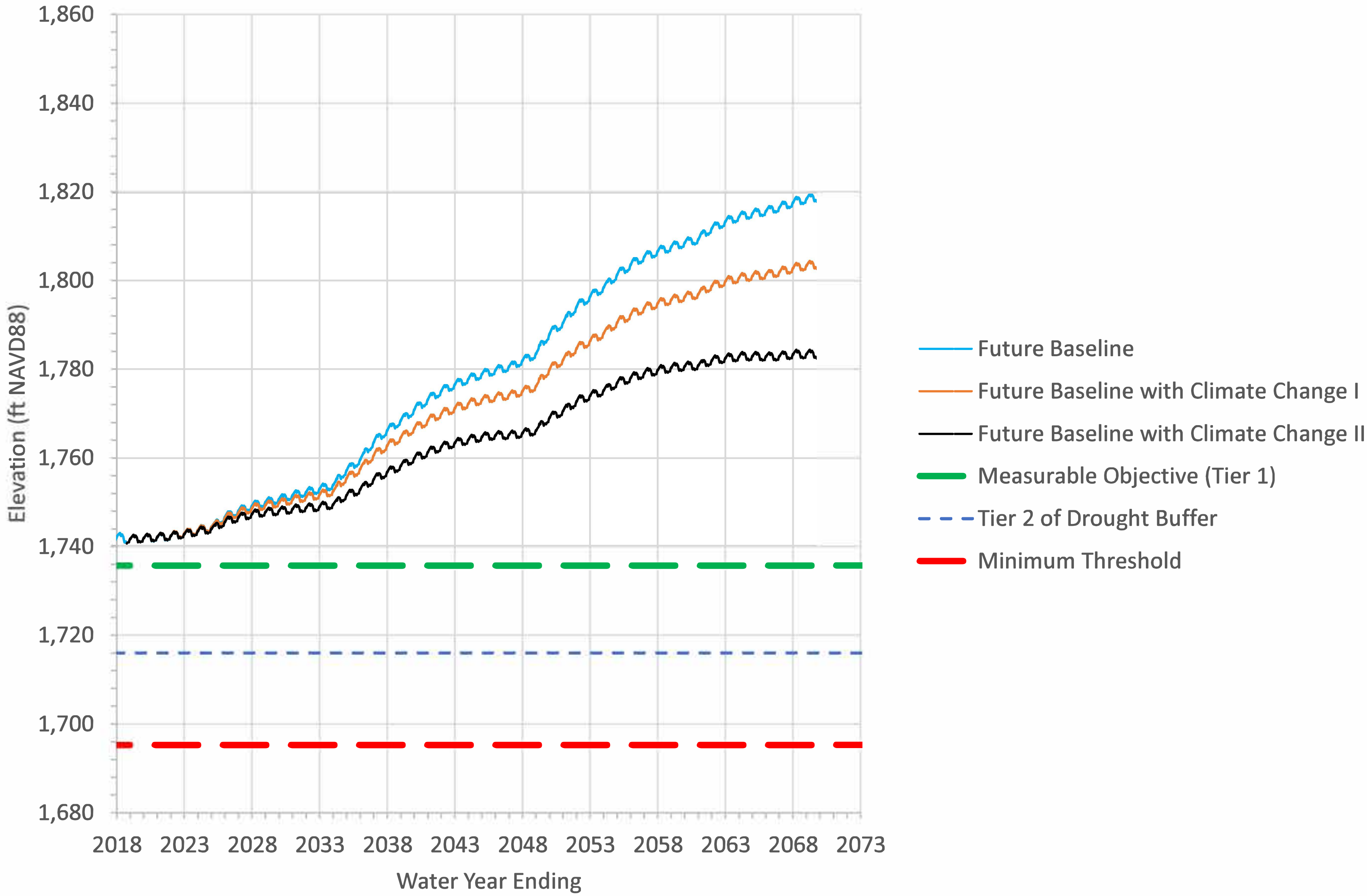

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Figure 4-17. Predicted Simulated Hydraulic Heads and Management Action Tiers at WHWC-10 in the Western Heights Management Area

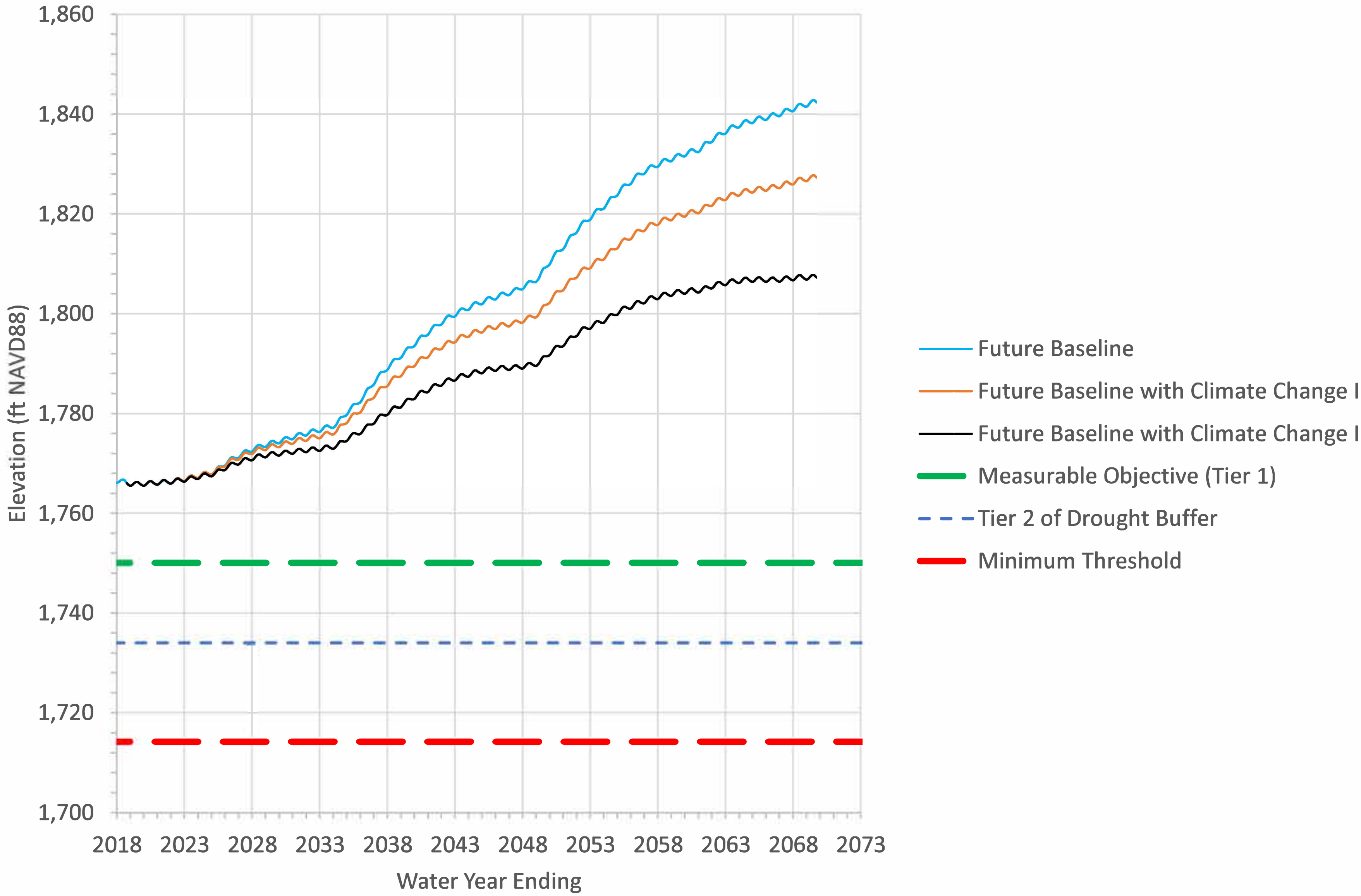

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Figure 4-18. Predicted Simulated Hydraulic Heads and Management Action Tiers at WHWC-11 in the Western Heights Management Area

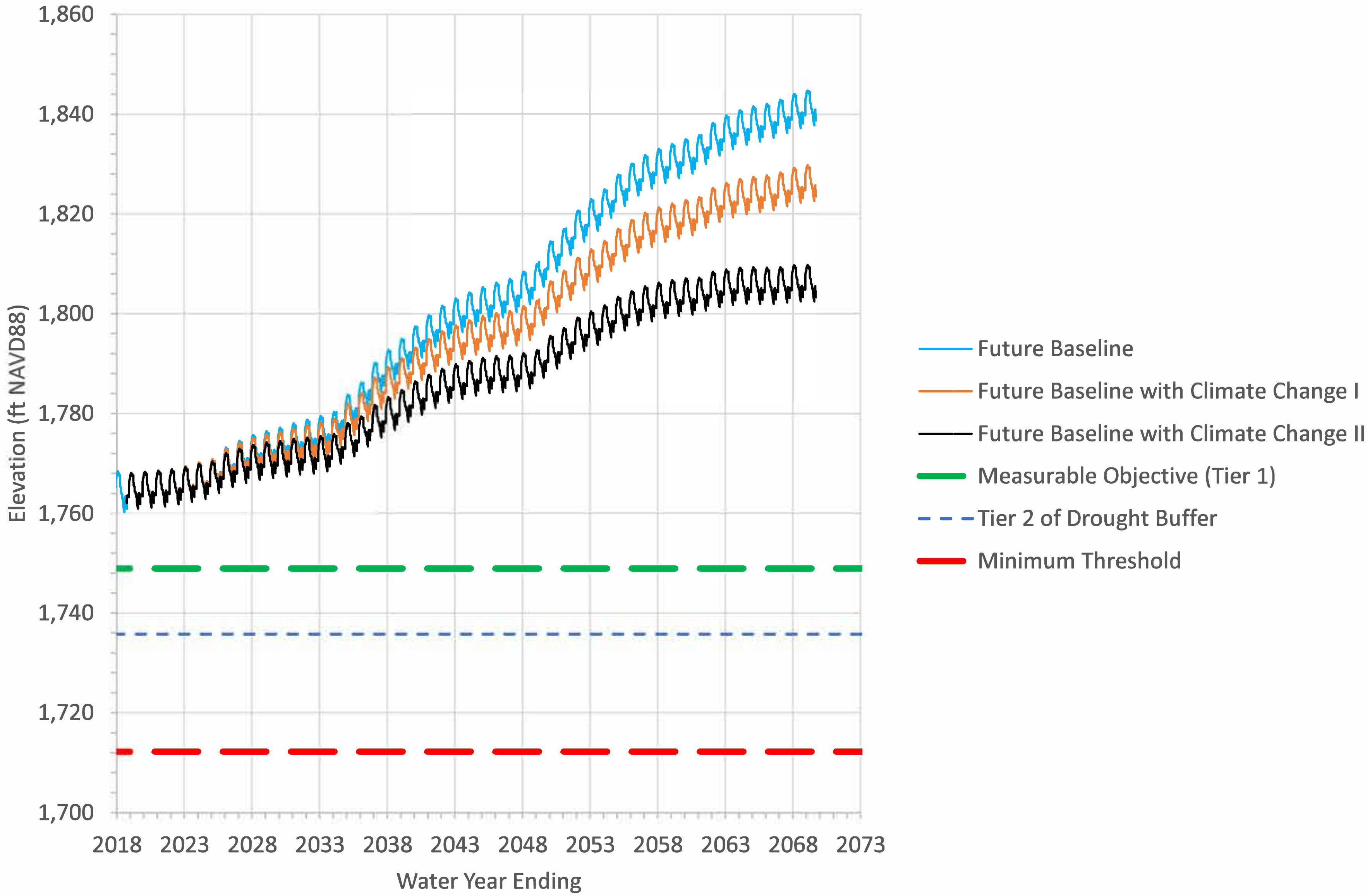

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Figure 4-19. Predicted Simulated Hydraulic Heads and Management Action Tiers at WHWC-12 in the Western Heights Management Area

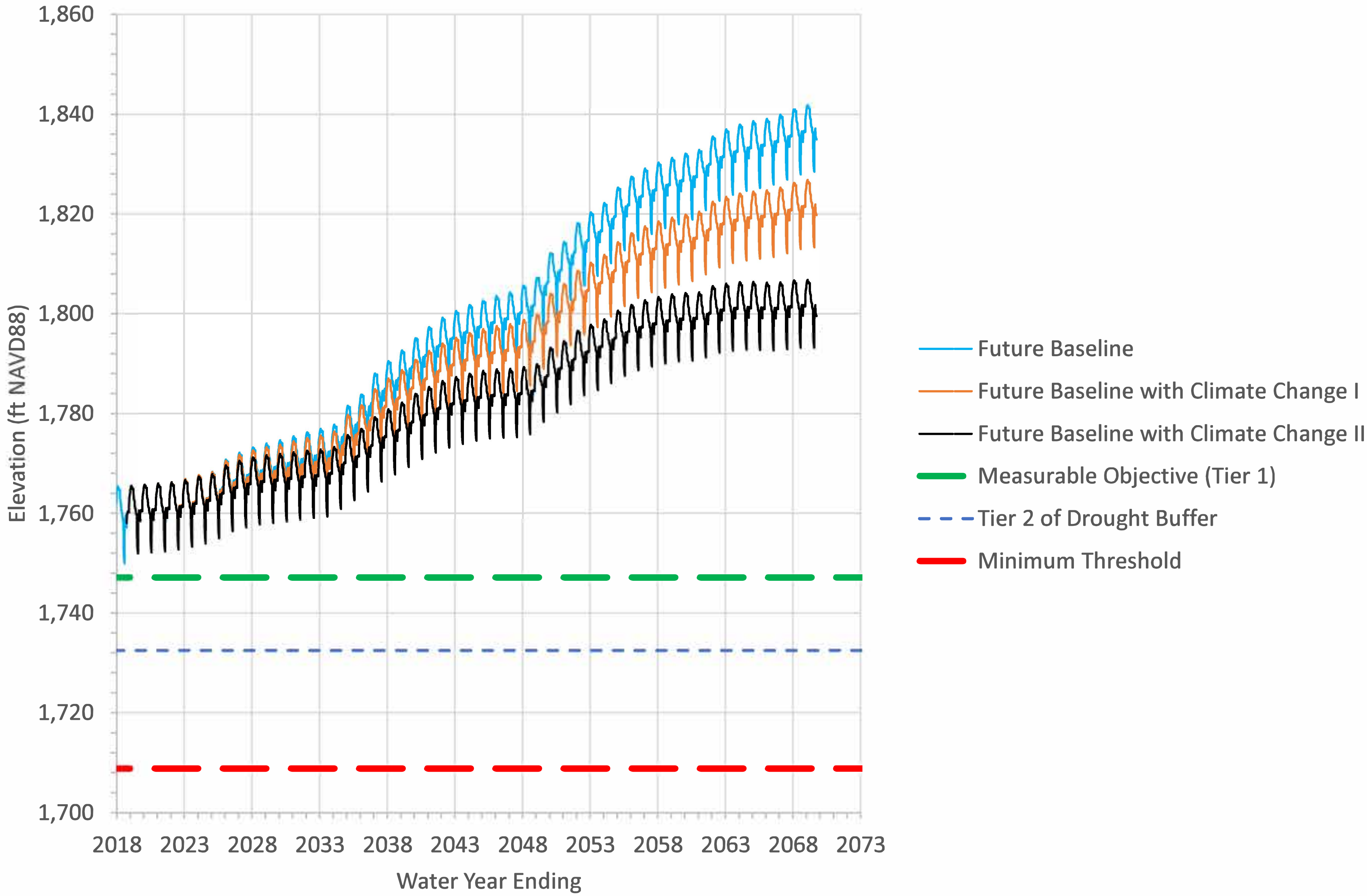

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Figure 4-20. Predicted Simulated Hydraulic Heads and Management Action Tiers at WHWC-14 in the Western Heights Management Area

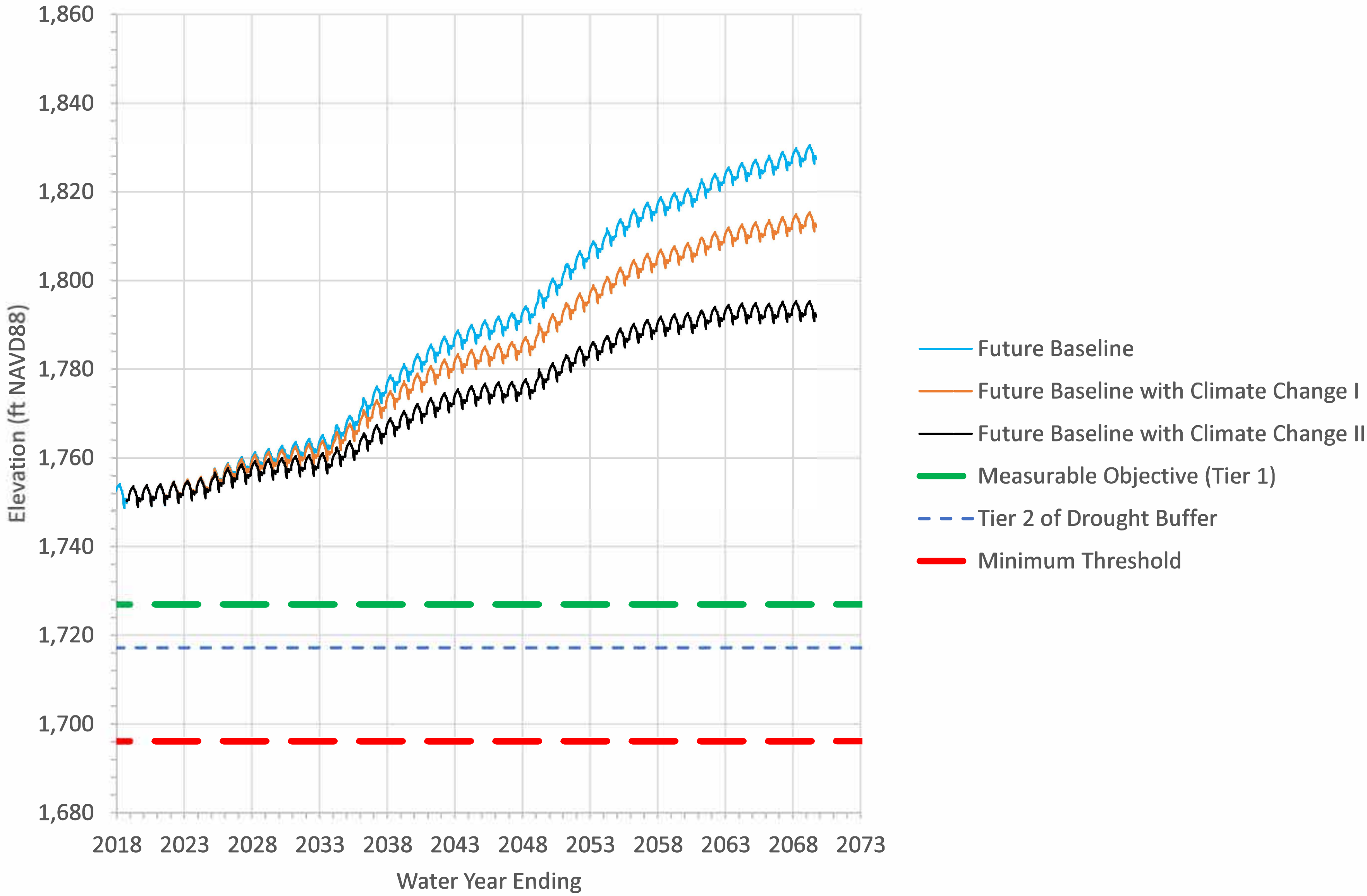

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Figure 4-21. Predicted Simulated Hydraulic Heads and Management Action Tiers at USGS Dunlap #2 Well in the Western Heights Management Area

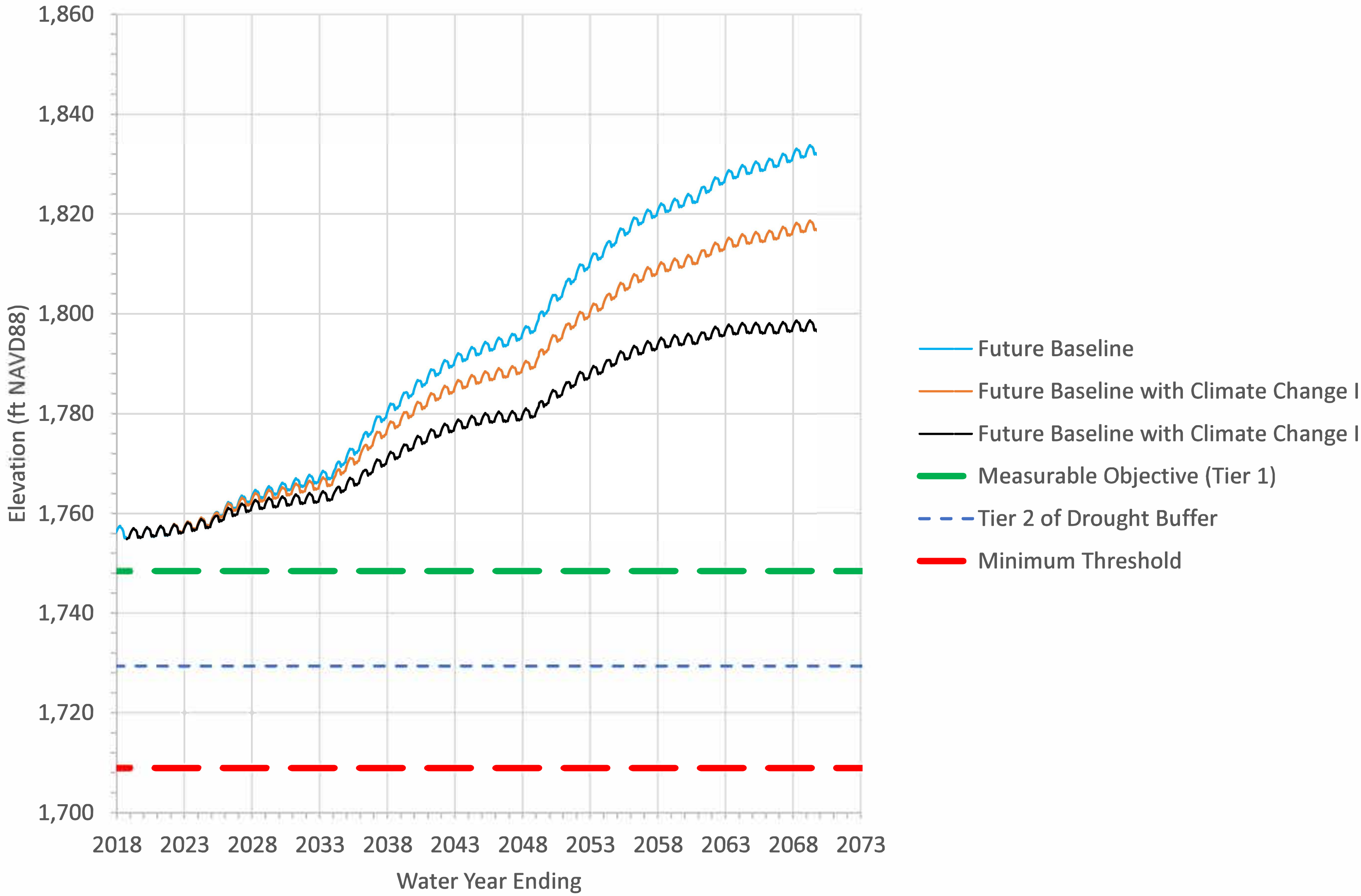

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Figure 4-22. Predicted Simulated Hydraulic Heads and Management Action Tiers at USGS Dunlap #4 Well in the Western Heights Management Area

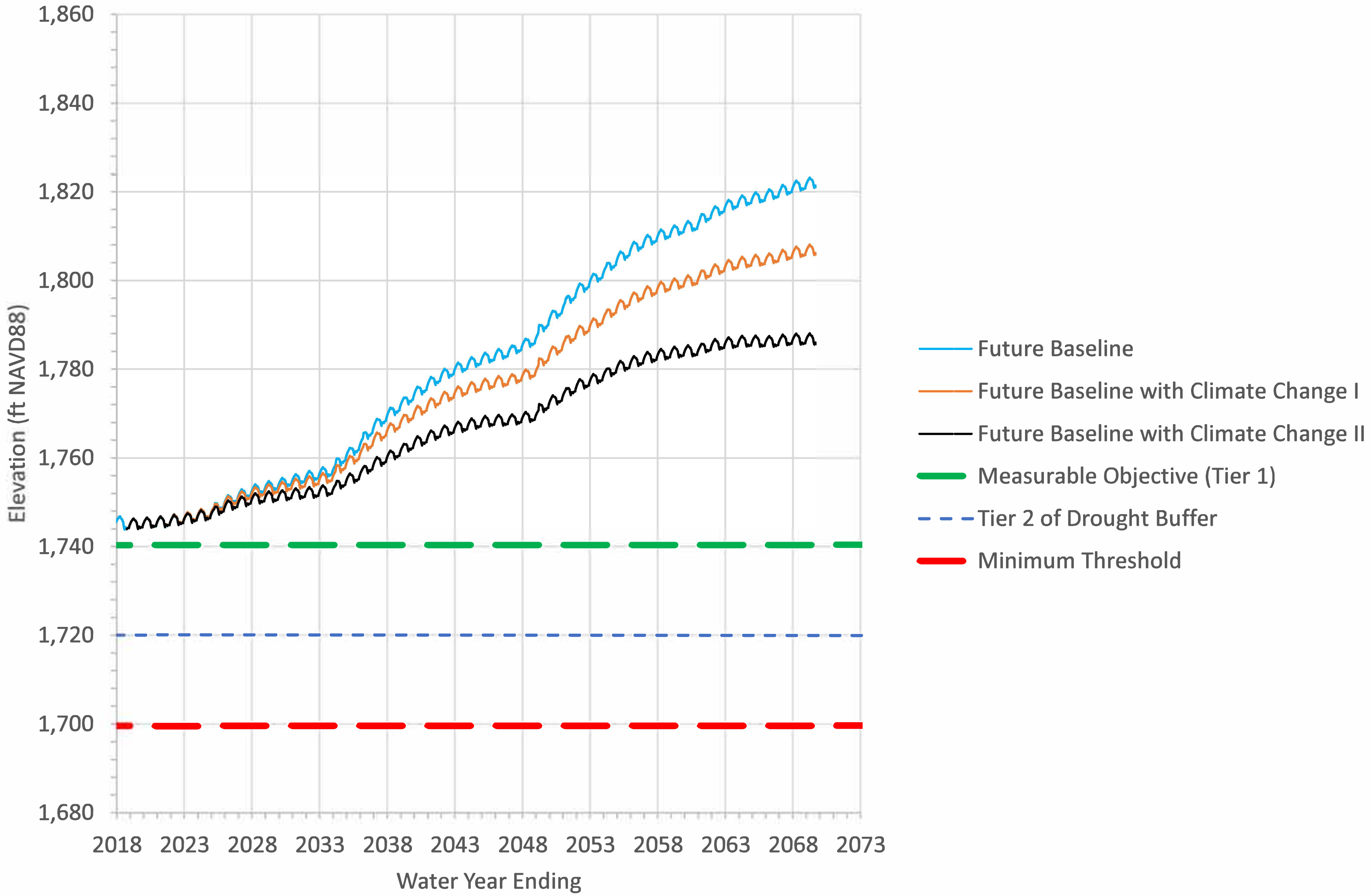

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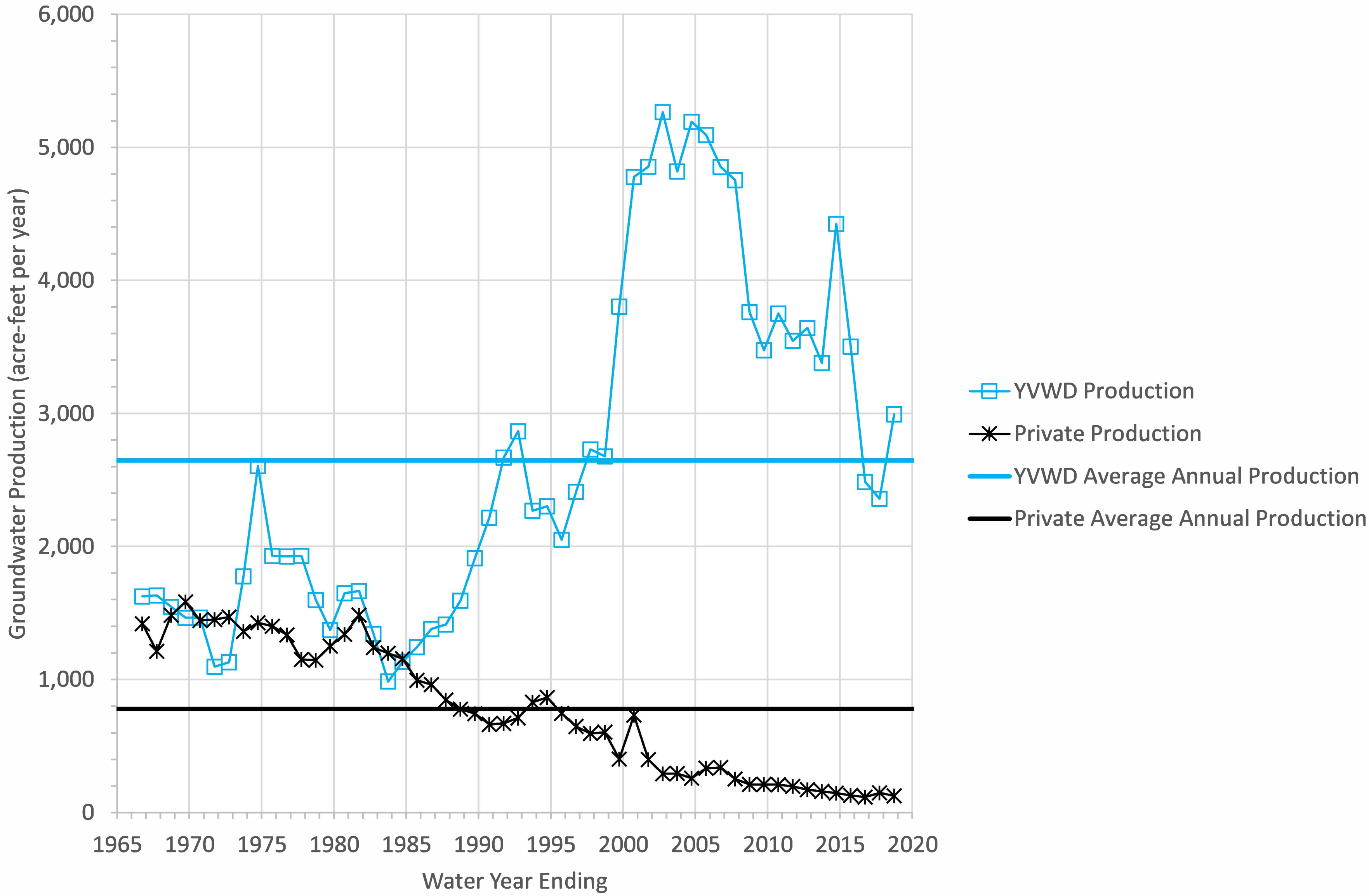
Figure 4-23. Historical Groundwater Production by Agency
in the North Bench Management Area



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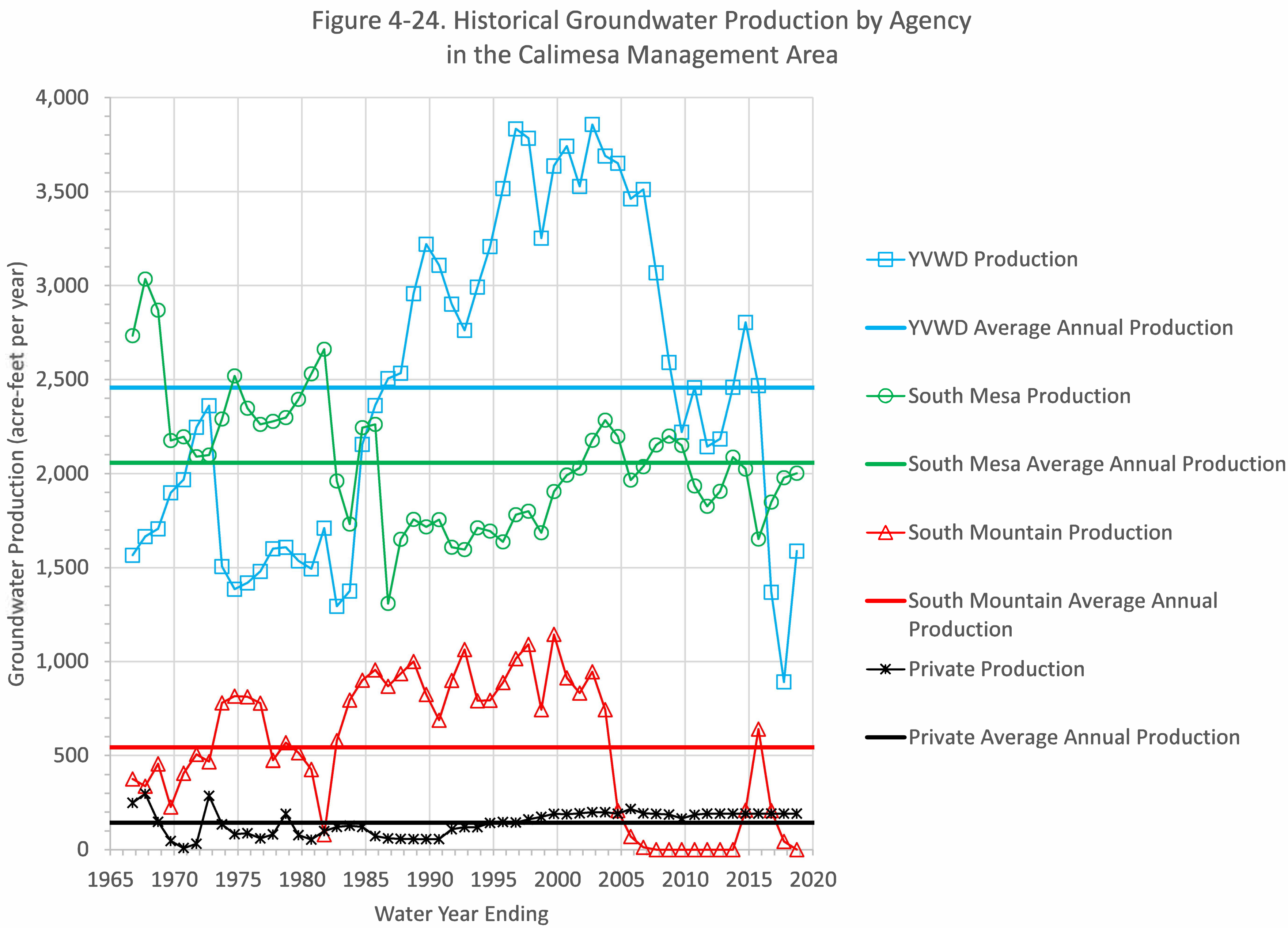

Figure 4-24. Historical Groundwater Production by Agency
in the Calimesa Management Area
Groundwater Production (acre-feet per year)
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Water Year Ending
YVWD Production
YVWD Average Annual Production
South Mesa Production
South Mesa Average Annual Production
South Mountain Production
South Mountain Average Annual Production
Private Production
Private Average Annual Production

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5 Plan Implementation

5.1 Introduction to Plan Implementation

Upon adoption of this Groundwater Sustainability Plan (GSP) by the Yucaipa Groundwater Sustainability Agency (GSA), the primary activities associated with implementing the GSP include administrative duties by the member agencies of the Yucaipa GSA, the management of data collection, data validation, and analysis to evaluate conditions in the Subbasin, the preparation and submittal of annual reports and periodic evaluations, with associated data, to the California Department of Water Resources (DWR), and an assessment of conditions in the Subbasin and determination if management actions need to be implemented. During the initial 5-year period after the GSP is adopted, the Yucaipa GSA will evaluate options to address data gaps identified in Section 2.6.3, and conduct feasibility studies to evaluate the effectiveness of potential spreading basins and other programs that would maintain or achieve sustainability in the Subbasin.

Resolutions by the Board of Directors for the Yucaipa GSA member agencies approving the GSP and instructing the Yucaipa GSA to adopt and submit the GSP to DWR are included in Appendix 5-A.

5.2 GSP Administration

The Yucaipa GSA is responsible for implementing the GSP after it is adopted. The administrative duties of the Yucaipa GSA include, at a minimum, the following:

- Adhering to the implementation schedule (Figure 5-1) to ensure that the Yucaipa GSA conducts the required minimum data collection periods in the spring and fall every year, the annual reports are prepared and submitted to DWR by April 1, and the periodic evaluation reports are submitted at least every 5 years or when the GSP is amended.
- Facilitate access to all wells and stream flow gauging stations in the monitoring network, including the representative monitoring points in each management area, to ensure the collection of representative data by following the monitoring protocols presented in Section 3.6.4.
- Validate and upload data to the data management system (DMS) for the purposes of evaluating conditions in the Plan Area.
- Facilitate the submission of annual reports and periodic evaluation reports per Sub-Article 7 of Article 5 of the California Code of Regulations (CCR) Division 2, Chapter 1.5 (23 CCR, Section 356). This section describes the procedures and requirements for preparing and submitting the annual reports and periodic evaluations to DWR.
- Facilitate public engagement.

The costs associated with administering the GSP will be shared per the Memorandum of Agreement (Appendix 1-B). The Memorandum of Agreement established a cost share structure with the water purveyors responsible for 75% and the San Bernardino Valley Municipal Water District and San Gorgonio Pass Water Agency (Regionals) and the Municipalities responsible for 25% of the costs associated with the administration of the Yucaipa GSA and the development and implementation of the GSP. In general, Yucaipa GSA plans to fund operating costs by using general operating funds, charging its customers through water rates, and/or fees assessed to new developments to connect to existing water services (public water supply, sanitary sewer). The estimated annual costs for implementing the GSP, including the estimated share in costs for each water purveyor and each Municipality and Regional, are summarized in Table 5-1.

Table 5-1. Estimated Annual Costs for Implementing the GSP

GSP Implementation Task	Estimated Annual Cost	Each Water Purveyor	Each Municipality and Regional
GSA Administrative Costs	$20,000.00	$3,750.00	$1,250.00
Public Engagement	$5,000.00	$937.50	$312.50
GSP Annual Reports	$30,000.00	$5,625.00	$1,875.00
GSP Periodic Evaluations[a]	$40,000.00	$7,500.00	$2,500.00
DMS Management	$5,000.00	$937.50	$312.50
Subtotal for Administrative Tasks	*$100,000.00*	*$18,750.00*	*$6,250.00*
Groundwater Level Monitoring[b]	$15,000.00	$2,812.50	$937.50
Groundwater Production Monitoring[c]	$10,000.00	$1,875.00	$625.00
Groundwater Quality Monitoring[d]	$15,000.00	$2,812.50	$937.50
Installation and Maintenance of Wells in the Monitoring Network	$15,000.00	$2,812.50	$937.50
Installation and Maintenance of Surface Water Gauging Stations	$15,000.00	$2,812.50	$937.50
Subtotal for Monitoring and Data Collection Tasks	*$70,000.00*	*$13,125.00*	*$4,375.00*
Total	**$170,000.00**	**$31,875.00**	**$10,625.00**

Notes: GSP = Groundwater Sustainability Plan; GSA = Groundwater Sustainability Agency; DMS = data management system.
[a] Includes updating, refining, and recalibrating numerical model.
[b] Includes installation/maintenance to obtain data, QA/QC, measuring devices.
[c] Includes installation/maintenance to obtain data, QA/QC, meter calibration.
[d] Includes installation/maintenance to obtain data, QA/QC, field meters.

The first five GSP Implementation tasks listed in Table 5-1 are categorized as administrative tasks, in which each member agency of the Yucaipa GSA will provide funds at the beginning of each calendar year to cover their estimated annual costs. The last five GSP Implementation tasks listed in Table 5-1 are categorized as monitoring and data collection tasks, in which each member agency of the Yucaipa GSA will provide funds as costs are incurred when implementing these tasks. The annual costs listed in Table 5-1 are estimated based on an understanding of current conditions and anticipation of the level of effort in implementing the GSP. These estimated costs will be reevaluated every year and may be modified based on actual costs incurred after the GSP is adopted and implemented.

Table 5-2 provides a summary of the estimated annual costs for each water purveyor and each Municipality and Regional of the Yucaipa GSA.

Table 5-2. Estimated Annual Costs for Each Water Purveyor and Each Municipality and Regional

Yucaipa GSA Member Agency		Estimated Annual Upfront Costs	Estimated Annual Incurred Costs	Estimated Total Annual Cost
Water Purveyors	South Mesa	$18,750.00	$13,125.00	$31,875.00
	South Mountain	$18,750.00	$13,125.00	$31,875.00
	WHWC	$18,750.00	$13,125.00	$31,875.00

Table 5-2. Estimated Annual Costs for Each Water Purveyor and Each Municipality and Regional

Yucaipa GSA Member Agency		Estimated Annual Upfront Costs	Estimated Annual Incurred Costs	Estimated Total Annual Cost
	YVWD	$18,750.00	$13,125.00	$31,875.00
Municipality and Regional	City of Redlands	$6,250.00	$4,375.00	$10,625.00
	City of Yucaipa	$6,250.00	$4,375.00	$10,625.00
	SBVMWD	$6,250.00	$4,375.00	$10,625.00
	SGPWA	$6,250.00	$4,375.00	$10,625.00
Estimated Total Annual Cost		**$100,000.00**	**$70,000.00**	**$170,000.00**

Notes: GSA = Groundwater Sustainability Agency; WHWC = Western Heights Water Company; YVWD = Yucaipa Valley Water District; SBVMWD = San Bernardino Valley Municipal Water District; SGPWA = San Gorgonio Pass Water Agency.

5.3 Data Collection, Validation, and DMS

Member agencies of the Yucaipa GSA will continue participating in monitoring programs already implemented (Section 1.5.1) to collect groundwater elevation, groundwater quality, and production data to characterize conditions in the Subbasin. The member agencies will follow the monitoring protocols presented in Section 3.6.4 to collect data that is accurate and representative of conditions in the Subbasin, and will upload the data to the DMS. As discussed in Section 3.6 (Monitoring Network), the monitoring schedule to collect static groundwater elevation data, at a minimum, is March 9 to 22 for the spring and October 9 to 22 for the fall. The recommended frequency to collect static groundwater elevation data is monthly. Water quality data is collected per the monitoring requirements under Title 22 for municipal water supply wells and the Maximum Benefits Monitoring Program, and water quality sampling will follow the monitoring protocols presented in Section 3.6.4.3, Groundwater Quality Monitoring.

The water purveyors use calibrated flow meters and totalizers to track the volume of groundwater extracted at their respective municipal and irrigation water supply wells. Production data is collected on a monthly basis. Precipitation gauges have been maintained and monitored by the San Bernardino County Flood Control District and the U.S. Geological Survey, both of which are public agencies that provide their respective data in the public domain. The Yucaipa GSA will access this data and upload it to the DMS.

During the initial 5-year period after the GSP is adopted, the Yucaipa GSA will evaluate options for filling data gaps identified in this GSP. The primary data gaps identified were a lack of knowledge of existing private well users operating in the Subbasin, spatial gaps in groundwater elevation data in the eastern section of the Calimesa management area, and stream flow gauging stations to measure low to normal flows. As discussed in Section 3.6.6 (Monitoring Network Improvements), the Yucaipa GSA will make efforts to obtain information on private well users, improve existing or install new stream flow gauging stations to enhance the characterization of stream flow in the Plan Area, and improve the spatial and temporal monitoring coverage of the Subbasin. For instance, pressure transducers may be installed at some wells in the monitoring network to reduce the time window during which groundwater elevations are manually collected. The costs of obtaining information from private well users, improving the monitoring of surface water flows, and addressing data gaps in the monitoring network are associated with GSP implementation.

5.4 Annual Reports

Sub-article 7 of Article 5 of the California Code of Regulations Division 2 Chapter 1.5 (23 CCR, Section 356.2) describes the general requirements for the annual reports to be submitted to DWR after the GSP is adopted by the Yucaipa GSA. Annual reports are due to DWR by April 1 of each year following the adoption of the GSP. Each annual report shall include the following components:

- General information, including an executive summary and a location map depicting the basin, jurisdictional boundaries, and Plan Area covered by the report
- A detailed description and graphical representation of the following:
  - Groundwater elevation data from wells identified in the monitoring network
  - Groundwater elevation contour maps depicting, at a minimum, the seasonal high and seasonal low groundwater elevations observed in the preceding year
  - Groundwater elevation hydrographs depicting historical trends updated with data collected in the preceding year
  - Groundwater extractions for the preceding water year
  - An accounting of surface water supply, including imported SWP water, imported groundwater from outside the Plan Area, and surface water diversions
  - An accounting of total water use and identity of the water use sector
  - Change in groundwater in storage
- A description of progress toward implementing the GSP, including implementation of projects or management actions since the previous annual report

The description and graphical representation of the change in groundwater storage will include a graph depicting water year type, based on the annual precipitation in the Plan Area compared to the mean annual rainfall (Section 2.2.1.4, Water Year Type), groundwater production, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the Plan Area based on the simulated annual change in storage by the YIHM. The annual reports will conclude with an overview of the implementation of the GSP, including an evaluation of groundwater conditions against the sustainability criteria established in Chapter 3. The annual report will include a descriptive summary of any management actions that were implemented in the Plan Area.

5.5 Periodic Evaluations

Every fifth year of GSP implementation and whenever the GSP is amended, the Yucaipa GSA is required to prepare and submit an Agency Evaluation and Assessment Report to DWR together with the annual report for that year (23 CCR, Section 356.4). The tasks associated with preparing this report include evaluating any new information that has been made available since the GSP adoption and assessing whether changes to assumptions or descriptions in the GSP are required. The following components are required in the periodic evaluation reports:

- A description of current groundwater conditions for each applicable sustainability indicator relative to measurable objectives and minimum thresholds.
- A description of the implementation of any projects or management actions, and the effect on groundwater conditions resulting from those projects or management actions.

- A review and evaluation of the Plan Area setting, management areas, sustainability criteria and management actions described in the GSP, and proposed revisions to the GSP based on information obtained since the adoption of the Plan.
- A description and evaluation of the monitoring network within the Plan Area. The evaluation will determine if data gaps identified in the GSP have been addressed, and if new data gaps are identified. The periodic evaluation will include proposed actions by the Yucaipa GSA to address data gaps, which may include modifications to or expansion of the existing monitoring network.
- A description of significant new information that has been made available since the adoption of the GSP, an amendment to the GSP, or the last 5-year assessment.
- A description of relevant actions taken by the Yucaipa GSA, including a summary of regulations or ordinances related to management of the Plan Area or the GSP.
- Information describing any enforcement or legal actions taken by the Yucaipa GSA in furtherance of the sustainability goal for the Plan Area.
- A description of completed or proposed GSP amendments.
- A reevaluation of the estimated sustainable yield of the Subbasin and the management areas by updating the YIHM with data collected since the last periodic evaluation.

5.6 GSP Implementation Schedule

The Yucaipa GSA has developed a schedule that outlines the approximate times at which the various monitoring and reporting components of the GSP will be implemented over the next 5 years (Figure 5-1). The actual start dates may vary from those shown in the schedule.

Management Actions Nos. 1, 2, and 3, described in Section 4.2, will go into effect at the adoption of the GSP. Implementation of Management Action No. 1 will be evaluated, at a minimum, every spring and fall when groundwater elevation data is collected and compared to the measurable objective and minimum thresholds established for the representative monitoring points described in Chapter 3. Implementation of Management Action No. 2 will be evaluated at the end of every water year when comparing water year pumping totals to sustainable yield pumping allocations. Implementation of Management Action No. 3 will occur when a groundwater user applies supplemental water stored in a management area to offset pumping exceedances identified when evaluating Management Action No. 2. Each management action will be reassessed every water year.

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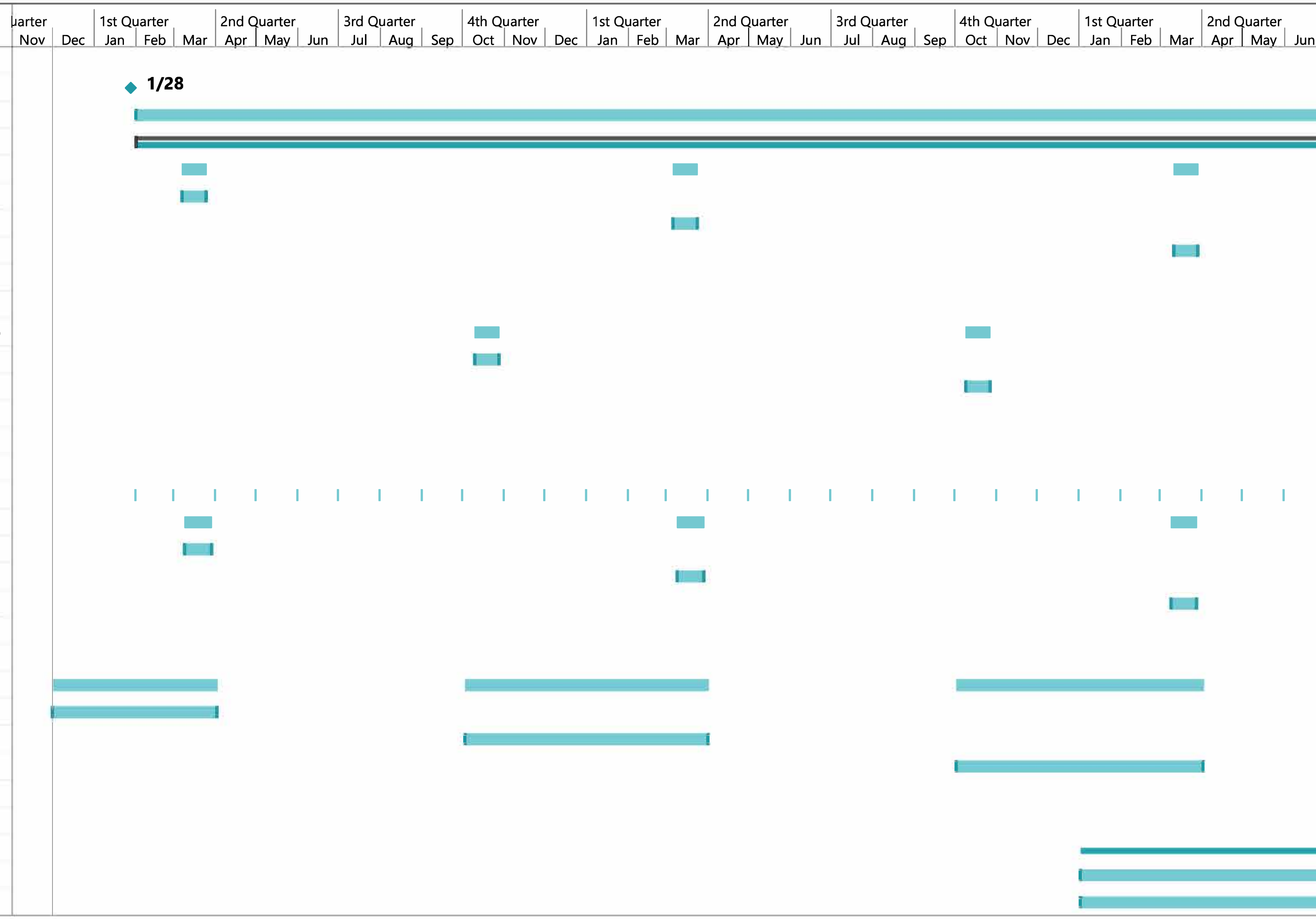
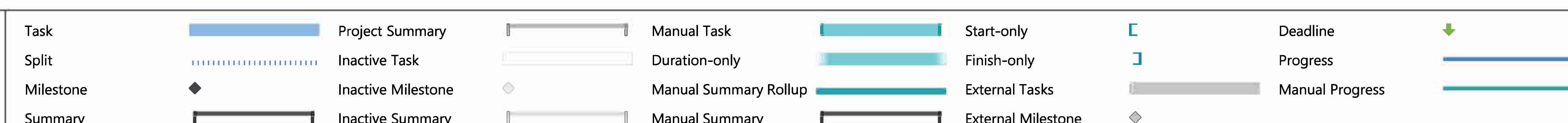
Figure 5-1. 5-Year Plan Implementation Schedule

ID	Task Name	Start	Finish
1			
2	GSP Submitted to DWR	Fri 1/28/22	Fri 1/28/22
3	GSP Administration	Tue 2/1/22	Thu 12/31/26
4	**Monitoring Program**	**Tue 2/1/22**	**Thu 12/31/26**
5	**Spring Groundwater Elevations**	**Mon 3/7/22**	**Thu 3/26/26**
6	Spring Groundwater Elevations 2022	Mon 3/7/22	Thu 3/24/22
7	Spring Groundwater Elevations 2023	Mon 3/6/23	Thu 3/23/23
8	Spring Groundwater Elevations 2024	Mon 3/11/24	Thu 3/28/24
9	Spring Groundwater Elevations 2025	Mon 3/10/25	Thu 3/27/25
10	Spring Groundwater Elevations 2026	Mon 3/9/26	Thu 3/26/26
11	**Fall Groundwater Elevations**	**Mon 10/10/22**	**Thu 10/29/26**
12	Fall Groundwater Elevations 2022	Mon 10/10/22	Thu 10/27/22
13	Fall Groundwater Elevations 2023	Mon 10/9/23	Thu 10/26/23
14	Fall Groundwater Elevations 2024	Mon 10/7/24	Thu 10/24/24
15	Fall Groundwater Elevations 2025	Mon 10/6/25	Thu 10/23/25
16	Fall Groundwater Elevations 2026	Mon 10/12/26	Thu 10/29/26
17	**Groundwater Production**	**Mon 1/31/22**	**Thu 12/31/26**
78	**Groundwater Quality**	**Wed 3/9/22**	**Thu 3/26/26**
79	Groundwater Quality 2022	Wed 3/9/22	Mon 3/28/22
80	Groundwater Quality 2023	Thu 3/9/23	Tue 3/28/23
81	Groundwater Quality 2024	Sat 3/9/24	Wed 3/27/24
82	Groundwater Quality 2025	Sun 3/9/25	Wed 3/26/25
83	Groundwater Quality 2026	Mon 3/9/26	Thu 3/26/26
84	**GSP Annual Report**	**Wed 12/1/21**	**Wed 4/1/26**
85	GSP Annual Report 2022	Wed 12/1/21	Fri 4/1/22
86	GSP Annual Report 2023	Mon 10/3/22	Fri 3/31/23
87	GSP Annual Report 2024	Mon 10/2/23	Mon 4/1/24
88	GSP Annual Report 2025	Tue 10/1/24	Tue 4/1/25
89	GSP Annual Report 2026	Wed 10/1/25	Wed 4/1/26
90	**Periodic Evaluation Report 2026**	**Sun 6/1/25**	**Wed 4/1/26**
91	Refine, Update and Calibrate YIHM	Tue 1/2/24	Tue 9/30/25
92	Evaluation Report Preparation	Tue 1/2/24	Wed 4/1/26





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15	Fall Groundwater Elevations 2025	Mon 10/6/25	Thu 10/23/25
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87	GSP Annual Report 2024	Mon 10/2/23	Mon 4/1/24
88	GSP Annual Report 2025	Tue 10/1/24	Tue 4/1/25
89	GSP Annual Report 2026	Wed 10/1/25	Wed 4/1/26
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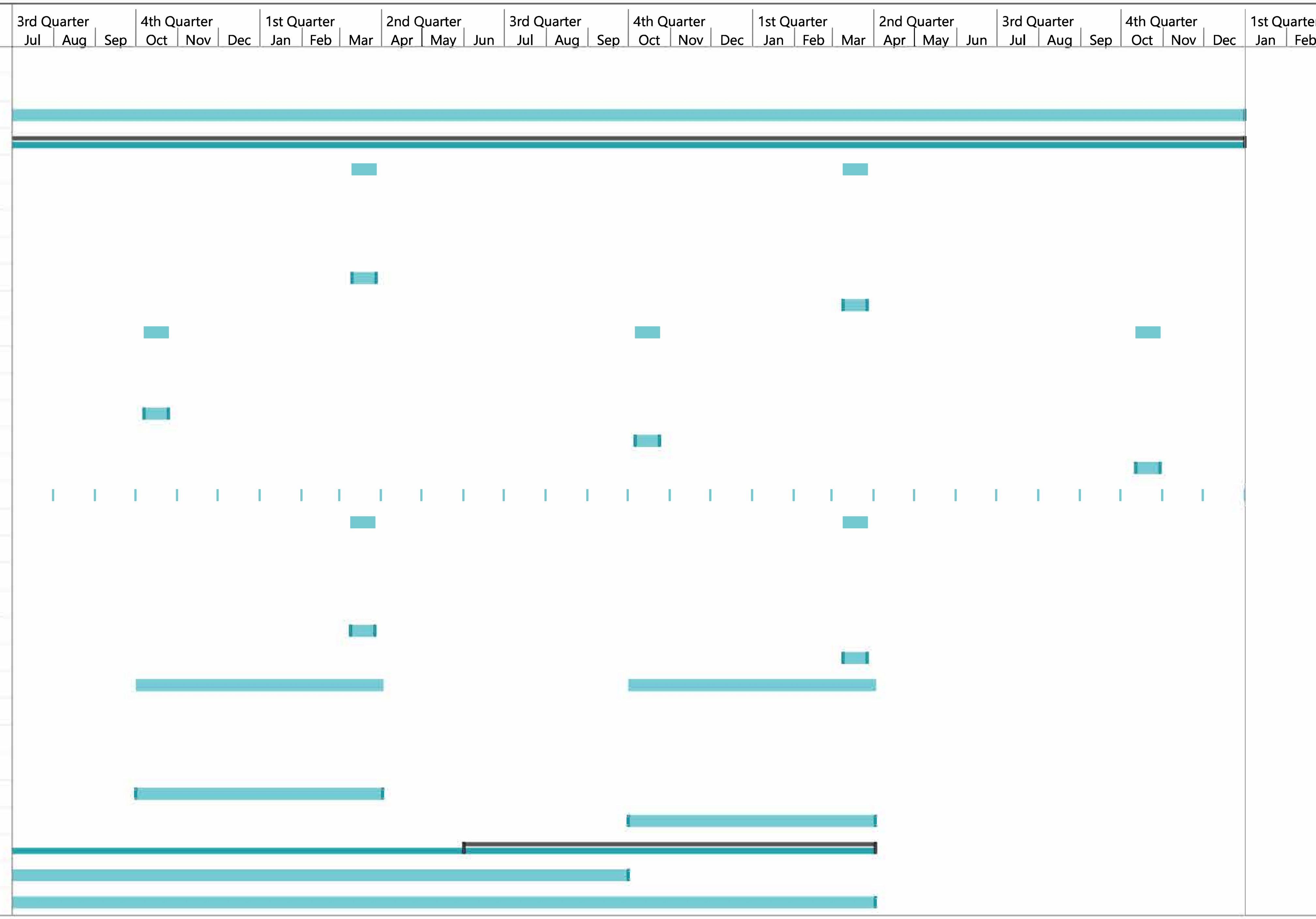

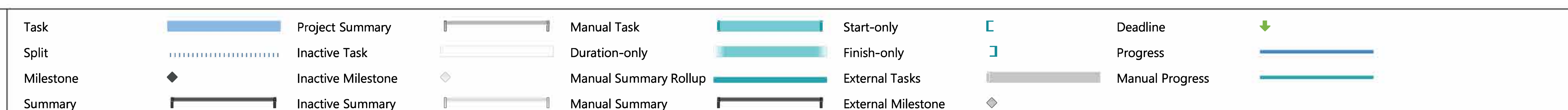

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Final Groundwater Sustainability Plan

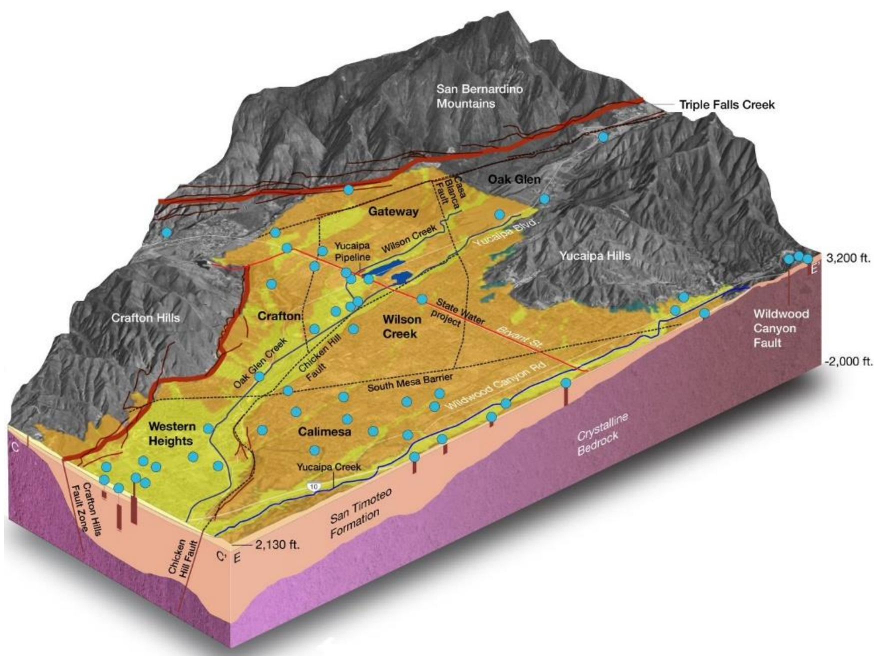
for the

Yucaipa Groundwater Subbasin: Appendices

January 2022

Prepared for:

Yucaipa Groundwater Sustainability Agency
c/o San Bernardino Valley Municipal Water District



Prepared by:

DUDEK

MAIN OFFICE
605 Third Street
Encinitas, California 92024
T 800.450.1818
F 760.632.0164

Appendix 1-A

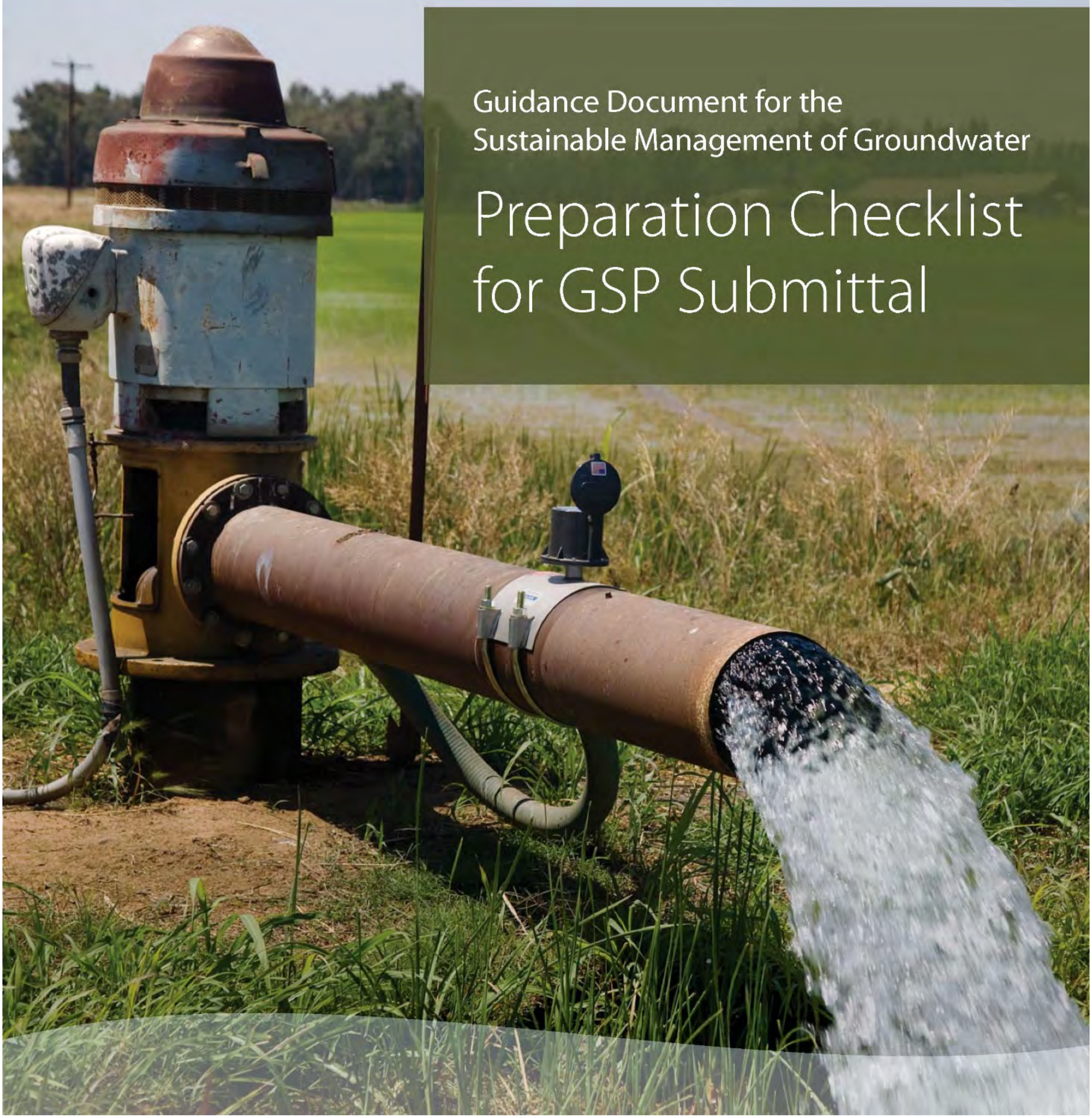
Preparation Checklist for GSP Submittal

California Department of Water Resources
Sustainable Groundwater Management Program

December 2016

Guidance Document for the
Sustainable Management of Groundwater

Preparation Checklist for GSP Submittal



Guidance Document for the Sustainable Management of Groundwater

Preparation Checklist for GSP Submittal

December 2016

The objective of this Guidance Document is to provide Groundwater Sustainability Agencies (GSAs) and other interested stakeholders a checklist of Groundwater Sustainability Plan (GSP) content requirements for the purpose of verifying a GSP is complete and is ready for submission to DWR. Please note that if multiple GSAs develop multiple GSPs for a basin, the coordinated submission of those GSPs shall not occur until the entire basin is covered by GSPs.

The Preparation Checklist for GSP Submittal is only intended to provide a guide to GSAs and other stakeholders. This guidance is optional, since the content of this Guidance Document does not create any new requirements or obligations for the GSA or other stakeholders.

Guidance documents are not a substitute for the GSP Emergency Regulations (GSP Regulations) or the Sustainable Groundwater Management Act (SGMA). Those GSAs submitting a GSP are strongly encouraged to read the GSP Regulations and SGMA. In addition, using this Guidance Document to develop a GSP using does not equate to an approval determination by DWR.

Context with GSP Regulations

The Preparation Checklist for GSP Submittal can be used by GSAs in conjunction with the GSP Annotated Outline Guidance Document as a method to develop a GSP consistent with the requirements of the GSP Regulations and SGMA. The detailed requirements of a GSP may be found in the GSP Regulations, primarily in Article 5 – Plan Contents, and in SGMA, primarily in Chapter 6 beginning with California Water Code (CWC) Section 10727. The checklist includes references to applicable GSP Regulations sections and CWC sections, as well as a brief description of the required GSP information. The checklist also contains a column for GSAs to record the page number, or section of the GSP, where the information for that particular requirement is found. The preparation checklist may also be included in the GSP.

Table 1 contains the **Preparation Checklist for GSP Submittal**.

California Department of Water Resources
Sustainable Groundwater Management Program
1416 Ninth Street
P.O. Box 942836
Sacramento, CA 94236-0001
www.water.ca.gov/groundwater

Table 1. Preparation Checklist for GSP Submittal

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 3. Technical and Reporting Standards				
352.2		Monitoring Protocols	• Monitoring protocols adopted by the GSA for data collection and management • Monitoring protocols that are designed to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence for basins for which subsidence has been identified as a potential problem, and flow and quality of surface water that directly affect groundwater levels or quality or are caused by groundwater extraction in the basin	Section 3.6.4
Article 5. Plan Contents, Subarticle 1. Administrative Information				
354.4		General Information	• Executive Summary • List of references and technical studies	Section ES
354.6		Agency Information	• GSA mailing address • Organization and management structure • Contact information of Plan Manager • Legal authority of GSA • Estimate of implementation costs	Section 1.2
354.8(a)	10727.2(a)(4)	Map(s)	• Area covered by GSP • Adjudicated areas, other agencies within the basin, and areas covered by an Alternative • Jurisdictional boundaries of federal or State land • Existing land use designations • Density of wells per square mile	Section 1.3

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 5. Plan Contents, Subarticle 1. Administrative Information (Continued)				
354.8(b)		Description of the Plan Area	• Summary of jurisdictional areas and other features	Section 1.3
354.8(c) 354.8(d) 354.8(e)	10727.2(g)	Water Resource Monitoring and Management Programs	• Description of water resources monitoring and management programs • Description of how the monitoring networks of those plans will be incorporated into the GSP • Description of how those plans may limit operational flexibility in the basin • Description of conjunctive use programs	Section 1.5
354.8(f)	10727.2(g)	Land Use Elements or Topic Categories of Applicable General Plans	• Summary of general plans and other land use plans • Description of how implementation of the GSP may change water demands or affect achievement of sustainability and how the GSP addresses those effects • Description of how implementation of the GSP may affect the water supply assumptions of relevant land use plans • Summary of the process for permitting new or replacement wells in the basin • Information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management	Section 1.6

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 5. Plan Contents, Subarticle 1. Administrative Information (Continued)				
354.8(g)	10727.4	Additional GSP Contents	**Description of Actions related to:** • Control of saline water intrusion • Wellhead protection • Migration of contaminated groundwater • Well abandonment and well destruction program • Replenishment of groundwater extractions • Conjunctive use and underground storage • Well construction policies • Addressing groundwater contamination cleanup, recharge, diversions to storage, conservation, water recycling, conveyance, and extraction projects • Efficient water management practices • Relationships with State and federal regulatory agencies • Review of land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity • Impacts on groundwater dependent ecosystems	Sections 1.5, 1.6, 2.7, 2.7.8.1, and 4.2.2.
354.10		Notice and Communication	• Description of beneficial uses and users • List of public meetings • GSP comments and responses • Decision-making process • Public engagement • Encouraging active involvement • Informing the public on GSP implementation progress	Sections 1.7, 1.8 and 1.9

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 5. Plan Contents, Subarticle 2. Basin Setting				
354.14		Hydrogeologic Conceptual Model	• Description of the Hydrogeologic Conceptual Model • Two scaled cross-sections • Map(s) of physical characteristics: topographic information, surficial geology, soil characteristics, surface water bodies, source and point of delivery for imported water supplies	Section 2.6
354.14(c)(4)	10727.2(a)(5)	Map of Recharge Areas	• Map delineating existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas	Section 2.3
	10727.2(d)(4)	Recharge Areas	• Description of how recharge areas identified in the plan substantially contribute to the replenishment of the basin	Section 2.5.4
354.16	10727.2(a)(1) 10727.2(a)(2)	Current and Historical Groundwater Conditions	• Groundwater elevation data • Estimate of groundwater storage • Seawater intrusion conditions • Groundwater quality issues • Land subsidence conditions • Identification of interconnected surface water systems • Identification of groundwater-dependent ecosystems	Section 2.7
354.18	10727.2(a)(3)	Water Budget Information	• Description of inflows, outflows, and change in storage • Quantification of overdraft • Estimate of sustainable yield • Quantification of current, historical, and projected water budgets	Section 2.8
	10727.2(d)(5)	Surface Water Supply	• Description of surface water supply used or available for use for groundwater recharge or in-lieu use	Section 2.8.2.5

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 5. Plan Contents, Subarticle 2. Basin Setting (Continued)				
354.20		Management Areas	• Reason for creation of each management area • Minimum thresholds and measurable objectives for each management area • Level of monitoring and analysis • Explanation of how management of management areas will not cause undesirable results outside the management area • Description of management areas	Sections 2.9, 3.4, and 3.5.
Article 5. Plan Contents, Subarticle 3. Sustainable Management Criteria				
354.24		Sustainability Goal	• Description of the sustainability goal	Section 3.2
354.26		Undesirable Results	• Description of undesirable results • Cause of groundwater conditions that would lead to undesirable results • Criteria used to define undesirable results for each sustainability indicator • Potential effects of undesirable results on beneficial uses and users of groundwater	Section 3.3
354.28	10727.2(d)(1) 10727.2(d)(2)	Minimum Thresholds	• Description of each minimum threshold and how they were established for each sustainability indicator • Relationship for each sustainability indicator • Description of how selection of the minimum threshold may affect beneficial uses and users of groundwater • Standards related to sustainability indicators • How each minimum threshold will be quantitatively measured	Section 3.4

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 5. Plan Contents, Subarticle 3. Sustainable Management Criteria (Continued)				
354.30	10727.2(b)(1) 10727.2(b)(2) 10727.2(d)(1) 10727.2(d)(2)	Measureable Objectives	• Description of establishment of the measureable objectives for each sustainability indicator • Description of how a reasonable margin of safety was established for each measureable objective • Description of a reasonable path to achieve and maintain the sustainability goal, including a description of interim milestones	Sections 3.5 and 4.2
Article 5. Plan Contents, Subarticle 4. Monitoring Networks				
354.34	10727.2(d)(1) 10727.2(d)(2) 10727.2(e) 10727.2(f)	Monitoring Networks	• Description of monitoring network • Description of monitoring network objectives • Description of how the monitoring network is designed to: demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features; estimate the change in annual groundwater in storage; monitor seawater intrusion; determine groundwater quality trends; identify the rate and extent of land subsidence; and calculate depletions of surface water caused by groundwater extractions • Description of how the monitoring network provides adequate coverage of Sustainability Indicators • Density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends • Scientific rational (or reason) for site selection • Consistency with data and reporting standards • Corresponding sustainability indicator, minimum threshold, measureable objective, and interim milestone	Section 3.6

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
			(Monitoring Networks Continued) • Location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used • Description of technical standards, data collection methods, and other procedures or protocols to ensure comparable data and methodologies	
354.36		Representative Monitoring	• Description of representative sites • Demonstration of adequacy of using groundwater elevations as proxy for other sustainability indicators • Adequate evidence demonstrating site reflects general conditions in the area	Section 3.6.5.
354.38		Assessment and Improvement of Monitoring Network	• Review and evaluation of the monitoring network • Identification and description of data gaps • Description of steps to fill data gaps • Description of monitoring frequency and density of sites	Section 3.6.6.

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 5. Plan Contents, Subarticle 5. Projects and Management Actions				
354.44		Projects and Management Actions	• Description of projects and management actions that will help achieve the basin's sustainability goal • Measureable objective that is expected to benefit from each project and management action • Circumstances for implementation • Public noticing • Permitting and regulatory process • Time-table for initiation and completion, and the accrual of expected benefits • Expected benefits and how they will be evaluated • How the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included. • Legal authority required • Estimated costs and plans to meet those costs • Management of groundwater extractions and recharge	Sections 4.2 and 4.3.
354.44(b)(2)	10727.2(d)(3)		• Overdraft mitigation projects and management actions	Section 4.2.2.

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 8. Interagency Agreements				
357.4	10727.6	Coordination Agreements - Shall be submitted to the Department together with the GSPs for the basin and, if approved, shall become part of the GSP for each participating Agency.	**Coordination Agreements shall describe the following:** • A point of contact • Responsibilities of each Agency • Procedures for the timely exchange of information between Agencies • Procedures for resolving conflicts between Agencies • How the Agencies have used the same data and methodologies to coordinate GSPs • How the GSPs implemented together satisfy the requirements of SGMA • Process for submitting all Plans, Plan amendments, supporting information, all monitoring data and other pertinent information, along with annual reports and periodic evaluations • A coordinated data management system for the basin • Coordination agreements shall identify adjudicated areas within the basin, and any local agencies that have adopted an Alternative that has been accepted by the Department	NA

Appendix 1-B

Yucaipa GSA Governance Documents

MEMORANDUM OF AGREEMENT TO FORM A GROUNDWATER SUSTAINABILITY AGENCY FOR THE YUCAIPA SUB-BASIN (Sub-basin No. 8-02.07)

This 2017 Memorandum of Agreement ("MOA") is entered into by and among: South Mesa Water Company ("SOUTH MESA"), South Mountain Water Company ("SOUTH MOUNTAIN"), Western Heights Water Company ("WESTERN HEIGHTS") and Yucaipa Valley Water District ("YVWD"), herein collectively referred to as the "WATER PURVEYORS"; and, the City of Calimesa ("CALIMESA"), the City of Redlands ("REDLANDS") and the City of Yucaipa ("YUCAIPA"), herein collectively referred to as the "MUNICIPALITIES"; and, the San Bernardino Valley Municipal Water District ("SAN BERNARDINO VALLEY MUNICIPAL") and the San Gorgonio Pass Water Agency ("SAN GORGONIO"), herein collectively referred to as the "REGIONALS." The MUNICIPALITIES are sometimes herein collectively referred to as the "LAND USE AGENCIES." Each of the above-described entities is individually referred to as a "Party" and are collectively referred to as the "Parties". For purposes of this MOA, SOUTH MESA, SOUTH MOUNTAIN and WESTERN HEIGHTS are collectively referred to as the "MUTUALS"; and, the Parties other than the MUTUALS are collectively referred to as the "LOCAL AGENCIES."

Pursuant to the Sustainable Groundwater Management Act ("SGMA") and as further set forth herein, the purpose of this MOA is to form a Groundwater Sustainability Agency ("GSA") for the entire Yucaipa Sub-basin (Basin or Sub-Basin No. 8-02.07), in order to preserve local management and control of the Basin as set forth under SGMA.

The County of Riverside ("RIVERSIDE") and the County of San Bernardino ("SAN BERNARDINO"), collectively "COUNTIES," shall be considered "Stakeholders" but not Parties to this MOA.

Recitals

WHEREAS, on September 16, 2014, Governor Jerry Brown signed into law Senate Bills 1168 and 1319, and Assembly Bill 1739, collectively known as the Sustainable Groundwater Management Act ("SGMA"), codified in certain provisions of the California Government Code, including commencing with Section 65350.5, and codified in Part 2.74 of Division 6 of the California *Water Code*, commencing with Section 10720, and amending other provisions of the California *Government Code* and California *Water Code*; and

WHEREAS, SGMA went into effect on January 1, 2015; and,

WHEREAS, various clarifying amendments to SGMA were signed into law in 2015, including Senate Bills 13 and 226, and Assembly Bills 617 and 939, which were codified in part in California *Water Code* Section 10723.6(a), authorizing a combination of local agencies to form a GSA pursuant to a joint powers agreement, a memorandum of agreement, or other legal agreement; and, California *Water Code* Section 10723.6(b), authorizing water corporations regulated by the California Public Utilities Commission and mutual water companies to participate in a GSA through a memorandum of agreement or other legal agreement; and

WHEREAS, the legislative intent and effect of SGMA, as set forth in California *Water Code* Section 10720.1, includes the following: (1) to provide for the sustainable management of groundwater basins; (2) to enhance local management of groundwater consistent with rights to use or store groundwater and Section 2 of Article X of the California Constitution, and to preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater; (3) to establish minimum standards for sustainable groundwater management; (4) to provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater; (5) to avoid or minimize subsidence; (6) to improve data collection and understanding about groundwater; (7) to increase groundwater storage and remove impediments to recharge; (8) to manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner; and (9) to provide a more efficient and cost-effective groundwater adjudication process that protects water rights, ensures due process, prevents unnecessary delay, and furthers the objectives of SGMA; and,

WHEREAS, SGMA affords GSAs specific powers to manage groundwater in addition to existing legal authorities, which powers may be used to provide the maximum degree of local control and flexibility consistent with the sustainability goals of SGMA; and,

WHEREAS, SGMA includes several un-codified findings by the California Legislature, including the determination that the people of the state have a primary interest in the protection, management, and reasonable beneficial use of the water resources of the state, both surface and underground, and that the integrated management of the state's water resources is essential to meeting its water management goals; and,

WHEREAS, the Basin, as depicted in **Exhibit A** to this MOA, is identified by the California Department of Water Resources Bulletin 118 as Sub-basin No. 8-02.07 of the Upper Santa Ana Valley Groundwater Basin, and is designated by DWR as medium-priority; and,

WHEREAS, California *Water Code* Section 10720.7 requires the Basin, as a medium-priority basin that is not designated by DWR as being subject to critical conditions of overdraft, to be managed by a Groundwater Sustainability Plan ("GSP") or coordinated GSPs by January 31, 2022; and,

WHEREAS, in order to avoid designation as a probationary basin and become subject to direct intervention and management by the State Water Board, California *Water Code* Section 10735.2 requires that, by June 30, 2017 a collection of local agencies must form a GSA or prepare agreements to develop one or more GSPs that will collectively serve as a GSP for the entire Basin, in the event that a local agency has not decided to become a GSA that intends to develop a GSP for the entire Basin; and,

WHEREAS, the LOCAL AGENCIES have water supply, water management, and/or land use responsibilities for their respective jurisdictional areas overlying the Basin and are local agencies as defined by SGMA in California *Water Code* Section 10721(n), and thus each is authorized by SGMA to become or form a GSA; and,

WHEREAS, the LOCAL AGENCIES' individually have jurisdictional and/or service areas within and their collective jurisdictional areas and/or service areas cover the entirety of the Basin, with no gaps in coverage; and,

WHEREAS, the WATER PURVEYORS, including the MUTUALS, produce groundwater and provide water service within the Basin, and it is the Parties' shared intent to provide for management-level participation by the MUTUALS in the GSA to the maximum extent allowed by law without limiting any powers afforded to a GSA under SGMA; and,

WHEREAS, the REGIONALS are State Water Contractors, and have the rights and duties of such, including for the delivery of State Water Project Water within the Basin; and,

WHEREAS, in accordance with the terms of this MOA, and in furtherance of the shared intent of the Parties to maximize funding opportunities for the Basin and avoid potential intervention in the Basin by the State Water Board, the Parties agree that the YUCAIPA-GSA formed by this MOA will cover the entire Basin; and,

WHEREAS, the Parties mutually desire and intend to work with local stakeholders and interested parties in the Basin that are not Parties to this MOA, to carry out the policy, purposes, and requirements of SGMA in the Basin.

Agreement

NOW, THEREFORE, in consideration of the promises, terms, conditions, and covenants contained herein, it is mutually understood and agreed as follows:

I. **Incorporation of Recitals.** The Recitals stated above are incorporated herein by reference.

II. **Purposes.** The purposes of this MOA is to form the YUCAIPA-GSA for the Basin as specified herein pursuant to applicable provisions and requirements of SGMA, including but not limited to California *Water Code* Sections 10723 and 10723.6.

III. **Approval of MOA and Formation of the YUCAIPA-GSA.** Approval of this MOA and formation of the YUCAIPA-GSA shall be accomplished by the LOCAL AGENCIES each holding its own noticed public hearing pursuant to California *Water Code* Section 10723(b) and California *Government Code* Section 6066 and at such hearing will consider approval of a Resolution by its governing board to enter this MOA and jointly form the YUCAIPA-GSA as specified in this MOA. Approval of this MOA by the MUTUALS shall be accomplished through their respective governing boards' duly authorized procedures.

IV. **Definitions.** The following terms, whether used in the singular or plural, and when used with initial capitalization, shall have the meanings specified herein. The Parties agree that any definitions set forth herein are intended to be consistent with SGMA, and in the event of any discrepancy between a defined term in this MOA and a defined term in SGMA, the terms of SGMA shall control.

A. "Basin" refers to the Yucaipa Sub-basin, designated by the California Department of Water Resources Bulletin 118 as Sub-basin No. 8-02.07, as depicted in **Exhibit A** to this MOA.

B. "DWR" means the California Department of Water Resources.

C. "GSA" means a Groundwater Sustainability Agency, as defined by SGMA.

D. "GSP" means a Groundwater Sustainability Plan, as defined by SGMA.

E. "Memorandum of Agreement" or "MOA" refers to this Memorandum of Agreement.

F. "SGMA" refers to the Sustainable Groundwater Management Act, of 2014, as amended.

G. "State Water Board" means the California State Water Resources Control Board.

H. "YUCAIPA-GSA" refers to the Yucaipa Sub-basin GSA formed under this MOA.

V. Coordination and Cooperation

A. Continued Cooperation. The Parties to this MOA will continue to meet, confer, coordinate, and collaborate to discuss and develop technical, managerial, financial, and other criteria and procedures for the preparation, governance, and implementation of a GSP or coordinated GSPs in the Basin and to carry out the policy, purposes, and requirements of SGMA in the Basin.

B. Points of Contact. Each Party shall designate a principal contact person for that Party, who may be changed from time to time at the sole discretion of the designating Party. The principal contact person for each Party shall be responsible for coordinating with the principal contact persons for the other Parties in scheduling meetings and other activities under this MOA.

C. Voting Methodology. The voting structure for matters pertaining to the establishment and implementation of the administrative components of the YUCAIPA-GSA shall be by simple majority (51%) of the voting Parties, wherein each WATER PURVEYOR, MUNICIPALITY and REGIONAL holds a single vote.

VI. Roles and Responsibilities

A. The YUCAIPA-GSA shall be controlled by a Governing Board comprised of one representative of each of the Parties to this MOA.

B. The Parties agree to jointly establish their specific roles and responsibilities for implementing this MOA, including through the adoption of organizational documents, management policies, rules and procedures.

C. The Parties agree to jointly develop and implement a GSP or coordinated GSPs for the Basin in accordance with SGMA.

D. The Parties agree to work in good faith and coordinate all activities to carry out the purposes of this MOA in implementing the policy, purposes, and requirements of SGMA in the Basin, including continuing to meet, confer, coordinate, and collaborate to discuss and develop governance, management, technical, financial, and other matters, including respective roles and responsibilities for activities such as, but not limited to, the following: modeling;

metering; monitoring; hiring consultants; developing and maintaining list of interested persons under California *Water Code* Section 10723.4; budgeting; and other initial tasks as determined by the Parties.

E. The LOCAL AGENCIES shall coordinate with each other to cause all applicable noticing and submission of required information to DWR regarding formation of the YUCAIPA-GSA.

VII. Funding and Budgeting. The Parties shall work together to identify the costs, funding needs and funding sources for the administration of the YUCAIPA-GSA and the development and implementation of the GSP. To the extent not otherwise funded in accordance with or inconsistent with SGMA's provisions regarding GSA funding, the PURVEYORS shall collectively bear seventy-five percent (75%) and the MUNICIPALITIES and REGIONALS shall collectively bear twenty-five percent (25%) of the cost of the creation and administration of the YUCAIPA-GSA; and within each group, the Parties shall equally share in the costs of the creation and administration of the YUCAIPA-GSA. Nothing in this provision shall obligate any party to bear any portion of the attorneys' fees and legal costs of another Party.

VIII. Stakeholders. The initially designated stakeholders are the COUNTIES. The Parties agree to work together in ensuring public outreach and involvement of the public and other interested stakeholders throughout the SGMA process, including but not limited to all beneficial uses and users of groundwater as provided in SGMA Section 10723.2. Stakeholders have no voting rights under Section V.C. and no cost sharing obligations under Section VII of this MOA.

IX. Term, Termination, and Withdrawal.

A. Term. This MOA shall continue and remain in effect unless and until terminated by the unanimous written consent of the Parties, or as otherwise provided in this MOA or as authorized by law.

B. Withdrawal. After the YUCAIPA-GSA is officially established as the GSA for the Basin, any Party may decide, in its sole discretion, to withdraw from this MOA by providing ninety (90) days written notice to the other Parties. A Party that withdraws from this MOA shall remain obligated to pay its share of costs and expenses incurred or accrued under this MOA and any related cost-sharing agreement or arrangement up to the date the Party provides its notice of withdrawal as provided herein. Withdrawal by a Party shall not cause or require the termination of this MOA or the existence of the YUCAIPA-GSA with respect to the non-withdrawing Parties. In the event of withdrawal by one of the LOCAL AGENCIES, the Parties shall meet and confer during the 90-day notice period regarding: (i) whether the withdrawing Party wishes to seek GSA status for a portion of the Basin underlying the jurisdictional area or service area of the withdrawing Party; (ii) whether, as a result of the withdrawal, a co-GSA management or other arrangement with the withdrawing Party is necessary to satisfy the requirements of SGMA; and (iii) any other issues and steps that are necessary to avoid triggering probationary status of the Basin and State Water Board intervention. Any resolution of issues pertaining to withdrawal and any other GSA issues shall be undertaken in a manner that satisfies all requirements of SGMA and DWR, including any requirement to file new GSA notices.

X. Notice Provisions

All notices required by this MOA shall be made in writing and delivered to the respective representatives of the Parties at their respective addresses as follows:

PARTIES:

PURVEYORS:

South Mesa Water Company
391 West Avenue L
Calimesa, California 92320
Attn: Dave Armstrong, General Manager
Email: smwc@verizon.net

South Mountain Water Company
35 Cajon Street
Redlands, California 92373
Attn: Cecilia Griego, Water Resources Specialist
Email: cgriego@cityofredlands.org

Western Heights Water Company
32352 Avenue D
Yucaipa, California 92399
Attn: William Brown, General Manager
Email: w.brown@westernheightswater.org

Yucaipa Valley Water District
12770 Second Street
Yucaipa, California 92399
Attn: Joseph, Zoba, General Manager
Email: jzoba@yvwd.dst.ca.us

MUNICIPALS:

City of Calimesa
908 Park Avenue
Calimesa, California 92399
Attn: Bonnie Johnson, City Manager
Email: bjohnson@cityofcalimesa.net

City of Redlands
35 Cajon Street
Redlands, California 92373
Attn: Chris Diggs, Municipal Utilities and Engineering Director
Email: cdiggs@cityofredlands.org

City of Yucaipa
34272 Yucaipa Boulevard
Yucaipa, California 92399
Attn: Ray Casey, City Manager
Email: rcasey@yucaipa.org

REGIONALS:

San Bernardino Valley Municipal Water District
380 E. Vanderbilt Way
San Bernardino, CA 92408
Attn: Douglas Headrick, General Manager & Chief Engineer
Email: douglash@sbvmwd.com

San Gorgonio Pass Water Agency
1210 Beaumont Avenue
Beaumont, CA 92223
Attn: Jeff Davis, General Manager and Chief Engineer
Email: jdavis@sgpwa.com

STAKEHOLDERS:

COUNTIES:

County of Riverside
4080 Lemon Street
Riverside, CA 92501
Attn: Steve Horn, Senior Management Analyst, Executive Office
Email: shorn@rceo.org

County of San Bernardino
385 N. Arrowhead Avenue
San Bernardino, CA 92415-0120
Attn: Bob Page, Principal Management Analyst, Special Projects
Email: bpage@sbcounty.gov

Any Party or Stakeholder may change the address to which notices are to be given under this MOA by providing all other Parties with written notice of such change at least fifteen (15) calendar days prior to the effective date of the change. All notices shall be effective upon receipt and shall be deemed received upon confirmed personal service, confirmed facsimile delivery, confirmed courier service, or on the fifth (5^{th}) calendar day following deposit of the notice in registered first class mail.

XI. General Terms

A. Amendments. Amendments to this MOA require the unanimous written consent of all Parties and approval by the Parties' respective governing boards.

B. Successors and Assigns. The terms of this MOA shall be binding upon and inure to the benefit of the successors-in-interest and assigns of each Party; provided, however, that no transfer or assignment shall be effective until approved by the

Parties in accordance with the provisions of Section V.C. of this MOA. Once succession and/or assignment has been approved, a former Party shall have no further rights or obligations under this MOA.

C. Waiver. No waiver of any provision of this MOA by any Party shall be construed as a further or continuing waiver of such provision or any other provision of this MOA by the waiving Party or any other Party.

D. Authorized Representatives. Each person executing this MOA on behalf of a Party hereto affirmatively represents that such person has the requisite authority to sign this MOA on behalf of the respective Party.

E. Exemption from CEQA. The Parties recognize and agree that, pursuant to SGMA Section 10728.6, neither this MOA nor the preparation or adoption of a GSP constitute a "project" or approval of a project under the California Environmental Quality Act (CEQA) or the State CEQA Guidelines, and therefore this MOA is expressly exempt from CEQA review.

F. Governing Law and Venue. This MOA shall be governed by and construed in accordance with the laws of the State of California. Any suit, action, or proceeding brought under the scope of this MOA shall be brought and maintained to the extent allowed by law in the County of San Bernardino, California.

G. Attorney's Fees, Costs, and Expenses. In the event of a dispute among any or all of the Parties arising under this MOA, each Party shall assume and be responsible for its own attorney's fees, costs, and expenses.

H. Entire Agreement/Integration. This MOA constitutes the entire agreement among the Parties regarding the specific provisions of this MOA, and the Parties hereto have made no agreements, representations or warranties relating to the specific provisions of this MOA that are not set forth herein.

I. Construction and Interpretation. The Parties agree and acknowledge that this MOA has been developed through a negotiated process among the Parties, and that each Party has had a full and fair opportunity to review the terms of this MOA with the advice of its own legal counsel and to revise the terms of this MOA, such that each Party constitutes a drafting Party to this MOA. Consequently, the Parties understand and agree that no rule of construction shall be applied to resolve any ambiguities against any particular Party as the drafting Party in construing or interpreting this MOA.

J. Force Majeure. No Party shall be liable for the consequences of any unforeseeeable force majeure event that (1) is beyond its reasonable control, (2) is not caused by the fault or negligence of such Party, (3) causes such Party to be unable to perform its obligations under this MOA, and (4) cannot be overcome by the exercise of due diligence. In the event of the occurrence of a force majeure event, the Party unable to perform shall promptly notify the other Parties in writing to the extent practicable. It shall further pursue its best efforts to resume its obligations under this MOA as quickly as possible and shall suspend performance only for such period of time as is necessary as a result of the force majeure event.

K. Execution in Counterparts. This MOA may be executed in counterparts, each of which shall be deemed an original and all of which when taken together shall constitute one and the same instrument.

L. No Third Party Beneficiaries. This MOA is not intended, and will not be construed, to confer a benefit or create any right on a third party or the power or right of any third party to bring an action to enforce any of the terms of this MOA.

M. Timing and Captions. Any provision of this MOA referencing a time, number of days, or period for performance shall be measured in calendar days. The captions of the various articles, sections, and paragraphs of this MOA are for convenience and ease of reference only, and do not define, limit, augment, or describe the scope, content, terms, or intent of this MOA.

IN WITNESS WHEREOF, the Parties hereto have approved and executed this MOA as of the respective dates specified in the adopting Resolution of each Party as provided above in Article III of this MOA.

[Signature Pages Follow]

COUNTY OF RIVERSIDE
EXECUTIVE OFFICE

GEORGE A. JOHNSON
COUNTY EXECUTIVE OFFICER

ROB FIELD
ASSISTANT COUNTY EXECUTIVE OFFICER
ECONOMIC DEVELOPMENT AGENCY

MICHAEL T. STOCK
ASSISTANT COUNTY EXECUTIVE OFFICER
HUMAN RESOURCES

ZAREH SARRAFIAN
ASSISTANT COUNTY EXECUTIVE OFFICER
HEALTH SYSTEMS

PAUL MCDONNELL
ASSISTANT COUNTY EXECUTIVE OFFICER
COUNTY FINANCE DIRECTOR

June 22, 2017

Mr. Douglas Headrick
General Manager and Chief Engineer
San Bernardino Valley Municipal Water
District 380 E. Vanderbilt Way
San Bernardino, CA 92408

re: Support for Yucaipa Sub-Basin GSA

Mr. Headrick:

The County of Riverside appreciates the commitment of the cities of Calimesa, Redlands and Yucaipa; San Bernardino Valley Municipal Water District; San Gorgonio Pass Water Agency; Yucaipa Valley Water District; South Mesa Water Company; South Mountain Water Company; and Western Heights Water Company to maintain local control of the Yucaipa Sub-Basin and to work together through a Memorandum of Agreement to sustainably manage the basin's groundwater resources in a way that considers the interests of all beneficial uses and users.

As the County is also eligible to serve as the Groundwater Sustainability Agency for the Yucaipa Sub-Basin, the County wishes to assure you that it does not intend to adopt a competing Groundwater Sustainability Agency formation resolution and notification of the California Department of Water Resources.

If you should have any questions, please contact me at 951-955-1110 or by email at agann@rivco.org.

Sincerely,

Alex Gann

Alex Gann
Deputy County Executive Officer

ec: Steve Van Stockum, Director, Riverside County Department of Environmental Health
Jeff Johnson, Deputy Director, Riverside County Department of Environmental Health
Jason Uhley, General Manager-Chief Engineer, Riverside County Flood Control
And Water Conservation District

385 N. Arrowhead Avenue, 5th Floor, San Bernardino, CA 92415 | Phone: 909.387.4830 Fax: 909.387.3029

www.SBcounty.gov

SAN BERNARDINO COUNTY

Board of Supervisors

May 23, 2017

Mr. Douglas Headrick
General Manager and Chief Engineer
San Bernardino Valley Municipal Water District
380 E. Vanderbilt Way
San Bernardino, CA 92408

Re: Support for Yucaipa Sub-Basin Groundwater Sustainability Agency

Mr. Headrick:

On May 23, 2017, the County of San Bernardino Board of Supervisors voted to communicate the County's support of the cooperative efforts of the Yucaipa Sub-Basin Groundwater Sustainability Agency to manage groundwater in the Yucaipa Sub-Basin (No. 8-2.07) in compliance with the California Sustainable Groundwater Management Act.

The County appreciates the commitment of the cities of Calimesa, Redlands and Yucaipa; San Bernardino Valley Municipal Water District; San Gorgonio Pass Water Agency; Yucaipa Valley Water District; South Mesa Water Company; South Mountain Water Company; and Western Heights Water Company to maintain local control of the Yucaipa Sub-Basin and to work together through a Memorandum of Agreement to sustainably manage the basin's groundwater resources in a way that considers the interests of all beneficial uses and users.

As the County is also eligible to serve as the Groundwater Sustainability Agency for the Yucaipa Sub-Basin, the County wishes to assure you that the County does not intend to adopt a competing Groundwater Sustainability Agency formation resolution and notification of the California Department of Water Resources. To that end, on March 7, 2017, the Board of Supervisors adopted a resolution that the County would not be the Groundwater Sustainability Agency for 11 groundwater basins and sub-basins in the county, including Yucaipa Sub-Basin. A copy of this resolution is attached.

If you should have any questions, please contact Bob Page, Principal Management Analyst, at (909) 387-4384 or by email at bpage@cao.sbcounty.gov. Thank you.

Sincerely,

Robert A Lovingood

Robert A. Lovingood
Chairman and First District Supervisor
Board of Supervisors
County of San Bernardino

REPORT/RECOMMENDATION TO THE BOARD OF SUPERVISORS OF SAN BERNARDINO COUNTY, CALIFORNIA AND RECORD OF ACTION

May 23, 2017

FROM: **DENA M. SMITH, Interim Chief Executive Officer**
County Administrative Office

SUBJECT: **SUPPORT FOR BEAR VALLEY BASIN AND YUCAIPA BASIN GROUNDWATER SUSTAINABILITY AGENCIES**

RECOMMENDATION(S)

1. Approve and authorize submission of letters of support for the cooperative efforts of cities, water districts and water companies to manage groundwater in compliance with the California Sustainable Groundwater Management Act in the following groundwater basins:
   a. Bear Valley Basin (No. 8-9)
   b. Yucaipa Sub-Basin (No. 8-2.07)
2. Authorize the Chairman of the Board of Supervisors or the Chief Executive Officer to execute similar letters of support, subject to review by County Counsel, for local agency efforts to manage other groundwater basins in San Bernardino County that must comply with the California Sustainable Groundwater Management Act for which the County has previously notified the California Department of Water Resources that the County will not serve as the Groundwater Sustainability Agency.

(Presenter: Bob Page, Principal Management Analyst, 387-5425)

COUNTY AND CHIEF EXECUTIVE OFFICER GOALS AND OBJECTIVES
Ensure Development of a Well-Planned, Balanced, and Sustainable County.
Pursue County Goals and Objectives by Working with Other Agencies.

FINANCIAL IMPACT
Providing letters of support to local agencies forming Groundwater Sustainability Agencies (GSAs) will not result in the use of additional Discretionary General Funding (Net County Cost).

BACKGROUND INFORMATION
Effective January 1, 2015, the California Sustainable Groundwater Management Act (SGMA) requires local water and land use agencies to sustainably manage 127 groundwater basins and sub-basins (basins) that have been designated by the California Department of Water Resources (DWR) as medium or high priority. SGMA mandates that one eligible local agency or multiple eligible local agencies form a GSA for each of these basins by June 30, 2017 with the responsibility of developing and implementing a Groundwater Sustainability Plan (GSP).

cc: CAO-Smith
CAO-Page w/Letters of Support
CAO-Shea
File - Administrative Office w/copy of Letters
jr 5/24/17

ITEM 55

Record of Action of the Board of Supervisors

APPROVED (CONSENT CALENDAR)
COUNTY OF SAN BERNARDINO
Board of Supervisors

MOTION	AYE	AYE	SECOND	MOVE	AYE
	1	2	3	4	5

LAURA H. WELCH, CLERK OF THE BOARD

BY Jamie

DATED: May 23, 2017

Rev 7-12-16

DWR has designated Bear Valley Basin as medium priority. DWR has also defined the boundaries of the Bear Valley Basin in its Bulletin 118 and assigned it No. 8-9. The City of Big Bear Lake, the Big Bear City Community Services District and the Big Bear Municipal Water District have formed the Bear Valley Basin Groundwater Sustainability Agency (Bear Valley Basin GSA), a joint powers authority that became effective on April 26, 2017, with the purpose to become the exclusive GSA for the Bear Valley Basin.

DWR has designated Yucaipa Sub-Basin as medium priority. DWR has also defined the boundaries of the Yucaipa Sub-Basin in its Bulletin 118 and assigned it No. 8-2.07. Negotiations of a Memorandum of Agreement (MOA) regarding the formation of a GSA for the Yucaipa Sub-Basin completed in April. The MOA was circulated for approval by June from the governing bodies of the following parties to the MOA: the cities of Calimesa, Redlands and Yucaipa; San Bernardino Valley Municipal Water District; San Gorgonio Pass Water Agency; Yucaipa Valley Water District; South Mesa Water Company; South Mountain Water Company; and Western Heights Water Company.

Before either GSA can be the exclusive GSA for their respective basin, SGMA requires that they hold a noticed public hearing to adopt a resolution to become the exclusive GSA. The Bear Valley Basin GSA hearing is scheduled for May 25, 2017. The parties to Yucaipa Sub-Basin GSA MOA will hold separate public hearings on various dates before June 30, 2017. The GSAs will then have 30 days to notify DWR of their decisions, providing among other things a map of the service areas of the parties within each basin (attached) and a list of all beneficial uses and users of the groundwater and how their interests will be considered in the operation of the GSAs and the development and implementation of their GSPs.

DWR will post the notices on its SGMA Portal on its website (sgma.water.ca.gov/portal/#intro). Other eligible local agencies in each basin, including the County, will then have 90 days to file a competing GSA notice. If no competing notices are filed with DWR, the Bear Valley Basin GSA and Yucaipa Sub-Basin GSA will become the exclusive GSAs for their basins. On March 7, 2017 (Item No. 20), the Board of Supervisors (Board) adopted a resolution that the County would not be the GSA for 11 groundwater basins and sub-basins in the county, including Bear Valley Basin and Yucaipa Sub-Basin. The Board adopted a similar resolution covering five other basins on January 10, 2017 (Item No. 21).

The parties to these GSAs requested that the County support their efforts. If approved by the Board, the recommended letters will be provided to the Bear Valley Basin GSA and Yucaipa Sub-Basin GSA.

If local agencies in any of the other 14 basins covered by the Board's January 10 and March 7 resolutions request support of their GSA, approval of Recommendation No. 2 will authorize the Chairman of the Board or the Chief Executive Officer to execute similar letters of support, subject to review by County Counsel.

PROCUREMENT
N/A.

REVIEW BY OTHERS
This item has been reviewed by County Counsel (Sophie A. Akins, Deputy County Counsel, 387-5001) on May 5, 2017; Finance (Stephenie Shea, Administrative Analyst, 387-4919) on May 8, 2017; and County Finance and Administration (Katrina Turturro, Deputy Executive Officer, 387-5423) on May 8, 2017.

Exhibit A

COPY

RESOLUTION NO. 2017-18

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF YUCAIPA, CALIFORNIA, APPROVING THE MEMORANDUM OF AGREEMENT TO FORM A GROUNDWATER SUSTAINABILITY AGENCY FOR THE YUCAIPA SUB-BASIN WITH THE CITIES OF CALIMESA AND REDLANDS; THE SOUTH MESA WATER COMPANY; THE SOUTH MOUNTAIN WATER COMPANY; THE WESTERN HEIGHTS WATER COMPANY; THE YUCAIPA VALLEY WATER DISTRICT; THE SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT; AND THE SAN GORGONIO PASS WATER AGENCY

WHEREAS, on September 16, 2014, Governor Jerry Brown signed into law Senate Bills 1168 and 1319, and Assembly Bill 1739, collectively known as the Sustainable Groundwater Management Act ("SGMA"), codified in certain provisions of the California Government Code, including commencing with Section 65350.5, and codified in Part 2.74 of Division 6 of the California Water Code, commencing with Section 10720, and amending other provisions of the California Government Code and California Water Code; and

WHEREAS, various clarifying amendments to SGMA were signed into law in 2015, including Senate Bills 13 and 226, and Assembly Bills 617 and 939, which were codified in part in California Water Code Section 10723.6(a), authorizing a combination of local agencies to form a Groundwater Sustainability Agency (GSA) pursuant to a joint powers agreement, a memorandum of agreement, or other legal agreement; and, California Water Code Section 10723.6(b), authorizing water corporations regulated by the California Public Utilities Commission and mutual water companies to participate in a GSA through a memorandum of agreement or other legal agreement; and

WHEREAS, the Yucaipa Sub-Basin (Basin) is identified by the California Department of Water Resources (DWR) Bulletin 118 as Sub-Basin No. 8-02.07 of the Upper Santa Ana Valley Groundwater Basin, and is designated by DWR as a medium priority basin; and

WHEREAS, California Water Code Section 10720.7 requires the Basin, as a medium priority basin that is not designated by DWR as being subject to critical conditions of overdraft, to be managed by Groundwater Sustainability Plan by January 31, 2022; and

WHEREAS, the Cities of Yucaipa, Calimesa and Redlands; the Yucaipa Valley Water District; the South Mountain Water Company; the San Bernardino Valley Municipal Water District; and the San Gorgonio Pass Water Agency have water supply, water management, and/or land use responsibilities for their respective jurisdictional areas overlying the Basin and are local agencies as defined by SGMA, and thus each is authorized by SGMA to become or form a GSA; and

WHEREAS, the South Mesa Water Company and the Western Heights Water Company produce groundwater and provide water service within the Basin, and it is the intent to provide for management-level participation by these Water Companies in the GSA

WHEREAS, the City held a public hearing on May 22, 2017, after publication of notice pursuant to Government Code Section 6066 to consider adoption of this Resolution; and

WHEREAS, adoption of this Resolution does not constitute a "Project" under the California Environmental Quality Act (CEQA) pursuant to 15060(c)(3) and 15378(b)(5) of the State CEQA Guidelines because it is an administrative action that does not result in any direct or indirect physical change in the environment.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF YUCAIPA DOES HEREBY RESOLVE, DETERMINE AND ORDER AS FOLLOWS:

Adopt Resolution No. 2017-18 approving the Memorandum of Agreement to form a Groundwater Sustainability Agency for the Yucaipa sub-basin with the Cities of Calimesa and Redlands; the South Mesa Water Company; the South Mountain Water Company; the Western Heights Water Company; the Yucaipa Valley Water District; the San Bernardino Valley Municipal Water District; and the San Gorgonio Pass Water Agency.

PASSED, APPROVED, and ADOPTED this 22nd day of May, 2017.

DICK RIDDELL, MAYOR

ATTEST:

JENNIFER SHANKLAND, CITY CLERK

RESOLUTION 2017 - 09

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE SAN GORGONIO PASS WATER AGENCY TO APPROVE THE MEMORANDUM OF AGREEMENT TO JOINTLY FORM THE YUCAIPA GROUNDWATER SUSTAINABILITY AGENCY FOR THE YUCAIPA SUBBASIN

WHEREAS, the Sustainable Groundwater Management Act of 2014 (SGMA) was signed into law on September 16, 2014, went into effect on January 1, 2015, and has been subject to various amendments; and

WHEREAS, SGMA provides for the sustainable management of groundwater basins at the local level through the formation of Groundwater Sustainability Agencies (GSAs) and through preparation and implementation of Groundwater Sustainability Plans (GSPs); and

WHEREAS, the Yucaipa Subbasin (Basin) is identified by the California Department of Water Resources (DWR) Bulletin 118 as Subbasin No. 8-02.07 of the Upper Santa Ana Valley Groundwater Basin, and is designated by DWR as medium priority, and therefore, except as provided by SGMA, the Basin is subject to the requirements of SGMA; and

WHEREAS, the San Gorgonio Pass Water Agency (Agency) is a special act agency of the State of California, organized and operating pursuant to the San Gorgonio Pass Water Agency Law, California Water Code Appendix, Chapter 101, and accordingly the Agency constitutes a local agency for all purposes under SGMA; and

WHEREAS, SGMA authorizes a combination of local agencies as defined by SGMA to form a GSA pursuant to a joint powers agreement, a memorandum of agreement, or other legal agreement, and SGMA also authorizes a water corporation regulated by the California Public Utilities Commission or a mutual water company to participate in a GSA through a memorandum of agreement or other legal agreement; and

WHEREAS, in accordance with SGMA, the Agency, South Mesa Water Company (South Mesa), South Mountain Water Company (South Mountain), Western Heights Water Company (Western Heights), Yucaipa Valley Water District (YVWD), City of Calimesa (Calimesa), City of Redlands (Redlands), City of Yucaipa (Yucaipa), and San Bernardino Valley Municipal Water District (San Bernardino Valley Municipal) have prepared a Memorandum of Agreement (MOA), attached hereto as **Exhibit A**, to jointly form a GSA that is referred to in the MOA as the Yucaipa-GSA to cover the entire Basin, the members of which Yucaipa-GSA are the Agency, South Mesa, South Mountain, Western Heights, YVWD, Calimesa, Redlands, Yucaipa, and San Bernardino Valley Municipal; and

WHEREAS, the Agency is committed to the sustainable management of groundwater resources within the Basin in accordance with SGMA; and

WHEREAS, pursuant to the requirements of SGMA, the Agency held a public hearing on this date after publications of notice pursuant to California Government Code Section 6066 to consider adoption of this Resolution; and

WHEREAS, pursuant to SGMA Section 10728.6 and Public Resources Code Section 21065, neither this Resolution, nor the MOA, nor the preparation or adoption of a GSP constitutes a project or approval of a project under the California Environmental Quality Act (CEQA) or the State CEQA Guidelines.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE SAN GORGONIO PASS WATER AGENCY THAT:

1. The San Gorgonio Pass Water Agency hereby approves the Memorandum of Agreement to Jointly Form the Yucaipa Groundwater Sustainability Agency for the Yucaipa Subbasin (MOA), a copy of which is attached hereto as **Exhibit A**.

2. Pursuant to the MOA and as authorized by SGMA, the San Gorgonio Pass Water Agency elects to jointly form and participate as a member of the Yucaipa Groundwater Sustainability Agency (Yucaipa-GSA) for the entire Basin as further set forth and depicted in the MOA.

3. The General Manager of the San Gorgonio Pass Water Agency is hereby authorized and directed to coordinate with other members of the Yucaipa-GSA to submit a copy of this Resolution and other applicable information to the California Department of Water Resources regarding the formation of the Yucaipa-GSA.

I HEREBY CERTIFY that the foregoing is a true, full and correct copy of Resolution 2017-09 that was duly introduced, passed and adopted at a regular meeting of the Board of Directors of the San Gorgonio Pass Water Agency, at its regular meeting on June 5, 2017.

David L Fenn

David L. Fenn, Board President
San Gorgonio Pass Water Agency

ATTEST:

Jeffrey W Davis

Jeffrey Davis, Secretary

Approved on May 23, 2018

BYLAWS OF THE
YUCAIPA SUSTAINABLE GROUNDWATER MANAGEMENT AGENCY
(Department of Water Resources Sub-Basin No. 8-02.07)

ARTICLE I - NAME, ORGANIZATION, REPRESENTATIVES, PRINCIPAL OFFICE

Section 1.1 Name. The name of this organization is the Yucaipa Sustainable Groundwater Management Agency (hereinafter referred to as the "Yucaipa-SGMA").

Section 1.2 Organization. The Yucaipa-SGMA was formed by a Memorandum of Agreement ("MOA") in 2017 which remains in full force and effect, by and among: South Mesa Water Company, South Mountain Water Company, Western Heights Water Company and Yucaipa Valley Water District, herein collectively referred to as the "Water Purveyors"; and the City of Calimesa, the City of Redlands, and the City of Yucaipa, herein collectively referred to as the "Municipalities"; and the San Bernardino Valley Municipal Water District, and the San Gorgonio Pass Water Agency, herein collectively referred to as the "Regionals." Each of the above-described entities is individually referred to as a "Party" and collectively referred to as the "Parties".

Section 1.3 Board of Directors. Each Party shall appoint a principal representative and alternative representative, who may be changed from time to time at the sole discretion of the designating Party. The individuals appointed to the Yucaipa-SGMA shall be a senior executive management level employee of each designating Party. In the event that the appointed representative(s) is/are no longer employed by the appointing Party, the individual will be removed as a member of the Board of Directors of the Yucaipa-SGMA. Written confirmation from the governing board shall be provided to the Yucaipa-SGMA at the Principal Office following any change in representation.

Section 1.4 Principal Office. The principal office of the Corporation is hereby fixed and located at the offices of the San Bernardino Valley Municipal Water District, 380 East

Vanderbilt Way, San Bernardino, California 92408. The Parties hereby granted full power and authority to change said principal office from one location to another. Any such change shall be noted by the Secretary.

ARTICLE II - ROLES AND RESPONSIBILITIES

Section 2.1 Sustainable Groundwater Management Act. The Parties agree to jointly implement the Sustainable Groundwater Management Act ("SGMA"), codified in certain provisions of the California Government Code, including commencing with Section 65350.5, and codified in Part 2.74 of Division 6 of the California *Water Code*, commencing with Section 10720, and amending other provisions of the California *Government Code* and California *Water Code.*

Section 2.2 Groundwater Sustainability Plan. Specifically, the Parties agree to develop, implement, and maintain a Groundwater Sustainability Plan ("Plan") prepared pursuant to the Sustainable Groundwater Management Act (Part 2.74 of Division 6 of the Water Code, beginning with Section 10720) for the Yucaipa Basin (Department of Water Resources Sub-Basin No. 8-02.07) ("Basin"),

The following general principles shall guide the Parties in the implementation of a Groundwater Sustainability Plan: (a) Adopt a Plan that defines the basin setting and establishes criteria that will maintain or achieve sustainable groundwater management; (b) Monitor and report groundwater conditions to demonstrate that the Plan is achieving the sustainability goal for the basin; (c) Document the effect of the implementation of the Plan on adjacent basins; (d) Modify the Plan as needed, and report on a substantial compliance to the California Department of Water Resources; (e) Establish and report sustainable management criteria, projects, and management actions; and (f) Justify that the Plan provides a sustainably managed basin for 20 years following Plan implementation without adversely affecting the ability of an adjacent basin to achieve and maintain its sustainability goal.

Section 2.3 Powers and Duties. The Yucaipa-SGMA shall exercise the following powers:

A. To adopt rules, regulations, policies, bylaws and procedures governing the operation of the Yucaipa-SGMA.

B. To establish as-needed Ad Hoc and Standing advisory committees for making recommendations to the Board of Directors. Committees shall exist for the term specified in the action creating the committee, and the Board of Directors may dissolve a committee at any time through a majority vote of the Parties.

C. To monitor all public and private groundwater production and extractions.

D. To develop a Groundwater Sustainability Plan as described in Section 2.2.

E. To prepare an Annual Groundwater Report that reflects: all public and private groundwater extractions; natural and artificial recharge; return from use; water quality issues; contamination plumes; and other parameters deemed necessary by the Board of Directors to accurately determine the quantity and quality of the groundwater conditions in the Yucaipa Basin (Department of Water Resources Sub-Basin No. 8-02.07).

F. To determine the amount of additional artificial recharge for the Basin from imported sources as a complement to native sources, and to plan for the development and application of such additional sources of recharge.

G. By a majority vote, the Board of Directors may elect to exercise the following powers for a duration determined or modified as needed:

   a. To contract for the services of engineers, attorneys, planners, financial consultants, and separate and apart therefrom, to appoint agents and representatives to employ such other staff persons as necessary.

   b. To determine, assess, collect, account, and audit annual groundwater extraction charges to recover expenses related to groundwater recharge, administrative expenses, data collection, and report preparation as determined by the Board of Directors.

   c. To cooperate, act in conjunction, and contract with the United States, the State of California, or any agency thereof, counties, municipalities, public and private corporations of any kind (including without limitation, investor-owned utilities), and individuals, or any of them, for any and all purposes necessary or convenient for the purposes of the Yucaipa-SGMA.

d. To accumulate operating and reserve funds and invest the same as allowed by law for the purposes of the Yucaipa-SGMA.

e. As may be permitted by law, to apply for and accept grants, contributions, donations and loans, including under any federal, state or local programs for assistance in developing or implementing any of its projects or programs in connection with any project untaken by the Yucaipa-SGMA.

f. To implement a cost-sharing methodology in a manner that qualifies as a pass-through charge under the Constitutional requirements of Proposition 218 and similar revenue-raising requirements.

g. To exercise any power necessary or incidental to the foregoing powers in the manner and according to the procedures provided for under the law applicable to the Parties to this Agreement.

ARTICLE III - MEETINGS

Section 3.1 Regular Meetings. The Parties shall hold regular quarterly meetings on the fourth Wednesday in January, April, July, October for the purpose of conducting routine business matters. The Parties by resolution may fix and adjust the time, date, and place of holding such meetings.

Section 3.2 Workshops and Special Meetings. The Parties may schedule, and conduct workshops and special meetings as needed at the direction of a majority of the Board of Directors. The Parties by resolution may fix the time, date, and place of holding such meetings.

Section 3.3 Voting Methodology. The voting structure for matters pertaining to the establishment and implementation of the administrative components of the Yucaipa-SGMA shall be by simple majority (51%) of the voting Parties, wherein each Water Purveyor, Municipality and Regional holds a single vote.

Section 3.4 Fees and Compensation. Representatives from each Party shall receive no compensation or expenses from the Yucaipa-SGMA.

Section 3.5 Ralph M. Brown Act. Notwithstanding any of the provisions of these Bylaws to the contrary, all meetings shall be subject to the Ralph M. Brown Act, commencing at Section 54950 of the Government Code of the State of California.

Section 3.6 Conduct of Meetings. The President or, in the absence of the President the Vice President, or, in the absence of the Vice President the Secretary, or, in the absence of the Secretary a Chairperson chosen by a majority of the Parties present, shall preside over the meeting.

Section 3.13 Quorum. A majority of the Parties constitutes a quorum for the transaction of business.

ARTICLE IV - OFFICERS

Section 4.1 Officers. The officers of the Yucaipa-SGMA shall be a President, a Vice President, a Secretary, a Treasurer.

Section 4.2 Election. The officers shall be chosen at the first Regular Meeting held each calendar year and each shall hold office until the officer shall resign, be removed, or be otherwise disqualified to serve, or the officer's successor is elected.

Section 4.3 Removal and Resignation. Any officer may resign, or may be removed, with or without cause, at any time. Vacancies caused by death, resignation or removal of any officer may be filled by a majority vote of the Parties.

Section 4.4 President. The President shall preside at all meetings of the Parties.

Section 4.5 Vice President. In the absence of the President, the Vice President shall perform all the duties of the President.

Section 4.6 Secretary. The Secretary shall keep a book of minutes of all meetings, with the time and place of holding, the names of those present, and actions taken by the Parties.

Section 4.7 Treasurer. The Treasurer shall keep and maintain adequate and correct books of account showing the receipts and disbursements of the Yucaipa-SGMA, and an account of its cash and other assets, if any. Such books of account shall at all reasonable times be open to inspection by any Director.

The Treasurer shall deposit all moneys of the Yucaipa-SGMA with such depositories as are designated by the Parties and shall disburse the funds of the Yucaipa-SGMA as may be ordered, and shall render to the Parties, regular statements of the financial condition of the Yucaipa-SGMA.

ARTICLE V - MISCELLANEOUS

Section 5.1 Execution of Documents. The Parties may authorize any officer or officers as agent or agents, to enter into any contract or execute any instrument in the name of and on behalf of the Yucaipa-SGMA and such authority may be general or confined to specific instances; and unless so authorized, no officer, agent or other person shall have any power or authority to bind the Yucaipa-SGMA by any contract or engagement or to pledge its credit or to render it liable for any purpose or to any amount.

Section 5.2 Inspection of Bylaws. The Yucaipa-SGMA shall keep in its principal office the original or a copy of these Bylaws, as amended or otherwise altered to date, certified by the Secretary, which shall be open to inspection by members of the public at all reasonable times during office hours.

Section 5.3 Fiscal Year. The fiscal year of the Yucaipa-SGMA shall begin July 1 of each year and end on the last day of June of the succeeding year.

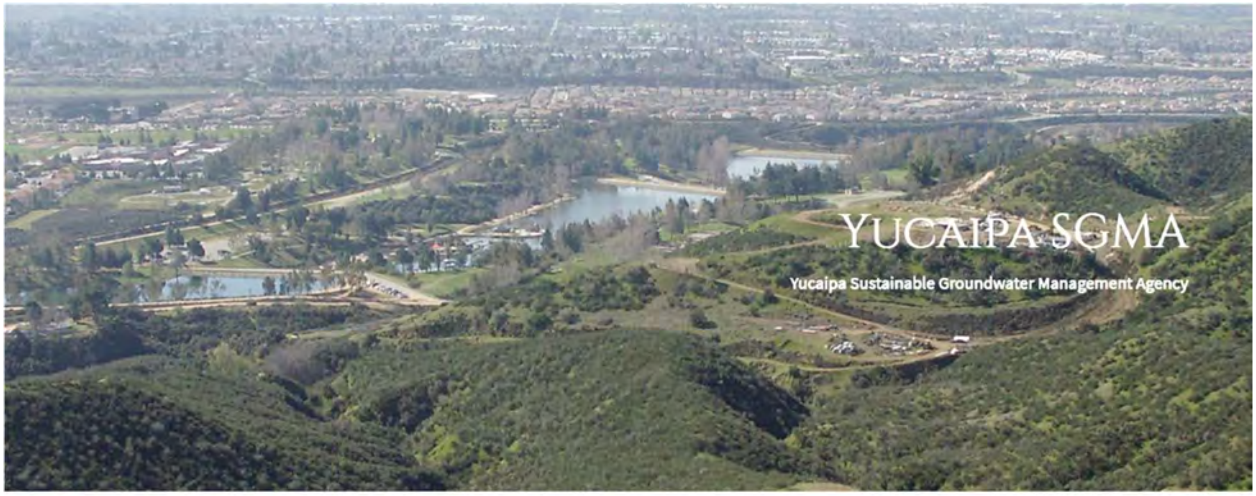
Section 5.4 Construction and Definitions. Unless the context otherwise requires, the general provisions, rules of construction and definitions contained in the Law shall govern the construction of these Bylaws. If any section, subsection, sentence, clause or phrase of these Bylaws, or the application thereof, is contrary to the Law, the provisions of the Law shall prevail. Without limiting the generality of the foregoing, the masculine gender includes the feminine and neuter, the singular number includes the plural and the plural number includes the singular, and the term "person" includes a corporation as well as a natural person.

Section 5.5 Amendments. New Bylaws may be adopted, or these Bylaws may be amended or repealed by the vote of the Parties. No amendment to these Bylaws shall be effective until approved by the Parties.

Approved unanimously on May 23, 2018.

Appendix 1-C

Public Outreach and Engagement Plan



PUBLIC OUTREACH AND ENGAGEMENT PLAN

Prepared for:

Yucaipa Sustainable Groundwater Management Agency
YucaipaSGMA.org

Prepared by:

DUDEK
605 Third Street
Encinitas, California 92024

July 2019

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FIGURES

GLOSSARY OF TERMS/ABBREVIATIONS

Acronym/Abbreviation	Definition
Yucaipa SGMA	Yucaipa Sustainable Groundwater Management Agency
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
DWR	California Department of Water Resources
TAG	Technical Advisory Group
SWRCB	State Water Resources Control Board
South Mesa	South Mesa Water Company
South Mountain	South Mountain Water Company
WHWC	Western Heights Water Company
YVWD	Yucaipa Valley Water District
SBVMWD	San Bernardino Valley Municipal Water District
SGPWA	San Gorgonio Pass Water Agency
Term	**Definition**
Aquifer	An underground layer of water-bearing permeable rock, rock fractures or unconsolidated material (gravel, sand, or silt) that yields significant amounts of groundwater to wells or springs (DWR Bulletin 118).
Yucaipa Subbasin	Upper Santa Ana Valley Groundwater Basin, Yucaipa Subbasin, identified as Groundwater Basin Number 8-2.07 in DWR Bulletin 118 – California's Groundwater
Stakeholder	An individual with interest in the Yucaipa Subbasin GSP
Engagement	Efforts made to understand and involve stakeholders and their concerns in the activities and decision-making of the Yucaipa GSA
Member Agencies	The water purveyors, municipalities and regional water agencies who are members of the Yucaipa Groundwater Sustainability Agency

1 BACKGROUND OF THE SUSTAINABLE GROUNDWATER MANAGEMENT ACT

The Sustainable Groundwater Management Act, signed into law by Governor Jerry Brown on September 16, 2014, created a new framework for groundwater management in California. The framework includes a structure and schedule to achieve sustainable groundwater management within 20 years. The California Department of Water Resources (DWR) has historically managed the state's central repository for groundwater data. Under The Sustainable Groundwater Management Act, DWR provides guidance, financial assistance, and technical support for compliance with state requirements. The State Water Resources Control Board (SWRCB) provides the regulatory backstop under The Sustainable Groundwater Management Act, taking over basin management and assessing fees if local groundwater management is not successful in complying with the requirements of The Sustainable Groundwater Management Act.

The Sustainable Groundwater Management Act established a new structure for local groundwater management through Groundwater Sustainable Agencies (GSAs). The formation of GSAs for all basins that the DWR designated as high and medium priority groundwater basins was required by July 1, 2017. Each GSA for these high and medium priority basins must then develop a Groundwater Sustainability Plan (GSP) that details how sustainable groundwater management will be achieved within 20 years of implementing the GSP. Sustainable groundwater management is defined by The Sustainable Groundwater Management Act as *the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results*. This avoidance of undesirable results is measured through six sustainability indicators:

1. Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon,
2. Significant and unreasonable reduction of groundwater storage,
3. Significant and unreasonable seawater intrusion,
4. Significant and unreasonable degradation of water quality,
5. Significant and unreasonable land subsidence, and
6. Depletion of interconnected surface water and groundwater that has significant and unreasonable adverse impacts on beneficial uses of the surface water.

The GSP is a tool used to help the GSA sustainably manage the basin. The criteria for sustainable management, including determining what is significant and unreasonable within the parameters of The Sustainable Groundwater Management Act for the groundwater basin managed by that GSA, must be assessed, with input from stakeholders, before the GSP can be adopted.

1.1 Sustainable Groundwater Management Act Requirements for Stakeholder Engagement

Stakeholder engagement is an important component of any successful long term planning effort. Engaging members of the public in groundwater sustainability planning will improve public understanding of the technical and political considerations the GSA factors into their decision-making process. Participation by the public will also improve the GSA's understanding of the potential impacts of their decisions.

The Sustainable Groundwater Management Act recognized the importance of stakeholder engagement and laid out specific requirements for stakeholder engagement within each of the four phases of The Sustainable Groundwater Management Act:

Phase 1: GSA Formation and Coordination
The following Phase 1 requirements were completed by Yucaipa SGMA in 2017 and 2018:

- Establish and maintain a list of interested parties
- Provide public notice of the GSA formation
- Conduct a GSA formation public hearing
- Notify DWR of the GSA formation
- Provide a written statement to DWR as well as cities and counties within the GSA boundary describing how interested parties may participate in the GSP development.
- Develop GSA website for interested parties

Phase 2: GSP Preparation and Submission
The following Phase 2 requirements will be completed by Yucaipa SGMA by January 31, 2022:

- Submit initial notification.
- Prepare a GSP that considers beneficial uses and users of groundwater when describing undesirable results, minimum thresholds, projects and actions.
- The GSP must include a communication section that includes the following:
    - An explanation of the Agency's decision-making process.
    - Identification of opportunities for public engagement and a discussion of how public input and response will be used.

  - A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin.
  - The method the Agency will follow to inform the public about progress implementing the Plan, including the status of projects and actions.
- The GSA must provide public noticing and hold a public meeting before adopting or amending a GSP.

Phase 3: GSP Review and Evaluation
The following Phase 3 requirements will be completed by DWR:

- After the GSA adopts the GSP and it is submitted to DWR, the GSP will be available on the DWR website for a 60-day comment period for any person to provide comments to DWR before the DWR completes evaluation and assessment of the GSP.

Phase 4: Implementation and Reporting
The following Phase 4 requirements will be completed by Yucaipa SGMA through 2042:

- The Sustainable Groundwater Management Act requires assessments and re-evaluation of the GSP at least every 5 years. The GSA must provide public notice and hold public meetings prior to amending the GSP.
- Public notice is also required before the GSA imposes or increases fees.

There are also has general requirements that apply to all four phases of Sustainable Groundwater Management Act implementation.

2 YUCAIPA SUBBASIN AND GSA FORMATION

The Upper Santa Ana Valley Groundwater Basin, Yucaipa Subbasin lies under portions of the cities of Calimesa, Redlands, and Yucaipa, as well as unincorporated San Bernardino and Riverside Counties. The Subbasin, cataloged by the California Department of Water Resources (DWR) as groundwater basin number 8-2.07, is approximately 25,300 acres (Figure 1).

The Yucaipa Sustainable Groundwater Management Agency (Yucaipa SGMA) was formed as the GSA for the Yucaipa Subbasin in 2017 through a Memorandum of Agreement (MOA) entered into by local water purveyors, municipalities, and regional water management entities.

Yucaipa-GSA Member Agencies
Purveyors
South Mesa Water Company
South Mountain Water Company
Western Heights Water Company
Yucaipa Valley Water District
Municipalities
City of Redlands
City of Yucaipa
Regionals
San Bernardino Valley Municipal Water District
San Gorgonio Pass Water Agency

The Yucaipa SGMA completed the initial phase of stakeholder engagement (Phase 1) in June 2017 and provided the required documentation for GSA formation, which is available to the public through the DWR Sustainable Groundwater Management Act Portal (https://sgma.water.ca.gov/portal/gsa/print/349).

The City of Calimesa submitted a written Notice of Withdrawal dated November 19, 2018 and the Yucaipa SGMA subsequently acknowledged the withdrawal of the City of Calimesa from the Yucaipa SGMA at the January 23, 2019 meeting.

2.1 Yucaipa SGMA and GSA Decision Making Process

The roles and responsibilities of the Yucaipa SGMA were further clarified in the By-Laws adopted in May 2018. Each of the Member Agencies appoints one principal representative and one alternate representative to the Yucaipa SGMA Board. All Board meetings are public meetings subject to the Ralph M. Brown Act. Each Board member has one vote and a simple majority of 51% of the voting parties is required to pass an item. A majority of the Board is considered a quorum for purposes of meeting and decision-making.

3 YUCAIPA SUBBASIN GSP

The DWR has designated the Yucaipa Subbasin as a high-priority basin based on population size and growth, reliance on groundwater for public water supply, and long-term declines in groundwater levels. The Yucaipa Subbasin is not designated as critically overdrafted, therefore a GSP must be developed by January 31, 2022. This GSP will detail a pathway to sustainable groundwater management by 2042 in accordance with the Sustainable Groundwater Management Act.

Yucaipa SGMA has initiated the process of developing a GSP (Yucaipa GSP) for the Yucaipa Subbasin that will define a course of action to achieve sustainable groundwater management within 20 years of plan adoption. The Yucaipa GSP will identify local undesirable results and identify management actions to minimize undesirable results as well as milestones to ensure progress. A groundwater monitoring program will be developed and implemented to track improvement within the basins leading to sustainable management. The Yucaipa GSP will be re-evaluated and refined, as needed, and submitted to DWR every five years in accordance with the Sustainable Groundwater Management Act.

4 PURPOSE OF THE DOCUMENT

This Public Outreach and Engagement Plan (Plan) has been developed as a communication tool to help stakeholders understand the importance of participation in groundwater sustainability planning and lay the framework of how stakeholders can actively engage in the Yucaipa-GSA planning effort. In 2018, DWR released a guidance document for GSP Stakeholder Communication and Engagement that details best practices including the development of Communication and Engagement Plans to increase transparency in the GSP development process.

The Yucaipa SGMA will prepare a GSP in accordance with The Sustainable Groundwater Management Act that will guide future management decisions including the amount of ground water that can be pumped from the subbasin without causing undesirable results, and the development of new projects to enhance water resource management.

The Yucaipa SGMA discussed overarching goals for outreach and engagement at the April 24, 2019 Board Meeting. The primary goals during the GSP development process included:

1. Maintaining transparency throughout the GSP development process,
2. Developing a common understanding among stakeholders of the Yucaipa subbasin needs, and

3. Exceeding the state requirements for outreach and engagement.

This Plan is intended to be a guiding framework that will be updated as needed to maintain transparency throughout the GSP development and implementation process.

5 OPPORTUNITIES FOR PUBLIC INVOLVEMENT AND ENGAGEMENT

The Yucaipa SGMA encourages members of the public to participate in the GSP development and implementation process through attending public meetings, providing comments on the draft GSP, and communicating directly with member agency staff and Board members.

5.1 Meeting Opportunities

The Yucaipa SGMA Board holds quarterly regular meetings the fourth Wednesday in January, April, July, and October to conduct routine business matters. During the development of the GSP, the Technical Advisory Group (TAG) will meet approximately monthly as needed. All Board and TAG meetings are open to the public and each meeting agenda includes an item where members of the public can speak to the Board. All meeting agendas and minutes are posted on the Yucaipa SGMA website (https://yucaipasgma.org).

5.1.1 Public Notices

Board meetings and workshops are noticed in accordance with the Brown Act. In addition to publicly noticing meetings on the Yucaipa SGMA website, the Yucaipa SMGA maintains a list of interested parties and distributes electronic agenda information and newsletters via email. Newsletters include notices of Yucaipa SGMA Board meetings and other updates including updates on the progress of the GSP development and implementation. Interested parties can subscribe to the list that receives email notifications through the “subscribe” link at the bottom of the website home page (https://yucaipasgma.org).

5.2 Collaborative Opportunities

The Yucaipa-SMGA has taken an inclusive approach to groundwater management, making space on the Board for each of the local entities with water supply, water management, and or land use responsibility in the Yucaipa Subbasin that wanted to participate in the GSA. The Board understands that each interested party has an established relationship with their local water supplier that should continue through the development and implementation of the GSP. Each Board member is appointed by the member agency and represents the constituents in their jurisdiction. In addition to the Yucaipa SGMA Board member agencies, representatives from the City of Calimesa, the County of Riverside and the County of San Bernardino participated in the formation of the Yucaipa SGMA and are committed to continued involvement as representatives of their stakeholder interests. Due to this uniquely inclusive Board structure, Yucaipa SGMA views each Board member and stakeholder representative as an ambassador of their own jurisdiction, representing their interests in the Yucaipa SGMA meetings.

Purveyors

5.2.1 South Mesa Water Company

The South Mesa Water Company (South Mesa) is a mutual water company, formed in 1912, with approximately 4 square miles within the service area including portions of both the City of Calimesa and the City of Yucaipa. Water supplied by South Mesa is currently 100% groundwater. The South Mesa service area is approximately 90% residential with some industrial uses, several schools, and some small parks. South Mesa engages directly with shareholders through the annual shareholder meeting and updates as needed. South Mesa engages with shareholders through their website, regular Consumer Confidence Reports, social media platforms and information available at the South Mesa office. Many shareholders also pay their bills in person and converse regularly with South Mesa staff.

5.2.2 South Mountain Water Company

The South Mountain Water Company (South Mountain) is a mutual water company with groundwater production in the Yucaipa subbasin. The City of Redlands owns majority shares and operates the two wells owned by South Mountain. The business activities of the company are conducted by Bear Valley Mutual Water Company.

5.2.3 Western Heights Water Company

The Western Heights Water Company (WHWC) serves approximately 4.53 square miles including parts of the City of Yucaipa and the City of Redlands. Approximately 90% of WHWC customer demand is domestic with approximately 10% industrial and commercial use. WHWC currently has sufficient groundwater supply for 100% of the potable water demand, but purchases 25% imported water to offset groundwater demand. WHWC shareholders engage in decision making through participation in WHWC Board meetings.

5.2.4 Yucaipa Valley Water District

The Yucaipa Valley Water District (YVWD) is a special district that was formed in 1971 and supplies local groundwater, treated imported water, and recycled water. The Yucaipa Valley Water District service area is approximately 40 square miles and includes portions of the City of Calimesa and the City of Yucaipa. Approximately 78% of the water use in the YVWD is residential with approximately 22% commercial, industrial and institutional. The YVWD engages with customers through their local office, website and consumer confidence reports. YVWD also published some notices in the local newspaper as appropriate.

Municipalities

5.2.5 City of Redlands

The City of Redlands was incorporated in 1888 and currently serves water to local businesses and more than 75,000 residents in Redlands, Mentone, parts of Crafton Hills, San Timoteo Canyon, and a small portion of San Bernardino. The City of Redlands supplies originate as surface water, groundwater and imported water. The City of Redlands provides ongoing communication with stakeholders through their website and social media. Important water-related information is distributed with consumer confidence reports and bills as appropriate.

5.2.6 City of Yucaipa

The City of Yucaipa was incorporated in 1989 and currently has over 58,000 residents. Water service in the City is provided by YVWD, South Mesa, and WHWC. South Mountain has water facilities, including water wells, within the City of Yucaipa, but does not currently provide water services in the City. The entire City of Yucaipa is within the service area of the SBVMWD. The City of Yucaipa has several commissions and committees, including the Planning Commission, Parks and Recreation Commission, and Trails and Open Space Committee, that enable citizens to participate in the governance process. The City of Yucaipa regularly holds public meetings where members of the general public can voice concerns or issues. The City also engages with stakeholders through social media, the city website and newspaper publications as appropriate.

Regionals

5.2.7 San Bernardino Valley Municipal Water District

The San Bernardino Valley Municipal Water District was formed in 1954 as a regional water agency. The San Bernardino Valley Municipal Water District is a wholesale water supplier that imports water through the State Water Project, manages groundwater stored within the District boundaries, and coordinates delivery of imported water to local water retail agencies.

5.2.8 San Gorgonio Pass Water Agency

The San Gorgonio Pass Water Agency (SGPWA) was established in 1961 and supplies State Water Project water to retail water agencies. The SGPWA engages with stakeholders through semi-monthly public Board meetings and workshops. SGPWA provides regular updates on the website and through social media.

Stakeholders

5.2.9 City of Calimesa

The City of Calimesa was incorporated in 1990 and currently has over 8,000 residents. Water service in the City is provided by South Mesa and YVWD. The entire City of Calimesa is within the San Gorgonio Pass Water Agency service area. The City has several active commissions and provides opportunities for public comment at all City Council and Commission meetings. The City also engages with stakeholders through their website and social media.

5.2.10 County of Riverside

The County of Riverside was formed in 1893 and covers nearly 7,300 square miles including 28 cities. The County provides information and updates on a centralized website as well as social media.

5.2.11 County of San Bernardino

The County of San Bernardino was formed in 1854 and covers 20,000 square miles including 24 cities. The County provides information and updates on a centralized website as well as social media.

5.3 Opportunities for Tribal Communities

According to the DWR Water Management Planning Tool, as of January 2019, there are no tribal trust lands within the Yucaipa Subbasin as shown in Figure 2. Although there are no federally recognized tribes, Indian land currently or historically held in Trust by the United States Government or smaller Reservation areas within the Yucaipa Subbasin, the Yucaipa SGMA encourages participation from all stakeholders including tribal communities within the watershed.

5.4 Disadvantaged Communities

There are several communities within the Subbasin that DWR has mapped as Disadvantaged Communities (DAC) and Severely Disadvantaged Communities (SDAC) based on median household income within community census tracts, blocks, and places as shown in Figure 3. The majority of the areas designated as DAC and SDAC are within either the City of Yucaipa or the City of Calimesa. Members of these communities are represented on the Yucaipa SGMA by both their City representative and their water supplier.

5.5 Stakeholder Email List

The Yucaipa SGMA maintains a list of stakeholders interested in the GSP process, known as the *List of Interested Parties (List).* Electronic newsletter, meeting notices, and notices of GSP documents are sent electronically to the List. There are currently over 100 individuals subscribed to the List. The List is continuously updated with individuals that request in writing to be placed on the list of interested parties or subscribe through the Yucaipa SGMA website.

5.6 Online Resources

The Yucaipa SGMA has created a website (www.YucaipaSGMA.org) that includes general information, relevant documents, a calendar of meetings and important events, as well as the agendas and minutes for all Yucaipa SGMA meetings.

6 CONTACT US

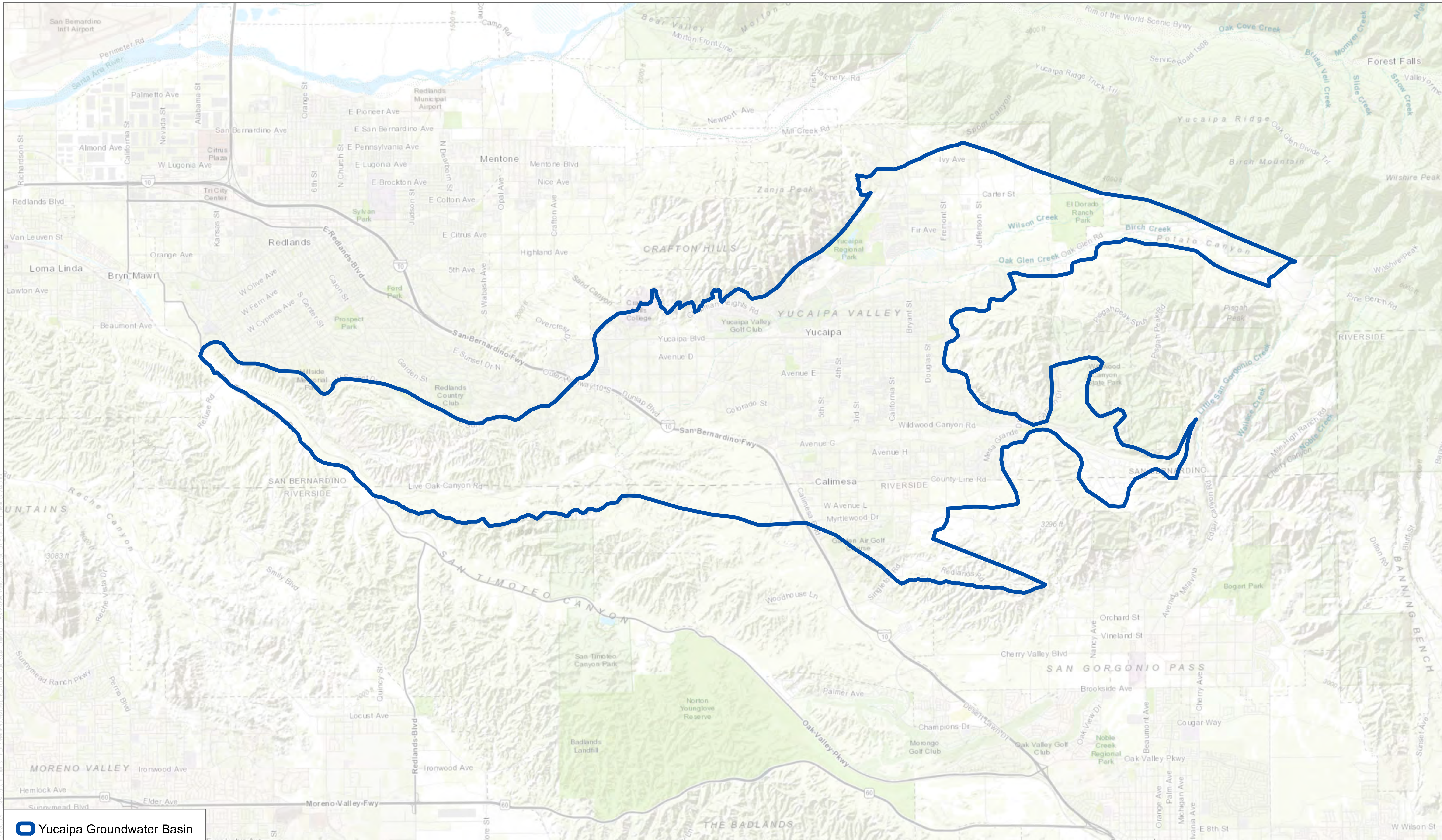
This document serves as a tool for facilitating public engagement in the GSP development process. It is designed to be a living document that is updated as needed to reflect current mechanism of engagement. Yucaipa SGMA will continue to use the communication tools outlined in this document as necessary through the implementation phase of the GSP.

For additional information regarding the Yucaipa SGMA and the GSP, please contact:

Bob Tincher, Deputy General Manager - Resources
Phone: (909) 387-9215
Email: bobt@sbvmwd.com

Mailing Address:
San Bernardino Valley Municipal Water District
380 East Vanderbilt Way,
San Bernardino, California 92408

Website: www.YucaipaSGMA.org



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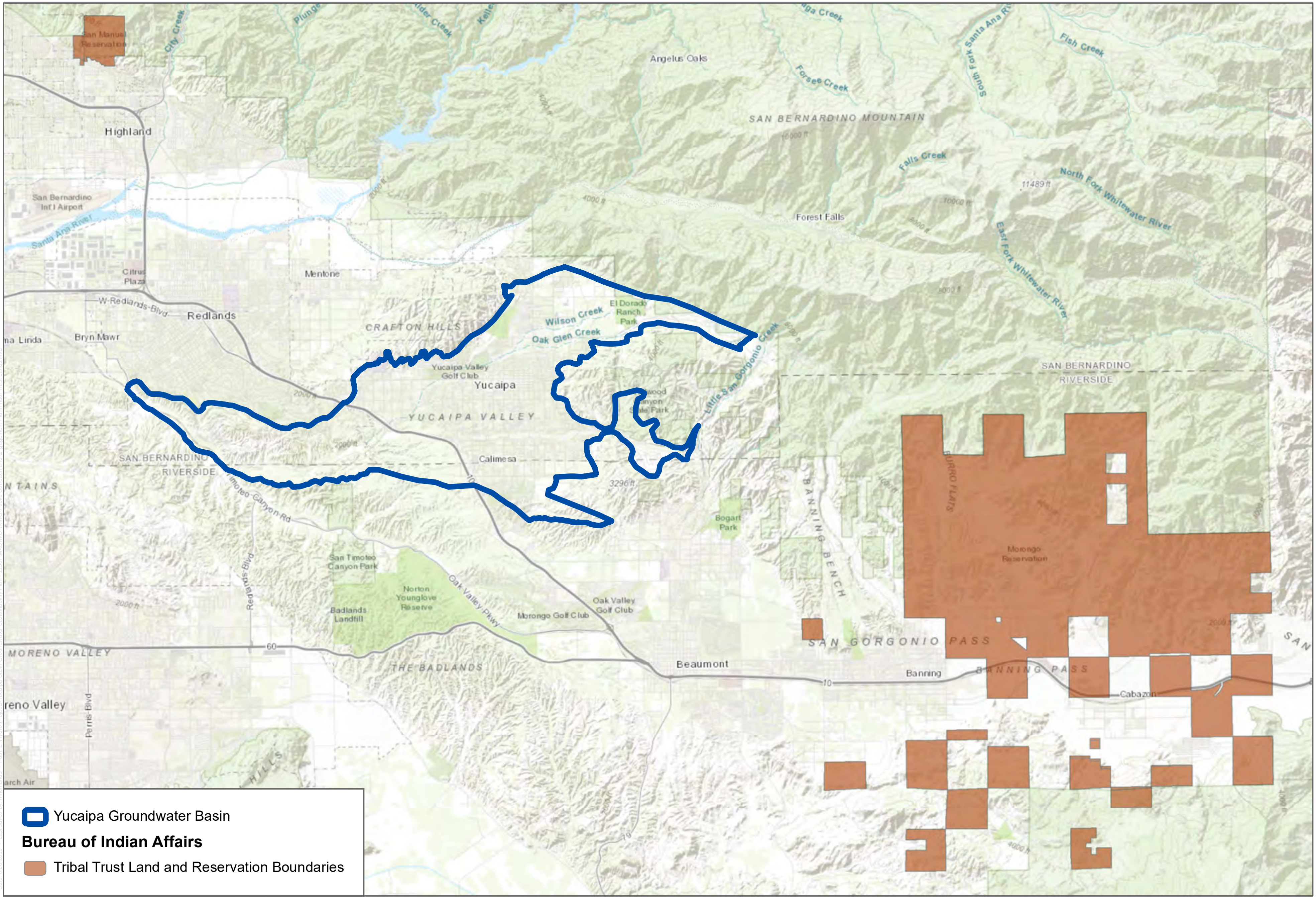
DUDEK

0 0.5 1 Miles

FIGURE 1

Boundary Map

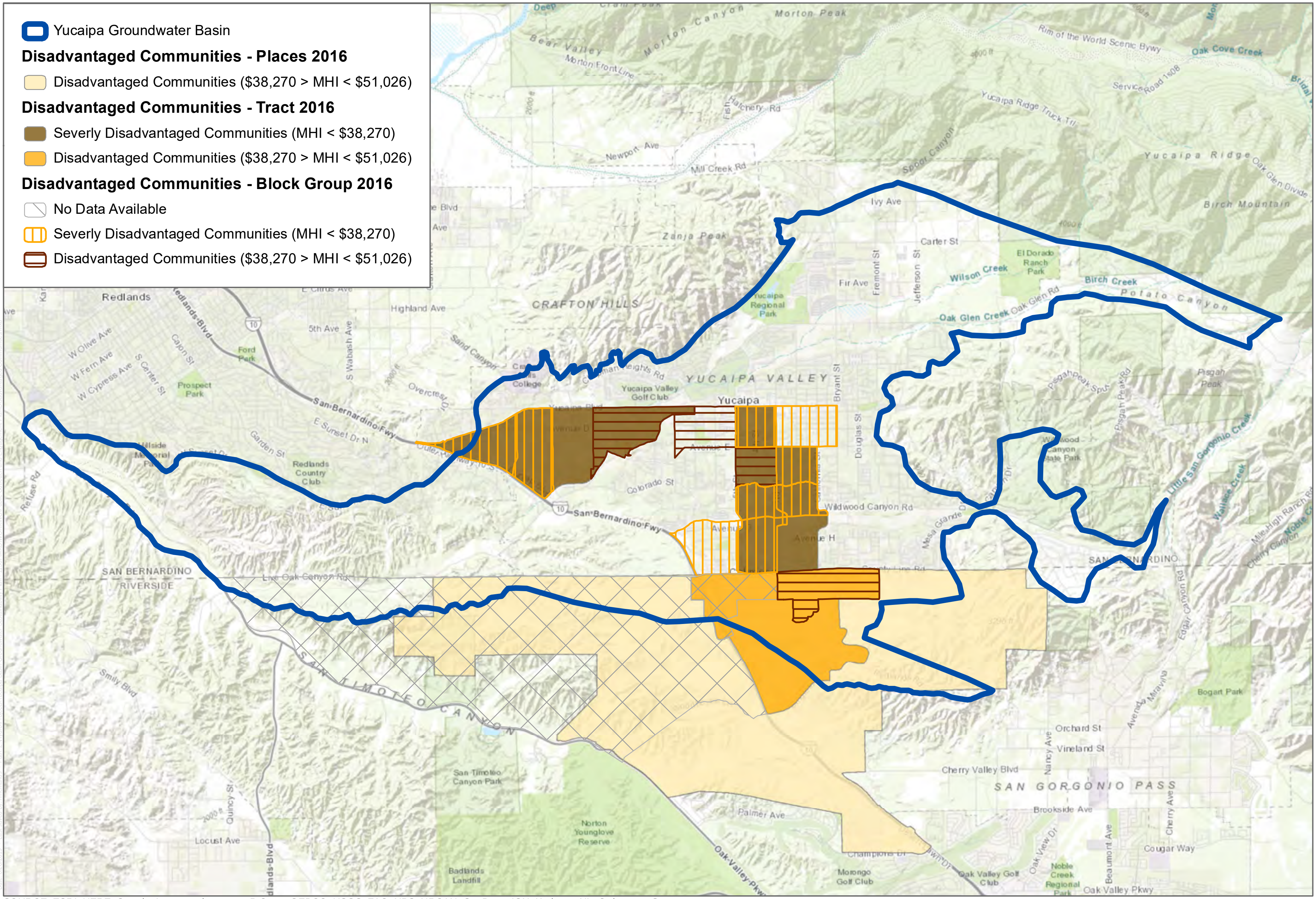
Public Outreach and Engagement Plan



SOURCE: ESRI, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordanance Survey, ESRI Japan, METI, ESRI China (Hong Kong), swisstopo, OpenStreetMap contributors, and the GIS User Community; BLM; DWR

DUDEK

FIGURE 2
Tribal Trust Lands
Public Outreach and Engagement Plan



SOURCE: ESRI, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordanance Survey, ESRI Japan, METI, ESRI China (Hong Kong), swisstopo, OpenStreetMap contributors, and the GIS User Community; DWR 2019

Note: MHI = Mean Household Income

DUDEK

0 0.75 1.5 Miles

FIGURE 3

Disadvantaged Communities

Public Outreach and Engagement Plan

This plan was paid for in part by a grant from the California Department of Water Resources through the Proposition 1 Sustainable Groundwater Planning Grant Program.

DUDEK

Appendix 1-D

Public Comments on Draft GSP

Comments on Draft GSP

City of Yucaipa Comments on Draft GSP

Management actions were defined to achieve sustainable management of the groundwater resources in the Plan Area should groundwater elevations decline below measurable objectives. These actions will be implemented when groundwater levels decline to the drought buffers established for the North Bench, Calimesa and Western Heights management areas. The drought buffers provide operational flexibility for the Yucaipa GSA to implement these management actions and/or other programs to prevent undesirable results.

INSERT 1

No projects were identified in this GSP to help achieve groundwater sustainability in the Plan Area. Yucaipa GSA member agencies have constructed stormwater capture basins to enhance recharge to the Subbasin. The Wilson Creek and Oak Glen Creek spreading basins are designed to capture stormwater and are used to artificially recharge the Subbasin using surplus SWP water delivered by the SWP East Branch Extension. Other existing and planned stormwater capture basins will provide additional opportunities to capture and recharge stormwater flows thereby reducing the reliance on imported water to meet the basin measurable objectives.

ES-5 Plan Implementation

Upon adoption of this GSP by the Yucaipa GSA, the primary activities associated with implementing the GSP include administrative duties by the member agencies of the Yucaipa GSA, the management of data collection, data validation, and analysis to evaluate conditions in the Subbasin, the preparation and submittal of annual reports and periodic evaluations, with associated data, to DWR, and an assessment of conditions in the Subbasin and determination if management actions need to be implemented. During the initial 5-year period after the GSP is adopted, the Yucaipa GSA will evaluate options to address data gaps, and conduct feasibility studies to evaluate the effectiveness of potential spreading basins and other programs that would maintain or achieve sustainability in the Subbasin.

INSERT TO REPLACE LAST PARAGRAPH OF ES-4

Some of the member agencies of the Yucaipa GSA have constructed storm water capture basins to enhance recharge to the Subbasin. The Wilson Creek and Oak Glen Creek basins are designed to capture storm water, but are primarily used to artificially recharge the Subbasin using surplus SWP water delivered by the SWP East Branch Extension. These basins are included in the YIHM to simulate their contributions to recharge to the Subbasin. The Wilson Creek and Oak Glen Creek basins have contributed an average 1,900 AFY and 170 AFY, respectively, since 2011. The other existing storm water capture basins are estimated to capture approximately 1,800 AFY. These projects provide additional benefits including improving water quality in surface waters by reducing stormwater runoff volumes and providing wildlife habitat.

The Yucaipa GSA identified proposed projects that have been designed, permitted, and are undergoing development or will in the near future. These include the Wilson Creek III Basins, the Pendleton Avenue Low Water Crossing, and the Upper Wildwood Creek Basin. The projects funded by the City of Yucaipa (with major funding also provided by SBVMWD for the Wilson III Basins) are designed to capture storm water flows and enhance recharge to the Subbasin. The estimated average annual recharge contribution is approximately 1,500 AF. These basins will be located in the North Bench management area. These planned basins were not included in the future water budget analyses for the North Bench management area using the YIHM, because the North Bench management area is not projected to experience undesirable results over the 50-year planning and implementation horizon. However, these planned projects will provide additional opportunities to capture and recharge stormwater flows, thereby reducing the reliance on imported water to meet the basin measurable objectives.

described in the November 2012 IRWM Proposition 84 and 1E Program Guidelines by the California Department of Water Resources. The 2015 IRWM Plan documents the IRWM Region's current IRWM program and processes that have been implemented since 2005 when the IRWM Region was created.

A Regional Water Management Group, also known as the Basin Technical Advisory Committee, was formed to implement and update the IRWM. The Basin Technical Advisory Committee consists of water agencies and other stakeholders. The Basin Technical Advisory Committee prepares an annual water management plan, which tracks certain metrics from the IRWM such as groundwater level data, groundwater storage levels, and liquefaction potential. It also provides recommended thresholds for groundwater recharge to help prevent liquefaction and migration of groundwater contamination plumes.

1.5.3 Operational Flexibility Limitations

Operational flexibility is a key consideration in integrated water resource management because it helps water purveyors adapt to known legal, operational, and environmental constraints, and plan for an uncertain future, especially as it relates to drought resiliency and the effects of climate change. Operational flexibility can be measured over a given time horizon and/or geographic scale (e.g., water district service area) as the difference between available water supply and service area demand. Operational flexibility is maximized when a water purveyor has a large variety of sources in a water supply portfolio, when it has local control over such sources, and when such sources are connected to each other (i.e., conjunctively managed). On a general statewide scale, water purveyors are increasingly looking to minimize reliance on imported water supplies by promoting stormwater recharge, maximizing wastewater recycling, and sustainably developing local sources of water.

For the Yucaipa Subbasin, water purveyors collectively draw from a combination of sources—including local surface water, groundwater, imports from the SWP, and recycled water—which differ in terms of the volume available, area served, timing of peak availability, reliability and cost. Climate and regulatory constraints (e.g., water quality standards, water rights, and minimum environmental flows) have historically had a greater impact on the availability of surface water supplies.

Groundwater sources were historically limited only by the capacity of production wells accessing the aquifer. However, declining water level trends prior to 2007 indicated an unsustainable withdrawal of groundwater from the Yucaipa Subbasin. The importation of supplemental SWP water into the subbasin led to a decrease in groundwater extractions to approximately the estimated safe yields of the minor subbasins. Consequently, the declining trends in groundwater levels ceased and water levels either stabilized or recovered to levels approaching the historical high groundwater levels observed in the Spring of 1988. With the passage of SGMA and the sustainable management criteria established in this GSP (Chapter 3), once adopted, groundwater extraction will be regulated by minimum thresholds established for each applicable sustainability indicator and an estimated sustainable yield.

The GSP complements and enhances existing projects and programs currently in place to maximize beneficial use of water resources and increase operational flexibility within the Yucaipa Subbasin. Existing water monitoring and management activities are summarized in Tables 1-3 and 1-5. To that end, individual Yucaipa GSA member agencies have implemented various policies and goals, such as enhancing recycled water use, implementing programs to conserve water usage, evaluating programs that would increase stormwater capture and artificial recharge, and policies requiring future developments to build and connect to existing water services, including recycled water, and sanitary sewer. Examples of projects that have increased operational flexibility within the Yucaipa Subbasin include YVWD's expansion and treatment upgrades at the WRWRF to increase recycled water output to serve back to its customers, and the near-future implementation of the Salinity and Groundwater Enhancement project designed to produce exceptionally pure recycled water for groundwater recharge.

INSERT

INSERT AT END OF PARAGRAPH 1.5.3

Other projects include the Wilson Creek and Oak Glen Creek basins which were designed to capture storm water, but are primarily used to artificially recharge the Subbasin using surplus SWP water delivered by the SWP East Branch Extension. These basins are included in the YIHM to simulate their contributions to recharge to the Subbasin. The Wilson Creek and Oak Glen Creek basins have contributed an average 1,900 AFY and 170 AFY, respectively, since 2011. The other existing storm water capture basins are estimated to capture approximately 1,800 AFY. These projects provide additional benefits including improving water quality in surface waters by reducing stormwater runoff volumes and providing wildlife habitat.

City of Redlands Comments on Draft GSP

Timestamp	Email	Name (First and Last)	Agency/Organization	Zip Code	Yucaipa GSP TOC and Executive Summary	Chapter 1 Administrative Information, Plan Area and Communication	Chapter 2 Basin Setting	Chapter 3 Sustainability Criteria	Chapter 4 Management Actions	Chapter 5 Plan Implementation	Appendices	General comments
2021/11/04 3:55:49 PM PDT	jharris@cityofredlands.org	John Harris	City of Redlands	92373		1.4.1.1.2 - City of Redlands is a majority shareholder in SMWC, and has historically operated and maintained their wells, but is not responsible for doing so. There is no Agreement obligating Redlands to operate and maintain SMWC wells. Also, Crafton Hills College is not located within the City of Redlands. 1.4.1.2.1 and 1.6.2.2.3 - Include similar language as above.						

South Mesa Water Company Comments on Draft GSP

South Mesa Water Company

Telephone (909)795-2401 · Fax (909)795-5299
391 West Avenue L · P.O. Box 458
Calimesa, California 92320-0458

November 30, 2021

VIA Email

Matt Howard
matth@sbvmwd.com
San Bernardino Valley Municipal Water District
380 E Vanderbilt Way
San Bernardino, CA 92408

Steve Stuart
sstuart@dudek.com
Dudek
605 3rd Street
Encinitas, California 92024
Steve Stuart

Re: Yucaipa GSA Revised GSP Administrative Draft and Dudek Responses
South Mesa Water Company Further Comments

Dear Mr. Howard and Mr. Stuart:

On behalf of South Mesa Water Company ("South Mesa"), we again express appreciation to Dudek and San Bernardino Valley Municipal Water District ("SBVMWD") staff for your hard work in preparing the Groundwater Sustainability Plan ("GSP") for the Yucaipa Groundwater Sustainability Agency ("Yucaipa GSA"). As you may recall, on October 12, 2021, South Mesa submitted detailed comments on the GSP Administrative Draft that was made available on September 22, 2021.

Following that date, Dudek released for Yucaipa GSA members' review: (1) a matrix summarizing Dudek's responses to comments on the GSP Administrative Draft; and (2) a revised, redline showing changes that were made to the GSP Administrative Draft based upon the comments received. We thank you for addressing many of South Mesa's comments both in the matrix and through revisions to the GSP text.

The purpose of this letter is provide comments on the revised GSP Administrative Draft and to follow up on prior South Mesa comments for which we request further responses and clarifications. We have focused our comments on important substantive issues (rather than grammatical aspects) that need to be addressed prior to adoption of the GSP in January.

New South Mesa Comment Regarding Transferability of Pumping Credits

In Section 4.2.2., entitled, "Management Action #2 – Sustainable Yield Pumping Allocations and Groundwater Replenishment," Dudek has made a revision to the draft GSP text at the request of SBVMWD that is of significant concern to South Mesa. The revision adds a sentence expressly stating that "Pumping credits cannot be transferred or sold to another entity within a given management area or with the Subbasin."

That sentence should be deleted. The transferability of pumping credits is a significant policy matter that has not yet been specifically addressed by the Yucaipa GSA. In fact, the ability to transfer pumping credits within a management area or within the Subbasin could potentially provide an important management tool for the Subbasin and should be explored and discussed. Until that policy issue is addressed and decided, the GSP should not include language limiting or prohibiting transferability.

We request that the subject of transferability be placed on the agenda for preliminary discussion at the next Yucaipa GSA meeting, and that placeholder language be included in the GSP stating that "The Yucaipa GSA will continue to discuss transferability of pumping credits."

Follow Up on Prior South Mesa Comments on GSP Administrative Draft

Below are follow-up requests regarding South Mesa's prior (October 12, 2021) comments on the GSP Administrative Draft. For your convenience, we have replicated the relevant segments of Dudek's responses to comments matrix. Following the replications, we state our follow-up comment(s) for Dudek's further review and responses.

1.3.1. Description of Plan Area

1.3.1	13	Reference should be made to the study/report that identifies the "hydrogeological subbasins"	South Mesa	10/12/2021	Geoscience provided GIS files of the subarea boundaries to YVWD in June 2018. Will provide document references when available.

- Does Dudek have access to those GIS files, and if not, why not?
- Has Dudek requested Geoscience to identify the document references?

- When will the document references be available?

1.5.1.3. Annual Calculations of Change in Groundwater Storage in the Yucaipa Subbasin

1.5.1.3		Please provide a brief explanatory statement why 1993 was the "base year" for the SBVMWD storage monitoring program."	South Mesa	10/12/2021	Edit was made and tracked in the Admin draft.

- We appreciate the clarification made in the text, and have a few follow-up questions. This section currently reads, in relevant part: "In 2014, SBVMWD integrated the Subbasin into its existing program that calculates an annual change in groundwater storage for the San Bernardino Basin Area (SBBA) (SBVMWD, 2018). DWR first calculated the annual change in storage in the SBBA from 1934 to 1960. SBVMWD continued the work initiated by DWR and calculated the annual change in groundwater storage from 1961 to present. SBVMWD calculates a cumulative change in storage by quantifying the volume of water lost or gained compared to a base year. The base year for the Yucaipa Subbasin is 1993, which SBVMWD noted was "equivalent" to the base year of 1934 established by DWR (SBVMWD, 2018)."
- Please explain the meaning of "equivalent" as referenced in the text. We suggest revising the text to include that explanation, to avoid confusion from using "equivalent" in quotation marks.
- Please provide further clarification and confirmation that 1993 is an appropriate base year for measuring changes in groundwater storage under SGMA.

2.5.1.1. Triple Falls Creek Subarea

2.5.1.1	20	"The prior draft GSP Chapter 2 stated: 'Data obtained from YVWD indicated that production from the Triple Falls Creek subarea since the 2005 WY has averaged 190 AFY' - is this no longer accurate?"	South Mesa	10/7/2021	This sentence was deleted in the Admin Draft. YVWD did not operate their wells in this subarea after the 1994 WY.

- How, if at all, do the revised numbers stated in this section affect the GSP pumping allocations, replenishment fees, and credits that were presented at the August 2021, September 2021 and October 2021 Yucaipa GSA meetings?

2.5.1.2 Oak Glen Subarea

2.5.1.2	21	Comment on paragraph describing water produced by YVWD-25.	South Mesa	10/12/2021	This paragraph has been revised to read, "Water produced from well YVWD-25 is under the direct influence of surface water from nearby Oak Glen Creek. Water produced from YVWD-25 is treated at the OGSWFF located approximately 0.25 mile west of YVWD-25. Since the 2001 WY, YVWD-25 has delivered 192 AFY to 342 AFY of water to the OGSWFF."

- How, if at all, do the revised numbers stated in this section affect the GSP pumping allocations, replenishment fees, and credits for this Management Area that were presented at the August 2021, September 2021 and October 2021 Yucaipa GSA meetings?
- Does YVWD hold surface water diversion permits/licenses with respect to YVWD-25? The revised text removes references to diversion of surface water.

Multiple Sections – Regarding Revisions to Pumping Figures for Subareas

2.5.1.2	21	"What is the basis for the substantial revisions to the pumping figures?"	South Mesa	10/12/2021	The sentence describing pumping from the 1966 WY to 2014 WY has been revised (see response to comment 2.5.1.1.page 20). Please see the response to comment 2.8.2.3.3 regarding the changes to the groundwater production rates between the preliminary and admin drafts of the GSP.

2.5.1.5	23	"Please explain the basis for the change in the estimated pumping figures."	South Mesa	10/12/2021	Please see the response to comment 2.8.2.3.3 regarding the changes to the groundwater production rates between the preliminary and admin drafts of the GSP.

2.5.1.6	23	"Please explain the basis for the change in the estimated pumping figures."	South Mesa	10/12/2021	Please see the response to comment 2.8.2.3.3 regarding the changes to the groundwater production rates between the preliminary and admin drafts of the GSP.

2.5.1.7	24	"Please explain the basis for the change in the estimated pumping figures."	South Mesa	10/12/2021	Please see the response to comment 2.8.2.3.3 regarding the changes to the groundwater production rates between the preliminary and admin drafts of the GSP.

2.8.2.3.3	67	Please explain why the total subsurface recharge estimates in the earlier GSP Draft Chapter 2 (approx. 16,900 AFY) were revised substantially downward in the GSP Administrative Draft Chapter 2 (approx. 13,800 AFY)	South Mesa	10/12/2021	The total subsurface recharge estimates presented in the Preliminary Draft Chapter 2 reflected numerical model results from the September 2020 version of the Yucaipa Integrated Hydrologic Model (YIHM) developed by the USGS. The September 2020 version of the YIHM was updated and recalibrated based on input from Yucaipa SGMA staff and consultants and an internal review by the USGS. The updated model was provided to the Yucaipa SGMA in May 2021. The water budget values presented in the Administrative Draft Chapter 2 reflect simulation results from the May 2021 version of the YIHM. Updates to the May 2021 version of the YIHM include: (1) Corrections to an error in the PRMS component (watershed model) of the YIHM, (2) Revised characterization of the unsaturated zone, (3) Updated return flow estimates used in

					the numerical model, and (4) Revised hydraulic conductivity and aquifer storage property distributions. In addition to these revisions, the water budget results presented in the Administrative Draft Chapter 2 were developed using an updated methodology for extracting model outputs from the YIHM. Based on discussions with the USGS, the water budgets developed for the Administrative Draft Chapter 2 were generated by extracting daily volumetric flux output data, which provides higher-resolution estimates of the modeled water budgets compared to the methodology employed during development of the Preliminary Draft Chapter 2. The reduced subsurface recharge estimates presented in the Administrative Draft Chapter 2 reflect both revisions to the YIHM and updated methodologies for extracting model outputs and developing the water budgets.

For the above-listed sections, please address the following question:

- How, if at all, do the revised numbers stated in these sections affect the GSP pumping allocations, replenishment fees, and credits for Management Areas that were presented at the August 2021, September 2021 and October 2021 Yucaipa GSA meetings?

2.5.3. Groundwater Production Wells

2.5.3	27	"Please identify the Yucaipa Basin Subarea and Management Area to which YVWD-48 supplies water, the amount of that water and how it is reflected in the GSP Water Budget."	South Mesa	10/12/2021	The text was revised to indicate that YVWD-48 "supplies water to a portion of YVWD's service area within the Singleton, Calimesa and Live Oak subareas." The fraction of the volume of water from YVWD-48 that is served within the Subbasin has not been quantified. The YIHM simulates production from YVWD-48 and estimates return flows in the Subbasin based on water served in the Subbasin.

- South Mesa appreciates the initial response, but requests further clarification on this subsection regarding YVWD-48 that pumps groundwater from the Beaumont Basin for partial use within the Yucaipa Subbasin. The response indicates that the fraction of water from YVWD-48 that is served within the Subbasin has not been quantified but further states that the YIHM "simulates production from YVWD-48" and estimates return flows in the Subbasin "based on water served in the Subbasin." Will Dudek please provide further clarification regarding the assumptions (pumping, return flows, water served within the Subbasin, etc.) utilized for YVWD-48 and also for the analogous South Mesa-04 (which also produces groundwater from the Beaumont Basin, for use within the Yucaipa Subbasin).

2.8.1.1. Integrated Surface Water and Groundwater Numerical Model

2.8.1.1		"When will the USGS report documenting the YIHM development (to complete GSP Appendix 2-D) be released by USGS and available to review?"	South Mesa	10/12/2021	SBVMWD to provide response.

- Please provide an update as to when SBVMWD anticipates receiving the USGS YIHM modeling report.

2.8.2.2.3. Imported Groundwater

2.8.2.2.3	66	Comments on the groundwater pumped by South Mesa-04, YVWD-16, YVWD-48 and YVWD-61 and imported into the Subbasin.	South Mesa	10/12/2021	The text in this section refers to the YIHM and the data used to simulate pumping at South Mesa-04, YVWD-16, YVWD-48 and YVWD-61. The text has been edited to indicate the pumping rates simulated in the YIHM, and includes a reference to data obtained from South Mesa indicating that South Mesa-04 began operating in 1956. Table 2C-3 has been updated with the individual annual pumping rates at these four wells.

- A copy of Dudek's revised draft Table 2C-3 is included with this letter as **Attachment "A"**. The revised text, Table 2C-3 and Dudek response to South Mesa's October 12, 2021 comment, appear to be inconsistent with the data provided by SMWC regarding South Mesa-04. The revised text appears to indicate that Well 4 data is being applied only back to 1988 is due to YIHM model parameters only going back to 1988. Is that correct? If so, why does the YIHM include YVWD importing water beginning 1981 via YVWD-16?
- Table 2C-3 in Appendix 2C lists "0" AF imported by South Mesa-04 from 1987 and prior, and no reference is made prior to 1965. Please explain the those figures and date ranges, and how they are being applied.
- We invite Dudek to contact South Mesa to ensure that complete and accurate South Mesa-04 data is being utilized for the GSP.

4.2.2. Management Action #2 – Sustainable Yield Pumping Allocations and Groundwater Replenishment

4.2.2	15	Consider language that Pumping credits and recharge credits cannot be transferred or sold to another entity within a given management area or within the Yucaipa Subbasin	SBVMWD	10/7/2021	Added language to this effect in 4.2.2.

- Please see South Mesa's significant concerns with this revision, as stated at the beginning of this letter.

4.2.3. Management Action #3 – Surplus Supplemental Water Spreading

4.2.3	24	"The details of the management action and the applicable accounting methodology should be further described in this section, including examples."	South Mesa	10/12/2021	Surplus supplemental water, which is not associated with Management Action #2, and discharged to a spreading basin to facilitate the artificial recharge of the Subbasin will have a separate accounting by the Yucaipa-SGMA. The surplus supplemental water will be accessible to the water purveyor that purchased the water and percolated it at a spreading basin. This water will be available to help offset production exceedances above the sustainable yield pumping allocations instead of pumping credits earned via Management Action #2.

- Please provide a further detailed explanation regarding the accounting methodology for Surplus Supplemental Water. The response above indicates that Surplus Supplemental Water is not associated with Management Action #2, but indicates that that Surplus Supplemental water will nonetheless be available to offset production exceedances above sustainable yield pumping allocations (which allocations comprise an integral component of Management Action #2). We would appreciate added clarity regarding the interrelatedness and accounting methodology for Management Action #2 and Management Action #3.

We look forward to the December meeting and to working together toward adoption of a timely and effective GSP for the Yucaipa Subbasin.

Sincerely,

SOUTH MESA WATER COMPANY

Dave Armstrong, General Manager

ATTACHMENT A

Table 2C-3: Imported Groundwater to the Yucaipa Subbasin			
Water Year Ending	Imported Groundwater (AF)		
	South Mesa	YVWD	**Total**
1965	-	-	**-**
1966	-	0	**-**
1967	-	0	**-**
1968	-	0	**-**
1969	-	0	**-**
1970	-	0	**-**
1971	-	0	**-**
1972	-	0	**-**
1973	-	0	**-**
1974	-	0	**-**
1975	-	0	**-**
1976	-	0	**-**
1977	-	0	**-**
1978	-	0	**-**
1979	-	0	**-**
1980	-	0	**-**
1981	0	20	**20**
1982	0	104	**104**
1983	0	43	**43**
1984	0	18	**18**
1985	0	13	**13**
1986	0	6	**6**
1987	0	14	**14**
1988	263	19	**282**
1989	373	45	**418**
1990	469	41	**509**
1991	403	14	**417**
1992	353	2	**355**
1993	417	2	**419**
1994	488	14	**502**
1995	523	6	**529**
1996	582	7	**589**
1997	609	7	**615**
1998	504	3	**507**
1999	560	3	**563**
2000	577	25	**602**
2001	553	886	**1,439**
2002	537	1,518	**2,055**
2003	382	1,693	**2,075**
2004	474	1,657	**2,131**
2005	610	1,279	**1,890**
2006	643	1,709	**2,352**
2007	662	1,609	**2,271**
2008	509	777	**1,286**
2009	399	551	**951**
2010	422	665	**1,087**
2011	415	587	**1,002**
2012	441	694	**1,135**
2013	338	1,010	**1,349**
2014	417	1,198	**1,615**
Average	**380**	**331**	**858**

AF = acre-feet

The Nature Conservancy, Audubon California, the Local Government Commission, the Union of Concerned Scientists, and Clean Water Action / Clean Water Fund

Comments on Draft GSP

December 3, 2021

Yucaipa Groundwater Sustainability Agency
% San Bernardino Valley Municipal Water District
San Bernardino, California, 92408

Submitted via email: yucaipasgma@gmail.com

Re: Public Comment Letter for Yucaipa Subbasin Draft GSP

Dear Mark Iverson,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Draft Groundwater Sustainability Plan (GSP) for the Yucaipa Subbasin being prepared under the Sustainable Groundwater Management Act (SGMA). Our organizations are deeply engaged in and committed to the successful implementation of SGMA because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of changing climate. Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, such as domestic well owners, environmental users, surface water users, federal government, California Native American tribes and disadvantaged communities (Water Code 10723.2).

As stakeholder representatives for beneficial users of groundwater, our GSP review focuses on how well disadvantaged communities, drinking water users, tribes, climate change, and the environment were addressed in the GSP. While we appreciate that some basins have consulted us directly via focus groups, workshops, and working groups, we are providing public comment letters to all GSAs as a means to engage in the development of 2022 GSPs across the state. Recognizing that GSPs are complicated and resource intensive to develop, the intention of this letter is to provide constructive stakeholder feedback that can improve the GSP prior to submission to the State.

Based on our review, we have significant concerns regarding the treatment of key beneficial users in the Draft GSP and consider the GSP to be **insufficient** under SGMA. We highlight the following findings:

1. Beneficial uses and users **are not sufficiently** considered in GSP development.
    a. Human Right to Water considerations **are not sufficiently** incorporated.
    b. Public trust resources **are not sufficiently** considered.
    c. Impacts of Minimum Thresholds, Measurable Objectives and Undesirable Results on beneficial uses and users **are not sufficiently** analyzed.
2. Climate change **is not sufficiently** considered.

3. Data gaps **are not sufficiently** identified and the GSP **does not have a plan** to eliminate them.
4. Projects and Management Actions **do not sufficiently consider** potential impacts or benefits to beneficial uses and users.

Our specific comments related to the deficiencies of the Yucaipa Subbasin Draft GSP along with recommendations on how to reconcile them, are provided in detail in **Attachment A.**

Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A	GSP Specific Comments
Attachment B	SGMA Tools to address DAC, drinking water, and environmental beneficial uses and users
Attachment C	Freshwater species located in the basin
Attachment D	The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset"
Attachment E	Maps of representative monitoring sites in relation to key beneficial users

Thank you for fully considering our comments as you finalize your GSP.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Western States Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
Working Lands Program Director
Audubon California

Danielle V. Dolan
Water Program Director
Local Government Commission

E.J. Remson
Senior Project Director, California Water Program
The Nature Conservancy

Melissa M. Rohde
Groundwater Scientist
The Nature Conservancy

Attachment A

Specific Comments on the Yucaipa Subbasin Draft Groundwater Sustainability Plan

1. Consideration of Beneficial Uses and Users in GSP development

Consideration of beneficial uses and users in GSP development is contingent upon adequate identification and engagement of the appropriate stakeholders. The (A) identification, (B) engagement, and (C) consideration of disadvantaged communities, drinking water users, tribes,[1] groundwater dependent ecosystems, streams, wetlands, and freshwater species are essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.

A. Identification of Key Beneficial Uses and Users

Disadvantaged Communities and Drinking Water Users

The identification of Disadvantaged Communities (DACs) and drinking water users is **incomplete**. The GSP provides information on DACs, including identification by name and location on a map (Appendix 1-C, Figure 3). However, the GSP fails to clearly state the population of each DAC or provide the population of DACs dependent on groundwater as their source of drinking water in the subbasin.

The plan fails to provide a density map or depth of domestic wells (such as minimum well depth, average well depth, or depth range) within the subbasin. This information is necessary to understand the distribution of shallow and vulnerable drinking water wells within the subbasin.

These missing elements are required for the GSAs to fully understand the specific interests and water demands of these beneficial users, and to support the consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions.

RECOMMENDATIONS
• Provide the population of each identified DAC. Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems). • Include a domestic well density map and a map showing domestic well locations and average well depth across the subbasin.

Interconnected Surface Waters

The identification of Interconnected Surface Waters (ISWs) is **insufficient**, due to lack of supporting information provided for the ISW analysis. The GSP describes the use of a

[1] Our letter provides a review of the identification and consideration of federally recognized tribes (Data source: SGMA Data viewer) within the GSP from non-tribal members and NGOs. Based on the likely incomplete information available to our organizations for this review, we recommend that the GSA utilize the California Department of Water Resources' "Engagement with Tribal Governments" Guidance Document (https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents) to comprehensively address these important beneficial users in their GSP.

groundwater model, the Yucaipa Integrated Hydrologic Model (YIHM), to analyze the interaction between groundwater and surface water within the subbasin. The model is briefly described in the Water Budget section of the GSP. The GSP provides a placeholder for the model documentation in Appendix 2-D, but this appendix was not provided as part of the draft GSP.

The GSP provides general statements regarding the connected nature of certain reaches in the Water Budget section of the GSP. The GSP states (p. 2-68): *"Groundwater in the Yucaipa Subbasin discharges to Oak Glen Creek, Wilson Creek, Yucaipa Creek, and San Timoteo Creek when underlying groundwater elevations are above the bottom elevation of each stream channel. Groundwater conditions that cause this are influenced by local pumping, climatic conditions, upstream stream leakage, and subsurface inflows from adjacent Subbasins, crystalline bedrock, and the San Timoteo Badlands."* However, the GSP does not provide a map of these reaches to illustrate the conclusions of the modeling analysis regarding which reaches are connected to groundwater.

RECOMMENDATIONS
• Provide a map showing all the stream reaches in the subbasin, with reaches clearly labeled as interconnected (gaining/losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP. • In the main text of the GSP, summarize the groundwater elevation data and stream flow data used in the modeling analysis. Discuss temporal (seasonal and interannual) variability of the data used to calibrate the model. • To confirm and illustrate the results of the groundwater modeling, overlay the subbasin's stream reaches with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis. • For the depth-to-groundwater contour maps, use the best practices presented in Attachment D. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

<u>Groundwater Dependent Ecosystems</u>

The identification of Groundwater Dependent Ecosystems (GDEs) is **insufficient**. The GSP took initial steps to identify and map GDEs using the Natural Communities Commonly Associated with Groundwater dataset (NC dataset). However, we found that some mapped features in the NC dataset were improperly disregarded.

- NC dataset polygons were incorrectly removed if Normalized Difference Vegetation Index (NDVI) and Normalized Difference Moisture Index (NDMI) data did not correlate with groundwater level trends. This is an incorrect method, since a lack of a relationship does not preclude that groundwater is providing some of the ecosystem's water needs. If the ecosystem is tapping into shallow groundwater then the ecosystem should be categorized as a GDE. If there are no data to characterize groundwater conditions in the shallow principal aquifer, then the GDE should be retained as a potential GDE and data gaps reconciled in the Monitoring Network section of the GSP.

- NC dataset polygons were incorrectly removed in areas where previous site investigations indicated that the habitats were sustained by surface water. However, this removal criteria is flawed since GDEs can rely on multiple water sources – including surface water *and* groundwater – simultaneously and at different temporal/spatial scales. NC dataset polygons adjacent to surface water supplies can still potentially be reliant on shallow groundwater aquifers, and therefore should not be removed solely based on their proximity to these additional water sources.

The text discusses groundwater level trends in each of the GDE units over the period 2009 to 2019, referring to specific well names. The wells are not labeled on the GDE map (Figure 2-57), however. The GSP could be improved by labeling the GDE units and labeling each well location provided on this figure, and providing the hydrographs of groundwater levels that are discussed qualitatively in the text.

The GSP presents the subbasin's common phreatophytes in Table 2-9 and describes the habitat types when discussing each GDE unit. However, the GSP does not provide a description or inventory of the subbasin's fauna or discuss endangered, threatened, or special status species.

RECOMMENDATIONS

- Re-evaluate the NC dataset polygons that were incorrectly removed based on NDVI and NDMI trends or proximity to surface water. Refer to Attachment D of this letter for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.

- Label the GDE units and label each well location provided on Figure 2-57. Provide the hydrographs of groundwater levels that are discussed qualitatively in the text.

- Provide depth-to-groundwater contour maps, noting the best practices presented in Attachment D. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- Provide a complete inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species in the subbasin and note any threatened or endangered species (see Attachment C in this letter for a list of freshwater species located in the Yucaipa Subbasin).

Native Vegetation and Managed Wetlands
Native vegetation and managed wetlands are water use sectors that are required to be included in the water budget.[2,3] The integration of native vegetation into the water budget is **insufficient**. The water budget did not include the current, historical, and projected demands of native vegetation. The omission of explicit water demands for native vegetation is problematic because key environmental uses of groundwater are not being accounted for as water supply decisions are made using this budget, nor will they likely be considered in project and management actions. Managed wetlands are not mentioned in the GSP, so it is not known whether or not they are present in the subbasin.

RECOMMENDATIONS
• Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation. • State whether or not there are managed wetlands in the subbasin. If there are, ensure that their groundwater demands are included as separate line items in the historical, current, and projected water budgets.

B. Engaging Stakeholders

Stakeholder Engagement during GSP development
Stakeholder engagement during GSP development is **insufficient**. SGMA's requirement for public notice and engagement of stakeholders is not fully met by the description in the Public Outreach and Engagement Plan (Appendix 1-C).[4]

The GSP documents targeted outreach to DACs, including specific representation of DACs on the Yucaipa GSA by both the City representatives and water suppliers of the DACs within the subbasin. However, we note the following deficiencies with the overall stakeholder engagement process:

- The GSP documents opportunities for public involvement and engagement in very general terms. These include meeting opportunities through the SGMA Board's quarterly meetings, Technical Advisory Group meetings during GSP development, SGMA Board appointed membership, and communication and engagement through the GSP webpage.
- The plan lacks specific details of outreach and engagement targeted to environmental stakeholders. In Section 1.8.6, the GSP documents environmental users as the subbasin's GDEs. We recommend that the GSA engage with environmental stakeholders

[2] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]
[3] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]
[4] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

in the subbasin, which could include California Department of Fish and Wildlife or environmental non-profits.

- Section 1.7.1 of the GSP states that notification and communication will continue to take place during the implementation phase of the GSP. However, the GSP describes outreach during GSP implementation as limited to *"engagement with the public and beneficial users regarding the progress of monitoring and reporting updates on the GSP to DWR, establishment of fees, and the development and implementation of management strategies, including projects as needed."* The discussion of public notice and engagement does not include a detailed plan for continual opportunities for engagement through the implementation phase of the GSP that is specifically directed to DACs, domestic well owners, and environmental stakeholders within the subbasin.

RECOMMENDATIONS

- In the Public Outreach and Engagement Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to Attachment B for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.
- Engage with environmental stakeholders in the subbasin, which could include California Department of Fish and Wildlife or environmental non-profits.
- Provide documentation on how stakeholder input was incorporated into the GSP development process.
- Utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the subbasin.[5]

C. Considering Beneficial Uses and Users When Establishing Sustainable Management Criteria and Analyzing Impacts on Beneficial Uses and Users

The consideration of beneficial uses and users when establishing sustainable management criteria (SMC) is **insufficient**. The consideration of potential impacts on all beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[6,7,8]

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[5] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

[6] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[7] "The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[8] "The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference." [23 CCR §354.28(b)(5)]

Disadvantaged Communities and Drinking Water Users

To establish minimum thresholds for each of four management areas, the GSP identifies the historic low storage volume, assigns a drought buffer to further lower the storage volume, and then uses the YIHM to determine the corresponding groundwater elevations at representative monitoring points (RMPs). The GSP does not quantify the number of domestic wells that could go dry or otherwise consider or analyze the impact of minimum thresholds on domestic wells. The GSP does not sufficiently describe whether minimum thresholds will avoid significant and unreasonable loss of drinking water to domestic well users that are not protected by the minimum threshold. In addition, the GSP does not sufficiently describe or analyze direct or indirect impacts on DACs or drinking water users when defining undesirable results, nor does it describe how the groundwater levels minimum thresholds are consistent with the Human Right to Water policy.[9]

The GSP does not establish SMC for groundwater quality. The GSP states (p. 3-2): *"Degradation of groundwater quality does not apply to the Plan Area as agriculture use has declined markedly since the 1950s to approximately 7% of the total land use, and the concerted efforts by the Yucaipa GSA member agencies to convert from septic systems to sanitary sewer systems has decreased nitrate and salt contributions to the aquifer. Limited contamination at some active remediation sites and the cessation of operations at the former Yucaipa Landfill have limited contamination to shallow, perched groundwater that has not impacted water quality in the principal aquifer."* Section 2.7.4 (Groundwater Quality) discusses other COCs, both naturally occurring and those associated with industrial activities, that have exceeded regulatory standards. All COCs in the subbasin that may be impacted or exacerbated by groundwater use and/or management should have established SMC, in addition to coordinating with water quality regulatory programs.

RECOMMENDATIONS

Chronic Lowering of Groundwater Levels

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. Include information on the impacts during prolonged periods of below average water years.

- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on drinking water users and DACs within the subbasin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be fully or partially de-watered at the minimum threshold.

Degraded Water Quality

- Establish water quality SMC. Set minimum thresholds and measurable objectives for all water quality constituents within the subbasin that can be impacted and/or exacerbated as a result of groundwater use or groundwater management.

- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality.[10] For specific guidance on how to

[9] California Water Code §106.3. Available at: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=106.3

[10] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[11]

- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.

<u>Groundwater Dependent Ecosystems and Interconnected Surface Waters</u>

We commend the GSA for evaluating potential cause and effect relationships between groundwater and remote sensing (NDVI, NDMI) data when establishing sustainable management criteria for the ISW sustainability indicator. However, sustainable management criteria for chronic lowering of groundwater levels provided in the GSP do not consider potential impacts to environmental beneficial users. This is problematic because without identifying potential impacts on GDEs, minimum thresholds may compromise, or even destroy, these environmental beneficial users. Since GDEs are present in the subbasin, they must be considered when developing all relevant SMC.

For depletion of interconnected surface waters, the GSP establishes the undesirable result but does not determine minimum thresholds. The undesirable result is established as follows (p. 3-6): *"A significant and unreasonable loss of GDE habitat may occur if there is a long-term decline in groundwater levels below 30 feet bgs."* The GSP continues (p. 3-6): *"Because the potential GDEs are not located near existing or currently planned groundwater extraction wells, it is not anticipated that they will be impacted by future extractions within the Plan Area. However, in the event that future groundwater production is planned within a mile of a potential GDE, additional investigations should be performed to identify whether the potential GDE relies on groundwater, and whether the planned production may negatively impact the potential GDE. If the potential GDE is found to rely on groundwater and planned production may impact groundwater levels in the vicinity of the potential GDE, sustainability criteria related to the depletion of interconnected surface water may be established to protect against the significant and unreasonable loss of GDE habitat."* Because ISWs have been identified in the subbasin, the GSA needs to define what significant and unreasonable effects are for ISWs, and the GSA should not wait for future well development to establish SMC. Also, please note that significant and unreasonable losses of GDE habitat can occur when groundwater levels decline within 30 feet bgs, as observed in Fillmore and Piru groundwater basins[12].

While the GSP identifies terrestrial GDEs, it does not identify or mention surface water beneficial users in the subbasin. In establishing SMC for depletion of interconnected surface water, the GSP should evaluate how the proposed minimum thresholds and measurable objectives avoid significant and unreasonable effects on surface water beneficial users in the subbasin (see Attachment C for a list of environmental users in the subbasin), such as increased mortality and inability to perform key life processes (e.g., reproduction, migration).

[11] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858.

[12] Kibler CL, Schmidt EC, Roberts DA, Stella JC, Kui L, Lambert AM, Singer MB. A brown wave of riparian woodland mortality following groundwater declines during the 2012-2019 California drought. Environmental Research Letters 16(8): 084030. https://doi.org/10.1088/1748-9326/ac1377

RECOMMENDATIONS

- When establishing SMC for the subbasin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

- Evaluate impacts on GDEs when establishing SMC for chronic lowering of groundwater levels. When defining undesirable results, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the subbasin.[13] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[14]

- Establish SMC for depletion of interconnected surface water. When defining undesirable results, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the subbasin are reached.[15] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[8,16]

2. Climate Change

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[17] The effects of climate change will intensify the impacts of water stress on GDEs, making available shallow groundwater resources especially critical to their survival. Condon *et al.* (2020) shows that GDEs are more likely to succumb to water stress and rely more

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[13] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[14] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[15] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[16] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[17] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

on groundwater during times of drought.[18] When shallow groundwater is unavailable, riparian forests can die off and key life processes (e.g., migration and spawning) for aquatic organisms, such as steelhead, can be impeded.

The integration of climate change into the projected water budget is **insufficient**. The GSP does incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the plan does not consider multiple climate scenarios (e.g., the 2070 extremely wet and extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the subbasin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is not required by DWR (only suggested), their consequences could be significant and their inclusion can help identify important vulnerabilities in the subbasin's approach to groundwater management.

The GSP integrates climate change into key inputs (e.g., changes in precipitation and evapotranspiration) of the projected water budget. However, the GSP does not adjust imported surface water supplies based on future climate change scenarios. Additionally, the sustainable yield is not calculated based on the projected water budget with climate change incorporated. If the water budgets are incomplete, including the omission of extreme climate scenarios, projected climate change effects on imported water inputs, and climate change projections in the sustainable yield calculations, then there is increased uncertainty in virtually every subsequent calculation used to plan for projects, derive measurable objectives, and set minimum thresholds. Plans that do not adequately include climate change projections may underestimate future impacts on vulnerable beneficial users of groundwater such as ecosystems, DACs, and domestic well owners.

RECOMMENDATIONS

- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Integrate climate change into imported water inputs for the projected water budget.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.
- Incorporate climate change scenarios into projects and management actions.

3. Data Gaps

The consideration of beneficial users when establishing monitoring networks is **insufficient**, due to lack of specific plans to increase the Representative Monitoring Points (RMPs) in the monitoring network that represent water quality conditions and shallow groundwater elevations around domestic wells, GDEs, and ISWs in the subbasin. These beneficial users may remain unprotected by the GSP without adequate

[18] Condon et al. 2020. Evapotranspiration depletes groundwater under warming over the contiguous United States. Nature Communications. Available at: https://www.nature.com/articles/s41467-020-14688-0

monitoring and identification of data gaps in the shallow aquifer. The Plan therefore fails to meet SGMA's requirements for the monitoring network.[19]

Figure 3-5 (Representative Monitoring Points) shows insufficient representation of GDEs and drinking water users for groundwater elevation monitoring and water quality monitoring. Refer to Attachment E for maps of these monitoring sites in relation to key beneficial users of groundwater.

The GSP provides discussion of data gaps for GDEs throughout the Sustainable Management Section of the GSP. For example, the GSP states (p. 3-26): *"If future extractions planned in this region are expected to exceed historical extractions in the region, additional field work may be required to characterize the impact that proposed pumping rates will have on the potential GDE in the Singleton subarea. This would include installing one or more shallow groundwater observation wells screened from the historical high groundwater level to approximately 35 feet bgs. Groundwater elevation data collected from the shallow groundwater observation well(s) will be analyzed to evaluate whether the local habitat is sustained by shallow groundwater (<30 feet bgs), and will be used to evaluate seasonal fluctuations and potential influences by nearby pumping in the principal aquifer."* The GSP does not provide specific plans, such as locations or a timeline, to fill the data gaps for GDEs. Because GDEs have been identified in the subbasin, these data gaps should be addressed now instead of waiting for groundwater extraction to increase in the future.

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, and GDEs to clearly identify monitored areas.
- Increase the number of RMPs in the shallow aquifer across the subbasin as needed to map ISWs and adequately monitor all groundwater condition indicators across the subbasin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMPs.
- Ensure groundwater elevation and water quality RMPs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.
- Further describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the subbasin.

4. Addressing Beneficial Users in Projects and Management Actions

The consideration of beneficial users when developing projects and management actions is **insufficient**, due to the failure to completely identify benefits or impacts of identified projects and management actions, including water quality impacts, to key beneficial users of groundwater such as GDEs, aquatic habitats, surface water users, DACs, and drinking water users. Therefore, potential project and management

[19] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

actions may not protect these beneficial users. Groundwater sustainability under SGMA is defined not just by sustainable yield, but by the avoidance of undesirable results for *all* beneficial users.

The GSP fails to describe the explicit benefits or impacts to beneficial users, such as GDEs and DACs, from Management Action No. 3, Surplus Supplemental Water Spreading. We also note that the plan does not include a domestic well mitigation program to avoid significant and unreasonable loss of drinking water. We strongly recommend inclusion of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation.

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to Attachment B for specific recommendations on how to implement a drinking water well mitigation program.

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[20]

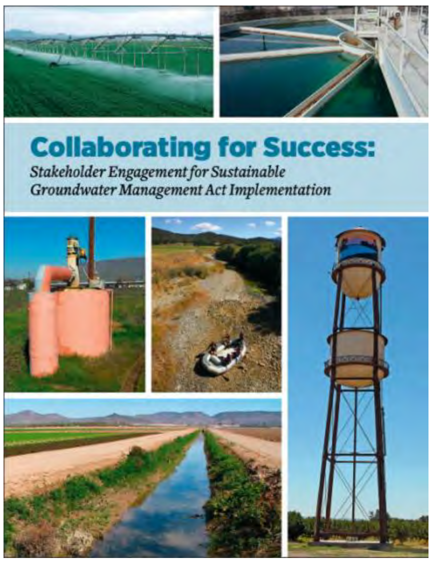
- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[20] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

Attachment B

SGMA Tools to address DAC, drinking water, and environmental beneficial uses and users

Stakeholder Engagement and Outreach



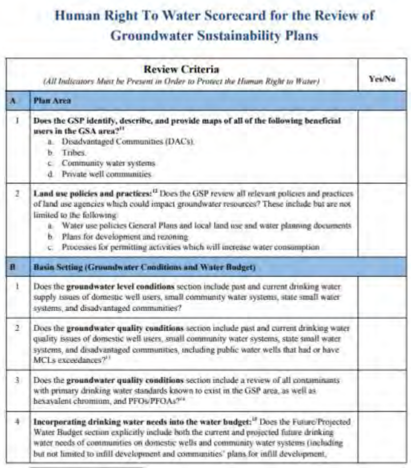
Clean Water Action, Community Water Center and Union of Concerned Scientists developed a guidance document called Collaborating for success: Stakeholder engagement for Sustainable Groundwater Management Act Implementation. It provides details on how to conduct targeted and broad outreach and engagement during Groundwater Sustainability Plan (GSP) development and implementation. Conducting a targeted outreach involves:

- Developing a robust Stakeholder Communication and Engagement plan that includes outreach at frequented locations (schools, farmers markets, religious settings, events) across the plan area to increase the involvement and participation of disadvantaged communities, drinking water users and the environmental stakeholders.

- Providing translation services during meetings and technical assistance to enable easy participation for non-English speaking stakeholders.

- GSP should adequately describe the process for requesting input from beneficial users and provide details on how input is incorporated into the GSP.

The Human Right to Water

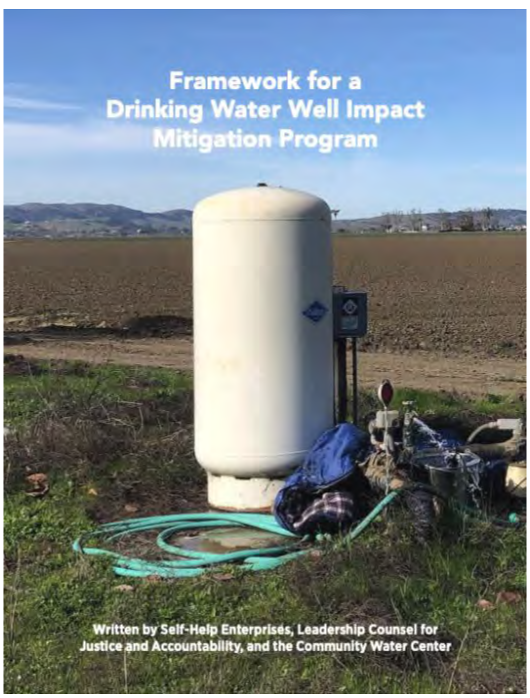


Human Right To Water Scorecard for the Review of Groundwater Sustainability Plans

	Review Criteria *(All Indicators Must be Present in Order to Protect the Human Right to Water)*	**Yes/No**
A	**Plan Area**	
1	**Does the GSP identify, describe, and provide maps of all of the following beneficial users in the GSA area?**[11] a. Disadvantaged Communities (DACs). b. Tribes. c. Community water systems d. Private well communities	
2	**Land use policies and practices:**[12] Does the GSP review all relevant policies and practices of land use agencies which could impact groundwater resources? These include but are not limited to the following: a. Water use policies General Plans and local land use and water planning documents b. Plans for development and rezoning c. Processes for permitting activities which will increase water consumption	
B	**Basin Setting (Groundwater Conditions and Water Budget)**	
1	Does the **groundwater level conditions** section include past and current drinking water supply issues of domestic well users, small community water systems, state small water systems, and disadvantaged communities?	
2	Does the **groundwater quality conditions** section include past and current drinking water quality issues of domestic well users, small community water systems, state small water systems, and disadvantaged communities, including public water wells that had or have MCLs exceedances?[13]	
3	Does the **groundwater quality conditions** section include a review of all contaminants with primary drinking water standards known to exist in the GSP area, as well as hexavalent chromium, and PFOs/PFOAs?[14]	
4	**Incorporating drinking water needs into the water budget:**[15] Does the Future/Projected Water Budget section explicitly include both the current and projected future drinking water needs of communities on domestic wells and community water systems (including but not limited to infill development and communities' plans for infill development,	

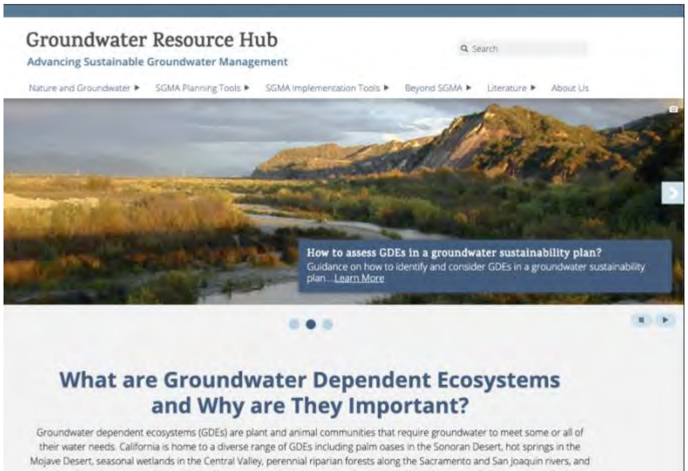
The [Human Right to Water Scorecard](#) was developed by Community Water Center, Leadership Counsel for Justice and Accountability and Self Help Enterprises to aid Groundwater Sustainability Agencies (GSAs) in prioritizing drinking water needs in SGMA. The scorecard identifies elements that must exist in GSPs to adequately protect the Human Right to Drinking water.

Drinking Water Well Impact Mitigation Framework



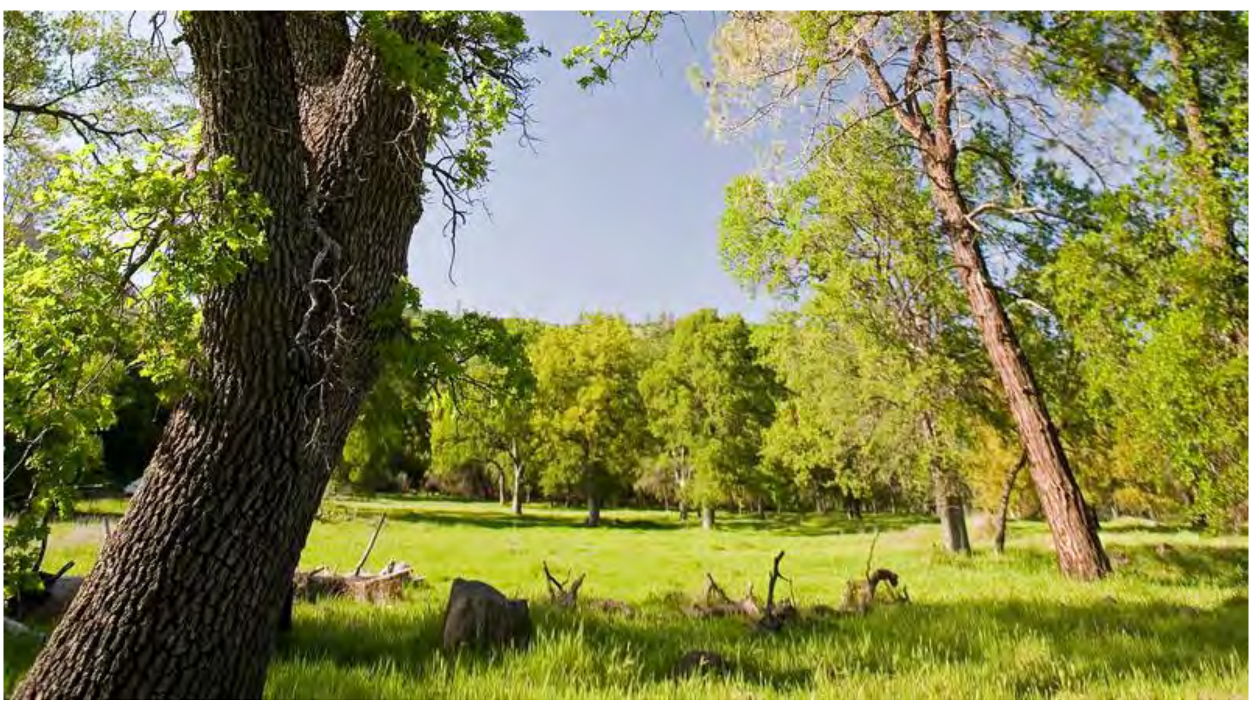
The [Drinking Water Well Impact Mitigation Framework](#) was developed by Community Water Center, Leadership Counsel for Justice and Accountability and Self Help Enterprises to aid GSAs in the development and implementation of their GSPs. The framework provides a clear roadmap for how a GSA can best structure its data gathering, monitoring network and management actions to proactively monitor and protect drinking water wells and mitigate impacts should they occur.

Groundwater Resource Hub



The Nature Conservancy has developed a suite of tools based on best available science to help GSAs, consultants, and stakeholders efficiently incorporate nature into GSPs. These tools and resources are available online at GroundwaterResourceHub.org. The Nature Conservancy's tools and resources are intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

Rooting Depth Database



The [Plant Rooting Depth Database]() provides information that can help assess whether groundwater-dependent vegetation are accessing groundwater. Actual rooting depths will depend on the plant species and site-specific conditions, such as soil type and availability of other water sources. Site-specific knowledge of depth to groundwater combined with rooting depths will help provide an understanding of the potential groundwater levels are needed to sustain GDEs.

How to use the database

The maximum rooting depth information in the Plant Rooting Depth Database is useful when verifying whether vegetation in the Natural Communities Commonly Associated with Groundwater (NC Dataset) are connected to groundwater. A 30 ft depth-to-groundwater threshold, which is based on averaged global rooting depth data for phreatophytes[1], is relevant for most plants identified in the NC Dataset since most plants have a max rooting depth of less than 30 feet. However, it is important to note that deeper thresholds are necessary for other plants that have reported maximum root depths that exceed the averaged 30 feet threshold, such as valley oak (*Quercus lobata*), Euphrates poplar (*Populus euphratica*), salt cedar (*Tamarix spp.*), and shadescale (*Atriplex confertifolia*). The Nature Conservancy advises that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to groundwater threshold of 80 feet should be used instead of the 30 ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to re-emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

The Plant Rooting Depth Database is an Excel workbook composed of four worksheets:

1. California phreatophyte rooting depth data (included in the NC Dataset)
2. Global phreatophyte rooting depth data
3. Metadata
4. References

How the database was compiled

The Plant Rooting Depth Database is a compilation of rooting depth information for the groundwater-dependent plant species identified in the NC Dataset. Rooting depth data were compiled from published scientific literature and expert opinion through a crowdsourcing campaign. As more information becomes available, the database of rooting depths will be updated. Please Contact Us if you have additional rooting depth data for California phreatophytes.

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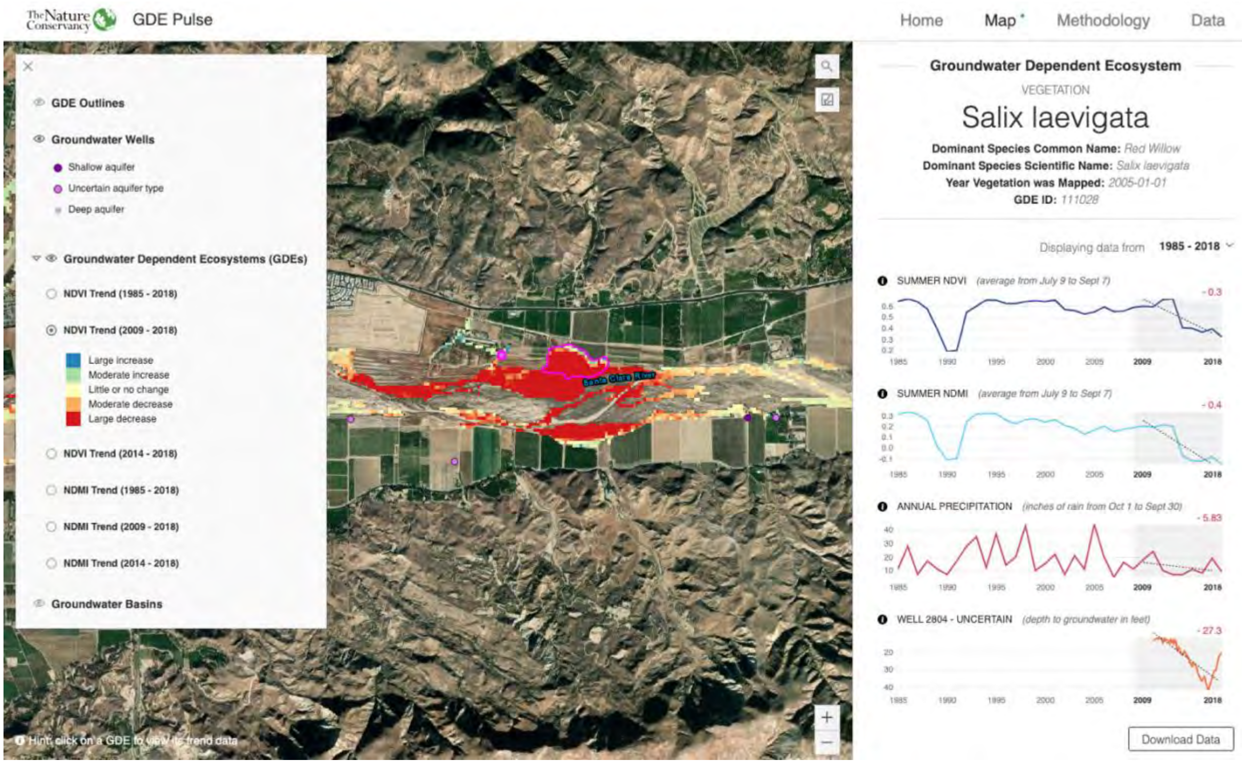
[1] Canadell, J., Jackson, R.B., Ehleringer, J.B. et al. 1996. Maximum rooting depth of vegetation types at the global scale. Oecologia 108, 583–595. https://doi.org/10.1007/BF00329030

GDE Pulse



[GDE Pulse](#) is a free online tool that allows Groundwater Sustainability Agencies to assess changes in groundwater dependent ecosystem (GDE) health using satellite, rainfall, and groundwater data. Remote sensing data from satellites has been used to monitor the health of vegetation all over the planet. GDE pulse has compiled 35 years of satellite imagery from NASA's Landsat mission for every polygon in the Natural Communities Commonly Associated with Groundwater Dataset. The following datasets are available for downloading:

Normalized Difference Vegetation Index (NDVI) is a satellite-derived index that represents the greenness of vegetation. Healthy green vegetation tends to have a higher NDVI, while dead leaves have a lower NDVI. We calculated the average NDVI during the driest part of the year (July - Sept) to estimate vegetation health when the plants are most likely dependent on groundwater.

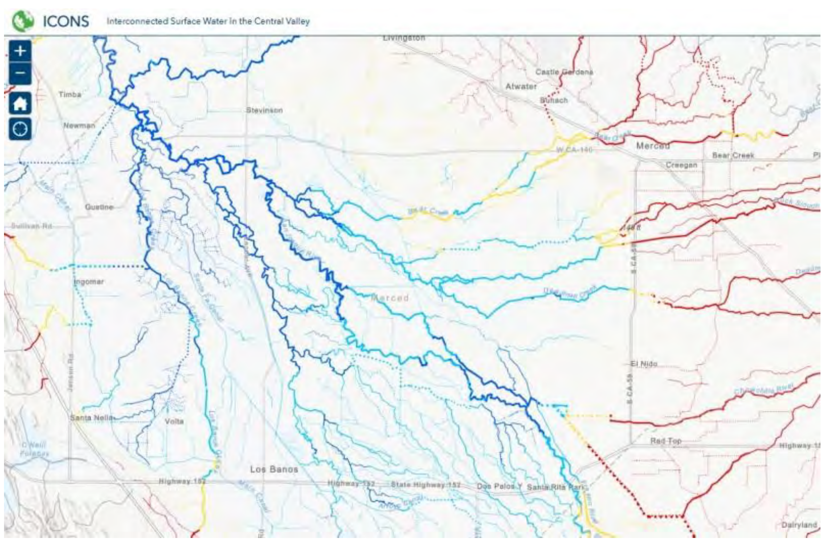
Normalized Difference Moisture Index (NDMI) is a satellite-derived index that represents water content in vegetation. NDMI is derived from the Near-Infrared (NIR) and Short-Wave Infrared (SWIR) channels. Vegetation with adequate access to water tends to have higher NDMI, while vegetation that is water stressed tends to have lower NDMI. We calculated the average NDVI during the driest part of the year (July–September) to estimate vegetation health when the plants are most likely dependent on groundwater.

Annual Precipitation is the total precipitation for the water year (October 1st – September 30th) from the PRISM dataset. The amount of local precipitation can affect vegetation with more precipitation generally leading to higher NDVI and NDMI.

Depth to Groundwater measurements provide an indication of the groundwater levels and changes over time for the surrounding area. We used groundwater well measurements from nearby (<1km) wells to estimate the depth to groundwater below the GDE based on the average elevation of the GDE (using a digital elevation model) minus the measured groundwater surface elevation.

ICONOS Mapper

Interconnected Surface Water in the Central Valley



ICONS maps the likely presence of interconnected surface water (ISW) in the Central Valley using depth to groundwater data. Using data from 2011-2018, the ISW dataset represents the likely connection between surface water and groundwater for rivers and streams in California's Central Valley. It includes information on the mean, maximum, and minimum depth to groundwater for each stream segment over the years with available data, as well as the likely presence of ISW based on the minimum depth to groundwater. The Nature Conservancy developed this database, with guidance and input from expert academics, consultants, and state agencies.

We developed this dataset using groundwater elevation data available online from the California Department of Water Resources (DWR). DWR only provides this data for the Central Valley. For GSAs outside of the valley, who have groundwater well measurements, we recommend following our methods to determine likely ISW in your region. The Nature Conservancy's ISW dataset should be used as a first step in reviewing ISW and should be supplemented with local or more recent groundwater depth data.

Attachment C

Freshwater Species Located in the Yucaipa Basin

To assist in identifying the beneficial users of surface water necessary to assess the undesirable result "depletion of interconnected surface waters", Attachment C provides a list of freshwater species located in the Yucaipa Basin. To produce the freshwater species list, we used ArcGIS to select features within the California Freshwater Species Database version 2.0.9 within the basin boundary. This database contains information on ~4,000 vertebrates, macroinvertebrates and vascular plants that depend on fresh water for at least one stage of their life cycle. The methods used to compile the California Freshwater Species Database can be found in Howard et al. 2015[1]. The spatial database contains locality observations and/or distribution information from ~400 data sources. The database is housed in the California Department of Fish and Wildlife's BIOS[2] as well as on The Nature Conservancy's science website[3].

Scientific Name	Common Name	Legal Protected Status		
		Federal	**State**	**Other**
BIRDS				
Actitis macularius	Spotted Sandpiper			
Agelaius tricolor	Tricolored Blackbird	Bird of Conservation Concern	Special Concern	BSSC - First priority
Aix sponsa	Wood Duck			
Anas acuta	Northern Pintail			
Anas americana	American Wigeon			
Anas clypeata	Northern Shoveler			
Anas crecca	Green-winged Teal			
Anas platyrhynchos	Mallard			
Anas strepera	Gadwall			
Ardea alba	Great Egret			
Ardea herodias	Great Blue Heron			
Aythya affinis	Lesser Scaup			
Aythya americana	Redhead		Special Concern	BSSC - Third priority
Aythya collaris	Ring-necked Duck			
Aythya marila	Greater Scaup			
Bucephala albeola	Bufflehead			
Bucephala clangula	Common Goldeneye			
Butorides virescens	Green Heron			
Calidris minutilla	Least Sandpiper			

[1] Howard, J.K. et al. 2015. Patterns of Freshwater Species Richness, Endemism, and Vulnerability in California. PLoSONE, 11(7). Available at: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0130710

[2] California Department of Fish and Wildlife BIOS: https://www.wildlife.ca.gov/data/BIOS

[3] Science for Conservation: https://www.scienceforconservation.org/products/california-freshwater-species-database

Chroicocephalus philadelphia	Bonaparte's Gull			
Cistothorus palustris palustris	Marsh Wren			
Egretta thula	Snowy Egret			
Empidonax traillii	Willow Flycatcher	Bird of Conservation Concern	Endangered	
Empidonax traillii extimus	Southwestern Willow Flycatcher	Endangered	Endangered	
Fulica americana	American Coot			
Haliaeetus leucocephalus	Bald Eagle	Bird of Conservation Concern	Endangered	
Icteria virens	Yellow-breasted Chat		Special Concern	BSSC - Third priority
Lophodytes cucullatus	Hooded Merganser			
Megaceryle alcyon	Belted Kingfisher			
Mergus merganser	Common Merganser			
Nycticorax nycticorax	Black-crowned Night-Heron			
Oxyura jamaicensis	Ruddy Duck			
Pelecanus erythrorhynchos	American White Pelican		Special Concern	BSSC - First priority
Phalacrocorax auritus	Double-crested Cormorant			
Piranga rubra	Summer Tanager		Special Concern	BSSC - First priority
Podilymbus podiceps	Pied-billed Grebe			
Porzana carolina	Sora			
Setophaga petechia	Yellow Warbler			BSSC - Second priority
Setophaga petechia brewsteri	A Yellow Warbler	Bird of Conservation Concern	Special Concern	
Tachycineta bicolor	Tree Swallow			
Tringa melanoleuca	Greater Yellowlegs			
Vireo bellii	Bell's Vireo			
Vireo bellii pusillus	Least Bell's Vireo	Endangered	Endangered	
CRUSTACEANS				
Hyalella spp.	Hyalella spp.			
HERPS				
Actinemys marmorata marmorata	Western Pond Turtle		Special Concern	ARSSC
Anaxyrus boreas boreas	Boreal Toad			
Anaxyrus californicus	Arroyo Toad	Endangered	Special Concern	ARSSC
Pseudacris cadaverina	California Treefrog			ARSSC

Rana draytonii	California Red-legged Frog	Threatened	Special Concern	ARSSC
Rana muscosa	Southern Mountain Yellow-legged Frog	Endangered	Candidate Endangered	ARSSC
Spea hammondii	Western Spadefoot	Under Review in the Candidate or Petition Process	Special Concern	ARSSC
Thamnophis hammondii hammondii	Two-striped Gartersnake		Special Concern	ARSSC
Thamnophis sirtalis sirtalis	Common Gartersnake			
INSECTS & OTHER INVERTS				
Apedilum spp.	Apedilum spp.			
Argia spp.	Argia spp.			
Baetidae fam.	Baetidae fam.			
Baetis adonis	A Mayfly			
Baetis spp.	Baetis spp.			
Baetis tricaudatus	A Mayfly			
Belostomatidae fam.	Belostomatidae fam.			
Chironomidae fam.	Chironomidae fam.			
Chironomus spp.	Chironomus spp.			
Cricotopus spp.	Cricotopus spp.			
Cricotopus trifascia				Not on any status lists
Cryptochironomus spp.	Cryptochironomus spp.			
Ephydridae fam.	Ephydridae fam.			
Eukiefferiella spp.	Eukiefferiella spp.			
Fallceon quilleri	A Mayfly			
Hydropsyche spp.	Hydropsyche spp.			
Hydropsychidae fam.	Hydropsychidae fam.			
Hydroptila spp.	Hydroptila spp.			
Hydroptilidae fam.	Hydroptilidae fam.			
Laccobius spp.	Laccobius spp.			
Laccophilus spp.	Laccophilus spp.			
Limnophyes spp.	Limnophyes spp.			
Micropsectra spp.	Micropsectra spp.			
Narpus spp.	Narpus spp.			
Parametriocnemus spp.	Parametriocnemus spp.			
Paraphaenocladius spp.	Paraphaenocladius spp.			
Pentaneura spp.	Pentaneura spp.			
Polypedilum spp.	Polypedilum spp.			
Pseudosmittia spp.	Pseudosmittia spp.			
Psychodidae fam.	Psychodidae fam.			
Rheotanytarsus spp.	Rheotanytarsus spp.			

Simuliidae fam.	Simuliidae fam.			
Simulium spp.	Simulium spp.			
Sperchon spp.	Sperchon spp.			
Tanytarsus spp.	Tanytarsus spp.			
Tipulidae fam.	Tipulidae fam.			
Zaitzevia spp.	Zaitzevia spp.			
MOLLUSKS				
Physa spp.	Physa spp.			
Pyrgulopsis californiensis	Laguna Mountain Springsnail			V
PLANTS				
Alnus rhombifolia	White Alder			
Arundo donax	NA			
Eleocharis coloradoensis				Not on any status lists
Juncus dubius	Mariposa Rush			
Juncus rugulosus	Wrinkled Rush			
Juncus xiphioides	Iris-leaf Rush			
Myriophyllum aquaticum	NA			
Myriophyllum sibiricum	Common Water-milfoil			
Persicaria lapathifolia				Not on any status lists
Phacelia distans	NA			
Rumex violascens	Violet Dock			

Attachment D

July 2019

IDENTIFYING GDEs UNDER SGMA
Best Practices for using the NC Dataset

The Sustainable Groundwater Management Act (SGMA) requires that groundwater dependent ecosystems (GDEs) be identified in Groundwater Sustainability Plans (GSPs). As a starting point, the Department of Water Resources (DWR) is providing the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) online[1] to help Groundwater Sustainability Agencies (GSAs), consultants, and stakeholders identify GDEs within individual groundwater basins. To apply information from the NC Dataset to local areas, GSAs should combine it with the best available science on local hydrology, geology, and groundwater levels to verify whether polygons in the NC dataset are likely supported by groundwater in an aquifer (Figure 1)[2]. This document highlights six best practices for using local groundwater data to confirm whether mapped features in the NC dataset are supported by groundwater.

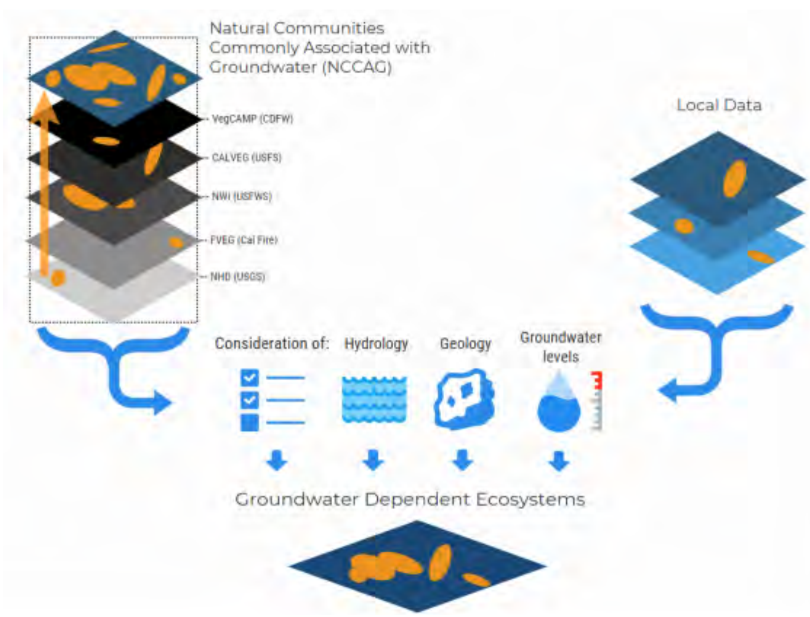


Figure 1. Considerations for GDE identification.
Source: DWR[2]

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[1] NC Dataset Online Viewer: https://gis.water.ca.gov/app/NCDatasetViewer/
[2] California Department of Water Resources (DWR). 2018. Summary of the "Natural Communities Commonly Associated with Groundwater" Dataset and Online Web Viewer. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Data-and-Tools/Files/Statewide-Reports/Natural-Communities-Dataset-Summary-Document.pdf

The NC Dataset identifies vegetation and wetland features that are good indicators of a GDE. The dataset is comprised of 48 publicly available state and federal datasets that map vegetation, wetlands, springs, and seeps commonly associated with groundwater in California[3]. It was developed through a collaboration between DWR, the Department of Fish and Wildlife, and The Nature Conservancy (TNC). TNC has also provided detailed guidance on identifying GDEs from the NC dataset[4] on the Groundwater Resource Hub[5], a website dedicated to GDEs.

BEST PRACTICE #1. Establishing a Connection to Groundwater

Groundwater basins can be comprised of one continuous aquifer (Figure 2a) or multiple aquifers stacked on top of each other (Figure 2b). In unconfined aquifers (Figure 2a), using the depth-to-groundwater and the rooting depth of the vegetation is a reasonable method to infer groundwater dependence for GDEs. If groundwater is well below the rooting (and capillary) zone of the plants and any wetland features, the ecosystem is considered disconnected and groundwater management is not likely to affect the ecosystem (Figure 2d). However, it is important to consider local conditions (e.g., soil type, groundwater flow gradients, and aquifer parameters) and to review groundwater depth data from multiple seasons and water year types (wet and dry) because intermittent periods of high groundwater levels can replenish perched clay lenses that serve as the water source for GDEs (Figure 2c). Maintaining these natural groundwater fluctuations are important to sustaining GDE health.

Basins with a stacked series of aquifers (Figure 2b) may have varying levels of pumping across aquifers in the basin, depending on the production capacity or water quality associated with each aquifer. If pumping is concentrated in deeper aquifers, SGMA still requires GSAs to sustainably manage groundwater resources in shallow aquifers, such as perched aquifers, that support springs, surface water, domestic wells, and GDEs (Figure 2). This is because vertical groundwater gradients across aquifers may result in pumping from deeper aquifers to cause adverse impacts onto beneficial users reliant on shallow aquifers or interconnected surface water. The goal of SGMA is to sustainably manage groundwater resources for current and future social, economic, and environmental benefits. While groundwater pumping may not be currently occurring in a shallower aquifer, use of this water may become more appealing and economically viable in future years as pumping restrictions are placed on the deeper production aquifers in the basin to meet the sustainable yield and criteria. Thus, identifying GDEs in the basin should done irrespective to the amount of current pumping occurring in a particular aquifer, so that future impacts on GDEs due to new production can be avoided. A good rule of thumb to follow is: *if groundwater can be pumped from a well - it's an aquifer*.

[3] For more details on the mapping methods, refer to: Klausmeyer, K., J. Howard, T. Keeler-Wolf, K. Davis-Fadtke, R. Hull, A. Lyons. 2018. Mapping Indicators of Groundwater Dependent Ecosystems in California: Methods Report. San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/iGDE_data_paper_20180423.pdf
[4] "Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans" is available at: https://groundwaterresourcehub.org/gde-tools/gsp-guidance-document/
[5] The Groundwater Resource Hub: www.GroundwaterResourceHub.org

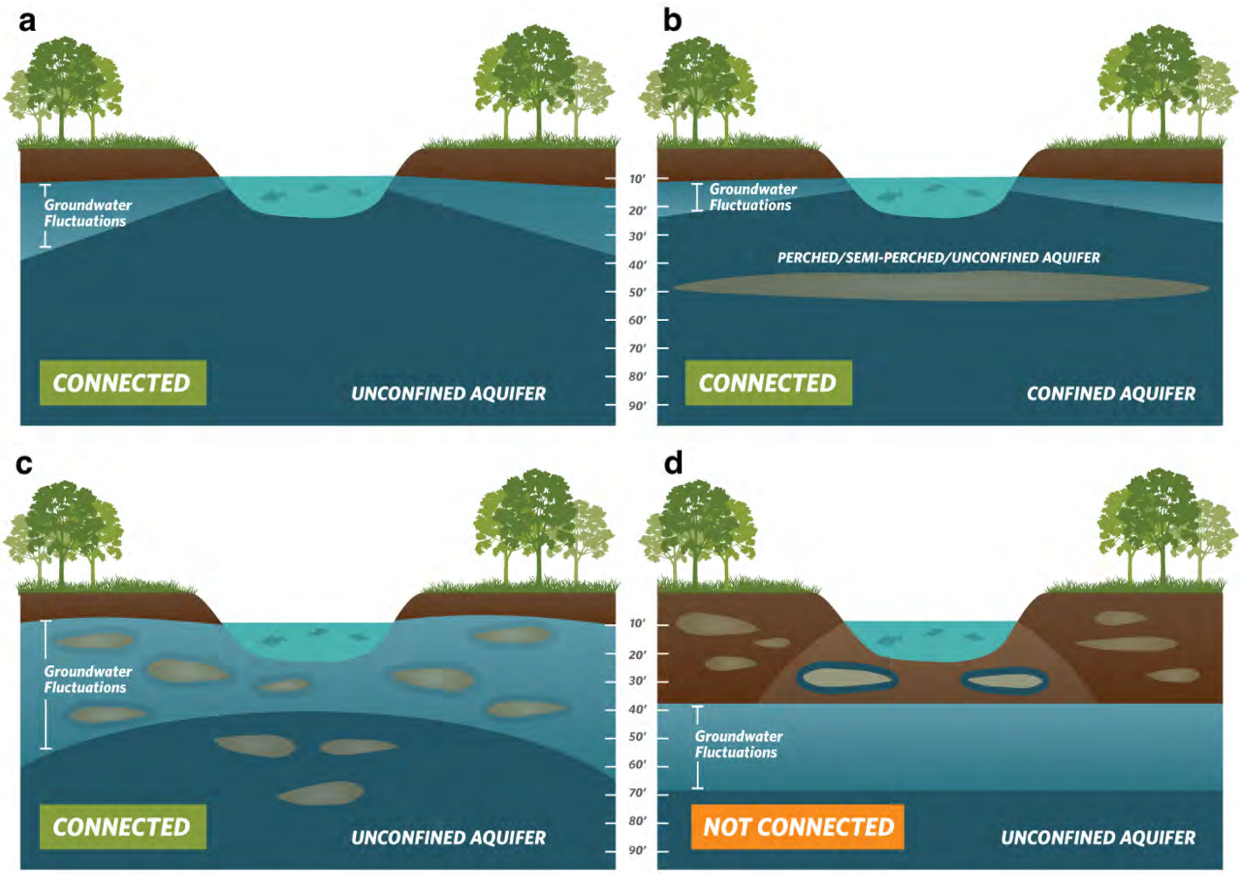

Figure 2. Confirming whether an ecosystem is connected to groundwater. Top: (a) Under the ecosystem is an unconfined aquifer with depth-to-groundwater fluctuating seasonally and interannually within 30 feet from land surface. (b) Depth-to-groundwater in the shallow aquifer is connected to overlying ecosystem. Pumping predominately occurs in the confined aquifer, but pumping is possible in the shallow aquifer. Bottom: (c) Depth-to-groundwater fluctuations are seasonally and interannually large, however, clay layers in the near surface prolong the ecosystem's connection to groundwater. (d) Groundwater is disconnected from surface water, and any water in the vadose (unsaturated) zone is due to direct recharge from precipitation and indirect recharge under the surface water feature. These areas are not connected to groundwater and typically support species that do not require access to groundwater to survive.

BEST PRACTICE #2. Characterize Seasonal and Interannual Groundwater Conditions

SGMA requires GSAs to describe current and historical groundwater conditions when identifying GDEs [23 CCR §354.16(g)]. Relying solely on the SGMA benchmark date (January 1, 2015) or any other single point in time to characterize groundwater conditions (e.g., depth-to-groundwater) is inadequate because managing groundwater conditions with data from one time point fails to capture the seasonal and interannual variability typical of California's climate. DWR's Best Management Practices document on water budgets[6] recommends using 10 years of water supply and water budget information to describe how historical conditions have impacted the operation of the basin within sustainable yield, implying that a baseline[7] could be determined based on data between 2005 and 2015. Using this or a similar time period, depending on data availability, is recommended for determining the depth-to-groundwater.

GDEs depend on groundwater levels being close enough to the land surface to interconnect with surface water systems or plant rooting networks. The most practical approach[8] for a GSA to assess whether polygons in the NC dataset are connected to groundwater is to rely on groundwater elevation data. As detailed in TNC's GDE guidance document[4], one of the key factors to consider when mapping GDEs is to contour depth-to-groundwater in the aquifer that is supporting the ecosystem (see Best Practice #5).

Groundwater levels fluctuate over time and space due to California's Mediterranean climate (dry summers and wet winters), climate change (flood and drought years), and subsurface heterogeneity in the subsurface (Figure 3). Many of California's GDEs have adapted to dealing with intermittent periods of water stress, however if these groundwater conditions are prolonged, adverse impacts to GDEs can result. While depth-to-groundwater levels within 30 feet[4] of the land surface are generally accepted as being a proxy for confirming that polygons in the NC dataset are supported by groundwater, it is highly advised that fluctuations in the groundwater regime be characterized to understand the seasonal and interannual groundwater variability in GDEs. Utilizing groundwater data from one point in time can misrepresent groundwater levels required by GDEs, and inadvertently result in adverse impacts to the GDEs. Time series data on groundwater elevations and depths are available on the SGMA Data Viewer[9]. However, if insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons in the GSP until data gaps are reconciled in the monitoring network (see Best Practice #6).

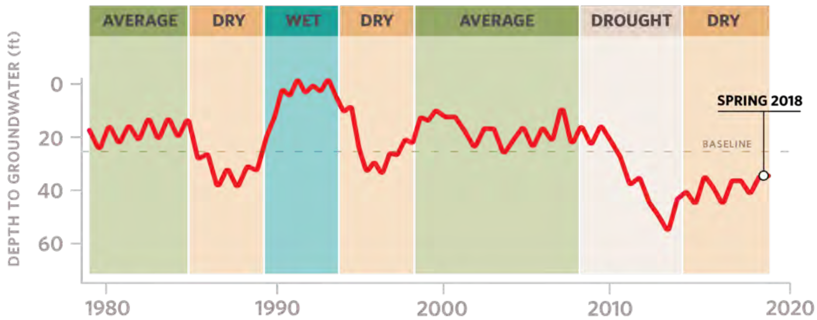

Figure 3. Example seasonality and interannual variability in depth-to-groundwater over time. Selecting one point in time, such as Spring 2018, to characterize groundwater conditions in GDEs fails to capture what groundwater conditions are necessary to maintain the ecosystem status into the future so adverse impacts are avoided.

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[6] DWR. 2016. Water Budget Best Management Practice. Available at: https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/BMP_Water_Budget_Final_2016-12-23.pdf

[7] Baseline is defined under the GSP regulations as "historic information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin." [23 CCR §351(e)]

[8] Groundwater reliance can also be confirmed via stable isotope analysis and geophysical surveys. For more information see The GDE Assessment Toolbox (Appendix IV, GDE Guidance Document for GSPs[4]).

[9] SGMA Data Viewer: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer

BEST PRACTICE #3. Ecosystems Often Rely on Both Groundwater and Surface Water

GDEs are plants and animals that rely on groundwater for all or some of its water needs, and thus can be supported by multiple water sources. The presence of non-groundwater sources (e.g., surface water, soil moisture in the vadose zone, applied water, treated wastewater effluent, urban stormwater, irrigated return flow) within and around a GDE does not preclude the possibility that it is supported by groundwater, too. SGMA defines GDEs as "ecological communities and species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" [23 CCR §351(m)]. Hence, depth-to-groundwater data should be used to identify whether NC polygons are supported by groundwater and should be considered GDEs. In addition, SGMA requires that significant and undesirable adverse impacts to beneficial users of surface water be avoided. Beneficial users of surface water include environmental users such as plants or animals[10], which therefore must be considered when developing minimum thresholds for depletions of interconnected surface water.

GSAs are only responsible for impacts to GDEs resulting from groundwater conditions in the basin, so if adverse impacts to GDEs result from the diversion of applied water, treated wastewater, or irrigation return flow away from the GDE, then those impacts will be evaluated by other permitting requirements (e.g., CEQA) and may not be the responsibility of the GSA. However, if adverse impacts occur to the GDE due to changing groundwater conditions resulting from pumping or groundwater management activities, then the GSA would be responsible (Figure 4).

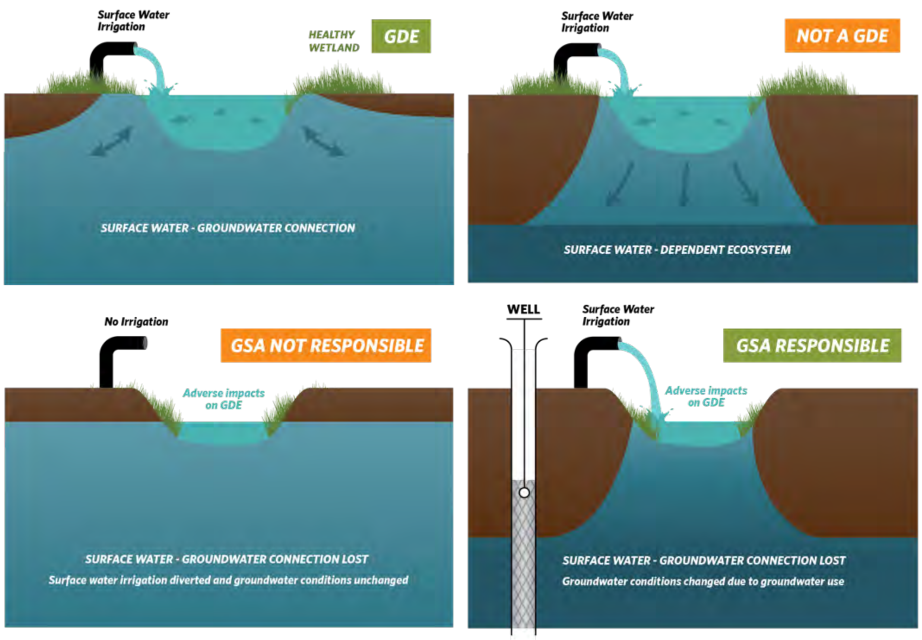

Figure 4. Ecosystems often depend on multiple sources of water. Top: (Left) Surface water and groundwater are interconnected, meaning that the GDE is supported by both groundwater and surface water. (Right) Ecosystems that are only reliant on non-groundwater sources are not groundwater-dependent. Bottom: (Left) An ecosystem that was once dependent on an interconnected surface water, but loses access to groundwater solely due to surface water diversions may not be the GSA's responsibility. (Right) Groundwater dependent ecosystems once dependent on an interconnected surface water system, but loses that access due to groundwater pumping is the GSA's responsibility.

[10] For a list of environmental beneficial users of surface water by basin, visit: https://groundwaterresourcehub.org/gde-tools/environmental-surface-water-beneficiaries/

BEST PRACTICE #4. Select Representative Groundwater Wells

Identifying GDEs in a basin requires that groundwater conditions are characterized to confirm whether polygons in the NC dataset are supported by the underlying aquifer. To do this, proximate groundwater wells should be identified to characterize groundwater conditions (Figure 5). When selecting representative wells, it is particularly important to consider the subsurface heterogeneity around NC polygons, especially near surface water features where groundwater and surface water interactions occur around heterogeneous stratigraphic units or aquitards formed by fluvial deposits. The following selection criteria can help ensure groundwater levels are representative of conditions within the GDE area:

- Choose wells that are within 5 kilometers (3.1 miles) of each NC Dataset polygons because they are more likely to reflect the local conditions relevant to the ecosystem. If there are no wells within 5km of the center of a NC dataset polygon, then there is insufficient information to remove the polygon based on groundwater depth. Instead, it should be retained as a potential GDE until there are sufficient data to determine whether or not the NC Dataset polygon is supported by groundwater.

- Choose wells that are screened within the surficial unconfined aquifer and capable of measuring the true water table.

- Avoid relying on wells that have insufficient information on the screened well depth interval for excluding GDEs because they could be providing data on the wrong aquifer. This type of well data should not be used to remove any NC polygons.

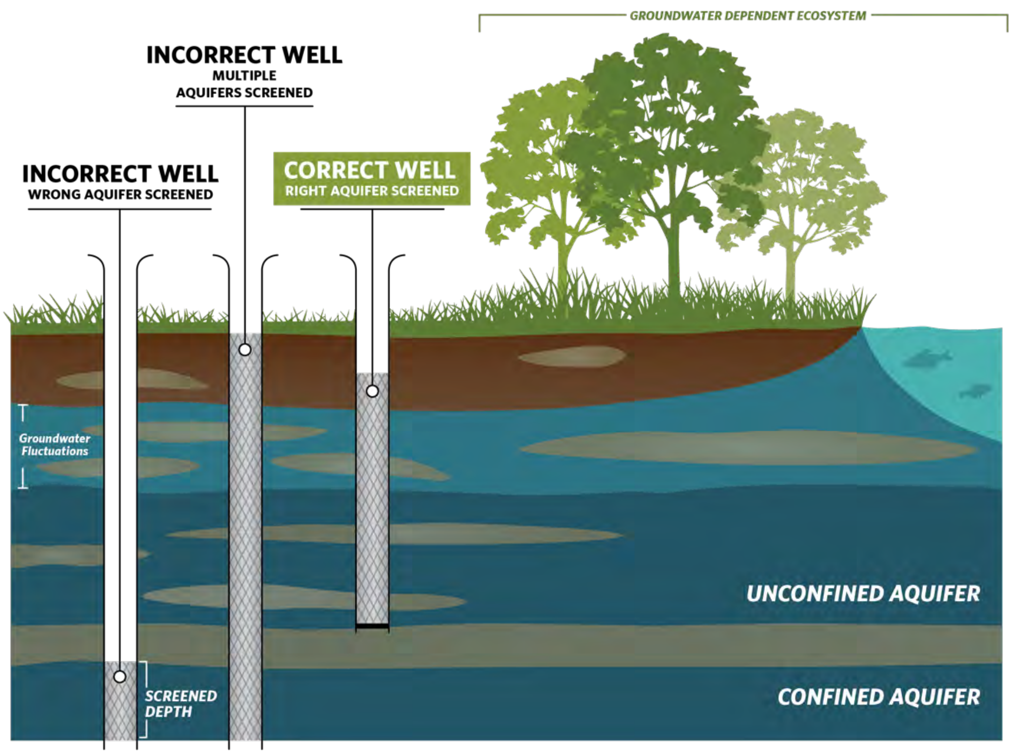

Figure 5. Selecting representative wells to characterize groundwater conditions near GDEs.

BEST PRACTICE #5. Contouring Groundwater Elevations

The common practice to contour depth-to-groundwater over a large area by interpolating measurements at monitoring wells is unsuitable for assessing whether an ecosystem is supported by groundwater. This practice causes errors when the land surface contains features like stream and wetland depressions because it assumes the land surface is constant across the landscape and depth-to-groundwater is constant below these low-lying areas (Figure 6a). A more accurate approach is to interpolate groundwater elevations at monitoring wells to get groundwater elevation contours across the landscape. This layer can then be subtracted from land surface elevations from a Digital Elevation Model (DEM)[11] to estimate depth-to-groundwater contours across the landscape (Figure b; Figure 7). This will provide a much more accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

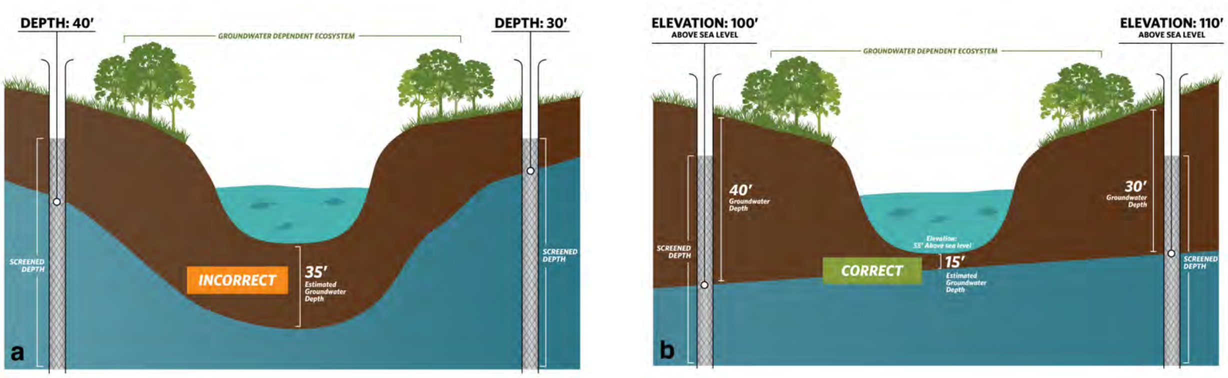

Figure 6. Contouring depth-to-groundwater around surface water features and GDEs. (a) Groundwater level interpolation using depth-to-groundwater data from monitoring wells. (b) Groundwater level interpolation using groundwater elevation data from monitoring wells and DEM data.

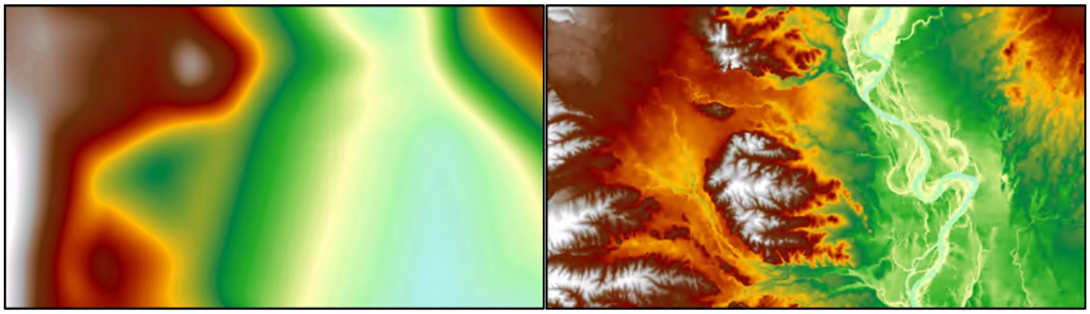

Figure 7. Depth-to-groundwater contours in Northern California. (Left) Contours were interpolated using depth-to-groundwater measurements determined at each well. (Right) Contours were determined by interpolating groundwater elevation measurements at each well and superimposing ground surface elevation from DEM spatial data to generate depth-to-groundwater contours. The image on the right shows a more accurate depth-to-groundwater estimate because it takes the local topography and elevation changes into account.

[11] USGS Digital Elevation Model data products are described at: https://www.usgs.gov/core-science-systems/ngp/3dep/about-3dep-products-services and can be downloaded at: https://iewer.nationalmap.gov/basic/

BEST PRACTICE #6. Best Available Science

Adaptive management is embedded within SGMA and provides a process to work toward sustainability over time by beginning with the best available information to make initial decisions, monitoring the results of those decisions, and using the data collected through monitoring programs to revise decisions in the future. In many situations, the hydrologic connection of NC dataset polygons will not initially be clearly understood if site-specific groundwater monitoring data are not available. If sufficient data are not available in time for the 2020/2022 plan, The Nature Conservancy strongly advises that questionable polygons from the NC dataset be included in the GSP until data gaps are reconciled in the monitoring network. Erring on the side of caution will help minimize inadvertent impacts to GDEs as a result of groundwater use and management actions during SGMA implementation.

KEY DEFINITIONS

Groundwater basin is an aquifer or stacked series of aquifers with reasonably well-defined boundaries in a lateral direction, based on features that significantly impede groundwater flow, and a definable bottom. *23 CCR §341(g)(1)*

Groundwater dependent ecosystem (GDE) are ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. *23 CCR §351(m)*

Interconnected surface water (ISW) surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted. *23 CCR §351(o)*

Principal aquifers are aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems. *23 CCR §351(aa)*

ABOUT US

The Nature Conservancy is a science-based nonprofit organization whose mission is *to conserve the lands and waters on which all life depends*. To support successful SGMA implementation that meets the future needs of people, the economy, and the environment, TNC has developed tools and resources (www.groundwaterresourcehub.org) intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

Attachment E

Maps of representative monitoring sites in relation to key beneficial users

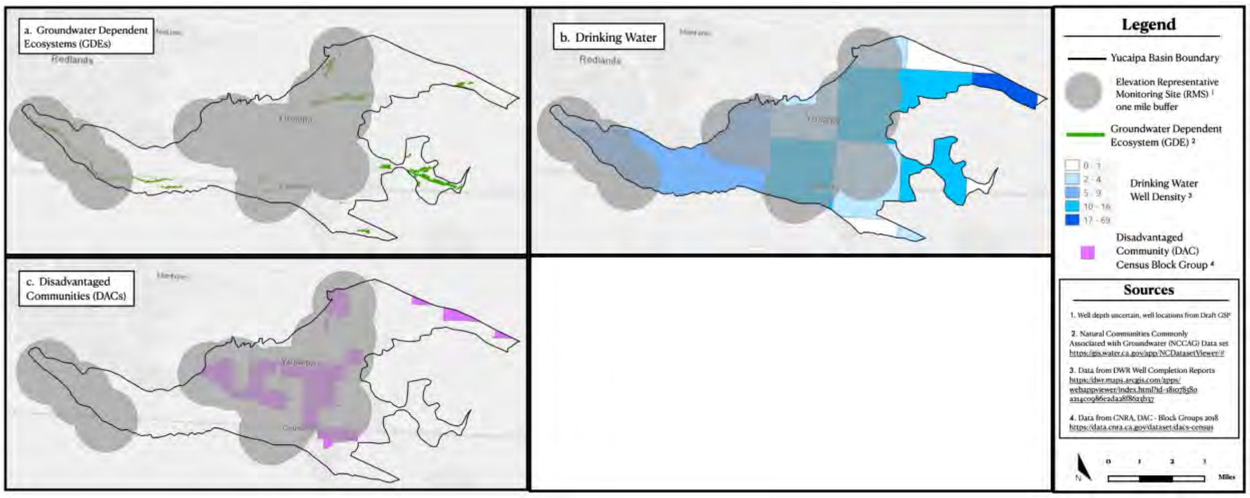

Figure 1. Groundwater elevation representative monitoring sites in relation to key beneficial users: a) Groundwater Dependent Ecosystems (GDEs), b) Drinking Water users, c) Disadvantaged Communities (DACs), and d) Tribes.

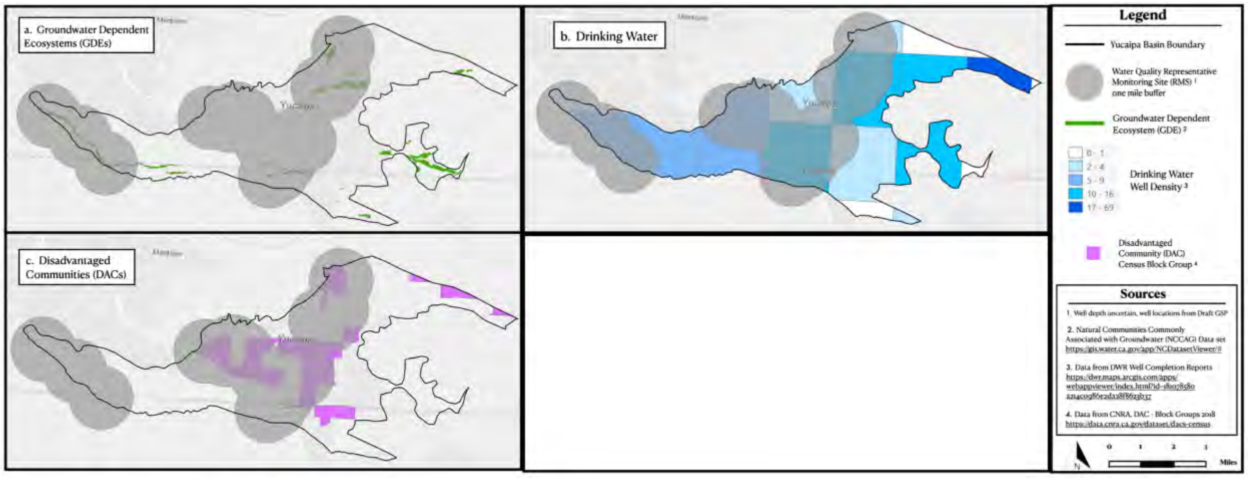

Figure 2. Groundwater quality representative monitoring sites in relation to key beneficial users: a) Groundwater Dependent Ecosystems (GDEs), b) Drinking Water users, c) Disadvantaged Communities (DACs), and d) Tribes.

Responses to Comments on Draft GSP

Public Draft Comments and Responses

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ES-4	ES-xiv	Replace the last paragraph of ES-4 with the following text, "Some of the member agencies of the Yucaipa GSA have constructed stormwater capture basins to enhance recharge to the Subbasin. The Wilson Creek and Oak Glen Creek basins are designed to capture stormwater, but are primarily used to artificially recharge the Subbasin using surplus SWP water delivered by the SWP East Branch Extension. These basins are included in the YIHM to simulate their contributions to recharge to the Subbasin. The Wilson Creek and Oak Glen Creek basins have contributed an average 1,900 AFY and 170 AFY, respectively, since 2011. The other existing stormwater capture basins are estimated to capture approximately 1,800 AFY. These projects provide additional benefits including improving water quality in surface waters by reducing stormwater runoff volumes and providing wildlife habitat. The Yucaipa GSA identified proposed projects that have been designed, permitted, and are undergoing development or will in the near future. These include the Wilson Creek III Basins, the Pendleton Avenue Low Water Crossing, and the Upper Wildwood Creek Basin. The projects funded by the City of Yucaipa (with major funding also provided by SBVMWD for the Wilson III Basins) are designed to capture stormwater flows and enhance recharge to the Subbasin. The estimated average annual recharge contribution is approximately 1,500 AF. These basins will be located in the North Bench management area. These planned basins were not included in the future water budget analyses for the North Bench management area using the YIHM, because the North Bench management area is not projected to experience undesirable results over the 50-year planning and implementation horizon. However, these planned projects will provide additional opportunities to capture and recharge stormwater flows, thereby reducing the reliance on imported water to meet the basin measurable objectives."	City of Yucaipa	12/2/2021	Edits were made and tracked in the Public Draft.
1.3.1	1-11	Does Dudek have access to those GIS files, and if not, why not?	South Mesa	12/2/2021	Yes. Dudek received the GIS files from YVWD in June 2018.
1.3.1	1-11	Has Dudek requested Geoscience to identify the document references? When will the document references be available?	South Mesa	12/2/2021	Geoscience provided a reference to their report, "Determination of the Usable Capacity and Safe Yield for Each Sub-basin within the Yucaipa Basin Area", dated April 17, 2014. Subsequently, YVWD requested that the sub-basin (i.e. subarea) boundaries presented in that report be modified to comport with the modified boundary of the Yucaipa Subbasin (accepted by DWR in 2016) and to include the Singleton and Live Oak subareas. GIS files with revised boundaries of the nine subareas in the Yucaipa Subbasin were provided by Geoscience to YVWD in February 2017.
1.4.1.1.2	1-12	1.4.1.1.2 - City of Redlands is a majority shareholder in SMWC, and has historically operated and maintained their wells, but is not responsible for doing so. There is no Agreement obligating Redlands to operate and maintain SMWC wells. Also, Crafton Hills College is not located within the City of Redlands. 1.4.1.2.1 and 1.6.2.2.3 - Include similar language as above.	City of Redlands	11/4/2021	Edits were made and tracked in the Public Draft.
1.5.1.3	1-18	Please explain the meaning of “equivalent” as referenced in the text. We suggest revising the text to include that explanation, to avoid confusion from using “equivalent” in quotation marks.	South Mesa	12/2/2021	The following text was inserted for Section 1.5.1.3 for clarification: "In 2014, SBVMWD integrated the Subbasin into its existing program that calculates an annual change in groundwater storage for the San Bernardino Basin Area (SBVMWD 2018). DWR first calculated the annual change in storage in the San Bernardino Basin Area (SBBA) from 1934 to 1960. SBVMWD continued the work initiated by DWR and calculated the annual change in groundwater storage from 1961 to present. The calculated annual change in storage, or the volume of water lost or gained, is based on field groundwater level measurements at wells throughout the Subbasin. SBVMWD also calculates the annual change in storage for each of the hydrogeologic subareas in the Yucaipa Subbasin. Storage is an extremely important metric that the Yucaipa GSA will use to evaluate the effectiveness of the GSP."
1.5.1.3	1-18	Please provide further clarification and confirmation that 1993 is an appropriate base year for measuring changes in groundwater storage under SGMA.	South Mesa	12/2/2021	This section of Chapter 1 of the GSP introduces water resources monitoring programs that have been implemented in the Plan Area. One of these programs is the annual calculation of the change in groundwater in storage for the San Bernardino Basin Area and the Yucaipa Basin Area conducted by SBVMWD. This work provides an estimation of the change in storage in the Yucaipa Subbasin separate from the change in storage estimated from the YIHM that was used to prepare this GSP.

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1.5.3	1-31	Insert the following text at the end of the last paragraph for Section 1.5.3: "Other projects include the Wilson Creek and Oak Glen Creek basins with were designed to capture storm water, but are primarily used to artificially recharge the Subbasin using surplus SWP water delivered by the SWP East Branch Extension. These basins are included in the YIHM to simulate their contributions to recharge to the Subbasin. The Wilson Creek and Oak Glen Creek basins have contribute an average 1,900 AFY and 170 AFY, respectively, since 2011. The other existing storm water capture basins are estimated to capture approximately 1,800 AFY. These projects provide additional benefits including improving water quality in surface waters by reducing stormwater runoff volumes and providing wildlife habitat."	City of Yucaipa	12/2/2021	Edits were made and tracked in the Public Draft.
2.5.1.1	2-20	How, if at all, do the revised numbers stated in this section affect the GSP pumping allocations, replenishment fees, and credits that were presented at the August 2021, September 2021 and October 2021 Yucaipa GSA meetings?	South Mesa	12/2/2021	The production values listed in Section 2.5.1.1., and the production values presented in all sections discussing the other subareas in the Yucaipa Subbasin, are derived from the May 2021 revised version of the USGS YIHM. Previous production values included in the preliminary draft of the GSP were based on the September 2020 version of the YIHM. The changes in production values between the two versions of the YIHM are due to revisions, recalibration, and refinement of the September 2020 version of the YIHM and revisions to the methodology for extracting modeled outputs. The sustainable yield pumping allocations presented in Chapter 4 of the GSP are based on the information and results from the May 2021 version of the YIHM. Information presented in the August, September, and October 2021 GSA meetings were based on information from the May 2021 version of the YIHM.
2.5.1.2	2-20	How, if at all, do the revised numbers stated in this section affect the GSP pumping allocations, replenishment fees, and credits for this Management Area that were presented at the August 2021, September 2021 and October 2021 Yucaipa GSA meetings?	South Mesa	12/2/2021	Please see response to the comment on section 2.5.1.1. page 2-20.
2.5.1.2	2-21	Does YVWD hold surface water diversion permits/licenses with respect to YVWD-25? The revised text removes references to diversion of surface water.	South Mesa	12/2/2021	Water produced by YVWD-25 is characterized as "groundwater under the direct influence of surface water." Section 64651.50 (CCR Title 22) defines groundwater under the direct influence of surface water as "any water beneath the surface of the ground with significant occurrence of insects or other macroorgansisms, algae or large diameter pathogens such as *Giardia lamblia* or *Cryptosporidium* , or significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity or pH which closely correlate to climatological or surface water conditions." (Text added to section 2.5.4.1 in GSP Chapter 2). Groundwater pumped from YVWD-25 is not extracted from a subterranean stream, which is a "body of groundwater flowing through known and definite channels." Therefore, water produced from YVWD-25 is not subject to the same permitting requirements as diversions from surface water streams as regulated by the State Water Resources Control Board. Therefore, no surface water diversion permit, or appropriative right to divert surface water, is applicable for YVWD-25.
2.5.1.2, 2.5.1.5, 2.5.1.6, 2.5.1.7, 2.8.2.3.3,	2-21 , 2-23, 2-24, 2-67	How, if at all, do the revised numbers stated in these sections affect the GSP pumping allocations, replenishment fees, and credits for Management Areas that were presented at the August 2021, September 2021 and October 2021 Yucaipa GSA meetings?	South Mesa	12/2/2021	Please see response to the comment on section 2.5.1.1. page 2-20.

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2.5.3	2-26	South Mesa appreciates the initial response, but requests further clarification on this subsection regarding YVWD-48 that pumps groundwater from the Beaumont Basin for partial use within the Yucaipa Subbasin. The response indicates that the fraction of water from YVWD-48 that is served within the Subbasin has not been quantified but further states that the YIHM "simulates production from YVWD-48" and estimates return flows in the Subbasin "based on water served in the Subbasin." Will Dudek please provide further clarification regarding the assumptions (pumping, return flows, water served within the Subbasin, etc.) utilized for YVWD-48 and also for the analogous South Mesa-04 (which also produces groundwater from the Beaumont Basin, for use within the Yucaipa Subbasin).	South Mesa	12/2/2021	Groundwater extracted from YVWD-48 is served within YVWD's service area. As previously noted, the fraction of YVWD-48 extractions served within YVWD's service area has not been quantified as part of this Plan preparation. Groundwater extractions from YVWD-48, as simulated by the YIHM, are presented in Table 2C-3 of the Public Draft GSP. The draft model documentation for the YIHM indicates that groundwater extraction rates in the model were obtained from SBVMWD, YVWD, SMWC, WHWC, and Geosciences Support Services Inc. (Alzraiee et al, 2021). The YIHM does not directly simulate the distribution of water served within the Subbasin. Instead, the YIHM calculates a water balance at the grid-cell level between groundwater inflows and outflows resulting in simulated changes in hydraulic head (i.e., change in storage). The USGS estimated average annual return flows for each groundwater subarea during the YIHM model development. These return flow volumes represent an aggregate of residential landscaping return flows, discharges from septic systems, and municipal system leaks (Cromwell et al, 2020a). Each of these subarea estimates were calculated by the USGS assuming that irrigation demands were approximately 4 AFY/acre to irrigate golf courses and approximately 1.6 AFY/acre to irrigate smaller parks and residential landscaping (Alzraiee et al, 2021)). The amount of return flow from these sources was estimated by the USGS to range from 15 to 30% of the total applied water at each location (Alzraiee et al). In addition to this, the USGS estimated that discharges from septic systems averaged approximately 70 gpd/person and that municipal system leaks were approximately 5-10% of the total municipal water demand (Alzraiee et al, 2021) Return flows from groundwater extracted at YVWD-48 and SMWC-04 and served within the Subbasin would be reflected in the total modeled return flows. Because the YIHM estimates the aggregate return flow volume for each subarea, the model does not directly describe where groundwater extracted from an individual well is served within the Subbasin. Accordingly, the YIHM does not provide the resolution to directly characterize how groundwater production from YVWD-48 and/or South Mesa-04 impact return flows in the Subbasin.
2.8.1.1	2-58	Please provide an update as to when SBVMWD anticipates receiving the USGS YIHM modeling report.	South Mesa	12/2/2021	USGS reported in early November 2021 that the two USGS reports, "Geology and Hydrogeology of the Yucaipa Groundwater Subbasin, San Bernardino and Riverside Counties, California" and "Hydrology of the Yucaipa Groundwater Subbasin: Characterization and integrated Numerical Model, San Bernardino and Riverside Counties, California" are in layout stage. Final approval and dissemination to the public will occur when layout is complete and the reports are published online. Expected publication date is end of 2021.
2.8.2.2.3	2-66	A copy of Dudek's revised draft Table 2C-3 is included with this letter as **Attachment "A"**. The revised text, Table 2C-3 and Dudek response to South Mesa's October 12, 2021 comment, appear to be inconsistent with the data provided by SMWC regarding South Mesa-04. The revised text appears to indicate that Well 4 data is being applied only back to 1988 is due to YIHM model parameters only going back to 1988. Is that correct? If so, why does the YIHM include YVWD importing water beginning 1981 via YVWD-16?	South Mesa	12/2/2021	The YIHM was designed by the USGS to simulate conditions in the Yucaipa Subbasin from January 1, 1947 through December 30, 2014. Dudek extracted model results from the YIHM to characterize the historical groundwater budget from water year 1965 through water year 2014, and then extended the model to simulate current and future conditions in the Subbasin. The historical model developed by the USGS operates South Mesa-04 beginning in the 1988 WY and YVWD-16 beginning the 1981 WY. Dudek did not change any of the historical model conditions as part of the Plan development. Dudek has discussed with South Mesa the accurate representation of historical pumping at South Mesa-04 and will look into incorporating the data into the next utilization of the YIHM. To better reflect that Table 2C-3 represents modeled groundwater extractions, rather than imported groundwater volumes, the title for Table 2C-3 has been changed from "Imported Groundwater to the Yucaipa Subbasin", to, "Groundwater Production from Wells Outside the Subbasin that Supplement Subbasin Water Supplies". In addition, Dudek has added a footnote to the table indicating that this data represents total production volumes, not imported groundwater volumes. Dudek has also updated the text in Section 2.8.2.2.3 to correctly reflect what this data represents.

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2.8.2.2.3	2-66	Table 2C-3 in Appendix 2C lists "0" AF imported by South Mesa-04 from 1987 and prior, and no reference is made prior to 1965. Please explain the those figures and date ranges, and how they are being applied.	South Mesa	12/2/2021	The 0 AFY importations from South Mesa-04 between 1965 and 1987 reflect the modeled pumping rates represented in the YIHM. Dudek did not adjust any of these historical pumping rates, which were incorporated into the model by the USGS during the YIHM development. Data prior to water year 1965 are not discussed because this data fall outside of the 50-year historical water budget time frame of WY 1965-2014. The 50-year time frame for the historical water budget was selected to characterize long-term conditions prior to water year 2015.
2.8.2.2.3	2-66	We invite Dudek to contact South Mesa to ensure that complete and accurate South Mesa-04 data is being utilized for the GSP.	South Mesa	12/2/2021	Dudek has discussed with South Mesa the accurate representation of historical pumping at South Mesa-04 and will look into incorporating the data into the next utilization of the YIHM.
4.2.2	4-16	In Section 4.2.2., entitled, "Management Action #2 - Sustainable Yield Pumping Allocations and Groundwater Replenishment," Dudek has made a revision to the draft GSP text at the request of SBVMWD that is of significant concern to South Mesa. The revision adds a sentence expressly stating that "Pumping credits cannot be transferred or sold to another entity within a given management area or within the Subbasin." That sentence should be deleted. The transferability of pumping credits is a significant policy matter that has not yet been specifically addressed by the Yucaipa GSA. In fact, the ability to transfer pumping credits within a management area or within the Subbasin could potentially provide an important management tool for the Subbasin and should be explored and discussed. Until that policy issue is addressed and decided, the GSP should not include language limiting or prohibiting transferability. We request that placeholder language be included in the GSP stating that "The Yucaipa GSA will continue to discuss transferability of pumping credits."	South Mesa	12/2/2021	The sentence, "Pumping credits cannot be transferred or sold to another entity within a given management area or within the Subbasin" was edited to read, "The Yucaipa GSA is continuing discussions on implementing a policy that will allow the transferability of pumping credits between groundwater users within a given management area or within the Subbasin." This sentence reflects South Mesa's concern that transferability of pumping credits has not been specifically addressed by the GSA.
4.2.3	4-23	Please provide a further detailed explanation regarding the accounting methodology for Surplus Supplemental Water. The response above indicates that Surplus Supplemental Water is not associated with Management Action #2, but indicates that that Surplus Supplemental water will nonetheless be available to offset production exceedances above sustainable yield pumping allocations (which allocations comprise an integral component of Management Action #2). We would appreciate added clarity regarding the interrelatedness and accounting methodology for Management Action #2 and Management Action #3.	South Mesa	12/2/2021	The following section, "which is not associated with Management Action No. 2 (Section 4.2.2)", will be deleted from the text to remove any confusion of the interrelationship between pumping credits defined in Management Action No. 2 and supplemental surplus spreading water defined in Management Action No. 3. The surplus supplemental water will be accessible to the water purveyor that purchased the water and percolated it at a spreading basin. This water will be available to help offset production exceedances above the sustainable yield pumping allocations instead of pumping credits earned via Management Action No. 2.
		Sec**tion 1. Consideration of Beneficial Uses and Users in GSP Development. Part A. Identification of Key Beneficial Uses and Users. Disadvantaged Communities and Drinking Water Users.** "The GSP fails to clearly state the population of each DAC or provide population of DAC's dependent on groundwater as their source of drinking water in the subbasin."	Nature Conservancy et al., Public Comment Letter for Yucaipa Subbasin Draft GSP	12/3/2021	Figure 1-13 was updated to include the populations for the DACs and SDACs identified in the Plan Area, and the source of water supplied to the DACs and SDACs. Section 1.8.8 was also revised with added text describing the sources of water for the disadvantaged communities.
		Section 1. Consideration of Beneficial Uses and Users in GSP Development. Part A. Identification of Key Beneficial Uses and Users. Interconnected Surface Waters. "The identification of Interconnected Surface Waters (ISWs) is insufficient, due to lack of supporting information provided for the ISW analysis." "The GSP does not provide a map of these reaches to illustrate the conclusions of the modeling analysis regarding which reaches are connected to groundwater."	Nature Conservancy et al., Public Comment Letter for Yucaipa Subbasin Draft GSP	12/3/2021	Chapter 2 of the GSP was updated to include a new section, titled “Section 2.7.8.1 Interconnected Surface Waters”. This section describes modeled surface water-groundwater interactions across the Yucaipa Subbasin and introduces revised Figures 2-56 and 2-57 that display the locations of ISWs confirmed by observed groundwater levels and potential ISWs simulated in the Plan Area. The locations of the ISWs are compared to mapped GDEs in the Plan Area. While the Yucaipa Integrated Hydrologic Model provides the best-available data characterizing ISWs in the Subbasin, we note that this component of the numerical model is uncertain and not well-constrained by surface water flow measurements. As part of this section, we identify the presence of ISWs as a data gap.

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		Section 1. Consideration of Beneficial Uses and Users in GSP Development. Part A. Identification of Key Beneficial Uses and Users. Groundwater Dependent Ecosystems. "NC dataset polygons were incorrectly removed if Normalized Difference Vegetation Index (NDVI) and Normalized Difference Moisture Index (NDMI) data did not correlate with groundwater level trends."	Nature Conservancy et al., Public Comment Letter for Yucaipa Subbasin Draft GSP	12/3/2021	NC dataset polygons were not removed solely based on the correlation between NDVI, NDMI, and nearby groundwater levels. Four of the five polygons that were characterized as habitats that do not rely on groundwater were characterized as such because the underlying water table is encountered at depths that exceed 100 ft. bgs, which is much deeper than the rooting depth of the overlying habitat. The fifth habitat that was characterized as not groundwater dependent was characterized as such because habitat health exhibited no response to groundwater production trends near the mapped ecosystem. Near this habitat, groundwater has historically been produced at an average rate of 100 AFY and the water table has been measured 44 ft. bgs to 77 ft. bgs. During the period where production averaged 100 AFY, habitat health increased.
		Section 1. Consideration of Beneficial Uses and Users in GSP Development. Part A. Identification of Key Beneficial Uses and Users. Groundwater Dependent Ecosystems. "The GSP could be improved by labeling the GDE units and labeling each well location provided on this figure (Figure 2-57), and providing the hydrographs of groundwater levels that are discussed qualitatively in the text."	Nature Conservancy et al., Public Comment Letter for Yucaipa Subbasin Draft GSP	12/3/2021	Well labels and GDE labels added to Figures 2-56 and 2-57. In addition, we have included hydrographs showing the depths-to-groundwater at the wells identified in Figures 2-56 and 2-57 in a new Appendix, 2-E, to Chapter 2.
		Section 1. Consideration of Beneficial Uses and Users in GSP Development. Part A. Identification of Key Beneficial Uses and Users. Native Vegetation and Management. "The integration of native vegetation into the water budget is insufficient." "Managed wetlands are not mentioned in the GSP, so it is not known whether or not they are present in the subbasin."	Nature Conservancy et al., Public Comment Letter for Yucaipa Subbasin Draft GSP	12/3/2021	The water budget analysis for the Yucaipa Subbasin was conducted with the YIHM. One of the groundwater outflows simulated by the YIHM is water usage via evapotranspiration by vegetation types based on land-use maps. Evapotranspiration of shallow groundwater by native vegetation may contribute to the total groundwater outflows in the Plan Area. These losses are not explicitly modeled by the YIHM, but were implicitly accounted for during model development and calibration. Further discussion of native vegetation water usage is included in Section 2.8.8. There are no managed wetlands in the Yucaipa Subbasin.
		Section 1. Consideration of Beneficial Uses and Users in GSP Development. Part B. Engaging Stakeholders. Stakeholder Engagement during GSP Development. "The plan lacks specific details of outreach and engagement targeted to environmental stakeholders. We recommend that the GSA engage with environmental stakeholders in the subbasin, which could include California Department of Fish and Wildlife or environmental non-profits."	Nature Conservancy et al., Public Comment Letter for Yucaipa Subbasin Draft GSP	12/3/2021	The Yucaipa GSA has presented meeting announcements with participant details for all meetings, and has welcomed stakeholders and interested parties to submit contact information to receive all public notices pertaining to the development of the GSP. The Yucaipa GSA will make efforts within the next 5 years of contacting individual domestic well owners to obtain well information and participation in the early stages of the GSP implementation phase.
		Section 1. Consideration of Beneficial Uses and Users in GSP Development. Part C. Considering Beneficial Uses and Users When Establishing Sustainable Management Criteria and Analyzing Impacts on Beneficial Uses and Users. Disadvantaged Communities and Drinking Water Users. "The GSP does not quantify the number of domestic wells that could go dry or otherwise consider or analyze the impact of minimum thresholds on domestic wells. The GSP does not sufficiently describe whether minimum thresholds will avoid significant and unreasonable loss of drinking water to domestic well users that are not protected by the minimum threshold."	Nature Conservancy et al., Public Comment Letter for Yucaipa Subbasin Draft GSP	12/3/2021	The current status of the domestic wells in the Plan Area is not known. The Yucaipa GSA will contact potential private domestic well users to obtain information about their wells and identify any active domestic wells that currently have potable water. The Yucaipa GSA will identify domestic wells that may be impacted by water level declines in the Plan Area.

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		Section 1. Consideration of Beneficial Uses and Users in GSP Development. Part C. Considering Beneficial Uses and Users When Establishing Sustainable Management Criteria and Analyzing Impacts on Beneficial Uses and Users. Disadvantaged Communities and Drinking Water Users. "The GSP does not establish SMC for groundwater quality."	Nature Conservancy et al., Public Comment Letter for Yucaipa Subbasin Draft GSP	12/3/2021	SMC were not established for the degraded water quality sustainability indicator because there are no current and projected significant and unreasonable effects to water quality in the Plan Area. Concerted efforts by the Yucaipa GSA member agencies to improve water quality by removing septic systems and connecting users to sanitary sewer systems, increasing wastewater treatment capacities and implementing advanced treatment technologies, along with a marked reduction in water use for agricultural purposes, has improved water quality throughout the Subbasin. Water quality issues only occur in localized areas (e.g., former Yucaipa landfill, active remediation of shallow groundwater in the Western Heights Management Area) that have not impacted water quality in the principal aquifer. Therefore, there are no water quality issues that may affect the long-term supply and beneficial uses of groundwater produced from the principal aquifer.
		Section 1. Consideration of Beneficial Uses and Users in GSP Development. Part C. Considering Beneficial Uses and Users When Establishing Sustainable Management Criteria and Analyzing Impacts on Beneficial Uses and Users. Groundwater Dependent Ecosystems and Interconnected Surface Waters. "Since GDEs are present in the subbasin, they must be considered when developing all relevant SMC." "Because ISWs have been identified in the subbasin, the GSA needs to define what significant and unreasonable effects are for ISWs.	Nature Conservancy et al., Public Comment Letter for Yucaipa Subbasin Draft GSP	12/3/2021	We have added YVWD-25 and YVWD-28 as representative monitoring points in the North Bench Management Area (see revised Figure 3-5). We will establish GDE SMCs at these wells following the same methodology used for the GDEs identified in the San Timoteo Management Area along San Timoteo Creek. Two new figures included in a new appendix, Appendix 3-C in Chapter 3, will show (1) the RMPs in relation to the mapped DACs and SDACs, and (2) the RMPs in relation to the GDEs. SMCs for ISWs are not established as part of this Plan because the location and extent of ISWs in the Subbasin are not well constrained by measured data and is a data gap. ISWs will be re-evaluated as measured data becomes available.
		Section 2. Climate Change. "The integration of climate change into the projected water budget is insufficient. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the subbasin. While these extreme scenarios may have a lower likelihood of occurring and their consideration is not required by DWR (only suggested), their consequences could be significant and their inclusion can help identify important vulnerabilities in the subbasin's approach to groundwater management."	Nature Conservancy et al., Public Comment Letter for Yucaipa Subbasin Draft GSP	12/3/2021	The inclusion of extreme climate scenarios may be considered for the 5-year update to the GSP when the YIHM is reevaluated using data obtained since the implementation of the GSP. The GSP includes Management Action No. 1, Reduce Net Use of Groundwater When Groundwater Levels Decline below Measurable Objectives, to protect the groundwater resource and beneficial users should groundwater levels decline below measurable objectives. A reduction in the net use of groundwater is equivalent to a reduction in the estimated sustainable yield because groundwater use is constrained to the estimated sustainable yield. A future decline in groundwater levels may be the result of less recharge due to climate change, in which case the GSA will reevaluate the estimate of sustainable yield and modify the value to reflect future conditions and protect all beneficial users.
		Section 2. Climate Change. "the sustainable yield is not calculated based on the projected water budget with climate change incorporated."	Nature Conservancy et al., Public Comment Letter for Yucaipa Subbasin Draft GSP	12/3/2021	The sustainable yield estimated for the Yucaipa Subbasin was based on a 50-year historical record of climate, pumping, and land use types, and the change in storage as a function of groundwater use. Management actions established in the GSP are designed to protect the groundwater resource should groundwater levels and groundwater storage decline via significant and unreasonable effects. Under such circumstances, the estimated sustainable yield for a particular management area will be reduced to limit groundwater withdrawals and protect the groundwater resource.
		Section 3. Data Gaps. "The consideration of beneficial users when establishing monitoring networks is insufficient, due to lack of specific plans to increase the Representative Monitoring Points (RMPs) in the monitoring network that represent water quality conditions and shallow groundwater elevations around domestic wells, GDEs, and ISWs in the subbasin." "The GSP does not provide specific plans, such as locations or a timeline, to fill the data gaps for GDEs. Because GDEs have been identified in the subbasin, these data gaps should be addressed now instead of waiting for groundwater extraction to increase in the future."	Nature Conservancy et al., Public Comment Letter for Yucaipa Subbasin Draft GSP	12/3/2021	The RMPs identified in the GSP were selected based on their ability to accurately represent conditions in the Plan Area. The density of these points equals the monitoring well density for an entire monitoring network in DWR's BMP guidance document on monitoring networks. These points are a subset of a broader monitoring network, which will continue to be used moving forward (see Section 3.6). If active domestic well users are identified, additional representative monitoring points may be recommended in future updates to the GSP. The Yucaipa GSA will incorporate YVWD-25 in the Oak Glen area and YVWD-28 in the Wildwood Canyon area as additional RMPs in the North Bench management area to evaluate groundwater level conditions in the proximity of the confirmed GDEs in those areas. These wells are already part of the groundwater monitoring network identified in the GSP.

Public Draft Comments and Responses					
Section	Page	Comment Item Description	Comment Received by	Date Comment Received	Response to Comment / Status of Revision
		Section 4. Addressing Beneficial Users in Projects and Management Actions. "The GSP fails to describe the explicit benefits or impacts to beneficial users, such as GDEs and DACs, from Management Action No. 3, Surplus Supplemental Water Spreading. We also note that the plan does not include a domestic well mitigation program to avoid significant and unreasonable loss of drinking water."	Nature Conservancy et al., Public Comment Letter for Yucaipa Subbasin Draft GSP	12/3/2021	The benefit of implementing Management Action No. 3, Surplus Supplemental Water Spreading, is supplying additional water vis-à-vis artificial recharge to the aquifer. Surplus supplemental water may be used to artificially recharge the aquifer during wet seasons or subsequent periods following a wet season to increase groundwater storage. The additional water is then available to meet higher demands during dry seasons. This management action increases and/or maintains groundwater supply and groundwater levels that will benefit all groundwater users, including GDEs and DACs. The GSP does include an adaptive groundwater management program with the establishment of Management Actions Nos. 1 and 2. These management actions call for a reduction in the net use of groundwater when groundwater levels decline below measurable objectives. The Yucaipa GSA will make a concerted effort to contact individual domestic well users to obtain information on their wells, including construction details and usage, to ensure that these sources of water are protected under the GSP.

Appendix 2-A

Annual Precipitation and Water Year Type at SBCFCD Climate Stations in the Yucaipa Subbasin

DRAFT Appendix 2-A. Annual Precipitation and Water Year-Type at San Bernardino County Flood Control District Climate Stations in the Yucaipa Subbasin

Water Year Ending	Western Heights					Calimesa					Crafton			Wilson Creek			
	2915 (2235')	3099 (2140')	3356 (2125')	% of Mean	Water Year Type	3126A (2813')	3132 (2710')	3386 (2620')	% of Mean	Water Year Type	2890 (2606')	% of Mean	Water Year Type	3126 (2815')	3128B (2860')	% of Mean	Water Year Type
1953							5.41		32%	Critically Dry				12.59	14.26	88%	Below Normal
1954							18.12		109%	Normal				17.84	16.92	114%	Above Normal
1955							13.75		82%	Below Normal				15.17	14.68	97%	Normal
1956							11.68		70%	Dry				11.72	11.83	77%	Below Normal
1957							14.47		87%	Below Normal				13.41		88%	Below Normal
1958		24.72		181%	Wet		26.48		159%	Wet				27.95		183%	Wet
1959		8.26		60%	Dry		9.13		55%	Dry				8.76		57%	Dry
1960		15.98		117%	Above Normal		14.03		84%	Below Normal				13.25		87%	Below Normal
1961		8.05		59%	Dry		2.50		15%	Critically Dry				7.63		50%	Critically Dry
1962		18.68		137%	Above Normal		16.78		101%	Normal				18.84		123%	Above Normal
1963		15.80		116%	Above Normal		14.01		84%	Below Normal				13.90		91%	Normal
1964		12.65		93%	Normal		11.04		66%	Dry				11.74		77%	Below Normal
1965		13.80		101%	Normal		13.02		78%	Below Normal							
1966		17.80		130%	Above Normal	19.63	18.19		113%	Above Normal							
1967		27.05		198%	Wet	27.41	24.76		156%	Wet							
1968		15.25		112%	Above Normal	15.46	16.80		97%	Normal							
1969		29.12		213%	Wet	38.22	35.36		221%	Wet							
1970		8.53		62%	Dry	10.26	9.91		60%	Dry					10.03	66%	Dry
1971		9.44		69%	Dry	13.44	13.75		82%	Below Normal					12.17	79%	Below Normal
1972		6.26		46%	Critically Dry	8.65	7.35		48%	Critically Dry					8.73	57%	Dry
1973		15.48		113%	Above Normal	22.33	19.93		127%	Above Normal					21.53	141%	Above Normal
1974		9.98		73%	Dry	14.32	11.83		78%	Below Normal					12.52	82%	Below Normal
1975		12.18		89%	Below Normal	17.74	14.98		98%	Normal					17.02	111%	Above Normal
1976		10.84		79%	Below Normal	18.19	15.89		102%	Normal					17.35	113%	Above Normal
1977						16.48	10.06		80%	Below Normal					13.49	88%	Below Normal
1978						36.63	29.65		199%	Wet					30.84	201%	Wet
1979						27.30	21.25		146%	Above Normal					22.51	147%	Above Normal
1980			24.67	181%	Wet	30.98	26.95		174%	Wet					21.03	137%	Above Normal
1981			7.43	54%	Dry	12.44	9.61		66%	Dry							
1982			16.05	118%	Above Normal	21.53	18.68		121%	Above Normal							
1983			28.58	209%	Wet	39.42	30.71		210%	Wet							
1984			6.87	50%	Dry	10.48	8.96		58%	Dry							
1985			10.33	76%	Below Normal	14.48	12.36		80%	Below Normal							
1986			12.36	91%	Normal	18.25	13.83		96%	Normal							
1987			8.84	65%	Dry	11.33	10.66		66%	Dry							
1988			12.10	89%	Below Normal	16.96	13.69		92%	Normal							
1989			9.20	67%	Dry	12.80	10.60	13.67	74%	Dry							
1990			7.40	54%	Dry	1.50	10.19	13.77	51%	Dry				10.99		72%	Dry
1991			15.38	113%	Above Normal	19.90	16.48	23.43	120%	Above Normal							
1992			14.88	109%	Normal	20.23	16.80	24.42	123%	Above Normal							
1993			28.18	206%	Wet	35.95	32.37	45.23	227%	Wet							

DRAFT Appendix 2-A. Annual Precipitation and Water Year-Type at San Bernardino County Flood Control District Climate Stations in the Yucaipa Subbasin

Water Year Ending	Western Heights					Calimesa					Crafton			Wilson Creek			
	2915 (2235')	3099 (2140')	3356 (2125')	% of Mean	Water Year Type	3126A (2813')	3132 (2710')	3386 (2620')	% of Mean	Water Year Type	2890 (2606')	% of Mean	Water Year Type	3126 (2815')	3128B (2860')	% of Mean	Water Year Type
1994			11.26	82%	Below Normal	12.95	11.35	15.80	80%	Below Normal							
1995			27.22	199%	Wet	31.84	28.54	38.36	197%	Wet							
1996			9.13	67%	Dry	12.12	10.19	14.06	73%	Dry	6.12	55%	Dry				
1997			16.67	122%	Above Normal	20.13	16.93	19.81	114%	Above Normal	13.12	118%	Above Normal				
1998			25.55	187%	Wet	32.10	28.60	33.27	188%	Wet	21.04	189%	Wet				
1999			7.29	53%	Dry	11.02	9.87	8.66	59%	Dry	9.20	83%	Below Normal				
2000			6.40	47%	Critically Dry	12.42	9.63	2.45	49%	Critically Dry	7.12	64%	Dry				
2001			10.49	77%	Below Normal	5.11	9.65	1.61	33%	Critically Dry	4.56	41%	Critically Dry				
2002			2.46	18%	Critically Dry	5.26	5.27	5.18	31%	Critically Dry	3.32	30%	Critically Dry				
2003			17.57	129%	Above Normal	21.32	19.50	16.92	115%	Above Normal	13.76	123%	Above Normal				
2004			9.47	69%	Dry	9.50	11.10	6.61	54%	Dry	9.16	82%	Below Normal				
2005	29.04		31.39	221%	Wet	41.67	32.73	31.70	212%	Wet	17.80	160%	Wet				
2006	9.08		11.45	75%	Below Normal		12.52	12.89	76%	Below Normal	10.92	98%	Normal				
2007	4.48		3.34	29%	Critically Dry	6.42	5.53		36%	Critically Dry	5.53	50%	Critically Dry				
2008	11.64		13.34	91%	Normal	17.94	14.79		98%	Normal	12.20	109%	Normal				
2009	8.80		9.90	68%	Dry	14.08	10.47		74%	Dry	13.04	117%	Above Normal				
2010	15.45		17.80	122%	Above Normal	16.40	17.68		102%	Normal	15.49	139%	Above Normal				
2011	14.35		24.52	142%	Above Normal	27.90	22.74		152%	Wet	20.91	188%	Wet				
2012	8.73		9.57	67%	Dry	10.85	10.80		65%	Dry	9.37	84%	Below Normal				
2013	9.96		9.69	72%	Dry	10.06	9.60		59%	Dry	10.36	93%	Normal				
2014	15.00		6.55	79%	Below Normal	7.55	7.58		45%	Critically Dry	6.92	62%	Dry				
2015	10.88		13.06	88%	Below Normal	14.78	12.39		81%	Below Normal	12.72	114%	Above Normal				
2016	9.64		10.56	74%	Dry	12.71	10.31		69%	Dry	10.42	93%	Normal				
2017	17.76		19.12	135%	Above Normal	21.49	18.38		120%	Above Normal	16.94	152%	Wet				
2018	6.08		6.27	45%	Critically Dry	7.52	6.48		42%	Critically Dry	6.44	58%	Dry				
AVERAGE			**13.65**					**16.68**			**11.15**				**15.31**		

DRAFT Appendix 2-A. Annual Precipitation and Water Year-Type at San Bernardino County Flood Control District Climate Stations in the Yucaipa Subbasin

Water Year Ending	Gateway				Live Oak					Triple Falls Creek			Oak Glen			
	3129 (2660')	3129A (2660')	% of Mean	Water Year Type	3239 (2080')	3239A (2281')	3023 (1285')	% of Mean	Water Year Type	3015 (4680')	% of Mean	Water Year Type	3121 (3695')	2800 (2946')	% of Mean	Water Year Type
1953	12.71		84%	Below Normal						10.52	43%	Critically Dry				
1954	16.54		110%	Normal						20.04	82%	Below Normal				
1955	12.74		84%	Below Normal						21.89	89%	Below Normal				
1956	10.82		72%	Dry						18.60	76%	Below Normal				
1957	14.34		95%	Normal						19.04	78%	Below Normal				
1958	28.13		186%	Wet						43.92	179%	Wet				
1959	7.57		50%	Dry						13.85	57%	Dry				
1960	13.17		87%	Below Normal						20.88	85%	Below Normal				
1961	5.48		36%	Critically Dry						11.33	46%	Critically Dry				
1962	20.06		133%	Above Normal						27.10	111%	Above Normal				
1963	10.31		68%	Dry						17.48	71%	Dry				
1964	11.41		76%	Below Normal			7.66	66%	Dry	21.71	89%	Below Normal				
1965	14.92		99%	Normal	10.60		9.59	86%	Below Normal	22.47	92%	Normal				
1966	19.14		127%	Above Normal	13.34		13.47	115%	Above Normal	31.05	127%	Above Normal				
1967	23.80		158%	Wet	17.11		17.52	148%	Above Normal	40.75	166%	Wet				
1968	15.77		105%	Normal	9.72		9.71	83%	Below Normal	20.20	82%	Below Normal				
1969	28.50		189%	Wet	24.72		24.30	210%	Wet	49.90	204%	Wet				
1970	9.51		63%	Dry	7.59		7.42	64%	Dry	17.15	70%	Dry				
1971	12.19		81%	Below Normal	8.99		9.05	77%	Below Normal	19.16	78%	Below Normal				
1972	8.04		53%	Dry	5.98		5.67	50%	Critically Dry	14.33	58%	Dry				
1973	18.16		120%	Above Normal	14.96		14.76	127%	Above Normal	33.31	136%	Above Normal				
1974	11.41		76%	Below Normal	11.27		10.28	92%	Normal	20.54	84%	Below Normal				
1975	16.84		112%	Above Normal	10.36		9.29	84%	Below Normal	22.73	93%	Normal				
1976	17.44		116%	Above Normal	13.17		12.15	108%	Normal	26.73	109%	Normal				
1977	13.31		88%	Below Normal	11.73		9.74	92%	Normal	20.81	85%	Below Normal				
1978	32.91		218%	Wet	24.46		21.67	197%	Wet	52.09	213%	Wet				
1979	20.40		135%	Above Normal	18.67		16.77	152%	Wet	33.77	138%	Above Normal				
1980		19.28	128%	Above Normal	22.14		22.90	193%	Wet	46.38	189%	Wet				
1981		9.43	62%	Dry	7.41		6.89	61%	Dry	14.90	61%	Dry	14.68		81%	Below Normal
1982		19.21	127%	Above Normal	14.90		14.46	126%	Above Normal	33.37	136%	Above Normal	28.00		154%	Wet
1983		31.48	209%	Wet	25.39		24.16	212%	Wet	50.38	206%	Wet	42.51		234%	Wet
1984		9.56	63%	Dry	5.97		4.99	47%	Critically Dry	18.80	77%	Below Normal	15.90		88%	Below Normal
1985		13.70	91%	Normal	9.02		8.72	76%	Below Normal	22.02	90%	Below Normal	20.70		114%	Above Normal
1986		15.33	102%	Normal	11.24		9.25	88%	Below Normal	26.00	106%	Normal	19.00		105%	Normal
1987		12.52	83%	Below Normal	7.90		7.79	67%	Dry	19.29	79%	Below Normal	5.75		32%	Critically Dry
1988		14.04	93%	Normal	12.49		11.18	101%	Normal	21.46	88%	Below Normal	10.07		55%	Dry
1989		10.76	71%	Dry	9.38		8.08	75%	Dry	17.82	73%	Dry	16.40		90%	Normal
1990		9.71	64%	Dry	7.19		7.21	62%	Dry	17.71	72%	Dry	15.80		87%	Below Normal
1991		17.52	116%	Above Normal	13.95		13.34	117%	Above Normal	26.92	110%	Normal	26.55		146%	Above Normal
1992		19.37	128%	Above Normal	14.58		14.96	126%	Above Normal	30.78	126%	Above Normal	27.72		153%	Wet
1993		34.60	229%	Wet	26.96		25.57	225%	Wet	57.96	237%	Wet	47.23		260%	Wet

DRAFT Appendix 2-A. Annual Precipitation and Water Year-Type at San Bernardino County Flood Control District Climate Stations in the Yucaipa Subbasin

Water Year Ending	Gateway				Live Oak					Triple Falls Creek			Oak Glen			
	3129 (2660')	3129A (2660')	% of Mean	Water Year Type	3239 (2080')	3239A (2281')	3023 (1285')	% of Mean	Water Year Type	3015 (4680')	% of Mean	Water Year Type	3121 (3695')	2800 (2946')	% of Mean	Water Year Type
1994		10.00	66%	Dry	11.90		10.06	94%	Normal	18.76	77%	Below Normal	18.19		100%	Normal
1995		14.70	97%	Normal	15.76		20.49	155%	Wet	57.92	236%	Wet	46.83		258%	Wet
1996		10.89	72%	Dry	0.65		8.08	37%	Critically Dry	20.04	82%	Below Normal	16.40		90%	Normal
1997		16.06	106%	Normal	9.03		10.77	85%	Below Normal	30.39	124%	Above Normal	22.92		126%	Above Normal
1998		24.70	164%	Wet	17.22		22.29	169%	Wet	49.46	202%	Wet	44.58		246%	Wet
1999		7.63	51%	Dry	6.30		6.46	55%	Dry	11.32	46%	Critically Dry	14.61	6.76	59%	Dry
2000		11.10	74%	Dry	5.68		7.41	56%	Dry	17.12	70%	Dry	14.64	12.20	74%	Dry
2001		9.92	66%	Dry	9.96		10.38	87%	Below Normal	11.24	46%	Critically Dry	17.23	12.12	81%	Below Normal
2002		5.66	38%	Critically Dry	3.97		3.35	31%	Critically Dry	6.72	27%	Critically Dry	8.60	4.52	36%	Critically Dry
2003		19.47	129%	Above Normal	16.45		12.18	122%	Above Normal	14.28	58%	Dry	29.20	14.36	120%	Above Normal
2004		11.84	78%	Below Normal	11.58		9.16	89%	Below Normal	18.39	75%	Below Normal	9.57	10.08	54%	Dry
2005		32.70	217%	Wet			24.43	209%	Wet	34.14	139%	Above Normal		38.28	211%	Wet
2006		13.14	87%	Below Normal		10.30	9.52	85%	Below Normal	22.58	92%	Normal		13.72	76%	Below Normal
2007		6.56	43%	Critically Dry		4.13	3.31	32%	Critically Dry	9.71	40%	Critically Dry		5.48	30%	Critically Dry
2008		14.67	97%	Normal		11.93	9.46	91%	Normal	27.54	112%	Above Normal		16.20	89%	Below Normal
2009		12.11	80%	Below Normal		11.35	8.91	87%	Below Normal	18.11	74%	Dry		11.52	63%	Dry
2010		18.79	125%	Above Normal		17.25	15.12	138%	Above Normal	29.72	121%	Above Normal		18.15	100%	Normal
2011		25.09	166%	Wet		22.33	17.38	170%	Wet	36.82	150%	Wet		24.96	138%	Above Normal
2012		11.80	78%	Below Normal		8.84	4.34	56%	Dry	15.13	62%	Dry		11.68	64%	Dry
2013		5.25	35%	Critically Dry		8.82	1.54	44%	Critically Dry	15.69	64%	Dry		9.56	53%	Dry
2014		4.45	29%	Critically Dry		6.92	2.08	38%	Critically Dry	14.07	57%	Dry		7.80	43%	Critically Dry
2015		12.49	83%	Below Normal		10.37	2.72	56%	Dry	20.54	84%	Below Normal		11.56	64%	Dry
2016		11.11	74%	Dry		8.61	1.70	44%	Critically Dry	18.80	77%	Below Normal		11.51	63%	Dry
2017		17.18	114%	Above Normal		16.90	14.42	134%	Above Normal	16.04	65%	Dry		17.56	97%	Normal
2018		6.47	43%	Critically Dry		5.53	5.43	47%	Critically Dry	7.44	30%	Critically Dry		7.36	41%	Critically Dry
AVERAGE		**15.09**				**11.69**				**24.50**				**18.15**		

Water Year Ending	Basin Wide		
	% of Mean	Avg. Rainfall (inches)	Water Year Type
1953	62%	11.24	Dry
1954	103%	17.36	Normal
1955	88%	14.09	Below Normal
1956	74%	11.51	Dry
1957	87%	14.07	Below Normal
1958	178%	26.82	Wet
1959	56%	8.43	Dry
1960	92%	14.11	Normal
1961	41%	5.92	Critically Dry
1962	121%	18.59	Above Normal
1963	86%	13.51	Below Normal
1964	78%	10.90	Below Normal
1965	91%	12.39	Normal
1966	122%	16.93	Above Normal
1967	165%	22.94	Wet
1968	96%	13.79	Normal
1969	207%	30.04	Wet
1970	64%	9.04	Dry
1971	78%	11.29	Below Normal
1972	52%	7.24	Dry
1973	127%	18.16	Above Normal
1974	81%	11.66	Below Normal
1975	98%	14.06	Normal
1976	105%	15.00	Normal
1977	87%	12.47	Below Normal
1978	206%	29.36	Wet
1979	143%	21.15	Above Normal
1980	167%	23.99	Wet
1981	64%	9.70	Dry
1982	130%	18.98	Above Normal
1983	213%	31.75	Wet
1984	64%	8.96	Dry
1985	88%	12.76	Below Normal
1986	98%	14.18	Normal
1987	65%	9.26	Dry
1988	86%	12.93	Below Normal
1989	75%	11.36	Below Normal
1990	66%	9.31	Dry
1991	120%	18.32	Above Normal
1992	127%	19.12	Above Normal
1993	231%	34.51	Wet

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Water Year Ending	Basin Wide		
	% of Mean	Avg. Rainfall (inches)	Water Year Type
1994	83%	12.69	Below Normal
1995	191%	27.97	Wet
1996	68%	9.74	Dry
1997	114%	16.16	Above Normal
1998	192%	27.71	Wet
1999	58%	8.78	Dry
2000	62%	8.91	Dry
2001	61%	9.10	Dry
2002	30%	4.76	Critically Dry
2003	114%	18.07	Above Normal
2004	72%	9.81	Dry
2005	196%	31.08	Wet
2006	84%	11.50	Below Normal
2007	37%	4.98	Critically Dry
2008	98%	13.57	Normal
2009	80%	11.13	Below Normal
2010	121%	16.90	Above Normal
2011	158%	22.24	Wet
2012	68%	9.55	Dry
2013	60%	8.32	Dry
2014	51%	7.21	Dry
2015	81%	11.22	Below Normal
2016	71%	9.62	Dry
2017	117%	17.75	Above Normal
2018	44%	6.40	Critically Dry
AVERAGE		**15.86**	= weighted average

Appendix 2-B

Information from CalGEM

DIVISION OF OIL, GAS, AND GEOTHERMAL RESOURCES

CHECK LIST – WellStats ORPHAN WELL ENTRY PROJECT

API# 071-00041 **Well Name/#** 1 **Operator** ~~[illegible]~~

Colan Development Corp. Ltd.

PDOX	**Entry Date -** July and August 2003	**Initials -** Dave Curtis
WellStats	**Entry Date -** 5/10/05	**Initials -** CO
Map and Map Work	**Entry Date -** 5/26/2005 **Map #** W1-7	**Initials -** JH

- **Return Files(s) to Christina when Mapping is complete.**

(01745)

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL AND GAS
SIXTH FLOOR
629 SOUTH HILL STREET
LOS ANGELES, CALIFORNIA

LOS ANGELES, CALIF. MAY 2 630 PM 1933 ARCADE STA.

~~112 W. 4th~~

Colan Development Corp. Ltd.,

~~317 I. W. Hellman~~ Bldg.,

~~Los Angeles~~, Cal.

~~Attention Mr. Bert [illegible] Colan~~

~~General~~ Manager.

~~8346 [illegible]~~

Beverly Hills, Cal.

TURN
WRIT
CLAIMED

LOS ANGELES MAY 25 1933 CALIF.

Los Angeles, Calif.

REASON FOR NON-DELIVERY CHECKED

Moved-No Address ...... Refused
Unknown at Address ......
No Such Number ...... Deceased
Firm Dissolved-No Order ......
Carrier's Initials ...... Route No. ......

BEVERLY HILLS, CALIF. MAY 4 PM 1933

629 South Hill Street
Los Angeles, California
May 2, 1933.

Colan Development Corp. Ltd.,
317 I. W. Hellman Building,
Los Angeles, Cal.

Attention Mr. Bert N. Colan,
General Manager.

Gentlemen:

Your attention is directed to the fact that this Division has not received log, history and core record covering operations at your well No. 1, Sec. 25, T. 1 S., R. 2 W., San Bernardino County.

Please file these records in duplicate on the enclosed forms as soon as possible.

Yours truly,

Deputy Supervisor.

CLB:EMS

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL AND GAS

R. D. BUSH
STATE OIL AND GAS SUPERVISOR
E. HUGUENIN, DEPUTY

629 South Hill Street
Los Angeles, California
May 2, 1933.

Colan Development Corp. Ltd.,
317 I. W. Hellman Building,
Los Angeles, Cal.

Attention Mr. Bert N. Colan,
General Manager.

Gentlemen:

Your attention is directed to the fact that this Division has not received log, history and core record covering operations at your well No. 1, Sec. 25, T. 1 S., R. 2 W., San Bernardino County.

Please file these records in duplicate on the enclosed forms as soon as possible.

Yours truly,

E. Huguenin

Deputy Supervisor.

FORM 100. 73066 12-29 20M
CALIFORNIA STATE PRINTING OFFICE

SUBMIT LOG IN DUPLICATE
FILL THIS BLANK IN WITH TYPEWRITER. WRITE ON ONE SIDE OF PAPER ONLY

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES

DIVISION OF OIL AND GAS

DIVISION OF OIL AND GAS
RECEIVED
FEB 9 1932
LOS ANGELES, CALIFORNIA

LOG OF OIL OR GAS WELL

FIELD Yucaipa Valley San Bernadino Cty COMPANY Colan Development Corp Lt

Sec. 25, T. ____, R. 2, 1 South S.B. B. & M., Elevation 2700 ft Well No. 1.

In compliance with the provisions of Chapter 718, Statutes of 1915, as amended, the information given herewith is a complete and correct record of the present condition of the well and all work done thereon, so far as can be determined from all available records.

Signed Bert Y Colan

Date February 8th, 1932. Title Pres.
(President, Secretary or Agent)

The summary on this page is for the ORIGINAL condition of the well

OIL SANDS

1st sand from 2163 to 2165. 4th sand from ____ to ____
2d sand from ____ to ____ 5th sand from ____ to ____
3d sand from ____ to ____ 6th sand from ____ to ____

IMPORTANT WATER SANDS

1st sand from 340 to 390 3d sand from ____ to ____
2d sand from ____ to ____ 4th sand from ____ to ____

CASING RECORD

Size of Casing	Where Landed	Where Cut	Weight Per Foot	Threads Per Inch	Kind of Shoe	Make of Casing	Cemented Yes	Cemented No	Number of Sacks
11 $\frac{3}{4}$"	85 ft	-	60 lbs	10	-	Standard	Yes	-	30.

CEMENTING OR OTHER SHUT-OFF RECORD

Casing, Size	Sacks	Time Set	Method	Test and Result (Give water level and bailing results)

PLUGS AND ADAPTERS

Heaving Plug—Material ____ Length ____ Where set ____
Adapters —Material ____ Size ____

TOOLS

Rotary Tools were used from nil- ft. to 2168. ft.
Cable Tools were used from ____ ft. to ____ ft.

PERFORATIONS

State clearly whether a machine was used or casing was drilled in shop

From	To	Size of Holes	Number of Rows	Holes Per Foot	Machine—Shop
ft.	ft.				
ft.	ft.				
ft.	ft.				
ft.	ft.				
ft.	ft.				

Thirty days after completion well produced ____ barrels of oil per day.

The gravity of oil was ____ degrees Baumé. Water in oil amounted to ____ per cent.

NAMES OF DRILLERS	NAMES OF TOOL DRESSERS
H.K.Weber.	
J.S.Page.	
Frank Dunn.	

Date drilling started June 1931. Date well was completed ____

FORMATIONS PENETRATED BY WELL

Depth to Top of Formation	Depth to Bottom of Formation	Thickness	Name of Formation

FORM 103. 78346 7-30 10M
CALIFORNIA STATE PRINTING OFFICE

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES

DIVISION OF OIL AND GAS

DIVISION OF OIL AND GAS
RECEIVED
FEB 9 - 1932
LOS ANGELES, CALIFORNIA

History of Oil or Gas Well

FIELD YUCAIPA VALLEY, San Bernadino County COMPANY Colan Development Corp Ltd,

Sec. 25, T. ______, R. Two 1 South S.B.B. & M., Well No. 1.

Signed Bert M Colan

Date February 8th 1932. Title Pres.
President, Secretary or Agent

It is of the greatest importance to have a complete history of the well. Please state in detail the dates of redrilling, together with the reason for the work and its results. If there were any changes made in the casing, state fully, and if any casing was "sidetracked" or left in the well, give its size and location. If the well has been dynamited, give date, size, position, and number of shots. If plugs or bridges were put in to test for water, state kind of material used, position, and results of pumping or bailing.

We took over the above mentioned well about June 1931, and cemented 85 feet of 11¾ surface casing with a 11¾ G.P. Blow out preventor attached at top. The bottom of hole at that time was approx 1980 feet with 375 feet of 3" drill pipe and bit at bottom, We cemented hole at approx 1450 ft and set 6-5/8" Whipstock and commenced drilling from that point, at 1975 ft set another Whipstock to sidetrack more junk at bottom, commenced drilling again to 2125 ft where we twisted off drill, pipe, leaving appox 100 ft drill pipe with collar and hughes bit, tried to fish out same but top of fish buried itself in a cavity , cemented up fish with 65 sacks of cement and started sidetracking, passed up fish and bottom of hole is now 2168 ft,.

Hard formation all the way with a few softer streaks of conglomerate, black lime, and brown shale hard shells and rock caps of country rock, considerable gas showings at 1750 ft and at intervals down to bottom of hole, had to carry very heavy mud at all times to hold down gas pressure, considerable trouble was incountered going in and out of hole from bridgeing omer at the various gas stratas, the hole was drilled with 9½" to 300 ft, and 7-5/8" Hughes Rock bit to bottom.

FORM 101-A. 82953 2-31 20M
CALIFORNIA STATE PRINTING OFFICE

SUBMIT IN DUPLICATE
FILL THIS BLANK IN WITH TYPEWRITER. WRITE ON ONE SIDE OF PAPER ONLY

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES

DIVISION OF OIL AND GAS

CORE RECORD OF OIL OR GAS WELL

DIVISION OF OIL AND GAS
RECEIVED
FEB 9 - 1932
LOS ANGELES, CALIFORNIA

FIELD Yucaipa Valley COMPANY Colan Development Corp Ltd.

Sec. 25, T. , R2, 1 South S.B. & M., Elevation 2700 Well No. 1.

In compliance with the provisions of Section 18, Chapter 718, Statutes of 1915, as amended, the information given herewith is a complete and correct record of all cores taken in this well to the depth on the accompanying log.

Signed Bert N Colan

Date February 8th 1932. Title Pres
(President, Secretary or Agent)

DATE	MAKE OF BARREL	SIZE OF BARREL	FROM (DEPTH)	TO (DEPTH)	CORE RECOVERED	DESCRIPTION OF CORE	ETHER TEST	CONDITION OF CORE
1931.								
10-25	Hughes	5-5/8	2001	2005	2 ft	Hard bn shale, blk lime, rock		broken
10-30	"	"	2028	2031	1½ "	Brown shale, lime, country rock		
11-23	"	"	2077	2079	1 "	Greenish schist, Hard rk,		
12-19	"	"	2112	2115	1 "	Brown & Gray shale, & schist		
1932								
1-22	"	"	2147	2149	1¾ "	Hard formation, black lime,		
2-5	"	"	2158	2161	2 "	Brown Shale, streak oil sand,	slight cut	
2-6	"	"	2161	2164	2½ "	" " black hard formation		

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DIVISION OF OIL AND GAS
RECEIVED
NOV 21 1931
LOS ANGELES, CALIFORNIA

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL AND GAS
FERRY BUILDING

R. D. BUSH
STATE OIL AND GAS SUPERVISOR

SAN FRANCISCO

November 20, 1931.

Mr. E. Huguenin,
Deputy Supervisor,
Los Angeles, Cal.

Dear Sir:

Mail addressed to

San Bernardino Co.

J. E. Grey, Agent,
Colan Development Corp., Ltd.,
Yucaipa, Cal.

has been returned by the post office with the notation "Moved, left no address".

Shall I request another appointment?

Yours truly,

R. D. Bush

State Oil and Gas Supervisor.

629 South Hill Street
Los Angeles, California
July 17, 1931.

Mr. R. D. Bush,
State Oil and Gas Supervisor,
San Francisco, California.

Dear Sir:

I am informed that Yucaipa Oil Company, Ltd., well No. 1, Sec. 25, T. 1 S., R. 2 W., S. B. B. & M., San Bernardino County, was transferred to Fred Gray on February 1, 1931. On April 22, 1931, the well was transferred to Mr. F. H. Bowers and on May 15, 1931, the well was transferred to Colan Development Corporation, Ltd.

This information was contained in a letter dated July 9, 1931, from Colan Development Corporation, and a letter dated June 23, 1931, from Fred H. Gray, and confirmed in a conversation with Mr. Bowers and Mr. Bert Colan. Our records have been changed accordingly.

Request for the designation of agent should be addressed to Colan Development Corporation, Ltd., 317 I. W. Hellman Building, Los Angeles, Cal.

Yours truly,

EHart

Deputy Supervisor.

Corrections Made as Follows	CLB	EHS By Whom
Weekly Summaries		
121		B
Elev. and Loc. Cards		
Production Records	✓	emd
Well Records { Folders		
Well Records { Reports		
Peg Models		off
Graphics		
Field Maps	Topog sheet-66	

bmd

B
MMJ
7.20.31.

D. Leslie Lord, Sec'y-Treas.
Thos. L. Colangelo, Vice-Pres.

Field Address
DIVISION OF OIL AND GAS
RECEIVED
JUL 10 1931
LOS ANGELES, CALIFORNIA

COLAN DEVELOPMENT CORPORATION, Ltd.

BERT N. COLAN, Gen'l Mgr.

317 I. W. Hellman Bldg.

LOS ANGELES, CALIF.

July 9th, 1931.

Division of Oil & Gas
of the State of California
629 South Hill Street
Los Angeles California

Gentlemen:

In response to your request this will advise you that on May 15th, 1931, the Colan Development Corporation succeeded to the rights of F. H. Bowers on lease covering ground upon which an oil well was formerly attempted by Fred Gray, on a portion of Section 25 Twp. 1 S. Range 2 West SBM at Yucaipa California.

On account of steel which was twisted off at the -time, the Colan Development Corporation was obliged to offset and drill an entirely new hole which is now at a depth of approximately 1950 feet, and is at present encountering very hard formation, and the drilling is very slow.

The company contempletes drilling to a depth of 2500 feet at which depth it has been estimated by geologists, oil should be encountered in commercial quantities.

Trusting this information meets with your request and assuring you of our co-operation, we are

BLC/ B

Very truly yours,

Colan Development Corporation

By Bert N Colan

Transf. from Fred Gray to F. H. Bowerss
April 22, 1931
Transf. from Yucaipa to Fred Gray on Feb. 1, 1931

DIVISION OF OIL AND GAS
RECEIVED
JUN 26 1931
LOS ANGELES, CALIFORNIA

June 23 1931.

E.Huguenin Esq;

Div.of Oil and Gas;

State of California;

Dear Sir;

We would like to inform you that the well in Sec.25 T.Township/1 S. Rge 2 w.S.B.B.& M San Bernardino County,is now being drilled by Colin Development Co.whose office is 314 I.W.Hellman bldg Los Angeles.

They will be glad to comply with any requests you may make re information that the law requires of them.

Yours Respectfully,

Fred H. Gray.

Fred H.Gray.

234 E.Laurel

Compton Calif.

FORM 100. 73066 12-29 20M CALIFORNIA STATE PRINTING OFFICE

Colan Development Corp. Ltd. #1

SUBMIT LOG IN DUPLICATE

FILL THIS BLANK IN WITH TYPEWRITER. WRITE ON ONE SIDE OF PAPER ONLY

DIVISION OF OIL AND GAS RECEIVED JAN 13 1931 LOS ANGELES, CALIFORNIA

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES

DIVISION OF OIL AND GAS

LOG OF OIL OR GAS WELL

FIELD (Yucaipa) San Bernardino County COMPANY Yucaipa Oil Co. Ltd Fred H. Gray

Sec. 25, T. 1 S, R. 2 West San Bernardino B. & M., Elevation 2500 Well No. 1

In compliance with the provisions of Chapter 718, Statutes of 1915, as amended, the information given herewith is a complete and correct record of the present condition of the well and all work done thereon, so far as can be determined from all available records.

Signed Fred H Gray

Date Jan. 6. 1931

Title Operator (President, Secretary or Agent)

Reference to file of dis

Map	Map Book	Section	Cards	Forms 114	Forms 121

The summary on this page is for the ORIGINAL condition of the well

OIL SANDS

1st sand from .... to .... 4th sand from None .... to ....
2d sand from .... to .... 5th sand from .... to ....
3d sand from .... to .... 6th sand from .... to ....

IMPORTANT WATER SANDS

1st sand from .... to .... 3d sand from .... to ....
2d sand from .... to .... 4th sand from .... to ....

CASING RECORD

Size of Casing	Where Landed	Where Cut	Weight Per Foot	Threads Per Inch	Kind of Shoe	Make of Casing	Cemented Yes	Cemented No	Number of Sacks
No Casing Set									

CEMENTING OR OTHER SHUT-OFF RECORD

Casing, Size	Sacks	Time Set	Method	Test and Result (Give water level and bailing results)
				None

PLUGS AND ADAPTERS

Heaving Plug—Material None Length .... Where set ....

Adapters —Material " Size ....

TOOLS

Rotary Tools were used from 0 ft. to 2000 ft.

Cable Tools were used from None ft. to .... ft.

PERFORATIONS

State clearly whether a machine was used or casing was drilled in shop

From	To	Size of Holes	Number of Rows	Holes Per Foot	Machine—Shop
ft.	ft.	None			
ft.	ft.				
ft.	ft.				
ft.	ft.				
ft.	ft.				

Thirty days after completion well produced .... barrels of oil per day.

The gravity of oil was .... degrees Baumé. Water in oil amounted to .... per cent.

NAMES OF DRILLERS

H. W. Weaver
J. Galantine
H. T. Jones

NAMES OF TOOL DRESSERS

Date drilling started Oct. 4. 1928

Date well was completed ....

FORMATIONS PENETRATED BY WELL

Depth To Top of Formation	Depth To Bottom of Formation	Thickness	Name of Formation

FORM 103. 73340 7-30 10M
CALIFORNIA STATE PRINTING OFFICE

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES

DIVISION OF OIL AND GAS

History of Oil or Gas Well

FIELD SAN BERNARDINO COUNTY COMPANY Yucaipa Oil Co. Ltd

Sec. 25, T. 1 So., R. 2 W., S. B. B. & M., Well No. One (1)

Signed Fred H Gray

Date December 30-19-30 Title

President, Secretary or Agent

It is of the greatest importance to have a complete history of the well. Please state in detail the dates of redrilling, together with the reason for the work and its results. If there were any changes made in the casing, state fully, and if any casing was "sidetracked" or left in the well, give its size and location. If the well has been dynamited, give date, size, position, and number of shots. If plugs or bridges were put in to test for water, state kind of material used, position, and results of pumping ~~or bailing~~.

Maps	Model	Cross Section	Cards	114	

Hole shot at 1340 feet. ~~Steel in the~~ hole. Unknown.
100 lbs. of 80% Gelatine.
Hole shot at 1576 feet. Rotary disc lost in hole. Tried to break disc to pieces. Failed.
100 lbs. of 80% Gelatine used.

Hole shot second time at 1576 to break up disc bit.
100 lbs. of 80% Gelatine and 15 quarts of nitro-glycerin. 30 ft. combination shot. Broke up disc bit and fished same out of hole.

Hole shot 1926 feet. Boulder riding bit, shot same out of way.
200 lbs. of 80% Gelatine.
78 feet of 3" drill pipe and drill collar were side-tracked at 1839 to 1927. Never touched same while side-tracking.

String of 3" Drill Pipe Froze 60 ft. off bottom - Backed out all but 360 ft. which is in Hole at present time.

90

DIVISION OF OIL AND GAS
RECEIVED
JAN 3 - 1931
LOS ANGELES, CALIFORNIA

LOG OF THE GRAY WELL NO. 1

Section 25, Township 1 S, R 2 W.
San Bernardino B and M.

0 to 18 ft.	Surface soil	748-753 ft.	Gray sand, streaks of lime
18 - 35	Conglomerate		
35 - 52	Sand stone	753-758	Tough shale
52 - 56	Hard Sand	758-763	Conglomerate
56 - 70	Conglomerate	763-767	Lime
70 - 90	Gray sand	767-775	Conglomerate
90 - 106	Gravel & Boulders	775-776	Shell
106- 129	Red clay	776-784	Hard sand, gas at this depth
129- 159	Sand Gravel		
159- 188	Blue shale	784-791	Conglomerate
188- 237	Sand & Boulders	791-798	Tough shale
237- 324	Hard sand	798-806	Conglomerate
324- 329	Sand & Gravel	806-815	Sandy shale
329- 333	Hard sand	815-820	Hard sandy shale
333- 348	Sandy shale	Gas blow plugged drill collar 11 ft. while making con.	
348- 378	Sand & Boulders		
378- 397	Hard sand	820-830	Hard sand, streaks of lime
397- 430	Conglomerate		
430- 465	Sand shale	830-839	Sandy shale, gas showing
465- 473	Hard shale		
473- 505	Sticky shale	839-840	Shell
505- 536	Conglomerate	840-849	Sticky shale, streaks of sand
536- 551	Sand shale		
551- 552	Shell	849-859	Conglomerate
552- 576	Conglomerate	859-860	Shell
576- 577	Shell	860-864	Hard sand
577- 580	Sand	864-868	Conglomerate
580- 581	Shell	868-874	Lime
581- 585	Hard sand	874-877	Tough Shale
585- 586	Shell	877-879	Shell
586- 591	Conglomerate	879-890	Conglomerate
591- 596	Tough shale	890-904	Shale
596- 600	Hard sand	904-921	Sandy shale
600- 611	Conglomerate	921-922	Shell
611- 612	Shell	922-929	Hard sand
612- 615	Sandy shale	929-938	Sandy shale
615- 620	Brown shale	938-944	Conglomerate
620- 623	Gas sand	944-951	Hard sand
623- 633	Tough shale	951-953	Shell
633- 636	Sandy shale	953-960	Conglomerate
636- 638	Shell	960-961	Shell
638- 645	Hard sand shale	961-965	Tough shale
645- 650	Conglomerate	965-966	Shell
650- 654	Lime	966-978-	Conglomerate
654- 664	Tough shale	978-983	Sticky shale
664- 678	Sandy shale	983-984	Shell
678- 682	Hard sand	984-986	Conglomerate
682- 683	Shell	986-992	Gray sand
683- 695	Lime	992-1004	Hard sand
695- 699	Tough shale	1004-1007	Blue shale, streaks of lime
699- 709	Hard sand		
709- 712	Shell	1007-1010	Sand streaked with lime
712- 718	Conglomerate		
718- 726	Sandy shale	1010-1014	Shell with lime
726- 730	Hard sand, Lime Streaks	1014-1018	Hard lime
730- 748	Sand shale	1018-1028	Conglomerate

85

1028-1038 ft.	Sandy shale
1038-1050	Conglomerate
1050-1053	Shell
1053-1060	Hard sandy shale
1060-1061	Shell
1061-1068	Conglomerate
1068-1080	Sandy shale
1080-1090	Hard sand
1090-1098	Conglomerate
1098-1100	Shell
1100-1112	Lime
1112-1113	Shell
1113-1127	Conglomerate
1127-1128	Shell
1128-1137	Lime conglomerate
1137-1139	Lime
1139-1157	Sandy shale
1157-1162	Hard sand
1162-1165	Hard sandy shale
1165-1178	Conglomerate
1178-1183	Hard sandy shale
1183-1191	Tough shale
1191-1192	Shell
1192-1204	Lime
1204-1208	Conglomerate
1208-1210	Tough shale
1210-1221	Conglomerate
1221-1231	Sandy shale,lime
1231-1238	Lime
1238-1243	Shale
1243-1258	Lime
1258-1261	Shale
1261-1304	Lime
1304-1311	Coring no recovery
1311-1340	Shell
1340-1341	Hard shell
1341-1349	Shell
1349-1350	Break in formation
1350-1366	Lime and sand
1366-1367	Break in formation
1367-1383	Lime
1383-1387	Shale with change
1387-1393	Blue shale
1393-1395	Sandy shale
1395-1396	Shell
1396-1400	Sand shale
1400-1401	Shell
1401-1408	Shell with break
1408-1409	Shale
1409-1434	Lime and streaks of shale
1434-1449	Lime conglomerate
1449-1468	Lime streaked with shale
1468-1501	Lime
1501-1528	Lime streaked shale
1528-1548	Lime
1548-1555	Blue shale
1555-1558	Hard sand
1558-1560	Lime
1560-1568 ft.	Blue shale
1568-1579	Hard sand, shale streaked
1579-1581	Lime and hard sand
1581-1582	Lime
1582-1585	Hard sand
1585-1588	Lime stone
1588-1589	Hard sand and lime
1589-1592	Lime
1592-1594	Lime, shale, some shells
1594-1602	Blue shale & lime
1602-1604	Hard sand
1604-1607	Brown shale
1607-1611	Hard sand, gray color with thin breaks
1611-1617	Hard sand, gas showing
1617-1618	Hard sand, marine shells
1618-1629	Brown shale
1629-1634	Shell
1634-1644	Hard & soft streaks
1644-1656	Hard shells with shale breaks
1656-1657	Break and soft
1657-1662	Hard sand shale, Streak brown sandy shale
1662-1678	Streaked thin shell
1678-1694	Hard sand
1694-1696	Soft break in formation
1696-1702	Blue shale
1702-1704	Lime & shells
1704-1715	Blue shale streaked hard sand, sticky shale.
1715-1730	Sticky Blue shale streaked hard sand
1730-1738	Blue shale
1738-1742	Shell
1742-1746	Lime streaked
1746-1750	Shell
1750-1767	Lime shale
1767-1792	Blue shale streaked with lime.
1792-1795	Hard gray sand with sofe breaks
1795-1806	Hard sand
1806-1823	Brown shale with hard sand streaks
1823-1828	Brown shale streaks with hard sand
1828-1838	Brown shale
1838-1844	Brown shale and layers of hard sand
1844-1855	Hard sand gray

1855-1860 ft.	Hard brown shale with thin shells
1865-1873	Shell
1873-1875	Hard gray sand - good gas pressure
1875-1878	Hard sand, gas showing in ditch
1878-1883	Hard sand - hard fine sand
1883-1886	Hard sand, sea shells, gas below shells
1886-1888	Hard sand, thin layers of B shale
1888-1891	Conglomerate - little gas
1891-1892	Shell
1892-1894	Lime streaks blue shale
1894-1902	Shell
1902-1903	Sea shells streaks green shale
1903-1904	Hard shell
1904-1905	Shell
1905-1906	Shell thin break. Good gas showing
1906-1909	Shell
1909-1911	Shell broke to oil sand Gas
1911-1913	Shell-Gas on ditch
1913-1915	Shell
1915-1916	Hard conglomerate-sea - shells
1916-1918	Conglomerate hard sand
1918-1923	Hard sand
1923-1924	Shell
1924-1926	Shale
1926-1929	Shell
1929-1935	Shell
1935-1937	Shell and hard sand
1937-1938	Shale
1938-1939$\frac{1}{2}$	Brown shale
1939$\frac{1}{2}$-1940	Shell
1940-1941	Shale to shell
1941-1943	Shell
1943-1949	Shell lime streaked brown shale
1949-1959	Lime streaked blue shale
1959-1963	Shell and shale
1963-1970	Shell
1970-1972	Break
1972-1975	Blue shale
1975-1976	Black Lime
1976-1982	Blue shale shells inter- mittent black lime
1982-1988	Shale and shells
1988-1991	Blue sand shale
1991-1992	Shell
1992-1997	Tough brown shale - good cut in this shale

611 New Orpheum Building
Los Angeles
December 30, 1930

Mr. R. D. Bush,
State Oil and Gas Supervisor,
San Francisco, Calif.

Dear Sir:

Fred H. Gray well No. 1, Sec. 25, T. 1 S., R. 2 W., San Bernardino County, was transferred to Yucaipa Oil Company, Limited, 519 Walter P. Story Building, Los Angeles, California, effective November 17, 1930. This information was contained in a letter received from Fred H. Gray dated December 19, 1930, and confirmed in a letter from Yucaipa Oil Company, Limited, dated December 26, 1930. We are, therefore, changing our records accordingly. Please request Yucaipa Oil Company, Limited, to appoint an agent.

Yours truly,

E J

Deputy Supervisor.

EH-GH

McHutt
Wallace Collins
John Sommer

Corrections Made as Follows	By Whom
Weekly Summaries	LB
131	
Elev. and Loc. Cards	
Production Reports ✓	Ems
Well Records { Folders / Reports ✓	alt
Peg Models	
Graphics ✓	E.J.K.
Field maps	

W.C. Book - E.J.K.
12/31/30

DIVISION OF OIL AND GAS
RECEIVED
DEC 30 1930
LOS ANGELES, CALIFORNIA

YUCAIPA OIL COMPANY LIMITED.
519 Walter P Story Building,
Los Angeles. Calif:
December 26th,1930.

E Huggenin Esq,
Division of Oil & Gas,
611 New Orpheum Building,
Los Angeles. Calif:

Dear Sir,

Replying to your letter of the 22nd Inst,re Gray Well.

This is being drilled by the Yucaipa Oil Company Limited, of which I am the General Manager, and was transferred to us on November 17th.

I have had the property surveyed, and will file a corrected location within the next few days.

We were compelled to sidetract a junked hole at 1400 feet, so will give your department a correct log from that depth.

All notices for the present will be received at the ~~abo~~ above address.

Yours very truly,

J. W. Somers

WGT/JHS.

Oct. 9,1928.

DIVISION OF MINES & MINING
RECEIVED
OCT 10 1928
Department of Petroleum and Gas
LOS ANGELES, CALIFORNIA

Division of Mines and Mining,
611 New Orpheum Bldg.,
Los Angeles,Calif.

Gentlemen:

Referring to your letter of Oct. 3rd, concerning the drilling operations on the Clyde Ranch in Section 25, Twp. I, S. R 2 W. S.B.B & M., I beg to advise you that I am assuming all the responsibility in connection with these operations and will be guided in my operations by the matters referred to in your communication of Sept. 21st, to my attorney John C.Miles.

Any further information I can furnish you from time to time I will be glad to do so. In the meantime,I remain

Yours very truly,

F H Gray
M

F.HG:M

611 New Orpheum Bldg.,
Los Angeles
September 13, 1928.

Mr. R. D. Bush,
State Oil and Gas Supervisor,
San Francisco, California.

Dear Sir:

The well carried in our records under the name of J. W. McPhearson well No. 1, Sec. 25, T. 1 S., R. 2 W., S.B.B.& M., San Bernardino County, was transferred on August 24, 1928 to Mr. Fred H. Gray whose address is Box 283, Compton, California.

This information was contained in a letter received from J. W. McPhearson dated September 10, 1928.

We are therefore changing our records accordingly. Please request Mr. Gray to appoint an agent.

Yours truly,

Deputy Supervisor.

EH-MC

Corrections Made as Follows		By Whom
Weekly Summaries		
121	✓	H
Elev. and Loc. Cards		
Production Reports		
Well Records	Folders ✓	Eraab
	Reports	
Peg Models		
Graphics	✓	
Field Maps	W.C. ✓	F.L.C.

W.C. B.K.
F.L.C.

FORM 111. 83572 8-27 5M
CALIFORNIA STATE PRINTING OFFICE

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES

DIVISION OF MINES AND MINING

PETROLEUM AND GAS

Report on Proposed Operations

No. P-1-16285

Los Angeles Cal. Oct. 25 1927

Mr. G. W. McPhearson

YUcaipa Cal.

Agent for W. McPHEARSON ~~Company~~ 1?

DEAR SIR: Should be J.

Your proposal to drill Well No. 1

Section 25, T. 1 S., R. 2 W., S.B. B. & M., -- Oil Field, San Bernardino County,

dated Oct. 7, 1927 received Oct. 21, 1927, has been examined in conjunction with records filed in this office.

Present conditions as shown by the records and the proposal are as follows:

THE NOTICE STATES:

"The well is 2800' N. and 700' W. from Southeast corner of Sec. 25.
The elevation of the derrick floor above sea level is 2600'.
We estimate that the first productive oil or gas sand should be encountered at a depth of about 500', more or less."

PROPOSAL:

"We propose to use the following strings of casing either cementing or landing them as here indicated:

Size of Casing Weight New or Second Hand Depth Landed or cemented

Casing program will depend upon formations encountered. Will core frequently.

It is understood that if changes in this plan become necessary we are to notify you before cementing or landing casing."

RECOMMENDATION:

This department has not sufficient data available upon which to base an estimate of the depth at which oil or gas bearing formations should be encountered in this vicinity, nor the depth at which a water shut-off should be effected.

The proposed drilling program is approved, however, subject to the recommendations that all possible steps shall be taken to determine the fluid content of porous formations encountered.

THIS DEPARTMENT MUST BE NOTIFIED AS FOLLOWS:

1. When a showing of oil or gas is encountered.
2. Before landing or cementing any casing.
3. To witness a bailing test of each possible water shut-off. Copies of our form 106 for this notification are enclosed herewith.

We would appreciate the filing of a memorandum log of the well with the notice of test of water shut-off.

cc--Company 5/17/28 McPhearson - Dead

T. D 400'. no casing; no important showings
McPhearson said he is living on lease and is in charge but that others associated with him are attempting to take possession without his consent. He does not claim ownership changed -11-28

R. D. BUSH,
State Oil and Gas Supervisor

By H. H. Gulliver Deputy

HVD:ML
J.S.

J. W.

FORM 105. 48484 2-26 10M

071-00041

CALIFORNIA STATE MINING BUREAU

DEPARTMENT OF PETROLEUM AND GAS

NOTICE OF INTENTION TO DRILL NEW WELL

This notice must be given before drilling begins

Colon Development Corp., Ltd. Yucaipa Cal. Oct 7 1927

Mr. E Haguenin

Deputy State Oil and Gas Supervisor

Los Angeles Cal.

Dear Sir:

In compliance with Section 17, Chapter 718, Statutes of 1915, as amended, notice is hereby given that it is our intention to commence the work of drilling well number 1 Section 25 T. 1 S R. 2 W. B. & M., Oil Field, San Bernardino County.

The well is 2800 feet N. ~~or S.~~, and 700 feet ~~E. or~~ W. from So East Corner of Sec 25
(Give location in distance from section corners or other corners of legal subdivision)

The elevation of the derrick floor above sea level is 2600 feet.

We propose to use the following strings of casing, either cementing or landing them as here indicated:

Size of Casing, Inches	Weight, Lb. Per Foot	New or Second Hand	Depth	Landed or Cemented
Casing program will depend upon formations encountered.				
Will core frequently.				

It is understood that if changes in this plan become necessary we are to notify you before cementing or landing casing.

We estimate that the first productive oil or gas sand should be encountered at a depth of about 500 feet, more or less. Second 2200

Respectfully yours,

Address R.R. NO. 2 Box 30 Yucaipa Calif   J. W. McPhearson
(Name of ~~Company~~ or Operator).

Telephone number   By J. W. Mc

Address notice to Deputy State Oil and Gas Supervisor in charge of district where well is located

Reference to file of data

Map	Map Book	Cross Section	Cards	Forms	
WC F.L.C.	off			✓	✓

M.C.
BK.
F.L.C

Lease consists of: 100 Acres

Topo. Sh. #66
E.Q.K.

Appendix 2-C

Water Budget Analysis

Table 2-C1: Temperature Lapse Rates used in the YIHM								
Month	**Minimum temperature (T_{min})**						**Maximum temperature (T_{max})**	
	Temperature lapse rate (degrees C/ft.)			**Linear regression coefficient of determination**			**Temperature lapse rate (degrees C/ft.)**	**Linear regression coefficient of determination**
	Low-elevation	**Mid-elevation**	**High-elevaation**	**Low-elevation**	**Mid-elevation**	**High-elevation**		
January	-0.000267	-0.009122	-0.001069	0.375161	0.949365	0.254554	-0.006274	0.986521
February	-0.002090	-0.008838	-0.002369	0.410287	0.951706	0.254554	-0.006286	0.986626
March	-0.002894	-0.008079	-0.002473	0.607330	0.944339	0.618303	-0.005846	0.981146
April	-0.003499	-0.007159	-0.002392	0.728538	0.935666	0.555306	-0.005798	0.965877
May	-0.004425	-0.006001	-0.001270	0.831409	0.937605	0.225797	-0.004960	0.906887
June	-0.002725	-0.004569	-0.000979	0.636168	0.804955	0.104089	-0.004187	0.784555
July	-0.000511	-0.004723	-0.000030	0.038804	0.789060	0.000088	-0.004783	0.795607
August	-0.000715	-0.005240	-0.000809	0.079302	0.789060	0.071081	-0.005111	0.839502
September	-0.000432	-0.007149	-0.001582	0.019373	0.890501	0.205146	-0.005646	0.904514
October	-0.001161	-0.008536	-0.000633	0.134185	0.940326	0.049203	-0.005988	0.937825
November	-0.000545	-0.008684	-0.001768	0.028359	0.942844	0.341591	-0.006120	0.978148
December	0.000048	-0.008963	-0.001861	0.000249	0.946138	0.375161	-0.005976	0.986968

Data provided by the USGS

Table 2-C2: Historical Water Budget for the Yucaipa Subbasin

Individual Components of the Basin Water Budget Reported in Units of Acre-Feet (AF)

Water Year[A]	Water Year Type	Inflows: Stream Leakage	Inflows: Return Flows[B]	Inflows: Precipitation Recharge	Subsurface Inflows: From Beaumont Basin	Subsurface Inflows: From San Timoteo Basin	Subsurface Inflows: From SBBA	Subsurface Inflows: From Crafton Hills	Subsurface Inflows: From Yucaipa Hills	Subsurface Inflows: From San Bernardino Mountains	Subsurface Inflows: *Subtotal*	Surface Water Spreading	Total Basin Inflows	Outflows: ET	Subsurface Outflows: To Beaumont Basin	Subsurface Outflows: To San Timoteo Basin	Subsurface Outflows: To SBBA	Subsurface Outflows: To Crafton Hills	Subsurface Outflows: To Yucaipa Hills	Subsurface Outflows: To San Bernardino Mountains	Subsurface Outflows: *Subtotal*	GW Discharges to Streams	GW Extractions[C]	Surface Water Diversions[D]	Groundwater Discharge to Surface[E]	Total Basin Outflows	Change in Storage: Annual	Change in Storage: Cumulative
1965	Normal	9,416	2,101	2,209	2,023	6,511	269	47	2,732	1,455	*13,036*	0	26,761	2,340	740	8,980	3,281	0	1,925	13	*14,940*	2,199	9,899	0	7	29,385	-2,624	**-2,624**
1966	Above Normal	10,441	2,101	5,153	2,115	6,449	248	46	2,791	1,596	*13,243*	0	30,938	2,697	741	8,954	3,464	0	1,958	14	*15,132*	2,629	11,609	31	9	32,108	-1,169	**-3,794**
1967	Wet	10,656	2,101	4,957	2,212	6,382	234	44	2,832	1,705	*13,409*	0	31,122	2,399	760	8,944	3,516	0	1,954	13	*15,187*	2,792	11,057	36	10	31,481	-359	**-4,153**
1968	Normal	9,688	2,107	3,166	2,232	6,379	229	43	2,861	1,837	*13,581*	0	28,541	2,611	774	8,974	3,356	0	1,945	13	*15,063*	2,422	11,106	16	8	31,225	-2,684	**-6,837**
1969	Wet	12,421	2,101	11,878	2,251	6,300	209	43	3,016	2,374	*14,193*	0	40,593	2,821	766	8,872	3,650	0	2,072	15	*15,375*	3,967	9,658	127	11	31,959	8,634	**1,796**
1970	Dry	10,341	2,515	4,557	2,148	6,313	185	41	3,187	2,298	*14,172*	0	31,585	2,925	737	8,958	3,490	0	2,072	17	*15,275*	3,018	9,861	111	11	31,200	385	**2,181**
1971	Below Normal	10,382	2,439	4,088	2,204	6,327	174	41	3,075	2,453	*14,275*	0	*31,184*	2,774	733	8,981	3,512	0	2,059	18	*15,303*	3,038	9,849	142	10	*31,117*	67	**2,248**
1972	Dry	10,002	2,446	3,302	2,223	6,356	169	41	3,016	2,295	*14,100*	0	*29,850*	3,004	747	9,018	3,494	0	2,019	21	*15,299*	2,783	10,818	156	8	*32,068*	-2,218	**29**
1973	Above Normal	10,912	2,439	5,141	2,197	6,286	165	41	2,951	2,241	*13,881*	0	*32,373*	2,478	746	9,003	3,665	0	2,019	20	*15,452*	3,391	10,411	217	10	*31,960*	413	**442**
1974	Below Normal	10,663	2,392	4,457	2,128	6,267	161	40	3,036	2,070	*13,701*	0	*31,214*	2,888	736	9,001	3,688	0	2,007	20	*15,453*	3,109	11,484	206	10	*33,150*	-1,936	**-1,494**
1975	Normal	10,059	2,571	3,316	1,975	6,263	157	39	3,005	2,021	*13,459*	0	*29,405*	2,546	718	9,009	3,640	0	1,977	19	*15,362*	2,748	10,501	133	9	*31,299*	-1,894	**-3,388**
1976	Normal	10,530	2,641	4,050	1,820	6,282	156	39	2,958	2,077	*13,334*	0	*30,556*	2,662	701	9,020	3,709	0	1,961	18	*15,410*	2,747	10,366	88	8	*31,282*	-726	**-4,114**
1977	Below Normal	10,098	2,634	4,238	1,720	6,246	160	39	2,929	2,093	*13,187*	0	*30,158*	2,753	687	9,020	3,632	0	1,956	19	*15,313*	2,716	9,906	100	9	*30,798*	-640	**-4,754**
1978	Wet	13,296	2,634	16,145	1,883	6,210	158	38	3,311	2,517	*14,118*	0	*46,193*	3,137	695	8,931	3,896	0	2,205	19	*15,747*	4,909	10,002	220	14	*34,030*	12,163	**7,409**
1979	Above Normal	12,654	2,634	9,423	1,845	6,251	139	35	3,642	2,618	*14,530*	0	*39,242*	3,072	698	9,016	3,967	0	2,296	23	*16,001*	4,675	9,764	267	18	*33,797*	5,445	**12,854**
1980	Wet	15,176	3,278	15,677	1,580	6,351	126	34	3,958	3,033	*15,081*	0	*49,212*	3,550	654	9,010	4,017	0	2,485	25	*16,191*	6,449	10,075	332	20	*36,616*	12,596	**25,450**
1981	Dry	12,933	3,483	6,838	1,187	6,413	119	32	4,029	2,842	*14,623*	0	*37,877*	3,860	612	9,083	3,853	0	2,419	27	*15,993*	4,774	10,198	286	17	*35,129*	2,748	**28,198**
1982	Above Normal	13,988	3,483	8,545	927	6,452	119	33	3,823	2,987	*14,340*	0	*40,355*	3,152	592	9,079	4,104	0	2,370	30	*16,176*	5,490	8,880	299	19	*34,017*	6,338	**34,536**
1983	Wet	14,684	3,483	11,157	788	6,457	116	31	3,857	2,913	*14,163*	0	*43,486*	3,110	598	9,100	4,248	0	2,427	29	*16,402*	6,184	8,353	332	22	*34,405*	9,081	**43,617**
1984	Dry	12,179	3,492	6,583	684	6,475	108	29	3,978	2,581	*13,855*	0	*36,110*	4,117	597	9,184	4,005	0	2,429	27	*16,243*	4,257	10,278	279	18	*35,191*	918	**44,535**
1985	Below Normal	12,335	5,337	6,275	652	6,467	102	29	3,861	2,555	*13,668*	0	*37,615*	3,874	601	9,162	4,081	0	2,402	27	*16,274*	4,297	10,533	268	18	*35,264*	2,351	**46,886**
1986	Normal	12,023	5,961	5,568	513	6,459	98	29	3,741	2,505	*13,346*	0	*36,898*	3,857	685	9,176	4,042	0	2,343	26	*16,272*	4,106	9,823	257	19	*34,333*	2,564	**49,450**
1987	Dry	11,289	5,961	4,170	438	6,430	96	30	3,640	2,385	*13,020*	0	*34,439*	3,878	698	9,179	4,037	0	2,299	24	*16,237*	3,593	9,987	230	19	*33,945*	494	**49,944**
1988	Below Normal	11,108	5,978	3,721	400	6,411	99	30	3,533	2,304	*12,778*	0	*33,584*	3,738	762	9,198	4,057	0	2,260	23	*16,300*	3,459	10,857	218	21	*34,593*	-1,008	**48,936**
1989	Below Normal	10,602	5,961	3,336	382	6,375	106	30	3,433	2,122	*12,448*	0	*32,347*	3,885	818	9,166	4,004	0	2,215	22	*16,225*	3,142	11,266	194	20	*34,733*	-2,385	**46,551**
1990	Dry	10,285	2,208	2,023	442	6,391	114	31	3,349	1,953	*12,280*	0	*26,796*	3,689	822	9,156	3,914	0	2,170	21	*16,082*	2,891	11,626	172	19	*34,479*	-7,683	**38,868**
1991	Above Normal	11,275	942	5,677	654	6,429	124	31	3,334	1,959	*12,531*	0	*30,426*	3,628	683	9,084	4,031	0	2,186	19	*16,003*	3,403	11,657	198	16	*34,906*	-4,480	**34,387**
1992	Above Normal	11,389	945	5,911	832	6,464	127	31	3,430	1,986	*12,871*	0	*31,116*	3,662	656	9,131	4,083	0	2,243	18	*16,131*	3,596	11,743	235	16	*35,383*	-4,267	**30,120**
1993	Wet	14,133	1,173	17,007	954	6,483	128	29	3,879	2,434	*13,907*	0	*46,221*	3,989	683	9,037	4,126	0	2,487	22	*16,355*	5,707	11,481	302	21	*37,854*	8,367	**38,488**
1994	Below Normal	12,201	1,195	5,643	964	6,561	109	28	4,023	2,454	*14,139*	0	*33,177*	3,815	697	9,147	4,145	0	2,490	19	*16,499*	4,233	11,947	279	20	*36,794*	-3,617	**34,871**
1995	Wet	15,315	1,489	12,358	936	6,618	111	27	4,046	2,873	*14,612*	0	*43,774*	3,876	724	9,088	4,227	0	2,566	22	*16,627*	6,814	11,870	354	22	*39,562*	4,212	**39,083**
1996	Dry	13,062	1,592	5,069	975	6,722	97	25	4,114	2,530	*14,464*	0	*34,188*	4,352	700	9,211	4,195	0	2,531	21	*16,658*	5,069	12,841	330	17	*39,268*	-5,080	**34,002**
1997	Above Normal	12,896	1,588	5,442	1,086	6,768	88	25	3,966	2,470	*14,404*	0	*34,329*	4,141	709	9,183	4,231	0	2,489	22	*16,634*	4,894	13,184	305	16	*39,174*	-4,845	**29,157**
1998	Wet	15,355	1,588	12,254	1,227	6,777	85	25	4,036	2,743	*14,893*	0	*44,089*	3,465	696	9,137	4,464	0	2,568	23	*16,888*	6,870	12,511	347	22	*40,102*	3,987	**33,144**
1999	Dry	12,540	1,588	4,722	1,275	6,784	79	24	4,131	2,404	*14,696*	0	*33,546*	3,976	699	9,227	4,338	0	2,537	21	*16,823*	4,719	14,065	315	18	*39,917*	-6,371	**26,774**
2000	Dry	12,304	1,868	4,044	1,409	6,867	79	26	4,011	2,425	*14,817*	0	*33,032*	4,176	727	9,260	4,276	0	2,505	21	*16,790*	4,279	14,988	299	15	*40,546*	-7,514	**19,259**
2001	Dry	12,246	1,955	3,666	1,241	6,840	84	27	3,836	2,417	*14,445*	0	*32,312*	3,699	800	9,221	4,358	0	2,437	20	*16,838*	4,338	14,330	297	15	*39,516*	-7,204	**12,055**
2002	Critically Dry	10,896	1,955	2,245	1,135	6,864	90	29	3,747	2,206	*14,071*	36	*29,202*	3,864	955	9,234	4,126	0	2,373	21	*16,710*	3,400	15,346	235	12	*39,566*	-10,364	**1,691**
2003	Above Normal	11,589	1,955	3,589	1,219	6,847	98	29	3,606	2,133	*13,932*	691	*31,757*	3,435	946	9,206	4,294	0	2,344	20	*16,809*	3,722	14,513	242	19	*38,740*	-6,983	**-5,292**
2004	Dry	10,939	1,961	2,926	1,212	6,849	106	30	3,581	1,988	*13,767*	624	*30,216*	3,649	1,224	9,233	4,155	0	2,323	17	*16,952*	3,316	14,215	215	19	*38,367*	-8,151	**-13,443**
2005	Wet	13,561	2,831	11,620	1,205	6,795	106	30	3,757	2,257	*14,150*	135	*42,297*	3,483	1,173	9,112	4,413	0	2,442	19	*17,159*	5,250	13,561	276	19	*39,747*	2,550	**-10,894**
2006	Below Normal	11,309	3,126	4,449	1,193	6,807	90	29	3,894	2,152	*14,164*	17	*33,065*	3,685	1,290	9,203	4,248	0	2,435	17	*17,193*	3,628	13,478	239	13	*38,237*	-5,172	**-16,065**
2007	Critically Dry	10,581	3,126	2,745	1,218	6,866	84	29	3,741	2,284	*14,221*	4	*30,677*	3,823	1,604	9,220	4,102	0	2,382	17	*17,326*	3,132	13,166	199	10	*37,656*	-6,979	**-23,044**
2008	Normal	11,284	3,135	4,099	1,234	6,877	85	29	3,580	2,292	*14,098*	551	*33,166*	3,664	1,148	9,226	4,276	0	2,343	17	*17,010*	3,554	11,395	218	17	*35,858*	-2,693	**-25,737**
2009	Below Normal	11,112	3,126	4,005	1,251	6,825	84	29	3,482	2,096	*13,768*	1,337	*33,349*	3,769	831	9,200	4,214	0	2,284	17	*16,547*	3,503	10,171	215	38	*34,243*	-895	**-26,632**
2010	Above Normal	12,416	3,787	6,687	1,222	6,752	79	28	3,465	1,985	*13,532*	3,549	*39,971*	3,635	810	9,165	4,322	0	2,274	18	*16,591*	4,528	10,400	236	112	*35,502*	4,470	**-22,162**
2011	Wet	12,924	4,009	8,383	1,161	6,708	66	27	3,523	2,000	*13,487*	3,071	*41,875*	3,740	791	9,145	4,482	0	2,304	17	*16,738*	4,892	9,839	254	128	*35,591*	6,283	**-15,879**
2012	Dry	11,403	4,020	4,835	1,101	6,720	52	26	3,584	1,886	*13,369*	2,936	*36,564*	4,066	812	9,227	4,356	1	2,301	16	*16,712*	3,864	10,174	209	98	*35,123*	1,441	**-14,438**
2013	Dry	11,089	4,009	4,164	1,051	6,724	44	25	3,491	2,030	*13,366*	2,170	*34,799*	3,806	900	9,190	4,441	1	2,263	16	*16,810*	3,562	10,341	182	79	*34,781*	18	**-14,420**
2014	Dry	10,633	4,009	3,544	1,013	6,731	41	25	3,398	2,005	*13,212*	521	*31,920*	3,767	1,068	9,199	4,340	1	2,222	16	*16,846*	3,127	11,897	176	29	*35,840*	-3,920	**-18,340**
Historical Average		**11,812**	**2,829**	**6,101**	**1,315**	**6,544**	**123**	**32**	**3,524**	**2,277**	***13,815***	**313**	***34,870***	**3,460**	**795**	**9,109**	**4,011**	**0**	**2,272**	**20**	***16,207***	**3,984**	**11,346**	**217**	**23**	***35,237***	**-367**	
Critically Dry Wate Year Average		10,738	2,541	2,495	1,177	6,865	87	29	3,744	2,245	*14,146*	20	*29,940*	3,844	1,280	9,227	4,114	0	2,378	19	*17,018*	3,266	14,256	217	11	*38,611*	-8,671	
Dry Water Year Average		11,518	2,936	4,317	1,171	6,615	98	29	3,668	2,289	*13,870*	447	*33,088*	3,783	796	9,168	4,089	0	2,323	20	*16,397*	3,828	11,830	233	27	*36,098*	-3,010	
Below Normal Water Year Average		11,090	3,576	4,468	1,211	6,476	121	33	3,474	2,255	*13,570*	150	*32,855*	3,465	795	9,120	3,954	0	2,234	20	*16,123*	3,458	11,055	207	18	*34,325*	-1,471	
Normal Water Year Average		10,500	3,086	3,734	1,633	6,462	165	38	3,146	2,031	*13,475*	92	*30,888*	2,947	794	9,064	3,717	0	2,083	18	*15,676*	2,963	10,515	119	11	*32,230*	-1,343	
Above Normal Water Year Average		11,951	2,208	6,174	1,344	6,522	132	33	3,445	2,219	*13,696*	471	*34,501*	3,322	731	9,091	4,018	0	2,242	20	*16,103*	4,036	11,351	226	26	*35,065*	-564	
Wet Water Year Average		13,752	2,469	12,144	1,420	6,508	134	33	3,622	2,485	*14,201*	321	*42,886*	3,357	754	9,037	4,104	0	2,351	20	*16,267*	5,383	10,841	258	29	*36,135*	6,751	

[A]Water Year corresponds to October 1 of the previous year, through September 30th of the current year.
[B]Return flows consist of water that recharges the Subbasin via municipal distribution network leaks, septic system discharges, and infiltration of irrigation water
[C]Groundwater Extractions are broken down by Usage Sector in Table 2C-7
[D]Represents surface water diversions through the operation of YVWD-25
[E]The YIHM calculates groundwater discharges to land surface when groundwater elevations in a given cell are higher than the top elevation of the cell

Table 2-C3: Groundwater Production from Wells Outside the Subbasin that Supplement Subbasin Water Supplies					
Water Year Ending	Groundwater Production Volume (AF)[a]				
	South Mesa-04	YVWD-16	YVWD-48	YVWD-61	**Total**
1965	-	-	-	-	**-**
1966	-	0	0	0	**-**
1967	-	0	0	0	**-**
1968	-	0	0	0	**-**
1969	-	0	0	0	**-**
1970	-	0	0	0	**-**
1971	-	0	0	0	**-**
1972	-	0	0	0	**-**
1973	-	0	0	0	**-**
1974	-	0	0	0	**-**
1975	-	0	0	0	**-**
1976	-	0	0	0	**-**
1977	-	0	0	0	**-**
1978	-	0	0	0	**-**
1979	-	0	0	0	**-**
1980	-	0	0	0	**-**
1981	0	20	0	0	**20**
1982	0	104	0	0	**104**
1983	0	43	0	0	**43**
1984	0	18	0	0	**18**
1985	0	13	0	0	**13**
1986	0	6	0	0	**6**
1987	0	14	0	0	**14**
1988	263	19	0	0	**282**
1989	373	45	0	0	**418**
1990	469	41	0	0	**509**
1991	403	14	0	0	**417**
1992	353	2	0	0	**355**
1993	417	1	0	1	**419**
1994	488	12	0	1	**502**
1995	523	5	0	2	**529**
1996	582	5	0	2	**589**
1997	609	5	0	2	**615**
1998	504	2	0	2	**507**
1999	560	1	0	2	**563**
2000	577	24	0	2	**602**
2001	553	30	855	2	**1,439**
2002	537	49	1,467	2	**2,055**
2003	382	48	1,644	2	**2,075**
2004	474	37	1,618	2	**2,131**
2005	610	27	1,250	2	**1,890**
2006	643	26	1,682	2	**2,352**
2007	662	32	1,575	2	**2,271**
2008	509	23	754	0	**1,286**
2009	399	33	517	1	**951**
2010	422	25	640	0	**1,087**
2011	415	26	561	0	**1,002**
2012	441	26	668	0	**1,135**
2013	338	43	966	1	**1,349**
2014	417	31	1,166	1	**1,615**
Average	**479**	**25**	**1,097**	**1**	**858**

AF = acre-feet

Table 2-C4: Imported Surface Water Supplies to the Subbasin									
Water Year Ending	**From SBVMWD**				**From SGWPA**				**Total SWP Water Imported to the Subbasin (AF)**
	Delivered to YVWRFF (AF)	Delivered to Wilson Creek spreading Basins (AF)	Delivered to Oak Glen Creek spreading Basins (AF)	**Total SBVMWD Imports (AF)**	Delivered to YVWRFF (AF)	Delivered to Wilson Creek spreading Basins (AF)	Delivered to Oak Glen Creek spreading Basins (AF)	**Total SGPWA Imports (AF)**	
2003	855	0	0	**855**					**855**
2004	1,246	0	0	**1,246**	0	0	0	**0**	**1,246**
2005	1,357	0	0	**1,357**	0	0	0	**0**	**1,357**
2006	2,213	0	0	**2,213**	0	0	0	**0**	**2,213**
2007	3,539	0	0	**3,539**	0	0	0	**0**	**3,539**
2008	7,263	0	0	**7,263**	0	0	0	**0**	**7,263**
2009	7,428	0	48	**7,476**	0	0	0	**0**	**7,476**
2010	5,530	0	0	**5,530**	0	0	0	**0**	**5,530**
2011	5,581	1,542	141	**7,264**	0	0	0	**0**	**7,264**
2012	6,008	3,119	267	**9,394**	0	0	0	**0**	**9,394**
2013	5,846	2,824	220	**8,890**	0	0	0	**0**	**8,890**
2014	5,133	0	159	**5,292**	0	0	0	**0**	**5,292**
2015	3,845	0	0	**3,845**	0	0	0	**0**	**3,845**
2016	7,145	0	0	**7,145**	0	0	0	**0**	**7,145**
2017	8,764	6,579	0	**15,343**	0	0	0	**0**	**15,343**
2018	8,455	1,180	558	**10,192**	0	0	0	**0**	**10,192**
Total	**80,210**	**15,244**	**1,393**	**96,846**	**0**	**0**	**0**	**0**	**96,846**

AF = acre-feet

Table 2-C5: Spreading at the Oak Glen Creek and Wilson Creek Spreading Basins						
Water Year Ending	Imported Water Delivered (AF)			YVWRFF Water Diverted to Spreading Basins (AF)	**Total Water Delivered for Spreading at the Wilson Creek and Oak Glen Creek Spreading Basins (AF)**	**Simulated Spreading at the Oak Glen Creek and Wilson Creek Spreading Basins (AF)**
	to Wilson Creek Spreading Basins	to Oak Glen Creek Spreading Basins	**Total SWP Water Used for Spreading**			
2001				0	**0**	
2002				0	**0**	**36**
2003	0	0	**0**	0	**0**	**691**
2004	0	0	**0**	0	**0**	**624**
2005	0	0	**0**	0	**0**	**135**
2006	0	0	**0**	0	**0**	**17**
2007	0	0	**0**	0	**0**	**4**
2008	0	0	**0**	0	**0**	**551**
2009	0	48	**48**	0	**48**	**1,337**
2010	0	0	**0**	0	**0**	**3,549**
2011	1,542	141	**1,683**	0	**1,683**	**3,071**
2012	3,119	267	**3,386**	0	**3,386**	**2,936**
2013	2,824	220	**3,044**	0	**3,044**	**2,170**
2014	0	159	**159**	0	**159**	**521**
2015	0	0	**0**	133	**133**	**313**
2016	0	0	**0**	8	**8**	**N/A[a]**
2017	6,579	0	**6,579**	3	**6,582**	**N/A[a]**
2018	1,180	558	**1,737**	20	**1,757**	**N/A[a]**
Total	**15,244**	**1,393**	**16,637**	**164**	**16,801**	**15,955**

AF = acre-feet

[a]The YIHM was designed to simulate groundwater conditions through water year 2014, and therefore does not contain estimates of recharge at the Spreading Basins between 2015 and 2019.

Table 2-C6: Historical and Current Production by YVWD-25 and Surface Water Diversions in the Subbasin				
Water Year Ending	Groundwater Under the Influence of Surface Water (YVWD-25 Production (AF))	Surface Water Diversion from Oak Glen Creek (AF)	Surface Water Diversion from Birch Creek (AF)	**Total Surface Water Diversions (AF)**
2001	312	29	56	**85**
2002	303	65	81	**147**
2003	330	67	105	**171**
2004	288	24	48	**72**
2005	322	107	99	**206**
2006	327	46	148	**194**
2007	313	57	47	**105**
2008	278	95	9	**104**
2009	287	50	19	**69**
2010	302	61	0	**61**
2011	342	36	0	**36**
2012	267	8	0	**8**
2013	215	20	0	**20**
2014	230	13	0	**13**
2015	217	12	0	**12**
2016	210	13	0	**13**
2017	205	4	0	**4**
2018	192	0	0	**0**
Total	**4,938**	**707**	**611**	**1,319**

AF = acre-feet

Table 2-C7: Historical Groundwater Extractions by Usage Type in the Subbasin								
Water Year[A]	**Water Year Type[B]**	Municipal Groundwater Extractions (AF)			Irrigation (AF)		Private Well Extractions (AF)	Total Groundwater Extractions (AF)
		YVWD	South Mesa	WHWC	South Mountain	Subtotal		
1965	Normal	2,996	1,602	1,499	115	6,211	3,688	**9,899**
1966	Above Normal	3,189	2,732	1,436	376	7,734	3,876	**11,609**
1967	Wet	3,296	3,035	1,266	337	7,933	3,124	**11,057**
1968	Normal	3,252	2,869	1,278	456	7,855	3,251	**11,106**
1969	Wet	3,362	2,174	936	226	6,698	2,959	**9,658**
1970	Dry	3,433	2,195	1,085	405	7,117	2,743	**9,861**
1971	Below Normal	3,341	2,088	1,187	506	7,122	2,728	**9,849**
1972	Dry	3,489	2,098	1,498	467	7,551	3,267	**10,818**
1973	Above Normal	3,280	2,289	1,334	780	7,683	2,728	**10,411**
1974	Below Normal	3,990	2,518	1,428	815	8,751	2,734	**11,484**
1975	Normal	3,347	2,346	1,430	812	7,936	2,565	**10,501**
1976	Normal	3,403	2,260	1,391	779	7,832	2,534	**10,366**
1977	Below Normal	3,527	2,277	1,327	474	7,605	2,301	**9,906**
1978	Wet	3,204	2,297	1,373	567	7,441	2,561	**10,002**
1979	Above Normal	2,908	2,394	1,510	514	7,325	2,439	**9,764**
1980	Wet	3,140	2,530	1,445	426	7,541	2,534	**10,075**
1981	Dry	3,375	2,660	1,556	80	7,672	2,526	**10,198**
1982	Above Normal	2,635	1,960	1,399	579	6,573	2,307	**8,880**
1983	Wet	2,359	1,731	1,384	795	6,269	2,084	**8,353**
1984	Dry	3,288	2,243	1,670	900	8,100	2,178	**10,278**
1985	Below Normal	3,602	2,261	1,771	956	8,590	1,943	**10,533**
1986	Normal	3,883	1,309	1,864	867	7,924	1,899	**9,823**
1987	Dry	3,945	1,650	1,625	935	8,155	1,833	**9,987**
1988	Below Normal	4,547	1,756	1,838	1,000	9,142	1,715	**10,857**
1989	Below Normal	5,131	1,716	2,042	825	9,713	1,553	**11,266**
1990	Dry	5,323	1,755	2,130	687	9,895	1,731	**11,626**
1991	Above Normal	5,569	1,607	2,052	899	10,127	1,530	**11,657**
1992	Above Normal	5,628	1,596	2,065	1,063	10,352	1,391	**11,743**
1993	Wet	5,261	1,712	2,113	791	9,877	1,604	**11,481**
1994	Below Normal	5,509	1,694	2,181	793	10,177	1,770	**11,947**
1995	Wet	5,567	1,637	2,139	888	10,230	1,640	**11,870**
1996	Dry	6,243	1,781	2,353	1,016	11,392	1,450	**12,841**
1997	Above Normal	6,512	1,799	2,331	1,091	11,733	1,451	**13,184**
1998	Wet	5,929	1,685	3,038	744	11,396	1,116	**12,511**
1999	Dry	7,438	1,904	2,450	1,144	12,936	1,129	**14,065**
2000	Dry	8,519	1,991	2,418	913	13,841	1,147	**14,988**
2001	Dry	8,382	2,029	2,365	832	13,607	723	**14,330**
2002	Critically Dry	9,121	2,176	2,473	946	14,716	629	**15,346**
2003	Above Normal	8,506	2,282	2,346	743	13,877	636	**14,513**
2004	Dry	8,841	2,196	2,392	208	13,637	578	**14,215**
2005	Wet	8,555	1,965	2,383	69	12,972	588	**13,561**
2006	Below Normal	8,362	2,037	2,542	12	12,953	525	**13,478**
2007	Critically Dry	7,821	2,151	2,765	-	12,738	428	**13,166**
2008	Normal	6,350	2,198	2,460	-	11,008	387	**11,395**
2009	Below Normal	5,692	2,148	1,964	-	9,805	366	**10,171**
2010	Above Normal	6,205	1,934	1,873	-	10,012	388	**10,400**
2011	Wet	5,685	1,826	1,946	-	9,458	381	**9,839**
2012	Dry	5,824	1,905	2,093	-	9,822	352	**10,174**
2013	Dry	5,837	2,086	2,081	-	10,004	338	**10,341**
2014	Dry	7,227	2,023	2,114	210	11,574	323	**11,897**

Table 2-C7: Historical Groundwater Extractions by Usage Type in the Subbasin								
Water Year[A]	**Water Year Type**[B]	Municipal Groundwater Extractions (AF)			Irrigation (AF)		Private Well Extractions (AF)	Total Groundwater Extractions (AF)
		YVWD	South Mesa	WHWC	South Mountain	Subtotal		
Historical Average		**5,116**	**2,062**	**1,873**	**652**	**9,612**	**1,733**	**11,346**
Critically Dry Wate Year Average		8,471	2,164	2,619	946	13,727	529	**14,256**
Dry Water Year Average		5,797	2,037	1,988	650	10,379	1,451	**11,830**
Below Normal Water Year Average		4,856	2,055	1,809	673	9,317	1,737	**11,055**
Normal Water Year Average		3,872	2,097	1,654	606	8,128	2,387	**10,515**
Above Normal Water Year Average		4,937	2,066	1,816	756	9,491	1,861	**11,351**
Wet Water Year Average		4,636	2,059	1,802	538	8,981	1,859	**10,841**

AF = acre-feet

Table 2-C8: Estimates of Safe Yield in the Yucaipa Subbasin and Subareas (AFY)				
Subarea	Historical Sustainable Yield Estimated from the YIHM	GSSI (2014) Estimates of Safe Yield		
	YIHM Water Budget	Zero-Net Draft	Hill	Hydrologic Water Balance
Triple Falls Creek	394	215	310	-
Oak Glen	473	415	600	-
Gateway	1,947	1,775	1,440	-
Crafton	427	200	370	-
Wilson Creek	696	1,520	1,245	-
Western Heights	1,764	2,270	2,100	-
Calimesa	4,354	3,195	3,580	-
Live Oak	962	-	-	-
Singleton[a]	0	-	-	-
Yucaipa Subbasin	**10,981**	**9,590**	**9,645**	**9,683**

Estimates of safe yield have not previously been calculated for the Singleton and Live Oak Hydrogeologic Subareas

[a]Results from the YIHM indicate that groundwater in storage declined by approximately 36 AFY; this was subtractred from the total Subbasin sustainable yield, and represented as a zero for the Singelton Subarea sustainable yield

Table 2-C9:
Historical Water Year Type Distribution in the Subbasin

Water Year Type	Number of occurences between 1965 and 2014	Water Years
Critically Dry	2	2002, 2007
Dry	14	1970, 1972, 1981, 1984, 1987, 1990, 1996, 2000, 2001, 2004, 2012, 2013, 2014
Below Normal	9	1971, 1974, 1977, 1985, 1988, 1994, 2006, 2009
Normal	6	1965, 1968, 1975, 1976, 1986, 2008
Above Normal	9	1966, 1973, 1979, 1982, 1991, 1992, 1997, 2003, 2010
Wet	10	1967, 1969, 1978, 1980, 1983, 1993, 1995, 1998, 2005, 2011

Table 2-C10: Historical Surface Water Availability in the Subbasin					
Water Year Ending	Water Year Type	SWP water imported from SBVMWD	SWP water imported from SGPWA	Surface water diversions from Oak Glen Creek, Birch Creek, and Well 25	**Total Surface Water Availability**
2001	Dry	---	---	85	**85**
2002	Critically Dry	---	---	147	**147**
2003	Above Normal	855	---	171	**1,026**
2004	Dry	1,246	---	72	**1,319**
2005	Wet	1,357	---	206	**1,563**
2006	Below Normal	2,213	---	194	**2,407**
2007	Critically Dry	3,539	---	105	**3,644**
2008	Normal	7,263	---	104	**7,367**
2009	Below Normal	7,476	---	69	**7,545**
2010	Above Normal	5,530	---	61	**5,591**
2011	Wet	7,264	---	36	**7,300**
2012	Dry	9,394	---	8	**9,403**
2013	Dry	8,890	---	20	**8,909**
2014	Dry	5,292	---	13	**5,306**
Average		5,027	---	88	**4,401**
Critically Dry Wate Year Average		3,539	---	126	**1,895**
Dry Water Year Average		6,206	---	40	**5,004**
Below Normal Water Year Average		4,844	---	132	**4,976**
Normal Water Year Average		7,263	---	104	**7,367**
Above Normal Water Year Average		3,193	---	116	**3,309**
Wet Water Year Average		4,311	---	121	**4,431**

--- = Blank cells indicate that YVWD had not contracted with SWP providers during this period

Table 2-C11
Current Condition Water Budget for the Yucaipa Subbasin

Water Year	Water Year Type	Individual Components of the Basin Water Budget Reported in Units of Acre-Feet (AF)											
		Inflows to Groundwater System											
		Stream Leakage	Return Flows[B]	Precipitation Recharge	Subsurface Inflows							Surface Water Spreading	Total Basin Inflows
					From Beaumont Basin	From San Timoteo Basin	From SBBA	From Crafton Hills	From Yucaipa Hills	From San Bernardino Mountains	*Subtotal*		
2015	Below Normal	10,571	4,009	2,903	1,006	6,721	39	25	3,292	1,887	*12,970*	115	**30,568**
2016	Dry	10,576	4,020	3,647	996	6,700	39	26	3,223	1,751	*12,735*	6	**30,985**
2017	Above Normal	14,433	4,009	10,073	949	6,614	38	25	3,251	1,815	*12,692*	6,582	**47,790**
2018	Critically Dry	11,349	4,009	5,339	889	6,581	32	22	3,298	1,577	*12,399*	1,757	**34,854**
Average		**11,732**	**4,012**	**5,491**	**960**	**6,654**	**37**	**24**	**3,266**	**1,758**	***12,699***	**2,115**	**36,049**

[A]Water Year corresponds to October 1 of the previous year, through September 30th of the current year.

[B]Return flows consist of water that recharges the Subbasin via municipal distribution network leaks, septic system discharges, and infiltration of irrigation water

[C]Represents surface water diversions through the operation of YVWD-25

[D]The YIHM calculates groundwater discharges to land surface when groundwater elevations in a given cell are higher than the top elevation of the cell

Table 2-C11
Current Condition Water Budget for the Yucaipa Subbasin

Individual Components of the Basin Water Budget Reported in Units of Acre-Feet (AF)														
Outflows from Groundwater System													**Change in Groundwater in Storage**	
ET	**Subsurface Outflows**							**GW Discharges to Streams**	**GW Extractions**	**Surface Water Diversions[C]**	**GW Discharge to Surface[D]**	**Total Basin Outflows**		
	To Beaumont Basin	**To San Timoteo Basin**	**To SBBA**	**To Crafton Hills**	**To Yucaipa Hills**	**To San Bernardino Mountains**	***Subtotal***						**Annual**	**Cumulative**
3,426	1,066	9,186	4,372	1	2,180	17	*16,821*	3,073	10,461	188	9	**33,978**	**-3,410**	-3,410
3,443	916	9,199	4,437	1	2,138	17	*16,708*	3,026	7,915	189	10	**31,292**	**-307**	-3,717
3,719	944	9,127	4,550	1	2,176	21	*16,818*	6,557	7,223	205	320	**34,842**	**12,947**	9,230
3,965	1,003	9,163	4,454	1	2,154	20	*16,795*	3,852	9,073	182	191	**34,058**	**796**	10,026
3,638	**982**	**9,169**	**4,453**	**1**	**2,162**	**19**	***16,786***	**4,127**	**8,668**	**191**	**133**	**33,542**	**2,506**	**-**

Table 2-C12: Sustainable Yield for each Management Area in the Yucaipa Subbasin	
Management Area	**Sustainable Yield (AFY)**
North Bench	3,940
Calimesa	4,955
Western Heights	1,760
San Timoteo	325
Total	**10,980**

Table 2-C13: Projected Future Baseline Water Budget

Water Year[A]	Inflows to Groundwater System												Outflows from Groundwater System													Change in Groundwater in Storage	
	Individual Components of the Basin Water Budget Reported in Units of Acre-Feet (AF)																										
	Stream Leakage	Return Flows[B]	Precipitation Recharge	Subsurface Inflows: From Beaumont Basin	From San Timoteo Basin	From SBBA	From Crafton Hills	From Yucaipa Hills	From San Bernardino Mtns	Subtotal	Surface Water Spreading	Total Basin Inflows	ET	Subsurface Outflows: To Beaumont Basin	To San Timoteo Basin	To SBBA	To Crafton Hills	To Yucaipa Hills	To San Bernardino Mtns	Subtotal	GW Discharges to Streams	GW Extractions	Surface Water Diversions[C]	GW Discharge to SurfaceD	Total Basin Outflows	Annual	Cumulative
2019	11,119	4,009	3,705	891	6,574	27	21	3,200	1,574	12,287	2,139	33,260	3,429	1,068	9,160	4,488	1	2,114	16	16,846	3,534	10,563	139	106	34,617	-1,357	-1,357
2020	11,256	4,020	4,161	893	6,573	26	21	3,127	1,721	12,362	2,139	33,939	3,457	1,088	9,186	4,559	1	2,099	16	16,949	3,679	10,555	153	120	34,912	-973	-2,330
2021	11,381	4,009	4,687	889	6,540	24	22	3,069	1,682	12,226	2,139	34,443	3,337	1,102	9,154	4,576	1	2,080	17	16,929	3,760	10,557	150	118	34,852	-409	-2,739
2022	12,253	4,009	8,268	897	6,527	22	21	3,155	1,757	12,380	2,139	39,050	3,894	1,120	9,110	4,698	1	2,126	19	17,074	4,319	10,586	188	119	36,180	2,869	131
2023	12,601	4,009	8,223	877	6,500	18	20	3,233	1,797	12,446	2,139	39,418	3,532	1,142	9,110	4,798	1	2,154	19	17,224	4,602	10,600	192	123	36,273	3,145	3,276
2024	11,731	4,020	5,605	864	6,531	16	20	3,287	1,852	12,570	2,139	36,065	3,911	1,179	9,178	4,659	1	2,167	17	17,201	4,097	10,580	191	119	36,101	-36	3,240
2025	14,806	4,009	15,922	864	6,521	14	18	3,494	2,405	13,317	2,139	50,193	4,268	1,204	9,072	4,788	1	2,313	20	17,398	6,641	10,632	191	126	39,256	10,936	14,177
2026	12,928	4,009	6,836	818	6,502	10	17	3,691	2,308	13,346	2,139	39,258	4,552	1,212	9,165	4,835	2	2,332	20	17,565	5,294	10,619	192	123	38,345	913	15,090
2027	13,302	4,009	6,429	807	6,527	9	18	3,566	2,394	13,321	2,139	39,200	4,373	1,297	9,190	4,889	1	2,287	22	17,687	5,505	10,614	192	124	38,495	705	15,795
2028	12,384	4,020	4,901	800	6,575	10	19	3,498	2,267	13,169	2,139	36,614	4,589	1,368	9,227	4,809	1	2,255	22	17,682	4,762	10,603	192	118	37,946	-1,332	14,463
2029	13,775	4,009	7,923	796	6,526	11	20	3,440	2,337	13,129	2,139	40,975	3,888	1,427	9,181	5,024	1	2,262	23	17,918	5,942	10,630	192	126	38,696	2,279	16,742
2030	13,039	4,009	6,948	793	6,514	11	20	3,509	2,112	12,959	2,139	39,094	4,476	1,466	9,178	4,914	1	2,266	23	17,849	5,345	10,633	192	123	38,618	475	17,217
2031	12,531	4,009	5,242	782	6,488	10	21	3,480	2,058	12,839	2,139	36,760	3,932	1,515	9,201	4,976	1	2,253	21	17,968	4,863	10,617	192	124	37,695	-935	16,282
2032	12,807	4,020	5,934	777	6,532	11	22	3,426	2,087	12,854	2,139	37,755	4,044	1,539	9,213	4,922	1	2,236	21	17,933	4,857	10,612	192	122	37,760	-5	16,277
2033	12,687	4,009	6,488	780	6,497	11	22	3,399	2,146	12,855	2,139	38,178	4,390	1,558	9,198	4,935	1	2,233	22	17,947	4,934	10,616	192	125	38,204	-26	16,250
2034	16,306	4,009	20,771	793	6,500	10	19	3,829	2,645	13,796	2,139	57,022	4,944	1,562	9,109	4,944	2	2,478	24	18,120	8,567	10,656	192	133	42,612	14,410	30,661
2035	16,645	4,009	13,198	732	6,439	6	15	4,143	2,638	13,974	2,139	49,965	5,061	1,561	9,170	5,144	4	2,598	23	18,500	8,965	10,657	192	139	43,513	6,452	37,112
2036	18,647	4,020	18,833	733	6,530	6	15	4,425	3,042	14,750	2,139	58,389	5,916	1,668	9,184	5,217	5	2,749	23	18,845	11,184	10,659	192	143	46,939	11,450	48,562
2037	17,040	4,009	7,761	678	6,554	6	15	4,441	2,818	14,511	2,139	45,461	6,310	1,716	9,234	5,315	3	2,674	22	18,965	9,150	10,630	192	135	45,381	79	48,642
2038	17,748	4,009	9,711	668	6,583	6	18	4,221	3,000	14,496	2,139	48,104	5,089	1,839	9,227	5,290	2	2,598	24	18,980	10,011	10,647	192	141	45,059	3,044	51,686
2039	18,164	4,009	13,277	672	6,640	6	18	4,272	3,007	14,614	2,139	52,204	5,181	1,924	9,178	5,299	2	2,663	25	19,092	11,186	10,663	192	150	46,465	5,739	57,425
2040	15,910	4,020	7,992	649	6,640	6	17	4,341	2,619	14,272	2,139	44,333	6,392	1,990	9,275	5,307	2	2,657	22	19,254	8,643	10,644	192	137	45,262	-928	56,497
2041	15,544	4,009	6,661	640	6,628	7	20	4,193	2,581	14,069	2,139	42,423	5,568	2,048	9,310	5,248	2	2,583	24	19,214	7,880	10,636	192	131	43,621	-1,198	55,299
2042	15,227	4,009	5,659	645	6,635	6	23	4,063	2,563	13,936	2,139	40,970	5,383	2,065	9,355	5,346	2	2,522	23	19,313	7,276	10,624	192	127	42,916	-1,946	53,353
2043	14,169	4,009	4,511	647	6,623	6	24	3,925	2,435	13,661	2,139	38,489	5,130	2,079	9,371	5,291	2	2,461	24	19,227	6,320	10,612	192	125	41,607	-3,118	50,235
2044	13,612	4,020	4,634	657	6,630	6	25	3,813	2,369	13,501	2,139	37,907	4,824	2,065	9,386	5,285	2	2,422	24	19,183	5,805	10,609	192	124	40,738	-2,831	47,404
2045	12,613	4,009	4,203	666	6,608	6	26	3,712	2,167	13,186	2,139	36,150	4,877	2,044	9,354	5,116	2	2,385	23	18,924	5,032	10,605	192	120	39,749	-3,600	43,804
2046	12,063	4,009	3,357	679	6,620	7	27	3,617	1,994	12,944	2,139	34,513	4,586	2,027	9,344	5,113	2	2,338	22	18,846	4,440	10,597	192	120	38,781	-4,268	39,536
2047	13,045	4,009	7,889	703	6,645	9	27	3,579	2,012	12,976	2,139	40,058	4,639	1,985	9,272	5,094	2	2,348	20	18,721	5,171	10,620	192	122	39,465	593	40,129
2048	13,469	4,020	8,722	717	6,644	9	25	3,677	2,056	13,129	2,139	41,479	4,804	1,950	9,299	5,094	2	2,400	20	18,765	5,652	10,638	192	124	40,176	1,303	41,432
2049	16,117	4,009	20,186	719	6,662	7	21	4,121	2,504	14,034	2,139	56,486	5,544	1,910	9,211	5,120	2	2,640	24	18,908	8,621	10,655	192	133	44,053	12,433	53,865
2050	15,057	4,009	7,825	676	6,661	6	18	4,200	2,555	14,117	2,139	43,147	5,298	1,870	9,296	5,345	2	2,609	19	19,139	7,296	10,640	192	134	42,699	448	54,313
2051	17,364	4,009	15,080	688	6,699	6	19	4,225	2,980	14,617	2,139	53,209	5,404	1,952	9,237	5,310	2	2,656	23	19,180	10,033	10,657	192	141	45,607	7,602	61,914
2052	15,428	4,020	7,471	652	6,730	6	19	4,257	2,613	14,277	2,139	43,336	6,107	1,984	9,336	5,305	2	2,613	20	19,259	7,838	10,629	192	130	44,157	-821	61,093
2053	15,118	4,009	7,625	655	6,732	7	21	4,103	2,545	14,062	2,139	42,954	5,758	2,075	9,330	5,246	2	2,556	22	19,231	7,493	10,633	192	127	43,434	-480	60,614
2054	17,239	4,009	14,971	668	6,755	6	21	4,174	2,862	14,485	2,139	52,843	4,955	2,110	9,260	5,312	2	2,639	24	19,347	10,078	10,656	192	144	45,371	7,472	68,085
2055	15,011	4,009	6,458	645	6,734	6	20	4,253	2,465	14,122	2,139	41,740	5,644	2,124	9,323	5,388	2	2,605	21	19,462	7,692	10,626	192	137	43,753	-2,014	66,072
2056	14,730	4,020	6,041	647	6,789	7	23	4,115	2,466	14,046	2,139	40,976	5,846	2,166	9,407	5,387	2	2,548	21	19,531	6,783	10,614	192	126	43,093	-2,116	63,955
2057	14,518	4,009	5,559	647	6,748	6	25	3,940	2,483	13,849	2,139	40,074	5,131	2,187	9,372	5,344	2	2,477	21	19,403	6,730	10,625	192	127	42,209	-2,135	61,821
2058	12,801	4,009	3,545	657	6,745	6	26	3,841	2,237	13,512	2,139	36,006	5,290	2,183	9,406	5,251	2	2,414	22	19,278	5,168	10,606	192	120	40,654	-4,648	57,173
2059	13,513	4,009	5,957	672	6,732	6	27	3,706	2,218	13,361	2,139	38,979	4,735	2,157	9,345	5,282	2	2,397	22	19,204	5,677	10,618	192	125	40,551	-1,572	55,601
2060	12,683	4,020	4,733	691	6,742	7	27	3,684	2,052	13,203	2,139	36,778	4,978	2,138	9,393	5,200	2	2,373	21	19,126	4,968	10,614	192	120	39,998	-3,220	52,381
2061	15,279	4,009	14,869	706	6,711	7	25	3,853	2,383	13,685	2,139	49,982	4,890	2,099	9,249	5,149	2	2,496	22	19,017	7,701	10,653	192	133	42,586	7,396	59,777
2062	13,283	4,009	5,883	668	6,689	6	23	3,971	2,199	13,555	2,139	38,870	5,162	2,046	9,354	5,354	2	2,485	19	19,260	5,555	10,618	192	127	40,914	-2,044	57,733
2063	12,297	4,009	4,024	679	6,746	6	25	3,831	2,281	13,569	2,139	36,039	5,202	2,057	9,382	5,184	1	2,420	19	19,063	4,659	10,601	192	118	39,835	-3,796	53,936
2064	12,631	4,020	4,594	686	6,783	6	27	3,668	2,294	13,466	2,139	36,851	4,824	2,069	9,373	5,110	1	2,365	19	18,937	4,976	10,597	192	120	39,646	-2,796	51,140
2065	12,281	4,009	4,197	703	6,777	8	28	3,571	2,113	13,199	2,139	35,825	4,800	2,058	9,347	5,096	1	2,311	21	18,834	4,624	10,600	192	118	39,168	-3,343	47,798
2066	12,952	4,009	7,026	723	6,751	9	28	3,536	2,002	13,049	2,139	39,175	4,418	2,043	9,299	5,103	1	2,301	21	18,768	5,122	10,633	192	122	39,256	-81	47,717
2067	13,458	4,009	8,366	721	6,729	9	26	3,592	2,022	13,100	2,139	41,072	4,488	2,036	9,274	5,105	1	2,326	21	18,762	5,597	10,646	192	127	39,812	1,259	48,976
2068	12,170	4,020	4,298	717	6,741	8	26	3,655	1,918	13,065	2,139	35,692	4,734	2,019	9,355	5,181	1	2,320	19	18,895	4,460	10,609	192	120	39,010	-3,318	45,658
2069	11,722	4,009	3,765	729	6,770	8	27	3,551	2,060	13,145	2,139	34,779	4,394	2,001	9,313	5,054	1	2,279	18	18,665	4,150	10,596	190	117	38,112	-3,333	42,326
Average	**14,009**	**4,012**	**7,861**	**729**	**6,633**	**9**	**22**	**3,778**	**2,308**	**13,478**	**2,139**	**41,500**	**4,831**	**1,786**	**9,264**	**5,094**	**2**	**2,409**	**21**	**18,576**	**6,326**	**10,620**	**189**	**127**	**40,670**	**830**	**-**

[A]Water Year corresponds to October 1 of the previous year, through September 30th of the current year.

[B]Return flows consist of water that recharges the Subbasin via municipal distribution network leaks, septic system discharges, and infiltration of irrigation water

[C]Represents surface water diversions through the operation of YVWD-25

[D]The YIHM calculates groundwater discharges to land surface when groundwater elevations in a given cell are higher than the top elevation of the cell

Table 2-C14
Comparison of Average Annual Water Budget Components for the Historical, Current, and Projected Conditions

Water Budget Component		Simulation Period				
				Projected		
		Historical (AFY)	Current (AFY)	Future Baseline (AFY)	Future Baseline with Climate Change I (AFY)	Future Baseline with Climate Change II (AFY)
Stream Leakage		11,812	11,732	14,009	13,257	12,295
Return Flows		2,829	4,012	4,012	4,012	4,012
Precipitation Recharge		6,101	5,491	7,861	7,290	6,496
Subsurface Inflows	From Beaumont Basin	1,315	960	729	755	795
	From San Timoteo Basin	6,544	6,654	6,633	6,591	6,558
	From SBBA	123	37	9	11	13
	From Crafton Hills	32	24	22	22	23
	From Yucaipa Hills	3,524	3,266	3,778	3,612	3,393
	From San Bernardino Mountains	2,277	1,758	2,308	2,200	2,053
	Total Subsurface Inflows	13,815	12,699	13,478	13,191	12,834
Surface Water Spreading		313	2,115	2,139	2,139	2,139
Average Annual Inflows		*34,870*	*36,049*	*41,500*	*39,888*	*37,776*
ET		3,460	3,638	4,831	4,825	4,731
Subsurface Outflows	To Beaumont Basin	795	982	1,786	1,736	1,659
	To San Timoteo Basin	9,109	9,169	9,264	9,246	9,188
	To SBBA	4,011	4,453	5,094	4,910	4,630
	To Crafton Hills	0	1	2	1	1
	To Yucaipa Hills	2,272	2,162	2,409	2,325	2,211
	To San Bernardino Mountains	20	19	21	21	21
	Total Subsurface Outflows	16,207	16,786	18,576	18,240	17,710
GW Discharges to Streams		3,984	4,127	6,326	5,448	4,538
Surface Water Diversions		217	191	189	188	180
GW Extractions		11,346	8,668	10,621	10,611	10,589
GW Discharge to Surface		23	133	127	119	112
Average Annual Outflows		*35,237*	*33,542*	40,670	39,432	37,859
Average Annual Change in Storage		**-367**	**2,506**	**830**	**457**	**-83**

AFY = acre-feet per year

Table 2-C15: Projected Future Baseline with Climate Change I Water Budget																											
Water Year[A]	Individual Components of the Basin Water Budget Reported in Units of Acre-Feet (AF)																										
	Inflows to Groundwater System												Outflows from Groundwater System													Change in Groundwater in Storage	
	Stream Leakage	Return Flows[B]	Precipitation Recharge	Subsurface Inflows							Surface Water Spreading	Total Basin Inflows	ET	Subsurface Outflows							GW Discharges to Streams	GW Extractions	Surface Water Diversions[C]	GW Discharge to Surface[D]	Total Basin Outflows	Annual	Cumulative
				From Beaumont Basin	From San Timoteo Basin	From SBBA	From Crafton Hills	From Yucaipa Hills	From San Bernardino Mtns	Subtotal				To Beaumont Basin	To San Timoteo Basin	To SBBA	To Crafton Hills	To Yucaipa Hills	To San Bernardino Mtns	Subtotal							
2019	11,333	4,009	3,902	891	6,581	27	21	3,204	1,569	12,292	2,139	33,676	3,684	1,068	9,161	4,451	1	2,114	16	16,811	3,497	10,563	136	103	34,794	-1,118	**-1,118**
2020	11,178	4,020	4,560	894	6,571	26	21	3,150	1,739	12,400	2,139	34,298	3,820	1,088	9,175	4,555	1	2,106	17	16,941	3,617	10,555	153	117	35,203	-905	**-2,024**
2021	11,168	4,009	4,559	888	6,547	24	22	3,091	1,678	12,250	2,139	34,125	3,645	1,103	9,161	4,460	1	2,089	16	16,830	3,596	10,555	145	114	34,884	-759	**-2,783**
2022	12,035	4,009	7,682	892	6,531	23	21	3,152	1,741	12,360	2,139	38,225	4,074	1,122	9,115	4,638	1	2,120	19	17,016	4,127	10,577	185	115	36,094	2,132	**-651**
2023	12,396	4,009	8,043	880	6,510	19	20	3,218	1,798	12,445	2,139	39,032	3,765	1,140	9,116	4,692	1	2,147	19	17,115	4,380	10,588	190	119	36,157	2,875	**2,224**
2024	11,481	4,020	5,447	867	6,541	17	20	3,271	1,840	12,555	2,139	35,642	4,137	1,174	9,181	4,531	1	2,155	17	17,058	3,887	10,575	189	115	35,962	-320	**1,904**
2025	14,291	4,009	15,055	867	6,526	15	19	3,453	2,324	13,203	2,139	*48,698*	4,467	1,205	9,070	4,693	1	2,290	20	17,278	6,120	10,621	188	121	*38,794*	9,904	**11,808**
2026	12,388	4,009	6,309	826	6,523	11	17	3,628	2,230	13,235	2,139	*38,081*	4,769	1,212	9,158	4,680	1	2,303	20	17,375	4,780	10,612	192	118	*37,845*	235	**12,043**
2027	12,422	4,009	6,143	817	6,558	10	18	3,505	2,381	13,289	2,139	*38,003*	4,570	1,281	9,179	4,712	1	2,259	22	17,454	4,783	10,605	192	118	*37,722*	281	**12,324**
2028	11,721	4,020	4,495	812	6,605	11	20	3,423	2,233	13,104	2,139	*35,480*	4,673	1,360	9,212	4,638	1	2,219	22	17,451	4,202	10,594	192	112	*37,226*	-1,746	**10,578**
2029	12,976	4,009	6,744	809	6,550	12	21	3,335	2,247	12,974	2,139	*38,842*	3,965	1,410	9,166	4,882	1	2,202	22	17,683	5,164	10,623	192	120	*37,747*	1,095	**11,674**
2030	12,378	4,009	6,510	813	6,549	13	21	3,370	2,005	12,770	2,139	*37,807*	4,535	1,448	9,158	4,759	1	2,205	23	17,594	4,683	10,616	192	117	*37,738*	69	**11,742**
2031	11,838	4,009	4,740	803	6,526	13	21	3,350	1,917	12,630	2,139	*35,355*	4,018	1,487	9,178	4,755	1	2,183	21	17,625	4,249	10,596	192	118	*36,797*	-1,441	**10,301**
2032	12,392	4,020	5,716	801	6,556	13	22	3,295	1,924	12,610	2,139	*36,877*	4,084	1,513	9,182	4,748	1	2,162	21	17,627	4,300	10,586	192	116	*36,905*	-28	**10,273**
2033	12,067	4,009	6,550	806	6,514	13	22	3,297	2,015	12,667	2,139	*37,432*	4,518	1,530	9,162	4,750	1	2,176	20	17,640	4,408	10,593	192	119	*37,471*	-38	**10,235**
2034	15,581	4,009	19,261	818	6,490	12	19	3,669	2,480	13,488	2,139	*54,478*	4,923	1,529	9,090	4,835	2	2,400	23	17,878	7,614	10,645	192	126	*41,378*	13,100	**23,335**
2035	15,451	4,009	11,336	758	6,406	6	16	3,959	2,586	13,731	2,139	*46,666*	4,994	1,520	9,165	5,022	3	2,494	22	18,227	7,599	10,652	192	130	*41,794*	4,873	**28,207**
2036	17,238	4,020	16,588	761	6,477	6	16	4,162	2,877	14,299	2,139	*54,284*	5,799	1,608	9,193	5,034	3	2,611	23	18,472	9,216	10,653	192	131	*44,463*	9,820	**38,028**
2037	15,688	4,009	7,170	702	6,473	6	16	4,192	2,629	14,017	2,139	*43,024*	6,136	1,674	9,268	5,016	2	2,547	22	18,528	7,572	10,624	192	124	*43,176*	-153	**37,875**
2038	16,632	4,009	8,361	694	6,503	6	19	3,997	2,804	14,023	2,139	*45,165*	5,001	1,775	9,255	5,159	2	2,488	24	18,702	8,383	10,640	192	129	*43,047*	2,118	**39,993**
2039	17,515	4,009	11,890	695	6,517	6	19	4,012	2,882	14,132	2,139	*49,686*	5,190	1,853	9,219	5,273	2	2,520	26	18,894	9,710	10,663	192	138	*44,787*	4,899	**44,892**
2040	15,094	4,020	7,564	677	6,522	7	18	4,090	2,527	13,841	2,139	*42,658*	6,294	1,887	9,349	5,125	2	2,529	23	18,916	7,351	10,639	192	126	*43,517*	-859	**44,032**
2041	14,462	4,009	6,271	667	6,518	6	21	3,961	2,449	13,623	2,139	*40,504*	5,422	1,947	9,335	5,098	2	2,475	24	18,880	6,556	10,626	192	122	*41,797*	-1,293	**42,739**
2042	13,927	4,009	5,091	667	6,553	6	23	3,841	2,454	13,545	2,139	*38,711*	5,315	1,974	9,348	5,095	2	2,413	23	18,854	5,989	10,616	192	119	*41,084*	-2,372	**40,367**
2043	13,097	4,009	4,330	678	6,578	6	24	3,737	2,361	13,385	2,139	*36,960*	5,122	1,979	9,346	5,070	2	2,361	23	18,780	5,291	10,608	192	118	*40,111*	-3,150	**37,216**
2044	12,632	4,020	4,092	688	6,603	7	25	3,628	2,267	13,219	2,139	*36,102*	4,860	1,985	9,362	5,031	2	2,335	23	18,737	4,860	10,603	192	117	*39,369*	-3,267	**33,949**
2045	11,934	4,009	3,890	701	6,608	9	26	3,526	2,045	12,915	2,139	*34,887*	4,779	1,974	9,318	4,928	2	2,290	22	18,534	4,324	10,599	192	114	*38,542*	-3,655	**30,294**
2046	11,415	4,009	3,314	719	6,616	11	27	3,433	1,857	12,662	2,139	*33,540*	4,548	1,942	9,301	4,844	2	2,241	21	18,351	3,844	10,587	189	114	*37,632*	-4,092	**26,202**
2047	12,356	4,009	7,271	739	6,617	12	27	3,391	1,852	12,637	2,139	*38,413*	4,562	1,926	9,228	4,867	2	2,247	20	18,290	4,467	10,592	184	115	*38,210*	202	**26,404**
2048	12,649	4,020	7,655	755	6,635	12	25	3,461	1,892	12,781	2,139	*39,245*	4,770	1,898	9,259	4,920	2	2,287	19	18,386	4,772	10,617	192	117	*38,853*	391	**26,795**
2049	15,508	4,009	19,111	765	6,611	10	21	3,874	2,287	13,568	2,139	*54,336*	5,359	1,853	9,166	4,980	2	2,508	23	18,532	7,532	10,651	192	125	*42,391*	11,944	**38,740**
2050	13,764	4,009	7,509	715	6,578	6	19	3,994	2,428	13,739	2,139	*41,161*	5,220	1,821	9,273	5,094	2	2,499	19	18,708	5,950	10,630	192	125	*40,825*	336	**39,076**
2051	16,138	4,009	12,230	719	6,607	6	20	3,964	2,766	14,083	2,139	*48,599*	5,344	1,897	9,226	5,084	2	2,530	22	18,760	8,208	10,651	192	129	*43,284*	5,315	**44,390**
2052	14,323	4,020	6,511	691	6,621	6	20	3,967	2,511	13,816	2,139	*40,809*	5,766	1,922	9,340	5,078	2	2,484	20	18,846	6,454	10,623	192	120	*42,002*	-1,193	**43,198**
2053	14,116	4,009	7,486	695	6,627	6	22	3,859	2,479	13,688	2,139	*41,438*	5,504	1,970	9,312	5,052	2	2,444	22	18,801	6,305	10,629	192	118	*41,550*	-112	**43,086**
2054	16,470	4,009	14,193	703	6,629	6	21	3,930	2,749	14,039	2,139	*50,851*	4,917	2,015	9,254	5,185	2	2,521	23	19,000	8,658	10,654	192	133	*43,555*	7,295	**50,381**
2055	14,034	4,009	6,353	672	6,597	6	20	4,031	2,408	13,735	2,139	*40,270*	5,650	2,035	9,366	5,216	2	2,493	21	19,132	6,295	10,624	192	126	*42,019*	-1,749	**48,632**
2056	13,639	4,020	5,679	676	6,660	7	23	3,900	2,357	13,623	2,139	*39,101*	5,622	2,083	9,389	5,116	2	2,455	21	19,066	5,683	10,611	192	118	*41,292*	-2,191	**46,441**
2057	13,602	4,009	5,450	677	6,647	6	24	3,756	2,400	13,511	2,139	*38,711*	5,047	2,104	9,346	5,139	2	2,396	21	19,008	5,783	10,616	192	120	*40,767*	-2,056	**44,385**
2058	11,997	4,009	3,529	690	6,674	7	26	3,675	2,167	13,239	2,139	*34,913*	5,325	2,100	9,371	4,958	2	2,337	22	18,790	4,448	10,605	192	113	*39,473*	-4,560	**39,825**
2059	12,722	4,009	5,333	703	6,678	8	27	3,538	2,084	13,038	2,139	*37,242*	4,803	2,085	9,325	5,070	1	2,310	21	18,812	4,766	10,605	192	117	*39,295*	-2,054	**37,772**
2060	11,973	4,020	4,511	726	6,704	10	27	3,506	1,942	12,915	2,139	*35,558*	4,947	2,063	9,352	4,945	1	2,286	21	18,668	4,258	10,603	192	113	*38,781*	-3,223	**34,548**
2061	14,564	4,009	13,127	745	6,642	10	25	3,620	2,220	13,262	2,139	*47,102*	4,835	2,049	9,237	5,093	1	2,378	22	18,781	6,465	10,645	192	124	*41,042*	6,060	**40,608**
2062	12,461	4,009	5,412	710	6,624	7	24	3,748	2,008	13,121	2,139	*37,142*	5,123	2,006	9,315	5,021	1	2,370	19	18,732	4,733	10,615	192	118	*39,514*	-2,371	**38,236**
2063	11,391	4,009	3,727	718	6,693	7	25	3,618	2,101	13,161	2,139	*34,427*	5,104	2,015	9,319	4,816	1	2,310	19	18,481	3,881	10,599	188	111	*38,364*	-3,936	**34,300**
2064	11,866	4,020	4,276	733	6,743	9	27	3,483	2,179	13,174	2,139	*35,475*	4,662	2,012	9,307	4,950	1	2,272	19	18,562	4,142	10,595	191	113	*38,264*	-2,790	**31,510**
2065	11,604	4,009	3,969	743	6,734	11	27	3,387	1,983	12,885	2,139	*34,607*	4,637	2,003	9,279	4,860	1	2,216	20	18,380	3,934	10,589	191	111	*37,843*	-3,237	**28,274**
2066	12,372	4,009	6,476	756	6,693	12	27	3,344	1,899	12,732	2,139	*37,727*	4,321	1,993	9,235	4,879	1	2,200	22	18,330	4,458	10,605	191	116	*38,021*	-294	**27,980**
2067	12,985	4,009	8,252	761	6,674	12	26	3,407	1,912	12,791	2,139	*40,177*	4,494	1,965	9,216	4,940	1	2,226	22	18,370	4,935	10,629	192	120	*38,741*	1,436	**29,416**
2068	11,494	4,020	4,308	758	6,692	11	25	3,463	1,772	12,721	2,139	*34,684*	4,711	1,957	9,291	4,827	1	2,218	19	18,313	3,891	10,594	190	113	*37,812*	-3,128	**26,287**
2069	11,340	4,009	3,784	764	6,710	11	27	3,373	1,934	12,818	2,139	*34,089*	4,256	1,951	9,241	4,860	1	2,178	17	18,248	3,718	10,576	173	112	*37,083*	-2,993	**23,294**
Average	**13,257**	**4,012**	**7,290**	**755**	**6,591**	**11**	**22**	**3,612**	**2,200**	**13,191**	**2,139**	**39,888**	**4,825**	**1,736**	**9,246**	**4,910**	**1**	**2,325**	**21**	**18,240**	**5,448**	**10,611**	**188**	**119**	**39,432**	**457**	**27,632**

[A]Water Year corresponds to October 1 of the previous year, through September 30th of the current year.

[B]Return flows consist of water that recharges the Subbasin via municipal distribution network leaks, septic system discharges, and infiltration of irrigation water

[C]Represents surface water diversions through the operation of YVWD-25

[D]The YIHM calculates groundwater discharges to land surface when groundwater elevations in a given cell are higher than the top elevation of the cell

Table 2-C16: Projected Future Baseline with Climate Change II Water Budget

Water Year[A]	Individual Components of the Basin Water Budget Reported in Units of Acre-Feet (AF)																									
	Inflows to Groundwater System												Outflows from Groundwater System												Change in Groundwater in Storage	
				Subsurface Inflows										Subsurface Outflows												
	Stream Leakage	Return Flows[B]	Precipitation Recharge	From Beaumont Basin	From San Timoteo Basin	From SBBA	From Crafton Hills	From Yucaipa Hills	From San Bernardino Mtns	Subtotals	Surface Water Spreading	Total Basin Inflows	ET	To Beaumont Basin	To San Timoteo Basin	To SBBA	To Crafton Hills	To Yucaipa Hills	To San Bernardino Mtns	GW Discharges to Streams	GW Extractions	Surface Water Diversions[C]	GW Discharge to Surface[D]	Total Basin Outflows	Annual	Cumulative
2019	11,195	4,009	3,839	891	6,592	27	21	3,209	1,558	11,407	2,139	33,480	3,984	1,070	9,164	4,363	1	2,114	16	3,367	10,562	131	100	34,871	-1,390	**-1,390**
2020	10,994	4,020	4,494	894	6,577	26	21	3,151	1,729	11,504	2,139	34,045	4,101	1,090	9,178	4,461	1	2,106	16	3,466	10,551	145	112	35,227	-1,181	**-2,572**
2021	10,823	4,009	3,982	888	6,560	25	22	3,090	1,650	11,347	2,139	33,189	3,936	1,099	9,162	4,326	1	2,082	16	3,341	10,549	132	109	34,753	-1,564	**-4,135**
2022	11,708	4,009	6,983	893	6,536	24	22	3,111	1,703	11,396	2,139	37,129	4,221	1,116	9,118	4,533	1	2,092	19	3,834	10,563	173	110	35,780	1,349	**-2,786**
2023	11,996	4,009	7,106	883	6,512	21	22	3,148	1,727	11,429	2,139	37,562	3,979	1,141	9,117	4,555	1	2,105	20	4,027	10,574	181	113	35,813	1,750	**-1,037**
2024	11,050	4,020	4,928	874	6,538	19	21	3,188	1,719	11,485	2,139	34,497	4,280	1,168	9,176	4,377	1	2,104	17	3,521	10,565	168	109	35,486	-989	**-2,025**
2025	13,393	4,009	13,363	878	6,525	17	20	3,322	2,116	12,000	2,139	*45,783*	4,522	1,190	9,061	4,568	1	2,215	20	5,226	10,602	172	114	*37,692*	8,091	**6,066**
2026	11,545	4,009	5,755	847	6,547	14	19	3,483	2,048	12,111	2,139	*36,407*	4,815	1,188	9,142	4,469	1	2,230	19	4,018	10,592	192	110	*36,776*	-368	**5,697**
2027	11,458	4,009	5,504	840	6,585	13	20	3,372	2,207	12,196	2,139	*36,147*	4,544	1,255	9,154	4,500	1	2,193	20	3,967	10,587	192	111	*36,523*	-376	**5,321**
2028	10,959	4,020	3,891	840	6,623	14	21	3,290	2,081	12,030	2,139	*33,878*	4,566	1,319	9,186	4,417	1	2,150	21	3,559	10,578	188	106	*36,091*	-2,213	**3,108**
2029	12,036	4,009	5,549	839	6,565	15	22	3,184	2,097	11,884	2,139	*36,456*	3,910	1,355	9,145	4,632	1	2,121	20	4,292	10,590	191	114	*36,371*	85	**3,194**
2030	11,669	4,009	5,687	841	6,554	16	22	3,202	1,849	11,644	2,139	*35,990*	4,480	1,404	9,128	4,562	1	2,109	22	3,992	10,587	192	110	*36,588*	-598	**2,595**
2031	10,989	4,009	3,950	846	6,535	16	23	3,169	1,725	11,467	2,139	*33,400*	4,051	1,416	9,150	4,449	1	2,079	20	3,537	10,565	184	111	*35,562*	-2,162	**433**
2032	11,754	4,020	5,077	839	6,534	16	24	3,109	1,709	11,392	2,139	*35,221*	4,056	1,449	9,141	4,531	1	2,061	20	3,674	10,555	164	109	*35,761*	-540	**-106**
2033	11,235	4,009	6,183	845	6,500	17	23	3,111	1,818	11,469	2,139	*35,880*	4,445	1,462	9,119	4,505	1	2,073	19	3,691	10,561	184	113	*36,172*	-292	**-398**
2034	14,384	4,009	16,767	857	6,449	15	21	3,401	2,228	12,114	2,139	*50,270*	4,737	1,456	9,060	4,679	1	2,274	20	6,226	10,621	188	118	*39,380*	10,890	**10,492**
2035	13,938	4,009	9,525	801	6,380	10	18	3,652	2,333	12,392	2,139	*42,803*	4,802	1,450	9,125	4,797	2	2,336	21	6,037	10,645	192	121	*39,528*	3,275	**13,767**
2036	15,500	4,020	14,073	814	6,458	8	17	3,822	2,737	13,042	2,139	*49,589*	5,568	1,517	9,145	4,781	2	2,435	26	7,308	10,646	192	120	*41,741*	7,848	**21,615**
2037	13,841	4,009	7,058	762	6,452	6	17	3,876	2,469	12,821	2,139	*40,630*	5,835	1,560	9,199	4,669	2	2,404	23	5,941	10,614	192	114	*40,553*	77	**21,692**
2038	15,276	4,009	7,815	749	6,501	6	19	3,717	2,633	12,876	2,139	*42,863*	5,003	1,650	9,185	4,860	1	2,358	24	6,883	10,621	192	119	*40,899*	1,964	**23,656**
2039	16,655	4,009	11,322	751	6,473	7	19	3,745	2,794	13,038	2,139	*47,915*	5,135	1,730	9,188	5,068	2	2,384	27	8,401	10,654	192	128	*42,909*	5,006	**28,662**
2040	13,859	4,020	7,046	725	6,470	6	19	3,839	2,476	12,810	2,139	*40,599*	6,048	1,766	9,308	4,773	2	2,397	25	6,161	10,620	192	116	*41,408*	-809	**27,853**
2041	13,120	4,009	5,546	718	6,483	6	21	3,716	2,396	12,622	2,139	*38,154*	5,316	1,819	9,274	4,826	2	2,347	23	5,339	10,606	192	113	*39,857*	-1,703	**26,150**
2042	12,695	4,009	4,747	717	6,541	7	23	3,611	2,388	12,569	2,139	*36,876*	5,222	1,860	9,274	4,746	2	2,296	23	4,938	10,598	192	112	*39,262*	-2,386	**23,764**
2043	11,973	4,009	3,964	726	6,578	9	24	3,507	2,304	12,422	2,139	*35,233*	5,078	1,866	9,267	4,701	2	2,252	24	4,367	10,592	192	111	*38,450*	-3,217	**20,547**
2044	11,685	4,020	3,687	741	6,607	11	25	3,426	2,133	12,202	2,139	*34,475*	4,750	1,878	9,285	4,653	2	2,222	23	4,053	10,587	192	110	*37,754*	-3,280	**17,267**
2045	11,172	4,009	3,435	757	6,594	12	26	3,315	1,895	11,842	2,139	*33,354*	4,643	1,873	9,241	4,617	2	2,173	21	3,654	10,574	188	107	*37,094*	-3,740	**13,527**
2046	10,811	4,009	3,111	768	6,594	14	27	3,222	1,703	11,558	2,139	*32,397*	4,422	1,859	9,224	4,530	2	2,124	21	3,339	10,556	166	107	*36,350*	-3,953	**9,574**
2047	11,694	4,009	6,241	786	6,572	15	27	3,166	1,688	11,468	2,139	*36,337*	4,352	1,831	9,158	4,628	2	2,124	22	3,860	10,558	165	109	*36,809*	-472	**9,102**
2048	11,939	4,020	6,858	803	6,575	16	26	3,218	1,724	11,559	2,139	*37,318*	4,603	1,820	9,198	4,667	2	2,146	22	4,052	10,579	188	110	*37,386*	-67	**9,035**
2049	14,675	4,009	17,715	812	6,522	14	22	3,600	2,067	12,225	2,139	*51,575*	5,156	1,778	9,101	4,750	2	2,362	25	6,402	10,629	191	117	*40,513*	11,062	**20,097**
2050	12,510	4,009	6,848	755	6,503	8	20	3,746	2,170	12,446	2,139	*38,708*	5,161	1,750	9,197	4,728	2	2,366	19	4,831	10,612	192	116	*38,971*	-264	**19,833**
2051	14,706	4,009	11,268	763	6,551	7	20	3,681	2,641	12,901	2,139	*45,786*	5,257	1,809	9,160	4,853	2	2,397	22	6,614	10,636	192	119	*41,061*	4,725	**24,558**
2052	13,029	4,020	6,060	743	6,594	7	21	3,720	2,443	12,785	2,139	*38,777*	5,610	1,826	9,255	4,771	1	2,371	21	5,284	10,612	192	113	*40,057*	-1,280	**23,278**
2053	12,890	4,009	6,466	742	6,596	7	22	3,604	2,398	12,627	2,139	*38,872*	5,368	1,865	9,223	4,766	1	2,322	22	5,175	10,610	192	111	*39,655*	-783	**22,495**
2054	15,156	4,009	11,652	750	6,573	8	22	3,637	2,621	12,861	2,139	*46,567*	4,810	1,903	9,194	4,928	1	2,376	23	7,041	10,644	192	123	*41,237*	5,330	**27,825**
2055	12,527	4,009	5,918	729	6,550	7	21	3,721	2,300	12,599	2,139	*37,921*	5,483	1,921	9,279	4,752	1	2,358	21	5,040	10,612	192	116	*39,776*	-1,855	**25,970**
2056	12,104	4,020	5,152	726	6,611	7	23	3,614	2,284	12,540	2,139	*36,681*	5,371	1,978	9,289	4,754	1	2,318	21	4,456	10,597	192	110	*39,087*	-2,406	**23,564**
2057	12,264	4,009	5,478	730	6,616	9	24	3,485	2,327	12,462	2,139	*37,082*	4,881	1,983	9,247	4,843	1	2,267	21	4,556	10,597	192	113	*38,701*	-1,619	**21,945**
2058	11,049	4,009	3,391	739	6,648	10	25	3,423	2,074	12,181	2,139	*33,509*	5,132	2,021	9,265	4,555	1	2,210	22	3,655	10,590	191	106	*37,749*	-4,240	**17,705**
2059	11,768	4,009	4,535	757	6,636	12	27	3,314	1,945	11,934	2,139	*35,142*	4,675	2,001	9,238	4,665	1	2,184	21	3,908	10,585	191	110	*37,579*	-2,437	**15,269**
2060	11,154	4,020	3,769	769	6,650	14	27	3,265	1,784	11,740	2,139	*33,592*	4,730	1,987	9,260	4,560	1	2,147	21	3,555	10,572	188	105	*37,129*	-3,537	**11,732**
2061	13,319	4,009	10,979	792	6,570	14	26	3,316	2,001	11,927	2,139	*43,165*	4,677	1,958	9,163	4,820	1	2,215	23	5,119	10,609	191	115	*38,890*	4,275	**16,007**
2062	11,394	4,009	4,762	765	6,577	12	24	3,427	1,789	11,829	2,139	*34,898*	4,907	1,925	9,215	4,568	1	2,205	20	3,835	10,589	191	110	*37,565*	-2,667	**13,340**
2063	10,540	4,009	3,482	772	6,633	12	25	3,322	1,827	11,820	2,139	*32,762*	4,788	1,929	9,207	4,459	1	2,157	19	3,184	10,565	153	104	*36,565*	-3,802	**9,538**
2064	11,054	4,020	3,755	783	6,654	14	27	3,216	1,962	11,872	2,139	*33,624*	4,394	1,918	9,214	4,570	1	2,131	19	3,437	10,559	152	106	*36,502*	-2,878	**6,660**
2065	10,773	4,009	3,241	793	6,637	15	27	3,139	1,808	11,626	2,139	*32,582*	4,401	1,905	9,186	4,456	1	2,082	19	3,293	10,551	152	104	*36,149*	-3,568	**3,092**
2066	11,545	4,009	5,310	799	6,594	16	27	3,083	1,731	11,452	2,139	*35,253*	4,161	1,892	9,141	4,573	1	2,055	22	3,692	10,555	169	108	*36,369*	-1,116	**1,975**
2067	12,087	4,009	7,040	805	6,561	16	26	3,123	1,734	11,460	2,139	*37,540*	4,310	1,883	9,134	4,648	1	2,067	24	4,011	10,573	184	111	*36,947*	594	**2,569**
2068	10,608	4,020	3,781	808	6,589	16	26	3,155	1,543	11,329	2,139	*32,686*	4,521	1,862	9,193	4,419	1	2,057	20	3,191	10,562	155	105	*36,085*	-3,400	**-830**
2069	10,557	4,009	3,195	812	6,569	16	27	3,081	1,588	11,280	2,139	*31,993*	4,063	1,846	9,154	4,440	1	2,013	17	3,106	10,548	106	105	*35,399*	-3,406	**-4,237**
Average	**12,295**	**4,012**	**6,496**	**795**	**6,558**	**13**	**23**	**3,393**	**2,053**	**12,039**	**2,139**	**37,776**	**4,731**	**1,659**	**9,188**	**4,630**	**1**	**2,211**	**21**	**4,538**	**10,589**	**180**	**112**	**37,859**	**-83**	**11,589**

[A] Water Year corresponds to October 1 of the previous year, through September 30th of the current year.

[B] Return flows consist of water that recharges the Subbasin via municipal distribution network leaks, septic system discharges, and infiltration of irrigation water

[C] Represents surface water diversions through the operation of YVWD-25

[D] The YIHM calculates groundwater discharges to land surface when groundwater elevations in a given cell are higher than the top elevation of the cell

Table 2-C17: Parameter groups included in YIHM Calibration and Sensitivity Analysis		
Group Name	Model Component	Parameter Description
A	PRMS	Solar Radiation and PET parameters
B	PRMS, MODFLOW	Soil zone and
C	MODFLOW	Hydraulic conductivity
D	MODFLOW	Storage properties
E	MODFLOW	General head and constant head boundary condition properties
F	MODFLOW	Conductance parameters for faults and barriers to flow
G	MODFLOW	Streambed conductivity
H	MODFLOW	Unsaturated zone parameters, including brook-corey exponent, extinction depths, and surface leakage conductances

Table 2-C18: Historical Water Budget for the Western Heights Management Area																								
Water Year[A]	Water Year Type	Inflows to Principal Aquifer										Outflows from Principal Aquifer											Change in Storage	
		Stream Leakage	Return Flows	Precipitation Recharge	Subsurface Inflows						Total Inflows	ET	GW Production	GW Discharge to Streams	Subsurface Outflows						GW Discharge to Surface	Total Outflows		
					From North Bench MA	From Crafton Hills	From SBBA	From Calimesa MA	From San. Tim. MA	Subtotal					To North Bench MA	To Crafton Hills	To SBBA	To Calimesa MA	To San. Tim. MA	Subtotal			Annual	Cumulative
1965	Normal	0	72	80	335	11	0	733	73	*1,152*	1,305	1	2,646	0	0	0	0	60	148	*208*	0	2,855	***-1,550***	**-1,550**
1966	Above Normal	0	72	251	343	10	0	731	96	*1,181*	1,505	8	2,741	0	0	0	0	45	148	*194*	0	2,943	***-1,438***	**-2,988**
1967	Wet	0	72	260	332	10	0	708	119	*1,169*	1,502	10	2,315	0	0	0	0	45	151	*195*	0	2,520	***-1,018***	**-4,007**
1968	Normal	0	73	199	332	10	0	685	141	*1,167*	1,440	0	2,580	0	0	0	0	46	156	*202*	0	2,782	***-1,342***	**-5,349**
1969	Wet	1	72	692	341	10	0	690	176	*1,217*	1,982	16	1,986	0	0	0	0	43	162	*205*	0	2,208	***-225***	**-5,575**
1970	Dry	0	321	360	333	9	0	710	172	*1,225*	1,906	2	2,186	0	0	0	0	38	169	*208*	0	2,396	***-490***	**-6,064**
1971	Below Normal	0	202	235	334	9	0	716	150	*1,209*	1,646	2	2,259	0	0	0	0	29	171	*200*	0	2,460	***-814***	**-6,879**
1972	Dry	0	202	168	338	9	0	706	139	*1,192*	1,562	1	2,831	0	0	0	0	24	171	*195*	0	3,026	***-1,464***	**-8,343**
1973	Above Normal	0	202	153	338	9	0	686	135	*1,168*	1,523	4	2,381	0	0	0	0	20	170	*190*	0	2,575	***-1,052***	**-9,394**
1974	Below Normal	0	202	220	316	9	0	718	136	*1,180*	1,602	8	2,473	0	0	0	0	19	170	*189*	0	2,670	***-1,068***	**-10,462**
1975	Normal	0	204	179	294	9	0	737	135	*1,174*	1,557	0	2,326	0	0	0	0	27	170	*197*	0	2,523	***-966***	**-11,429**
1976	Normal	0	207	205	289	9	0	753	135	*1,186*	1,597	4	2,351	0	0	0	0	30	171	*201*	0	2,556	***-959***	**-12,388**
1977	Below Normal	0	206	190	299	8	0	768	135	*1,211*	1,607	6	2,214	0	0	0	0	27	171	*199*	0	2,418	***-811***	**-13,198**
1978	Wet	1	206	789	296	8	0	786	169	*1,260*	2,256	17	2,382	0	1	0	0	38	172	*211*	0	2,612	***-356***	**-13,554**
1979	Above Normal	0	206	489	289	8	0	828	178	*1,304*	1,999	15	2,410	0	0	0	0	43	178	*221*	0	2,646	***-648***	**-14,202**
1980	Wet	1	76	738	286	8	0	866	188	*1,349*	2,164	17	2,267	0	0	0	0	48	181	*229*	0	2,514	***-350***	**-14,552**
1981	Dry	0	32	482	284	8	0	900	173	*1,365*	1,880	0	2,236	0	0	0	0	50	184	*234*	0	2,470	***-590***	**-15,142**
1982	Above Normal	0	32	384	286	8	0	926	159	*1,379*	1,795	12	2,121	0	0	0	0	41	182	*223*	0	2,356	***-561***	**-15,703**
1983	Wet	1	32	464	277	8	0	938	178	*1,400*	1,897	16	1,957	0	0	0	0	39	183	*222*	0	2,195	***-298***	**-16,001**
1984	Dry	0	32	353	276	8	0	982	173	*1,439*	1,824	0	2,429	0	0	0	0	45	186	*232*	0	2,661	***-837***	**-16,838**
1985	Below Normal	0	50	280	284	8	0	1,010	155	*1,456*	1,787	0	2,533	0	0	0	0	45	185	*229*	0	2,762	***-975***	**-17,813**
1986	Normal	0	56	215	290	8	0	1,056	150	*1,503*	1,774	0	2,626	0	0	0	0	39	183	*222*	0	2,848	***-1,074***	**-18,887**
1987	Dry	0	56	190	294	7	0	1,086	147	*1,535*	1,781	0	2,460	0	0	0	0	32	181	*214*	0	2,674	***-894***	**-19,780**
1988	Below Normal	0	56	164	294	7	0	1,105	146	*1,552*	1,772	0	2,591	0	0	0	0	29	181	*210*	0	2,801	***-1,029***	**-20,809**
1989	Below Normal	0	56	136	296	7	0	1,122	137	*1,562*	1,754	0	2,641	0	0	0	0	28	179	*208*	0	2,848	***-1,094***	**-21,903**
1990	Dry	0	158	130	298	7	0	1,146	133	*1,584*	1,873	0	2,926	0	0	0	0	33	177	*210*	0	3,136	***-1,263***	**-23,167**
1991	Above Normal	0	192	273	297	7	0	1,131	141	*1,576*	2,042	5	2,624	0	0	0	0	32	176	*209*	0	2,838	***-796***	**-23,963**
1992	Above Normal	0	193	340	290	7	0	1,109	151	*1,557*	2,090	12	2,476	0	0	0	0	37	178	*215*	0	2,704	***-614***	**-24,576**
1993	Wet	1	411	954	283	7	0	1,097	207	*1,594*	2,961	17	2,616	0	1	0	0	53	182	*235*	0	2,868	***92***	**-24,484**
1994	Below Normal	0	432	509	293	7	0	1,132	195	*1,627*	2,568	0	2,795	0	0	0	0	68	190	*259*	0	3,054	***-487***	**-24,971**
1995	Wet	1	561	672	299	7	0	1,114	185	*1,605*	2,839	17	2,733	0	1	0	0	58	191	*249*	0	2,999	***-160***	**-25,131**
1996	Dry	0	606	455	290	7	0	1,088	172	*1,557*	2,618	0	2,863	0	0	0	0	60	193	*254*	0	3,117	***-499***	**-25,630**
1997	Above Normal	0	604	350	289	7	0	1,070	147	*1,512*	2,467	9	2,876	0	0	0	0	64	189	*253*	0	3,138	***-672***	**-26,302**
1998	Wet	1	604	528	279	7	0	1,066	175	*1,527*	2,660	15	3,228	0	0	0	0	71	188	*259*	0	3,502	***-842***	**-27,144**
1999	Dry	0	604	396	277	7	0	1,073	179	*1,536*	2,536	0	2,842	0	0	0	0	85	192	*278*	0	3,120	***-584***	**-27,728**
2000	Dry	0	640	298	283	7	0	1,051	148	*1,488*	2,426	0	2,503	0	0	0	0	77	190	*268*	0	2,771	***-345***	**-28,073**
2001	Dry	0	649	266	258	7	0	1,037	141	*1,442*	2,358	0	2,359	0	0	0	0	91	186	*278*	0	2,637	***-279***	**-28,352**
2002	Critically Dry	0	649	226	249	7	0	1,023	135	*1,414*	2,289	0	2,466	0	0	0	0	100	184	*284*	0	2,751	***-462***	**-28,814**
2003	Above Normal	0	649	224	245	7	0	1,003	138	*1,393*	2,266	4	2,340	0	0	0	0	106	182	*288*	0	2,631	***-365***	**-29,180**
2004	Dry	0	651	205	243	7	0	988	140	*1,377*	2,233	0	2,386	0	0	0	0	108	182	*291*	0	2,676	***-443***	**-29,622**
2005	Wet	1	456	500	237	7	0	988	180	*1,412*	2,369	14	2,380	0	0	0	0	116	183	*300*	0	2,694	***-326***	**-29,948**
2006	Below Normal	0	391	340	236	7	0	979	182	*1,403*	2,134	0	2,537	0	0	0	0	123	189	*312*	0	2,848	***-714***	**-30,662**
2007	Critically Dry	0	391	219	242	6	0	986	153	*1,388*	1,998	0	2,759	0	0	0	0	125	188	*313*	0	3,072	***-1,074***	**-31,736**
2008	Normal	0	392	219	245	6	0	997	148	*1,395*	2,006	0	2,456	0	0	0	0	129	186	*315*	0	2,771	***-765***	**-32,501**
2009	Below Normal	0	391	210	245	6	0	980	146	*1,377*	1,978	0	1,961	0	0	0	0	123	184	*307*	0	2,268	***-290***	**-32,791**
2010	Above Normal	0	400	316	245	6	0	963	156	*1,370*	2,087	3	1,870	0	0	0	0	120	184	*303*	0	2,177	***-90***	**-32,881**
2011	Wet	1	403	419	246	6	0	949	174	*1,376*	2,198	5	1,943	0	0	0	0	118	186	*304*	0	2,251	***-52***	**-32,934**
2012	Dry	0	404	342	250	6	0	958	158	*1,372*	2,119	0	2,089	0	0	0	0	122	188	*310*	0	2,398	***-280***	**-33,214**
2013	Dry	0	403	261	255	6	0	978	144	*1,383*	2,047	0	2,077	0	0	0	0	126	185	*311*	0	2,389	***-342***	**-33,555**
2014	Dry	0	403	212	259	6	0	974	138	*1,377*	1,991	0	2,110	0	0	0	0	125	183	*308*	0	2,418	***-426***	**-33,981**
Historical Average		**0**	**293**	**335**	**286**	**7.64**	***0***	***937***	***153***	***1,384***	***2,011***	***5***	***2,443***	***0***	***0***	***0***	***0***	***64***	***179***	***243***	***0***	***2,691***	**-680**	
Critically Dry Water Year Avg		0	520	223	245	7	*0*	*1,005*	*144*	*1,401*	*2,143*	*0*	*2,613*	*0*	*0*	*0*	*0*	*113*	*186*	*299*	*0*	*2,912*	-768	
Dry Water Year Avg		0	369	294	281	7	*0*	*977*	*154*	*1,419*	*2,082*	*0*	*2,450*	*0*	*0*	*0*	*0*	*73*	*184*	*256*	*0*	*2,706*	-624	
Below Normal Water Year Avg		0	221	254	289	8	*0*	*948*	*154*	*1,397*	*1,872*	*2*	*2,445*	*0*	*0*	*0*	*0*	*55*	*180*	*235*	*0*	*2,681*	-809	
Normal Water Year Avg		0	167	183	297	9	*0*	*827*	*130*	*1,263*	*1,613*	*1*	*2,497*	*0*	*0*	*0*	*0*	*55*	*169*	*224*	*0*	*2,722*	-1,109	
Above Normal Water Year Avg		0	283	309	291	8	*0*	*939*	*145*	*1,382*	*1,975*	*8*	*2,427*	*0*	*0*	*0*	*0*	*56*	*176*	*233*	*0*	*2,668*	-693	
Wet Water Year Avg		1	289	602	288	8	*0*	*920*	*175*	*1,391*	*2,283*	*14*	*2,381*	*0*	*0*	*0*	*0*	*63*	*178*	*241*	*0*	*2,636*	-354	

[A]Water Year corresponds to October 1 of the previous year, through September 30th of the current year.

Table 2-C19: Historical Water Budget for the North Bench Management Area

Water Year[A]	Water Year Type	Inflows to Principal Aquifer													Outflows from Principal Aquifer															Change in Groundwater in Storage	
						Subsurface Inflows													Subsurface Outflows											
		Stream Leakage	Return Flows	Precipitation Recharge	Surface Water Spreading	From San Bernardino Mtns	From Crafton Hills	From Yucaipa Hills	From SBBA near Mill Creek	From San Timoteo Subbasin	From Calimesa	From Western Heights	Subtotal	Total Inflows	ET	GW Production	Surface Water Diversions	GW Discharge to Streams	To San Bernardino Mtns	To Crafton Hills	To Yucaipa Hills	To SBB near Mill Creek	To San Timoteo Subbasin	To Calimesa	To Western Heights	Subtotal	GW Discharge to Surface	Total Outflows	Annual	Cumulative
1965	Normal	1,829	1,992	1,253	0	1,455	36	2,510	263	436	14	0	4,714	9,787	1,092	2,477	0	2,006	13	0	1,910	238	12	2,088	335	4,598	5	10,178	*-391*	-391
1966	Above Normal	2,400	1,992	3,456	0	1,596	35	2,568	242	429	17	0	4,885	12,733	1,377	3,049	31	2,371	14	0	1,940	272	14	2,101	343	4,685	6	11,518	*1,215*	823
1967	Wet	2,533	1,992	3,160	0	1,705	34	2,603	228	433	14	0	5,017	12,702	1,145	2,845	36	2,512	13	0	1,937	296	13	2,167	332	4,757	6	11,301	*1,401*	2,225
1968	Normal	2,045	1,997	1,695	0	1,837	34	2,610	223	434	14	0	5,151	10,889	1,294	3,026	16	2,242	13	0	1,927	307	13	2,210	332	4,802	5	11,385	*-496*	1,729
1969	Wet	3,943	1,992	7,782	0	2,374	33	2,745	203	426	14	0	5,795	19,511	1,450	3,048	127	3,564	15	0	2,047	337	15	2,247	341	5,001	8	13,197	*6,314*	8,043
1970	Dry	2,480	1,992	2,294	0	2,298	32	2,848	180	464	13	0	5,836	12,602	1,459	2,905	111	2,820	17	0	2,051	373	9	2,260	333	5,044	7	12,346	*256*	8,299
1971	Below Normal	2,629	1,991	2,122	0	2,453	32	2,727	168	456	14	0	5,851	12,592	1,375	2,544	142	2,826	18	0	2,037	389	11	2,292	334	5,082	7	11,975	*617*	8,916
1972	Dry	2,391	1,996	1,574	0	2,295	32	2,702	163	452	15	0	5,658	11,620	1,543	2,597	156	2,602	21	0	2,000	403	12	2,361	338	5,135	5	12,038	*-418*	8,498
1973	Above Normal	3,131	1,991	3,300	0	2,241	32	2,660	159	433	18	0	5,543	13,964	1,265	3,133	217	3,117	20	0	1,999	414	15	2,392	338	5,177	6	12,914	*1,049*	9,547
1974	Below Normal	2,755	1,991	2,425	0	2,070	31	2,754	155	434	14	0	5,457	12,628	1,466	4,030	206	2,851	20	0	1,987	429	15	2,387	316	5,155	6	13,715	*-1,086*	8,461
1975	Normal	2,380	2,008	1,501	0	2,021	31	2,731	151	439	14	0	5,386	11,276	1,220	3,326	133	2,523	19	0	1,959	440	14	2,339	294	5,065	6	12,273	*-997*	7,463
1976	Normal	2,546	2,020	2,031	0	2,077	31	2,678	150	436	15	0	5,387	11,984	1,282	3,257	88	2,490	18	0	1,942	442	15	2,295	289	5,001	5	12,123	*-138*	7,325
1977	Below Normal	2,436	2,015	2,199	0	2,093	31	2,659	154	434	15	0	5,385	12,035	1,269	3,075	100	2,505	19	0	1,936	427	16	2,266	299	4,963	6	11,918	*118*	7,443
1978	Wet	4,728	2,015	10,722	0	2,517	30	3,024	152	454	13	1	6,191	23,656	1,676	2,739	220	4,464	19	0	2,173	433	13	2,370	296	5,304	10	14,413	*9,243*	16,686
1979	Above Normal	4,251	2,015	5,736	0	2,618	27	3,267	133	502	14	0	6,561	18,562	1,606	2,621	267	4,350	23	0	2,268	485	6	2,494	289	5,565	12	14,421	*4,142*	20,828
1980	Wet	6,368	1,096	9,452	0	3,033	25	3,558	121	540	15	0	7,293	24,209	1,946	2,985	332	6,004	25	0	2,445	517	6	2,626	286	5,905	13	17,184	*7,025*	27,853
1981	Dry	4,625	783	2,421	0	2,842	24	3,571	113	574	20	0	7,145	14,975	1,980	3,148	286	4,537	27	0	2,383	529	7	2,639	284	5,869	11	15,832	*-858*	26,995
1982	Above Normal	5,447	783	4,215	0	2,987	25	3,395	113	561	19	0	7,099	17,544	1,570	2,579	299	5,135	30	0	2,334	527	8	2,637	286	5,822	11	15,416	*2,128*	29,123
1983	Wet	5,952	783	6,453	0	2,913	24	3,475	110	604	21	0	7,147	20,336	1,491	2,178	332	5,790	29	0	2,388	545	8	2,729	277	5,976	13	15,781	*4,555*	33,679
1984	Dry	3,832	786	2,961	0	2,581	22	3,589	102	603	23	0	6,919	14,498	1,964	2,287	279	4,004	27	0	2,392	575	8	2,858	276	6,137	10	14,680	*-182*	33,496
1985	Below Normal	4,068	1,102	2,597	0	2,555	22	3,480	96	583	24	0	6,761	14,528	1,852	2,233	268	4,014	27	0	2,362	583	9	2,913	284	6,179	9	14,554	*-27*	33,470
1986	Normal	3,841	1,209	2,007	0	2,505	22	3,393	91	581	25	0	6,617	13,674	1,754	2,337	257	3,815	26	0	2,306	592	9	2,864	290	6,087	8	14,258	*-584*	32,885
1987	Dry	3,192	1,209	1,376	0	2,385	22	3,308	90	576	24	0	6,406	12,182	1,637	2,255	230	3,287	24	0	2,263	596	8	2,817	294	6,003	7	13,419	*-1,237*	31,649
1988	Below Normal	3,007	1,212	1,387	0	2,304	23	3,223	93	572	25	0	6,240	11,846	1,499	2,366	218	3,132	23	0	2,224	590	8	2,817	294	5,957	6	13,178	*-1,333*	30,316
1989	Below Normal	2,612	1,209	1,289	0	2,122	23	3,137	100	558	24	0	5,964	11,074	1,576	2,653	194	2,831	22	0	2,180	569	8	2,781	296	5,856	5	13,116	*-2,042*	28,274
1990	Dry	2,390	852	760	0	1,953	23	3,065	108	553	22	0	5,724	9,726	1,429	2,926	172	2,607	21	0	2,140	549	7	2,773	298	5,789	5	12,928	*-3,202*	25,072
1991	Above Normal	3,110	732	3,831	0	1,959	24	3,066	118	539	22	0	5,726	13,400	1,533	3,343	198	3,032	19	0	2,158	524	9	2,783	297	5,790	5	13,902	*-502*	24,569
1992	Above Normal	3,166	734	3,882	0	1,986	24	3,174	121	546	20	0	5,870	13,652	1,613	3,575	235	3,268	18	0	2,216	518	7	2,770	290	5,820	7	14,518	*-866*	23,704
1993	Wet	5,274	733	11,331	0	2,434	22	3,597	122	585	18	1	6,780	24,119	1,935	3,095	302	5,152	22	0	2,451	514	6	2,796	283	6,072	11	16,567	*7,552*	31,255
1994	Below Normal	3,709	733	2,711	0	2,454	20	3,651	103	610	20	0	6,859	14,012	1,724	3,164	279	3,953	19	0	2,458	544	6	2,801	293	6,121	10	15,252	*-1,239*	30,016
1995	Wet	6,562	895	8,087	0	2,873	20	3,685	105	597	21	1	7,301	22,845	1,948	2,793	354	6,340	22	0	2,533	544	7	2,882	299	6,287	12	17,732	*5,113*	35,129
1996	Dry	4,661	952	2,519	0	2,530	19	3,733	91	614	23	0	7,009	15,141	2,191	3,056	330	4,825	21	0	2,503	591	7	3,000	290	6,412	9	16,822	*-1,680*	33,449
1997	Above Normal	4,618	950	3,170	0	2,470	19	3,601	82	587	24	0	6,781	15,518	2,103	3,322	305	4,609	22	0	2,460	611	7	3,037	289	6,426	8	16,773	*-1,255*	32,194
1998	Wet	6,527	950	8,059	0	2,743	18	3,692	79	614	22	0	7,169	22,704	1,762	3,279	347	6,395	23	0	2,532	633	7	3,063	279	6,537	12	18,331	*4,373*	36,567
1999	Dry	4,078	950	1,928	0	2,404	18	3,756	73	623	22	0	6,895	13,850	1,918	4,203	315	4,450	21	0	2,511	663	7	3,072	277	6,552	10	17,447	*-3,597*	32,971
2000	Dry	3,974	1,193	1,696	0	2,425	19	3,620	73	599	23	0	6,759	13,622	2,062	5,509	299	4,026	21	0	2,474	650	7	3,002	283	6,438	8	18,341	*-4,718*	28,252
2001	Dry	3,940	1,271	1,731	0	2,417	20	3,475	78	580	24	0	6,594	13,536	1,804	5,252	297	4,050	20	0	2,411	620	7	2,838	258	6,155	8	17,566	*-4,030*	24,223
2002	Critically Dry	2,801	1,271	747	36	2,206	22	3,412	83	567	22	0	6,312	11,168	1,817	5,560	235	3,178	21	0	2,349	601	7	2,704	249	5,930	6	16,727	*-5,560*	18,663
2003	Above Normal	3,302	1,271	2,166	691	2,133	23	3,298	92	558	23	0	6,128	13,558	1,633	5,117	242	3,423	20	0	2,319	576	7	2,563	245	5,730	13	16,158	*-2,600*	16,063
2004	Dry	2,802	1,274	1,562	624	1,988	24	3,285	100	552	21	0	5,970	12,232	1,774	5,443	215	3,072	17	0	2,299	559	6	2,441	243	5,565	15	16,083	*-3,851*	12,211
2005	Wet	4,813	2,339	8,047	135	2,257	23	3,471	100	560	19	0	6,430	21,765	1,819	5,426	276	4,773	19	0	2,408	566	6	2,367	237	5,605	12	17,912	*3,853*	16,064
2006	Below Normal	2,942	2,700	2,113	17	2,152	22	3,555	84	582	18	0	6,413	14,184	1,795	5,187	239	3,373	17	0	2,411	611	6	2,347	236	5,628	8	16,230	*-2,046*	14,019
2007	Critically Dry	2,484	2,700	1,115	4	2,284	22	3,393	77	568	22	0	6,366	12,669	1,866	4,999	199	2,918	17	0	2,359	620	7	2,303	242	5,548	6	15,535	*-2,866*	11,153
2008	Normal	3,082	2,707	2,101	551	2,292	23	3,250	79	558	22	0	6,223	14,664	1,886	3,967	218	3,289	17	0	2,319	615	7	2,285	245	5,488	12	14,859	*-195*	10,958
2009	Below Normal	2,989	2,700	2,290	1,337	2,096	22	3,178	78	546	17	0	5,937	15,252	1,957	3,679	215	3,252	17	0	2,262	625	6	2,273	245	5,430	33	14,566	*686*	11,644
2010	Above Normal	4,099	3,347	4,485	3,549	1,985	22	3,187	73	526	16	0	5,809	21,289	1,954	3,956	236	4,187	18	0	2,253	666	8	2,291	245	5,482	107	15,921	*5,367*	17,011
2011	Wet	4,414	3,565	5,436	3,071	2,000	21	3,254	60	536	14	0	5,885	22,371	2,041	3,737	254	4,513	17	0	2,282	738	6	2,472	246	5,761	122	16,428	*5,943*	22,954
2012	Dry	3,216	3,575	2,564	2,936	1,886	20	3,291	45	544	13	0	5,799	18,091	2,154	3,806	209	3,622	16	0	2,280	809	6	2,683	250	6,045	93	15,929	*2,161*	25,115
2013	Dry	2,988	3,565	2,188	2,170	2,030	19	3,191	38	537	17	0	5,831	16,741	2,041	3,530	182	3,312	16	0	2,242	847	6	2,828	255	6,195	75	15,334	*1,407*	26,522
2014	Dry	2,634	3,565	1,541	521	2,005	18	3,100	35	529	16	0	5,703	13,964	1,933	4,560	176	2,899	16	0	2,204	867	6	2,996	259	6,348	25	15,941	*-1,977*	24,545
Historical Average		**3,600**	**1,714**	**3,429**	**313**	**2,277**	**25**	**3,204**	**117**	**533**	**19**	**0**	**6,174**	**15,230**	**1,690**	**3,444**	**217**	**3,686**	**20**	**0**	**2,244**	**539**	**9**	**2,586**	**286**	**5,685**	**16**	**14,739**	**491**	
Critically Dry Wate Year Avg		2,643	1,985	931	20	2,245	22	3,402	80	568	22	0	6,339	11,919	1,841	5,280	217	3,048	19	0	2,354	610	7	2,503	245	5,739	6	16,131	**-4,213**	
Dry Water Year Avg		3,372	1,712	1,937	447	2,289	22	3,324	92	557	20	0	6,303	13,770	1,849	3,677	233	3,579	20	0	2,297	616	8	2,755	281	5,978	20	15,336	**-1,566**	
Below Normal Water Year Avg		3,016	1,739	2,126	150	2,255	25	3,152	115	531	19	0	6,096	13,128	1,612	3,215	207	3,193	20	0	2,206	530	9	2,542	289	5,597	10	13,834	**-706**	
Normal Water Year Avg		2,621	1,989	1,765	92	2,031	29	2,862	159	481	17	0	5,580	12,046	1,421	3,065	119	2,727	18	0	2,061	439	12	2,347	297	5,173	7	12,513	**-467**	
Above Normal Water Year Avg		3,725	1,535	3,804	471	2,219	25	3,135	126	520	19	0	6,045	15,580	1,628	3,411	226	3,721	20	0	2,216	510	9	2,563	291	5,611	19	14,616	**964**	
Wet Water Year Avg		5,111	1,636	7,853	321	2,485	25	3,310	128	535	17	0	6,501	21,422	1,721	3,212	258	4,951	20	0	2,319	512	9	2,572	288	5,720	22	15,885	**5,537**	

[A]Water Year corresponds to October 1 of the previous year, through September 30th of the current year.

Table 2-C20: Historical Water Budget for the Calimesa Management Area

Water Year	Water Year Type	Inflows to Principal Aquifer											Outflows from Principal Aquifer												Change in Groundwater in Storage	
		Stream Leakage	Return Flows	Precipitation Recharge	Subsurface Inflows							Total Inflows	ET	GW Production	GW Discharge to Streams	Subsurface Outflows							GW Discharge to Surface	Total Outflows	Annual	Cumulative
					From Yucaipa Hills	From North Bench	From Western Heights	From Beaumont Basin	From San Timoteo MA	From San Timoteo subbasin	Subtotal					To Yucaipa Hills	To North Bench	To Western Heigths	To Beaumont Basin	To San Timoteo Subbasin	To San Timoteo MA	Subtotal				
1965	Normal	419	36	798	222	2,088	60	1,660	11	322	4,363	5,616	132	3,814	30	15	14	733	565	34	524	1,885	1	5,862	-246	-246
1966	Above Normal	427	36	1,157	223	2,101	45	1,754	16	313	4,451	6,071	146	4,915	31	18	17	731	568	42	525	1,901	1	6,994	-923	-1,170
1967	Wet	441	36	1,193	230	2,167	45	1,855	17	268	4,581	6,251	143	5,326	35	17	14	708	588	46	522	1,896	1	7,401	-1,151	-2,320
1968	Normal	422	36	1,095	251	2,210	46	1,878	14	256	4,655	6,208	153	5,173	33	18	14	685	604	47	505	1,874	1	7,234	-1,026	-3,346
1969	Wet	442	36	2,328	271	2,247	43	1,915	28	247	4,751	7,556	161	4,341	40	25	14	690	601	56	515	1,902	1	6,445	1,111	-2,235
1970	Dry	456	199	1,589	339	2,260	38	1,822	15	224	4,698	6,941	184	4,574	39	21	13	710	578	56	497	1,875	2	6,674	267	-1,969
1971	Below Normal	441	244	1,494	348	2,292	29	1,875	12	250	4,806	6,984	175	4,866	38	21	14	716	576	54	482	1,863	2	6,943	40	-1,928
1972	Dry	396	244	1,368	315	2,361	24	1,896	11	261	4,867	6,877	179	5,207	33	20	15	706	589	53	473	1,855	2	7,275	-399	-2,327
1973	Above Normal	420	244	1,492	292	2,392	20	1,875	11	267	4,856	7,012	152	4,705	38	20	18	686	588	47	461	1,820	2	6,717	295	-2,032
1974	Below Normal	416	197	1,525	282	2,387	19	1,812	12	262	4,774	6,912	169	4,794	36	20	14	718	578	51	460	1,842	1	6,842	70	-1,963
1975	Normal	397	354	1,452	275	2,339	27	1,660	12	258	4,571	6,774	152	4,659	36	17	14	737	559	48	459	1,835	1	6,684	90	-1,872
1976	Normal	368	410	1,511	281	2,295	30	1,506	11	276	4,399	6,688	157	4,572	34	19	15	753	542	48	457	1,834	1	6,598	90	-1,782
1977	Below Normal	388	409	1,644	270	2,266	27	1,410	11	274	4,257	6,698	163	4,427	36	20	15	768	527	50	456	1,835	1	6,463	236	-1,546
1978	Wet	425	409	3,497	288	2,370	38	1,591	79	215	4,581	8,912	186	4,660	45	33	13	786	535	64	454	1,886	2	6,778	2,134	588
1979	Above Normal	454	409	2,754	375	2,494	43	1,540	34	195	4,681	8,298	200	4,519	54	29	14	828	541	61	458	1,930	3	6,706	1,592	2,180
1980	Wet	459	2,085	4,319	400	2,626	48	1,292	24	184	4,574	11,437	248	4,500	61	40	15	866	501	70	506	1,999	4	6,811	4,626	6,806
1981	Dry	458	2,640	3,492	458	2,639	50	908	12	173	4,240	10,830	291	4,544	53	36	20	900	459	62	512	1,990	5	6,882	3,948	10,754
1982	Above Normal	454	2,640	3,493	428	2,637	41	646	9	194	3,954	10,541	262	3,952	55	36	19	926	435	59	521	1,997	5	6,271	4,270	15,024
1983	Wet	450	2,640	3,759	382	2,729	39	521	8	165	3,843	10,693	322	4,025	63	39	21	938	433	64	538	2,034	6	6,451	4,242	19,266
1984	Dry	456	2,648	2,943	389	2,858	45	426	8	158	3,885	9,931	498	5,413	52	37	23	982	423	63	557	2,084	6	8,053	1,878	21,144
1985	Below Normal	450	4,128	3,089	381	2,913	45	398	7	176	3,919	11,587	519	5,645	50	40	24	1,010	418	60	577	2,129	7	8,350	3,237	24,381
1986	Normal	449	4,630	3,071	349	2,864	39	269	6	167	3,694	11,844	561	4,740	69	37	25	1,056	493	58	607	2,274	9	7,653	4,191	28,572
1987	Dry	449	4,630	2,354	332	2,817	32	206	5	156	3,549	10,981	693	5,172	94	36	24	1,086	494	56	636	2,332	10	8,301	2,681	31,252
1988	Below Normal	446	4,642	1,937	310	2,817	29	175	5	152	3,488	10,513	736	5,764	106	36	25	1,105	547	51	664	2,427	12	9,045	1,467	32,720
1989	Below Normal	433	4,630	1,694	296	2,781	28	162	4	153	3,425	10,182	790	5,811	104	35	24	1,122	594	54	681	2,509	13	9,226	955	33,675
1990	Dry	417	1,180	933	284	2,773	33	222	5	181	3,497	6,028	734	5,601	92	29	22	1,146	591	46	681	2,516	12	8,955	-2,927	30,748
1991	Above Normal	433	17	1,074	268	2,783	32	428	6	231	3,748	5,272	632	5,512	72	27	22	1,131	448	45	656	2,330	8	8,554	-3,281	27,467
1992	Above Normal	446	17	1,291	257	2,770	37	604	7	246	3,920	5,674	592	5,536	57	27	20	1,109	423	50	641	2,270	6	8,461	-2,787	24,679
1993	Wet	452	27	3,138	281	2,796	53	752	31	225	4,138	7,756	582	5,611	72	36	18	1,097	456	57	672	2,336	7	8,608	-853	23,827
1994	Below Normal	455	28	2,025	372	2,801	68	746	10	266	4,264	6,771	525	5,834	43	33	20	1,132	477	51	615	2,329	7	8,738	-1,967	21,860
1995	Wet	453	31	2,676	361	2,882	58	708	15	283	4,307	7,468	461	6,186	49	33	21	1,114	512	61	600	2,342	7	9,045	-1,577	20,283
1996	Dry	458	32	1,725	381	3,000	60	742	10	308	4,502	6,718	448	6,770	27	28	23	1,088	495	58	570	2,262	6	9,513	-2,795	17,488
1997	Above Normal	455	32	1,561	365	3,037	64	837	9	350	4,661	6,709	383	6,831	22	29	24	1,070	509	53	547	2,232	5	9,473	-2,763	14,724
1998	Wet	453	32	2,779	344	3,063	71	980	16	334	4,808	8,073	330	5,854	32	36	22	1,066	501	58	544	2,228	5	8,450	-377	14,347
1999	Dry	459	32	2,017	375	3,072	85	1,026	11	331	4,901	7,409	352	6,871	29	26	22	1,073	510	55	518	2,205	5	9,462	-2,053	12,294
2000	Dry	457	33	1,742	391	3,002	77	1,145	9	378	5,003	7,236	358	6,830	21	31	23	1,051	541	54	501	2,201	4	9,415	-2,179	10,115
2001	Dry	455	34	1,391	361	2,838	91	972	9	380	4,650	6,530	312	6,578	21	26	24	1,037	618	51	485	2,242	4	9,156	-2,626	7,489
2002	Critically Dry	455	34	1,044	335	2,704	100	863	9	408	4,419	5,951	293	7,175	19	24	22	1,023	776	47	476	2,367	3	9,857	-3,906	3,584
2003	Above Normal	454	34	902	308	2,563	106	941	10	431	4,358	5,747	258	6,910	22	25	23	1,003	770	45	464	2,331	2	9,523	-3,777	-193
2004	Dry	453	34	911	296	2,441	108	929	10	432	4,217	5,615	236	6,242	19	24	21	988	1,053	48	452	2,586	2	9,085	-3,470	-3,663
2005	Wet	451	35	2,106	286	2,367	116	936	22	412	4,139	6,730	217	5,711	29	34	19	988	1,010	58	456	2,564	2	8,522	-1,792	-5,454
2006	Below Normal	457	35	1,628	339	2,347	123	920	15	406	4,150	6,271	203	5,751	23	25	18	979	1,135	53	430	2,639	3	8,619	-2,348	-7,802
2007	Critically Dry	455	35	1,153	348	2,303	125	932	12	451	4,172	5,815	193	5,407	19	24	22	986	1,455	54	411	2,952	2	8,573	-2,758	-10,560
2008	Normal	455	35	1,513	330	2,285	129	944	12	458	4,157	6,160	185	4,972	22	24	22	997	1,002	51	400	2,495	2	7,676	-1,516	-12,076
2009	Below Normal	453	35	1,268	304	2,273	123	959	12	445	4,117	5,873	186	4,532	25	22	17	980	689	49	392	2,147	2	6,892	-1,019	-13,095
2010	Above Normal	453	39	1,439	278	2,291	120	933	16	424	4,062	5,993	163	4,574	27	22	16	963	669	52	392	2,115	2	6,882	-889	-13,984
2011	Wet	454	41	1,866	270	2,472	118	884	21	398	4,162	6,522	171	4,159	30	22	14	949	652	54	395	2,086	2	6,447	74	-13,910
2012	Dry	458	41	1,620	293	2,683	122	823	16	383	4,319	6,437	187	4,279	29	20	13	958	674	49	385	2,101	2	6,598	-161	-14,070
2013	Dry	450	41	1,469	301	2,828	126	763	15	391	4,423	6,383	173	4,734	27	21	17	978	763	50	380	2,208	2	7,143	-761	-14,831
2014	Dry	434	41	1,567	298	2,996	125	721	15	399	4,554	6,596	169	5,227	24	19	16	974	931	51	375	2,365	1	7,786	-1,191	-16,021
Historical Average		**442**	**812**	**1,918**	**320**	**2,586**	**64**	**1,035**	**14**	**290**	**4,310**	**7,481**	**314**	**5,276**	**42**	**27**	**19**	**937**	**620**	**53**	**510**	**2,165**	**4**	**7,802**	**-320**	
Critically Dry Wate Year Avg		455	34	1,098	341	2,503	113	897	11	429	4,295	5,883	243	6,291	19	24	22	1,005	1,116	50	444	2,659	3	9,215	-3,332	
Dry Water Year Avg		447	845	1,794	344	2,755	73	900	11	297	4,379	7,465	344	5,574	40	27	20	977	623	54	501	2,201	4	8,164	-699	
Below Normal Water Year Avg		438	1,594	1,812	322	2,542	55	940	10	265	4,133	7,977	385	5,269	51	28	19	948	616	53	529	2,191	5	7,902	75	
Normal Water Year Avg		418	917	1,573	285	2,347	55	1,319	11	290	4,307	7,215	223	4,655	37	22	17	827	628	48	492	2,033	3	6,951	264	
Above Normal Water Year Avg		444	385	1,685	310	2,563	56	1,062	13	295	4,299	6,813	310	5,273	42	26	19	939	550	51	518	2,103	4	7,731	-918	
Wet Water Year Avg		448	537	2,766	311	2,572	63	1,143	26	273	4,389	8,140	282	5,037	46	32	17	920	579	59	520	2,127	4	7,496	644	

Table 2-C21: Historical Water Budget for the San Timoteo Management Area

Water Year	Water Year Type	Inflows to Principal Aquifer										Outflows from Principal Aquifer											Change in Storage	
		Stream Leakage	Return Flows	Precipitation Recharge	Subsurface Inflows						Total Inflows	ET	GW Production	GW Discharge to Streams	Subsurface Outflows						GW Discharge to Surface	Total Outflows	Annual	Cumulative
					From Beaumont Basin	From San Timoteo Subbasin	From SBBA	From Western Heights	From Calimesa	Total Subsurface Inflows					To Beaumont Basin	To San Timoteo Subbasin	To SBBA	To Western Heights	To Calimesa	To Subsurface Outflows				
1965	Normal	7,169	1	77	363	5,753	6	148	524	6,794	14,041	1,115	962	163	175	8,933	3,042	73	11	12,236	2	14,477	***-436***	**-436**
1966	Above Normal	7,614	1	289	361	5,708	6	148	525	6,748	14,652	1,166	904	228	173	8,898	3,192	96	16	12,376	2	14,675	***-23***	**-459**
1967	Wet	7,681	1	344	356	5,681	6	151	522	6,717	14,742	1,101	571	246	172	8,886	3,220	119	17	12,414	2	14,334	***408***	**-51**
1968	Normal	7,220	1	176	354	5,689	6	156	505	6,710	14,107	1,164	327	147	170	8,914	3,049	141	14	12,288	1	13,928	***179***	**129**
1969	Wet	8,035	1	1,076	336	5,627	6	162	515	6,647	15,759	1,193	283	363	164	8,801	3,313	176	28	12,483	2	14,324	***1,434***	**1,563**
1970	Dry	7,405	3	315	326	5,624	6	169	497	6,622	14,345	1,280	195	159	159	8,893	3,117	172	15	12,356	2	13,992	***352***	**1,915**
1971	Below Normal	7,313	3	237	330	5,621	6	171	482	6,609	14,161	1,222	181	175	157	8,916	3,123	150	12	12,358	2	13,938	***223***	**2,139**
1972	Dry	7,215	3	191	327	5,643	6	171	473	6,620	14,029	1,281	185	148	158	8,952	3,091	139	11	12,351	2	13,966	***63***	**2,201**
1973	Above Normal	7,361	3	196	321	5,586	6	170	461	6,544	14,104	1,058	191	237	158	8,941	3,251	135	11	12,495	3	13,984	***120***	**2,322**
1974	Below Normal	7,491	3	288	316	5,571	6	170	460	6,523	14,306	1,246	187	221	158	8,935	3,259	136	12	12,501	2	14,157	***149***	**2,470**
1975	Normal	7,281	4	184	314	5,565	6	170	459	6,515	13,984	1,173	189	189	158	8,947	3,200	135	12	12,452	2	14,005	***-21***	**2,450**
1976	Normal	7,616	5	304	314	5,569	6	171	457	6,517	14,442	1,219	187	223	160	8,958	3,267	135	11	12,530	2	14,161	***281***	**2,731**
1977	Below Normal	7,273	5	205	311	5,539	6	171	456	6,483	13,966	1,315	190	176	160	8,954	3,205	135	11	12,465	2	14,148	***-182***	**2,548**
1978	Wet	8,141	5	1,137	292	5,540	6	172	454	6,465	15,748	1,257	222	400	160	8,854	3,463	169	79	12,725	3	14,606	***1,142***	**3,690**
1979	Above Normal	7,949	5	445	305	5,554	6	178	458	6,500	14,898	1,251	214	271	157	8,950	3,482	178	34	12,801	3	14,540	***358***	**4,048**
1980	Wet	8,348	21	1,167	288	5,626	6	181	506	6,606	16,142	1,340	323	384	153	8,933	3,500	188	24	12,799	3	14,848	***1,294***	**5,342**
1981	Dry	7,850	26	443	280	5,666	6	184	512	6,647	14,966	1,588	269	184	153	9,014	3,323	173	12	12,675	2	14,718	***248***	**5,590**
1982	Above Normal	8,086	26	454	281	5,697	6	182	521	6,687	15,254	1,308	228	300	157	9,013	3,577	159	9	12,914	3	14,753	***501***	**6,091**
1983	Wet	8,281	26	481	268	5,688	6	183	538	6,684	15,472	1,281	192	331	165	9,028	3,703	178	8	13,082	4	14,889	***582***	**6,673**
1984	Dry	7,892	27	325	257	5,715	6	186	557	6,722	14,965	1,655	149	201	174	9,113	3,430	173	8	12,898	2	14,906	***59***	**6,733**
1985	Below Normal	7,817	57	309	255	5,708	6	185	577	6,730	14,913	1,503	122	233	183	9,093	3,498	155	7	12,936	3	14,797	***115***	**6,848**
1986	Normal	7,733	67	274	245	5,711	6	183	607	6,751	14,825	1,542	120	222	192	9,109	3,450	150	6	12,907	3	14,793	***31***	**6,879**
1987	Dry	7,648	67	250	232	5,698	6	181	636	6,753	14,717	1,547	100	212	204	9,115	3,441	147	5	12,911	3	14,773	***-56***	**6,823**
1988	Below Normal	7,656	67	233	224	5,688	6	181	664	6,763	14,720	1,503	135	221	215	9,138	3,468	146	5	12,972	3	14,833	***-114***	**6,709**
1989	Below Normal	7,556	67	218	220	5,664	6	179	681	6,750	14,590	1,519	161	208	224	9,104	3,435	137	4	12,905	2	14,795	***-204***	**6,505**
1990	Dry	7,478	17	201	220	5,658	6	177	681	6,742	14,438	1,525	173	193	232	9,102	3,364	133	5	12,835	2	14,728	***-290***	**6,215**
1991	Above Normal	7,731	1	499	226	5,660	6	176	656	6,725	14,955	1,457	179	299	234	9,030	3,507	141	6	12,918	3	14,856	***99***	**6,314**
1992	Above Normal	7,777	1	398	228	5,673	6	178	641	6,726	14,902	1,446	156	270	233	9,074	3,564	151	7	13,029	3	14,903	***-1***	**6,313**
1993	Wet	8,406	2	1,584	202	5,672	6	182	672	6,734	16,726	1,454	158	482	227	8,974	3,612	207	31	13,051	4	15,150	***1,576***	**7,889**
1994	Below Normal	8,037	2	398	218	5,685	6	190	615	6,715	15,151	1,567	154	237	219	9,090	3,601	195	10	13,115	3	15,075	***76***	**7,966**
1995	Wet	8,299	2	924	228	5,739	6	191	600	6,764	15,988	1,450	158	425	212	9,020	3,683	185	15	13,115	4	15,152	***836***	**8,802**
1996	Dry	7,943	2	371	233	5,800	6	193	570	6,802	15,117	1,713	152	217	206	9,145	3,604	172	10	13,137	3	15,222	***-106***	**8,696**
1997	Above Normal	7,823	2	361	250	5,831	6	189	547	6,823	15,009	1,645	155	264	200	9,123	3,619	147	9	13,097	3	15,164	***-155***	**8,541**
1998	Wet	8,374	2	888	246	5,828	6	188	544	6,813	16,076	1,358	150	443	195	9,072	3,831	175	16	13,288	4	15,244	***832***	**9,373**
1999	Dry	8,003	2	382	248	5,830	6	192	518	6,795	15,182	1,707	149	240	189	9,165	3,675	179	11	13,220	3	15,319	***-137***	**9,236**
2000	Dry	7,872	2	307	264	5,890	6	190	501	6,852	15,033	1,756	146	232	186	9,199	3,627	148	9	13,168	3	15,304	***-271***	**8,965**
2001	Dry	7,851	2	277	269	5,880	6	186	485	6,827	14,957	1,582	141	268	182	9,163	3,738	141	9	13,232	3	15,227	***-270***	**8,695**
2002	Critically Dry	7,640	2	228	273	5,889	6	184	476	6,828	14,697	1,754	144	203	179	9,180	3,526	135	9	13,029	3	15,133	***-436***	**8,259**
2003	Above Normal	7,834	2	297	278	5,857	6	182	464	6,787	14,920	1,540	146	277	176	9,154	3,717	138	10	13,195	3	15,161	***-241***	**8,018**
2004	Dry	7,683	2	248	283	5,864	6	182	452	6,788	14,721	1,639	145	226	171	9,178	3,596	140	10	13,096	3	15,109	***-388***	**7,630**
2005	Wet	8,296	1	967	269	5,823	6	183	456	6,738	16,002	1,433	44	447	163	9,048	3,846	180	22	13,259	4	15,188	***814***	**8,444**
2006	Below Normal	7,910	1	368	272	5,819	6	189	430	6,716	14,995	1,687	4	232	155	9,144	3,637	182	15	13,133	3	15,059	***-64***	**8,380**
2007	Critically Dry	7,641	1	258	286	5,846	6	188	411	6,737	14,637	1,764	0	195	149	9,160	3,482	153	12	12,956	2	14,918	***-281***	**8,099**
2008	Normal	7,747	1	266	290	5,861	6	186	400	6,744	14,757	1,594	0	244	146	9,168	3,661	148	12	13,134	3	14,975	***-217***	**7,882**
2009	Below Normal	7,670	1	237	292	5,835	6	184	392	6,708	14,617	1,625	0	226	143	9,145	3,589	146	12	13,035	3	14,888	***-272***	**7,610**
2010	Above Normal	7,863	1	447	289	5,803	6	184	392	6,674	14,986	1,514	0	314	141	9,105	3,657	156	16	13,074	3	14,905	***81***	**7,691**
2011	Wet	8,056	1	663	277	5,774	6	186	395	6,638	15,358	1,523	0	349	139	9,085	3,744	174	21	13,163	4	15,039	***319***	**8,010**
2012	Dry	7,729	1	309	278	5,794	6	188	385	6,651	14,690	1,725	0	212	138	9,172	3,547	158	16	13,030	3	14,970	***-280***	**7,730**
2013	Dry	7,652	1	246	288	5,797	6	185	380	6,656	14,555	1,593	0	224	136	9,134	3,594	144	15	13,022	3	14,842	***-287***	**7,444**
2014	Dry	7,565	1	224	292	5,803	6	183	375	6,659	14,450	1,666	0	203	136	9,142	3,474	138	15	12,905	2	14,776	***-326***	**7,117**
Historical Average		**7,770**	**11**	**419**	**280**	**5,721**	**6**	**179**	**510**	**6,695**	**14,895**	**1,451**	**183**	**255**	**175**	**9,047**	**3,472**	**153**	**14**	**12,861**	**3**	**14,753**	**142**	
Critically Dry Wate Year Avg		7,640	1	243	279	5,868	6	186	444	6,783	14,667	1,759	72	199	164	9,170	3,504	144	11	12,993	2	15,026	-358	
Dry Water Year Avg		7,699	11	292	271	5,761	6	184	501	6,724	14,726	1,590	129	209	173	9,106	3,473	154	11	12,917	2	14,847	-121	
Below Normal Water Year Avg		7,636	23	277	271	5,681	6	180	529	6,666	14,602	1,465	126	214	179	9,058	3,424	154	10	12,824	2	14,632	-30	
Normal Water Year Avg		7,461	13	213	313	5,691	6	169	492	6,672	14,359	1,301	297	198	167	9,005	3,278	130	11	12,591	2	14,390	-30	
Above Normal Water Year Avg		7,782	5	376	282	5,708	6	176	518	6,690	14,853	1,376	241	273	181	9,032	3,508	145	13	12,878	3	14,771	82	
Wet Water Year Avg		8,192	6	923	276	5,700	6	178	520	6,680	15,801	1,339	210	387	175	8,970	3,592	175	26	12,938	3	14,877	924	

Table 2-C22
Comparison of average annual water budget components for each Management Area in the Yucaipa Subbasin

Water Budget Component		Historical Simulation Period: WY 1965-2014				
			Management Area			
		Yucaipa Subbasin	Western Heights	North Bench	Calimesa	San Timoteo
	Stream Leakage	11,812	0	3,600	442	7,770
	Return Flows	2,829	293	1,714	812	11
	Precipitation Recharge	6,101	335	3,429	1,918	419
Subsurface Inflows	From Beaumont Basin	1,315	--	--	1,035	280
	From San Timoteo Basin	6,544	--	533	290	5,721
	From SBBA	123	0	117	--	6
	From Crafton Hills	32	8	25	--	--
	From Yucaipa Hills	3,524	--	3,204	320	--
	From San Bernardino Mountains	2,277	--	2,277	--	--
	From Western Heights MA	--	--	0	64	179
	From North Bench MA	--	286	--	2,586	--
	From Calimesa MA	--	937	19	--	510
	From San Timoteo MA	--	153	--	14	--
	Total Subsurface Inflows	13,815	1,384	6,174	4,310	6,696
	Surface Water Spreading	313	--	313	--	--
	Average Annual Inflows	*34,870*	*2,012*	*15,231*	*7,481*	*14,896*
	ET	3,460	5	1,690	314	1,451
Subsurface Outflows	To Beaumont Basin	795	--	--	620	175
	To San Timoteo Basin	9,109	--	9	53	9,047
	To SBBA	4,011	0	539	--	3,472
	To Crafton Hills	0	0	0	--	--
	To Yucaipa Hills	2,272	--	2,244	27	--
	To San Bernardino Mountains	20	--	20	--	--
	To Western Heights MA	--	--	286	937	153
	To North Bench MA	--	0	--	19	--
	To Calimesa MA	--	64	2,586	--	14
	To San Timoteo MA	--	179	--	510	--
	Total Subsurface Outflows	16,207	243	5,685	2,166	12,861
	GW Discharges to Streams	3,984	0	3,686	42	255
	Surface Water Diversions	217	--	217	--	--
	GW Extractions	11,346	2,443	3,444	5,276	183
	GW Discharge to Surface	23	0	16	4	3
	Average Annual Outflows	*35,237*	*2,691*	14,737	7,802	14,753
Average Annual Change in Storage		**-367**	**-679**	**494**	**-321**	**143**

Surface Water Diversions represent extractions from YVWD Well 25 **3,938**

"--" represents categories that are not applicable to specific management area, or Subbasin, water budget

Appendix 2-D

USGS SIR 2021-5118: Hydrology of the Yucaipa Groundwater Subbasin - Characterization and Integrated Numerical Model

Scientific Investigations Report 2021-5118

Hydrology of the Yucaipa Groundwater Subbasin – Characterization and Integrated Numerical Model San Bernardino and Riverside Counties, California

by

United States Geological Survey

Link: https://doi.org/10.3133/sir20215118

Appendix 2-E

Depths-to-Groundwater Hydrographs

Figure 2-E1. Depths-to-Groundwater at Wells in Live Oak Subarea

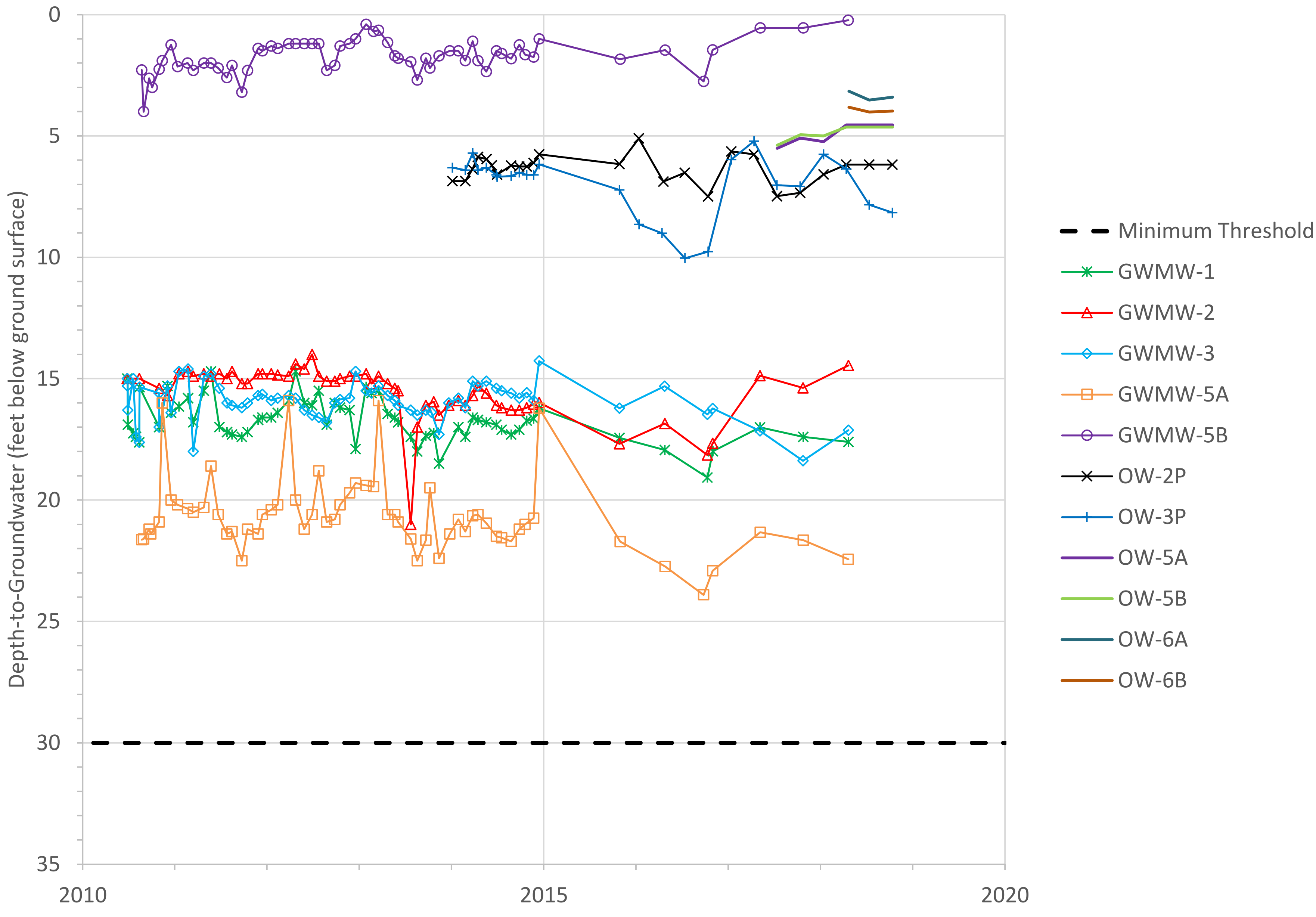


Figure 2-E2. Depths-to-Groundwater at Wells in Upper Oak Glen Subbarea

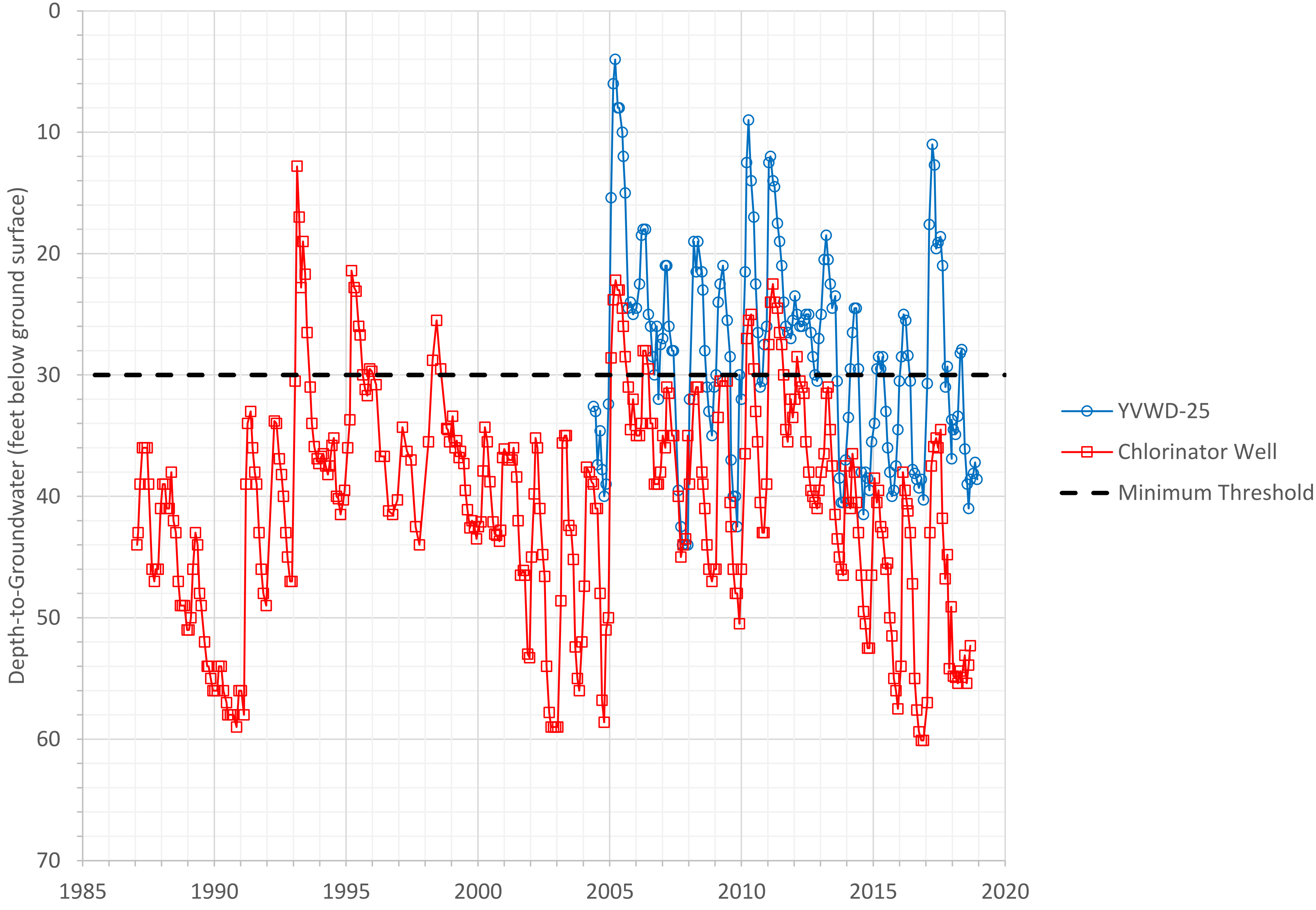


Figure 2-E3. Depths-to-Groundwater at Wells in the North Bench Management Area

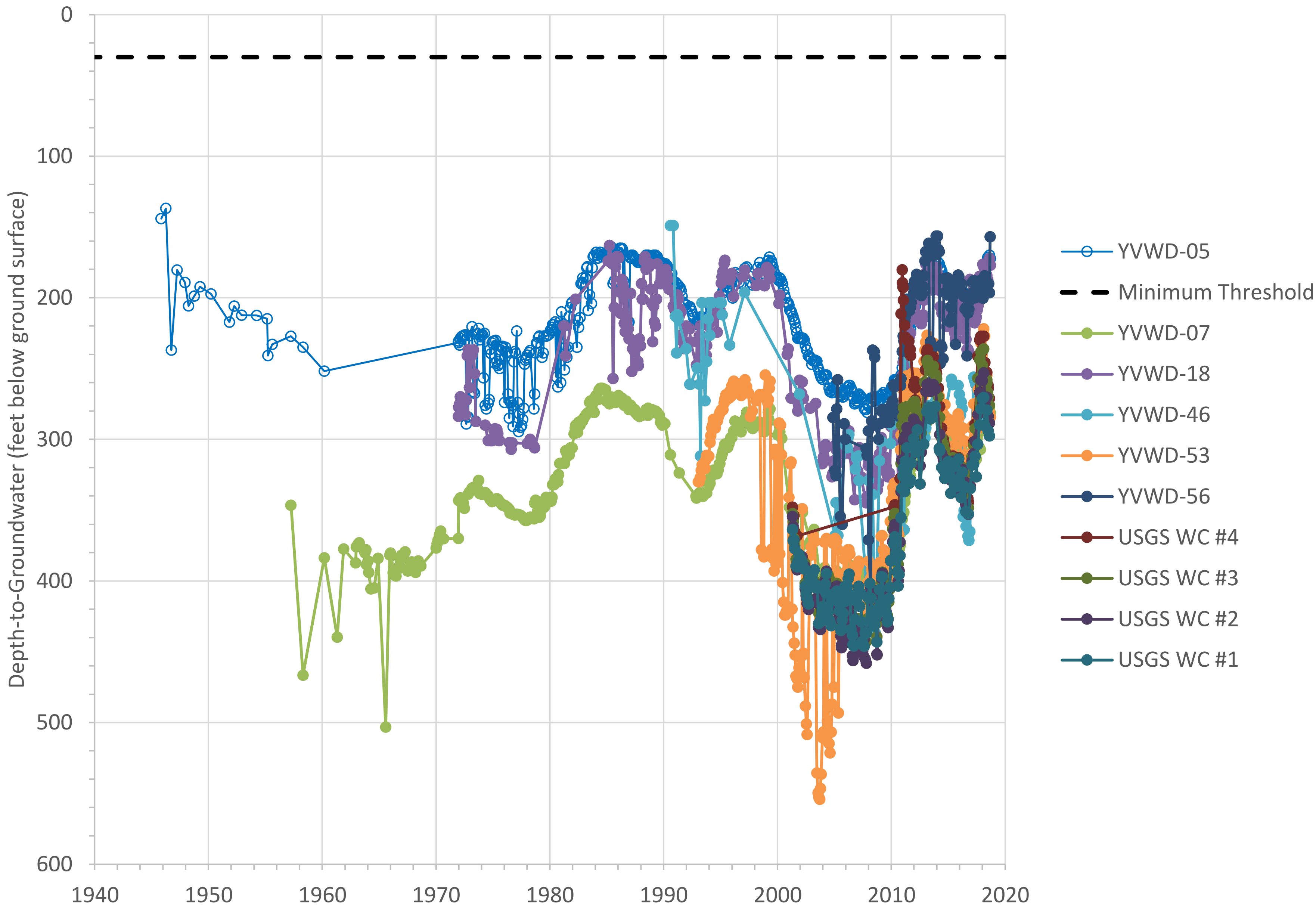


Figure 2-E4. Depths-to-Groundwater at Wells in Lower Oak Glen Subbarea

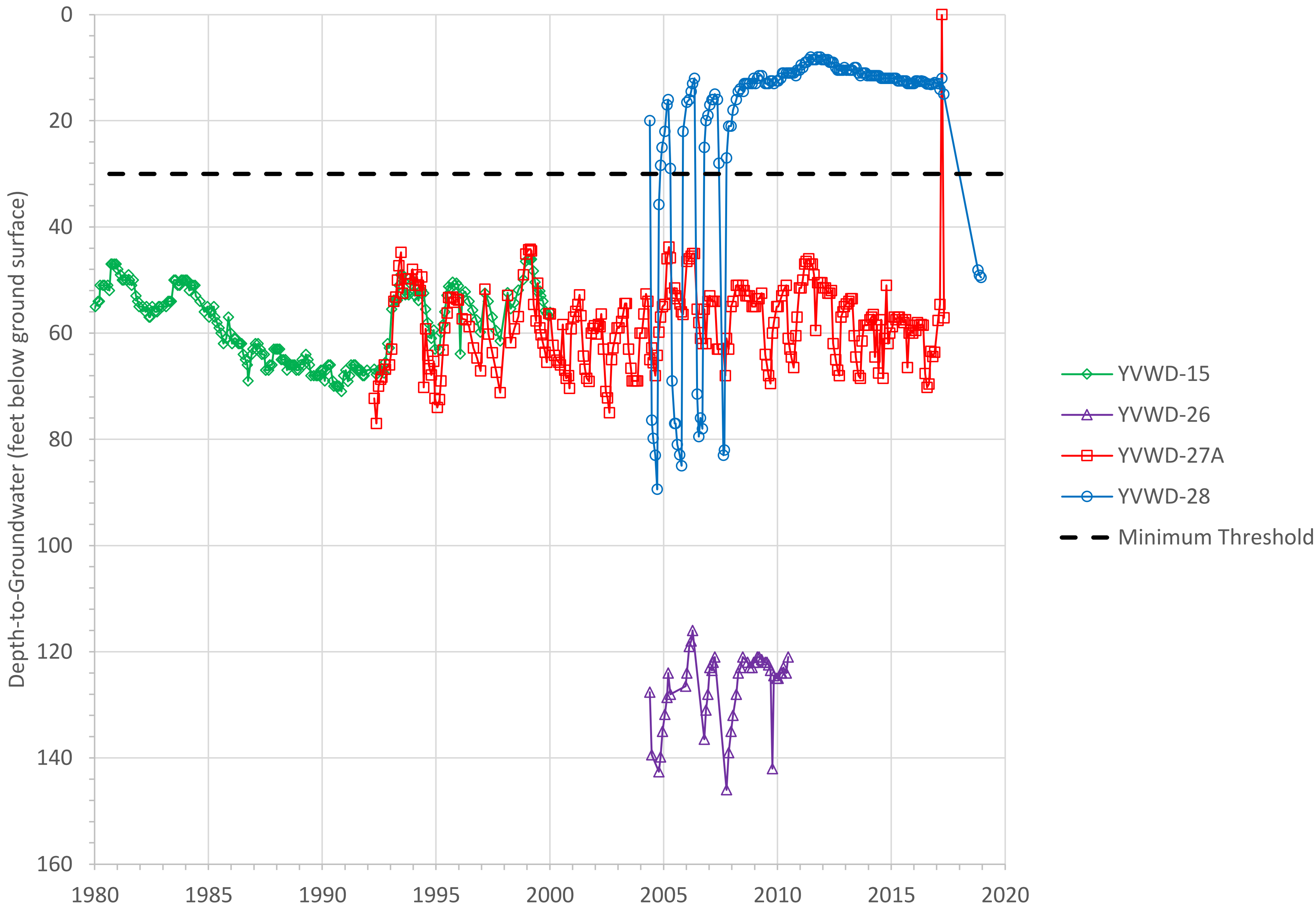


Figure 2-E5. Depths-to-Groundwater at Wells in the Crafton Hills Subarea

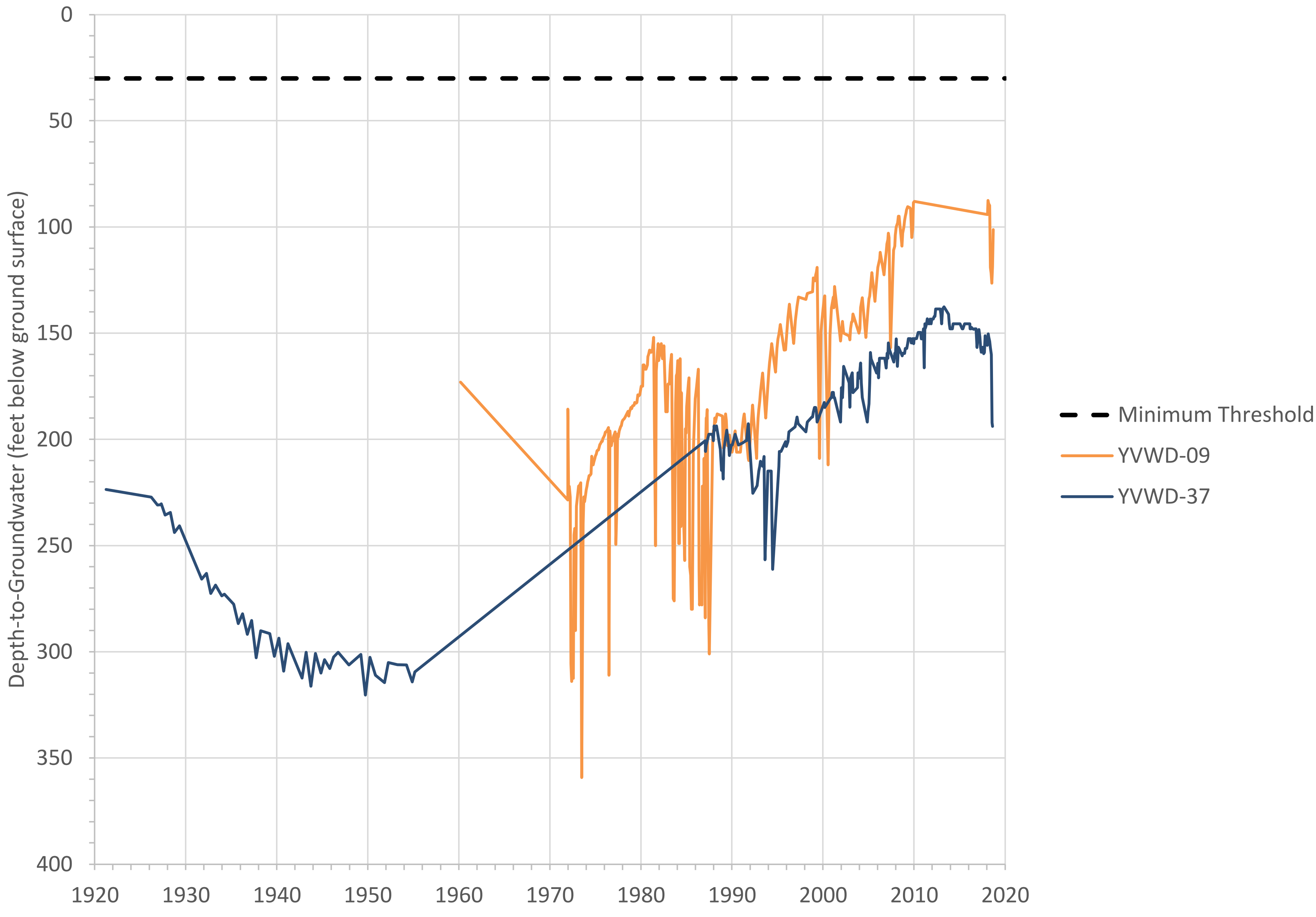
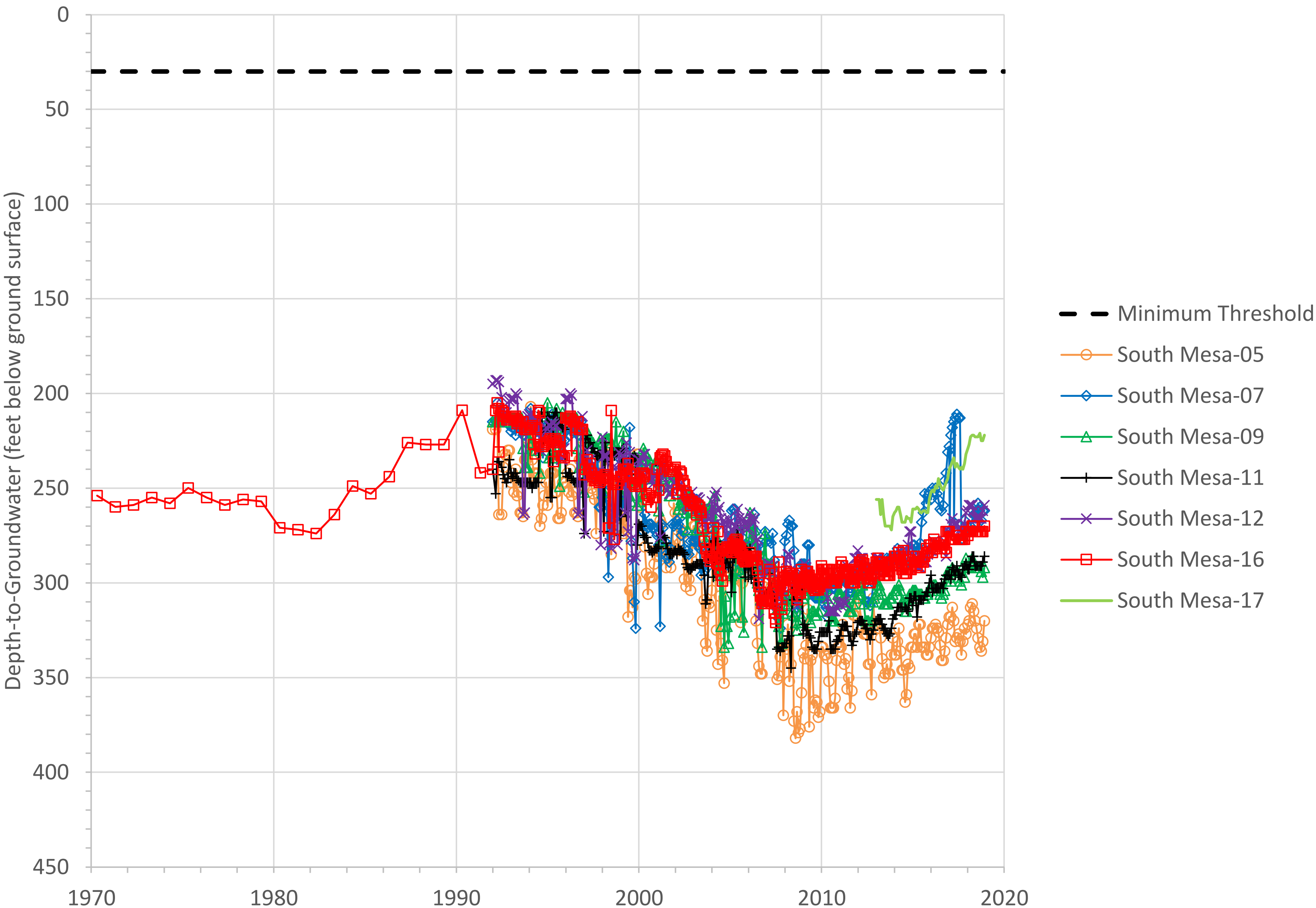


Figure 2-E6. Depths-to-Groundwater at Wells in the Calimesa Management Area



Appendix 3-A

Drilling Logs and Well Completion Reports

8423

QUADRUPLICATE
Use to comply with local requirements

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 051199

State Well No. 2S/1W-16B1

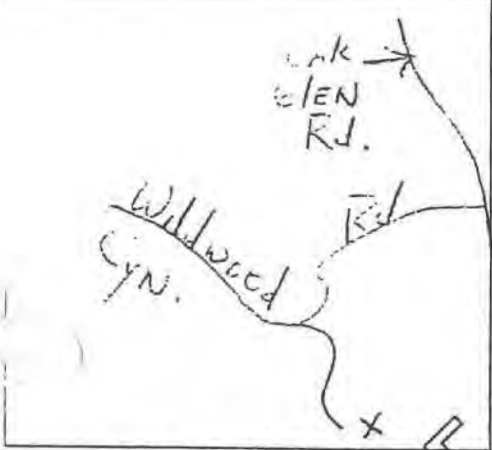
Other Well No.

Notice of Intent No.
Local Permit No. or Date 8423

ASD Corporation

(1) OWNER: Name [redacted]
Address [redacted]
City Zip 92399

(2) LOCATION OF WELL (See instructions):
County Riverside Owner's Well Number Wildwood Canyon
Well address if different from above
Township 2S Range 1W Section 16
Distance from cities, roads, railroads, fences, etc.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well XX Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other XX

(5) EQUIPMENT:
Rotary ☐ Reverse X
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes XX No ☐ Size birdseye
Diameter of bore 24"
Packed from bottom to 50 ft.

(7) CASING INSTALLED:
Steel X Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	506	12	1/4"

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size
206	506	3/32
12 rows	5 inch apart	

(9) WELL SEAL:
Was surface sanitary seal provided? Yes XX No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No XX Interval ft.
Method of sealing Steel/Concrete

(10) WATER LEVELS:
Depth of first water, if known - ft.
Standing level after well completion - ft.

(11) WELL TESTS:
Was well test made? Yes XX No ☐ If yes, by whom?
Type of test Pump X Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
50 gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No XX If yes, by whom?
Was electric log made? Yes ☐ No X If yes, attach copy to this report

(12) WELL LOG: Total depth 506 ft. Depth of completed well 506 ft.
from ft. 0 to 506 ft. Formation (Describe by color, character, size or material)

0 - 48	Sandy gravel
48 - 60	Clay
60 - 80	Gravel & rock
80 - 185	Clay
185 - 200	Sand
200 - 250	Gravel & sand
250 - 305	Sand
305 - 340	Clay
340 - 500	Gravel, sand & clay
500 - 506	Sandy clay

Work started 1-23 19 79 Completed 2-16 19 79

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED Joseph W. Grammer (Well Driller)

NAME Jack Jones Wells & Pumps
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 2031
City Hemet, California Zip 92343
License No. 281601 Date of this report 3-16-79

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

GSSI
410

Mail Two Copies to:
DEPARTMENT OF PUBLIC HEALTH
Court House
Riverside, California

WATER WELL DRILLERS REPORT

(County Ordinances No. 340 and 340A)
COUNTY OF RIVERSIDE
DEPARTMENT OF PUBLIC HEALTH

451
Do Not Fill In
State Well No. 2S/1W-1BL1
Other Well No.
Region

(1) OWNER:
Name [redacted]
Address

(2) LOCATION OF WELL:
County Riverside Owner's number, if any— 3
1110 So. Fremont - Yucaipa

(3) TYPE OF WORK (check):
New well ☑ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☐ Irrigation ☑ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☐ Cable ☑ Dug Well ☐

(6) CASING INSTALLED:
SINGLE ☑ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
0	340	12"	1/4"
339	415	10"	1/4"

If gravel packed: Diameter of Bore / from ft. / to ft.

Type and size of shoe or well ring 10"X3/4"X12"   Size of gravel:
Describe joint All joints butt welded

(7) PERFORATIONS:
Type of perforator used Mills
Size of perforations 2 in., length, by 3/8 in.
From 100 ft. to 335 ft. Perf. per row Rows per ft.
5 holes on 12" centers

(8) CONSTRUCTION:
Was a surface sanitary seal provided? ☐ Yes ☑ No To what depth ft.
Were any strata sealed against pollution? ☐ Yes ☑ No If yes, note depth of strata
From ft. to ft.
Method of Sealing

(9) WATER LEVELS:
Depth at which water was first found 100 ft.
Standing level before perforating 100 ft.
Standing level after perforating 100 ft.

(10) WELL TESTS:
Was a pump test made? ☐ Yes ☑ No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.

(11) WELL LOG:
Total depth 415 ft. Depth of completed well 415 ft.
Formation: Describe by color, character, size of material, and structure.

ft.	to ft.	
0	80	Brown sandy clay
80	275	Fractured rock with clay streaks
275	412	Decomposed granite
412	415	Hard blue granite

12" casing was stuck at 340 reduction to 10" casing 339' to 415' with 10"x12" adapter at 339'

10" casing torch perforated

Bailer test showing recovery of 4 1/2 GPM based on 12" ID casing area.

Work started Oct. 10 1963. Completed Dec. 9 1963

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
NAME Kirkland Well Service
(Person, firm, or corporation) (Typed or printed)
Address 32291 Dunlap
Yucaipa, Calif.
[SIGNED] K. Kirkland
Well Driller

7551
283

Mail Two Copies to:
DEPARTMENT OF PUBLIC HEALTH
Court House
Riverside, California

WATER WELL DRILLERS REPORT

(County Ordinances No. 340 and 340A)
COUNTY OF RIVERSIDE
DEPARTMENT OF PUBLIC HEALTH

-4385
Do Not Fill In
State Well No. 2S/1W-18P1
Other Well No.
Region

(1) OWNER:

Name [redacted]
Address [redacted]
Los Angeles, Calif.

(2) LOCATION OF WELL:

County Riverside Owner's number, if any—
31300 1/2 Singleton Rd.
Calimesa, Calif.

(3) TYPE OF WORK (check):

New well ☑ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☑ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☐
Cable ☑
Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☑ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
0	288	8"	3/16"
288	300	8"	1/4"

If gravel packed

Diameter of Bore	from ft.	to ft.

Type and size of shoe or well ring 8X8X1/4
Size of gravel:
Describe joint ALL Joints circumferentially Welded

(7) PERFORATIONS:

Type of perforator used Mills
Size of perforations 2 in., length, by 1/4 in.
From 130 ft. to 298 ft. 4 Perf. per row 1 Rows per ft.

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☑ Yes ☐ No To what depth 20 ft.
Were any strata sealed against pollution? ☐ Yes ☑ No If yes, note depth of strata
From 0 ft. to 20 ft.
Method of Sealing Clay Jel mixture

(9) WATER LEVELS:

Depth at which water was first found 132 ft.
Standing level before perforating 132 ft.
Standing level after perforating 132 ft.

(10) WELL TESTS:

Was a pump test made? ☐ Yes ☑ No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.

(11) WELL LOG:

Total depth 300 ft. Depth of completed well 300 ft.

Formation: *Describe by color, character, size of material, and structure.*

ft.	to ft.	
0	25	Brown sandy soil clay, small gravel
25	51	Brown gravel & Boulder
51	68	Brown clay & gravel
68	105	Hard Brown Sandy Clay
105	300	Brown Sandy clay, Some gravel embedde.

Work started Dec. 29 1962. Completed Jan. 22 1963

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Kirkland Well Service
(Person, firm, or corporation) (Typed or printed)
Address 32291 Dunlap Blvd,
Yucaipa Calif.
[SIGNED] K. Kirkland
Well Driller

2551
409

QUADRUPLICATE
Use to comply with
local requirements

of Intent No. ______
Local Permit No. or Date ______

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 277307

State Well No. 2S/1W-19C
Other Well No. ______

(1) OWNER: Name [redacted]
Address [redacted]
City Redlands, CA ZIP 92374

(2) LOCATION OF WELL (See instructions):
County Riverside Owner's Well Number ______
Well address if different from above ______
Township 2-South Range 1-West Section 19
Distance from cities, roads, railroads, fences, etc. ______

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well [X] Deepening [ ]
Reconstruction [ ]
Reconditioning [ ]
Horizontal Well [ ]
Destruction [ ] (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic [X]
Irrigation [ ]
Industrial [ ]
Test Well [ ]
Municipal [ ]
Other [ ]
(Describe)

(5) EQUIPMENT:
Rotary [X] Reverse [ ]
Cable [ ] Air [ ]
Other [ ] Bucket [ ]

(6) GRAVEL PACK:
Yes [X] No [ ] Size 3/8 Spl
Diameter of bore 15
Packed from 0 to 435 ft.

(7) CASING INSTALLED:
Steel [X] Plastic [ ] Concrete [ ]

(8) PERFORATIONS:
Type of perforation or size of screen Vert. Mill Slot

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	435	3/16	8-5/8	195	275	.093
				295	435	.093

(9) WELL SEAL:
Was surface sanitary seal provided? Yes [X] No [ ] If yes, to depth 50 ft.
Were strata sealed against pollution? Yes [ ] No [X] Interval ______ ft.
Method of sealing Cement in Place

(10) WATER LEVELS:
Depth of first water, if known ______ ft.
Standing level after well completion 90 ft.

(11) WELL TESTS:
Well test made? Yes [X] No [ ] If yes, by whom? ______
Type of test Pump [ ] Bailer [ ] Air lift [X]
Depth to water at start of test ______ ft At end of test ______ ft
Discharge X gal/min after ______ hours Water temperature ______
Chemical analysis made? Yes [ ] No [X] If yes, by whom? ______
Was electric log made Yes [ ] No [X] If yes, attach copy to this report

7-1
76

(12) WELL LOG: Total depth 435 ft. Completed depth 435 ft.

from ft	to ft.	Formation (Describe by color, character, size or material)
0	4	Top Soil
4	54	Small Gravel
54	59	Loose Gravel
59	91	Gravel with Some Brown Clay
91	94	Loose Gravel
94	168	Sand and Gravel
168	192	Gravel and Brown Clay
192	200	Boulder Zone
200	211	Sand and Gravel
211	213	Boulder Zone
213	273	Gravel
273	275	Rock Very Hard
275	281	Hard Brown Clay
281	294	Gray Clay with Some Rock
294	321	Gravel 1" - 2"
321	334	Brown Clay and Gravel
334	342	Gravel
342	351	Brown Clay and Gravel
351	355	Gravel
355	373	Gravel
373	377	Brown Clay
377	435	Boulder Zone

Work started 10-4 19 88 Completed 10-24 19 88

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed ______ (Well Driller)

NAME McCalla Brothers - Division of Layne We
(Person, firm, or corporation) (Typed or printed)
Address 3132 W. 17th St.
City Santa Ana ZIP 92703
License No. 510011 Date of this report 10-31-88

DWR 188 (REV. 12-86)

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVE NUMBERED FORM

86 96355

[redacted]

25/2W-20L #8
1S/2W-202--USGS
NOT #8

LOG OF WELL NO. 8
S.R. No. 36-01856

LOCATION: Hill Ranch
NW$\frac{1}{4}$ of SW$\frac{1}{4}$, sect. 25, T1S, R2W, SBB&M
DRILLED BY: E. J. Brockman
R. 1, Box 150
Colton, Calif.

YEAR: March 3, 1951 completed

log from YVWD = in folder for well 08

Depth From	Depth To		Material
0	4'	sand/gravel	Top Soil
4'	50'		Sand and rock 2329'
50'	85'		Sandy clay
85'	105'	sandy clay & gravel	Sand and small gravel
105'	178'		Sandy clay
178'	222'		Sand and coarse gravel 2152'
222'	260'	CL	Hard clay — 2119
260'	274'	sandy clay gravel	Sand and small gravel
274'	300'		Sandy clay
300'	306'		Sand — 2068'
306'	340'	clay rock	Clay and rock 2034
340'	354'		Rock and Sand
354'	415'	sandy clay	Sandy clay
415'	425'		Sand
425'	478'		Sand with streaks of clay 1896'
478'	506'	CL	Hard clay

Hole was reamed to 16" to 363' and 10" x 3/16" casing installed. 10" casing was perforated with 3/16" x 4" slots 4 to the round every foot.

Hole was reamed to 10" from 363' to 506' and 6" x 1/8" casing installed. 6" casing was perforated all the way with 3/16" x 4" slots 4 to the round, one round every foot.

Hole was gravel packed with 3/8" gravel all the way.

Static water level 115'

Well on the pump test pumped the following capacities:

from 143' - 162 GPM
" 166' - 279 GPM
" 178' - 342 GPM

Rotary Rig

2S/2W-2P1 Well 8

Rec. #36 01997

WELL RECORD

SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT

Company

Location 8th Street South of Washington Drive Elevation = 2360'

NE 1/4 NE 1/4 Township 2 S Range 2 W Section 3

PIT

Date drilled 1959 By

Depth 750' Diameter Packed 500'

CASING

Diameter 16" Length 500' Gauge 10 ga.

" " "

Perforated interval

COLUMN

Diameter 8" Length 400 Gauge STD

" " "

Tube diameter Shaft diameter

BOWLS

Date installed March 18, 1963 By Turley Pump Company

Make Model 10 LA Serial no. R 58225

Size 10" Stages 11 Length Suction 10'

DESIGN PERFORMANCE

GPM 450 RPM 1760 TDH 400 HP 55

GPM RPM TDH HP

GPM RPM TDH HP

ENGINE

Date installed 3-63 (from #3 well) By

Type Elect. Make U.S. Model HU Serial no. 1251837

Cu. in. B & S HP 60 RPM 1800

GEAR

Date installed By

Make Model Serial no. HP

Shaft Universals

Notes: Pump test July 25, 1966

Pump Head Jacuzzi - Pump as shown

SBVMWD FORM JK-10C

FORM 115
INVESTIGATION

South Coastal Basin

DIVISION OF WATER RESOURCES
DEPARTMENT OF PUBLIC WORKS
STATE OF CALIFORNIA

WELL LOG

2S/2W-13E2

SHEET 1

NUMBER E-138e-

LOCAL DESIGNATION Owner #4

Hicks Y-4

LOCATION 300' S. of Ave. "L," 30' E. of W. line of Lot 225, Sub. 9, Yucaipa Valley, Yucaipa. Sec. 13.

Loc. #18249A

OWNER [redacted]

DATE COMPLETED 1913

DIAMETER OF CASING 16"

DRILLED BY W. D. Anderson

SOURCE OF INFORMATION P. E. Hicks

INSPECTED WHILE DRILLING ______ SEE FILE NO. ______

SURFACE ELEVATION 2453. Hicks

SKETCH

FOR FIELD COPIES USE ALTERNATE LINES

DEPTH	ELEVATION OF BOTTOM OF STRATUM	MATERIAL	THICKNESS FEET	% VOIDS	ABSOLUTE VOIDS FEET	TOTAL VOIDS FEET
0-20	2433	Packed soil	20			
44	2409	Cement gravel	24			
94	2359	Cement clay	50			
108	2345	Cement ~~and~~ gravel	14			
120	2333	Red clay	12			
168	2285	Gravel	48			
178	2275	Red clay	10			
182	2271	Gravel	4			
188	2265	Red clay, struck water	6			
206	2247	Water gravel	18			
208	2245	Red clay	2			
218	2235	Water gravel	10			
220	2233	Clay	2			
222	2231	Water gravel	2			
270	2183	Cement clay	48			
276	2177	Cement gravel	6			
310	2143	Red clay	34			
316	2137	Water gravel	6			
338	2115	Red clay	22			
360	2093	Water gravel	22			
362	2091	Red clay	2			
368	2085	Water gravel	6			
370	2083	Red clay	2			
372	2081	Cement gravel	2			
408	2045	Red clay	36			
426	2027	Cement gravel	18			
436	2017	Cement clay	10			
440	2013	Cement gravel	4			
476	1977	Cement clay	36			
497	1956	Cement gravel	21			
		Pumps 40" - Drawdown 100'.				

GEST
943
12

LOG OBTAINED BY ______ DATE ______

50612 6-51 15M CALIFORNIA STATE PRINTING OFFICE

FORM 115 INVESTIGATION

South Coastal Basin

DIVISION OF WATER RESOURCES
DEPARTMENT OF PUBLIC WORKS
STATE OF CALIFORNIA

WELL LOG

2S/2W-14F1

SHEET 1

NUMBER E-136j-

LOCAL DESIGNATION Owner #15

LOCATION 60' N. of Ave. L, 1700' W. of State Highway, Lot 213, Sub. 9, Yucaipa.

Loc. #182393

OWNER [redacted]

SKETCH

DATE COMPLETED About 1928

DIAMETER OF CASING 16"

DRILLED BY Clark McEuen

SOURCE OF INFORMATION Redlands-Yucaipa Water Co.

INSPECTED WHILE DRILLING ____ SEE FILE NO. ____

SURFACE ELEVATION ____

DEPTH	ELEVATION OF BOTTOM OF STRATUM	MATERIAL	THICKNESS FEET	% VOIDS	ABSOLUTE VOIDS FEET	TOTAL VOIDS FEET
1-152		Top soil and clay	152			
330		Water gravel - good	178			
342		Clay and red sandstone	12			
346		Rocks, square gravel	4			
350		Clay	4			
352		Red formation - rock and gravel	2			
356		Clay	4			
358		Red rocks and gravel	2			
360		Clay	2			

At 300' some streaks of brown sandstone were found. Very thin.

Pumps 100"; 100' drawdown.

MICROFILMED

FOR FIELD COPIES USE ALTERNATE LINES

USGS 347

LOG OBTAINED BY ____ DATE ____

FORM 115
INVESTIGATION

South Coastal Basin

2S/2W-15R1

DIVISION OF WATER RESOURCES

DEPARTMENT OF PUBLIC WORKS
STATE OF CALIFORNIA

SHEET 1

NUMBER E-829-

WELL LOG

LOCAL DESIGNATION Hicks #Y-74

Loc. #17330-

LOCATION 2000' N. and 200' E. from S.W. corner Sec. 14, T.2S., R.2W., Yucaipa.

OWNER [redacted]

DATE COMPLETED 1926

DIAMETER OF CASING 12"

DRILLED BY

SOURCE OF INFORMATION P.E.Hicks

INSPECTED WHILE DRILLING SEE FILE NO.

SURFACE ELEVATION

SKETCH

DEPTH	ELEVATION OF ... OF STRATUM	MATERIAL	THICKNESS FEET	% VOIDS	ABSOLUTE VOIDS FEET	TOTAL VOIDS FEET
0-79		Soil				
109		Gravel				
114		Clay and gravel mixed				
125		Clay				

MICROFILMED

FOR FIELD COPIES USE ALTERNATE LINES

GSSI
210

QUADRUPLICATE
Use to comply with
...al requirements

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

RECEIVED
MAY 17 1990
Ans'd

Do not fill in

No. 294181

Notice of Intent No.
Local Permit No. or Date

State Well No. 2S/2W-16A1
Other Well No.

(1) OWNER: Name [redacted]
Address [redacted]
City La Quinta, CA ZIP 92253

(2) LOCATION OF WELL (See instructions):
County Riverside Owner's Well Number 1
Well address if different from above
Township 2S Range 2W Section 16
Distance from cities, roads, railroads, fences, etc.
3000' W. of County Line Rd.
1000' So. of San Bernardino County Line

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well [X] Deepening [ ]
Reconstruction [ ]
Reconditioning [ ]
Horizontal Well [ ]
Destruction [ ] (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic [X]
Irrigation [X]
Industrial [ ]
Test Well [ ]
Municipal [ ]
Other [ ]
(Describe)

(5) EQUIPMENT:
Rotary [ ] Reverse [X]
Cable [ ] Air [ ]
Other [ ] Bucket [ ]

(6) GRAVEL PACK:
Yes [X] No [ ] Size
Diameter of bore
Packed from to ft.

(7) CASING INSTALLED.
Steel [X] Plastic [ ] Concrete [ ]

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	760	16	5/16	210	760	3/32
760	1070	12	5/16	760	1060	3/32

(9) WELL SEAL:
Was surface sanitary seal provided? Yes [X] No [ ] If yes, to depth 100 ft.
Were strata sealed against pollution? Yes [ ] No [X] Interval ft.
Method of sealing

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion 230' ft.

(11) WELL TESTS:
Was well test made? Yes [X] No [ ] If yes, by whom? McCalla Bros.
Type of test Pump [X] Bailer [ ] Air lift [ ]
Depth to water at start of test 221 ft At end of test 230 ft.
Discharge 1050 gal/min after 56 hours Water temperature
Chemical analysis made? Yes [ ] No [X] If yes, by whom?
Was electric log made? Yes [X] No [ ] If yes, attach copy to this report

(12) WELL LOG: Total depth 1320 ft. Completed depth 1070 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	30	Sandy Clay
30	80	Sand, Gravel & Clay
80	110	Sand & Gravel
110	280	Sand, Gravel, Streaks of Clay
280	460	Sand, Gravel & Rock
460	550	Brown Clay & Sandy Gravel
550	750	Rocks, Sand & Spots of Clay
750	885	Hard Granite Formation, Spots
885	975	Fine & Coarse Sand, Clay Strea
975	1087	Sandy Brown Clay
1087	1200	Granite Boulders, Spots of Cla
1200	1320	Sand, Gravel, Granite Boulders

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

Work started 7-19 19 89 Completed 9-20 19 89

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed (Well Driller)
NAME McCalla Bros., Div. of Layne-Western Co
(Person, firm, or corporation) (Typed or printed)
Address 3132 W. 17th St.
City Santa Ana, CA ZIP 92703
License No. 510011 Date of this report 9-22-89

2S/2W-17R1
2S/2W-14-R1

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

No. 2S/2-14

WELL LOG

State Calif. County Riverside Subarea Calimesa

Owner [redacted]

Location

Drilled by Brewer and Son Address

Date March 1, 1956 Casing diam. 16 Land-surf. alt. 2335 topo.

Source of data

(Enter type of well, perforations, yield, and drawdown at end of log)

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	Top soil	3	3
	Sand with some clay	27	30
	Brown clay	70	100
	Brown clay	32	132
	Reddish-brown clay with sand	16	148
	Yellowish clay with sand	37	185
	Sand and gravel with streaks of rock	215	400
	Mainly sand from 300-400.		
	Rotary to 400, cable tool to 500.		
	SW/L = 120-130 ft.		

GSSI
350

2S/2W -24E3 Well 34

NOT IN FILES

#35

WELL 34

Plotted on BFW

E2

WATER WELL DRILLERS REPORT

DUPLICATE

THIS HAS TO BE W-35

Permit No. 3703

T. 2S., R. 2 W Sec. 2

State Well No.

R.C.F.C.D. No. 34

02S/02W-24(E) -24E3

(1) OWNER:

Name [redacted] Phone: 797-3329

Address [redacted]

Calimesa, California

(2) LOCATION OF WELL:

County Riverside Owner's number, if any No. 2

Sec. 24-T2S R2W 800 North of Chandler Road

800 Ftte East of Highway 99

(3) TYPE OF WORK (check):

New well [X] Deepening [ ] Reconditioning [ ] Abandon [ ]

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic [ ] Industrial [ ] Municipal [ ]

Irrigation [X] Test Well [ ] Other [ ]

(5) EQUIPMENT:

Rotary [X]

Cable [ ]

Dug Well [ ]

(6) CASING INSTALLED:

If gravel packed:

From ft.	to ft.	Diam.	Gage or wall	Diameter of bore	from ft.	to ft.
0	800	14	3/16	21	0	800

Type and size of shoe or well ring: none

Size of gravel: Pea

Describe joint: Butt weld

(7) PERFORATIONS:

Type of perforator used: Torch

Size of perforations: 1/4 in., length 3/16 in.

From ft.	to ft.	Perf. per row	Rows per ft.
170	800	1	6

(8) CONSTRUCTION:

Method of Sealing: Cement

(9) WATER LEVELS:

Depth at which water was first found	1?? ft.
Standing level before perforating	168 ft.
Standing level after perforating	168 ft.

(10) WELL TESTS:

(11) WELL LOG:

Total depth 800 ft. Depth of completed well 800 ft.

From ft.	to ft.	Formation
0	4	Top soil
4	75	Gravel sand and clay
75	155	Gravel and sand
155	220	Sand and clay
220	260	Rock and sand
260	360	Sandy clay & gravel
360	380	Clay
380	394	Sand
394	410	Rock and sand
410	440	Gravel
440	475	Hard sand & clay
475	510	Rock and sand
510	648	Sand & gravel
648	650	Rock
650	800	Hard sand and clay

CONFIDENTIAL - NOT FOR PUBLIC RELEASE

MAR 1960 RECEIVED YUCAIPA VALLEY WATER DIST.

Driller:

Name R. L. Trower

Address 145 E. Wabash

San Bernardino, California

TRIPLICATE
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No. ____
(Insert appropriate number)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

Do Not Fill In
№ 54064
State Well No. ____
Other Well No. ____

(1) OWNER:
Name [redacted]
Address
Calimesa, Calif.

(2) LOCATION OF WELL:
County Riverside Owner's number, if any— No. 2
R.F.D. or Street No. Sec. 24-t2s 2-W 800 North
of chandle road 400 ft.
East of Highway 99

Permit NO1 3703

(3) TYPE OF WORK (check):
New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☒ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:
SINGLE ☒ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
0	800	14	3/16

If gravel packed

Diameter of Bore	from ft.	to ft.
21	0	800

Type and size of shoe or well ring none
Size of gravel: Pea
Describe joint but weld

(7) PERFORATIONS:
Type of perforator used torach
Size of perforations 4 1/2 in., length, by 3/16 in.

From ft.	to ft.	Perf. per row	Rows per ft.
170	800	1	6

(8) CONSTRUCTION:
Was a surface sanitary seal provided? ☒ Yes ☐ No To what depth 90 ft.
Were any strata sealed against pollution? ☐ Yes ☒ No If yes, note depth of strata
From ft. to ft.
Method of Sealing Cement

(9) WATER LEVELS:
Depth at which water was first found 168 ft.
Standing level before perforating 168 ft.
Standing level after perforating 168 ft.

(10) WELL TESTS:
Was a pump test made? ☐ Yes ☐ No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No
Was electric log made of well? ☐ Yes ☐ No

(11) WELL LOG:
Total depth 800 ft. Depth of completed well 800 ft.
Formation: Describe by color, character, size of material, and structure.

ft.	to ft.	Formation
0	4	Top Soil.
4	75	Gravel sand and clay
75	155	gravel and sand.
155	220	sand and clay
220	260	rock and sand
260	360	sandy clay& gravel
360	380	Clay
380	394	sand
394	410	rock and sand
410	440	gravel
440	475	Hard sand & clay
475	510	rock and sand
510	648	sand & gravel
648	650	rock
650	800	Hard sand and clay

Work started 19 , Completed 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME ~~xx~~ R. L. Trower
(Person, firm, or corporation) (Typed or printed)
Address 445 E. Wabash
San Bernardino, Calif.

[SIGNED] ____ Well Driller
License No. 189826 Dated ____, 19

87025 8-57 80M QUIN SPO DWR 188 (REV. 3-54)

Well #35

24E2

WELL LOG

2S/2W - 24E3

Well No. ______

Well Owner [redacted] Well No. 1

Location Approximately 2200 feet south of north line of Section 24

; SW ¼, NW ¼, Section 24, T 2 S, R 2 W

Drilled by Trower & Son Date completed October 1959

Drilling method rotary

Total depth ______ Size of casing and depth 14" Gauge 3/16" (Double) (Single)

Type of well ______

Struck water at ______, SWL before perforating 120 after perforating ______ (ft.)

Completion test data: SWL ______ PWL ______ Discharge ______ Hours run ______

Surface elev. 2320 Source of information ______

Perforations ______

Depth	Elev. Bot. of Stratum	Material	Thickness	
3 - 3		Top soil	3	
3 - 90		Red clay and decomposed granite	87	
90 - 134		Gravel and sand	44	
134 - 178		Clay and sand	44	
178 - 200		Gravel rock and sand	22	
200 - 210		Sand	10	
210 - 225		Gravel and sand	15	
225 - 247		Clay	22	
247 - 282		Gravel	35	
282 - 310		Clay and sand	28	
310 - 365		Gravel and sand	55	
365 - 491		Fine sand and clay	126	
491 - 560		Alternate layers of sand and rock	69	
560 - 790		Hard cemented gravel rock and sand	230	

Remarks:
21-inch hole to 530 feet
18-inch hole to 790 feet

SHEET ______ of ______ Sheets

2S/2W-24E2

SAN BERNARDINO VALLEY WATER CONSERVATION DISTRICT
10½ West Citrus Avenue - Redlands, California

WELL LOG

1 Well No. 35

Well Owner [redacted] WELL NO 1

Location aprox 2200 ft S. of North line of Sec. 24

; ¼, ¼, Section 24, T 2S, R 2W

Drilled by TROWER & SON Date completed Oct 1959

Drilling method Rotary

Total depth Size of casing and depth 14-inch Gauge 3/16" ~~(Double)~~ (Single)

Type of well

Struck water at , SWL before perforating 120 after perforating (ft.)

Completion test data: SWL PWL Discharge Hours run

Surface elev. 2320 Source of information

Perforations

Depth	Elev. Bot. of Stratum	Material	Thickness	
0-3		Top Soil		
3-90		Red Clay & Decomposed GRANITE		
90-134		Gravel & Sand		
134-178		Clay & Sand		
178-200		GRAVEL Rock & Sand		
200-210		SAND		
210-225		GRAVEL & SAND		
225-247		Clay		
247-282		GRAVEL		
282-310		Clay & SAND		
310-365		GRAVEL & SAND		
365-491		FINE SAND & Clay		
491-560		alternate layers of Sand & rock		
560-790		Hard Cemented Gravel Rock & Sand		

Remarks:
21-inch hole to 530 feet
18-inch hole to 790

SHEET of Sheets

Well N3

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0106895

Page 1 of 1

Owner's Well Number MW-3

Date Work Began 11/17/2009 Date Work Ended 11/20/2009

Local Permit Agency County of San Bernardino Environmental Health

Permit Number 2009110688 Permit Date 11/10/09

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Hollow Stem Auger Drilling Fluid Air

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	2	Asphalt on silty sand (fill)
2	4	Silty sand, brown
4	12	Sandy clay, fine, dark brown
12	40	Silty sand, fine to coarse, dark brown
40	50	Silt with sand, fine, gray brown
50	60	Sand, fine to coarse, dark gray
60	70	Gravelly sand, fine to coarse, dark gray

Total Depth of Boring 70 Feet

Total Depth of Completed Well 60 Feet

Well Owner

Name [redacted]

Mailing Address [redacted]

City Yucaipa State CA Zip 92399

Well Location

Address San Timoteo Canyon Road

City Redlands County San Bernardino

Latitude 34 Deg. 1 Min. 23 Sec. N Longitude 117 Deg. 11 Min. 48 Sec. W

Datum NAD83 Decimal Lat. 34.023 Decimal Long. 116.197

APN Book Page Parcel

Township 2S Range 3W Section 4

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West

East

USGS South 1" = 2000'

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
⦿ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water 19 (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	45	10	Blank	PVC Sch. 40		4		
45	60	10	Screen	PVC Sch. 40		4	Milled Slots	0.020

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	39	Cement	seal
39	42	Bentonite	seal
42	60	Filter Pack	sand

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Jay J. Martin for C.H.J., Incorporated, Vice President, CEG 1529
(Person, Firm or Corporation)

1355 E. Cooley Drive (Address) Colton (City) CA (State) 92324 (Zip)

Signed [signature] (C-57 Licensed Water Well Contractor) 3/4/2010 (Date Signed) 766402 (C-57 License Number)

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

MONITORING WELL NO. MW-3

Date Drilled: 11/18/09 | Client: [redacted]

Equipment: B-61 Hollow-Stem Auger | Driving Weight / Drop: 140 lbs./30 in.

Coordinates: 34.023°-116.197° | Logged by: VJR | Groundwater First Encountered (ft): 19.2

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	SAMPLE NO.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/FOOT (Equiv. SPT)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
		8" Asphalt Concrete, No Aggregate Base							
		(SM) Silty Sand, fine with medium, light brown	Fill	X		5 2 2			SPT
		(SM) Silty Sand, fine with clay, dark brown	Native						
5		(CL) Sandy Clay, fine, dark brown							
10				X		3 10 10			SPT
		(SM) Silty Sand, fine to coarse with gravel, dark brown							
15									
			Groundwater						
20		(SM) Silty Sand, fine to coarse with gravel, dark brown		X		4 7 12			SPT
25									
30				X		3 6 7			SPT

MONITORING WELL 09631-8.GPJ CHJ.GDT 11/24/09

C.H.J.

WELLS - SAN TIMOTEO & LIVE OAK CANYONS
RIVERSIDE COUNTY, CALIFORNIA

Job No. 09631-8

Enclosure B-3a

MONITORING WELL NO. MW-3

Date Drilled: 11/18/09 | Client: [redacted]

Equipment: B-61 Hollow-Stem Auger | Driving Weight / Drop: 140 lbs./30 in.

Coordinates: 34.023°-116.197° | Logged by: VJR | Groundwater First Encountered (ft): 19.2

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	SAMPLE NO.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/FOOT (Equiv. SPT)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
40		(ML) Silt with Sand, fine, gray brown		X		3 4 7			SPT
45									
50		(SP-SM) Sand, fine to coarse with silt and gravel, dark gray		X		21 50/5"			SPT
55									
60		(SP-SM) Gravelly Sand, fine to coarse with silt, gravel, dark gray		X		24 38 50/5"			SPT
65									

MONITORING_WELL 09631-8.GPJ CHJ.GDT 11/24/09

MONITORING WELL NO. MW-3

Date Drilled: 11/18/09 Client: [redacted]

Equipment: B-61 Hollow-Stem Auger Driving Weight / Drop: 140 lbs./30 in.

Coordinates: 34.023°-116.197° Logged by: VJR Groundwater First Encountered (ft): 19.2

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	SAMPLE NO.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/FOOT (Equiv. SPT)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
		(ML) Silt with sand, fine and clay, dark gray to red brown		X		15 16 24			SPT
		END OF BORING							
		BORING TERMINATED AT 70.0' - REDRILLED TO 60.0' FILL TO 2.0', SLIGHT CAVING GROUNDWATER AT 18.8'							
75									
80									
85									
90									
95									
100									

MONITORING_WELL 09631-8.GPJ CHJ.GDT 11/24/09

Well 104

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0106893

Page 1 of 1

Owner's Well Number MW-2

Date Work Began 11/16/2009 Date Work Ended 11/20/2009

Local Permit Agency County of San Bernardino Environmental Health

Permit Number 2009110689 Permit Date 11/10/09

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Hollow Stem Auger Drilling Fluid Air

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	3	Asphalt concrete on sand (fill)
3	20	Silty sand, fine to medium, brown
20	30	Silty sand,fine to coarse w/clay,dark brown
30	40	Clayey sand, fine w/medium and silt, yellow brown
40	50	Silty sand,fine w/medium & clay,brown
50	60	sand,fine to coarse w/silt, gray
60	71	Silty sand, fine w/medium & clay,brown

Total Depth of Boring 71 Feet

Total Depth of Completed Well 70 Feet

Well Owner

Name [redacted]

Mailing Address [redacted]

City Yucaipa State CA Zip 92399

Well Location

Address Alessandro Road

City Redlands County San Bernardino

Latitude 34 Deg. 0 Min. 51 Sec. N Longitude 117 Deg. 10 Min. 46 Sec. W

Datum NAD83 Decimal Lat. 34.014 Decimal Long. 117.179

APN Book ____ Page ____ Parcel ____

Township 2S Range 3W Section 10

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy (Describe procedures and materials under "GEOLOGIC LOG")

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
⦿ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water 17 (Feet below surface)

Depth to Static Water Level ____ (Feet) Date Measured ____

Estimated Yield * ____ (GPM) Test Type ____

Test Length ____ (Hours) Total Drawdown ____ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	55	10	Blank	PVC Sch. 40		4		
55	70	10	Screen	PVC Sch. 40		4	Milled Slots	0.020

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	46	Cement	seal
46	49	Bentonite	seal
49	70	Filter Pack	sand

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Jay J. Martin for C.H.J., Incorporated, Vice President, CEG 1529
Person, Firm or Corporation

1355 E. Cooley Drive Colton CA 92324
Address City State Zip

Signed [signature] 3/4/2010 766402
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

MONITORING WELL NO. MW-2

Date Drilled: 11/18/09 | Client: [redacted]

Equipment: B-61 Hollow-Stem Auger | Driving Weight / Drop: 140 lbs./30 in.

Coordinates: 34.014°-117.179° | Logged by: VJR | Groundwater First Encountered (ft): 16.5

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	SAMPLE NO.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/FOOT (Equiv. SPT)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
		7-1/2" Asphalt Concrete	Asphalt						
		(SP-SM) Sand, fine to medium with coarse, silt and gravel, brown	Fill	X		7 6 7			SPT
		(SM) Silty Sand, fine to medium, brown	Native						
5									
10				X		4 5 7			SPT
15			Groundwater						
20		(SM) Silty Sand, fine to coarse with clay, dark brown		X		7 11 11			SPT
25									
30		(SC) Clayey Sand, fine with medium and silt, yellow brown		X		2 2 4			SPT

MONITORING WELL NO. MW-2

Date Drilled: 11/18/09 | Client: [redacted]

Equipment: B-61 Hollow-Stem Auger | Driving Weight / Drop: 140 lbs./30 in.

Coordinates: 34.014°-117.179° | Logged by: VJR | Groundwater First Encountered (ft): 16.5

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	SAMPLE NO.	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS/FOOT (Equiv. SPT)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
40		(SM) Silty Sand, fine with medium and clay, brown		X		8 10 15			SPT
45									
50		(SP) Sand, fine to coarse with silt, gray		X		4 15 25			SPT
55									
60		(SM) Silty Sand, fine with medium and clay, brown		X		5 9 16			SPT
65									

MONITORING WELL NO. MW-2

Date Drilled: 11/18/09 Client: [redacted]

Equipment: B-61 Hollow-Stem Auger Driving Weight / Drop: 140 lbs./30 in.

Coordinates: 34.014°-117.179° Logged by: VJR Groundwater First Encountered (ft): 16.5

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	SAMPLE NO.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/FOOT (Equiv. SPT)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
				X		30 50/5"			SPT
		END OF BORING REFUSAL AT 71.0', NO BEDROCK FILL TO 3.0', SLIGHT CAVING GROUNDWATER AT 16.5'	Refusal						
75									
80									
85									
90									
95									
100									

MONITORING_WELL 09631-8.GPJ CHJ.GDT 11/24/09

well 105

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0107582

Page 1 of 1

Owner's Well Number MW-1

Date Work Began 11/18/2009 Date Work Ended 11/18/2009

Local Permit Agency Riverside County Department of Environmental Health

Permit Number WP 20440 Permit Date 11/10/09

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N W

Latitude Longitude

APN/TRS/Other

Geologic Log

Orientation ◉ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Hollow Stem Auger Drilling Fluid Air

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	1	Asphalt concrete and aggregate on sand (fill)
1	10	Silty sand, fine with clay, brown
10	20	Sand,fine to medium w/coarse, brown
20	30	Silty sand, fine to medium w/clay, gray brown
30	40	Silty sand,fine to coarse w/gravel, brown
40	50	Sand,fine to medium w/coarse, silt & gravel,gray
50	72	Silty sand, fine to medium w/clay, gray brown

Total Depth of Boring 72 Feet

Total Depth of Completed Well 60 Feet

Well Owner

Name [redacted]

Mailing Address [redacted]

City Yucaipa State CA Zip 92399

Well Location

Address Live Oak Canyon Road

City Calimesa County Riverside

Latitude 34 Deg. 0 Min. 10 Sec. N Longitude 117 Deg. 9 Min. 52 Sec. W

Datum NAD83 Decimal Lat. 34.003 Decimal Long. 117.165

APN Book 473 Page 320 Parcel 012

Township 2S Range 3W Section 14

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
◉ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water 19 (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	45	10	Blank	PVC Sch. 40		4		
45	60	10	Screen	PVC Sch. 40		4	Milled Slots	0.020

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	36	Cement	seal
36	39	Bentonite	seal
39	60	Filter Pack	sand

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Jay J. Martin for C.H.J., Incorporated, Vice President, CEG 1529
Person, Firm or Corporation

1355 E. Cooley Drive Colton CA 92324
Address City State Zip

Signed [signature] 3/18/2010 766402
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

YVWD

MONITORING WELL NO. MW-1

Date Drilled: 11/18/09 Client: [redacted]

Equipment: B-61 Hollow-Stem Auger Driving Weight / Drop: 140 lbs./30 in.

Coordinates: 34.003°-117.164° Logged by: VJR Groundwater First Encountered (ft): 19.0

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	SAMPLE NO.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/FOOT (Equiv. SPT)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
0		5" Asphalt Concrete, 4" Aggregate Base	Asphalt						
		(SP-SM) Sand, fine with silt, gray brown	Base						
		(SM) Silty Sand, fine with clay, brown	Fill / Native	X		2 3 2			SPT
5									
10		(SP-SM) Sand, fine to medium with coarse, brown		X		4 6 7			SPT
15									
19			▼ Groundwater						
20		(SM) Silty Sand, fine to medium with clay, gray brown		X		3 4 4			SPT
25									
30		(SM) Silty Sand, fine to coarse with gravel, brown		X		11 17 21			SPT

MONITORING_WELL 09631-8.GPJ CHJ.GDT 11/24/09

MONITORING WELL NO. MW-1

Date Drilled: 11/18/09 | Client: [redacted]

Equipment: B-61 Hollow-Stem Auger | Driving Weight / Drop: 140 lbs./30 in.

Coordinates: 34.003°-117.164° | Logged by: VJR | Groundwater First Encountered (ft): 19.0

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	SAMPLE NO.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/FOOT (Equiv. SPT)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
40		(SP-SM) Sand, fine to medium with coarse, silt and gravel, gray		X		4 6 14			SPT
45									
50		(SM) Silty Sand, fine to medium with clay, gray brown		X		14 22 23			SPT
55									
60				X		9 17 30			SPT
65									

MONITORING WELL 09631-8.GPJ CHJ.GDT 11/24/09

C.H.J.

WELLS - SAN TIMOTEO & LIVE OAK CANYONS
RIVERSIDE COUNTY, CALIFORNIA

Job No. 09631-8

Enclosure B-1b

MONITORING WELL NO. MW-1

Date Drilled: 11/18/09 | Client: [redacted]

Equipment: B-61 Hollow-Stem Auger | Driving Weight / Drop: 140 lbs./30 in.

Coordinates: 34.003°-117.164° | Logged by: VJR | Groundwater First Encountered (ft): 19.0

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	SAMPLE NO.	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS/FOOT (Equiv. SPT)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
				X		22 35 50			SPT
		END OF BORING REFUSAL AT 71.5', NO BEDROCK FILL TO 1.0', SLIGHT CAVING GROUNDWATER AT 19.0'	Refusal						
75									
80									
85									
90									
95									
100									

MONITORING_WELL 09631-8.GPJ CHJ.GDT 11/24/09

25-2W-13E1

FORM 115

INVESTIGATION

South Coastal Basin

DIVISION OF WATER RESOURCES

DEPARTMENT OF PUBLIC WORKS

STATE OF CALIFORNIA

WELL LOG

SHEET 1

NUMBER E-138d-

LOCAL DESIGNATION

Owner #2
Hicks #Y-2
Loc. #18249 —

LOCATION 700' S. of Ave. L; 20' E. of W. line of Lot 225, Sub. 9, Yucaipa Valley, Yucaipa . Sec.13.

OWNER [redacted]

DATE COMPLETED 1913

DIAMETER OF CASING 16"

DRILLED BY W. D. Anderson

SOURCE OF INFORMATION P. E. Hicks

INSPECTED WHILE DRILLING ______ SEE FILE NO. ______

SURFACE ELEVATION 2453. levels Hicks.

SKETCH

FOR FIELD COPIES USE ALTERNATE LINES

DEPTH	ELEVATION OF BOTTOM OF STRATUM	MATERIAL	THICKNESS FEET	% VOIDS	ABSOLUTE VOIDS FEET	TOTAL VOIDS FEET
0-95	2358	Packed clay	95			
190	2263	Cement gravel	95			
202	2251	Water gravel	12			
204	2249	Clay	2			
208	2245	Water gravel	4			
212	2241	Clay	4			
220	2233	Gravel	8			
226	2227	Clay	6			
230	2223	Gravel	4			
238	2215	Clay	8			
266	2187	Gravel	28			
277	2176	Clay	11			
313	2140	Gravel	36			
316	2137	Red clay	3			
330	2123	Cement gravel	14			
336	2117	Gravel	6			
338	2115	Clay	2			
346	2107	Gravel	8			
350	2103	Cement and quicksand	4			
362	2091	Red clay	12			
375	2078	Granite	[illegible]			
383	2070	Concrete	8			

MICROFILMED

Pumps 40" Drawdown 100'

682

LOG OBTAINED BY ______ DATE ______

66612 6-31 15M CALIFORNIA STATE PRINTING OFFICE

GSSI
342

MAY 31 1968

SMWC Well 4

2S/2W-14R3

ORIGINAL
File with DWR

WATER WELL DRILLERS REPORT

(Sections 7079, 7080, 7081, 7082, Water Code)

THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

Do Not Fill In

Nº 35123

State Well No. 2S/2W-14

Other Well No.

(1) OWNER:

Name [redacted]

Address Calimesa, California.

(2) LOCATION OF WELL:

County Riverside — Owner's number, if any No. 4 Well

Township, Range, and Section SE-1/4, Sec 14, Twp 2-S

Distance from cities, roads, railroads, etc. R-2-W, Riverside County

(3) TYPE OF WORK (check):

New Well [X] Deepening [ ] Reconditioning [ ] Destroying [ ]

If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic [ ] Industrial [ ] Municipal [ ] Irrigation [ ] Test Well [ ] Other [X]

(5) EQUIPMENT:

Rotary [X] Cable [ ] Other [ ]

(6) CASING INSTALLED:

STEEL: OTHER: SINGLE [X] DOUBLE [ ]

If gravel packed

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
100	30" x 1/4" conductor casing					
76'	16" x 5/16" blank casing					
624'	16" x 5/16" perforated casing					

Size of shoe or well ring: — Size of gravel:

Describe joint

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
352	976	10 holes per		2-2/3"

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes [X] No [ ] To what depth 100 ft.

Were any strata sealed against pollution? Yes [ ] No [ ] If yes, note depth of strata

From ft. to ft.

From ft. to ft.

Method of sealing

(9) WATER LEVELS:

Depth at which water was first found, if known ft.

Standing level before perforating, if known ft.

Standing level after perforating and developing ft.

(10) WELL TESTS:

Pump test made? Yes [X] No [ ] If yes, by whom? Roscoe Moss

Yield: 1720 gal./min. with 335 ft. drawdown after 49 hrs.

Temperature of water — Was a chemical analysis made? Yes [ ] No [ ]

Was electric log made of well? Yes [ ] No [ ] If yes, attach copy

(11) WELL LOG:

Total depth 1000 ft. Depth of completed well ft.

Formation: Describe by color, character, size of material, and structure

0 to 14' Soil
14 to 69' Gravel
69 to 73' Clay and gravel
73 to 92' Boulders
92 to 110' Gravel and clay
110 to 124' Sand and gravel
124 to 135' Red sandy clay, some gravel
135 to 195' Sand and gravel with cemented streaks
195 to 240' Sandy clay, some gravel
240 to 250' Red clay
250 to 280' Hard sand and gravel, some clay
280 to 348' Sand, gravel and rocks
348 to 358' Sand, gravel and clay
358 to 365' Brown clay
365 to 504' Hard sand, gravel, boulders and clay
504 to 535' Sand, gravel and clay
535 to 539' Sand and gravel
539 to 549' Sand and clay
549 to 580' Sand and gravel
580 to 635' Sand and gravel, some clay
635 to 694' Sandy clay, some sand and gravel
694 to 700' Hard rocks and sand
700 to 715' Brown clay
715 to 758' Sand and gravel
758 to 802' Clay, some sand and gravel
802 to 808' Hard rock and sand
808 to 835' Brown clay and gravel
835 to 840' Sand and gravel, some clay
840 to 856' Sandy clay, some sand
856 to 934' Sand, gravel and boulders
934 to 940' Sand and gravel, some clay
940 to 982' Sand gravel and boulders
982 to 1000' Brown clay

Work started 3-22-68, Completed 4-19-68

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Roscoe Moss Company
(Person, firm, or corporation) (Typed or printed)

Address 4360 Worth Street
Los Angeles, California.

[SIGNED] (Well Driller)

License No. 624 C-57 Dated May 17, 1968

SKETCH LOCATION OF WELL ON REVERSE SIDE

SMWG well 4

MAY 31 1968

-2S/2W-14R3

ORIGINAL
File with DWR

WATER WELL DRILLERS REPORT

(Sections 7079, 7080, 7081, 7082, Water Code)

THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

Do Not Fill In

No. 35123

State Well No. 2S/2W-14

Other Well No.

(1) OWNER:

Name [redacted]

Address Calimesa, California.

(2) LOCATION OF WELL:

County Riverside   Owner's number, if any No. 4 well

Township, Range, and Section SE-1/4, Sec 14, Twp 2-S

Distance from cities, roads, railroads, etc. R-2-W, Riverside County

(3) TYPE OF WORK (check):

New Well [X] Deepening [ ] Reconditioning [ ] Destroying [ ]

If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic [ ] Industrial [ ] Municipal [ ]
Irrigation [ ] Test Well [ ] Other [X]

(5) EQUIPMENT:

Rotary [X]
Cable [ ]
Other [ ]

(6) CASING INSTALLED:

STEEL: SINGLE [X] DOUBLE [ ] OTHER: If gravel packed

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
100	30" x 1/4" conductor casing					
76'	16" x 5/16" blank casing					
624'	- 16" x 5/16" perforated casing					

Size of shoe or well ring: Size of gravel:

Describe joint

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
352	976	10 holes per		2-2/3"

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes [X] No [ ] To what depth 100 ft.

Were any strata sealed against pollution? Yes [ ] No [ ] If yes, note depth of strata

From ft. to ft.

From ft. to ft.

Method of sealing

(9) WATER LEVELS:

Depth at which water was first found, if known ft.

Standing level before perforating, if known ft.

Standing level after perforating and developing ft.

(10) WELL TESTS:

Pump test made? Yes [X] No [ ] If yes, by whom? Roscoe Moss

Yield: 1720 gal./min. with 335 ft. drawdown after 49 hrs.

Temperature of water   Was a chemical analysis made? Yes [ ] No [ ]

Was electric log made of well? Yes [ ] No [ ] If yes, attach copy

(11) WELL LOG:

Total depth 1000 ft. Depth of completed well ft.

Formation: Describe by color, character, size of material, and structure

0 to 14' Soil
14 to 69' Gravel
69 to 73' Clay and gravel
73 to 92' Boulders
92 to 110' Gravel and clay
110 to 124' Sand and gravel
124 to 135' Red sandy clay, some gravel
135 to 195' Sand and gravel with cemented streaks
195 to 240' Sandy clay, some gravel
240 to 250' Red clay
250 to 280' Hard sand and gravel, some clay
280 to 348' Sand, gravel and rocks
348 to 358' Sand, gravel and clay
358 to 365' Brown clay
365 to 504' Hard sand, gravel, boulders and clay
504 to 535' Sand, gravel and clay
535 to 539' Sand and gravel
539 to 549' Sand and clay
549 to 580' Sand and gravel
580 to 635' Sand and gravel, some clay
635 to 694' Sandy clay, some sand and gravel
694 to 700' Hard rocks and sand
700 to 715' Brown clay
715 to 758' Sand and gravel
758 to 802' Clay, some sand and gravel
802 to 808' Hard rock and sand
808 to 835' Brown clay and gravel
835 to 840' Sand and gravel, some clay
840 to 856' Sandy clay, some sand
856 to 934' Sand, gravel and boulders
934 to 940' Sand and gravel, some clay
940 to 982' Sand gravel and boulders
982 to 1000' Brown clay

Work started 3-22-68, Completed 4-19-68

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Roscoe Moss Company
(Person, firm, or corporation) (Typed or printed)

Address 4360 Worth Street
Los Angeles, California.

[SIGNED] [illegible]
(Well Driller)

License No. 624 C-57   Dated May 17, 1968

SKETCH LOCATION OF WELL ON REVERSE SIDE

QUADRUPLICATE
For Local Requirements
Page ___ of ___

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 441027

DWR USE ONLY — DO NOT FILL IN
25/2W-15-H
STATE WELL NO./STATION NO.
LATITUDE | LONGITUDE
APN/TRS/OTHER

Owner's Well No. Well #5
Date Work Began 09/11/96 , Ended ________
Local Permit Agency County of Riverside Environmental Health
Permit No. 21447 Permit Date 09/11/96

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DEPTH TO FIRST WATER ______ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
	Install 14" liner to depth of
	514', Gravel Pack Liner

RECEIVED
OCT 21 1996

TOTAL DEPTH OF BORING ________ (Feet)
TOTAL DEPTH OF COMPLETED WELL ________ (Feet)

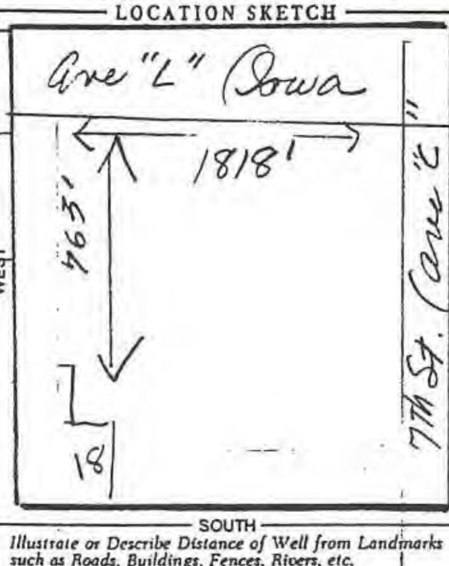
WELL OWNER

Name [redacted]
Mailing Address [redacted]
Calimesa Ca. 92320
CITY STATE ZIP

WELL LOCATION

Address S.of Ave. L, W of 7th St. Behind Mobil
City Home Park, - Calimesa
County Riverside
APN Book ______ Page ______ Parcel 411-200-018-9
Township 2S Range 2W Section 15
Latitude ___ ___ ___ NORTH (DEG. MIN. SEC.) Longitude ___ ___ ___ WEST (DEG. MIN. SEC.)

LOCATION SKETCH



Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

___ NEW WELL
MODIFICATION/REPAIR
___ Deepen
X Other (Specify) Annular Seal
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING
WATER SUPPLY
___ Domestic
X Public
___ Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD ________ FLUID ________

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ______ (Ft.) & DATE MEASURED ______
ESTIMATED YIELD* ______ (GPM) & TEST TYPE ______
TEST LENGTH ______ (Hrs.) TOTAL DRAWDOWN ______ (Ft.)
** May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 : 50	22	X				Mild Steel	16"	1/4	
0 : 264		X				Mild Steel	14"	1/4	
264 : 514			X			Mild Steel	14"	1/4	.090

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 : 50	X			3"

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ______

ATTACH ADDITIONAL INFORMATION IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Layne Western Division of Layne Christensen
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

900 Nevada Street Redlands Ca. 92373
ADDRESS CITY STATE ZIP

Signed [signature] 10/18/96 540011
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

GSSI
354

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

February 7, 1949

Log of Test-hole Drilled for the [redacted]
Driller: C. C. Scott
Box 26,
Beaumont, California

#5 #5

Total Depth of Test-Hole- 1, 119 Feet

FROM	TO	DESCRIPTION OF FORMATIONS
0	48	Gravel, and sand imbedded in Clay
48	70	Fine Gravel
70	120	Gravel, and Sand imbedded in Clay
120	132	Sandy Clay
132	170	Gravel imbedded in Clay
170	185	Shale
185	240	Clay
240	248	Fine Gravel
248	260	Clay
260	268	Rock
268	293	Gravel imbedded in Clay
293	305	Coarse Sand (Water)
305	370	Clay
370	375	Rock Ledge
375	400	Clay
400	406	Rock, and Decomposed Granite
406	415	Sand
415	450	Clay
450	480	Sandy Clay
480	490	Rock
490	538	Sandy Clay
538	555	Hard, solid Clay
555	578	Coarse sand (Water)
578	586	Rock
586	615	Clay
615	625	Sand
625	650	Sandy Clay
650	670	Very Hard Clay
670	683	Coarse Water Sand, and Gravel
683	693	Rock
693	730	Clay
730	740	S andy Clay
740	745	S and-Stone
745	750	Sand
750	756	Hard Clay
756	760	Sand
760	770	Sandy Clay
770	782	Clay
782	816	Very Hard Clay
816	830	Sand
830	850	Clay
850	855	Rock, and Sand-Stone

(Log continued on Page 2)

25/2W-14B2 form Exact log as 25/2W-14E1

WATER WELL DRILLERS REPORT

DUPLICATE

SMWC # 5

Permit No. 292
T. 2 S., R. 2 W Sec.
State Well No.
R.C.F.C.D. No.

M14E

OWNER:

Name [redacted]

Address

Calimesa, California

(2) LOCATION OF WELL:

County Riverside Owner's number, if any—

Portion of Blk. 251, Subd. 9, of Yucaipa Valley, Riverside Co.

(3) TYPE OF WORK (check):

New well ☐ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☐

Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☐
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☐ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall	If gravel packed: Diameter of Bore	from ft.	to ft.

Type and size of shoe or well ring

Size of gravel:

Describe joint

(7) PERFORATIONS:

Type of perforator used

Size of perforations, in., length, by in.

From ft.	to ft.	Perf. per row	Rows per ft.

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☐ Yes ☐ No To what depth ft.

Were any strata sealed against pollution? ☐ Yes ☐ No If yes, note depth of strata

From ft. to ft.

Method of Sealing

(9) WATER LEVELS:

Depth at which water was first found 230 ft.

Standing level before perforating 230 ft.

Standing level after perforating 180 ft.

(10) WELL TESTS:

Was a pump test made? ☐ Yes ☐ No If yes, by whom?

(11) WELL LOG:

Total depth 1,119 ft. Depth of completed well

Formation: Describe by color, character, size of material, and structure.

From ft.	to ft.	Formation
0	48	gravel & sand imbedded in
48	70	fine gravel
70	120	gravel & sand imbedded in
120	132	sandy clay
132	170	gravel imbedded in clay
170	185	shale
185	240	clay
240	248	fine gravel
248	260	clay
260	268	rock
268	293	gravel imbedded in clay
293	305	coarse sand (water)
305	370	clay
370	375	rock ledge
375	400	clay
400	406	rock & decomposed granite
406	415	sand
415	450	clay
450	480	sandy clay
480	490	rock
490	538	sandy clay
538	555	hard, solid clay
555	578	coarse sand (water)
578	586	rock
586	615	clay
615	625	sand
625	650	sandy clay
650	670	very hard clay
670	683	coarse water sand & gravel
683	693	rock
693	730	clay
730	740	sandy clay
740	745	sand-stone
745	750	sand
750	756	hard clay
756	760	sand
760	770	sandy clay
770	782	clay
782	816	very hard clay
816	830	sand
830	850	clay
850	855	rock and sandstone
		cont'd next page

Work started Jan. 6 1949 Completed Feb. 7 19

Driller

Name C. C. Scott

Address Box 26

Beaumont, California

2/5/2W-14R2

WATER WELL DRILLERS REPORT

DUPLICATE

Permit No. 292 page
T. 2S., R. 2W Sec.,
State Well No.
R.C.F.C.D. No.
02/4R

OWNER:
Name [redacted]
Address
Calimesa, California

(2) LOCATION OF WELL:
County Owner's number, if any—
Portion of Blk. 251, Subd. 9, of
Yucaipa Valley, Riverside Co.

(3) TYPE OF WORK (*check*):
New well ☐ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (*check*):
Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☐
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:
SINGLE ☐ DOUBLE ☐

From ft. to ft.	Diam.	Gage or Wall	If gravel packed: Diameter of Bore	from ft.	to ft.

Type and size of shoe or well ring
Size of gravel:
Describe joint

(7) PERFORATIONS:
Type of perforator used
Size of perforations in., length, by in.

From ft. to ft.	Perf. per row	Rows per ft.

(8) CONSTRUCTION:
Was a surface sanitary seal provided? ☐ Yes ☐ No To what depth ft.
Were any strata sealed against pollution? ☐ Yes ☐ No If yes, note depth of strata
From ft. to ft.
Method of Sealing

(9) WATER LEVELS:
at which water was first found ft.
Standing level before perforating ft.
Level after perforating ft.

(10) WELL TESTS:
Was a pump test made? ☐ Yes ☐ No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.

(11) WELL LOG:
Total depth 1,119 ft. Depth of completed well
Formation: Describe by color, character, size of material, and structure.

From ft.	to ft.	Formation
855	863	fine sand
863	890	clay
890	910	coarse sand (water)
910	970	sandy clay
970	978	hard clay
978	985	sandy clay
985	1,000	sand & fine gravel (water)
1,000	1,004	hard clay
1,004	1,016	hard clay
1,016	1,020	rock
1,020	1,050	clay
1,050	1,070	coarse sand (water)
1,070	1,085	clay
1,085	1,090	rock ledge
1,090	1,119	hard clay

NOTE:
Water meas. at 410', level 230'
" " " 650' " 230'
" " " 1,119' " stood at
approx. 180', on Feb. 7, 1949

Work started Jan. 6 1949 Completed Feb. 7 1949

Driller
Name C. C. Scott
Address Box 26
Beaumont, California

Mail Two Copies to:
DEPARTMENT OF PUBLIC HEALTH
Court House
Riverside, California

WATER WELL DRILLERS REPORT

(County Ordinances No. 340 and 340A)
COUNTY OF RIVERSIDE
DEPARTMENT OF PUBLIC HEALTH

Do Not Fill In 431

State Well No.
Other Well No. 2S/1W-15A
Region

(1) OWNER:
Name [redacted]
Address P. O. Box 307
Calimesa, Calif.

(2) LOCATION OF WELL:
County Riverside Owner's number, if any—
NE 1/4 NE 1/4 Sec. 15 T 2-S
R 1-W., S.B.B. & M.

(3) TYPE OF WORK (check):
New well [X] Deepening [ ] Reconditioning [ ] Abandon [ ]
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic [X] Industrial [ ] Municipal [ ]
Irrigation [ ] Test Well [ ] Other [ ]

(5) EQUIPMENT:
Rotary [X]
Cable [ ]
Dug Well [ ]

(6) CASING INSTALLED:
SINGLE [X] DOUBLE [ ]

From ft.	to ft.	Diam.	Gage or Wall	Diameter of Bore	from ft.	to ft.
0	800	16	1/4	22	0	800

If gravel packed

Type and size of shoe or well ring none
Size of gravel: 1/2
Describe joint Butt weld

(7) PERFORATIONS:
Type of perforator used Toarch
Size of perforations 4 1/2 in., length, by 3/16 in.

From ft.	to ft.	Perf. per row	Rows per ft.
242	800	6	1

(8) CONSTRUCTION:
Was a surface sanitary seal provided? [X] Yes [ ] No To what depth 50 ft.
Were any strata sealed against pollution? [ ] Yes [ ] No If yes, note depth of strata
From ft. to ft.
Method of Sealing Cement

(9) WATER LEVELS:
Depth at which water was first found 242 ft.
Standing level before perforating 242 ft.
Standing level after perforating 242 ft.

(10) WELL TESTS:
Was a pump test made? [ ] Yes [ ] No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.

(11) WELL LOG:
Total depth 1200 ft. Depth of completed well 800 ft.
Formation: Describe by color, character, size of material, and structure.

From ft.	to ft.	Formation
0	8	Brown Clay.
8	11	light Tan Clay.
11	94	Brown clay.
94	262	Sand, Gravel and Rock.
262	311	Sand with some clay.
311	400	Decomposed granite.
400	472	Hard decomposed.
472	500	Sand course.
500	528	Sand and clay.
528	578	Sand course.
578	584	Rock and gravel.
584	675	Sand and gravel.
675	691	Gravel and D. G.
691	705	Sandy clay.
705	980	Cemented rock and gravel
980	1004	Very hard D. G.
1004	1202	Granite Niece.

Work started 19 , Completed Nov. 8 1962

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME R. L. Trower
(Person, firm, or corporation) (Typed or printed)
Address 445 E. Wabash
San Bernardino, Calif.
[SIGNED] Robert L. Trower

DUPLICATE
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No.________
(Insert appropriate number)

WATER WELL DRILLERS REPORT
(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

Do Not Fill In
№ 54073
State Well No.
Other Well No.

(1) OWNER:
Name [redacted]
Address [redacted]
Calimesa, Calif.

(2) LOCATION OF WELL:
County Riverside Owner's number, if any--
R. F. D. or Street No.
NE. 1/4 NE. 1/4 Sec. 15 T 2-S
R. 1-W., S. B. B. &M.

(3) TYPE OF WORK (check):
New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:
SINGLE ☒ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
0	800	16	1/4

If gravel packed

Diameter of Bore	from ft.	to ft.
22	0	800

Type and size of shoe or well ring none
Size of gravel: 1/2 in.
Describe joint Butt weld

(7) PERFORATIONS:
Type of perforator used Torach
Size of perforations 4 1/2 in., length, by 3/16 in.

From ft.	to ft.	Perf. per row	Rows per ft.
242	800	6	1

(8) CONSTRUCTION:
Was a surface sanitary seal provided? ☒ Yes ☐ No To what depth 50 ft.
Were any strata sealed against pollution? ☐ Yes ☒ No If yes, note depth of strata
From ft. to ft.
Method of Sealing Cement

(9) WATER LEVELS:
Depth at which water was first found 242 ft.
Standing level before perforating 242 ft.
Standing level after perforating 242 ft.

(10) WELL TESTS:
Was a pump test made? ☐ Yes ☐ No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No
Was electric log made of well? ☐ Yes ☐ No

(11) WELL LOG:
Total depth 1200 ft. Depth of completed well 800 ft.
Formation: Describe by color, character, size of material, and structure.

ft.	to ft.	Formation
0	8	Brown Clay.
8	11	Light tan clay.
11	94	Brown clay.
94	262	Sand, gravel and rock.
262	311	Sand with some clay.
311	400	Decomposed granite.
400	472	Hard decomposed granite
472	500	Course sand.
500	528	Sand and clay
528	578	Course sand.
578	584	Rock and gravel.
584	675	Sand and gravel.
675	691	D.G. and gravel.
691	705	Sandy clay.
705	980	Cemented rock and gravel
980	1004	Very hard DG!
1004	1200	Granite niece.

Work started 19 . Completed Nov. 8 1962

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME R. L. Trower
(Person, firm, or corporation) (Typed or printed)
Address 445 E. Wabash
San Bernardino, Calif.
[SIGNED] Robert L Trower
Well Driller
License No. 189826 Dated Nov. 8, 1962

87025 6-57 50M QUIN SPO
DWR 188 (REV. 3-54)

DUPLICATE
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No.________
(Insert appropriate number)

WATER WELL DRILLERS REPORT
(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

Do Not Fill In
Nº 54073
State Well No.
Other Well No.

(1) OWNER:
Name [redacted]
Address [redacted]
Calimesa, Calif.

(2) LOCATION OF WELL:
County Riverside Owner's number, if any--
R. F. D. or Street No.
NE. 1/4 NE. 1/4 Sec. 15 T 2-S
R. 1-W., S. B. B. &M.

(3) TYPE OF WORK (*check*):
New well [X] Deepening [ ] Reconditioning [ ] Abandon [ ]
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (*check*):
Domestic [X] Industrial [ ] Municipal [ ]
Irrigation [ ] Test Well [ ] Other [ ]

(5) EQUIPMENT:
Rotary [X]
Cable [ ]
Dug Well [ ]

(6) CASING INSTALLED:
SINGLE [X] DOUBLE [ ]

From ft.	to ft.	Diam.	Gage or Wall
0	800	16 1/4	

If gravel packed

Diameter of Bore	from ft.	to ft.
22	0	800

Type and size of shoe or well ring none
Size of gravel: 1/2 in.
Describe joint Butt weld

(7) PERFORATIONS:
Type of perforator used Torach
Size of perforations 4 1/2 in., length, by 3/16 in.

From ft.	to ft.	Perf. per row	Rows per ft.
242	800	6	1

(8) CONSTRUCTION:
Was a surface sanitary seal provided? [X] Yes [ ] No To what depth 50 ft.
Were any strata sealed against pollution? [ ] Yes [X] No If yes, note depth of strata
From ft. to ft.
Method of Sealing Cement

(9) WATER LEVELS:
Depth at which water was first found 242 ft.
Standing level before perforating 242 ft.
Standing level after perforating 242 ft.

(10) WELL TESTS:
Was a pump test made? [ ] Yes [ ] No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.
Temperature of water Was a chemical analysis made? [ ] Yes [ ] No
Was electric log made of well? [ ] Yes [ ] No

(11) WELL LOG:
Total depth 1200 ft. Depth of completed well 800 ft.
Formation: *Describe by color, character, size of material, and structure.*

ft.	to ft.	
0	8	Brown Clay.
8	11	Light tan clay.
11	94	Brown clay.
94	262	Sand, gravel and rock.
262	311	Sand with some clay.
311	400	Decomposed granite.
400	472	Hard decomposed granite
472	500	Course sand.
500	528	Sand and clay
528	578	Course sand.
578	584	Rock and gravel.
584	675	Sand and gravel.
675	691	D.G. and gravel.
691	705	Sandy clay.
705	980	Cemented rock and gravel
980	1004	Very hard DG!
1004	1200	Granite piece.

Work started 19 . Completed Nov. 8 1962

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME R. L. Trower
(Person, firm, or corporation) (Typed or printed)
Address 445 E. Wabash
San Bernardino, Calif.
[SIGNED] Robert L Trower
Well Driller
License No. 189826 Dated Nov. 8, 1962

87025 6-57 50M QUIN SPO
DWR 188 (REV. 3-54)

QUADRUPLICATE
RETAIN THIS COPY

#9

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

1S/7W 15A02

Do Not Fill In
No. 54055
State Well No.
Other Well No.

SMWC WS #9

(1) OWNER:
Name [redacted]
Address

(2) LOCATION OF WELL:
County Riverside Owner's number, if any #9
R. F. D. or Street No.

(3) TYPE OF WORK (check):
New well ☐ Deepening ☒ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:
SINGLE ☒ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
0	985	16	1/4

If gravel packed

Diameter of Bore	From ft.	to ft.
22	0	985
12	985	1400

Type and size of shoe or well ring none
Size of gravel: 3/8 pea
Describe joint butt weld

(7) PERFORATIONS:
Type of perforator used milling blade
Size of perforations 5/16 in., length, by 3 1/4 in.

From ft.	to ft.	Perf. per row	Rows per ft.
250	760	4	8
800	985	4	8

(8) CONSTRUCTION:
Was a surface sanitary seal provided? ☒ Yes ☐ No To what depth 65 ft.
Were any strata sealed against pollution? ☐ Yes ☐ No If yes, note depth of strata
From ft. to ft.
Method of Sealing 65 ft. of 22in. pipe cemented

(9) WATER LEVELS:
Depth at which water was first found 256 ft.
Standing level before perforating 256 ft.
Standing level after perforating 256 ft.

(10) WELL TESTS:
Was a pump test made? ☐ Yes ☐ No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No
Was electric log made of well? ☐ Yes ☐ No

(11) WELL LOG:
Total depth 1400 ft. Depth of completed well 985 ft.
Formation: *Describe by color, character, size of material, and structure.*

25% | Top: 1823 | bot: 1672

ft.	to ft.	
538	689	packed sand, graveland ~~gravel~~ rock.
689	745	redish brown clay & sand
745	746	rock.
746	759	sand and rock.
759	820	sandy clay.
820	1005	sand, gravel and rock.
1005	1400	blue clay and gray sand.

Work started 19 . Completed Jan 20 19 65

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME R.L. Trower (Person, firm, or corporation) (Typed or printed)
Address 445 E. Wabash
San Bernardino, Calif
[SIGNED] Robert L. Trower (Well Driller)
License No. 189826 Dated Jan 26 19 65

67026 8-57 80M QUIN SPO DWR 188 (REV. 3-54)

GKI 3E2

QUADRUPLICATE

RETAIN THIS COPY

#9

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

Do Not Fill In

№ 54055

State Well No.

Other Well No.

(1) OWNER:

Name [redacted]

Address

(2) LOCATION OF WELL:

County Riverside Owner's number, if any #9

R. F. D. or Street No.

(3) TYPE OF WORK (check):

New well ☐ Deepening ☒ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☒

Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒

Cable ☐

Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☒ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
0	985	16	1/4

If gravel packed

Diameter of Bore	from ft.	to ft.
22	0	985
12	985	1400

Type and size of shoe or well ring none

Size of gravel: 3/8 pea

Describe joint butt weld

(7) PERFORATIONS:

Type of perforator used milling blade

Size of perforations 5/16 in., length, by 3 1/4 in.

From ft.	to ft.	Perf. per row	Rows per ft.
250	760	4	8
800	985	4	8

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☒ Yes ☐ No To what depth 65 ft.

Were any strata sealed against pollution? ☐ Yes ☐ No If yes, note depth of strata

From ft. to ft.

Method of Sealing 65 ft. of 22in. pipe cemented

(9) WATER LEVELS:

Depth at which water was first found 256 ft.

Standing level before perforating 256 ft.

Standing level after perforating 256 ft.

(10) WELL TESTS:

Was a pump test made? ☐ Yes ☐ No If yes, by whom?

Yield: gal./min. with ft. draw down after hrs.

Temperature of water Was a chemical analysis made? ☐ Yes ☐ No

Was electric log made of well? ☐ Yes ☐ No

(11) WELL LOG:

Total depth 1400 ft. Depth of completed well 985 ft.

Formation: Describe by color, character, size of material, and structure.

ft. to	ft.	
538	689	packed sand, graveland ~~gravel~~ rock.
689	745	redish brown clay &sand
745	746	rock.
746	759	sand and rock.
759	820	sandy clay.
820	1005	sand, gravel and rock.
1005	1400	blue clay and gray sand.

Work started 19 Completed Jan 20 1965

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME R. L. TROWER (Person, firm, or corporation) (Typed or printed)

Address 445 E. Wabash

San Bernardino, Calif

[SIGNED] Robert L. Trower Well Driller

License No. 189826 Dated Jan 26, 1965

87028 6-57 50M QUIN △ SPO DWR 188 (REV. 3-54)

SMWC Well 11

FORM 115
INVESTIGATION

South Coastal Basin

DIVISION OF WATER RESOURCES
DEPARTMENT OF PUBLIC WORKS
STATE OF CALIFORNIA

WELL LOG

2S/2W-14C1

SHEET

NUMBER E-1364

LOCAL DESIGNATION Owner #
Marliave Red. #51
Hicks Y-11

~~Loc. #1823CA~~

LOCATION 10' S. of County Line Road, 150' W. of State Highway, Lot 209, Sub. 9. Yucaipa.

OWNER [redacted]

SKETCH

DATE COMPLETED ~~-164~~ About 1922

DIAMETER OF CASING 16"

DRILLED BY Henry F. Gansner

SOURCE OF INFORMATION P. E. Hicks

INSPECTED WHILE DRILLING ______ SEE FILE NO. ______

SURFACE ELEVATION ______

DEPTH	ELEVATION OF BOTTOM OF STRATUM	MATERIAL	THICKNESS FEET	% VOIDS	ABSOLUTE VOIDS FEET	TOTAL VOIDS FEET
0-135		Clay and some gravel	135			
140		Sand	5			
190		Clay	50			
208		Sand and clay	18			
294		Sand and gravel, greater part cemented.	86			
336		Gravel, some clay	42			
360		Clay and gravel	24			
369		Clay	9			
430		Hard red clay	61			
431		Clay, little gravel	1			
440		Soft sandy clay	9			
443		Clay	3			
		Perf 205-363				
		Pumps 150" - drawdown 1[illegible]				

NEGATIVES

FOR FIELD COPIES USE ALTERNATE LINES

LOG OBTAINED BY ______ DATE ______

345
7

DUPLICATE

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in
No. 161398

Notice of Intent No. ____ State Well No. ____
Local Permit No. or Date ____ Other Well No. ____

(1) OWNER: Name [redacted]
Address [redacted]
City Calimesa, CA Zip 92320

(2) LOCATION OF WELL (See instructions):
County San Bernardino Owner's Well Number 28
Well address if different from above ____
Township 2S Range 2W Section 11
Distance from cities, roads, railroads, fences, etc. Calimesa
500' East of County Line Rd.
200' South of "H" St.

WELL LOCATION SKETCH
PER BULLETIN # 74 WATER WELL STANDARD

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☒
Other ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size #5 Gravel
Diameter of bore 24"
Packed from 50' to 770 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen R/M Hirizontal Louvre

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	770	5/16	5/16	250	770	3/32x2½"

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ____ ft.
Method of sealing Cement in place

(10) WATER LEVELS:
Depth of first water, if known ____ ft.
Standing level after well completion 183 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? McCalla Bros
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test ____ ft. At end of test ____ ft
Discharge 2400 gal/min after 26½ hours Water temperature ____
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? ____
Was electric log made? Yes ☒ No ☐ If yes, attach copy to this report N.A.

(12) WELL LOG: Total depth 1000 ft. Depth of completed well 770 ft.

from ft. to ft.	Formation (Describe by color, character, size or material)
0 - 16	Top Soil, Clay, Rock & Sand
16 - 41	Clay, Rock & Gravel
41 - 103	Samll Gravel & Sand
103 - 214	Spotted Rock, Sand & Gravel
214 - 260	Granite Formation, firm
260 - 327	Small Gravel, Sand & Rock
327 - 390	Small Gravel, tight
390 - 506	Gravel
506 - 540	Gravel & Small Boulders
540 - 556	Red Clay
556 - 587	Gravel, w/Clay Streaks
587 - 611	Gravel & Granite, tight spots
611 - 620	Sandy Clay, tight
620 - 637	Sandy Clay, Gravel Streaks
637 - 744	Gravel & Small Rocks
744 - 762	Small Gravel, Sandy Clay
762 - 770	Gravel
770 - 802	Sandy Clay
802 - 808	Gravel & Rock
808 - 865	Sandy Clay
865 - 952	Gravel w/Clay Streaks
952 - 1000	Sand & Gravel

Work started 11-20 19 85 Completed 1-9 19 86

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge ~~and belief~~.
SIGNED ____ (Well Driller)
NAME McCalla Bros.
(Person, firm, or corporation) (Typed or printed)
Address 3132 W. 17th St.
City Santa Ana, CA Zip 92703
License No. 196824 Date of this report 1-27-86

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

FORM 115

INVESTIGATION South Coastal Basin

DIVISION OF WATER RESOURCES
DEPARTMENT OF PUBLIC WORKS
STATE OF CALIFORNIA

WELL LOG

2S/2W - 14B01

SHEET 1

NUMBER E-136h

LOCAL DESIGNATION Owner #14
Marliave Red. #53
Hicks Y-14

LOCATION 50' S. of County Line Road, 700' E. of State Highway, Lot 205, Sub. 9, Yucaipa.

Loc. #18239-

OWNER [redacted]

DATE COMPLETED About 1927

DIAMETER OF CASING 16"

DRILLED BY Clark McEuen

SOURCE OF INFORMATION P.E.Hicks

INSPECTED WHILE DRILLING ______ SEE FILE NO. ______

SURFACE ELEVATION ______

SKETCH

DEPTH	ELEVATION OF BOTTOM OF STRATUM	MATERIAL	THICKNESS FEET	% VOIDS	ABSOLUTE VOIDS FEET	TOTAL VOIDS FEET
0-130		Clay	130			
150		Tight gravel	20			
160		Clay	10			
175		Tight gravel	15			
210		Coarse gravel, loose	35			
212		Red coarse sand	[illegible]			
250		Coarse gray gravel	38			
265		Clay and gravel, hard	[illegible]			
310		Coarse gravel, good	[illegible]			
317		Sand and clay	[illegible]			
325		All clay	[illegible]			
348		Wash gravel, coarse	[illegible]			
351		Clay	[illegible]			
353		Fine sand	[illegible]			
395		Clay	[illegible]			
		Pumps 100" Drawdown 1?0'				

MICROFILMED

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LOG OBTAINED BY ______ DATE ______

56612 6-31 15M CALIFORNIA STATE PRINTING OFFICE

6557
6 344

2-2-14E01

FORM 115
INVESTIGATION

DIVISION OF WATER RESOURCES
DEPARTMENT OF PUBLIC WORKS
STATE OF CALIFORNIA

2S/2W-14E01

SHEET 1

NUMBER E-136K

WELL LOG

LOCAL DESIGNATION

LOCATION E. Side of ... St. extension ... N. of Ave. ... ~~50 south of county line and 100 feet west of Highway 99~~ 19' E. of Loc. # 18239 L

Loc. # 18239 C

OWNER [redacted]

DATE COMPLETED drilled 1920

DIAMETER OF CASING

DRILLED BY Ganzer

SOURCE OF INFORMATION San Bernardino Valley Water Conservation District

INSPECTED WHILE DRILLING SEE FILE NO.

SURFACE ELEVATION 2370.0

SKETCH

DEPTH	ELEVATION OF BOTTOM OF STRATUM	MATERIAL	THICKNESS FEET	% VOIDS	ABSOLUTE VOIDS FEET	TOTAL VOIDS FEET
0 - 130		clay				
130 - 135		sand				
135 - 170		clay				
170 - 185		sand and gravel				
185 - 195		clay and gravel				
195 - 200		gravel				
235						

FOR FIELD COPIES USE ALTERNATE LINES

MICROFILMED

GSSI 346

LOG OBTAINED BY DATE

PACIFIC SURVEYS

ELECTRIC LOG
GAMMA-RAY

Job No.	16423
File No.	
Company	[redacted]
Well	CAL MESA WATER 7TH ST. WELL
Field	YUCAIPA
County	SAN BERNARDINO
State	CA

Location:

EAST END OF 7TH ST
GPS: N34o 00.769' W117o 04.032'

Sec. Twp. Rge.

Other Services:

SONIV/VDL

Permanent Datum	G.L.		Elevation	K.B.
Log Measured From	G.L.	0'	above perm. datum	D.F.
Drilling Measured From	G.L.			G.L.

Elevation

Date	02-27-2012		
Run Number	ONE		
Depth Driller	913'		
Depth Logger	912'		
Bottom Logged Interval	910'		
Top Log Interval	50'		
Casing Driller	30" @ 50'		
Casing Logger	50'		
Bit Size	17.5"		
Type Fluid in Hole	WATER		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	PIT		
Rm @ Meas. Temp	14.2 @ 77F		
Rmf @ Meas. Temp	14.2 @ 77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	MEAS		
Rm @ BHT	N/A		
Time Circulation Stopped	3 HRS		
Time Logger on Bottom	02:10		
Max. Recorded Temperature	N/A		
Equipment Number	PS-5		
Location	L.A.		
Recorded By	RIDDER		
Witnessed By	--		

<<< Fold Here >>>

Comments

~200-300 mg/L TDS

Calibration Report

Database File: 16423.db
Dataset Pathname: Elog
Dataset Creation: Mon Feb 27 02:06:10 2012 by Log Open-Cased 100827

Serial:	D1
Model:	DTQ
Shop Calibration Performed:	Fri Sep 02 10:21:35 2011
Before Survey Verification Performed:	Wed May 18 15:44:28 2011
After Survey Verification Performed:	Wed May 18 15:45:08 2011

Shop Calibration

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	8.723	99.406		10.200	102.200	Ohm-m	1.015	1.350
Long	7.680	96.048		10.200	102.200	Ohm-m	1.041	-17.600
IEE	52.920	3270.320	counts	0.058	3.579	A		
VSN	49.080	5373.320	counts	0.936	102.490	V		
VLN	204.820	45711.480	counts	3.907	871.891	V		

Before Survey Verification

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	80.215	146.194		82.548	146.243	Ohm-m	0.965	5.112
Long	1342.350	4974.190		4976.440	4976.440	Ohm-m	0.991	47.934
IEE	54.260	3251.500	counts	0.059	3.558	A		
VSN	48.900	5340.600	counts	0.933	101.865	V		
VLN	204.580	45427.860	counts	3.902	866.481	V		

After Survey Verification

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	79.445	146.186		80.215	146.194	Ohm-m	0.989	1.677
Long	1341.850	4973.840		4974.190	4974.190	Ohm-m	1.000	0.554
IEE	54.360	3249.300	counts	0.059	3.556	A		
VSN	48.520	5336.700	counts	0.925	101.791	V		
VLN	204.880	45393.900	counts	3.908	865.833	V		

After Survey Verification compared to Before Survey Calibration

	Zero			Cal		
	Before	After		Before	After	
Short	82.548	80.215	Ohm-m	146.243	146.194	Ohm-m
Long	1377.960	1342.350	Ohm-m	4976.440	4974.190	Ohm-m

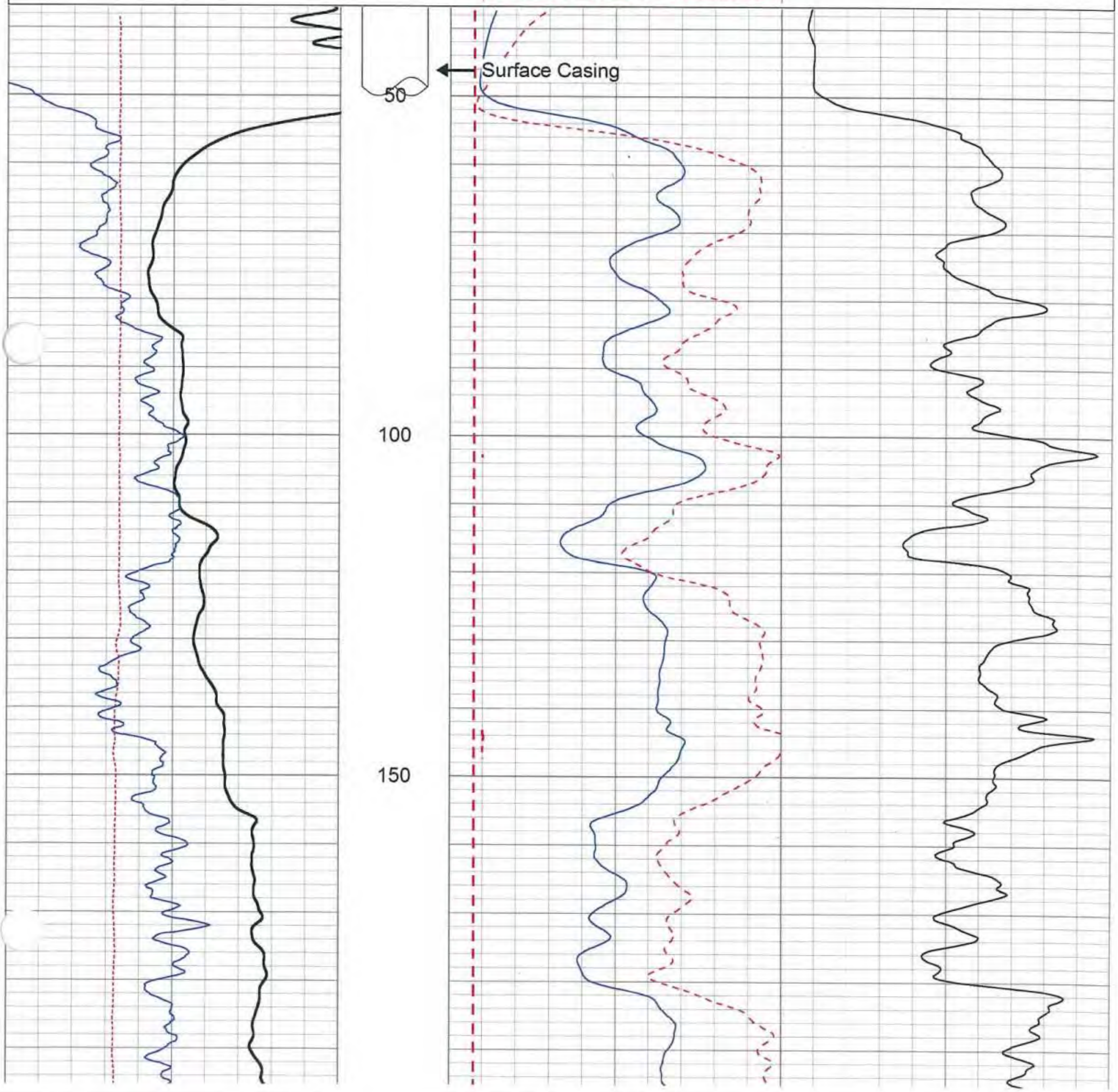
Gamma Ray Calibration Report

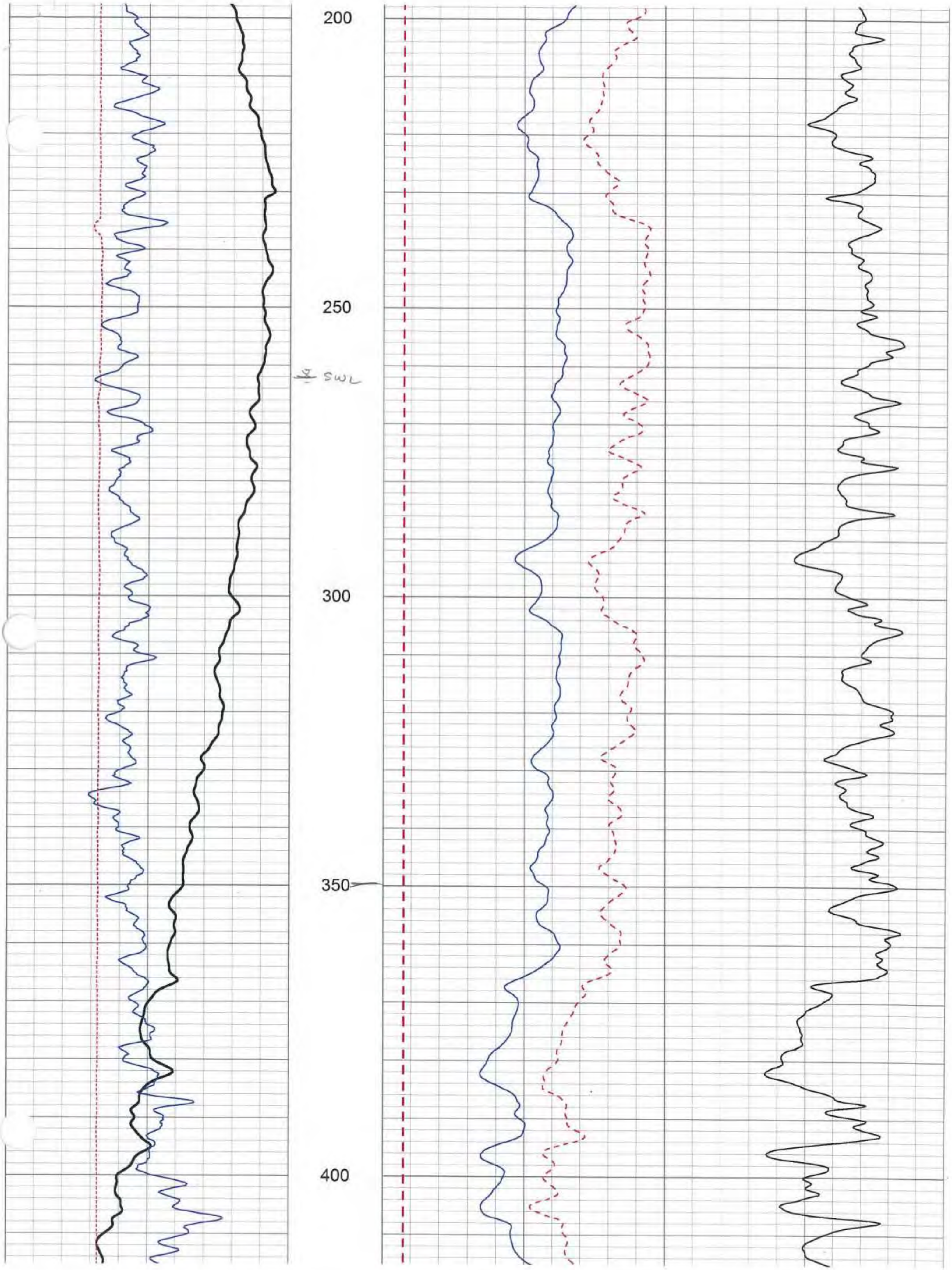
Serial Number:	D4	
Tool Model:	ELOG	
Performed:	Sat Apr 09 12:21:07 2011	
Calibrator Value:	162.0	GAPI
Background Reading:	212.4	cps
Calibrator Reading:	707.5	cps

Sensitivity: 0.3272 GAPI/cps

Database File: 16423.db
Dataset Pathname: Elog
Presentation Format: elog
Dataset Creation: Mon Feb 27 02:06:10 2012 by Log Open-Cased 100827
Charted by: Depth in Feet scaled 1:240

-75 SP (mV) 50	0 RSN (Ohm-m) 200	200 SPR (Ohm-m) 310
0 Line Speed (ft/min) -100	0 RLN (Ohm-m) 200	
30 Gamma Ray (GAPI) 130	0 RMF (Ohm-m) 200	
	200 RSN x 10 (Ohm-m) 2000	
	200 RLN x 10 (Ohm-m) 2000	

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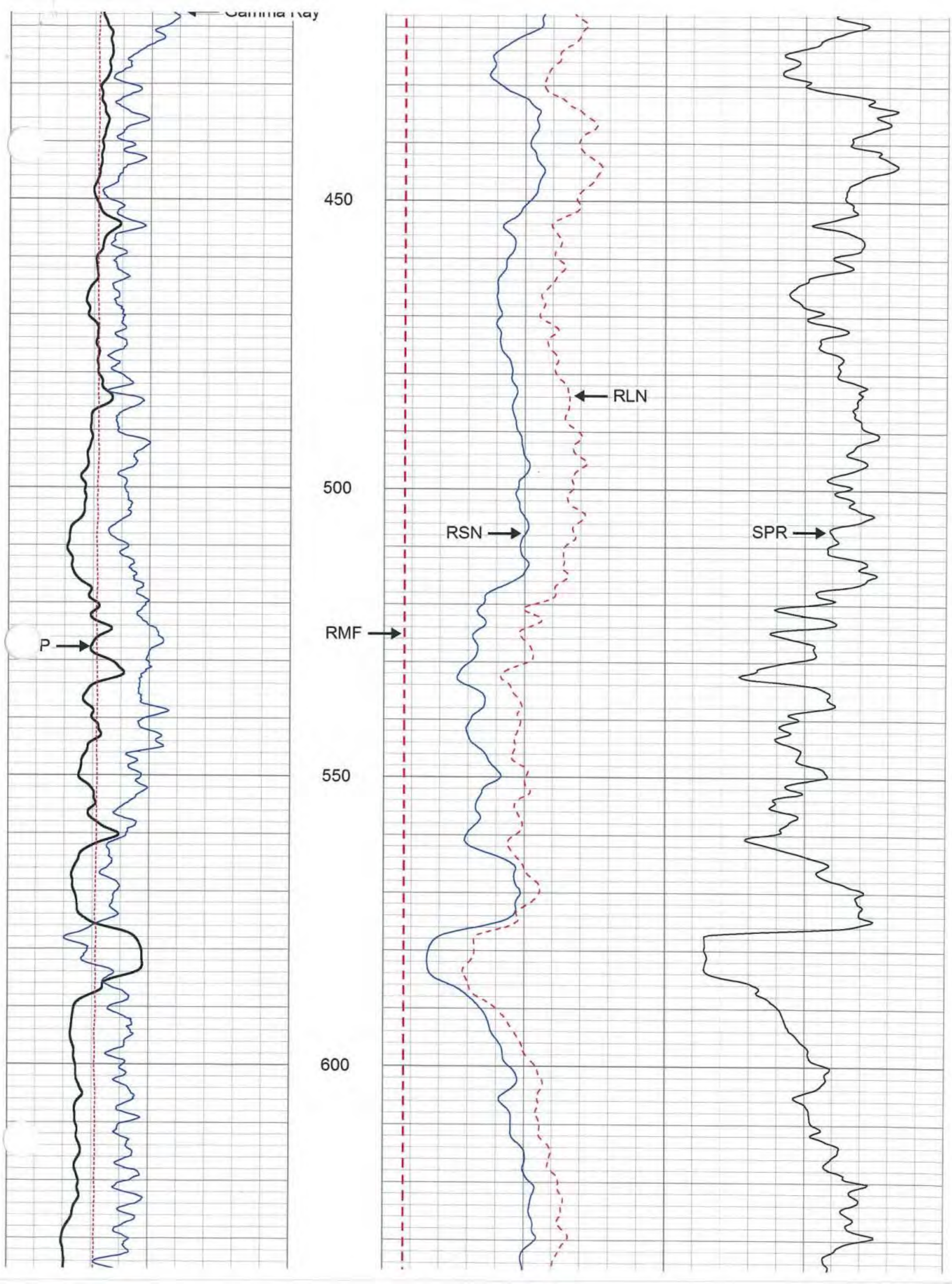
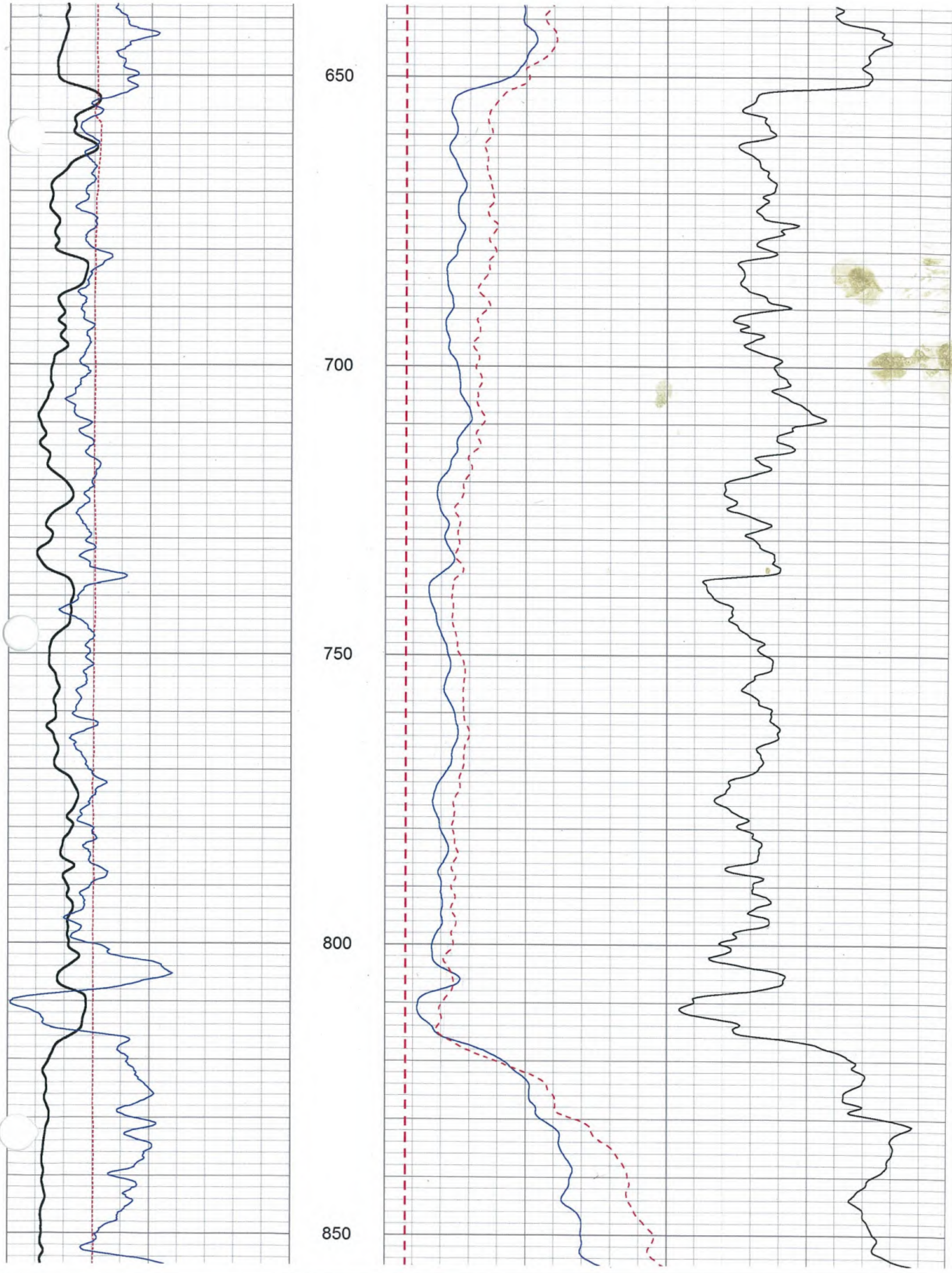
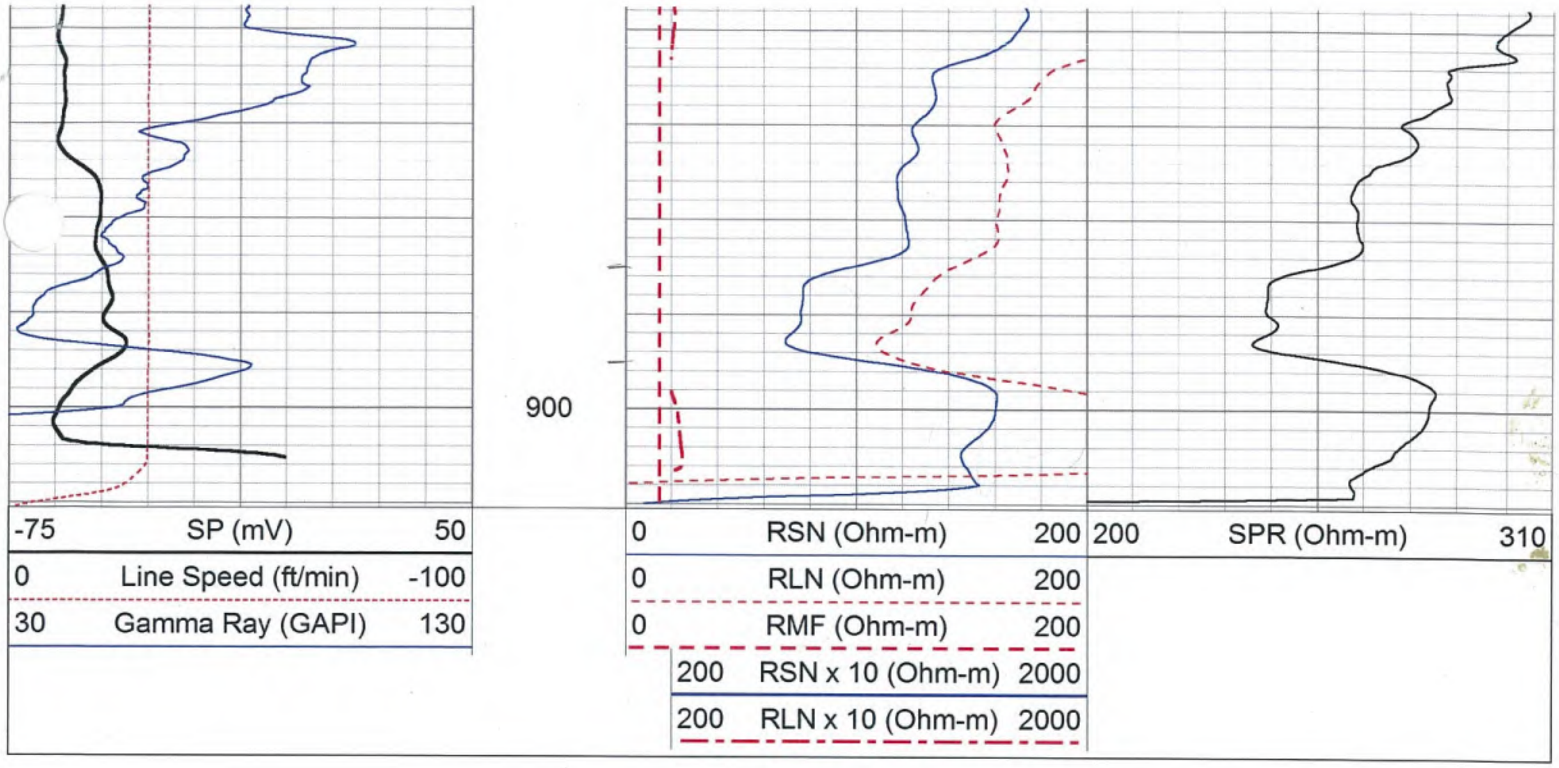
250
SWL
300
350
400


450
500
550
600
RLN
RSN
SPR
RMF
P


650
700
750
800
850


900
-75 SP (mV) 50
0 Line Speed (ft/min) -100
30 Gamma Ray (GAPI) 130
0 RSN (Ohm-m) 200
0 RLN (Ohm-m) 200
0 RMF (Ohm-m) 200
200 RSN x 10 (Ohm-m) 2000
200 RLN x 10 (Ohm-m) 2000
200 SPR (Ohm-m) 310

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0115380

DWR Use Only – Do Not Fill In
State Well Number/Site Number
Latitude N Longitude W
APN/TRS/Other

Owner's Well Number ______

Date Work Began 07/29/2010 Date Work Ended 8/4/2010

Local Permit Agency San Bernardino Department of Public Health

Permit Number 7010070342 Permit Date 7/23/10

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ______

Drilling Method Reverse Rotary Drilling Fluid Fresh Water

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
35	90	Sand Gravel
90	120	Sand Clay
120	200	Sand Gravel
200	250	Sand Gravel Clay
250	310	Sand Gravel
310	340	Sand Gravel Clay
340	417	Sand Gravel

Total Depth of Boring 417 Feet

Total Depth of Completed Well 415 Feet

Well Owner

Name [redacted]

Mailing Address [redacted]

City Yucaipa State CA. Zip 92399

Well Location

Address San Timoteo Canyon Road

City Yucaipa County San Bernardino

Latitude ____ Deg. ____ Min. ____ Sec. N Longitude ____ Deg. ____ Min. ____ Sec. W

Datum ______ Decimal Lat. ______ Decimal Long. ______

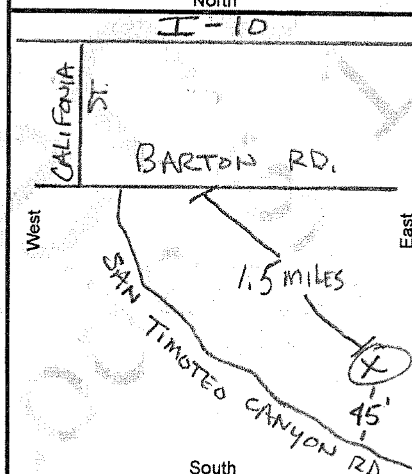
APN Book 0175 Page 221 Parcel 06

Township 2S Range 3W Section 4

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North



West East South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other ______
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
⦿ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other ______

Water Level and Yield of Completed Well

Depth to first water ______ (Feet below surface)

Depth to Static Water Level ______ (Feet) Date Measured ______

Estimated Yield * ______ (GPM) Test Type ______

Test Length ______ (Hours) Total Drawdown ______ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	35	32	Conductor	Low Carbon Steel	.250	20		
0	340	17.5	Blank	PVC Sch. 80	.214	5		
340	360	17.5	Screen	PVC Sch. 80	.214	5		0.050
0	285	17.5	Blank	PVC Sch. 80	.214	5		
285	305	17.5	Screen	PVC Sch. 80	.214	5		0.050
0	120	17.7	Blank	PVC Sch. 80	.214	5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	225	Filter Pack	8x16 Midcal
225	230	Fill	Sand
230	250	Bentonite	Seal
250	255	Fill	Sand
255	310	Filter Pack	8x16 Gravel
310	315	Fill	Sand

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other ______

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Bakersfield Well & Pump Co.
Person, Firm or Corporation

7212 Fruitvale Ave (Address) Bakersfield (City) CA (State) 93308 (Zip)

Signed ______ (C-57 Licensed Water Well Contractor) 8/20/2010 (Date Signed) 440537 (C-57 License Number)

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0115380

Owner's Well Number ______

Date Work Began 07/29/2010 Date Work Ended 8/4/2010

Local Permit Agency San Bernardino Department of Public Health

Permit Number 7010070342 Permit Date 7/23/10

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation (•) Vertical ( ) Horizontal ( ) Angle Specify ______

Drilling Method Reverse Rotary Drilling Fluid Fresh Water

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
35	90	Sand Gravel
90	120	Sand Clay
120	200	Sand Gravel
200	250	Sand Gravel Clay
250	310	Sand Gravel
310	340	Sand Gravel Clay
340	417	Sand Gravel

Total Depth of Boring 417 Feet

Total Depth of Completed Well 415 Feet

Well Owner

Name [redacted]

Mailing Address [redacted]

City Yucaipa State CA. Zip 92399

Well Location

Address San Timoteo Canyon Road

City Yucaipa County San Bernardino

Latitude ___ Deg. ___ Min. ___ Sec. N Longitude ___ Deg. ___ Min. ___ Sec. W

Datum ______ Decimal Lat. ______ Decimal Long. ______

APN Book 0175 Page 221 Parcel 06

Township 2S Range 3W Section 4

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West

East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

(•) New Well

( ) Modification/Repair

( ) Deepen

( ) Other ______

( ) Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

( ) Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

( ) Cathodic Protection

( ) Dewatering

( ) Heat Exchange

( ) Injection

(•) Monitoring

( ) Remediation

( ) Sparging

( ) Test Well

( ) Vapor Extraction

( ) Other ______

Water Level and Yield of Completed Well

Depth to first water ______ (Feet below surface)

Depth to Static Water Level ______ (Feet) Date Measured ______

Estimated Yield * ______ (GPM) Test Type ______

Test Length ______ (Hours) Total Drawdown ______ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
120	140	17.5	Screen	PVC Sch. 80	.214	5		0.050

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
315	330	Bentonite	Seal
330	335	Fill	Sand
335	415	Filter Pack	8x16 Midcal

Attachments

☐ Geologic Log

☐ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other ______

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Bakersfield Well & Pump Co.

Person, Firm or Corporation

7212 Fruitvale Ave Bakersfield CA 93308

Address City State Zip

Signed [signature] 8/20/2010 440537

C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do Not Fill In
Nº 105799
State Well No.
Other Well No.

Local Permit # 03098701

(1) OWNER:

Name [redacted]
Address [redacted]
Yucaipa, California 92399

(2) LOCATION OF WELL:
County San Bernardino Owner's number, if any 2A
Township, Range, and Section 2S, 2W, Section 4
Distance from cities, roads, railroads, etc. 1,000 FT. N. of Ave. E., 600' E.of 14th St.

(3) TYPE OF WORK (check):
New Well ☒ Deepening ☐ Reconditioning ☐ Destroying ☐
If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☒
Cable ☐
Other ☐

(6) CASING INSTALLED:
STEEL: X OTHER:
SINGLE ☐ DOUBLE ☐
If gravel packed Yes

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
0	630	16"	5/16	26"	50	630

of shoe or well ring: Size of gravel: 4 x 7 mix
Describe joint

(7) PERFORATIONS OR SCREEN:
Type of perforation or name of screen

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
400'	620'			3/32

(8) CONSTRUCTION:
Was a surface sanitary seal provided? Yes ☒ No ☐ To what depth 50 ft.
Were any strata sealed against pollution? Yes ☐ No ☒ If yes, note depth of strata
From ft. to ft.
From ft. to ft.
Method of sealing Concrete

(9) WATER LEVELS:
Depth at which water was first found, if known ft.
Standing level before perforating, if known ft.
Standing level after perforating and developing 270' ft.

(10) WELL TESTS:
Was pump test made? Yes ☒ No ☐ If yes, by whom? McCalla Bros.
Yield: 1500 gal./min. with 81' ft. drawdown after 65½ hrs.
Temperature of water Was a chemical analysis made? Yes ☒ No ☐
Was electric log made of well? Yes ☒ No ☐ If yes, attach copy

(11) WELL LOG:
Total depth 673' ft. Depth of completed well 630' ft.
Formation: Describe by color, character, size of material, and structure
ft. to ft.

0'-50' Conductor
50'-80' Coarse sand, fine gravel
80'-109' Sand
109'-115' Gray clay, fine gravel
115'-125' Brown clay, coarse sand
125'-132'Sticky brown clay &sand
132'-135' Coarse sand
135'-173' Sticky brown clay, sand, gravel
173'-175' Sand & little clay
175'-180' Sand & gravel, with clay streaks
180'-183' Sticky clay & coarse sand
183'-190' Sticky clay,fine sand & silt
190'-192' Loose clay, fine & coarse sand
192'-200' Sticky brown clay,& sand
200'-215' Coarse sand,loose clay,& gravel
215'-225' Sticky brown clay,sand& gravel
225'-239' Coarse sand & loose clay
239'-250' Sticky clay, sand, & gravel
250'-258' Coarse sand & loose clay
258'-308' Coarse sand & gravel
308'-346' Sticky clay & coarse sand
346'-353' Sand & small fragmented gravel
353'-547' Coarse sand, sticky clay, gravel
547'-560' Coarse sand,gravel, white quartz
560'-590' Coarse sand & gravel, little clay
590'-673' Coarse sand, little or no clay, gravel very firm

Work started 3-10 19 87, Completed 5-8 19 87

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME McCalla Bros.
(Person, firm, or corporation) (Typed or printed)
Address 802 Nevada Street, Redlands, Ca.

[SIGNED] [signature]
(Well Driller)

License No. C-57196824 Dated July 10, 1987

SKETCH LOCATION OF WELL ON REVERSE SIDE

DWR 188 (REV. 9-68) 87139-750 8-72 30M TRIP OSP

[redacted]

Well 2A

0-50'	Conductor
50-80'	Coarse sand and fine gravel
80-109'	Sand no clays
109-115'	Gray clay (loose) and fine gravel
115-125'	Brown clay (loose) coarse sand 70% fine gravel
125-132'	Sticky brown clay and sand
132-135'	Sand (coarse) very loose clay (4')
135-148'	Sticky brown clay sand and gravel (rough drilling)
148-173'	Sticky brown clay some sand and fine gravel, firm spots
173-175'	Sand little clay
175-180'	Sand and gravel with clay streaks
180-183'	Sticky brown clay and coarse sand
183-190'	Very sticky clay and fine sand and silt, some gravel.
190-192'	Loose clay, fine and coarse sand
192-200'	Very sticky brown clay and sand, some small gravel
200-215'	Coarse sand and loose clay, some gravel
215-225'	Sticky brown clay, sand, and gravel
225-239'	Coarse sand and loose clay
239-250'	Sticky clay sand and gravel (fragmented)
250-258'	Coarse sand and loose clay
258-280'	Coarse sand and fine gravel , little clay
280-283'	Coarse sand and gravel, increase in sticky clay
283-308'	Coarse sand and gravel, very loose clay
308-338'	Sticky clay and coarse sand
338-341'	Very sticky clay, some sand and gravel
341-346'	Sticky clay and coarse sand
346-353'	Sand and small fragmented gravel, little clay
353-370'	Coarse sand, very uniform and clay, some gravel.
370-393'	Increase in clay, very sticky
393-409'	Very sticky clay, some sand and gravel (40%)
409-435'	Sticky sand and clay
435-445'	Sticky loose sand, clay, and gravel
445-470'	Loose clay and coarse sand (80%)
470-473'	Sticky clay, sand, and gravel
473-481'	Coarse sand and gravel, loose clay
481-485'	Very tight sticky clay and coarse sand
485-494'	Clay and coarse sand (clay is loose and sticky)
494-545'	Coarse sand fragmented gravel, some clay
545-547'	Coarse sand, gravel, (fragged) sticky clay
547-560'	Coarse sand gravel little loose clay, a lot of very fragged white quartz
560-566'	Coarse sand and gravel, little clay, very rough drilling very tight.
566-578'	Sticky clay coarse sand and fragmented gravel
578-583'	Loose sticky clay coarse sand and gravel
583-587'	Coarse sand, some gravel (fine) loose sticky clay
587-590'	Coarse sand, spotty gravels, tight sticky clay
590-608'	Coarse uniform sand and loose clay (20%) fine fragmented gravels
608-648'	Coarse uniform sand, sticky clay little gravel
648-673'	Coarse sand (uniform) little or no clay, very firm

[redacted]

WHWC Well 2A

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

2S/2W-4G3 *Do Not Fill In*

No 105799

State Well No.

Other Well No.

Local Permit # 03098701

(1) OWNER:

Name [redacted]

Address [redacted]

Yucaipa, California 92399

(2) LOCATION OF WELL:

County San Bernardino Owner's number, if any 2A

Township, Range, and Section 2S, 2W, Section 4

Distance from cities, roads, railroads, etc. 1,000 FT. N. of Ave. E., 600' E.of 14th St.

(3) TYPE OF WORK (*check*):

New Well [X] Deepening [ ] Reconditioning [ ] Destroying [ ]

If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (*check*):

Domestic [ ] Industrial [ ] Municipal [X] Irrigation [ ] Test Well [ ] Other [ ]

(5) EQUIPMENT:

Rotary [X] Cable [ ] Other [ ]

(6) CASING INSTALLED:

STEEL: X OTHER:

SINGLE [ ] DOUBLE [ ]

If gravel packed Yes

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
0	630	16"	5/16	26"	50	630

Size of shoe or well ring:

Size of gravel: 4 x 7 mix

Describe joint

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
400'	620'			3/32

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes [X] No [ ] To what depth 50 ft.

Were any strata sealed against pollution? Yes [ ] No [X] If yes, note depth of strata

From ft. to ft.

From ft. to ft.

Method of sealing Concrete

(9) WATER LEVELS:

Depth at which water was first found, if known ft.

Standing level before perforating, if known ft.

Standing level after perforating and developing 270' ft.

(10) WELL TESTS:

Was pump test made? Yes [X] No [ ] If yes, by whom? McCalla Bros.

Yield: 1500 gal./min. with 81' ft. drawdown after 65½ hrs.

Temperature of water Was a chemical analysis made? Yes [X] No [ ]

Was electric log made of well? Yes [X] No [ ] If yes, attach copy

(11) WELL LOG:

Total depth 673' ft. Depth of completed well 630' ft.

Formation: *Describe by color, character, size of material, and structure*

ft. to ft.

0'-50' Conductor
50'-80' Coarse sand, fine gravel
80'-109' Sand
109'-115' Gray clay, fine gravel
115'-125' Brown clay, coarse sand
125'-132'Sticky brown clay &sand
132'-135' Coarse sand
135'-173' Sticky brown clay, sand, gravel
173'-175' Sand & little clay
175'-180' Sand & gravel, with clay streaks
180'-183' Sticky clay & coarse sand
183'-190' Sticky clay,fine sand & silt
190'-192' Loose clay, fine & coarse sand
192'-200' Sticky brown clay,& sand
200'-215' Coarse sand,loose clay,& gravel
215'-225' Sticky brown clay,sand& gravel
225'-239' Coarse sand & loose clay
239'-250' Sticky clay, sand, & gravel
250'-258' Coarse sand & loose clay
258'-308' Coarse sand & gravel
308'-346' Sticky clay & coarse sand
346'-353' Sand & small fragmented gravel
353'-547' Coarse sand, sticky clay, gravel
547'-560' Coarse sand,gravel, white quartz
560'-590' Coarse sand & gravel, little cla
590'-673' Coarse sand, little or no clay &
gravel very firm

Alluv.

Work started 3-10 19 87, Completed 5-8 19 87

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME McCalla Bros.

(Person, firm, or corporation) (*Typed or printed*)

Address 802 Nevada Street, Redlands, Ca.

[SIGNED] Bill [signature]

(*Well Driller*)

License No. C-57196824 Dated July 10, 1987

SKETCH LOCATION OF WELL ON REVERSE SIDE

DWR 188 (REV. 9-68) 18754

2A

67138-780 6-72 30M TRIP OSP

[redacted]

Well 2A

0-50'	Conductor
50-80'	Coarse sand and fine gravel
80-109'	Sand no clays
109-115'	Gray clay (loose) and fine gravel
115-125'	Brown clay (loose) coarse sand 70% fine gravel
125-132'	Sticky brown clay and sand
132-135'	Sand (coarse) very loose clay (4')
135-148'	Sticky brown clay sand and gravel (rough drilling)
148-173'	Sticky brown clay some sand and fine gravel, firm spots
173-175'	Sand little clay
175-180'	Sand and gravel with clay streaks
180-183'	Sticky brown clay and coarse sand
183-190'	Very sticky clay and fine sand and silt, some gravel.
190-192'	Loose clay, fine and coarse sand
192-200'	Very sticky brown clay and sand, some small gravel
200-215'	Coarse sand and loose clay, some gravel
215-225'	Sticky brown clay, sand, and gravel
225-239'	Coarse sand and loose clay
239-250'	Sticky clay sand and gravel (fragmented)
250-258'	Coarse sand and loose clay
258-280'	Coarse sand and fine gravel , little clay
280-283'	Coarse sand and gravel, increase in sticky clay
283-308'	Coarse sand and gravel, very loose clay
308-338'	Sticky clay and coarse sand
338-341'	Very sticky clay, some sand and gravel
341-346'	Sticky clay and coarse sand
346-353'	Sand and small fragmented gravel, little clay
353-370'	Coarse sand, very uniform and clay, some gravel.
370-393'	Increase in clay, very sticky
393-409'	Very sticky clay, some sand and gravel (40%)
409-435'	Sticky sand and clay
435-445'	Sticky loose sand, clay, and gravel
445-470'	Loose clay and coarse sand (80%)
470-473'	Sticky clay, sand, and gravel
473-481'	Coarse sand and gravel, loose clay
481-485'	Very tight sticky clay and coarse sand
485-494'	Clay and coarse sand (clay is loose and sticky)
494-545'	Coarse sand fragmented gravel, some clay
545-547'	Coarse sand, gravel, (fragged) sticky clay
547-560'	Coarse sand gravel little loose clay, a lot of very fragged white quartz
560-566'	Coarse sand and gravel, little clay, very rough drilling very tight.
566-578'	Sticky clay coarse sand and fragmented gravel
578-583'	Loose sticky clay coarse sand and gravel
583-587'	Coarse sand, some gravel (fine) loose sticky clay
587-590'	Coarse sand, spotty gravels, tight sticky clay
590-608'	Coarse uniform sand and loose clay (20%) fine fragmented gravels
608-648'	Coarse uniform sand, sticky clay little gravel
648-673'	Coarse sand (uniform) little or no clay, very firm

RECEIVED
JUN 20 1987

2A

[redacted]

County of San Bernardino — Environmental Public Works Agency
ENVIRONMENTAL HEALTH SERVICES DEPARTMENT
385 North Arrowhead Avenue · San Bernardino, CA 92415-0160

WELL PERMIT

Do Not Fill In
Permit No. 03098701
Expiration ____
FF ____
FA ____
SN ____

PLEASE PRINT:

1. OWNER: Name [redacted]
Mailing Address [redacted]
City YUCAIPA CA Zip 92399
Phone No. 790-1901

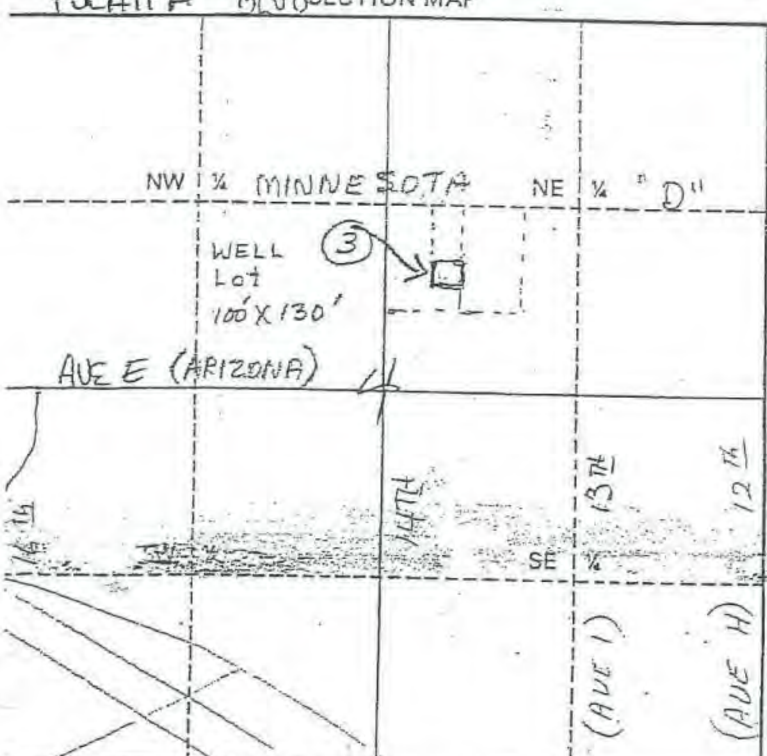
2. DATE OF WORK (approximate):
Start ____ Complete ____

3. WELL DRILLER (Check One):
☐ Owner ☒ Contractor ____
Name

4. WELL USE (check):
☒ Community ☐ Industrial
☐ Individual ☐ Test
☐ Agricultural ☐ Other
☐ Dairy ☐ Horizontal

5. TYPE OF WORK (check):
☒ New ☐ Reconstruction ☐ Destruction

YUCAIPA BLVD SECTION MAP



Scale — 1 inch to 1/4 mile

Items 6 through 10 to be estimated for new wells, and exact for all other wells.

6. ANNULAR SEAL: Depth 50 ft.
Furnished by: ☐ Owner ☒ Contractor
☐ Driven Conductor Dia. ____ in., Wall (Gage) ____
☒ Sealing Material Concrete, Thickness ____ in.

7. DEPTH OF WELL (feet):
Proposed 650 Existing ____
DIAMETER OF BORE (in.): 24 - 26

8. CASING INSTALLED:
☒ Steel ☐ Plastic ☐ Other

From (ft.)	To (ft.)	Dia. (in.)	Wall (Gage)
0	650	16"	1/4

GRAVEL PACK: ☒ Yes ☐ No
From 50' to 650 ft.

9. PERFORATIONS (if applicable):
From 400 to 650 ft.

10. SEALED ZONES (if applicable):
From ? to ____ ft.

11. GENERAL LOCATION MAP: Pg 30 - 6E
DUNLAP RANCH SUBDV
(a) Sketch location of well, name(s) and location of road(s) on section map.
(b) Township 2S N/S Range 2W E/W
Section 4
(c) Assessor's Parcel No. 301-091-03
(d) Solid or liquid waste disposal site within two miles?
☐ Yes ☐ No
Location: ____

Do Not Fill In

Fee Stamp	Date Stamp
DATE 0309872-2 AMOUNT 170.00 RECEIPT NO. 0309872-2 BY: McCalla Bros #5309 PAID	

03-14785-631 Rev. 11/82

Continue on Reverse Side

2A

NO MAP VIOL

ENVIRONMENTAL HEALTH SERVICES DEPARTMENT
385 North [illegible]owhead Avenue · San Bernardino, CA 92415-[illegible]0

WELL PERMIT

Do Not Fill In
Permit No. 03028701
Expiration Mar. 2, 1988
FF ______
FA ______
SN ______

PLEASE PRINT:

1. OWNER: Name [redacted]
Mailing Address [redacted]
WELL #2
City YUCAIPA CA. Zip 92399
Phone No. 714-790-1901

2. DATE OF WORK *(approximate)*:
Start 2 MAR 87 Complete 2 APRIL 87

3. WELL DRILLER *(Check One)*:
☐ Owner ☐ Contractor NOT KNOWN
Name

4. WELL USE *(check)*:
☑ Community ☐ Industrial
☐ Individual ☐ Test
☐ Agricultural ☐ Other
☐ Dairy ☐ Horizontal

5. TYPE OF WORK *(check)*:
☐ New ☐ Reconstruction ☒ Destruction

Items 6 through 10 to be estimated for new wells, and exact for all other wells.

6. ANNULAR SEAL: Depth ______ ft.
Furnished by: ☑ Owner ☐ Contractor
☐ Driven Conductor Dia. 10 in., Wall (Gage) ______
☐ Sealing Material N/A, Thickness N/A in.

7. DEPTH OF WELL *(feet)*:
Proposed ______ Existing 472'
DIAMETER OF BORE *(in.)*: 10'

8. CASING INSTALLED:
☐ Steel ☐ Plastic ☐ Other

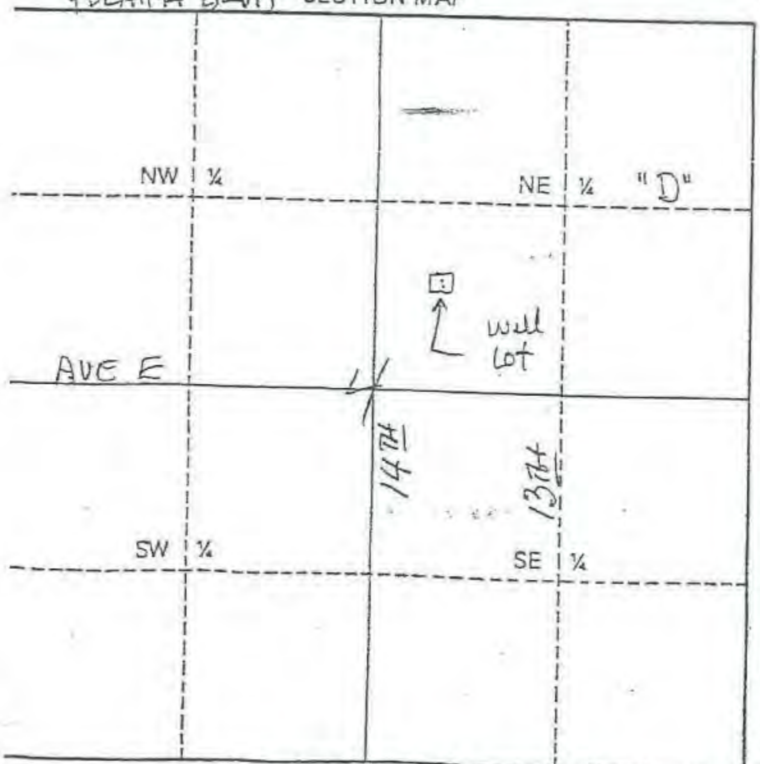
From (ft.)	To (ft.)	Dia. (in.)	Wall (Gage)
0	472'	10"	

GRAVEL PACK: ☐ Yes ☑ No
From N/A to N/A ft.

9. PERFORATIONS *(if applicable)*:
From N/A to N/A ft.

10. SEALED ZONES *(if applicable)*:
From N/A to N/A ft.

YUCAIPA BLVD SECTION MAP



Scale – 1 inch to 1/4 mile

11. GENERAL LOCATION MAP:
(a) Sketch location of well, name(s) and location of road(s) on section map.
(b) Township 2S N/S Range 2W E/W
Section 4
(c) Assessor's Parcel No. 301-051-03
(d) Solid or liquid waste disposal site within two miles?
☐ Yes ☑ No
Location: ______

Do Not Fill In

Fee Stamp	Date Stamp
Fee Exempt – Rec'd 3/2/87	

03-14785-631 Rev. 11/82

Continue on Reverse Side

2A

Scale — 1 inch to 100 feet

12. PLOT PLAN:

(a) In perspective to the well site, sketch and label the following items: well lot property lines, other wells *(include abandoned wells)*, sewage disposal systems *(sewers, septic tanks, leaching fields, seepage pits, cesspools)*, lakes and ponds, water courses and animals or fowl kept.

(b) Indicate the distance in *feet*, of any of the following which are within 200 ft. of the well site:

Other wells ______
Sewers ______
Septic tanks ______
Leaching fields ______
Seepage pits ______
Cesspools ______
Lakes and ponds ______
Water courses ______
Animals or fowl kept ______

I have read this application and agree to comply with all laws regulating the type of work being performed. The California Labor Code requires Workers' Compensation Insurance as a prerequisite to permit issuance unless the applicant signs the following certificate:

☐ I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner so as to become subject to the Workers' Compensation laws of California.

Owner's Signature [signature] Date 2 MAR 87

☐ Contractor's Signature ______ Date ______ Reg. No. ______

DISPOSITION OF PERMIT
(Do Not Fill In)

☑ Approved subject to the following:

A. Notify the Department, STUART LONG 387-4666, twenty-four (24) hours in advance to make an inspection of the following operations:

☐ Prior to sealing of the annular space or filling of the conductor casing.

☐ Verify the depth of the conductor (outer) casing prior to further drilling and installation of the inner casing.

☐ After installation of the surface protective slab and pumping equipment.

☑ During destruction of wells, prior to pouring the sealing material.

B. Submit to the Department within thirty (30) days after completion of work, a copy of:

☑ Water Well Driller's Report ☐ Bacteriological Analysis ☐ Inorganic Chemical Analysis

C. Other ______

☐ DENIED ______

12. PLOT PLAN:

(a) In perspective to the well site, sketch and label the following items: well lot property lines, other wells *(include abandoned wells)*, sewage disposal systems *(sewers, septic tanks, leaching fields, seepage pits, cesspools)*, lakes and ponds, water courses and animals or fowl kept.

(b) Indicate the distance in *feet*, of any of the following which are within 200 ft. of the well site:

Other wells 50' - Abandoned Per. Bail;
Sewers ______
Septic tanks ______
Leaching fields ______
Seepage pits ______
Cesspools ______
Lakes and ponds ______
Water courses ______
Animals or fowl kept ______

13. I have read this application and agree to comply with all laws regulating the type of work being performed. The California Labor Code requires Workers' Compensation Insurance as a prerequisite to permit issuance unless the applicant signs the following certificate:

☒ I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner so as to become subject to the Workers' Compensation laws of California.

Owner's Signature ______ Date ______

☐ Contractor's Signature Bill Provence Date 3/3/87 Reg. No. ______

DISPOSITION OF PERMIT

(Do Not Fill In)

☒ Approved subject to the following:

A. Notify the Department, Stuart Long (714) 387-4666, twenty-four (24) hours in advance to make an inspection of the following operations:

☒ Prior to sealing of the annular space or filling of the conductor casing.

☐ Verify the depth of the conductor (outer) casing prior to further drilling and installation of the inner casing.

☒ After installation of the surface protective slab and pumping equipment.

☐ During destruction of wells, prior to pouring the sealing material.

B. Submit to the Department within thirty (30) days after completion of work, a copy of:

☒ Water Well Driller's Report ☐ Bacteriological Analysis ☐ Inorganic Chemical Analysis

C. Other ______

DENIED ______

[redacted]

1.	22'	
DC.	27'10"	
DC	21'11"	
	71'9"	
DC	27'3"	
	99'0"	
DC	17'1"	
	116'1"	
DC	17'3"	
	133'4"	
D	21'7"	
1.	154'11"	
	21'8"	
2	176'7"	
	21'7"	
3.	198'2"	
	21'7"	
4.	219'9"	
	21'7"	
5.	241'4"	
	22'5"	
6.	263'0"	
	21'7"	
7.	285'4"	
	21'6"	
8.	306'10"	
	21'7"	
9	328'5"	
	21'7"	
10	350'0	

235-245 very rough.
258-270 rough.

10.	350'0"	24	630'1"
	21'7"		21'2"
11.	371'7"		651'3
	21'7"		21'6"
12.	393'2"	25	673'2"
	21'8		
13.	414'10"		old #2
	21'7"		
14.	436'5"		static 273
	21'7		
15.	458'0		
	21'8"		
16.	479'8"		
	21'8		
17.	501'4"		
	21'7"		
18.	522'11"		
	21'6"		
19.	544'5"		
	21'5"		
20.	565'10"		
	21'7"		
21.	586'5		
	21'7"		
22.	608'0"		
	22'1"		

[redacted]

Well # 2A
25/2W-9G3

0-50'	conductor
50'-80'	coarse sand and fine gravel
80'-109'	sand no clays
109'-115'	gray clay (loose) & fine gravel
115'-125	brown clay (loose) coarse sand 70% fine gvl
125'-132'	sticky brown clay & sand
132-135'	sand (coarse) very loose clay 4'
135-148	sticky brown clay sand & gravel (rough drilling)
148-173	sticky brown clay some sand & fine gravel firm spots
173-175	sand c̄ little clay
175-180	sand & gravel with clay streaks.
180-183	sticky brown clay & coarse sand
183-190	very sticky clay & fine sand & still some gravel.
190-192	loose clays fine & coarse sand.
192-200	very sticky brown clay & sand some small grav.
200-215	coarse sand & loose clay some gravel.
215-225	sticky brown clay & sand & gravel.
225-239	coarse sand & loose clay
239-250	sticky clay, sand & gravel (fragmented)
250-258	coarse sand & loose clay
258-280	coarse sand & fine gravel little clay
280-283	coarse sand & gravel increase in sticky clay.
283-308	coarse sand & gravel very loose clay.
308-338	sticky clay & coarse sand
338-341	VERY sticky clay some sand & gravel.
341-346	sticky clay & coarse sand.
346-353	sand & small fragmented gravel, little clay
353-370	coarse sand very uniform & clay. some gravel.
370-393	increase in clay very sticky
393-409	very sticky clay some sand & gravel (40%)

[illegible]

[illegible]-445	sticky loose clay sand & gravel
445-470	loose clay & coarse sand (80%)
470-473	sticky clay sand & gravel
473-481	coarse sand & gravel loose clay (~~[illegible]~~)
481-485	very tight sticky clay & coarse sand.
485-494	clay & coarse sand. (clay is loose & sticky)
494-545	coarse sand fragmented gravel some clay
545-547	coarse sand gravel (fragged) sticky clay
547-560	coarse sand gravel little loose clay. a lot of very fragged white quartz
560-566	coarse sand and gravel little clay very rough drilling very tight
566-573	sticky clay coarse sand and fragmented gravel.
573-583	loose sticky clay coarse sand & gravel.
583-587	coarse sand some gravel (fine) loose sticky clay.
587-590	coarse sand spotty gravels tight sticky clay
590-608	coarse uniform sand and loose clay (~8%) fine fragmented gravels
608-648	coarse uniform sand sticky clay little gravel
[illegible]3-673	coarse sand uniform little ~~[illegible]~~ clay very firm.

400

620'

Perf.

630

230'

3/2 m[illegible]

FORM 115 INVESTIGATION

South Coastal Basin

DIVISION OF WATER RESOURCES
DEPARTMENT OF PUBLIC WORKS
STATE OF CALIFORNIA

WELL LOG

2S/2W-3E1

SHEET 1

NUMBER F-132j-

LOCAL DESIGNATION Owner #6

LOCATION ~~50'~~ 40' S. of Ave. D, 1st ⊄ of on 11th St., proj. S., Lot #40, Dunlap Sub. #2, Yucaipa.

Loc. #18216F

OWNER [redacted]

SKETCH

DATE COMPLETED ~~1930~~ 1927

DIAMETER OF CASING 20"

DRILLED BY Clark McEwen

SOURCE OF INFORMATION Redlands-Yucaipa Land Co. S.B.V.W.C.D.

INSPECTED WHILE DRILLING ______ SEE FILE NO. ______

SURFACE ELEVATION 2160 D.W.R. Map

DEPTH	ELEVATION OF BOTTOM OF STRATUM	MATERIAL		THICKNESS FEET	% VOIDS	ABSOLUTE VOIDS FEET	TOTAL VOIDS FEET
1-122		Dry sand	sc	122			
122- 130		Dirty gravel	fg	8			
130- 137		Clay	c	7			
152		Gravel	g	15			
236		Sandy clay	sc	84			
240		Dirty gravel	fg	4			
252		Fair gravel	fg	12			
328		Sandy clay	sc	74			
340		Gravel - extra good	g	12			
378		Clay and silt	slc	38			
388		Gravel	g	10			
395		Dirty gravel	fg	7			
440		Clay and gravel	gc	45			
456		Gravel	fg	16			
466		Clay	c	10			
472		Fair gravel	fg	6			
478		Clay	c	6			
500		Gravel	g	[illegible]			
505		Clay		5			
544		Gravel		39			
590		Rocks and muddy gravel	fg	46			
599		Clay	c	9			
		Perf 135-578					
		Pumps 90" - drawdown 90'					
		PERF. WITH 1/2" KNIFE					
		6 HOLES TO A ROUND					

MICROFILMED

FOR FIELD COPIES USE ALTERNATE LINES

LOG OBTAINED BY ______ DATE ______

88612 8-31 15M CALIFORNIA STATE PRINTING OFFICE

SOUTHERN CALIFORNIA EDISON COMPANY

APRIL 9, 1979

[redacted]
YUCAIPA, CA 92399

SUBJECT: HYDRAULIC TEST RESULTS - WELL 6
ACCT: 4-26-31-618-3080
LOTH & AVE "D"
DATE OF TEST:FEBRUARY 28,1979

IN ACCORDANCE WITH YOUR REQUEST, A TEST WAS MADE ON YOUR TURBINE WELL PUMP ON THE DATE LISTED ABOVE. IF YOU HAVE ANY QUESTIONS REGARDING THE TEST RESULTS WHICH FOLLOW, PLEASE CONTACT L. E. WILSON, 793-2712.

EQUIPMENT

PUMP: L&R NO: 26896
MOTOR: US 125.0 HP NO: 499075
METER: P229-204

TEST RESULTS

DISCHARGE PRESSURE,PSI	53.5
STANDING WATER LEVEL,FT	321.7
DRAWDOWN,FT	23.8
DISCHARGE HEAD,FT	123.6
PUMPING WATER LEVEL,FT	345.5
TOTAL HEAD,FT	469.1
CAPACITY,GPM	557.[illegible]
GPM PER FT DRAWDOWN	23.4
ACRE FT PUMPED IN 24 HRS	2.466
KW INPUT TO MOTOR	106.3
HP INPUT TO MOTOR	142.5
MOTOR LOAD(%)	103.8
MEASURED SPEED OF PUMP,RPM	1775.0
KWH PER ACRE FT	1035.
OVERALL PLANT EFFICIENCY(%)	46.4
CUSTOMER'S METER,GPM	553

W. S. FRANKEN
DISTRICT MANAGER

QUADRUPLICATE
RETAIN THIS COPY

8

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

Do Not Fill In
Nº 100589
State Well No. 2S/2W-5K1
Other Well No.

(1) OWNER:
Name [redacted]
Address [redacted]
Yucaipa, California

(2) LOCATION OF WELL:
County San Bernardino Owner's number, if any— 10
R. F. D. or Street No. Ave. E near the corner of 17th St.

(3) TYPE OF WORK (check):
New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☐
Cable ☒
Dug Well ☐

(6) CASING INSTALLED:
SINGLE ☒ DOUBLE ☐
From 0 ft. to 690 ft. 16 Diam. 5/16 Gage or Wall

If gravel packed: Diameter of Bore / from ft. / to ft.

Type and size of shoe or well ring 16"x14"x1/4 Size of gravel:
Describe joint All joints butt welded

(7) PERFORATIONS:
Type of perforator used Mills
Size of perforations 3/8 in., length, by 2 in.

From ft.	to ft.	Perf. per row	Rows per ft.
330	670	7	1 row per ft.

(8) CONSTRUCTION: By Owners
Was a surface sanitary seal provided? ☒ Yes ☐ No To what depth 50 ft.
Were any strata sealed against pollution? ☐ Yes ☒ No If yes, note depth of strata
From ft. to ft.
Method of Sealing

(9) WATER LEVELS:
Depth at which water was first found 169 ft.
Standing level before perforating 169 ft.
Standing level after perforating 169 ft.

(10) WELL TESTS:
Was a pump test made? ☒ Yes ☐ No If yes, by whom? Owners
Yield: gal./min. with ft. draw down after hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No
Was electric log made of well? ☐ Yes ☐ No

(11) WELL LOG:
Total depth 690 ft. Depth of completed well 690 ft.
Formation: Describe by color, character, size of material, and structure.

From ft.	To ft.	Formation
0	4	Black adobe
4	7	White caleche
7	55	Brown clay
55	133	Brown sandy clay and gravel
133	151	Sand and gravel
151	165	Brown sandy clay
165	175	Gravel
175	242	Brown sandy clay with gravel streaks
242	248	Brown sandy clay
248	282	Brown clay with gravel streaks
282	330	Clay and embedded gravel
330	335	Loose sand and gravel
335	360	50% cemented gravel & 50% loose gravel with clay streaks
360	548	Clean coarse sand and gravel with streaks of cemented gravel
548	570	Brown clay with large gravel embedded
570	600	Brown gravel- clay-and conglomerate
600	618	Loose coarse sand-gravel and boulders
618	622	Tight clay-gravel and boulders
622	667	Clean coarse sand-gravel and boulders
667	690	Brown tight clay-gravel and boulders

Work started Jan. 16 1964 Completed Mar. 31 1964

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
NAME KIRKLAND WELL SERVICE
(Person, firm, or corporation) (Typed or printed)
Address 32291 Dunlap Blvd.
Yucaipa, California
[SIGNED] K. Kirkland
Well Driller
License No. 168847 Dated April 5, 1964

2102 7-59 600 QUIN SPO

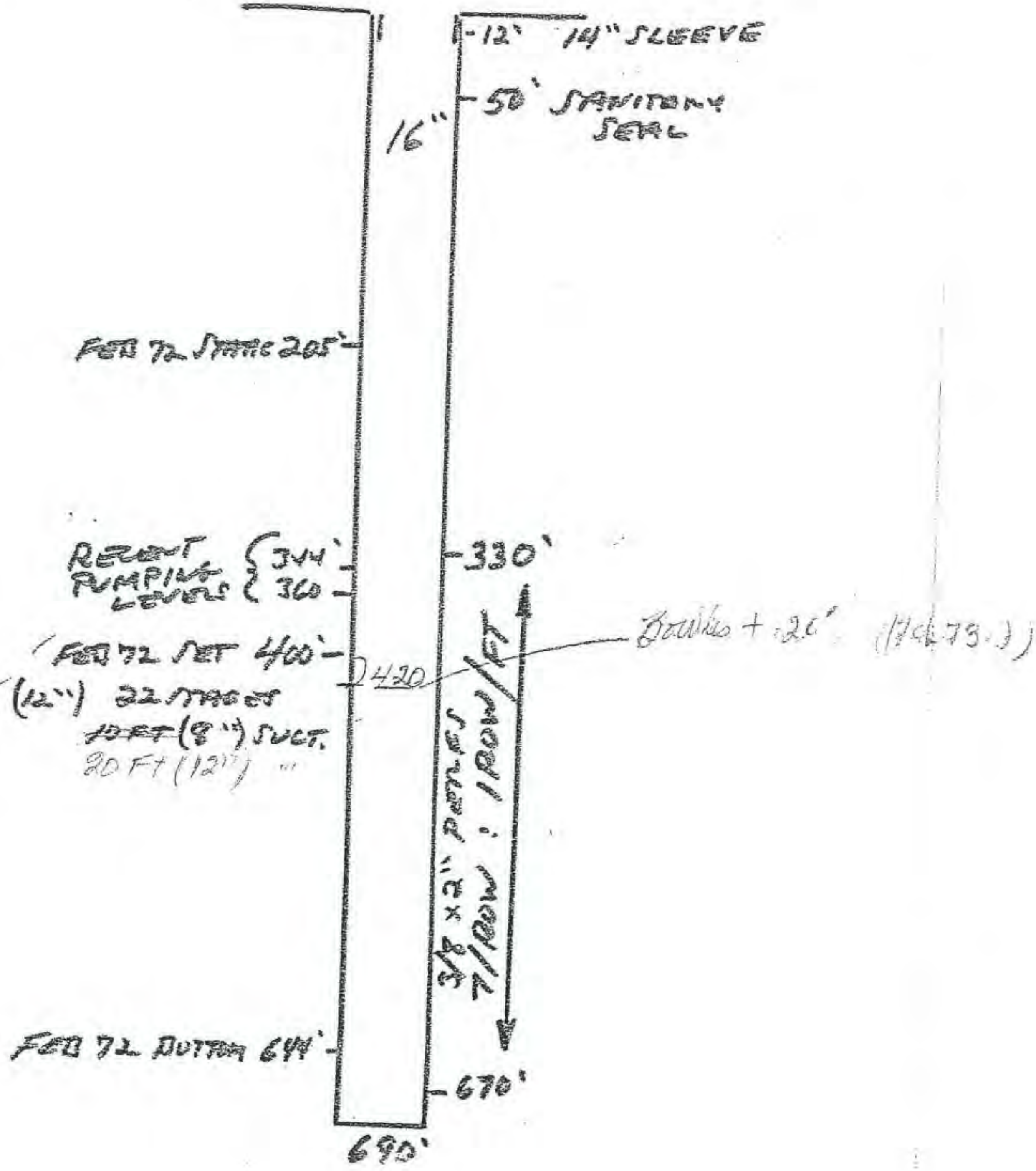
DWR 188 (REV. 5-63)

191621

14511 40-17

This is Harold's Note.
Can't find bill that
it was done
Bernice

#10 WELL



HWB

TRIPLICATE
Owner's Copy
Page 1 of 1
Owner's Well No. 11
Date Work Began 4/23/97 Ended 7/3/97
Local Permit Agency san bernardino environmental health
Permit No. 04219701 Permit Date 4/21/97

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 469733

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DEPTH TO FIRST WATER 347 (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.		DESCRIPTION Describe material, grain size, color, etc.
0	50	SAND & CLAY
50	180	course sand & clay
180	210	COARSE SAND & CLAY
210	350	CLAY
350	940	COARSE GRAVEL, SAND & SOME CLAY
940	960	SAND, GRAVEL & SMALL ROCKS
960	1720	CLAY

RECEIVED
DEC - 3 1997
[redacted]

TOTAL DEPTH OF BORING 1720 (Feet)
TOTAL DEPTH OF COMPLETED WELL 1710 (Feet)

WELL OWNER

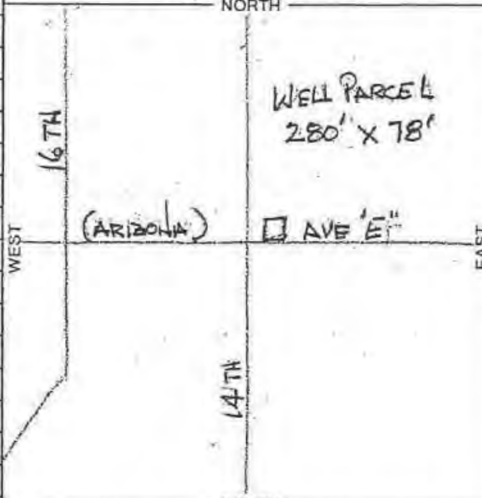
Name [redacted]
Mailing Address [redacted]
YUCAIPA CA 92399
CITY STATE ZIP

WELL LOCATION

Address
City YUCAIPA
County SAN BERNARDINO
APN Book ___ Page ___ Parcel ___
or Township 25 Range 2W Section 4
Latitude ___ DEG. MIN. SEC. NORTH Longitude ___ DEG. MIN. SEC. WEST

LOCATION SKETCH

NORTH



WEST EAST
SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING
WATER SUPPLY
___ Domestic
X Public
___ Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD REVERSE ROTARY FLUID WATER

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL 347 (Ft.) & DATE MEASURED 6/18/97
ESTIMATED YIELD * 2000 (GPM) & TEST TYPE PUMP
TEST LENGTH 51 (Hrs.) TOTAL DRAWDOWN 76 (Ft.)
** May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	50	36			X		STEEL	30	3/8	
0	705	36	X				STEEL	16	5/16	
705	1205	26		X			STEEL	16	5/16	.090 .090
1205	1210	24	X				STEEL	16x12	5/16	
1210	1690	24		X			STEEL	12	5/16	.090
1690	1710	24	X				STEEL	12	5/16	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	300	X			
300	1710				4x10

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME LAYNE CHRISTENSEN COMPANY
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

11001 ETIWANDA AVE. FONTANA CA 92337
ADDRESS CITY STATE ZIP

Signed [signature] 11-26-97 510011
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 7-90 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

- 25/2W - 4G4

TRIPLICATE
Owner's Copy
Page 1 of 1
Owner's Well No. 11
Date Work Began 4/23/97 Ended 7/3/97
Local Permit Agency san bernardino environmental health
Permit No. 04219701 Permit Date 4/21/97

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 469733

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DEPTH TO FIRST WATER 347 (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0 : 50	SAND & CLAY
50 : 180	course sand & clay
180 : 210	COARSE SAND & CLAY
210 : 350	CLAY
350 : 940	COARSE GRAVEL, SAND & SOME CLAY
940 : 960	SAND, GRAVEL & SMALL ROCKS
960 : 1720	CLAY

RECEIVED
DEC - 3 1997
[redacted]

TOTAL DEPTH OF BORING 1720 (Feet)
TOTAL DEPTH OF COMPLETED WELL 1710 (Feet)

WELL OWNER

Name [redacted]
Mailing Address [redacted]
YUCAIPA CA 92399
CITY STATE ZIP

WELL LOCATION

Address
City YUCAIPA
County SAN BERNARDINO
APN Book ___ Page ___ Parcel ___
Township 25 Range 2W Section 4
Latitude ___ DEG. MIN. SEC. NORTH Longitude ___ DEG. MIN. SEC. WEST

LOCATION SKETCH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)
X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)
___ MONITORING
WATER SUPPLY
___ Domestic
X Public
___ Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD REVERSE ROTARR FLUID WATER

WATER LEVEL & YIELD OF COMPLETED WELL
DEPTH OF STATIC WATER LEVEL 347 (Ft.) & DATE MEASURED 6/18/97
ESTIMATED YIELD * 2000 (GPM) & TEST TYPE PUMP
TEST LENGTH 51 (Hrs.) TOTAL DRAWDOWN 76 (Ft.)
** May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 : 50	36			X		STEEL	30	3/8	
0 : 705	26	X				STEEL	16	5/16	
705 : 1205	26		X			STEEL	16	5/16	.090 .090
1205 : 1210	24	X				STEEL	16x12	5/16	
1210 : 1690	24		X			STEEL	12	5/16	.090
1690 : 1710	24	X				STEEL	12	5/16	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 : 300	X			
300 : 1710				4x10

ATTACHMENTS (✓)
___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT
I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME LAYNE CHRISTENSEN COMPANY
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
11001 ETIWANDA AVE. FONTANA CA 92337
ADDRESS CITY STATE ZIP
Signed [signature] 11-26-97 510011
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 7-90 18755 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM WELL NO-11

DUPLICATE
Driller's Copy
Page 1 of 2
Owner's Well No. 12
Date Work Began 8/25/98, Ended 11/23/98
Local Permit Agency San Bernardino County dept. of Health
Permit No. 1998080117 Permit Date

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 537229

DWR USE ONLY – DO NOT FILL IN –
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DEPTH TO FIRST WATER 321 (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION Describe material, grain size, color, etc.
0	40	Top Soil, sand & gravel
40	60	sand & gravel
60	110	sand & gravel w/clay
110	130	Black & brown sand w/gravel & clay
130	140	sand
140	160	sand & gravel
160	170	sand & clay
170	200	sand, gravel & clay
200	230	fine sand & clay
230	240	fine sand, clay & little gravel
240	280	fine sand & little gravel
280	330	sand, gravel, little clay
330	360	Black sand & little gravel
360	400	consolidated sand
400	440	sand & gravel
440	450	sand
450	470	cemented sand
470	530	sand & some gravel
530	540	sand
540	570	consolidated sand
570	610	sand, gravel & clay
610	650	sand & gravel
650	680	sand & gravel
680	750	sand & gravel
750	770	sand
770	800	sand & gravel
800	810	consolidated sand
810	830	cemented sand w/ rock
830	850	sand & gravel
850	860	sand, gravel & clay

TOTAL DEPTH OF BORING 1120 (Feet)
TOTAL DEPTH OF COMPLETED WELL 1100 (Feet)

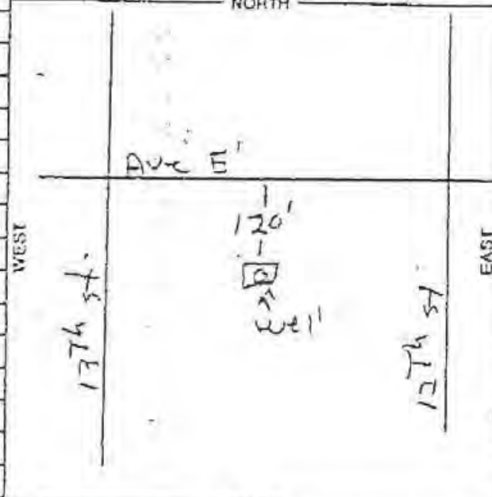
WELL OWNER

Name [redacted]
Mailing Address [redacted]
City Yucaipa Ca. 92399 STATE ZIP

WELL LOCATION

Address XXXXXXX
City Yucaipa
County San Bernardino
APN Book 31 Page 71 Parcel 301-112-07
Township 2S Range 2W Section 4
Latitude ___ DEG. MIN. SEC. NORTH Longitude ___ DEG. MIN. SEC. WEST

LOCATION SKETCH



Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING
WATER SUPPLY
___ Domestic
X Public
___ Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD Reverse FLUID water

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL 321 (Ft.) & DATE MEASURED 10/8/98
ESTIMATED YIELD* 2500 (GPM) & TEST TYPE pump
TEST LENGTH 59 (Hrs.) TOTAL DRAWDOWN 60 (Ft.)
* May not be representative of a well's long-term yield.

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE: BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL/GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	35	36	X		X		A53GB	30	3/8	
35	390	26	X				A53GB	16	5/16	
390	430	26		X			A53GB	16	5/16	std flo.050
430	470	26		X			A53GB	16	5/16	fullflo,050
470	620	26		X			A53GB	16	5/16	std.flo.050
620	740	26		X			A53GB	16	5/16	fullflo.050

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	35	X			
0	300	X			
301	1100				6x14kol-p

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief
NAME Layne Christensen Company (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
11001 Etiwanda Ave., Fontana, Ca. 92337
ADDRESS CITY STATE ZIP
Signed [signature] WELL DRILLER/AUTHORIZED REPRESENTATIVE 11-26-98 DATE SIGNED 510011 C-57 LICENSE NUMBER

18956

DUPLICATE
Driller's Copy

Page 2 of 2

Owner's Well No. 12

Date Work Began 8/25/98, Ended 11/23/98

Local Permit Agency San Bernardino County Dept. of Health

Permit No. 1998080117 Permit Date

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 537230

DWR USE ONLY — DO NOT FILL IN —

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER 321 (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
860	910	sand & gravel
910	950	sand, gravel & clay
950	960	gravel & sand
960	970	coarse sand & rocks
970	1050	gravel & sand
1050	1060	gravel, sand & granule granite fractured layer
1060	1090	granite, mostly crushed
1090	1120	granite, fractured

TOTAL DEPTH OF BORING 1120 (Feet)

TOTAL DEPTH OF COMPLETED WELL 1100 (Feet)

WELL OWNER

Name [redacted]

Mailing Address [redacted]

CITY Yucaipa STATE Ca. ZIP 92399

WELL LOCATION

Address

City Yucaipa

County San Bernardino

APN Book 31 Page 71 Parcel 301-112-07

Township 2S Range 2W Section 4

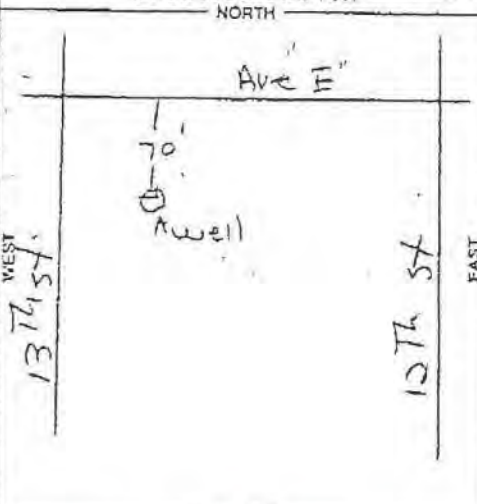
Latitude ___ NORTH Longitude ___ WEST

DEG. MIN. SEC.

LOCATION SKETCH

NORTH

WEST EAST



SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

___ Domestic

X Public

___ Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD Reverse FLUID water

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL 321 (Ft.) & DATE MEASURED 10/8/98

ESTIMATED YIELD* 2500 (GPM) & TEST TYPE pump

TEST LENGTH 59 (Hrs.) TOTAL DRAWDOWN 60 (Ft.)

* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE: BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
740	1090	26		X			A53GB	16	5/16	std.flo.050
1090	1100	26	X				A53GB	16	5/16	fullflo.050

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Layne Christensen Company
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 11001 Etiwanda Ave., Fontana, Ca. 92337
CITY STATE ZIP

Signed [signature]
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED

510011 C-57 LICENSE NUMBER

San Bernardino County Department of Public Health
DIVISION OF ENVIRONMENTAL HEALTH SERVICES
385 North Arrowhead Avenue, San Bernardino, CA 92415-0160

387-4646 Sco
4666 Mike Ford

DO NOT FILL IN
Permit Number 1998080117
Expiration 8-25-99
FF
FA
SN

WELL PERMIT
(Please Print)

RECEIVED
AUG 2 5 1998

#12

DO NOT FILL IN
Date 8-25-98
Amount $ 370.00
Receipt Number 14039
Paid By Layne Christensen Co.
Check #2712109

1. OWNER: Name [redacted]
Mailing Address [redacted]
City Yucaipa, ca. 92399 Zip 92399
Site Address
City Yucaipa Zip 92399
Telephone Number (909) 796-1901

2. WELL DRILLER: Layne Christensen Co.
Business Name
Sept 1998
Start Date
Completion Date

3. WELL USE (check):
☐ Community ☐ Horizontal ☐ Test
☐ Individual ☐ Monitoring ☐ Dairy
☐ Agricultural ☒ Public Water Supply ☐ Other

4. TYPE OF WORK (check):
☒ New ☐ Reconstruction ☐ Destruction

Items 6 through 10 to be estimated for new wells, exact for all other wells
5. ANNULAR SEAL: Seal Depth 300'
Furnished by: ☐ Owner ☒ Contractor
☒ Conductor Dia. 30"x35' in., Wall (Gage)
☐ Sealing Material Concrete, Thickness 5"

6. DEPTH OF WELL (feet):
Proposed 1100' Existing
DIAMETER OF BORE (in.): 26"

7. CASING INSTALLED:
☒ Steel ☐ Plastic ☐ Other

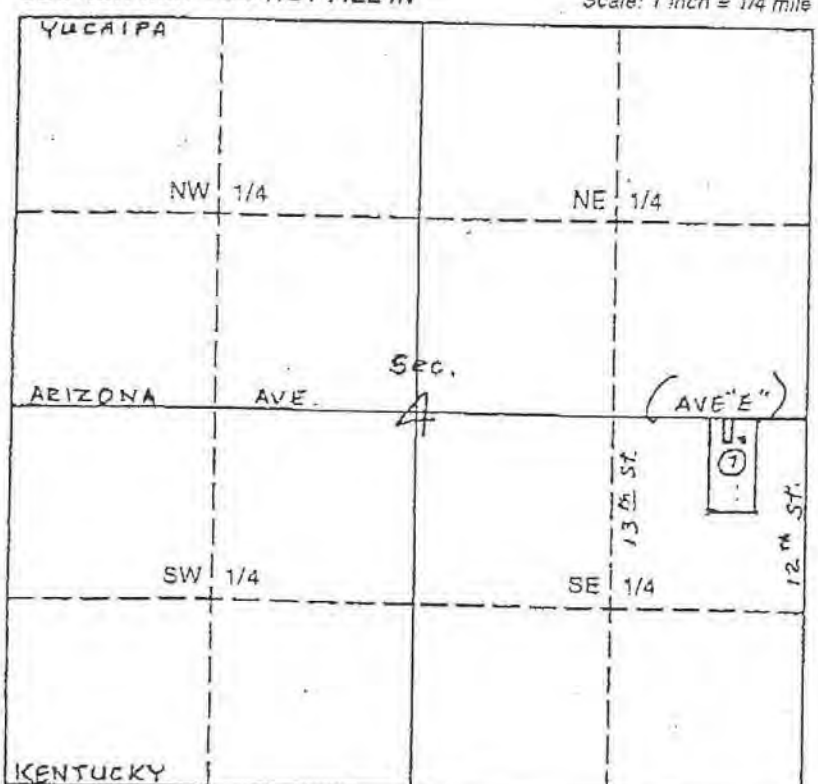
From (ft.)	To (ft.)	Dia. (in.)	Wall (Gage)
0	1100	16	5/16

Gravel Pack: ☒ Yes ☐ No
From 300' to 1100' ft.

8. PERFORATIONS (if applicable):
From 390' to 1090' ft. 40' LB

9. SEALED ZONES (if applicable):
From 0 to 300' ft.

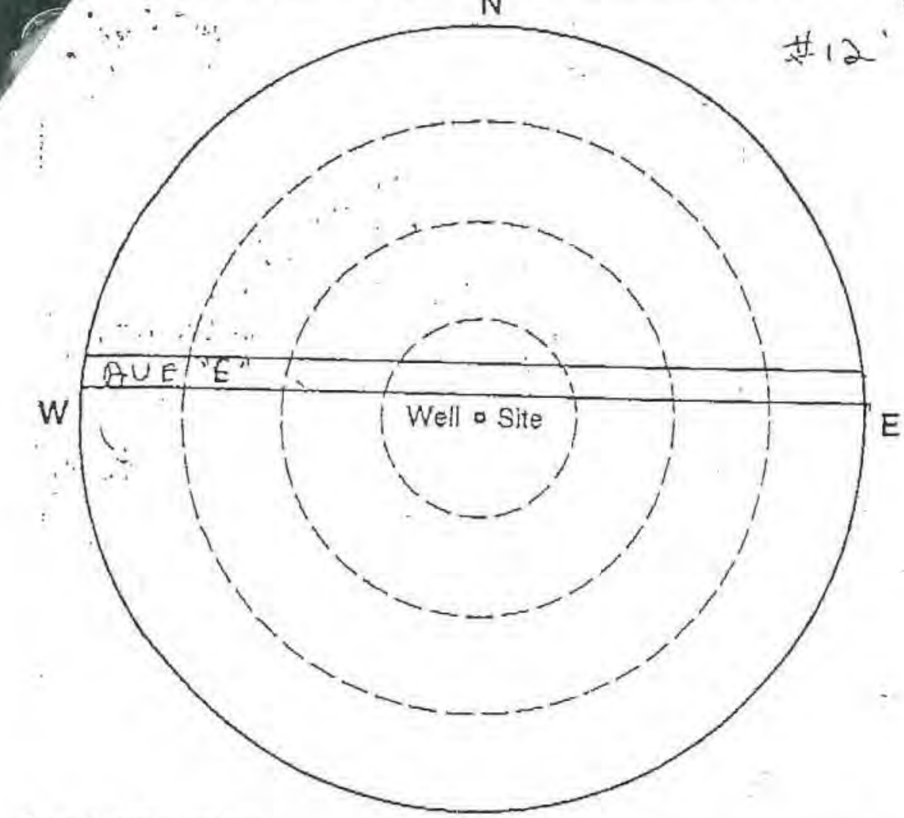
SECTION MAP - DO NOT FILL IN Scale: 1 inch = 1/4 mile



10. LOCATION INFORMATION: 30-E6
(a) Township: 649-D4
Tier 2S N/S Range 2W E/W Section 4
(b) Assessor's Parcel No. ~~301-112-06 + portion of~~ 301-112-07
(c) Latitude and Longitude
Book 31 Page 71
Lat: ° ' " N/S
Long: ° ' " E/W
(d) Solid or Liquid Disposal Site within Two Miles
☐ Yes ☐ No
Location

DO NOT FILL IN
Seal
Cap
Check Valve
Electricals
Slab
Tag
Building & Safety Notified

11. PLOT PLAN: 1998080117



Scale: 1 inch = 100 feet

(a) In perspective to the well site, sketch and label the following items: well lot property lines, other wells *(include abandoned wells)*, sewage disposal systems *(sewers, septic tanks, leaching fields, seepage pits, cesspools)*, lakes and ponds, watercourses and animals or fowl kept.

(b) Indicate the distance, in feet, of any of the following which are within 200 ft. of the well site:

Other	
Sewers	
Septic tanks	
Leaching fields	
Seepage pits	
Cesspools	
Lakes and ponds	
Watercourses	
Animals or fowl kept	

(c) ☐ None of the above are within 200 feet of the well si

PRESITE OK. BY M. FARRELL 8-25-98

12. I have read this application and agree to comply with all laws regulating the type of work being performed.

C-57 Contractor's Signature Robert A. E[illegible] Date 8-21-98

County Registration No. 84 California License No. 510011

DISPOSITON OF PERMIT

(For Department Use Only)

☐ Sent to Water Agency for review.

☐ Water Agency conditions or recommendations attached.

☐ Denied

☒ Approved subject to the following:

A. ☒ Notify the Department, Safe Drinking Water Section (909) 387-4666, twenty-four (24) hours in advanc to make an inspection of the following operations:

☒ Prior to sealing of the annular space or filling of the conductor casing.

☒ After installation of the surface protective slab and pumping equipment.

☐ During destruction of wells, prior to pouring the sealing material.

B. ☒ Submit to the Department, within thirty (30) days after completion of work, a copy of:

☒ Water Well Driller's Report ☒ Bacterial Analysis ☒ Inorganic Chemical Analysis

☒ Radiological Analysis ☒ General Mineral ☒ Organic Chemical Analysis ☒ General Physical

Comments

2S/2W-4L

WHWC Well 14

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e054636

DWR Use Only – Do Not Fill In
State Well Number/Site Number
Latitude N / Longitude W
APN/TRS/Other

Page 1 of 1

Owner's Well Number 14

Date Work Began 11/27/2006 Date Work Ended 1/29/2007

Local Permit Agency San Bernardino Department of Environmental Health

Permit Number 2006111150 Permit Date 11/29/06

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ______

Drilling Method Reverse Circulation Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	40	Top soil, sand & gravel.
40	70	Sand and gravel.
70	130	Sand, gravel and some clay.
130	150	Sand and clay.
150	195	Sand, clay and gravel.
195	230	Fine sand and clay.
230	275	Fine sand, clay and gravel.
275	309	Fine sand, and gravel.
309	340	Black sand and gravel.
340	390	Consolidated sand.
390	425	Sand and gravel.
425	450	Sand, gravel and some clay.
450	480	Sand.
480	515	Cemented sand.
515	540	Sand and gravel.
540	575	Sand, gravel and clay.
575	605	Consolidated sand.
605	640	Sand and gravel.
640	685	Sand, gravel and some clay.
685	715	Sand and gravel.
715	760	Sand.
760	795	Sand and gravel.
795	813	Consolidated sand.
813	845	Sand and gravel.
845	881	Cemented sand and rock.
881	910	Coarse sand, gravel, and clay.
910	964	Coarse sand, rocks.
964	1,030	Gravel, coarse sand.
1030	1,090	Gravel, sand, rocks.
1090	1,120	Granite, mostly crushed.

Above

SP

below

Total Depth of Boring 1120 Feet

Total Depth of Completed Well 1100 Feet

Well Owner

Name [redacted]

Mailing Address [redacted]

City Yucaipa State CA Zip 92399

Well Location

Address 32419 Avenue E

City Yucaipa County San Bernardino

Latitude ___ Deg. ___ Min. ___ Sec. N Longitude ___ Deg. ___ Min. ___ Sec. W

Datum ______ Decimal Lat. ______ Decimal Long. ______

APN Book 0301 Page 132 Parcel 85

Township 2 S Range 2 W Section 4

Location Sketch

(Sketch must be drawn by hand after form is printed.)

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other ______
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply
☑ Domestic ☑ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other ______

Water Level and Yield of Completed Well

Depth to first water 320 (Feet below surface)

Depth to Static Water Level 320 (Feet) Date Measured 01/29/2007

Estimated Yield * 1,506 (GPM) Test Type Constant Rate

Test Length 16.0 (Hours) Total Drawdown 66 (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	50	42	Conductor	Low Carbon Steel	.3125	30		
0	410	26	Blank	Low Carbon Steel	.3125	16		
410	1,090	26	Screen	Low Carbon Steel	.3125	16	Louver	0.050
1,090	1,100	26	Blank	Low Carbon Steel	.3125	16		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	50	Cement	10.5 sack
0	300	Cement	10.5 sack
300	1,100	Filter Pack	Tacna 8x20

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other ______

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Layne Christensen Company
(Person, Firm or Corporation)

11001 Etiwanda Avenue (Address) Fontana (City) CA (State) 92337 (Zip)

Signed [signature] (C-57 Licensed Water Well Contractor) 5-8-2007 (Date Signed) 510011 (C-57 License Number)

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

23111

WELL No. 14

2S/2W - 4L

San Bernardino County Department of Public Health
DIVISION OF ENVIRONMENTAL HEALTH SERVICES
385 North Arrowhead Avenue - 2nd Floor, San Bernardino, CA 92415-0160

WP 3371
SR 15216

DO NOT FILL IN
Permit Number 2006111150
Expiration 05-29-07
SN

K Deeds Presite

WELL PERMIT

(Please Print)

presite o.k. Hester Def

Owner's Well No. 14

DO NOT FILL IN
Date 11-29-06
Amount $ 493.00
Receipt Number 59738
Paid by LAYNE CHRISTENSEN

1. OWNER: Name [redacted]

Mailing Address [redacted]

City Yucaipa Zip 92399

Site Address 32419 Ave E

City Yucaipa Zip 92399

Telephone Number (909) 790-1901

2. WELL DRILLER: Layne Christensen Company
Business Name

11-27-2006 Start Date
2-27-2006 Completion Date

3. WELL USE (check):
☐ Agricultural ☐ Horizontal ☐ Test
☐ Cathodic ☐ Monitoring/Observation ☐ Dairy
☐ Ind/Domestic ☒ Community/PWS/City ☐ Other

4. TYPE OF WORK (check):
☒ New ☐ Reconstruction ☐ Destruction

Items 6 through 9 to be estimated for new wells, exact for all other wells

5. ANNUALAR SEAL: Seal Depth 50 ft.
Furnished by: ☐ Owner ☒ Contractor
☐ Driven Conductor Dia. 30 in., Wall (Gage) .375
☐ Sealing Material 10.5 sack, Thickness 6 in.

6. DEPTH OF WELL (feet):
Proposed 1100 Existing
DIAMETER OF BORE (in.): 26

7. CASING INSTALLED:
☒ Steel ☐ Plastic ☐ Other

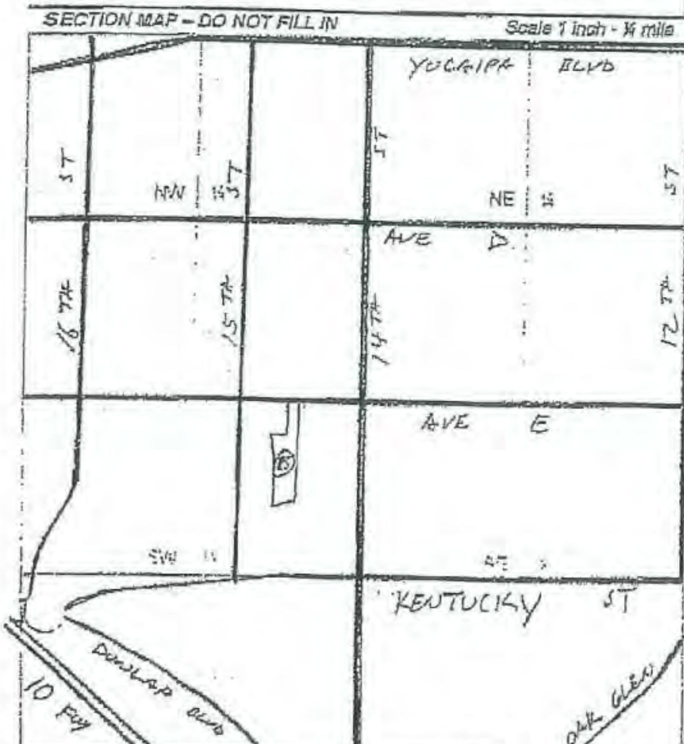
From (ft.)	To (ft.)	Dia. (in.)	Wall (Gage)
0	400	16	.312

Gravel Pack ☒ Yes ☐ No
From 300 to 1100 ft.

8. PERFORATIONS (if applicable):
From 400 to 1100 ft.

9. SEALED ZONES (if applicable):
From to ft.

SECTION MAP – DO NOT FILL IN Scale 1 inch - ¼ mile



10. LOCATION INFORMATION
(a) Assessor's Parcel No. 0301132850000
(b) Consulting Firm & Project Number:

(c) Latitude and Longitude (If Known)
Lat: ° ' "N/S
Long: ° ' "E/W
(d) Township:
Tier 2 N/S Range 2 E/W Section 4
Map Info TG# 649 C4

DO NOT FILL IN
Seal
Cap
Check Valve
Electricals
Slab
Tag
Building & Safety Notified

[redacted]

Fly 1. 22'
DC. 27'10"
DC 21'11"
71'9"
DC 27'3"
44'0"
DC 17'1"
116'1"
DC 17'3"
133'4"
0. 21'7"
1. 154'11"
21'8"
2. 176'7"
21'7"
3. 198'2"
21'7'
4. 219'9"
21'7"
5. 241'4"
22'5"
6. 263'9"
21'7"
7. 285'4"
21'6"
8. 306'10"
21'7"
9. 328'5"
21'7"
10. 350'0

235-245 very rough.
258-270 rough.

10. 350'0"
21'7"
11. 371'7"
21'7"
12. 393'2"
21'8
13. 414'10"
21'7"
14. 436'5"
21'7'
15. 458'0
21'8"
16. 479'8"
21'8
17. 501'4"
21'7"
18. 522'11"
21'6"
19. 544'5"
21'5"
20. 565'10"
21'7"
21. 586'5
21'7"
22. 608'0"
22'1"

24. 630'1"
21'2"
651'3
21'6"
25. 673'2"

old #2

static 273

[redacted]

0-50' conductor
50'-80' coarse sand and fine gravel
80'-109' sand no clays.
109'-115' gray clay (loose) & fine gravel
115'-125 brown clay (loose) coarse sand 70% fine gvl
125'-132' sticky brown clay & sand
132-135' sand (coarse) very loose clay 4'
135-148 sticky brown clay sand & gravel (rough drilling
148-173 sticky brown clay some sand & fine gravel firm spots
173-175 sand c̄ little clay
175-180 sand & gravel with clay streaks.
180-183 sticky brown clay & coarse sand.
183-190 very sticky clay & fine sand & still some gravel.
190-192 loose clay's fine & coarse sand.
192-200 very sticky brown clay & sand some small gravel
200-215 coarse sand & loose clay some gravel.
215-225 sticky brown clay & sand & gravel.
225-239 coarse sand & loose clay
239-250 sticky clay sand & gravel. (fragmented)
250-258 coarse sand & loose clay
258-280 coarse sand & fine gravel little clay
280-283 coarse sand & gravel increase in sticky clay.
283-308 coarse sand & gravel very loose clay.
308-338 sticky clay & coarse sand
338-341 very sticky clay some sand & gravel.
341-346 sticky clay & coarse sand.
346-353 sand & small fragmented gravel, little clay
353-370 coarse sand very uniform & clay. some gravel.
370-393 increase in clay very sticky
393-409 very sticky clay some sand & gravel. (40%)
[illegible] till

[illegible]-445	sticky loose clay sand & gravel.
445-470	loose clay & coarse sand (80%)
470-473	sticky clay sand & gravel
473-481	coarse sand & gravel loose clay ([illegible])
481-485	very tight sticky clay & coarse sand.
485-494	clay & coarse sand (clay is loose & sticky)
494-545	coarse sand fragmented gravel some clay
545-547	coarse sand gravel (fragged) sticky clay
547-560	coarse sand gravel little loose clay. a lot of very fragged white quartz
560-566	coarse sand and gravel little clay very rough drilling very tight
566-573	sticky clay coarse sand and fragmented gravel.
573-583	loose sticky clay coarse sand & gravel.
583-588	coarse sand some gravel (fine) loose sticky clay.
588-590	coarse sand spotty gravels tight sticky clay
590-608	coarse uniform sand and loose clay (-8%) fine fragmented gravels
608-648	coarse uniform sand sticky clay little gravel
643-673	coarse sand uniform, little [illegible] clay very firm.

400

620'

630

230'

Perf.

3/2mk

TLX: 62933889
TWX: 510-601-5891

Water Well Redevelopers, Inc.

1365-B DYNAMICS STREET
ANAHEIM, CALIFORNIA 92806

(714) 996-1462
(714) 779-2425

VIDEOLOG FIELD REPORT

OWNER [redacted]
Los Angeles, Ca. 90004

WELL LOCATION 1/2 mile West of Oak Glen Rd., on Davies Ranch Rd., San Bernardino, Ca.

WELL NO. 6 TECHNICIAN BC UNIT NO. 1 DATE 4-1-88

WELL HISTORY

Casing: 6" - - 0' to 142'+ Perforations: 25' to 142'+

(Per VIDEOLOG)

Drilled 1979 By Jack Jones Type C-Tool Perf. Type Drilled Holes

Pump: Type DWT Column 4" x 130' Bowls 4" x 8' Depth of Intake 138'

Remarks

VIDEOLOG INFORMATION

SWL 56' TWD 142' Water Visibility GOOD Date 4-1-88

Camera COLOR Tape Format VHS Speed SP Make TDK

Videolog X Revideo ___ Reruns ___ PC Log to Dickinson Hackers Pump Tape to Dickinson

REMARKS

No camera centering device was used during survey, due to (minimum size) 6" casing diameter. No drag was noted while descending.

8" steel casing is visible from 0' to 5', where a straight reduction to 6" PVC casing exists

The highly reflective white PVC produces glare and requires viewing from behind the saturated ring of light in front of the camera.

Possible roots entering through perforations at 85'.

Organic material can be seen entering through perforations, when disturbed by the camera, see 74', 86' and 100' to 200'. (Also note excessive material being drawn into well bore while camera more rapidly ascends).

Dark stains can be seen on casing adjacent to where bowls setting 130' to 135'.

The casing appears clean and drilled perforations open throughout the survey (i.e., 5' to 141

Casing, reduction, joints and perforations all appear clean and in normal condition.

The entrance of organics along with specific capacity loss would indicate a coagulation of the surrounding formation.

Well #2 YVWD #2.

DUPLICATE
Retain this copy

WATER WELL DRILLERS REPORT

(Sections 7079, 7080, 7081, 7082, Water Code)

THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

2S/2W-11B1

Do Not Fill In

Nº 32912

State Well No.______

Other Well No.______

(1) OWNER: Valley

Name [redacted]

Address [redacted]

(2) LOCATION OF WELL:

County San Bernardino Owner's number, if any 2

Township, Range, and Section NW ¼ of NE ¼ T 2S R 2W Sec. 11

Distance from cities, roads, railroads, etc. Ave. F between 5th & 6th Streets- Yucaipa

(3) TYPE OF WORK (check):

New Well ☒ Deepening ☐ Reconditioning ☐ Destroying ☐

If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☒ Industrial ☒ Municipal ☒ Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☐ Cable ☒ Other ☐

(6) CASING INSTALLED:

STEEL: SINGLE ☒ DOUBLE ☐ OTHER:

If gravel packed

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
0	614	16"	¼"			
	638	16"	5/16"			

Size of shoe or well ring: 16x12x1" Bit Steel

Describe joint All joints butt weld

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen Mills

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
350	563	8	1	2½ x 7/16"
613	625	8	1	2½ x 7/16"

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes ☒ No ☐ To what depth 40 ft.

Were any strata sealed against pollution? Yes ☐ No ☒ If yes, note depth of strata

From ft. to ft.

From ft. to ft.

Method of sealing Concrete grout installed between casing and formation

(9) WATER LEVELS:

Depth at which water was first found, if known 308 ft.

Standing level before perforating, if known 308 ft.

Standing level after perforating and developing 308 ft.

(10) WELL TESTS: Will be made by Owner

Pump test made? Yes ☐ No ☐ If yes, by whom?

gal./min. with ft. drawdown after hrs.

Temperature of water Was a chemical analysis made? Yes ☐ No ☐

Was electric log made of well? Yes ☐ No ☐ If yes, attach copy

(11) WELL LOG:

Total depth 638 ft. Depth of completed well 638 ft.

Formation: *Describe by color, character, size of material, and structure*

From ft.	To ft.	Formation
0	128	Brown clay with sand and gravel
128	190	Loose gravel, some brown clay
190	284	Brown clay, gravel and boulders
284	386	Gravel and boulders, some brown clay
386	414	Light brown clay with gravel embedded
414	430	Loose rough gravel
430	475	Hard tight gravel with trace of gray clay
475	512	Brown and gray clay with gravel embedded
512	563	Rough gravel some g clay
563	613	Tough brown clay
613	619	Gravel, some brown clay
619	638	Tough brown clay

Brown clay / gravel

1948 gray clay 40 1860

brown clay / gravel 1809

Bob Thompson

Work started Jan. 14 67, Completed Mar. 21, 1967

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME KIRKLAND WELL SERVICE

(Person, firm, or corporation) (*Typed or printed*)

Address 32291 Dunlap Blvd. Yucaipa, Calif.

[SIGNED] R. Kirkland

(*Well Driller*)

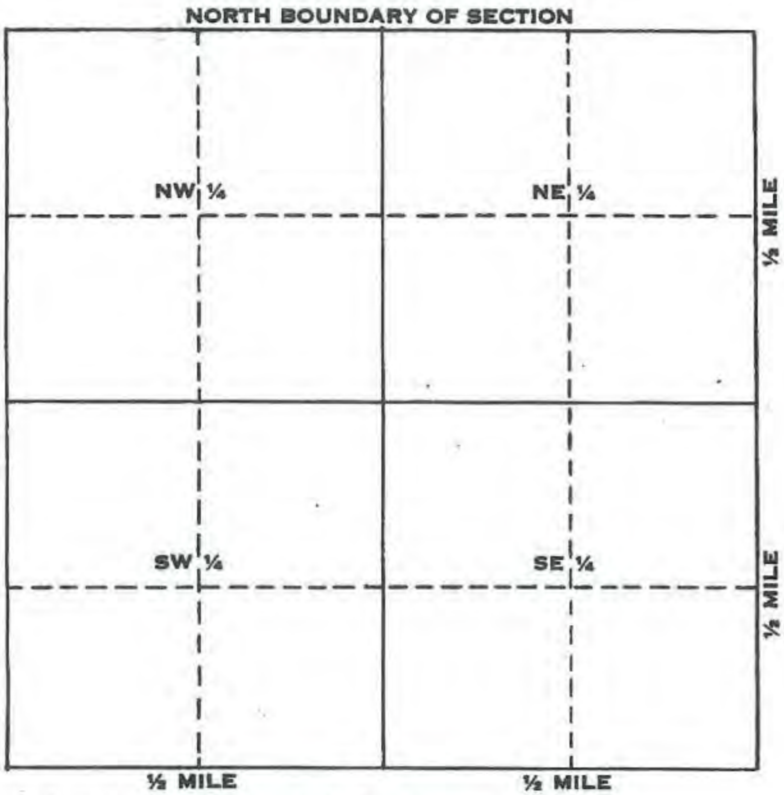
License No. 168847 Dated Mar. 22, 1967

SKETCH LOCATION OF WELL ON REVERSE SIDE

DWR 188 (REV. 9-65)

86391-950 10-65 50M TRIP OSP

WELL LOCATION SKETCH

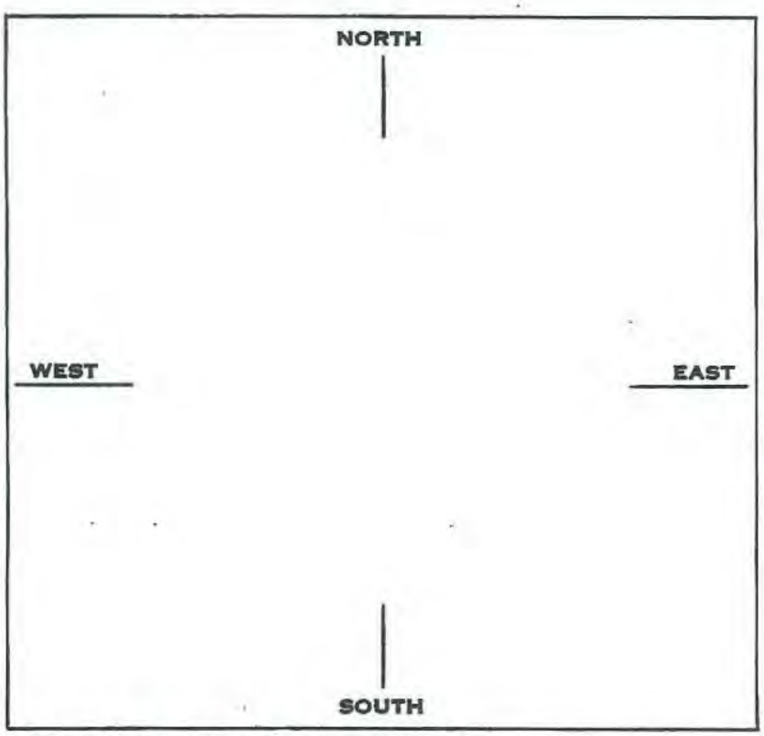


Township 2S N/S

Range 2W E

Section No. 11

A. Location of well in sectionized areas.
Sketch roads, railroads, streams, or other features as necessary.



B. Location of well in areas not sectionized.
Sketch roads, railroads, streams, or other features as necessary.
Indicate distances.

#2

YUCAIPA WATER COMPANY NO. 1
LOG OF WELL NO. 2
S.R. No. 36-01850

LOCATION: Avenue F, between Fifth and Sixth Streets
NW$\frac{1}{4}$ of NE$\frac{1}{4}$, Sect. 11, T2S, R2W, SBB&M

DRILLED BY: Unknown YEAR: 1921

Depth From	Depth To	Material
0	155'	Clay & Gravel
155'	172'	Gravel No cuts
172'	202'	Clay & Gravel
202'	240'	Gravel
240'	260'	Boulders 512 cuts between 225' & 280'
260'	289'	Gravel
289'	300'	Clay & Gravel
300'	315'	Gravel 152 cuts
315'	360'	Clay & Gravel
360'	378'	Gravel 144 cuts
378'	398'	Clay & Gravel
398'	464'	Gravel 320 cuts between 398' & 438' top of Starter

Cuts are about 1/2" wide x 4" long, and are made 8 per foot.

Standard Rig

Note: [illegible]
Spring of 1992 [illegible] apparently [illegible]
[illegible]

13/2W-36N1

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

No. 5

WELL DATA

(1) Place and Owner [redacted]

(2) Source of Information Data on File

Collected by [redacted] Date 15 June 62

(3) Number or Name	#5		
Date drilled	Jan. 24, 1946		
(4) Location: Neighborhood	Residential		
Size of lot			
Distance to: Sewer	No sewers in area		
Sewage disposal	Cesspool or septic tank		
Abandoned well			
Nearest property line			
(5) Housing: Type	Metal		
Condition	Good		
Pit depth *(if any)*	None		
Floor *(material)*	Concrete		
Drainage	Yes		
(6) Well Depth	508'		
(7) Casing: Depth	465'		
Diameter	16" to 465' depth		
Kind	Steel-10 ga Double		
Height above floor	4"		
Distance to highest perforations			
Surface sealed *(yes or no)*	Yes		
Gravel pack *(yes or no)*	No		
Second casing depth			
Second casing diameter			
Annular seal *(depth)*			
(8) Impervious Strata: Penetrated — Thickness			
Depth to			
(9) Water Levels: Depth to — Surface	251.9		
Static			
When Pumping			
(10) Pump: Make	Layne & Bowler		
Type	D.W. Turbine		
Capacity, g.p.m.	750'		
Lubrication	Oil		
Power	N Gas		
Auxiliary power	No		
Control			
Discharge location	Above Ground		
Discharge to	Mains		
(11) Frequency of Use	Cont.		
(12) Flood Hazard	No		
(13) Remarks and Defects (Use other side if necessary)			

(14) Show well log on other side.

COPY

1S/2W-36N1

Well 5
Rec. #36 01853

WELL RECORD

[redacted]

Company

Location Cedar Avenue between 3rd & 4th Streets Elev 2560

SW 1/4 SW 1/4 Township 1S Range 2W Section 36

PIT

Date drilled January 1946 By Eula Wells Roberts

Depth 508' Diameter Packed

CASING

Diameter 16" Length 465' Gauge 10 ga. - double

" " "

Perforated interval

COLUMN

Diameter 10" Length 310' Gauge

" 8" " 40' "

Tube diameter Shaft diameter

BOWLS

Date installed March 26, 1963 By Turley Pump Co.

Make Peerless Model 10 MA Serial no. R58283

Size 10" Stages 14 Length Suction 10'

DESIGN PERFORMANCE

GPM	RPM	TDH	HP
700	1760	550	120
675	1760	555	
600	1760	594	

ENGINE

Date installed February 1958 By Wilson Engine Service

Type Nat. Gas Make Climax Model K67 Serial no. 53576

Cu. in 1616 B & S 7 x 7" HP 125 RPM 880

GEAR

Date installed February 1958 By Ray Roberts

Make U.S. Model 1.2 Serial no. 1138599 HP 150

Shaft Spicer WL 71 Universals

Notes: March 1963 - All new shaft bearings, strainer spiders, head shaft & tension section.

SBVMWD FORM JK-10C

1S/2W-36N1

REDEVELOPING
'IDEOLOGGING
_HOTOLOGGING

Water Well Redevelopers, Inc.

5583 PEBBLE BEACH LANE
YORBA LINDA, CALIFORNIA 92686

TELEPHONE
(7__) _96-1462
(714) __9-2425

DEC 1983
RECEIVED
YUCAIPA VALLEY
COUNTY WATER
DISTRICT

VIDEOLOG FIELD REPORT

OWNER [redacted]

WELL LOCATION Approximately
34586 Cedar St.
Yucaipa, Calif.

WELL NO. 5

DATE OF VIDEOLOG 12-5-83 BY B.J.C.

WELL HISTORY

Casing: 16" -- 0' to 508'

Perforations: 190' to 199', 220' to 227', 236' to 245', 254' to 355', 366' to 400'& 422' to 470'.

Drilled 1946 By Flula Wells

Type C-Tool Perf's Mills Knife.

Depth of Pump Setting: Column 350' Bowls 10' Suction 10'

Remarks All out for service.

'RING SURVEY

Standing Water Level 174'

Depths Televised 0' to Present Bottom.

Total Well Depth 490'

Water Conditions Good

VIDEO

VTR Beta SETTING 1 TAPE: On File ___ Customer ___ Dealer X None ___

POLAROID SUPPLEMENTS None.

REMARKS

Camera centering guide set at 14"O.D. during survey. No drag noted while camera descended.

Sample mills knife cuts are visible at 2'.

Casing and perforations appear clean and in normal condition from 174' (static) to 400'. Some perforation plugging and or restriction can be seen from 400'± to 470', end of casing.

Open hole from 470' to 490'(bottom).

Perforations on joint 328' and 433'.

Lost airline visible at 475' and 481'.

San Bernardino Valley Municipal Water District
1350 SOUTH "E" STREET - P. O. BOX 5906 - SAN BERNARDINO, CALIFORNIA 92412 - (714) 824-2200
(714) 889-0433

September 9, 1976

[redacted]

Dear Sir:

On behalf of the SBVMWD I would like to thank you for your assistance this summer with our vertical control project.

All of our surveys were run to determine the mean sea elevation of the measuring point for each well. All of our work was done within third order limits.

The following are the wells surveyed and their elevation:

Well No. 4	2346.36 ft.
Well No. 5	2561.98 ft.
Well No. 7	2711.00 ft.
Well No. 8	2364.18 ft.
Well No. 11	2387.92 ft.
Well No. 12	2379.15 ft.
Well No. 13	3180.95 ft.
Well No. 14	3341.77 ft.
Well No. 24	2434.71 ft.
Well No. 33	3127.80 ft.

Thank you again.

Sincerely,

Robert Martin

Robert Martin
Water Resources Aide

RM:as

1S/2W-36R1 No. 7

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

WELL DATA (1) Place and Owner [redacted]

(2) Source of Information Data on File [redacted]

Collected by [redacted] Date 15 June 62

(3) Number or Name	#7		
Date drilled	October 18, 1950 '		
(4) Location: Neighborhood			
Size of lot			
Distance to: Sewer	No sewer in area		
Sewage disposal	Cesspool or septic tank		
Abandoned well			
Nearest property line			
(5) Housing: Type			
Condition			
Pit depth *(if any)*			
Floor *(material)*			
Drainage			
(6) Well Depth	695'		
(7) Casing: Depth	665'		
Diameter	14"		
Kind	1/4" Steel		
Height above floor	4"		
Distance to highest perforations			
Surface sealed *(yes or no)*	Yes		
Gravel pack *(yes or no)*	Yes		
Second casing depth			
Second casing diameter			
Annular seal *(depth)*			
(8) Impervious Strata: Penetrated — Thickness			
Depth to			
(9) Water Levels: Depth to — Surface	383.7		
Static			
When Pumping			
(10) Pump: Make	Layne & Bowler		
Type	Turbine-L.S.		
Capacity, g.p.m.	450		
Lubrication	Oil		
Power	N Gas		
Auxiliary power	No		
Control			
Discharge location	Above ground		
Discharge to	Mains		
(11) Frequency of Use	Cont.		
(12) Flood Hazard	No		
(13) Remarks and Defects (Use other side if necessary)			

(14) Show well log on other side.

COPY

[redacted]

LOG OF WELL NO. 7
S.R. No. 36-01855

15/2W-361 #7

LOCATION: Cedar and Adams Streets
SE¼ of SE¼, Sect. 36, T1S, R2W, SBB&M

DRILLED BY: E. J. Brockman, Drilling Contractor DATE: Oct. 18, 1950
R. 1, Box 150, Colton, Calif.

Depth From	Depth To	Material
0	18'	Decomposed granite boulders
18'	120'	Sand and rock
120'	184'	Sand and clay with some rock
184'	195'	Clay and rock
195'	223'	Red clay
223'	298'	Sandy clay
298'	315'	Sand and gravel
315'	328'	Sandy clay
328'	340'	Sand and gravel
340'	395'	Sandy clay
395'	415'	Rock and clay
415'	460'	Sandy clay
460'	475'	Rock and clay
475'	514'	Sand
514'	520'	Sandy clay
520'	530'	Cemented gravel
530'	540'	Sandy clay
540'	545'	Sand
545'	552'	Granite ledge
552'	568'	Sandy clay
568'	580'	Sand
580'	584'	Sandy clay
584'	589'	Sand
589'	594'	Clay and rock
594'	605'	Sandy clay
605'	625'	Cemented gravel
625'	635'	Clay and rock
635'	660'	Soft sand clay
660'	688'	Clay and rock
688'	695'	Rock

Hole was reamed to 20" diameter to a depth of 665' and 14" x ¼" wall casing installed to 665'.

1S/2W_36R1

Well 7

WELL RECORD

[redacted]

Company

Location Cedar & Adams # 36 01867

SE 1/4 SE 1/4 Township 1 S Range 2 W Section 36

PIT

Date drilled Oct. 1950 By E.S. Brockman

Depth 695' Diameter 30" Packed 665'

CASING

Diameter 14 Length 665 Gauge 1/4"

" " "

Perforated interval

COLUMN

Diameter 6 Length 500 Gauge STD

" " "

Tube diameter $2\frac{1}{2}$ Shaft diameter $1\frac{1}{2}$

BOWLS

Date installed 3-25-57 By Roberts

Make Layne & Bowler Model ELL - M Serial no.

Size 12 Stages 12 Length Suction 10' of 6"

DESIGN PERFORMANCE

3/25/57 GPM 450 RPM 1650 TDH 423 HP 79

GPM RPM TDH HP

GPM RPM TDH HP

ENGINE

Date installed By

Type Make Waukesha Model Wak R-25A Serial no. 1018788

Cu. in. 1197 B & S 6 1/4 X $6\frac{1}{2}$ HP 96 RPM 900

GEAR

Date installed By

Make US Model 1.2 Serial no. 1101571 HP 110

Shaft Delte WL 61 Universals

Notes: 1 CK 189 S Gas Engine Starter - Serial - 1016352

SBVMWD FORM JK-10C

1S/2W-36R1

695' 14"
DEPTH DIAM. DRILLED

San Bernardino Valley Water Conservation District
REDLANDS, CALIFORNIA

WELL RECORDS

WELL NO.
LOCATION NO. Yuc. W. Co. No. 1 #7
36-01855

USE
LOG AVAILABLE Yes
LOCATION 80' n/o Cedar, 40' w/o Adams
OWNER [redacted] - Well No. 20 (old) (new) No. 7
EQUIPMENT
DESCRIPTION OF M. P. Top of casing
ELEV. M. P.
ELEV. G. S. 2710
LEVELS BY

DATE	OBSERVER	DEPTH TO WATER	ELEVATION OF WATER	REMARKS
1950				
11-03	Hicks	316.7	2393.3	To top casing
1951				
3-03	Serber	317.1	2392.9	
4-04	Hicks	317.2	2392.8	To top casing
5-15	Serber	319.7	2390.3	
1952				
4-11	Hicks	325.7	2394.3	New bench plug-outlet pipe
4-11	Edison Co.	325	2385	1.65' above pump base
1953				
3-17	Serber	328.6	2381.4	
1955				
3-28	USGS	334.8	2375.2	
8-9	Edison Co.	367.2	2342.8	
8-9	"	497.7	2212.3	Pumping 434 GPM
9-17	USGS	400±	2310	
1957				
4-2	Dibble	346.6	2363.4	2" pipe East side
1958				
4-28	Foster	466.6	2243.4	Pumping
1960				
3-9	Henstad	383.7	2326.3	Idle
1961				
4-24	Stafford	440.6	2269.4	Pumping
1963				
3-20	SRCFCD	383.7	2322.8	
1963			2328	

25/2W-201 #8

[redacted]

LOG OF WELL NO. 8
S.R. No. 36-01856

NOT #8

LOCATION: Hill Ranch
NW¼ of SW¼, sect. 25, T1S, R2W, SBB&M
DRILLED BY: E. J. Brockman
R. 1, Box 150
Colton, Calif.

YEAR: March 3, 1951 completed

Depth From	Depth To	Material
0	4'	Top Soil
4'	50'	Sand and rock
50'	85'	Sandy clay
85'	105'	Sand and small gravel
105'	178'	Sandy clay
178'	222'	Sand and coarse gravel
222'	260'	Hard clay
260'	274'	Sand and small gravel
274'	300'	Sandy clay
300'	306'	Sand
306'	340'	Clay and rock
340'	354'	Rock and Sand
354'	415'	Sandy clay
415'	425'	Sand
425'	478'	Sand with streaks of clay
478'	506'	Hard clay

Hole was reamed to 16" to 363' and 10" x 3/16" casing installed. 10" casing was perforated with 3/16" x 4" slots 4 to the round every foot.

Hole was reamed to 10" from 363' to 506' and 6" x 1/8" casing installed. 6" casing was perforated all the way with 3/16" x 4" slots 4 to the round, one round every foot.

Hole was gravel packed with 3/8" gravel all the way.

Static water level 115'

Well on the pump test pumped the following capacities:

from 143' - 162 GPM
" 166' - 279 GPM
" 178' - 342 GPM

Rotary Rig

2S/2W-2P Well 8

Rec. #36 01957

WELL RECORD

[redacted]

Company________

Location 8th Street South of Washington Drive Elevation = 2360'

NE 1/4 NE 1/4 Township 2 S Range 2 W Section 3

PIT

Date drilled 1959 By________

Depth 750' Diameter________ Packed 500'

CASING

Diameter 16" Length 500' Gauge 10 ga.

" ________ " ________ " ________

Perforated interval________

COLUMN

Diameter 8" Length 400 Gauge STD

" ________ " ________ " ________

Tube diameter________ Shaft diameter________

BOWLS

Date installed March 18, 1963 By Turley Pump Company

Make________ Model 10 LA Serial no. R 58225

Size 10" Stages 11 Length________ Suction 10'

DESIGN PERFORMANCE

GPM 450	RPM 1760	TDH 400	HP 55
GPM	RPM	TDH	HP
GPM	RPM	TDH	HP

ENGINE

Date installed 3-63 (from #3 well) By________

Type Elect. Make U.S. Model HU Serial no. 1251837

Cu. in.________ B & S________ HP 60 RPM 1800

GEAR

Date installed________ By________

Make________ Model________ Serial no.________ HP________

Shaft________ Universals________

Notes: Pump test July 25, 1966

Pump Head Jacuzzi - Pump as shown

SBVMWD FORM JK-10C

[redacted]

25/1W-8E1

LOG OF WILDWOOD CANYON WELL
S.R. No. 36-01864

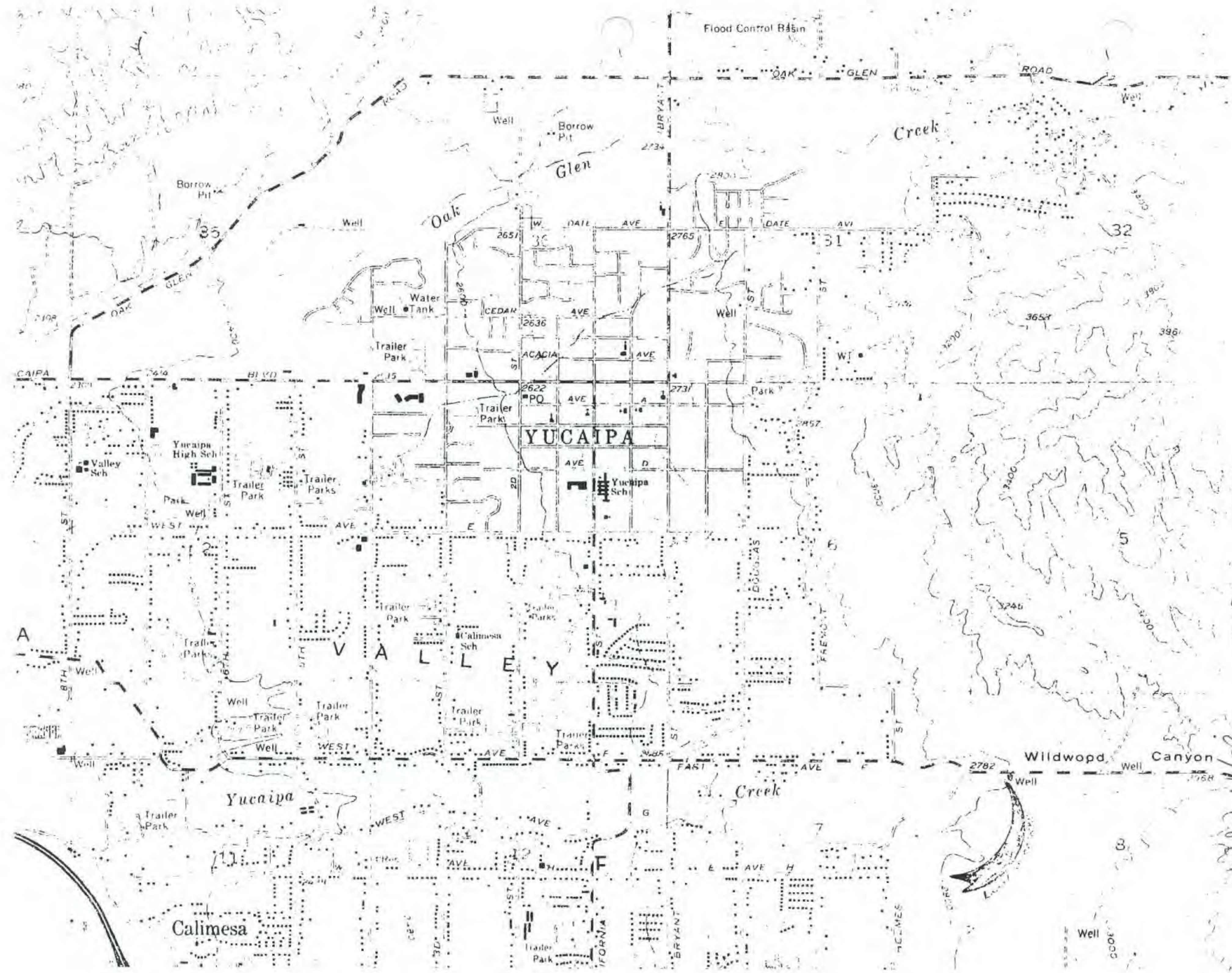
Well -15

LOCATION: Wildwood Canyon
NW$\frac{1}{4}$ of NW$\frac{1}{4}$, Sect. 8, T2S, R1W, SBB&M

DRILLED BY: Unknown   YEAR: Unknown

Depth From	Depth To	Material
0	85'	Gravel size of a pea to 6" mixed with sand & some clay to cement slightly not enough water to attract attention above 80'.
85'	90'	Sand & clay mixed not cemented but loose.
90'	129'	Gravel size of a pea to 6" with sand and no clay.
129'	145'	Decomposed granite or soft schist becoming harder as well went down.

All 100 perforations between 50' and 129' below surface perforation 8" to 18" long and average width 5/8 of an inch.



Flood Control Basin
OAK GLEN ROAD
Well
Borrow Pit
Creek
Glen
Oak
BRYANT
DATE AVE
CEDAR AVE
ACACIA AVE
BLVD
Water Tank
Trailer Park
PO
YUCAIPA
Yucaipa High Sch
Valley Sch
Trailer Parks
Yucaipa Sch
WEST AVE
DOUGLAS
FREMONT
V A L L E Y
Calimesa Sch
Wildwood Canyon
Yucaipa
EAST AVE
Creek
Calimesa
BRYANT
35
31
32
5
6
7
8
12
11

2S/1W-8E1

Well Wildwood #15

WELL RECORD

[redacted]

Company

Location Wildwood Canyon 36 01864

NW 1/4 NW 1/4 Township 2 S Range 1 W Section 8

PIT

Date drilled Unknown By Unknown

Depth 145 Diameter Packed

CASING

Diameter 12 Length 145 Gauge 1/4

" " "

Perforated interval 50 - 129

COLUMN

Diameter 5 Length 120 Gauge STD

" " "

Tube diameter $1\frac{1}{2}$ Shaft diameter 1

BOWLS

Date installed By

Make Wintroath Model 8-75 Serial no.

Size 8 Stages 5 Length Suction 10 ft.

DESIGN PERFORMANCE

GPM RPM TDH HP

GPM RPM TDH HP

GPM RPM TDH HP

ENGINE

Date installed By

Type Elec. Make GE Model 12 F 56715 Serial no. XCS 6721749

Cu. in. B & S HP $7\frac{1}{2}$ RPM

GEAR

Date installed By

Make Model Serial no. HP

Shaft Universals

Notes:

SBVMWD FORM JK-10C

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

well 15-1
Test well

Do not fill in

No. 182243

...e of Intent No. ______

...al Permit No. or Date 07208924

State Well No. ______

Other Well No. ______

(1) OWNER: Name [redacted]
Address [redacted]
City [redacted] Zip [redacted]

(2) LOCATION OF WELL (See instructions):
County San Bernardino Owner's Well Number ______
Well address if different from above Wildwood Canyon
Township 2 S Range 1 W Section 8
Distance from cities, roads, railroads, fences, etc.
Assessors Parcel #322-212-05

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☒
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size Pea Gravel
Diameter of bore 12 ½
Packed from 0 to 315 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	315	6	1/8	80	295	.090

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☐ No ☒ If yes, to depth ______ ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ______ ft.
Method of sealing ______

(10) WATER LEVELS:
Depth of first water, if known 62 ft.
Standing level after well completion ______ ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom? ______
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test ______ ft. At end of test ______ ft
...harge ______ gal/min after ______ hours Water temperature ______
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? ______
Was electric log made? Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 315 ft. Depth of completed well 315 ft.
from ft. to ft. Formation (Describe by color, character, size or material)

0 - 102 ft Fine sand short streak of clay.
102 - 149 ft Medium & coarse sand, gravel mix.
149 - 315 ft Blue Granite (Decompose).

Work started 5-14 19 89 Completed 5-23 19 89

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED ______ (Well Driller)

NAME SoCal Pump & Well Service, Inc.
(Person, firm, or corporation) (Typed or printed)
Address 585 W. Valley Blvd
City Bloomington, California Zip 92316
License No. 510836 Date of this report Nov 1, 1989

R 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED. USE NEXT CONSECUTIVELY NUMBERED FORM

This is our well Dave Pafund

15/1W-33M1

Well BAUMANN 16

WELL RECORD

SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT

Company

Location S of Potato Canyon Rd. Lot 7 - So Mtn Sub. 36 01866

SE 1/4 SE 1/4 Township 1 S Range 1 W Section 27

PIT

Date drilled ____ By ____

Depth 115 Diameter ____ Packed ____

CASING

Diameter 8 Length 115 Gauge 12

" ____ " ____ " ____

Perforated interval ____

COLUMN

Diameter 3 Length 90 Gauge STD

" ____ " ____ " ____

Tube diameter 1 1/4 Shaft diameter 3/4

BOWLS

Date installed ____ By ____

Make Peerless Model 6 L.A. Serial no. ____

Size 6 Stages 12 Length ____ Suction 10

DESIGN PERFORMANCE

GPM ____ RPM ____ TDH ____ HP ____

GPM ____ RPM ____ TDH ____ HP ____

GPM ____ RPM ____ TDH ____ HP ____

ENGINE

Date installed ____ By ____

Type ____ Make Waukesha 4 cyl Model ICK 136C Serial no. 768040

Cu. in. 61 B & S 2½x3 1/8 HP 13.5 RPM 1950

GEAR

Date installed ____ By ____

Make Johnson Model HA - 2.3 Serial no. 17348 HP 15

Shaft Spicer Universals ____

Notes:

SBVMWD FORM JK-10C

1S/1W-33M1

TRIPLICATE
Owner's Copy Well 16

Page 1 of 1

Owner's Well No. 16

Date Work Began 4/23/01, Ended 4/27/01

Local Permit Agency San Bernardino County Health Services

Permit No. 2001040204 Permit Date 4/13/01

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 584982

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0 to 50	Installed sanitary seal on existing well, bored 6" around existing 16" casing and filled with 6 sack concrete and pea gravel by tremmie pipe. Depth of Sanitary seal 50'

TOTAL DEPTH OF BORING ___ (Feet)

TOTAL DEPTH OF COMPLETED WELL ___ (Feet)

WELL OWNER

Name [redacted]

Mailing Address [redacted]

CITY [redacted] STATE ZIP

WELL LOCATION

Address Canyon Drive 3/4 mile east of Oak Glen

City Yucaipa

County San Bernardino

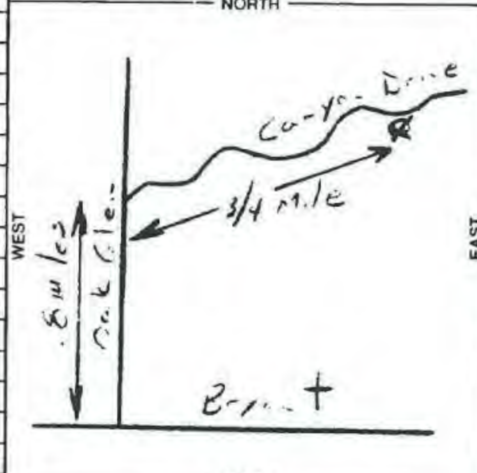
APN Book 0321 Page 251 Parcel 14

Township 1S Range 1 Section 33

Latitude ___ NORTH Longitude ___ WEST (DEG. MIN. SEC.)

LOCATION SKETCH

NORTH



SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

___ NEW WELL

MODIFICATION/REPAIR

___ Deepen

X Other (Specify) Sanitary Seal

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

___ Domestic

X Public*

___ Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD ___ FLUID ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___

ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL/GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 to 50	X			N/A

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Tri County Pump Company
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

241 South Arrowhead Ave. San Bernardino, CA 92408
ADDRESS CITY STATE ZIP

Signed ___ WELL DRILLER/AUTHORIZED REPRESENTATIVE

5/9/01 DATE SIGNED

744742 C-57 LICENSE NUMBER

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Well 17

TRIPLICATE
Owner's Copy

Notice of Intent No.
Local Permit No. or Date

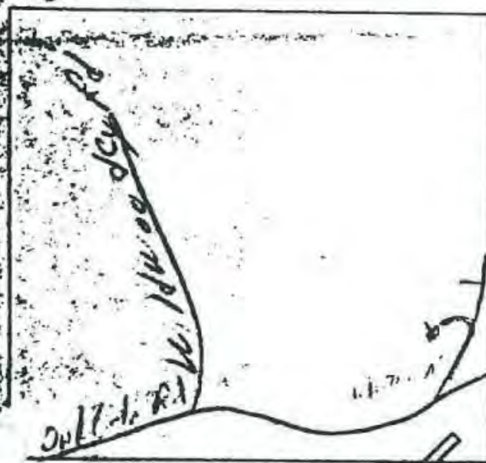
STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

2S/1W-2L1

Do not fill in
No. 15689
State Well No. 02S/07W-02L02
Other Well No.

(1) OWNER: Name [redacted]
Address [redacted]
City [redacted] Zip [redacted]

(2) LOCATION OF WELL (See instructions):
County San Bernadino Owner's Well Number W-62
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☒
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size
Diameter of bore
Packed from to ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia.	Gage or Wall	From	To	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing Steel & Cement

(10) WATER LEVELS:
Depth of first water, if known 80 ft.
Standing level after well completion 65 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test ft. At end of test ft
Discharge 100 gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 180 ft. Depth of completed well 180 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	10	Brown DG & Firm
10	20	Brown DG & Firm
20	40	firmeDG brown
40	80	Gravel brown DG mix
80	100	rusty brown gravel water
100	140	brown DG firm
140	150	black sand stone or rock
150	160	brown green DG
160	180	Harder DG brown
180		STOP

Work started 4-7 19 87 Completed 4-9 19 87

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (Well Driller)

NAME Ron Engeldinger (Person, firm, or corporation) (Typed or printed)
Address P.O. Box 250
City Hemet, Ca. Zip 92343
License No. 294625 Date of this report 4-16-87

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

WR 188 (REV. 7-76)

was 50 ft sanitary seal

pumps test

Well 17 25/1W-24 Well 62

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill

No. 15689

Notice of Intent No.
Permit No. or Date

State Well No.
Other Well No.

(1) OWNER: Name [redacted]
Address [redacted]
City [redacted] Zip [redacted]

(2) LOCATION OF WELL (See instructions):
County San Bernadino Owner's Well Number
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well X Deepening
Reconstruction
Reconditioning
Horizontal Well
Destruction (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic
Irrigation
Industrial
Test Well
Stock
Municipal
Other

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air X
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size
Diameter of bore
Packed from to ft.

(7) CASING INSTALLED:
Steel ☐ Plastic X Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
	180	8"	

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes X No ☐ If yes, to depth ft.
Were strata sealed against pollution? Yes ☐ No X Interval ft.
Method of sealing Steel & Cement

(10) WATER LEVELS:
Depth of first water, if known 80 ft.
Standing level after well completion 65 ft.

(11) WELL TESTS:
Was well test made? Yes X No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift X
Depth to water at start of test ft. At end of test ft.
Discharge 100 gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No X If yes, by whom?
Was electric log made? Yes ☐ No X If yes, attach copy to this report

(12) WELL LOG: Total depth 180 ft. Depth of completed well 180 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	10	Brown DG & Firm
10	20	Brown DG & Firm
20	40	firmeDG brown
40	80	Gravel brown DG mix
80	100	rusty brown/gravel water
100	140	brown DG firm
140	150	black/sand stone or rock
150	160	brown/green DG
160	180	Harder DG brown
180		STOP

FOR OFFICE USE 752

Work started 4-7 1987 Completed 4-9 1987

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (Well Driller)
NAME Ron Engeldinger (Person, firm, or corporation) (Typed or printed)
Address P.O. Box 250
City Hemet, Ca. Zip 92343
License No. 294625 Date of this report 4-16-87

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

15/2W-25G1

FROM : SOCAL PUMP & WELL DRILLING INC FAX NO. : 9093415031 Dec. 07 2000 09:40AM P2

ORIGINAL
File with DWR

Page 1 of 1

Owner's Well No. [redacted] WE11 #19

Date Work Began 9/28/99 Ended 10/12/99

Local Permit Agency San Bernardino County EHS Div

Permit No. 1999100830 Permit Date 10/22/99

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 766676

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ___ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD ___ FLUID ___

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION Describe material, grain size, color, etc.
	Excavated down 6 feet, graveled well up to 50 feet and pumped in a 50 feet 10 sack sand slurry mix.

TOTAL DEPTH OF BORING ___ (Feet)

TOTAL DEPTH OF COMPLETED WELL ___ (Feet)

WELL OWNER

Name [redacted]

Mailing Address [redacted]

Yucaipa CA 92399

CITY STATE ZIP

WELL LOCATION

Address Fir/Coldstein

City Yucaipa

County San Bernardino

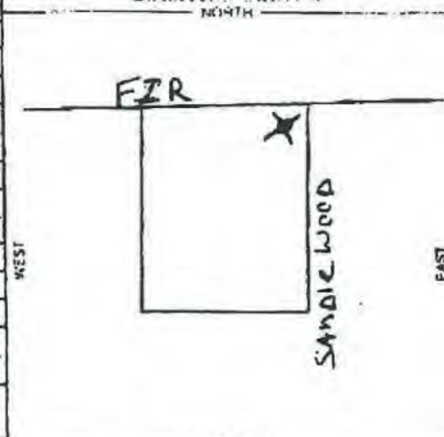
APN Book ___ Page ___ Parcel 303-391-78

Township 1S Range 2W Section 25

Latitude ___ NORTH Longitude ___ WEST

DEG. MIN. SEC.

LOCATION SKETCH



Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

___ NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

X DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ___ Public
___ Irrigation ___ Industrial

MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___

ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

* May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME SoCal Pump & Well Drilling, Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

P.O. Box 5488 Riverside CA 92517
ADDRESS CITY STATE ZIP

Signed [signature] 12-7-00 510836
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

1S/2W-25G1

Well 19
36-01105

WELL RECORD

SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT

Company

Location 1200 W. Bryant 800 No. Oak Glen ELEV 1770

NW 1/4 SE 1/4 Township 1S Range 1W Section 25

PIT

Date drilled By

Depth 365 Diameter Packed

CASING

Diameter 16 Length 365 Gauge

" " "

Perforated interval

COLUMN

Diameter Length 300 Gauge

" " "

Tube diameter Shaft diameter

BOWLS

Date installed By Coe

Make Pomona Model Water tube Serial no.

Size Stages Length Suction

DESIGN PERFORMANCE

GPM RPM TDH HP

GPM RPM TDH HP

GPM RPM TDH HP

ENGINE

Date installed By

Type Elect Make G.E. Model 12F3262 Serial no. 5777487

Cu. in. B & S HP 30 RPM 1770

GEAR

Date installed By

Make Model Serial no. HP

Shaft Universals

Notes: Motor Rewind 64

SBVMWD FORM JK-10C

1S/2W-25G1

Well 19
36-C11CS

MONTHLY PRODUCTION RECORD

SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT

Company

Month of

5655

DATE	WATER METER	GPD	GPM	GAS METER	Cu. Ft.	OIL	MIN. DOWN
64 J				3879		———	615
F				4044			140
M				4092		22.73	35
A				4116			150
M				4137		74.36	80
J				4160			12.5
J				4196		79.51	19.0
A				4251			145
S				4294		89.87	18
O				4341			20
N				4404		10.30	9
D				4428			5 1/2
	200GPM						
							201.5
65 J				4444		3.59	3
F				4453			5.5
M				4468		4.37	4.5
A				4482			4.0
M				4494		82.64	12.0
J				4526			14
J				4558		87.95	17.5
A				4608			
S				4676		86.70	22
O				4676			14
N				4715		9.52	8.5
D				4733			8.5
	200 GPM est.						
	1,242,000 GAL.	3.81 AF.					
TOT.							

REMARKS

WM #20

FROM: DEPT WATER RESOURCES   FAX NO.: 8185434604   08-06-97 11:12A P.02

DUPLICATE

ginal, Duplicate and Triplicate with the
ONAL WATER POLLUTION
ROL BOARD No. 7
(appropriate number)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

Do Not Fill In
Nº 59344
State Well No. 1S/2W-25 R01
Other Well No.

(1) OWNER:
[redacted]
Address [redacted]

(2) LOCATION OF WELL:
County San Bernardino
R.F.D. or Street No.
South 125 acres of SE¼, section 25, T1S
Range 2W, NW corner of Bryant and Oak
Glen, Yucaipa, Calif.

(3) TYPE OF WORK (check):
New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:
SINGLE ☒ DOUBLE ☐

From ft.	To ft.	Diam.	Gage or Wall	If gravel packed: Diameter of Bore	From ft.	To ft.
	590	12 3/4"	¼	18 5/8"	0	590

85/8" to 12 3/4"
ing guides

Type and size of shoe or well ring
Describe joint: welded joint
collars
pea
tile

(7) PERFORATIONS:
Type of perforator used: mill cut
Size of perforations: 120 mesh ... 14 rows

From ft.	To ft.	Perf. per row	Rows per ft.
190	590	120 mesh	14

(8) CONSTRUCTION:
Was a surface sanitary seal provided? ☒ Yes ☐ No To what depth 150 ft.
Were any strata sealed against pollution? ☐ Yes ☐ No If yes, note depth of strata
From ft. to ft.
Method of Sealing Rotary mud slurry

(9) WATER LEVELS:
Depth at which water was first found ft.
Standing level before perforating ft.
Standing level after perforating 400 ft.

(10) WELL TESTS:
Was a pump test made? ☒ Yes ☐ No If yes, by whom? C.V. Pump
Yield: 830 gal./min. with 340 ft. draw down after 24 hrs.
Temperature of water   Was a chemical analysis made? ☐ Yes ☒ No

(11) WELL LOG:
Total depth 590 ft. Depth of completed well 590 ft.
Formation: Describe by color, character, size of material, and structure

From ft.	To ft.	Formation
0	58	coarse sand & gravel
58	70	coarse sand & gravel
70	104	coarse sand w streaks of heavy gravel
104	149	coarse sand w/gravel
149	190	sand & gravel
190	220	coarse sand
220	240	coarse sand
240	255	sand & gravel
255	280	sand w/ some clay
280	290	sand & gravel
290	300	sand & rock
300	320	sand & gravel
320	340	rocks & sand
340	375	sand & rock
375	395	snad & gravel, free
395	410	sand
410	440	hard sand & rock
440	480	hard sand & rock
480	500	coarse sand
500	555	coarse sand
555	578	coarse sand
578	590	coarse sand
590		Hard rock

CONFIDENTIAL - NOT FOR PUBLIC RELEASE

MICROFILMED

Work started 6/8 .62 Completed July 20 .62

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
NAME Coachella Valley Pump & Supply, I
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 1274
Indio, Calif.
[SIGNED] (Well Driller)
License No. 161541   Dated , 19

DWR 188 (REV. 5-

DUPLICATE
...ginal, Duplicate and Triplicate with the
...ONAL WATER POLLUTION
...ROL BOARD No. 7
(appropriate number)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

WELL WAS #'D R01, R02 & R03

STATE OF CALIFORNIA

AS OF 8-7-97 - 015/02W-25R02S 88

Do Not Fill In
No 59344
State Well No. 15/2W-25R01
Other Well No.

(1) OWNER:

Name [redacted]
Address [redacted]

(2) LOCATION OF WELL:

County San Bernardino Owner's number, if any—

R. F. D. or Street No.
South 133 acers of SE¼, section 25, T15 Range 2W, NW corner of Bryant and Oak Glen, Yucaipa, Calif.

(3) TYPE OF WORK (check):

New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☒ DOUBLE ☐

ft. to	ft.	Diam.	Gage or Wall
	590	12 3/4"	¼
85/8" to 12 5/4"			
ing guides			

If gravel packed

Diameter of Bore	from ft.	to ft.
18 5/8"	0	590

Type and size of shoe or well ring

Size of gravel sm pea Holtville

Describe joint welded slip joint collars

(7) PERFORATIONS:

Type of perforator used mill cut

Size of perforations 120 mesh. length, by 14 rows in.

From ft. to	ft.	Perf. per row	Rows per ft.
8190	590	120 mesh	14
XXXXXXXX4XX			

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☒ Yes ☐ No To what depth 150 ft.

Were any strata sealed against pollution? ☐ Yes ☐ No If yes, note depth of strata

From ft. to ft.

Method of Sealing Rotary mud slurry

(9) WATER LEVELS:

...at which water was first found ft.
...g level before perforating ft.
...g level after perforating 400 ft. ft.

WELL TESTS:

...ump test made? ☒ Yes ☐ No If yes, by whom? C.V. Pump

Yield: 830 gal./min. with 340 ft. draw down after 24 hrs.

Temperature of water Was a chemical analysis made? ☐ Yes ☒ No

Was electric log made of well? ☐ Yes ☒ No

(11) WELL LOG:

Total depth 590 ft. Depth of completed well 590 ft.

Formation: *Describe by color, character, size of material, and structure.*

ft.	to ft.	
0	58	coarse sand & gravel
58	70	coarse sand & gravel
70	104	coarse sand w streaks of heavy gravel
104	149	coarse sand w/gravel
149	190	sand & gravel
190	220	coarse sand
220	240	coarse sand
240	255	sand & gravel
255	280	sand w/ some clay
280	290	sand & gravel
290	300	sand & rock
300	320	sand & gravel
320	340	rocks & sand
~~340~~	~~375~~	~~sand & rock~~
~~375~~	~~395~~	~~snad & gravel, free~~
~~395~~	~~410~~	~~sand~~
~~410~~	~~440~~	~~hard sand & rock~~
~~440~~	~~480~~	~~hard sand & rock~~
~~480~~	~~500~~	~~coarse sand~~
~~500~~	~~555~~	~~coarse sand~~
~~555~~	~~578~~	~~coarse sand~~
~~578~~	~~590~~	~~coarse sand~~
~~590-~~		~~Hard rock~~

CONFIDENTIAL - NOT FOR PUBLIC RELEASE

AUG 11 1997
MICROFILMED

Work started 6/8 1962. Completed July 20 1962

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Coachella Valley Pump & Supply, Inc.
(Person, firm, or corporation) (Typed or printed)

Address P.O. Box 1274
Indio, Calif.

[SIGNED] [signature]
Well Driller

License No. 161541 Dated , 19

87088 6-57 50M QUIN SPO

DWR 188 (REV. 3-54)

#20

COACHELLA VALLEY PUMP & SUPPLY, Inc.

'OHNSTON PUMP DISTRIBUTORS
COMPLETE PUMPING EQUIPMENT
DOMESTIC AND IRRIGATION

Licensed Contractors
Telephone EXpress 9-2192
P. O. BOX 1274 ☆ INDIO, CALIF. 92201

SPRINKLER IRRIGATION SYSTEMS
WATER WELL DRILLING
FABRICATED STEEL PIPE

May 30, 1968

San Bernardino Valley Municipal W¨ter District
L.D. Hook, Water Superintendent
P.O. Box 458
Yucaipa, California 92399

Dear Mr. Hook:

I cannot find a copy of the report that was sent to the State on their forms, but below is the needed information as we have in our records. This information is the same as that reported.

Drilled for: E.J. Culligan
Started: June8, 1962
finished: July 20, 1962
Legal description: South 133 acres of SE¼, Sec. 25; T1S; R2W; NW corner of Bryant and Oak Glen, Yucaipa, Calif.

Well Log:

0'	to	58'	Coarse sand & gravel
58'		70'	coarse sand & gravel
70		104	coarse sand w/streaks of heavy gravel
104		149	coarse sand w/gravel
149		190	sand & gravel
190		240	coarse sand
240		255	sand & gravel
255		280	sand w/some clay
280		290	sand & gravel
290		300	sand & rock
300		320	sand & gravel
320		340	rocks & sand
340		375	sand & rock
375		395	sand & gravel
395		410	sand
410		480	hard sand & rock
480		590	coarse sand
590		597	hard rock

Casing record:

0'	590'	12 3/4" OD X ¼" wall casing
190'	590'	perforations, mill cut, 120 mesh, 14 rows

Water standing level: 400'

diameter of drilled hole: 18 5/8"

Size of gravel: small pea

Sealed to 150'

Yours truly,
Julia Marsal Sec.

State of California
DEPARTMENT OF WATER RESOURCES
Southern District

FACSIMILE TRANSMISSION COVER SHEET

DATE: 8/6/97

TO: Ron Mc Call
NAME OF RECIPIENT

YVWD
ORGANIZATION

909 7976381
FAX NUMBER OF RECIPIENT

PHONE NUMBER OF RECIPIENT

FROM: Gary Gilbreath
NAME OF SENDER

818 543-4600 Ext 222
PHONE

Data Section
SECTION OR UNIT

Fax # 818 543-4604

770 Fairmont Ave. Glendale, Ca. 91203

1 PAGES TO FOLLOW

____ APPROVAL

SUBJECT: per our conversation

COMMENTS:

IF ALL PAGES SHOWN ARE NOT RECEIVED, PLEASE CALL:
ATSS 8-667-4600 OR PUBLIC 818-543-4600

SOUTHERN DISTRICT FACSIMILE MACHINE PHONE NUMBERS ARE:
ATSS 8-667-4604 OR PUBLIC 818-543-4604

THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

State Well No. 01S/02W-25R01, S B&M

WELL INDEX

Location No.
Serial or Ventura No.
Local or Riv. No.
Bulletin 39-J No.
Other No. Log Nº 59344

Data Available		Filed Under
Log	2	5050
Water Analyses	–	
Water Levels	–	
Prod. Records	–	

Well Use 3

County 36
Areal Designation ~~Y-01-F6~~
Areal Code No. 8 Y-01-F6

Well Condition 4
Ref. Pt. Elev. 2762.0 ft.
Effective Date
Ground Elev. 2760.0 ft.

Original Well Depth 0590 ft.
Well Soundings
Casing: Dia. 12 3/4 in., Length 0590 ft.
Perf. 190' to 590'

Aquifer(s)
Record: Begins 6/8/62, Ends

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

State Well No. 01S/02W 25R02S B&M

WELL INDEX

Location No.
Serial or Ventura No.
Local or Riv. No.
Bulletin 39-J No.
Other No. Yucaipa V.C.W.D Nr 20

Data Available	Filed Under
Log	
Water Analyses	
Water Levels	
Prod. Records	

Well Use
Well Type

DWR 1058 (Rev. 6/70)

County S. Bernardino (36)
Areal Designation
Areal Code No. Y 01 F6

Well Condition
Ref. Pt. Elev. 2740' ft.
Effective date
Ground Elev. ft.

Original Well Depth 576 ft.
Well Soundings
Casing Dia. 12 in., Length ft.
Perf.

Aquifer(s)
Record: Begins , Ends

AUG 11 1997

Well 20

WELL RECORD

Rec. #36 02321

SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT

Company

Location 400' No. of Oak Glen Road - 1000' W. of Bryant Street

SE 1/4 SE 1/4 Township 1S Range 2W Section 25

PIT

Date drilled 1962 By

Depth 576' Diameter 12" Packed No

CASING

Diameter 12" Length 576' Gauge $\frac{1}{4}$

" " "

Perforated interval

COLUMN

Diameter 8" Length 460' Gauge

" 6" " 50' "

Tube diameter $2\frac{1}{2}$" Shaft diameter $1\frac{1}{2}$"

BOWLS

Date installed April 1966 By Turley Pump Co.

Make Peerless Model 8 LB Serial no. 250120

Size 8" Stages 22 Length Suction Strainer

DESIGN PERFORMANCE

GPM 275	RPM 1760	TDH 620	HP 60
GPM	RPM	TDH	HP
GPM	RPM	TDH	HP

ENGINE

Date installed 11-65 By Turley Pump Co.

Type Elect. Make U.S. Model Serial no. 3831181

Cu. in. B & S HP 60 RPM 1760

GEAR

Date installed By

Make Model Serial no. HP

Shaft Universals

Notes: 540' Air Line

SBVMWD FORM JK-10C

25/2W - 11B2

QUINTUPLICATE
RETAIN THIS COPY

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

THE RESOURCES AGENCY OF CALIFORNIA

Do Not Fill In 24
№ 122021

State Well No.
Other Well No.

(1) OWNER: District
Name [redacted]
Address [redacted]

(2) LOCATION OF WELL:
County San Bernardino Owner's number, if any [redacted]
R. F. D. or Street No. 100 ft.-of east of 5th St. - 1000 feet north of Ave. F - Yucaipa

(3) TYPE OF WORK (check):
New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☐
Cable ☒
Dug Well ☐

(6) CASING INSTALLED:
SINGLE ☒ DOUBLE ☐

From ft.	to ft.	ft. Diam.	Gage or Wall
0	566	16	1/4
566	590	16	5/16"

If gravel packed

Diameter of Bore	from ft.	to ft.

Type and size of shoe or well ring 16"x12"x1" Bit size steel
Describe joint All joints butt weld

(7) PERFORATIONS:
Type of perforator used Mills
Size of perforations 2 1/2 in., length, by 7/16 in.
From 320 ft. to 585 ft. 8 Perf. per row 1 Rows per ft.

(8) CONSTRUCTION:
Was a surface sanitary seal provided ☒ Yes ☐ No To what depth 20 ft.
Were any strata sealed against pollution? ☐ Yes ☒ No If yes, note depth of strata
From ft. to ft.
Method of Sealing Ring of concrete between casing and formation

(9) WATER LEVELS:
Depth at which water was first found 310 ft.
Standing level before perforating 306 ft.
Standing level after perforating 305 ft.

(10) WELL TESTS:
Was a pump test made? ☐ Yes ☒ No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No
Was electric log made of well? ☐ Yes ☐ No

(11) WELL LOG:
Total depth 590 ft. Depth of completed well 590 ft.
Formation: Describe by color, character, size of material, and structure.

From ft.	to ft.	Formation
0	245	Hard brown gravelly clay 2192.4
245	328	Gray tight sand & gravel some clay
328	430	Rough gray gravel & boulders, some clay
430	456	Brown clay with gravel embedded
456	532	Rough gravel with few clay streaks
532	540	Brown clay with streaks of gravel 1897.4
540	563	Gray and brown soft decomposed granite
563	590	Hard gray decomposed granite 1847
590		Hard blue granite

Work started Nov. 2 1965. Completed Dec. 27 1965

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME KIRKLAND WELL SERVICE
(Person, firm, or corporation) (Typed or printed)
Address 32291 Dunlap Blvd.
Yucaipa, Calif.
[SIGNED] K. Kirkland
Well Driller
License No. 163847 Dated Jan. 3, 1966

File Original, Duplicate and Triplicate with the REGIONAL WATER POLLUTION CONTROL BOARD No. ...
(Insert appropriate number)

WATER WELL DRILLERS REPORT 2S/2W-11B2
(Sections 7076, 7077, 7078, Water Code)

Nº 122022

THE RESOURCES AGENCY OF CALIFORNIA

State Well No. ...

Other Well No. ...

(1) OWNER:

Name [redacted]

Address [redacted]

(2) LOCATION OF WELL:

County San Bernardino Owner's number, if any— (24)

R. F. D. or Street No. 100 ft. of 5th St.-1000 ft North of F St. Yucaipa.

Avenue F

(3) TYPE OF WORK (check):

New well [X] Deepening [ ] Reconditioning [ ] Abandon [ ]

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic [ ] Industrial [ ] Municipal [X] Irrigation [ ] Test Well [ ] Other [ ]

(5) EQUIPMENT:

Rotary [ ] Cable [X] Dug Well [ ]

(6) CASING INSTALLED:

SINGLE [X] DOUBLE [ ]

From ft.	to ft.	Diam.	Gage or Wall
0	566	16"	1/4
566	590	"	5/16

If gravel packed: Diameter of Bore / from ft. / to ft.

Type and size of shoe or well ring Bit Steel-16" x 2" ...

Describe joint All joints butt weld

(7) PERFORATIONS:

Type of perforator used Mills

Size of perforations 2 1/2 in., length, by 7/16 in.

From 320 ft. to 585 ft. 8 Perf. per row 1 Rows per ft.

(8) CONSTRUCTION:

Was a surface sanitary seal provided? [X] Yes [ ] No To what depth 20 ft.

Were any strata sealed against pollution? [ ] Yes [X] No If yes, note depth of strata

From ft. to ft.

" " Ring of concrete between casing

Method of Sealing and formation

(9) WATER LEVELS:

Depth at which water was first found 310 ft.

Standing level before perforating 306 ft.

Standing level after perforating 305 ft.

(10) WELL TESTS:

Was a pump test made? [ ] Yes [X] No If yes, by whom?

Yield: gal./min. with ft. draw down after hrs.

Temperature of water Was a chemical analysis made? [ ] Yes [ ] No

Was electric log made of well? [ ] Yes [ ] No

(11) WELL LOG:

TOPO ...

Total depth 590 ft. Depth of completed well 590 ft.

Formation: Describe by color, character, size of material, and structure.

From ft.	to ft.	Formation
0	245	Hard brown gravelly clay.
245	328	Gray tight sand and gravel some clay.
328	430	Rough gray, gravel and boulders, some clay.
430	456	Brown clay with gravel embedded.
456	532	Rough gravel with few clay streaks.
532	540	Brown clay with streaks of gravel.
540	563	Gray and brown, soft decomposed granite.
563	590	Hard gray decomposed granite.
	590	Hard blue granite.

Work started Nov. 2 1965 Completed Dec. 27 1965

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Kirkland Well Service
(Person, firm, or corporation) (Typed or printed)

Address 32291 Dunlap Blvd. Yucaipa, Calif.

[SIGNED] K. Kirkland
Well Driller

License No. 168547 Dated ... 19 66

2S/2W-11B2

Well 24
36-02322

WELL RECORD
SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT

Company

Location 200 ft. E of 5th St. 900 ft No. of Ave. F. ELEV 2440

NW 1/4 NE 1/4 Township 2S Range 2 W Section 11

PIT

Date drilled Dec. 1965 By Kirkland

Depth 590 Diameter 16 ~~Cable Tool~~ Packed No

CASING

Diameter 16 Length 590 Gauge 1/4

Perforated interval 320 to 585 2½ by 7/16

COLUMN

Diameter 8 Length 400 Gauge std

Tube diameter 3 Shaft diameter 1-11/16

BOWLS

Date installed June 66 By Roberts

Make Johnston Model 14BC imp F Serial no. JY-2354

Size 14 Stages 12 Length Suction strainer only ~~10 ft pipe~~

DESIGN PERFORMANCE

	GPM	RPM	TDH	HP
	850	1188	560	150
ACT	750	1188		

ENGINE

Date installed June 66 By Roberts

Type Elec Make Model Serial no.

Cu. in. B & S HP 150 RPM 1160

GEAR

Date installed By

Make Model Serial no. HP

Shaft Universals

Notes: ~~400 ft airline, plastic~~
P-61 Pump control valve installed. Warric automation to the 2nd. St. reservoir. Well has 10 min. blow off time for heavy sand condition experienced for first 5-10 min.

RETAIN THIS COPY

D (Sections 7076, 7077, 7078, Water Code)

2S 1W 8F01S

Wildwood Canyon #27

№ 109205

THE RESOURCES AGENCY OF CALIFORNIA

State Well No.

Other Well No. #5

(1) OWNER:

Name [redacted]

Address [redacted]

(2) LOCATION OF WELL:

County [illegible] Owner's number, if any—

R. F. D. or Street No.

[illegible] Camp

[illegible] California

(3) TYPE OF WORK (check):

New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☒ Industrial ☐ Municipal ☐

Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒

Cable ☐

Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☐ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall	Diameter of Bore	from ft.	to ft.
0	314	5 5/8 x	1/16	12 1/4	0	314

If gravel packed

Type and size of shoe or well ring

Size of gravel: [illegible]

Describe joint [illegible]

(7) PERFORATIONS:

Type of perforator used [illegible]

Size of perforations 1/4 in., length, by 1/5 in.

From ft.	to ft.	Perf. per row	Rows per ft.
164	314	4	2

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☒ Yes ☐ No To what depth 40 ft.

Were any strata sealed against pollution? ☐ Yes ☐ No If yes, note depth of strata

From ft. to ft.

Method of Sealing [illegible]

(9) WATER LEVELS:

Depth at which water was first found ft.

Standing level before perforating ft.

Standing level after perforating ft.

(10) WELL TESTS:

Was a pump test made? ☐ Yes ☒ No If yes, by whom?

Yield: gal./min. with ft. draw down after hrs.

Temperature of water Was a chemical analysis made? ☐ Yes ☒ No

[illegible] ☐ Yes ☒ No

(11) WELL LOG:

Total depth 314 ft. Depth of completed well 314

Formation: *Describe by color, character, size of material, and structure.*

ft.	to ft.	
0	15	TOP SOIL
15	75	SAND & CLAY
75	95	CLAY
95	110	SAND
110	130	SAND & GRAVEL
130	161	SAND & ROCK
161	175	SAND
175	185	SAND & ROCK
185	210	ROCK & CLAY
210	250	ROCK
250	300	SAND & ROCK
300	314	DECOMPOSED GRANITE

314

150

164

Perf

PERF 95

Work started 19 , Completed

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the my knowledge and belief.

NAME R. L. [illegible]

(Person, firm, or corporation) (Typed or printed)

Address [illegible]

[illegible] California

[SIGNED] [illegible]

Well Driller

License No. 157026 Dated Feb. 2, 19

MONITORING WELL NEXT TO WELL 27 — Well 27A monitoring well

25/2W-8F2

not well 27

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 182242

Notice of Intent No.

al Permit No. or Date 07208923

State Well No.

Other Well No.

(1) OWNER: Name [redacted]

Address [redacted]

City [redacted] Zip 92399

(2) LOCATION OF WELL (See instructions):

County San Bernardino Owner's Well Number

Well address if different from above Wildwood Canyon

Township 2 S Range 1 W Section 8

Distance from cities, roads, railroads, fences, etc.

Assessors Parcel #322-212-30

WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well ☒ Deepening ☐

Reconstruction ☐

Reconditioning ☐

Horizontal Well ☐

Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

Domestic ☐

Irrigation ☐

Industrial ☐

Test Well ☒

Stock ☐

Municipal ☐

Other ☐

(5) EQUIPMENT:

Rotary ☒ Reverse ☐

Cable ☐ Air ☐

Other ☐ Bucket ☐

(6) GRAVEL PACK:

Yes ☒ No ☐ Size Pea Gravel

Diameter of bore 12¼

Packed from 20 to 207 ft.

(7) CASING INSTALLED:

Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:

Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	207	4"	Sch40	160	207	.032

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 20 ft.

Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.

Method of sealing Bentonite

(10) WATER LEVELS:

Depth of first water, if known 65 ft.

Standing level after well completion ft.

(11) WELL TESTS:

Was well test made? Yes ☐ No ☒ If yes, by whom?

Type of test Pump ☐ Bailer ☐ Air lift ☒

Depth to water at start of test ft. At end of test ft

Discharge gal/min after hours Water temperature

Chemical analysis made? Yes ☐ No ☒ If yes, by whom?

Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 207 ft. Depth of completed well 207 ft.

from ft. to ft. Formation (Describe by color, character, size or material)

0 - 60 ft fine sand

60 - 160 ft medium & coarse sand, small gravel.

160 - 180 ft Blue Granite (Decompose).

Work started 6-21 1989 Completed 6-23 1989

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED [signature] (Well Driller)

NAME SoCal Pump & Well Service, Inc.
(Person, firm, or corporation) (Typed or printed)

Address 585 W. Valley Blvd

City Bloomington, California Zip 92316

License No. 510836 Date of this report Nov 1, 1989

R 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

WELL #2
IMP. DIST. NO. 2

Girl Scout

SAN [B]ERNARDINO VA[LLEY] WATER CONSERVA[TIO]N DISTRICT
[1]4 West Citrus A[ve]nue - Redlands, C[ali]fornia

YVCWD #29

Should be Well 28 [W]ELL LOG

WILDWOOD CANYN

~~28/1W~~ Well No. ~~XX~~

Well Owner [redacted]

Location On Mesa East of end of Wildwood Canyon. South of road about ½ mile.

¼; ¼; Sect. , T. , R.

Drilled by Brockman Date completed

Drilling method Rotary

Total depth 606' Size of casing and depth Gauge (Double) (Single)

Type of well Irrigation

Struck water at , SWL before perforating after perforating (ft.)

Completion test data: SWL PWL Discharge Hours run

Surface elev. 3341.2 Source of information

Perforations

Depth	Elev. Bot. of Stratum	Material	Thickness	
0-10		Top Soil	10	
10-28		Sand	18	
28-50		Soft Clay	22	
50-72		Sandy Rock	22	
72-160		Clay	88	
160-191		Sand	31	
191-205		Soft Clay	14	
205-218		Sand, Gravel	13	
218-248		Clay	30	
248-256		Black sand	8	
256-318		Soft Clay	62	
318-329		Sand and Rock	11	
329-408		Sandy Clay	79	
408-420		Sand	12	
420-490		Clay and Few Rocks	70	
490-494		Sand	4	
494-532		Sandy Clay	38	
532-565		Clay Rock	33	
565-572		Fine Sand	7	
572-606		Clay	34	
		ELEV. OF WELL 3341.2		

(Continued on reverse side)

Remarks: Pumped 45 miners inches

When filled out, please mail this form to
San Bernardino Valley Water Conservation District
[1]4 West Citrus Ave. Redlands, California

TRIPLICATE
Owner's Copy
Page ___ of ___

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STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 766704

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO. STATION NO.
LATITUDE LONGITUDE
APN TRS OTHER

Owner's Well No. Well #29
Date Work Began Jan . Ended Health
Local Permit Agency County of Riv./Service Agency
Permit No. 23720 Permit Date January 23, 2000

GEOLOGIC LOG

ORIENTATION (✓) ___ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD ___ FLUID ___

DEPTH FROM SURFACE Ft to Ft	DESCRIPTION *Describe material, grain size, color, etc.*
	Excavate down 6 feet from finish grade.
	Cut off casing, gravel well up to 50 feet.
	Install 2" tremie line and pumped in a 10 sack sand slurry mix, remove tremie and backfill hole.

JUN 2001 RECEIVED YUCAIPA VALLEY WATER DIST.

TOTAL DEPTH OF BORING ___ Feet
TOTAL DEPTH OF COMPLETED WELL ___ Feet

WELL OWNER

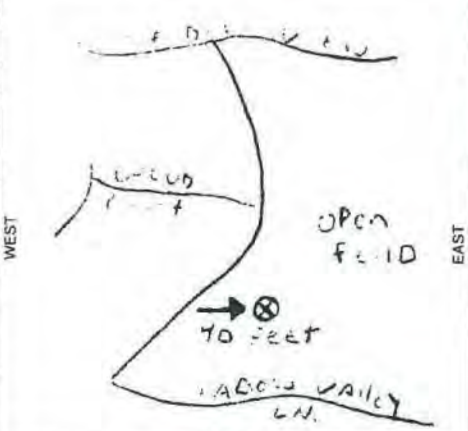
Name [redacted]
Mailing Address [redacted]
CITY Yucaipa STATE CA ZIP 92399

WELL LOCATION

Address Pineview
City Calimesa
County Riverside
APN Book ___ Page ___ Parcel 403-320-066
Township 2S Range 1W Section 16
Latitude ___ DEG ___ MIN ___ SEC NORTH Longitude ___ DEG ___ MIN ___ SEC WEST

LOCATION SKETCH

NORTH / SOUTH / WEST / EAST



Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

___ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
X DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___
ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft to Ft	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 to 160		X				steel	6"	.250	
160 to 308			X			steel	3"	.250	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft to Ft	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Keith Collier SoCal Pump and Well, Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS P.O. Box 5483 CITY Riverside, STATE CA ZIP 92517

Signed ___ WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED 6-26-01 C-57 LICENSE NUMBER 510836

DWR 188 REV. 11-97
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

WELL # 2 ... DIST. ... WP

San Bernardino Valley Water Conservation District
... 1/2 West Citrus Avenue - Redlands, California

WILDWOOD CNYN

297

28

28

WELL LOG

20/1W - 9F- 2
Well No.

Well Owner [redacted]

Location

; 1/4, 1/4, Section , T , R

Drilled by Trower Date completed Dec. 1959

Drilling method Rotary

Total depth 289' Size of casing and depth 8" & 6" 289 Gauge (Double) (Single)

Type of well

Struck water at , SWL before perforating after perforating (ft.)

Completion test data: SWL PWL Discharge Hours run

Surface elev. 3145 Source of information

Perforations

Depth	Elev. Bot. of Stratum	Material	Thickness	
0-2		Surface Soil	2	
2-25		Coarse pea gravel	23	
25-30		Coarse Sand	5	
30-45		Gravel (small) and Sand	15	
45-70		Decomposed Granite (soft) and Blue Shale	25	
70-85		Fine Sand	15	
85-200		Coarse sand and gravel with occasional rock	115	
200-215		Light colored decomposed granite	15	
215-289		Granite - broken	74	
		Standing water level 35' prior to casing and cleaning		
		Casing:		
		8" Id 130		
		8" OD 130-160		
		6" OD 160-289		
		Pump Test January 1960		
		Static W/L 40 Ft.		
		100 GPM 80 Ft.		
		125 GPM 95 Ft.		
		150 GPM 113 Ft.		
		170 GPM 141 Ft.		
		Pump tested about 3 weeks before coming in		

Remarks: 3145'

SHEET of Sheets

Well 31 1S/1W-19G2

TRIPLICATE
Owner's Copy Intent

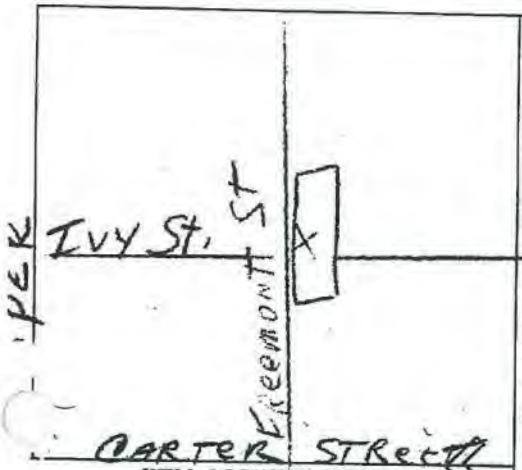
of Intent No. 199078
Permit No. or Date 11248101

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in
No. 093756
State Well No.
Other Well No.

(1) OWNER: [redacted]
Address [redacted]
City Zip 92399

(2) LOCATION OF WELL (See instructions): Ackerman Well
County San Bernardino Owner's Well Number
Well address if different from above at Ivy Aven ue and Fremont St
Township 1S Range 1W Section 19
Distance from cities, roads, railroads, fences, etc. Assessors Parcel No. 320-181 0- 43 (191)



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☐ Deepening ☐
Reconstruction XX
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other community X

(5) EQUIPMENT:
Rotary ☐ Reverse X
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No X Size
Diameter of bore 24"
Packed from to ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes X No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing 9 sack grout mix

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No X If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No X If yes, by whom?
Was electric log made? Yes ☐ No X If yes, attach copy to this report

(12) WELL LOG: Total depth ft. Depth of completed well ft.
from ft. to ft. Formation (Describe by color, character, size or material)

Work started 11/25/ 19 81 Completed 11/27 19 81

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SIGNED John R. Beylik (Well Driller)
NAME BEYLIK DRILLING, INC.
(Person, firm, or corporation) (Typed or printed)
Address 591 South Walnut Street
City La Habra, Calif. 90631 Zip 90631
License No. 306291-C57&C-61 Date of this report June 23, 1982

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

JUN 25 1982

15/1W-19B1

ORIGINAL
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No.________
(Insert appropriate number)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

Well #33

Do Not Fill In
Nº 21869
State Well No.
Other Well No. 33 YUCWO

(1) OWNER:

Name [redacted]
Address

(2) LOCATION OF WELL:

County   Owner's number, if any—
R. F. D. or Street No.
~~IVY ST. OFF BRYANT~~

(3) TYPE OF WORK (check):

New well [X]   Deepening [ ]   Reconditioning [ ]   Abandon [ ]
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic [ ] Industrial [ ] Municipal [ ]
Irrigation [X] Test Well [ ] Other [ ]

(5) EQUIPMENT:

Rotary [ ]
Cable [X]
Dug Well [ ]

(6) CASING INSTALLED:

SINGLE [X] DOUBLE [ ]

From ft. to	ft.	Diam.	Gage or Wall
0	470	12	4

If gravel packed

Diameter of Bore	from ft.	to ft.

Type and size of shoe or well ring
Size of gravel:
Describe joint

(7) PERFORATIONS:

Type of perforator used MILLS
Size of perforations 3/8 in., length, by 1 1/2 in.

From ft. to	ft.	Perf. per row	Rows per ft.
340	460	5	1

(8) CONSTRUCTION:

CEMENT
NO SANITARY SEAL

Was a surface sanitary seal provided? [X] Yes [ ] No To what depth 200 ft.
Were any strata sealed against pollution? [X] Yes [ ] No If yes, note depth of strata
From 0 ft. to 200 ft.

Method of Sealing WELD PIPE SOLID

(9) WATER LEVELS:

Depth at which water was first found 300 ft.
Standing level before perforating 255 ft.
Standing level after perforating 245 ft.

(10) WELL TESTS:

Was a pump test made? [ ] Yes [ ] No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.
Temperature of water   Was a chemical analysis made? [ ] Yes [ ] No
Was electric log made of well? [ ] Yes [ ] No

(11) WELL LOG:

Total depth ft. Depth of completed well ft.
Formation: *Describe by color, character, size of material, and structure.*

ft. to	ft.	Formation	
0	20	ROCK	
20	50	SANDY CLAY	
50	88	SANDY CLAY	PEA GRAVEL
88	94	SANDY CLAY	
94	97	ROCK	
97	148	SANDY CLAY	ROCK
148	197	SANDY CLAY	
197	221	SANDY CLAY	SMALL GRAVEL
221	366	SANDY CLAY	ROCK
366	393	SANDY ROCK	D G
393	455	D G	CLAY
455	465	D G	SAND ROCK CLAY
465	479	D G	CLAY
479	496	SAND ROCK	D G
		HARD	

Work started 19 , Completed 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME R & W Drilling Inc
(Person, firm, or corporation) (Typed or printed)
Address 25525 [illegible]
[illegible]

[SIGNED] R D [illegible]
Well Driller

License No. 231340   Dated 6/1[illegible], 1965

15/1W-20M1

DUPLICATE
Retain this copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do Not Fill In

Nº 104927

State Well No.
Other Well No. #36

(1) OWNER:
Name [redacted]
Address [redacted]

(2) LOCATION OF WELL:
County San Bernardino Owner's number, if any 36
Township, Range, and Section T 1S; R 1W; Sec. 20
Distance from cities, roads, railroads, etc. 360' So. of center of Ivy Ave. 33' East of center of Jefferson St. Yuc.

(3) TYPE OF WORK (*check*):
New Well X Deepening ☐ Reconditioning ☐ Destroying ☐
If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (*check*):
Domestic ☒ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☐
Cable ☒
Other ☐

(6) CASING INSTALLED:
STEEL: SINGLE ☒ DOUBLE ☐ OTHER:

From ft.	To ft.	Diam.	~~Gage~~ or Wall	Diameter of Bore	From ft.	To ft.
0	443	12"	1/4"			

If gravel packed

Size of shoe or well ring: 12 x 3/4 x 12" Size of gravel:
Describe joint All joints butt weld

(7) PERFORATIONS OR SCREEN:
Type of perforation or name of screen Mills

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
251	260	6	8" centers	5/16 x 2 1/4
260	430	6	12" centers	5/16x2 1/4

(8) CONSTRUCTION:
Was a surface sanitary seal provided? Yes X No ☐ To what depth 50 ft.
Were any strata sealed against pollution? Yes ☐ No ☒ If yes, note depth of strata
From ft. to ft.
From ft. to ft.
Method of sealing 12 sacks cement-sand mix, pumped

(9) WATER LEVELS:
Depth at which water was first found, if known 245 ft.
Standing level before perforating, if known 245 ft.
Standing level after perforating and developing 245 ft.

(10) WELL TESTS:
Was pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
Temperature of water Was a chemical analysis made? Yes ☐ No ☐
Was electric log made of well? Yes ☐ No ☐ If yes, attach copy
To be in future

(11) WELL LOG:
Total depth 440 ft. Depth of completed well 440 ft.
Formation: *Describe by color, character, size of material, and structure*

0 ft. to 60 ft.
Brown clay, gravel, boulders
60 155
Brown sandy clay, sharp gravel, few boulders
155 233
Brown sandy clay with small gravel embedded
233 251
Brown clay, sand, small gravel-tight
251 260
Brown clay, sand, small gravel-loose
260 430
Brown tight clay, sand, small gravel
430 440
Blue decomposed granite

Copies to:
☐ Directors
☐ General Manager
☐ Attorney
☐ District Engineer
☒ Consulting Engineer
☐ Auditor
☒ Superintendent
☐ Agenda
☐ Shop
File
Date Routed

RECEIVED
FEB 18 1976
Y.V.C.W.D.
BY

into annular space from 50' depth to surface.

Work started 12/18 19 75, Completed 2/3 19 76

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

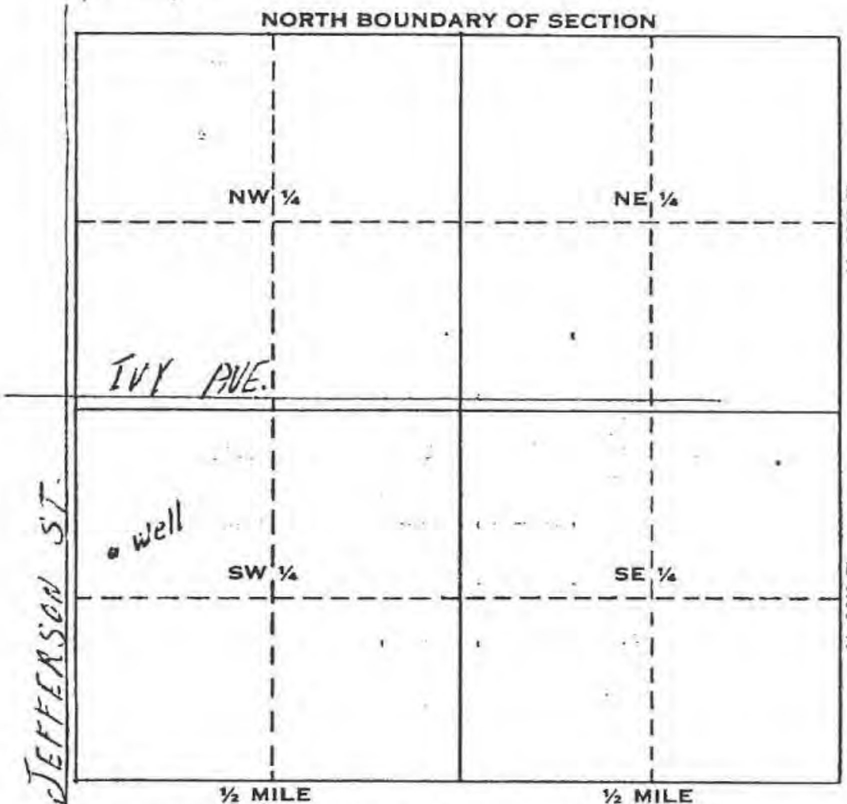
NAME Kirkland Well Service
(Person, firm, or corporation) (*Typed or printed*)
Address 32291 Dunlap Blvd.
Yucaipa, Ca. 92399
[SIGNED] R. Kirkland
(*Well Driller*)
License No. 168847 Dated Feb. 14, 19 76

SKETCH LOCATION OF WELL ON REVERSE SIDE

DWR 188 (REV. 9-68)
87139-750 9-72 30M TRIP OSP

YUCAIPA AREA

WELL LOCATION SKETCH

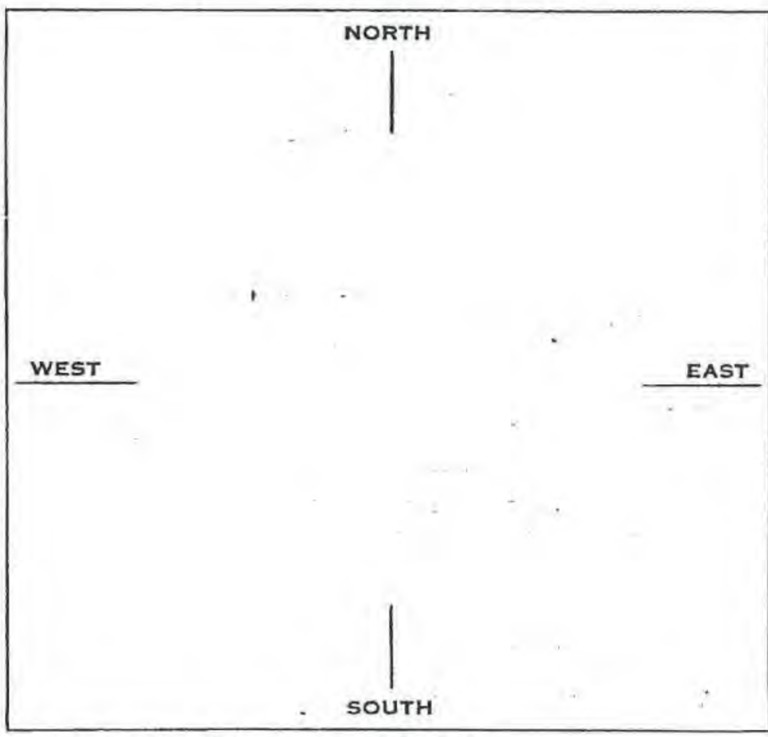


A. Location of well in sectionized areas.
Sketch roads, railroads, streams, or other features as necessary.

Township 1 N/S

Range 1 E/W

Section No. 20



B. Location of well in areas not sectionized.
Sketch roads, railroads, streams, or other features as necessary.
Indicate distances.

15/1W-20M1

DUPLICATE
Retain this copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do Not Fill In
№ 104927
State Well No. Well #36
Other Well No.

(1) OWNER:

Name [redacted]
Address [redacted]

(2) LOCATION OF WELL:

County San Bernardino Owner's number, if any 36
Township, Range, and Section T 1S; R 1W; Sec. 20
Distance from cities, roads, railroads, etc. 360' So. of center of Ivy Ave. 33' East of center of Jefferson St. Yuc.

(3) TYPE OF WORK (check):

New Well ☒ Deepening ☐ Reconditioning ☐ Destroying ☐
If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☒ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☐
Cable ☒
Other ☐

(6) CASING INSTALLED:

STEEL: SINGLE ☒ DOUBLE ☐ OTHER:

From ft.	To ft.	Diam.	~~Gage~~ or Wall	If gravel packed: Diameter of Bore	From ft.	To ft.
0	443	12"	1/4"			

Size of shoe or well ring: 12 x 3/4 x 12" Size of gravel:
Describe joint All joints butt weld

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen Mills

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
251	260	6	8" centers	5/16 x 2 1/4
260	430	6	12" centers	5/16 x 2 1/4

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes ☒ No ☐ To what depth 50 ft.
Were any strata sealed against pollution? Yes ☐ No ☒ If yes, note depth of strata
From ft. to ft.
From ft. to ft.
Method of sealing 12 sacks cement-sand mix, pumped into annular space from 50' depth to surface.

(9) WATER LEVELS:

Depth at which water was first found, if known 245 ft.
Standing level before perforating, if known 245 ft.
Standing level after perforating and developing 245 ft.

(10) WELL TESTS:

Was pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
Temperature of water Was a chemical analysis made? Yes ☐ No ☐
Was electric log made of well? Yes ☐ No ☐ If yes, attach copy
To be in future

(11) WELL LOG:

Total depth 440 ft. Depth of completed well 440 ft.
Formation: Describe by color, character, size of material, and structure

From ft.	To ft.	Formation
0	60	Brown clay, gravel, boulders
60	155	Brown sandy clay, sharp gravel, few boulders
155	233	Brown sandy clay with small gravel embedded
233	251	Brown clay, sand, small gravel-tight
251	260	Brown clay, sand, small gravel-loose
260	430	Brown tight clay, sand, small gravel
430	440	Blue decomposed granite

Copies to:
☐ Directors
☐ General Manager
☐ Attorney
☐ District Engineer
☒ Counseling Engineer
☐ Auditor
☒ Superintendent
☒ Agenda
☐ Shop
File
Date Routed

RECEIVED
FEB 18 1976
BY Y.V.C.W.D.

Work started 12/18 1975, Completed 2/3 1976

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

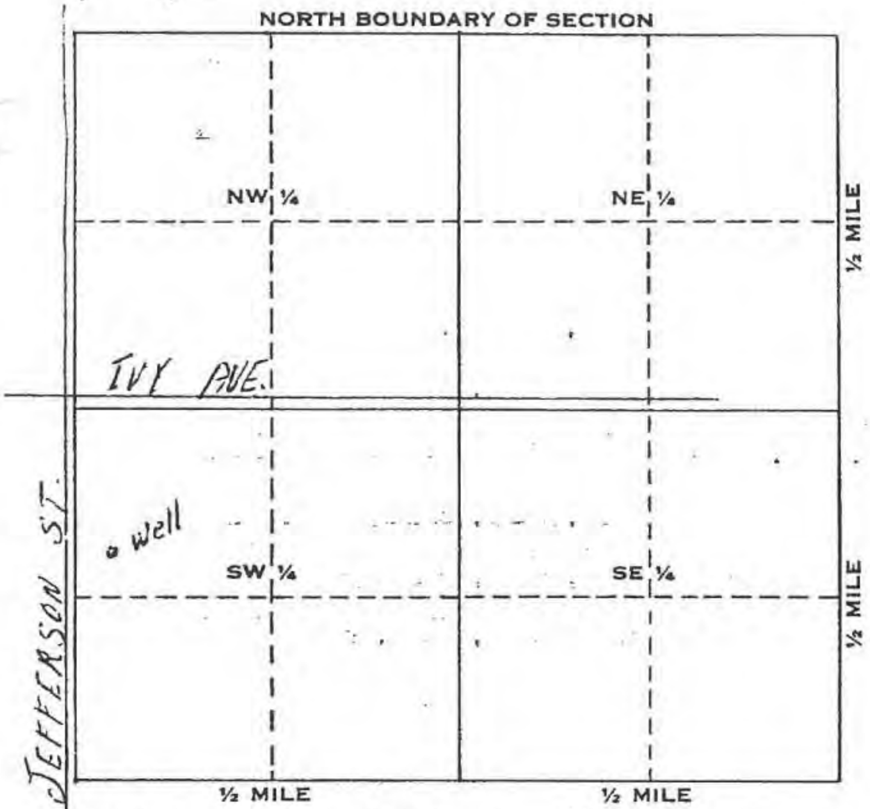
NAME Kirkland Well Service
(Person, firm, or corporation) (Typed or printed)
Address 32291 Dunlap Blvd.
Yucaipa, Ca. 92399
[SIGNED] K. Kirkland
(Well Driller)
License No. 168847 Dated Feb. 14, 1976

SKETCH LOCATION OF WELL ON REVERSE SIDE

DWR 188 (REV. 9-68)
87139-750 8-72 30M TRIP OSP

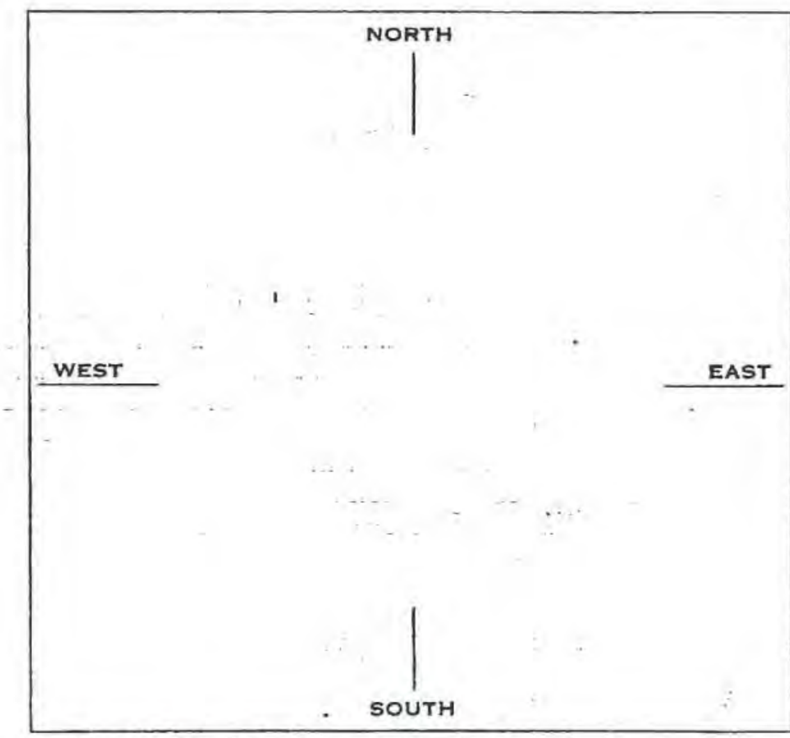
YUCAIPA AREA

WELL LOCATION SKETCH



A. Location of well in sectionized areas.
Sketch roads, railroads, streams, or other features as necessary.

Township 1 N/S
Range 1 E/W
Section No. 20



B. Location of well in areas not sectionized.
Sketch roads, railroads, streams, or other features as necessary.
Indicate distances.

(2S/1W-17F1 (Well (39)

DUPLICATE
Driller's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

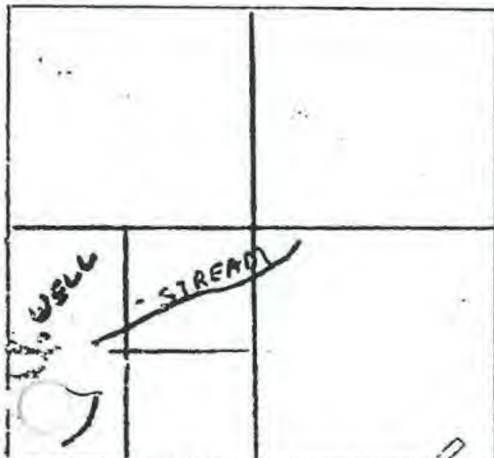
Do not fill in
No. 069230

N[illegible]ent No.
L[illegible] Permit No. or Date 9024

State Well No.
Other Well No. Well # 2

(1) OWNER: Name [redacted]
Address [redacted]
City [redacted] Zip

(2) LOCATION OF WELL (See instructions):
County Riverside Owner's Well Number
Well address if different from above
Township 2S Range 1W Section 17
Distance from cities, roads, railroads, fences, etc.
NW¼, SW¼



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 5/16 X 7
Diameter of bore 0 to 413 in 10", 413 to 540 in 6¼"
Packed from 50 to 413 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	413	6-5/8	.188

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size
73	93	6 rows
113	133	12 cuts
153	173	2¼ X 1/8"

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing cement grout

(10) WATER LEVELS:
Depth of first water, if known 45 ft.
Standing level after well completion 30 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? driller
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test 0400 ft. At end of test ft.
Discharge 75 gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 540 ft. Depth of completed well 540 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	10	Top soil
10	13	Sand
13	16	Boe
16	33	Clay
33	48	Sand & clay
48	50	Rock
50	75	Clay
75	81	Rock
81	96	Clay & rock
96	180	Blue granite
180	185	Quartz & decomposed granite
185	205	Granite
205	228	Sandstone
228	265	Granite
265	272	Clay
272	540	Granite with fractured areas of about 4 ft. depths at 358, 380, 446 with quartz, 481, 510, and 519. Greatest fracture at 540

Perf.- continued

From	To
193	253
273	293
313	333
353	413

Work started Jan. 22 19 80 Completed Feb. 6 1980

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED Donald B. Trunnell
(Well Driller)

NAME AMERICAN DRILLING, INC.
(Person, firm, or corporation) (Typed or printed)
Address 104 W. Main
City Aguanga, CA Zip 92302
License No. 324684 Date of this report Feb. 9, 1980

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

(2S/1W-17L1 (

YVWD #40

TRIPLICATE
Owner's Copy

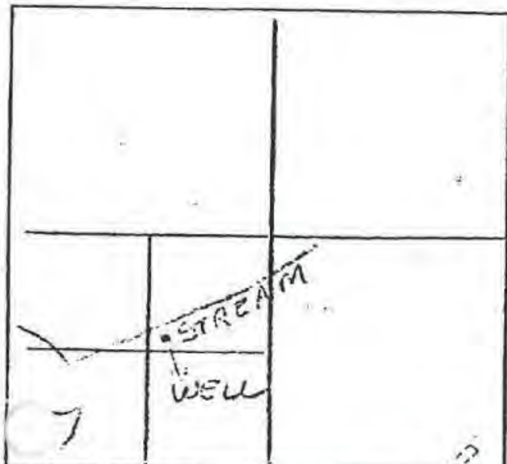
No. of Intent No.
Permit No. or Date

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in
No. 218802
State Well No.
Other Well No. Well #3

(1) OWNER: Name [redacted]
Address [redacted]
City Zip 92320

(2) LOCATION OF WELL (See instructions):
County Riverside Owner's Well Number
Well address if different from above
Township 2S Range 1W Section 17
Distance from cities, roads, railroads, fences, etc.
NW¼, SW¼,



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☒
Other ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 5/16 x 4
Diameter of bore 10"
Packed from 50 to 349 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	349	6-5/8	.188	69	349	6 rows
						12 cuts
						2½ x .120

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing cement grout

(10) WATER LEVELS:
Depth of first water, if known 40 ft.
Standing level after well completion 29 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? driller
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test ft. At end of test ft
Discharge 100+ gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 349 ft. Depth of completed well 349

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	13	Soft dirt
13	26	Fractured white rock
26	28	Brown clay
28	35	Gray clay
35	145	Fractured white rock with
		water increasing at 60', 100',&
		120'
145	150	Very fractured
150	162	Firm to hard white rock
162	165	Fractured
165	180	Firm to hard white rock w/ increa[se]
		in water
180	195	Firm to hard black rock
195	201	Firm to hard white rock
201	204	Fractured
204	209	Firm to hard
209	212	Fractured w/ more water
212	220	Fairly hard granite
221	224	Fractured
225	234	Firm to hard gray granite, w/
		increase in water
234	245	Light fracture
245	255	Granite with increase in water
255	260	Heavily fractured with water
260	264	Fairly hard
264	295	Fractured white rock w/ increase
		in water
295	349	Dark gray rock, fractured

Work started Dec. 12 19 80 Completed Dec. 19 19 80

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED [signature] (Well Driller)

NAME AMERICAN DRILLING, INC.
(Person, firm, or corporation) (Typed or printed)
Address 104 W. Main,
City Aguanga, CA Zip 92302
License No. 324684 Date of this report Dec. 22, 1980

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

1S/2W-36A011

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in

No. 217102

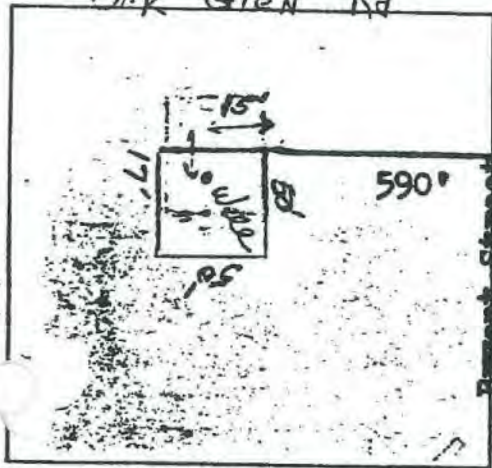
State Well No. ______
Other Well No. #44

...tent No. 195450
...rmit No. or Date 02098204

(1) OWNER: [redacted]
Address [redacted]
City San Bernardino, Cal. Zip 92412

(2) LOCATION OF WELL (See instructions):
County San Bernardino Owner's Well Number ______
Well address if different from above ______
Township 1S Range 2W Section 36
Distance from cities, roads, railroads, fences, etc. ______

Oak Glen Rd



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☒
Other ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 5/16 x 16
Diameter of bore 22"
Packed from 0 to 660 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen Roscoe Moss Louver

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	50	30"	1/4	275	650	1/8" x Std.
0	660	16"	5/16			

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☐ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval ______ ft.
Method of sealing cement grout

(10) WATER LEVELS:
Depth of first water, if known ______ ft.
Standing level after well completion 311' ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? C.V. Pump
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test 311 ft. At end of test 386 ft
Discharge 1000 gal/min after 24 hours Water temperature ______
Chemical analysis made? Yes ☐ No ☐ If yes, by whom? ______
Electric log made? Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 660 ft. Depth of completed well 660 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	50	fine sand with large rock mixed
50	65	fine sand with large rock size of hand.
65	110	medium & coarse sand mixed
110	120	Medium & coarse sand with small rock, mixed
120	180	Medium & coarse sand with small gravel & short streaks of sandy clay
180	320	Medium & coarse sand with small gravel
320	360	Medium & Coarse sand, dark
360	380	Med. & coarse sand with short streak of brown clay
380	660	Decomposed granite

Work started 2/14 19 82 Completed 5/20/82 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED Coachella Valley Pump & Supply, Inc.
(Well Driller)

NAME [signature]
(Person, firm, or corporation) (Typed or printed)

Address P.O. Drawer QQQ
City Indio, Calif. Zip 92202
License No. 164541 Date of this report 8/9/82

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

welenco

WELL ENGINEERING SURVEYS

ELECTRIC LOG

FILING NO

COMPANY McCALLA BROS.

WELL #46

FIELD YUCAIPA

STATE CALIFORNIA COUNTY SAN BERNARDINO

LOCATION 2ND ST @ OAK GLEN Rd.

OTHER SERVICES NONE

SEC ______ TWP ______ RGE ______

Permanent Datum: GROUND LEVEL, Elev ______ Elev.: K.B. ______

Log Measured From G.L. 0 Ft. Above Perm. Datum D.F. ______

Drilling Measured From GROUND LEVEL G.L. ______

FIELD PRINT

Date	3/16/88			
Run No.	ONE			
Depth—Driller	1155'			
Depth—Logger	1155'			
Btm. Log Inter.	1154'			
Top Log Inter.	100'			
Casing—Driller	36" @ 50'	@	@	@
Casing—Logger	NOT REACHED			
Bit Size	17.5"			
Type Fluid in Hole	WATER			
Dens. | Visc.	N/A	|	|	|
pH | Fluid Loss	N/A ml	ml	ml	ml
Source of Sample	PIT			
R_m @ Meas. Temp.	22.0 @ 63 °F	@ °F	@ °F	@ °F
R_{mf} @ Meas. Temp.	22.0 @ 63 °F	@ °F	@ °F	@ °F
R_{mc} @ Meas. Temp.	N/A @ °F	@ °F	@ °F	@ °F
Source: R_{mf} R_{mc}	MEAS. |	|	|	|
R_m @ BHT	N/A @ °F	@ °F	@ °F	@ °F
Time Since Circ.	2 HOURS			
Max. Rec. Temp.	N/A °F	°F	°F	°F
Equip. | Location	DU-1 | L.A.	|	|	|
Recorded By	RIDDER			
Witnessed By				

This Heading and Log Conform To API RP 33

Fold Here

REMARKS

Equipment Data				
Run No.	Tool Type	Pad Type	Tool Position	Other
ONE	NORMAL	—	FREE	

Type Log	Depth	Scale Up Hole	Scale Down Hole
E-LOG		~~0-500 OHM-M~~	0-200 OHM-M

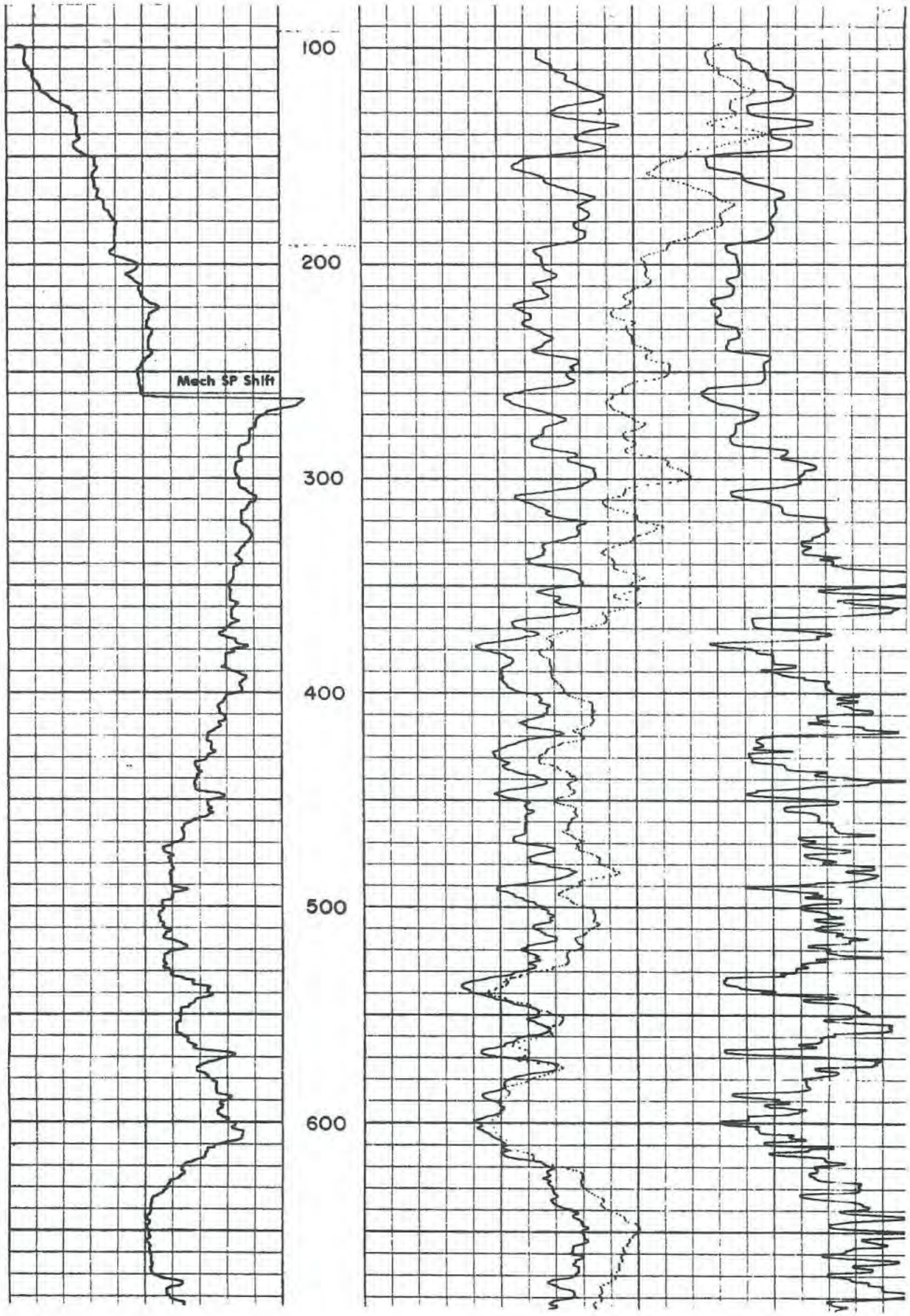
Changes in Mud Type or Additional Samples

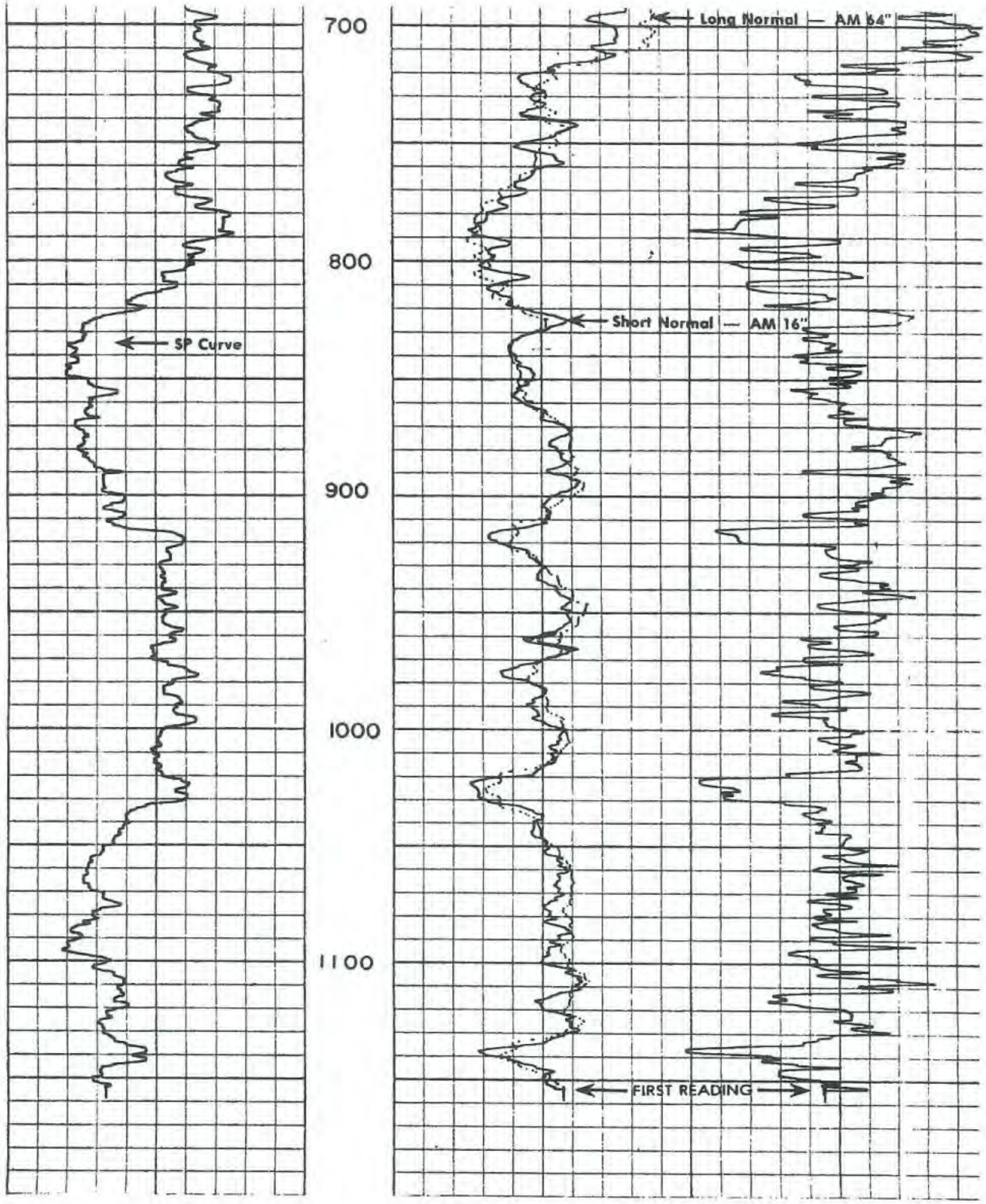
Date | Sample No.	Depth—Driller	Type Fluid in Hole	Dens. | Visc.	ph | Fluid Loss	Source of Sample	R_m @ Meas. Temp.	R_{mf} @ Meas. Temp.	R_{mc} @ Meas. Temp.	Source: R_{mf} | R_{mc}	R_m @ BHT	R_{mf} @ BHT	R_{mc} @ BHT
			ml			@ °F	@ °F	@ °F		@ °F	@ °F	@ °F

SPONTANEOUS POTENTIAL millivolts	Depths	RESISTIVITY ohms. m²/m	
− 10 +		SHORT NORMAL 16 Inch 0 — 200	LONG NORMAL 64 Inch 0 — 200
		RESISTIVITY ohms. m²/m	RESISTANCE Detail Curve

Well 46

1S/2W-36G1


100
200
Mech SP Shift
300
400
500
600



700
800
900
1000
1100
SP Curve
Long Normal — AM 64"
Short Normal — AM 16"
FIRST READING

County of San Bernardino — Environmental Public Works Agency
ENVIRONMENTAL HEALTH SERVICES DEPARTMENT
385 North Arrowhead Avenue • San Bernardino, CA 92415-0160

1A2

WELL PERMIT

Do Not Fill In
Permit No. 0126 PE08
Expiration 1-26-89
FF
FA
SN

PLEASE PRINT: Job # 5113 Well # 46

1. OWNER: Name [redacted]
Mailing Address [redacted]
City Yucaipa Zip
Phone No. 714) 797-5117

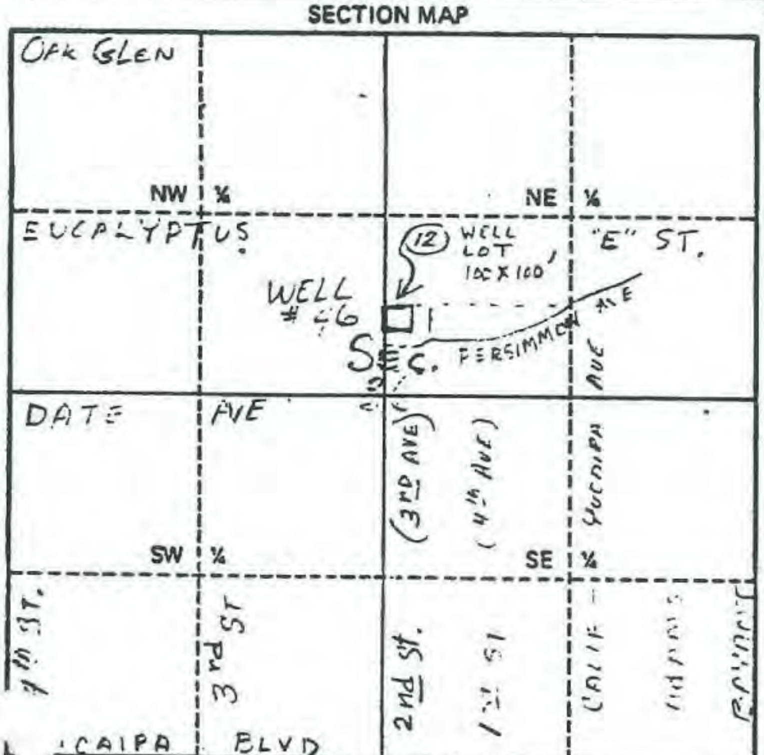
2. DATE OF WORK *(approximate)*:
Start 2/15/88 Complete 4/1/88

3. WELL DRILLER *(Check One)*:
☐ Owner ☒ Contractor McCalla Bros.
Name

4. WELL USE *(check)*:
☒ Community ☐ Industrial
☐ Individual ☐ Test
☐ Agricultural ☐ Other
☐ Dairy ☐ Horizontal

TYPE OF WORK *(check)*:
☒ New ☐ Reconstruction ☐ Destruction

SECTION MAP



REDLANDS Scale — 1 inch to 1/4 mile

Items 6 through 10 to be estimated for new wells, and exact for all other wells.

6. ANNULAR SEAL: Depth 50 ft.
Furnished by: ☐ Owner ☒ Contractor
☐ Driven Conductor Dia. 32 in., Wall (Gage) .250
☐ Sealing Material concrete, Thickness 4 in.

7. DEPTH OF WELL *(feet)*:
Proposed 800 Existing
DIAMETER OF BORE *(in.)*: 28

8. CASING INSTALLED:
☒ Steel ☐ Plastic ☐ Other

From (ft.)	To (ft.)	Dia. (in.)	Wall (Gage)
0	500	~~.250~~ 16"	.250
500	800	~~.250~~ 16"	.250 perforated

GRAVEL PACK: ☒ Yes ☐ No
From 0 to 800 ft.

9. PERFORATIONS *(if applicable)*:
From 500 to 800 ft.

10. SEALED ZONES *(if applicable)*:
From 0 to 50 ft.

11. GENERAL LOCATION MAP: 31 - C4
(a) Sketch location of well, name(s) and location of road(s) on section map.
(b) Township 1S N/S Range 2W E/W
Section 26
(c) Assessor's Parcel No. 303-191-12
(d) Solid or liquid waste disposal site within two miles?
☐ Yes ☒ No
Location:

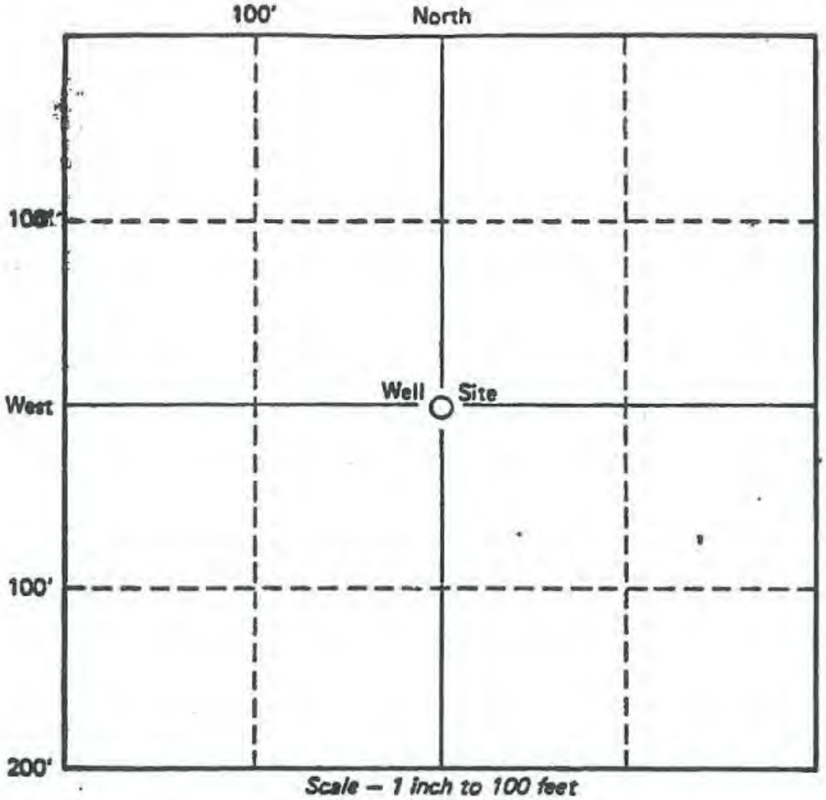
Do Not Fill In	
Fee Stamp	Date Stamp
DATE 1-8-88 AMOUNT 250.00 RECEIPT NO. 21088 1-8 BY: [illegible] PAID	FEB 1988 RECEIVED YUCAIPA VALLEY WATER DIST.

03-14785-631 Rev. 11/82

Continue on Reverse Side

AS M.A.V.

Well Permit



Scale – 1 inch to 100 feet

12. PLOT PLAN:

(a) In perspective to the well site, sketch and label the following items: well lot property lines other wells *(include abandoned wells)*, sewage disposal systems *(sewers, septic tanks, leaching fields, seepage pits, cesspools)*, lakes and ponds, water courses and animals or fowl kept.

(b) Indicate the distance in *feet*, of any of the following which are within 200 ft. of the well site:

Other wells ______
Sewers ______
Septic tanks ______
Leaching fields ______
Seepage pits ______
Cesspools ______
Lakes and ponds ______
Water courses ______
Animals or fowl kept ______

NONE OF THE ABOVE

13. I have read this application and agree to comply with all laws regulating the type of work being performed. The California Labor Code requires Workers' Compensation Insurance as a prerequisite to permit issuance unless the applicant signs the following certificate:

☐ I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner so as to become subject to the Workers' Compensation laws of California.

Owner's Signature ______ Date ______

☐ Contractor's Signature [illegible signature] Date 1/15/88 Reg. No. ______

DISPOSITION OF PERMIT

(Do Not Fill In)

☑ Approved subject to the following:

A. Notify the Department, [illegible] (714) 387-4666, twenty-four (24) hours in advance to make an inspection of the following operations:

☑ Prior to sealing of the annular space or filling of the conductor casing.

☐ Verify the depth of the conductor (outer) casing prior to further drilling and installation of the inner casing.

☑ After installation of the surface protective slab and pumping equipment.

☐ During destruction of wells, prior to pouring the sealing material.

B. Submit to the Department within thirty (30) days after completion of work, a copy of:

☑ Water Well Driller's Report ☑ Bacteriological Analysis ☑ Inorganic Chemical Analysis

C. Other ______

DENIED ______

1S/2W-36G1 Well 46 143

TRIPLICATE
Owner's Copy

Notice of Intent No.
Permit No. or Date

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in
No. 158791
State Well No.
Other Well No.

(1) OWNER: Name [redacted]
Address [redacted]
City [redacted] Zip 92399

(2) LOCATION OF WELL (See instructions):
County San Bernaddino Owner's Well Number 46
Well address if different from above
Township 1S Range 2W Section 36
Distance from cities, roads, railroads, fences, etc.
50' E. of 2nd St.
350' N. of Persimmon

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☒
Other ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size Brawley 4x8
Diameter of bore 28"
Packed from 0 to 1150 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
B/M Horizontal Louvre

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	340	16	.250	1		
340	800	16	.250	340	800	.060
800	1130	16	.312	800	1130	.060

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing 32" Conductor Cemented in 40" Bore

(10) WATER LEVELS:
Depth of first water, if known 187' ft.
Standing level after well completion 187' ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? McCalla Bros.
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test 187 ft. At end of test 321 ft
Discharge 2800 gal/min after 1024 hours Water temperature
Chemical analysis made? Yes ☒ No ☐ If yes, by whom? Y.V.W.D.
Was electric log made? Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 1154 ft. Depth of completed well 1150 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	50	Conductor
50	64	Sand, Gravel & Sm. & Med. Rock
64	73	Fine Sand, Gravel & Clay
73	107	Fine Sand, Gravel & Small Rock
107	123	Fine Sand
123	132	Gravel & Rock
132	140	Gravel & Boulders
140	152	Fine Sand & Gravel
152	166	Cemented Sand & Gravel
166	205	Sand, Sm. & Med. Gravel & Sm. Rock
205	208	White Granite Ledge
208	272	Sand Gravel, Rock & Clay
272	274	Small Boulders
274	279	Sand, Gravel & Rocks
279	282	Boulders
282	292	Sand, Gravel & Rocks
292	298	Rocks & Boulders
298	302	Sand, Gravel & Rocks
302	310	Sand, Clay & Sm. Gravel
310	314	Granite, Boulders
314	328	Sand, Gravel & Clay
328	342	Sand, Gravel, Sm. & Med.
342	354	Sand, Gravel & Boulders
354	372	Sand, Gravel & Clay
372	390	Sand, Gravel & Sm. Rocks
390	414	Sand, Gravel, Sm. Rocks & Clay
414	426	Sm. Boulders & Large Rocks
426	448	Sand, Gravel & Clay
448	450	Sm. Boulders
450	470	Sand, Gravel, Sm. Boulders & Rocks
470	553	Sand, Sm. Gravel
553	586	Sand, Sm. & Med. Gravel
586	596	Sand, Gravel w/Clay
596	604	Fine Sand
604	613	Fine Sand, & Sm. Gravel
613	636	Gravel & Large Rocks
636	640	Rock Boulder
640	644	Boulders

Work started 3-3 19 88 Completed 4-1 19 88

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (Well Driller)

NAME McCalla Bros., Division of Layne Western C
(Person, firm, or corporation) (Typed or printed)
Address 3132 W. 17th St.
City Santa Ana, CA Zip 92703
License No. 510011 Date of this report 8-10-88

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

- CONTINUED -

1S/2W-36G1 -6of3

Well 4b

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in

No. **277299**

Notice of Intent No. ____
Local Permit No. or Date ____

State Well No. ____
Other Well No. ____

(1) OWNER: Name [redacted]
Address ____
City ____ ZIP ____

(2) LOCATION OF WELL (See instructions):
County ____ Owner's Well Number ____
Well address if different from above ____
Township ____ Range ____ Section ____
Distance from cities, roads, railroads, fences, etc. ____

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☐ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size ____
Diameter of bore ____
Packed from ____ to ____ ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen ____

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☐ No ☐ If yes, to depth ____ ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ____ ft.
Method of sealing ____

(10) WATER LEVELS:
Depth of first water, if known ____ ft.
Standing level after well completion ____ ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom? ____
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ____ ft. At end of test ____ ft.
Discharge ____ gal/min after ____ hours Water temperature ____
Chemical analysis made? Yes ☐ No ☐ If yes, by whom? ____
Was electric log made Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth **1154** ft. Completed depth **1150** ft.

from ft to ft. Formation (Describe by color, character, size or material)

CONTINUED FROM FORM# 158791

from ft	to ft	Formation
644	651	Sand, Sm. & Med. Gravel, Rocks
651	657	Boulders
657	682	Sand
682	704	Sand, Gravel & Rock
704	709	Sand, Sm. & Med. Gravel
709	732	Sand, Sm. Gravel, Sandy Clay
732	747	Gravel & Rocks
747	752	Sand & Clay
752	765	Sand, Gravel & Clay
765	767	Small Boulders
767	773	Sand, Gravel & Clay
773	775	Small Boulders
775	786	Sandy Clay, Sm. Gravel
786	800	Course Sand, Sm. Gravel & Clay
800	806	Large Boulders
806	828	Course Sand, Sm. Gravel & Clay
828	833	Sand, Sm. & Med. Gravel
833	854	Gravel, Sandy Clay
854	894	Sand, Sm. Gravel & Rock
894	897	Boulders
897	921	Sm. & Med. Lrg. Gravel & Rock
921	927	Lrg. Boulders
927	939	Sand, Gravel & Rocks
939	942	Boulders
942	965	Med. Lrg. Gravel & Rocks
965	968	Boulders
968	975	Sm., Med. & Large Gravel & Rocks
975	987	Sand, Sm. & Med. Gravel
987	992	Fine Sand & Sandy Clay
992	1021	Sand, Sm. & Med. Gravel & Rocks
1021	1044	Fine Sand & Sandy Clay
1044	1060	Fine Sand & Sm. Gravel
1060	1064	Boulders
1064	1085	Fine Sand & Small Gravel
1085	1092	Sm. Boulders & Rocks
1092	1098	Sand, Sm. & Med. Gravel & Rocks
1098	1105	Fine Sand, Sm. Gravel & Rocks
1105	1109	Boulders

Work started ____ 19__ Completed ____ 19__

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed ____ (Well Driller)

NAME **McCalla Bros., Div. of Layne-Western Co.**
(Person, firm, or corporation) (Typed or printed)

Address ____
City ____ ZIP ____
License No. ____ Date of this report ____

1S/2W-36G1 VCM 4b 343

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in

No. **277300**

Notice of Intent No. ______
Local Permit No. or Date ______

State Well No. ______
Other Well No. ______

(1) OWNER: Name [redacted]
Address ______
City ______ ZIP ______

(2) LOCATION OF WELL (See instructions):
County ______ Owner's Well Number ______
Well address if different from above ______
Township ______ Range ______ Section ______
Distance from cities, roads, railroads, fences, etc. ______

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☐ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size ______
Diameter of bore ______
Packed from ______ to ______ ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☐ No ☐ If yes, to depth ______ ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ______ ft.
Method of sealing ______

(10) WATER LEVELS:
Depth of first water, if known ______ ft.
Standing level after well completion ______ ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom? ______
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ______ ft. At end of test ______ ft.
Discharge ______ gal/min after ______ hours Water temperature ______
Chemical analysis made? Yes ☐ No ☐ If yes, by whom? ______
Was electric log made Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth **1154** ft. Completed depth **1150** ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
		CONTINUED FROM FORM# 277299
1109	1110	Sand
1110	1118	Drilling (hard) Lrg. Boulders
1118	1126	Lrg. Boulder Steel (hard) drilling
1126	1135	Sand, Sm. & Med. Gravel & Rocks
1135	1150	Sand, Gravel & Clay
1150	1154	Bedrock T.D.

Work started ______ 19___ Completed ______ 19___

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed ______
(Well Driller)
NAME **McCalla Bros., Division of Layne Western Co.**
(Person, firm, or corporation) (Typed or printed)
Address ______
City ______ ZIP ______
License No. ______ Date of this report ______

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

86 96355

QUADRUPLICATE
Use of comply with
ocal requirements

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in
No. 157622
State Well No. 25/2W-1/13-P
Other Well No.

Notice of Intent No.
Local Permit No. or Date 12809

Herbert

(1) OWNER: Name [redacted]
Address [redacted]
City Redlands, CA Zip 92373

(2) LOCATION OF WELL (See instructions):
County Riverside Owner's Well Number
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size
Diameter of bore
Packed from to ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☒ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	300	4	

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size
300	100	1/8
100	0	1/8

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 20 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing driven steel

(10) WATER LEVELS:
Depth of first water, if known 180 ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? JJWP
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge 10+ gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth ft. Depth of completed well ft.
from ft. to ft. Formation (Describe by color, character, size or material)

0-20 soft sandy topsoil to sandy& grav
20-40 colored gravel & sand some boulc
40-60 colored gravel & sand
60-80 colored gravel & sand (pit drop)
80-100 colored gravel & some grey clay
100-120 firm grey clay & sand
120-140 brown clay & sand (hard)
140-160 brown clay & sand stone
160-180 brown clay sand stone
180-200 hard clayish((brown) sandstone
200-220 Hard brown clayish sandstone
220-240 hard sandstone & clay
240-260 hard sandstone some clay
260-280 hard sand stone some clay
280-300 hard sand stone some caay

Work started 19 Completed 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (Well Driller)
NAME Jack Jones Wells & Pumps
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 2031
City Hemet, CA 92343
License No. 436011 Date of this report 7-29-85

 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

well #48

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 341080

Notice of Intent No. 243716
Local Permit No. or Date 016174

L02S
02S/02W-24L01S

State Well No. 02S/02W-24L01 S
Other Well No.

(1) OWNER: Name [redacted]
Address [redacted]
City Yucaipa, CA ZIP 92399

(2) LOCATION OF WELL (See instructions):
County Riverside Owner's Well Number 48
Well address if different from above Singleton Road
Township 2S Range 2W Section 24
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well XX Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal XX
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary XX Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes XX No ☐ Size 4 X 8
Diameter of bore 26"
Packed from 0 to 1180 ft.

(7) CASING INSTALLED:
Steel XX Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	380	16 5/8	5/16	380	870	.060
870	930	"	"	930	1180	.060
1160	1180	"	"			

(9) WELL SEAL:
Was surface sanitary seal provided? Yes XX No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing concrete grout

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 1230 ft. Completed depth 1180 ft.

from ft.		to ft.	Formation (Describe by color, character, size or material)
0	-	30	Sand & gravel
30	-	32	Silty clay and sand
32	-	63	Sand & gravel
63	-	115	Silty clay and sand
115	-	129	Sand and gravel
129	-	137	Silty clay with sand
137	-	150	Sand and gravel
150	-	162	Silty clay
162	-	188	Sand and gravel
188	-	201	Sand, gravel and cobbles
201	-	224	Silty clay with sand
224	-	243	Sand, gravel and cobbles
243	-	258	Silty clay with sand
258	-	286	Sand, gravel and cobbles
286	-	321	Silty clay with sand
321	-	338	Sand and gravel
338	-	371	Silty clay with sand
371	-	385	Silty clay (greenish)
385	-	414	Sand and gravel
414	-	451	Sand and gravel (rough)
451	-	508	Sand and gravel
508	-	545	Sand, gravel and silt
545	-	562	Sand, gravel and silty clay
562	-	674	Sand and gravel
674	-	698	Silty clay with sand
698	-	711	Sand and gravel
711	-	757	Silty clay with sand
757	-	770	Sand and gravel
770	-	783	Silty clay
783	-	825	Sand and gravel
825	-	860	Silty clay with interbedded
	-		sand layers
860	-	875	Silty clay, more sand
875	-	1132	Silty clay with interbedded
	-		sand layers
1132	-	1161	Sand & gravel with silty clay
1161	-	1230	Silty clay with sand

Work started 2-12 19 90 Completed 3-9 19 90

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed Gary S. Hall, Jr.
(Well Driller)
NAME Howard Pump, Inc.
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 1249
City Barstow, CA ZIP 92312-1249
License No. Date of this report

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

WN #48

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in

No. **341080**

Notice of Intent No. 243716
Local Permit No. or Date 016174

2S/2W-24L2

State Well No. ______
Other Well No. ______

(1) OWNER: Name [redacted]
Address [redacted]
City Yucaipa, CA ZIP 92399

(2) LOCATION OF WELL (See instructions):
County Riverside Owner's Well Number 48
Well address if different from above Singleton Road
Township 2S Range 2W Section 24
Distance from cities, roads, railroads, fences, etc. ______

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well XX Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal XX
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary XX Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes XX No ☐ Size 4 X 8
Diameter of bore 26"
Packed from 0 to 1180 ft.

(7) CASING INSTALLED:
Steel XX Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	380	16 5/8	5/16	380	870	.060
870	930	"	"	930	1160	.060
1160	1180	"	"			

(9) WELL SEAL:
Was surface sanitary seal provided? Yes XX No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ______ ft.
Method of sealing concrete grout

(10) WATER LEVELS:
Depth of first water, if known ______ ft.
Standing level after well completion ______ ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom? ______
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ______ ft. At end of test ______ ft.
Discharge ______ gal/min after ______ hours Water temperature ______
Chemical analysis made? Yes ☐ No ☐ If yes, by whom? ______
Was electric log made Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 1230 ft. Completed depth 1180 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	30	Sand & gravel
30	32	Silty clay and sand
32	63	Sand & gravel
63	115	Silty clay and sand
115	129	Sand and gravel
129	137	Silty clay with sand
137	150	Sand and gravel
150	162	Silty clay
162	188	Sand and gravel
188	201	Sand, gravel and cobbles
201	224	Silty clay with sand
224	243	Sand, gravel and cobbles
243	258	Silty clay with sand
258	286	Sand, gravel and cobbles
286	321	Silty clay with sand
321	338	Sand and gravel
338	371	Silty clay with sand
371	385	Silty clay (greenish)
385	414	Sand and gravel
414	451	Sand and gravel (rough)
451	508	Sand and gravel
508	545	Sand, gravel and silt
545	562	Sand, gravel and silty clay
562	674	Sand and gravel
674	698	Silty clay with sand
698	711	Sand and gravel
711	757	Silty clay with sand
757	770	Sand and gravel
770	783	Silty clay
783	825	Sand and gravel
825	860	Silty clay with interbedded sand layers
860	875	Silty clay, more sand
875	1132	Silty clay with interbedded sand layers
1132	1161	Sand & gravel with silty clay
1161	1230	Silty clay with sand

Work started 2-12 19 90 Completed 3-9 19 90

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed Gary S. Hall, Jr. (Well Driller)
NAME Howard Pump, Inc. (Person, firm, or corporation) (Typed or printed)
Address P.O. Box 1249
City ______ ZIP ______
License No. Barstow, CA Date of this report 92312-1249

Well 48
2S/2W-29L2

welenco

ELECTRIC LOG

FILING NO.	
COMPANY	HOWARD PUMP
WELL	#48 YUCAIPA VALLEY WATER DISTRICT
FIELD	YUCAIPA
STATE	CA
COUNTY	RIVERSIDE
LOCATION	SINGLETON BLVD
SEC. / TWP. / RGE.	
OTHER SERVICES	NONE
Permanent Datum	GROUND LEVEL
Elev.	
Log Measured From	G.L., 0 Ft. Above Perm. Datum
Drilling Measured From	GROUND LEVEL
Elev.: K.B. / D.F. / G.L.	

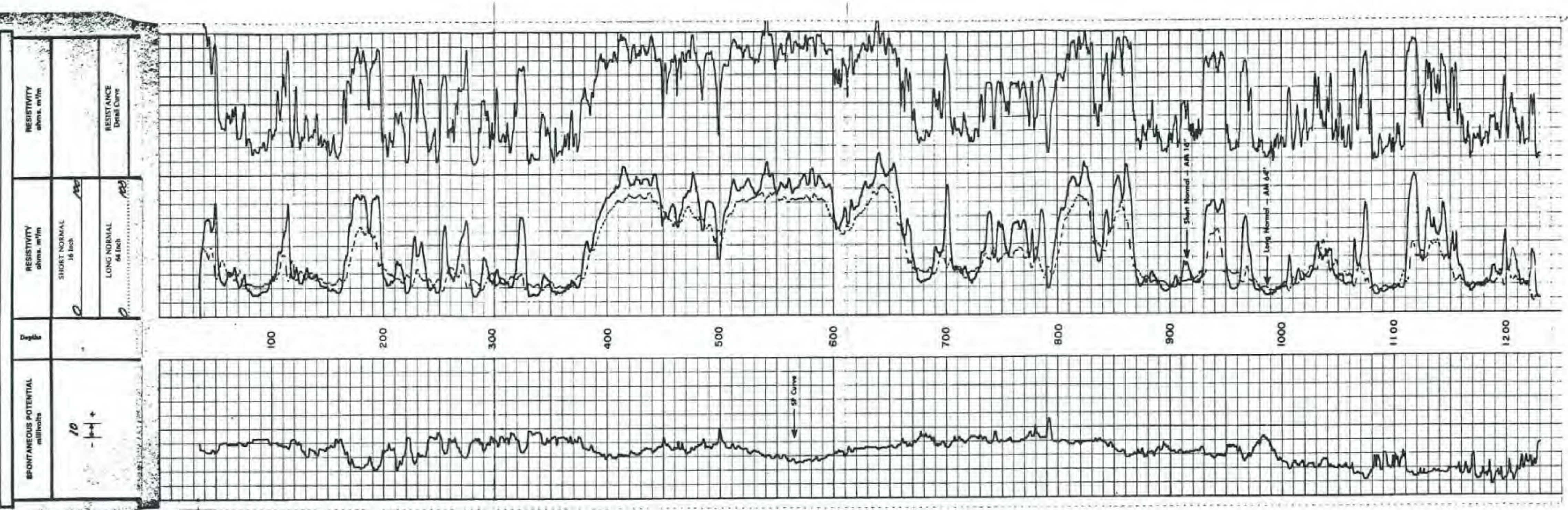
Date	2-20-90			
Run No.	ONE			
Depth—Driller	1230'			
Depth—Logger	1230'			
Btm. Log Inter.	1230'			
Top Log Inter.	35'			
Casing—Driller	NONE @	@	@	@
Casing—Logger	—			
Bit Size	9 7/8"			
Type Fluid in Hole	BENTONITE			
Dens. | Visc.	N/A			
pH | Fluid Loss	N/A | ml	ml	ml	ml
Source of Sample	P.T.			
R_m @ Meas. Temp.	13.0 @ 73 °F	@ °F	@ °F	@ °F
R_{mf} @ Meas. Temp.	12.8 @ 73 °F	@ °F	@ °F	@ °F
R_{mc} @ Meas. Temp.	N/A @ °F	@ °F	@ °F	@ °F
Source: R_{mf} | R_{mc}	MEAS			
R_m @ BHT	N/A @ °F	@ °F	@ °F	@ °F
Time Since Circ.	2 HOURS			
Max. Rec. Temp.	N/A °F	°F	°F	°F
Equip. | Location	DU-1 | L.B.			
Recorded By	RIDDER			
Witnessed By	B. FOX			

FIELD PRINT

This Heading and Log Conform To API RP 33

Fold Here

REMARKS

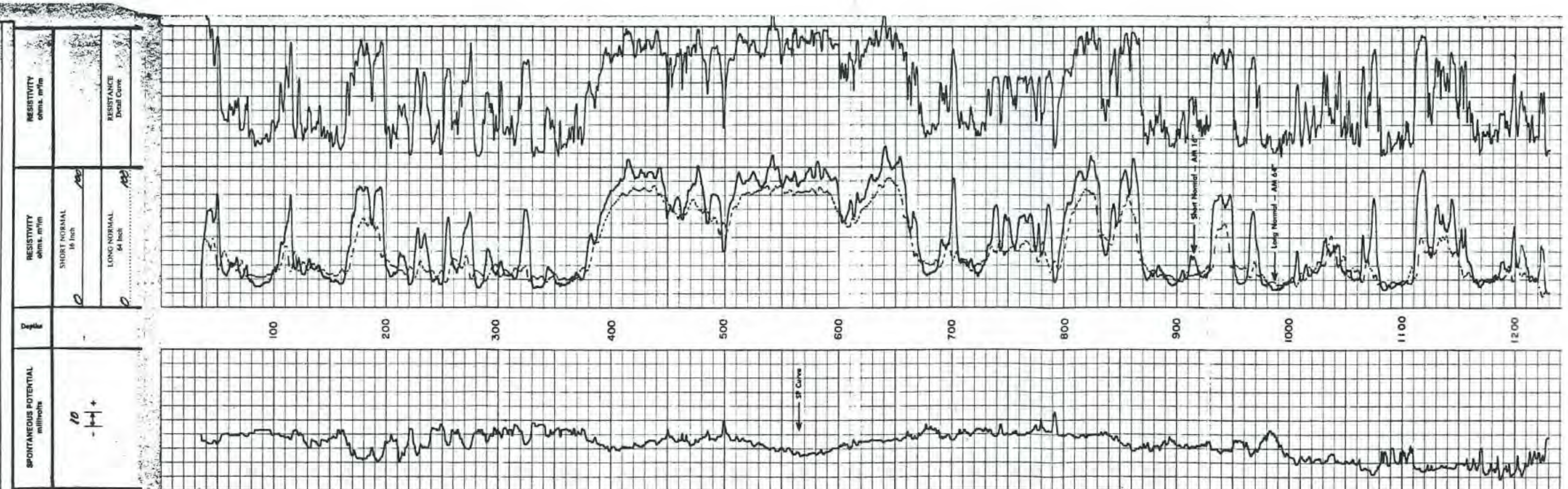


C.O. #194

welenco

ELECTRIC LOG

COMPANY HOWARD PUMP
WELL #48 YUCAIPA VALLEY WATER DISTRICT
FIELD YUCAIPA
STATE CA COUNTY RIVERSIDE
LOCATION SINGLETON BLVD
OTHER SERVICES NONE
Permanent Datum GROUND LEVEL
Log Measured From G.L., 0 Ft. Above Perm. Datum
Drilling Measured From GROUND LEVEL
Date 2-20-90
Run No. ONE
Depth—Driller 1230'
Depth—Logger 1230'
Btm. Log Inter. 1230'
Top Log Inter. 35'
Casing—Driller NONE @
Bit Size 9 7/8"
Type Fluid in Hole BENTONITE
Dens. | Visc. N/A
pH | Fluid Loss N/A
Source of Sample P.T.
R_m @ Meas. Temp. 13.0 @ 73 °F
R_{mf} @ Meas. Temp. 12.8 @ 73 °F
R_{mc} @ Meas. Temp. N/A
Source: R_{mf} | R_{mc} MEAS
R_m @ BHT N/A
Time Since Circ. 2 HOURS
Max. Rec. Temp. N/A
Equip. | Location DU-1 | L.B.
Recorded By RIDDER
Witnessed By B. FOX
FIELD PRINT



welenco

ELECTRIC LOG

FILING NO

COMPANY HOWARD PUMP

WELL #48 YUCAIPA VALLEY WATER DISTRICT

FIELD YUCAIPA

STATE CALIFORNIA COUNTY RIVERSIDE

LOCATION: SINGLETON RD. EAST OF I-10

SEC ____ TWP ____ RGE ____

OTHER SERVICES NONE

Permanent Datum: GROUND LEVEL, Elev. ____

Log Measured From G.L., 0 Ft. Above Perm. Datum

Drilling Measured From GROUND LEVEL

Elev.: K.B. ____ D.F. ____ G.L. ____

Date	2-20-90			
Run No.	ONE			
Depth—Driller	1230'			
Depth—Logger	1230'			
Btm. Log Inter.	1230'			
Top Log Inter.	35'			
Casing—Driller	NONE @	@	@	@
Casing—Logger	--			
Bit Size	9 7/8"			
Type Fluid in Hole	BENTONITE			
Dens. | Visc.	N/A	|	|	|
pH | Fluid Loss	N/A | ml	| ml	| ml	| ml
Source of Sample	PIT			
R_m @ Meas. Temp.	13.0 @ 73 °F	@ °F	@ °F	@ °F
R_{mf} @ Meas. Temp.	12.8 @ 73 °F	@ °F	@ °F	@ °F
R_{mc} @ Meas. Temp.	N/A @ °F	@ °F	@ °F	@ °F
Source: R_{mf} R_{mc}	MEAS	|	|	|
R_m @ BHT	N/A @ °F	@ °F	@ °F	@ °F
Time Since Circ.	2 HOURS			
Max. Rec. Temp.	N/A °F	°F	°F	°F
Equip. | Location	DV-1 | L.A.	|	|	|
Recorded By	RIDDER			
Witnessed By	S. ROY			

This Heading and Log Conform To API RP 31

Fold Here

REMARKS

Changes in Mud Type or Additional Samples

Date	Sample No.	Depth—Driller	Type Fluid in Hole

Scale Changes

Type Log	Depth	Scale Up Hole	Scale Down Hole

Equipment Data

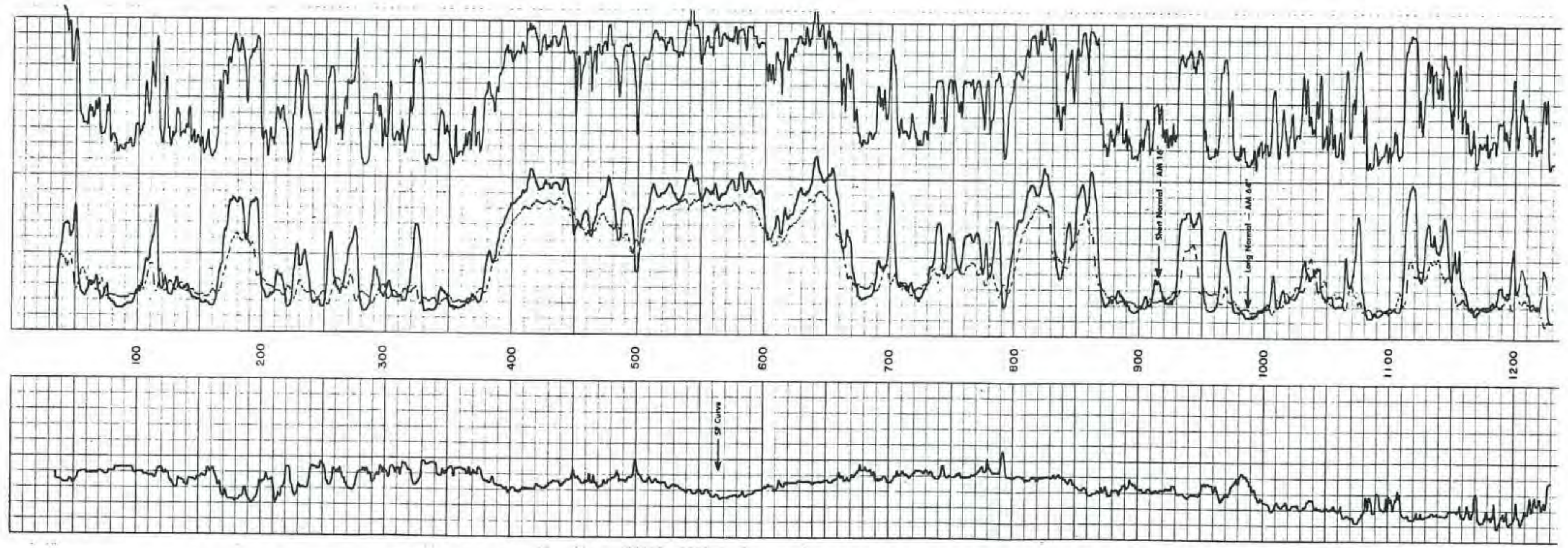
Run No.	Pad Type	Tool Position	Other
ONE	NORMAL	FREE	

RESISTIVITY ohms. m²/m | RESISTANCE Detail Curve

RESISTIVITY ohms. m²/m | SHORT NORMAL 16 Inch 0 100 | LONG NORMAL 64 Inch 0 100

Depths

SPONTANEOUS POTENTIAL millivolts 10 - +



2S/2W-3J1

#49

DUPLICATE
Driller's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in

No. 341209

Notice of Intent No. 243729
Local Permit No. or Date

State Well No.
Other Well No.

(1) OWNER: Name [redacted]
Address [redacted]
City Yucaipa, Ca 92399 ZIP

(2) LOCATION OF WELL (See instructions):
County San Bernardino Owner's Well Number #49
Well address if different from above
Township 2S Range 2W Section 3
Distance from cities, roads, railroads, fences, etc.
Parcel # 318-051-43

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☐ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☒
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size
Diameter of bore
Packed from ___ to ___ ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	480			480	622	
520	670			670	800	
830 / 830	870 / 910			830 / 910	380 / 1180	
1150	1180					

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ___ ft.
Method of sealing

(10) WATER LEVELS:
Depth of first water, if known ___ ft.
Standing level after well completion ___ ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☒ Bailer ☒ Air lift ☐
Depth to water at start of test ___ ft At end of test ___ ft
Discharge ___ gal/min after ___ hours Water temperature
Chemical analysis made? Yes ☒ No ☐ If yes, by whom?
Was electric log made Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth ___ ft. Completed depth ___ ft.

from ft	to ft	Formation (Describe by color, character, size or material)
0'	390'	7.5hr Sand and gravel & cobbles
390'	439'	22hr Drlg slowed down
439'	459'	22hr Sand & gravel & cobbles w/some clay
459'	470	22hr Sand & gravel w/some cobbl and silt
470'	473'	22 hr Sand & gravel w/some clay
473'	490'	18hr Fine t. med sand & silt
490	520	13hr Med to course sand & silt
520	535	Looks like chipped rock sharp cobbles
535	615	Med to course sand w/cobbles and silt
615	627	Sand & Gravel w/some clay
627	700	Sand & gravel w/some cobbles & silt
700	765	Med to course sand
765	845	Med to course sand& gravel
854		TD
854	935	Sand, Gravel and silts
935	1198	Med to course sand

Work started ___ 19 ___ Completed ___ 19 90

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

Signed Mark C. (Well Driller)
NAME Howard Pump Inc.
(Person, firm, or corporation) (Typed or printed)
Address PO Box 1249
City Barstow Ca ZIP 92311
License No. 231914 Date of this report

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

86 96355

THIS WELL DRILLED
PRIOR TO PERMITTING
OR PRESITE BY DEHS.

County of San Bernardino — Environmental Public Works Agency
DEPARTMENT OF ENVIRONMENTAL HEALTH SERVICES
385 North Arrowhead Avenue, San Bernardino, CA 92415-0160

DO NOT FILL IN
Permit Number 04129021
Expiration 4-12-91
FF
FA
SN

2S/2W-3J1

WELL PERMIT
(Please Print)

DO NOT FILL IN CK 19787
$ 275 - 137.50
Date 4-12-90
Amount $ 412.50
Receipt Number 041290 1-2
By Howard Pump #19787

Items 6 through 10 to be estimated for new wells, exact for all other wells.

1. OWNER: Name [redacted]
   Mailing Address [redacted]
   City Yucaipa, CA Zip 92399
   Site Address Well #49
   City Yucaipa Zip
   Telephone Number (714) 797-5117

2. WELL DRILLER:
   Contractor Howard Pump, Inc.
   Name
   Date Start April 1990
   Date Complete May 1990

3. WELL USE *(check)*:
   - [x] Community
   - [ ] Horizontal
   - [ ] Other
   - [ ] Individual
   - [ ] Test
   - [ ] Agricultural
   - [ ] Monitoring
   - [ ] Dairy
   - [ ] Public Water Supply

4. TYPE OF WORK *(check)*:
   - [x] New
   - [ ] Reconstruction
   - [ ] Destruction

5. ANNUAL SEAL: Seal Depth 50 ft.
   Furnished by: [ ] Owner [x] Contractor
   [ ] Driven Conductor Dia. ____ in., Wall (Gage) ____
   [x] Sealing Material cement, Thickness 2 in.

6. DEPTH OF WELL *(feet)*:
   Proposed 1000 Existing 0
   DIAMETER OF BORE *(in.)*: 28"

7. CASING INSTALLED:
   [x] Steel [ ] Plastic [ ] Other

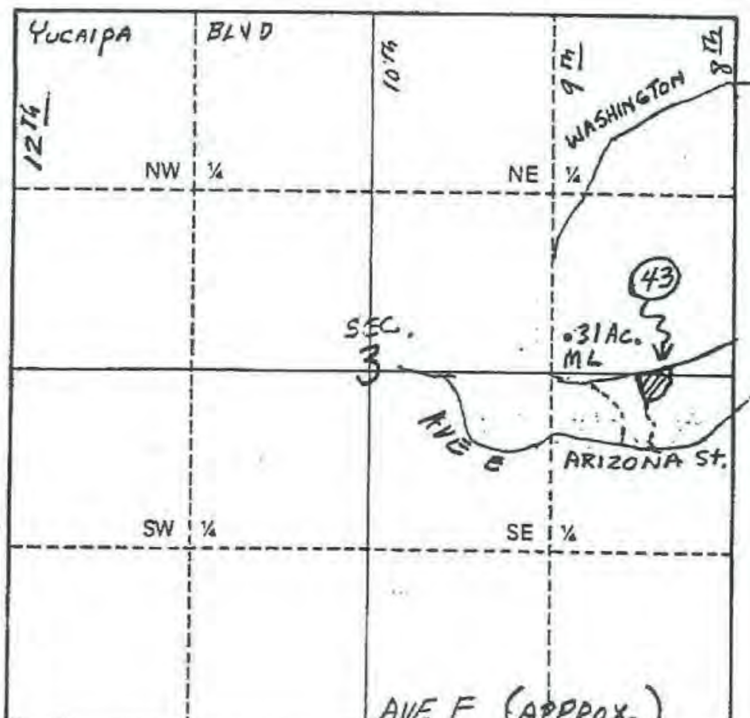
From (ft.)	To (ft.)	Dia. (in.)	Wall (Gage)
0	650	14"	

   GRAVEL PACK: [x] Yes [ ] No
   From 50 to 1000 ft.

8. PERFORATIONS *(if applicable)*:
   From 650 to 1000 ft.

9. SEALED ZONES *(if applicable)*:
   From 0 to 50 ft.

SECTION MAP — DO NOT FILL IN *Scale: 1 inch = ¼ mile*



10. LOCATION INFORMATION: 31-A6
   (a) Township 2S N/S Range 2W E/W
   Section 3
   (b) Assessor's Parcel No. 318-051-43
   (c) Solid or liquid waste disposal site within two miles?
   [ ] Yes [x] No
   Location

(Continue on reverse side)

NO M.A.V.

DO NOT FILL IN
Seal
Cap
Check Valve
Electricals
Slab
Tag
Building and Safety Notified

Well 49
25/2W-3J1

CO # 339

welenco

ELECTRIC LOG

FILING NO.

COMPANY Howard Pump
WELL #49 (Run Two)
FIELD Yucaipa
STATE CA COUNTY San Bernardino

LOCATION: 9th Ave @ Ave E.
SEC ____ TWP ____ RGE ____

OTHER SERVICES: E-LOG

Permanent Datum: Ground Level Elev. ____
Log Measured From G.L. 0 Ft. Above Perm. Datum
Drilling Measured From Ground Level

Elev.: K.B. ____ D.F. ____ G.L. ____

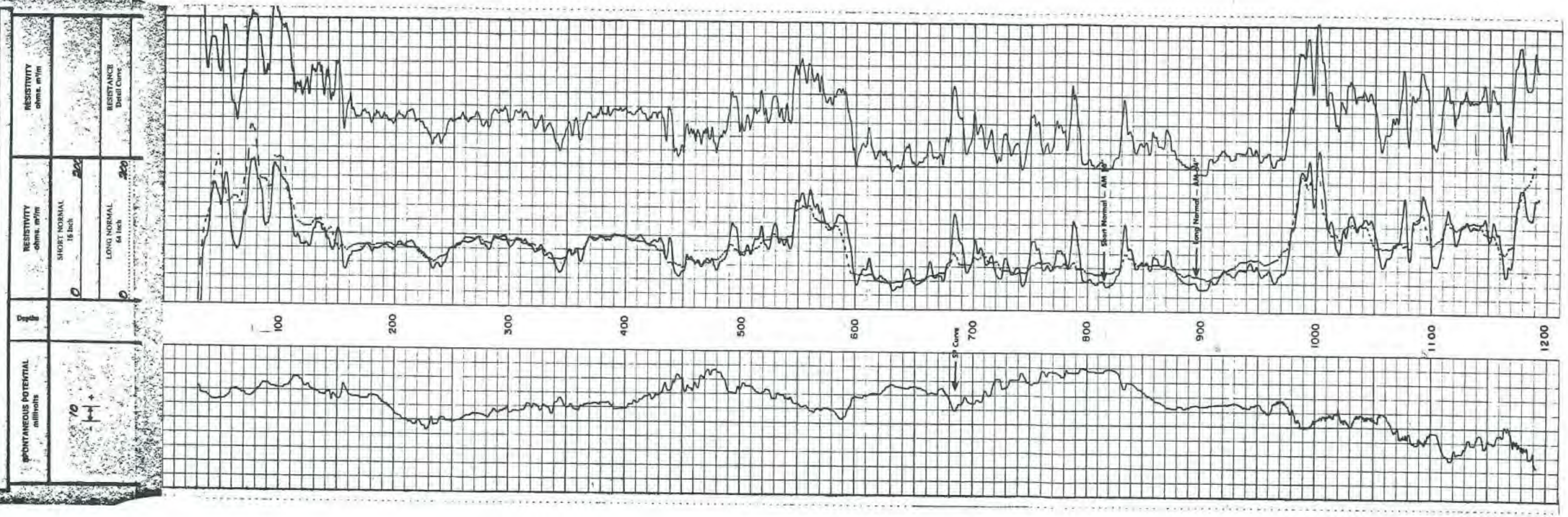
Date	9-6-90			
Run No.	ONE			
Depth—Driller	1178'			
Depth—Logger	1194'			
Btm. Log Inter.	1192'			
Top Log Inter.	30'			
Casing—Driller	None @	@	@	@
Casing—Logger	—			
Bit Size	9 7/8"			
Type Fluid in Hole	Bentonite			
Dens. | Visc.	N/A			
pH | Fluid Loss	N/A ml	ml		ml
Source of Sample	Pit			
R_m @ Meas. Temp.	10.8 @ 65 °F	@ °F	@ °F	@ °F
R_{mf} @ Meas. Temp.	11.0 @ 66 °F	@ °F	@ °F	@ °F
R_{mc} @ Meas. Temp.	N/A @ °F	@ °F	@ °F	@ °F
Source: R_{mf} | R_{mc}	Meas			
R_m @ BHT	N/A @ °F	@ °F	@ °F	@ °F
Time Since Circ.	3 Hours			
Max. Rec. Temp.	N/A °F	°F	°F	°F
Equip. | Location	DV-1 | L.A.			
Recorded By	Ridder			
Witnessed By				

FIELD PRINT

This Heading and Log Conform To API RP 31

Fold Here

REMARKS



welenco

ELECTRIC LOG

FILING NO

COMPANY HOWARD PUMP

WELL #49

FIELD YUCAIPA

STATE CALIFORNIA COUNTY SAN BERNARDINO

LOCATION: 8th AVE. @ AVE E

SEC. ____ TWP ____ RGE ____

OTHER SERVICES: NONE

Permanent Datum: G.L. , Elev. ____

Log Measured From G.L. 0 Ft. Above Perm. Datum

Drilling Measured From G.L.

Elev.: K.B. ____ D.F. ____ G.L. ____

Date	3-30-90			
Run No.	ONE			
Depth—Driller	854'			
Depth—Logger	853'			
Btm. Log Inter.	850'			
Top Log Inter.	100'			
Casing—Driller	NONE @	@	@	@
Casing—Logger	-			
Bit Size	9 7/8"			
Type Fluid in Hole	BENTONITE			
Dens. | Visc.	N/A			
pH | Fluid Loss	N/A | ml	| ml	| ml	| ml
Source of Sample	PIT			
R_m @ Meas. Temp.	11.0 @ 70 °F	@ °F	@ °F	@ °F
R_{mf} @ Meas. Temp.	11.2 @ 71 °F	@ °F	@ °F	@ °F
R_{mc} @ Meas. Temp.	N/A @ °F	@ °F	@ °F	@ °F
Source: R_{mf} | R_{mc}	MEAS |	|	|	|
R_m @ BHT	N/A @ °F	@ °F	@ °F	@ °F
Time Since Circ.	0 HOURS			
Max. Rec. Temp.	N/A °F	°F	°F	°F
Equip. | Location	DV-1 | 1 A	|	|	|
Recorded By	RIDDER			
Witnessed By				

This Heading and Log Conform To API RP 31

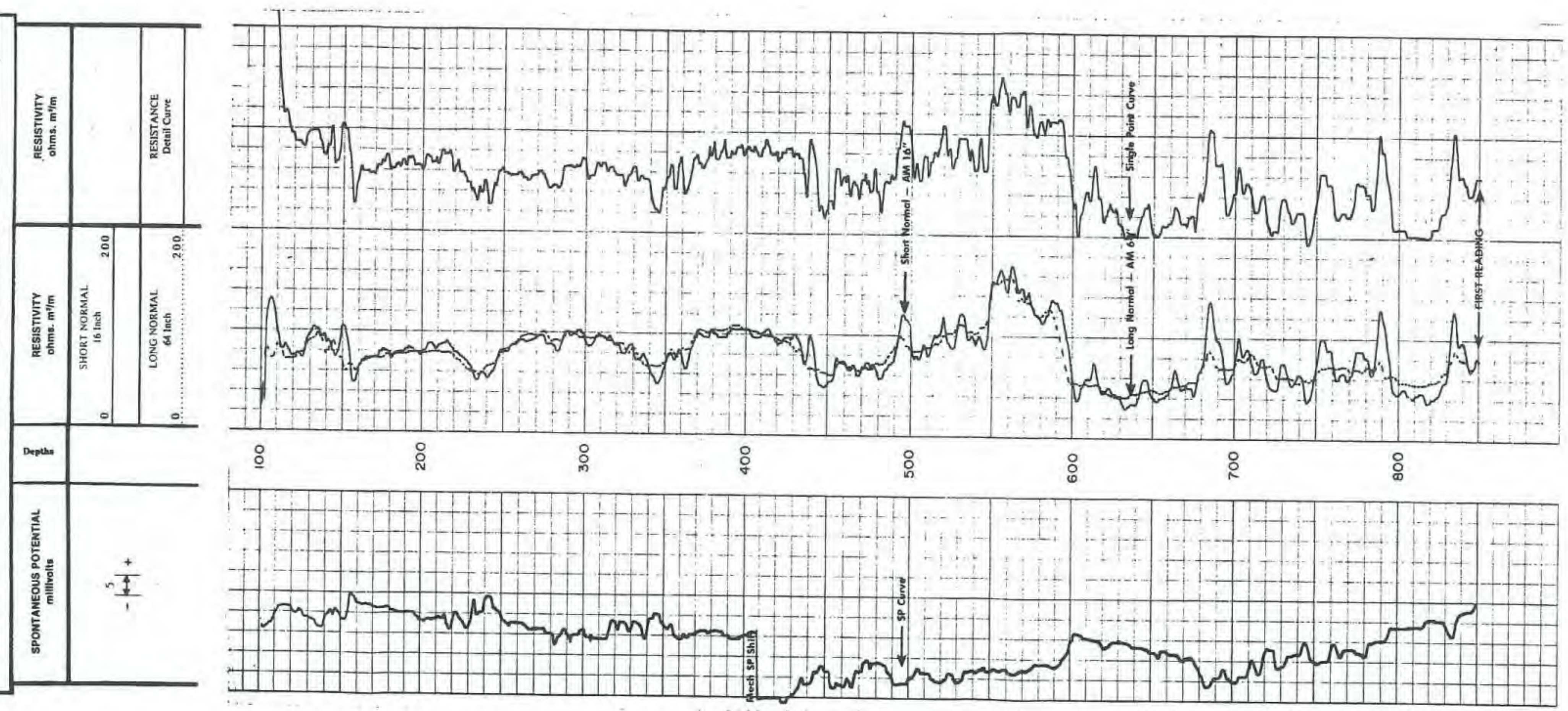
Fold Here

REMARKS

Changes in Mud Type or Additional Samples

Scale Changes: Type Log | Depth | Scale Up Hole | Scale Down Hole

Equipment Data: Run No. ONE | Tool Type NORMAL | Pad Type | Tool Position FREE | Other



\# 2S/2W - 1Q1 - notes say changed to 2S/2W - 1K1 in 2003 Yucaipa well database = 2S/2W-1Q1 #50

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

... Copy

WATER WELL DRILLERS REPORT

Do not fill in

No. 341098

Notice of Intent No. 249930

Local Permit No. or Date

State Well No.

Other Well No.

(1) OWNER: Name [redacted]
Address [redacted]
City [redacted] ZIP 92399

(2) LOCATION OF WELL (See instructions):
County San Bernardino Owner's Well Number #50
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc.
Parcel # 319-132-25

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well XX Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☒
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☒ XX Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size
Diameter of bore
Packed from to ft.

(7) CASING INSTALLED:
Steel ☒ X Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	330	6 5/8	.134

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size
330	350	.080

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 20' ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing Hole plug

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth ft. Completed depth ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	5	Clay (brown silty)
5	30	Sand and gravel
30	270	Sand gravel & cobbles
270	291	Sand, gravel & boulders
291	300	Silty clay and asand
300	334	Sand gravel and boulders
334	341	Silty clay and sand
341	372	Sand & gravel and cobbles
372	383	Dark green rock (hard)
383	420	Sand - gravel and cobbles
420	430	Sand & gravel & cobbles
430	450	Granite
450	451	Granite w/silts

Work started 4-9 19 90 Completed 34-13 19 90

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed Gary Hall (Well Driller)
NAME Howard Pump, Inc.
(Person, firm, or corporation) (Typed or printed)
Address PO Box 1219
City Barstow, Ca ZIP 92311
License No. 231311 Date of this report

CONFIDENTIAL NOT FOR PUBLIC WATER CODE SEC 13752

DWR 188 (REV. 12-8-) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 86 96355

25/2W-1Q1

...r's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. **341098**

Notice of Intent No. 249930
Local Permit No. or Date

State Well No.
Other Well No.

(1) OWNER: Name [redacted]
Address
City [redacted] ZIP 92399

(2) LOCATION OF WELL (See instructions):
County ~~San Bernardino~~ Owner's Well Number #50
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc.
Parcel # 310-132-25

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well XX Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well X
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary XX Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size
Diameter of bore
Packed from to ft.

(7) CASING INSTALLED:
Steel XX Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
~~0~~	~~330~~	~~6 5/8~~	~~.134~~	330	350	.080

(9) WELL SEAL:
Was surface sanitary seal provided? Yes X No ☐ If yes, to depth 20' ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing ~~Hole plug~~

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made Yes X No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth ft. Completed depth ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	5	Clay (brown silty)
5	80	Sand and gravel
80	270	Sand gravel & cobbles
270	291	Sand, gravel & boulders
291	300	Silty clay and asand
300	334	Sand gravel and boulders
334	341	Silty clay and sand
341	372	Sand & gravel and cobbles
372	388	Dark green rock (hard)
388	420	Sand - gravel and cobbles
420	430	Sand & gravel & cobbles
430	450	Granite
450	481	Granite w/silts

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC 13752

Work started 4-9 19 90 Completed ~~4-13~~ 19 90

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed Gary Hall (Well Driller)
NAME Howard Pump, Inc.
(Person, firm, or corporation) (Typed or printed)
Address ~~PO Box 1249~~
City ~~Barstow, Ca~~ ZIP ~~92311~~
License No. ~~281314~~ Date of this report

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 84 76355

03-28-03 02:16pm From-WATER RESOURCES SD 25/2W-1B1 8185434604 T-855 P.02/02 F-943

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in

No. 341098

Notice of Intent No. 249930 025/02W-01K0015/15

State Well No. ~~025/02W01B1~~

Local Permit No. or Date

Other Well No.

(1) OWNER: Name [redacted]
Address [redacted]
City ZIP 92399

(2) LOCATION OF WELL (See instructions):
County ~~San Bernardino~~ Owner's Well Number #50
Well address if different from above
Township 2S Range 2W Section 1
Distance from cities, roads, railroads, fences, etc.
Parcel # 319-132-25

WELL LOCATION SKETCH

changed 3/28/03
plate in K
01K001
gg

(3) TYPE OF WORK:
New Well XX Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well XX
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary XX Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☑ Size
Diameter of bore
Packed from to ft.

(7) CASING INSTALLED:
Steel XX Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	330	6-5/8	.134

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size
330	350	.080

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 20' ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing Hole plug

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 481 ft. Completed depth 350 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	5	Clay (brown silty)
5	80	Sand and gravel
80	270	Sand gravel & cobbles
270	291	Sand, gravel & boulders
291	300	Silty clay and sand
300	334	Sand gravel and boulders
334	341	Silty clay and sand
341	372	Sand & gravel and cobbles
372	388	Dark-green rock (hard)
388	420	Sand - gravel and cobbles
420	450	Sand & gravel & cobbles
420	450	Granite
450	481	Granite w/silts

Work started 4-9 19 90 Completed 4-13 19 90

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed Gary Hall (Well Driller)
NAME Howard Pump, Inc.
(Person, firm, or corporation) (Typed or printed)
Address PO Box 1249
City Barstow, Ca ZIP 92311
License No. 281814 Date of this report

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

DWR 188 (REV. 12-86)

1S/2W -29C1

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 341364

Notice of Intent No. 243729
Local Permit No. or Date 04129021

State Well No.
Other Well No.

(1) OWNER: Name [redacted]
Address [redacted]
City [redacted] ZIP 92399

(2) LOCATION OF WELL (See instructions):
County San Bernardino Owner's Well Number #51
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☐ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☐
Other ☒
(Describe)

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☑ Size
Diameter of bore
Packed from to ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☐ No ☐ If yes, to depth ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth ft. Completed depth ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	18	Clay
18	45	Sand, Gravel and Cobbles
45	65	Clay w/sand
65	84	Sand, gravel and cobbles
84	110	Clay w/sand
110	291	Sand, gravel and cobbles
291	298	Clay w/sand and gravel
298	345	Sand and Gravel
345	360	Sand and gravel w/ clay
360	482	Sand and gravel and cobbles
482	490	Sand and gravel (green)
490	600	Sand and gravel
600	610	Sand and gravel w/sharp chips of rock. very hard DRLG
610	683	Very hard Rock CHips No sand or clay (granite)
	683	T D

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

Work started 4-23 19 90 Completed 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed
(Well Driller)
NAME Howard Pump, Inc
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 1249 Barstow, Ca 92312-1249
City ZIP
License No. 281814 Date of this report

DWR 188 (REV. 12-86)

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

86 96355

15/2W-24C1

#51

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 341364

Notice of Intent No. 243729
Local Permit No. or Date 04129021

State Well No. ______
Other Well No. ______

(1) OWNER: Name [redacted]
Address [redacted]
City [redacted] ZIP 92399

(2) LOCATION OF WELL (See instructions):
County San Bernardino Owner's Well Number #51
Well address if different from above Kadota & Bryant
Township 1S Range 2W Section 24
Distance from cities, roads, railroads, fences, etc.

302-311-04

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☒
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK: AIP Amer. Rancho
Yes ☒ No ☐ Size
Diameter of bore 30"
Packed from 0 to XXX 610

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	230	12"	.	230	590	.080
590	610					

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ______ ft.
Method of sealing 30" conductor cemented in place

(10) WATER LEVELS:
Depth of first water, if known 82.1 ft.
Standing level after well completion 90.1 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? HPI
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test 82.1 At end of test 90.1 ft
Discharge 1500 gal/min after 65 hours Water temperature ______
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? ______
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth ______ ft. Completed depth ______ ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	13	Clay
13	45	Sand, Gravel and Cobbles
45	55	Clay w/sand
55	84	Sand, gravel and cobbles
84	110	Clay w/sand
110	291	Sand, gravel and cobbles
291	293	Clay w/sand and gravel
293	345	Sand and Gravel
345	360	Sand and gravel w/ clay
360	432	Sand and gravel and cobbles
432	550	Sand and gravel (green)
550	600	Sand and gravel
600	615	Sand and gravel w/sharp chips of rock. very hard DRLG
615	633	Very hard Rock CHips No sand or clay (granite)
	633	T D

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

Work started 4-23 19 91 Completed ______ 19 91

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Signed Gary Hall (Well Driller)
NAME Howard Pump, Inc (Person, firm, or corporation) (Typed or printed)
Address P.O. Box 1249 Barstow, Ca 92312-1249
City ______ ZIP ______
License No. 231914 Date of this report 1-22-91

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

DWR 188 (REV. 12-86) 86 96355

Yucaipa Valley Water District

12770 Second Street • P. O. Box 730 • Yucaipa, California 92399-0730
(909) 797-5117 • • E-mail: yvwd@eee.org

FAX COVER SHEET
YVWD ENGINEERING FAX NO.: 909-797-5937

Date: 02-05-99

Number of Pages Including Cover 6

To: MR. TONG
Geo Science

FAX NO.: (909) 920-0403

FROM: B. Antoni / Ray

REGARDING: Well #53 (YVWD)
Ray - Asked me to send you
E-Log & Driller's Log

Carefully account for the number of pages faxed to you. If there are any missing or illegible pages, please notify the sender immediately.

TRIPLICATE
Owner's Copy
Page 1 of 1
Owner's Well No. 53
Date Work Began 11-10-92 Ended 1-30-93
Local Permit Agency San Bernardino Environment Health
Permit No. 1109211 Permit Date 11-4-92

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 477777

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DEPTH TO FIRST WATER 331 (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0 : 50	TOP SOIL
50 : 60	FINE SAND AND GRAVEL
60 : 110	FINE BAND, COARSE SAND, GRAVEL
110 : 150	FINE & COARSE SAND
150 : 250	FINE SAND, COARSE SAND, GRAVEL
250 : 290	FINE SAND, GRAVEL, CLAY
290 : 440	FINE SAND, GRAVEL, ROCK
440 : 490	SAND, GRAVEL, ROCK
490 : 500	DECOMPOSED GRANITE, HARD
500 : 520	DECOMPOSED GRANITE, SAND, GRAVEL
520 : 640	SAND, GRAVEL, CLAY
640 : 680	SAND, GRAVEL, ROCK, CLAY
680 : 710	SAND, GRAVEL, CLAY
710 : 740	SAND, GRAVEL, CLAY, ROCK
740 : 800	GRAVEL, ROCK, GRANITE, BOULDERS
800 : 840	SAND, GRAVEL, ROCK, CLAY
840 : 860	CEMENTED BAND, GRAVEL, ROCK
860 : 1030	SAND, GRAVEL, SMALL & LARGE ROCK, CLAY
1030 : 1140	SAND, GRAVEL, CLAY, VOULDERS
1140 : 1210	SAND, GRAVEL, CLAY
1210 : 1220	CEMENTED SAND, GRAVEL, GRANITE

TOTAL DEPTH OF BORING 1225 (Feet)
TOTAL DEPTH OF COMPLETED WELL 970 (Feet)

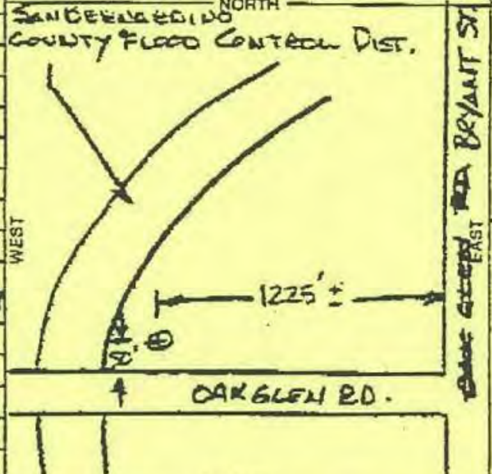
WELL OWNER

Name [redacted]
Mailing Address
CITY STATE ZIP

WELL LOCATION
Address Side of Oak Glen Road, between Sunnyside & Bryant in City of Yucaipa
City
County San Bernardino
APN Book 303 Page 51 Parcel 45
Township 1S Range 2W Section 5
Latitude DEG. MIN. SEC. NORTH Longitude DEG. MIN. SEC. WEST

LOCATION SKETCH

NORTH



WEST EAST
SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)
X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)
___ MONITORING
WATER SUPPLY
X Domestic
___ Public
___ Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD Reverse FLUID Water

WATER LEVEL & YIELD OF COMPLETED WELL
DEPTH OF STATIC WATER LEVEL 331 (Ft.) & DATE MEASURED 1-4-93
ESTIMATED YIELD* 1750 (GPM) & TEST TYPE Constant
TEST LENGTH 24 (Hrs.) TOTAL DRAWDOWN 115 (Ft.)
* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE: BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 : 50	40"			X		M.S.	30"	5/16	
0 : 450	30"	X				M.S.	16"	5/16	
450 : 950	30"		X			M.S.	16"	5/16	.080
950 : 970	30"	X				M.S.	16"	5/16	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 : 50	X			10 sack slurr
8 : 970			X	4x12 valley
970 : 1225			X	Natural

ATTACHMENTS (✓)
___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil Water Chemical Analyses
___ Other
ATTACH ADDITIONAL INFORMATION IF IT EXISTS

CERTIFICATION STATEMENT
I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME STEFAN A. HICKS – McCALLA
(PERSON, FIRM OR CORPORATION) (TYPED OR PRINTED)
900 NEVADA ST. REDLANDS CA 92373
ADDRESS CITY STATE ZIP
Signed Stefan A. Hicks 2-1-93 510011
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 7/90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

welenco ELECTRIC LOG

25R4

COUNTY: SAN BERNARDINO CA.
FIELD: YUCAIPA
LOCATION: OAK GLEN AVE SOUTH OF BR
WELL: #53
COMPANY: McCALLA BROS. DRILLING
[redacted]

COMPANY MCCALLA BROS. DRILLING
WELL #53
FIELD YUCAIPA
COUNTY SAN BERNARDINO STATE CA.

LOCATION
OAK GLEN AVE SOUTH OF BRYAN

Other Services
NONE

Sec. Twp. Rge.

Permanent datum GROUND LEVEL Elev. N/A
Log Measured From GROUND LEVEL Above Perm. Datum
Drilling Measured From GROUND LEVEL

Elev.: K.B.
D.F.
G.L.

Date	11/23/92			
Run No.	ONE			
Depth-Driller	1180'			
Depth-Logger	1180'			
Btm Log Interval	1178'			
Top Log Interval	50'			
Casing Driller	30" @ 50'	@	@	@
Casing Logger	50'			
Bit Size	17.5"			
Type Fluid in Hole	WATER			
Density | Viscosity	N/A | N/A			
pH | Fluid Loss	N/A | N/A cc	cc	cc	cc
Source of Sample	PIT			
Rm @ Meas. Temp.	16.8 @ 70 °F	@ °F	@ °F	@ °F
Rmf @ Meas. Temp.	16.8 @ 70 °F	@ °F	@ °F	@ °F
Rmc @ Meas. Temp.	N/A @ N/A °F	@ °F	@ °F	@ °F
Source of Rmf and Rmc	MEAS | N/A			
Rm @ BHT	N/A @ N/A °F	@ °F	@ °F	@ °F
Time: End Circulation	11/22 21:00			
Time: Logger on bottom	11:59			
Max Rec Temp Deg. F	N/A °F	°F	°F	°F
Equip No. | Location	L-14 | L.A.			
Recorded By	RIDDER			

CWP DRS 1.2616

Fold Here

Changes in Mud Type or Additional Samples

Date | Sample No.		
Depth Driller		
Type Fluid		
Dens | Visc		
pH | Fluid Loss		
Source of Sample		
Rm @ Meas Temp	°	°
Rmf @ Meas Temp	°	°
Rmc @ Meas Temp	°	°
Source RMF | Rmc		
Rm @ BHT	°	°
Rmf @ BHT	°	°
Rmc @ BHT	°	°

Scale Changes

Type Log	Depth	Scale Up Hole	Scale Down Hole

EQUIPMENT DATA

Run No.	Tool No.	Tool Type	Tool Pos.		Gamma Ray Tool No.
ONE	--	NORMAL	FREE		

CALIBRATION DATA

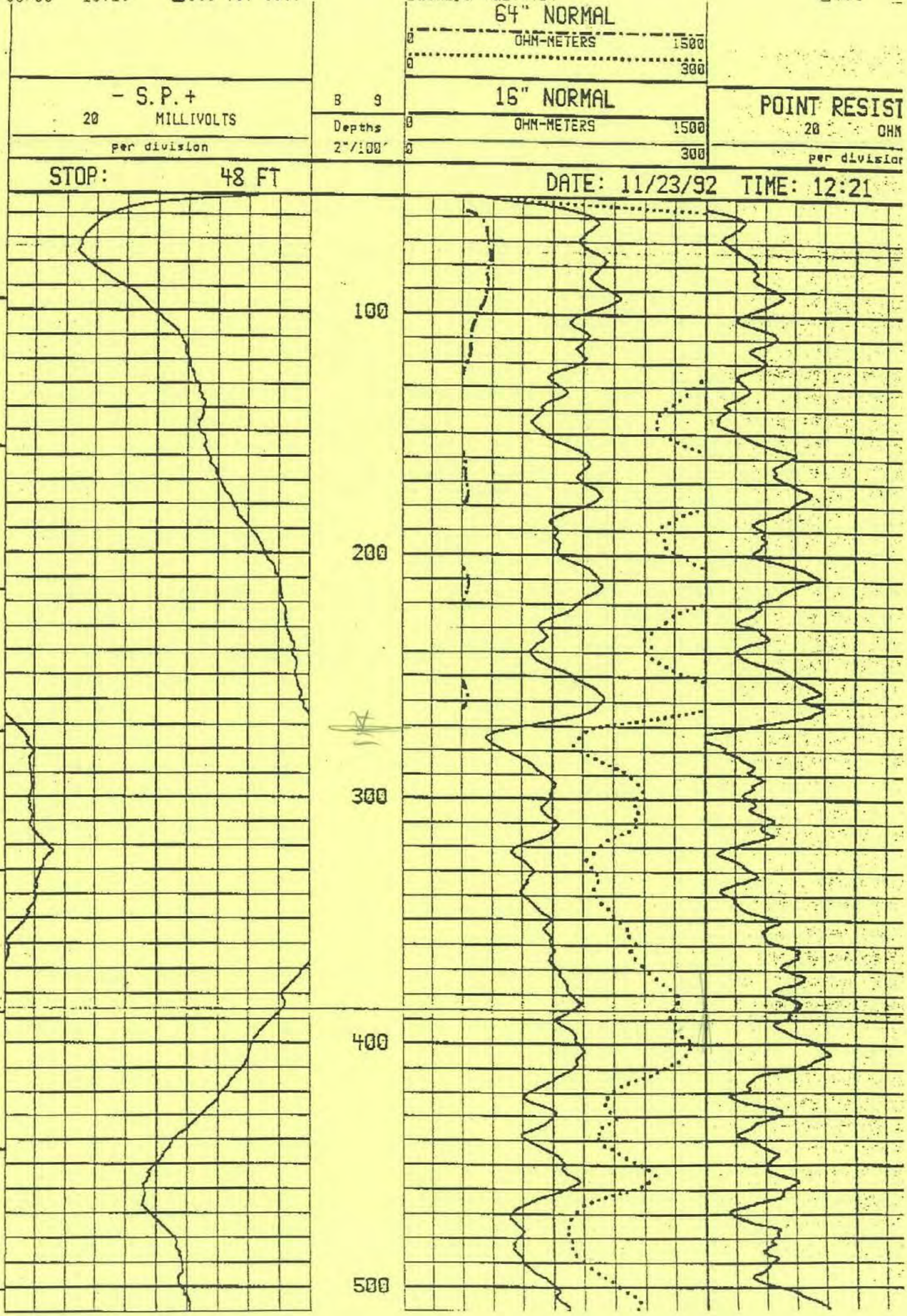
Run No.	16"Normal Zero	16"Normal Int. Cal	Induction Loop Cal	Induction Tool Zero	Induction Tool Cal	GAMMA RAY API SCALE	GAMMA RAY BKG CPS	GAMMA RAY STD C

REFERENCE LITERATURE:

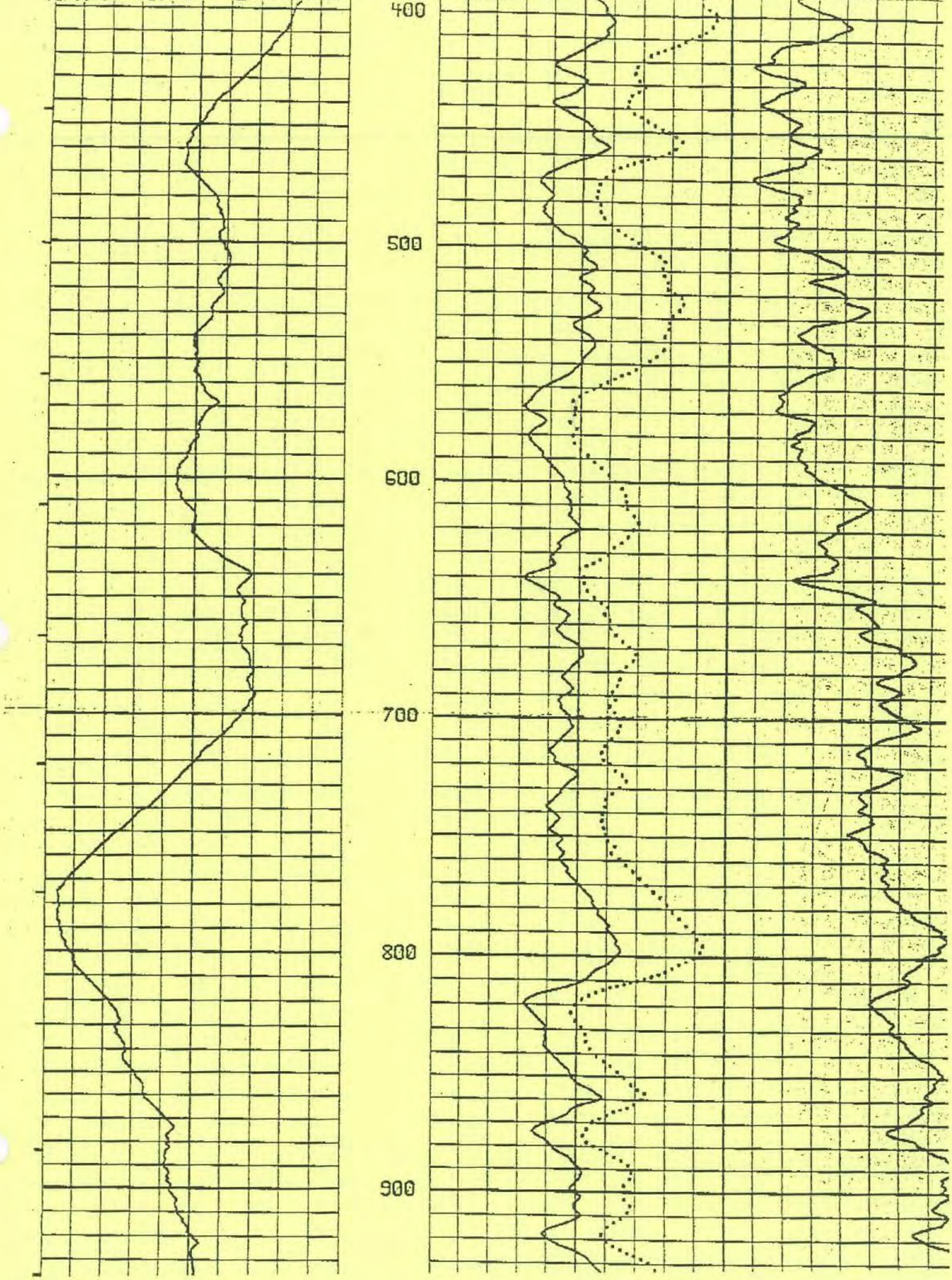
REMARKS:

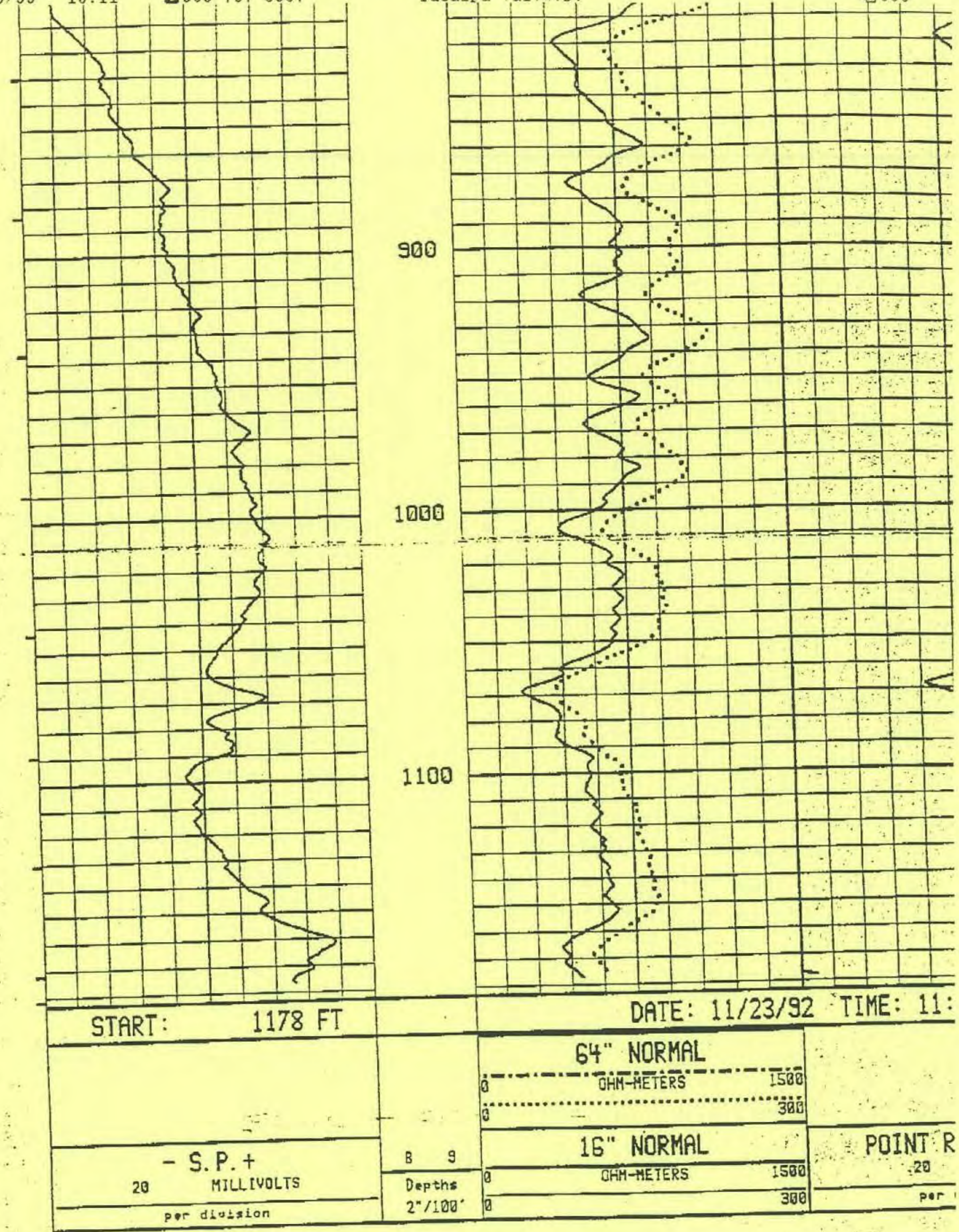
NOTICE: All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by one of our officers, agents or employees. These interpretations are also subject to our General Terms and Conditions as set out in our current Price Schedule.
Welenco

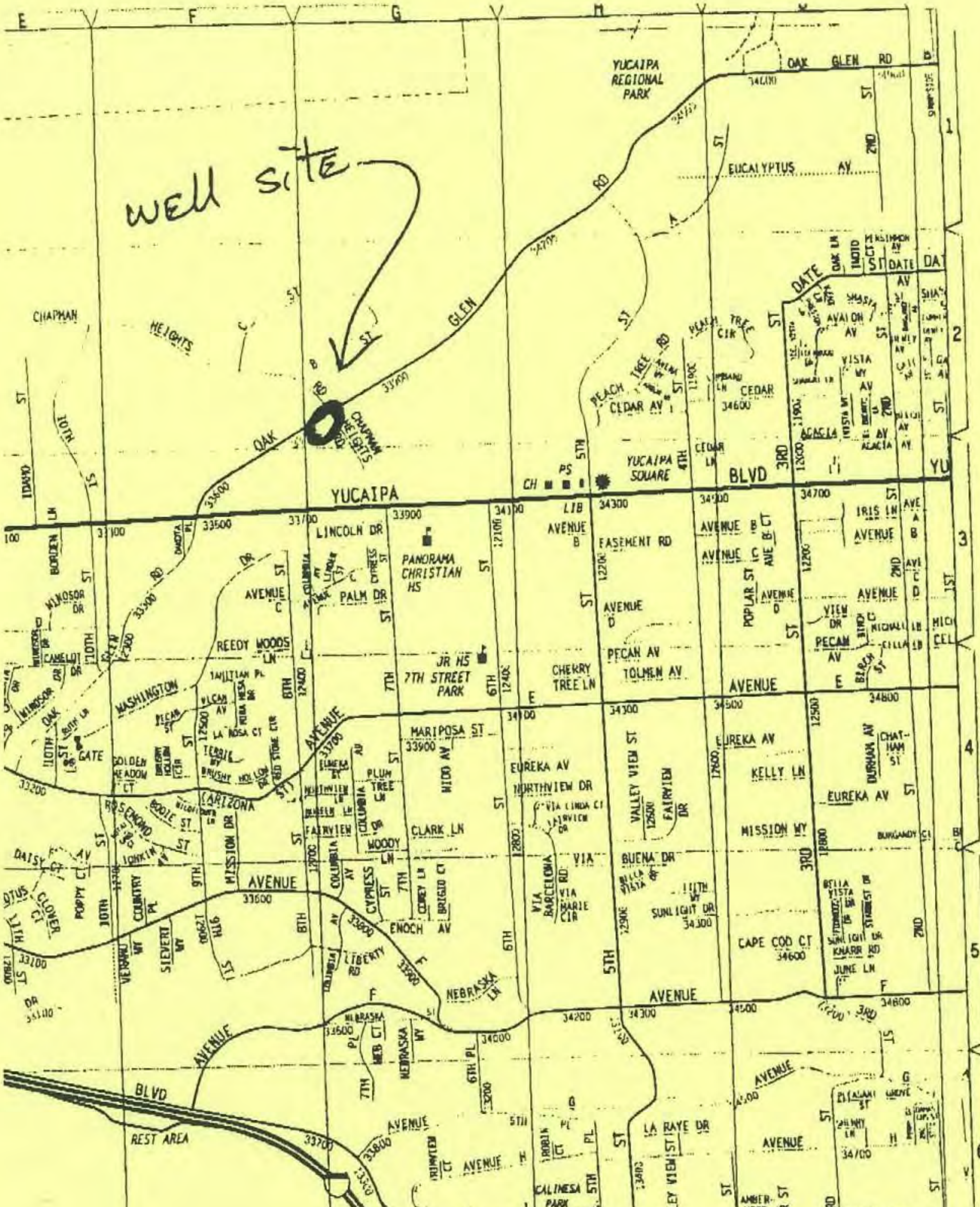
64" NORMAL
0 OHM-METERS 500



64" NORMAL
OHM-METERS
0 1500
0 300
- S.P. +
20 MILLIVOLTS
per division
8 9
Depths
2"/100'
16" NORMAL
OHM-METERS
0 1500
0 300
POINT RESIST
20 OHM
per division
STOP: 48 FT
DATE: 11/23/92 TIME: 12:21
100
200
300
400
500


400
500
600
700
800
900


900
1000
1100
START: 1178 FT
DATE: 11/23/92 TIME: 11:
64" NORMAL
0 OHM-METERS 1500
0 300
16" NORMAL
0 OHM-METERS 1500
0 300
POINT R
20
per
- S.P. +
20 MILLIVOLTS
per division
8 9
Depths
2"/100'



INLAND EMPIRE

REF. 649 G-2

JAN-27-99 11:31 AM

P.02

15/2W-35H3

ORIGINAL
File with DWR
Page 1 of 1
Owner's Well No. 55
Date Work Began 1-22-01, Ended 7-28-01
Local Permit Agency San Bernardino County Dept. of Public Health
Permit No. 2001 010028 Permit Date 1-18-01

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 748842

DWR USE ONLY — DO NOT FILL IN
01S02W35H003 STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD Reverse Cir. FLUID Polybore

DEPTH FROM SURFACE Ft. to Ft.		DESCRIPTION Describe material, grain size, color, etc.
0	50	Top Soil Rock
50	100	Sand & Gravel
100	180	Sand, Gravel, & Rock
180	200	Sand, Clay, & Granite
200	230	Sand, Gravel, & Granite
230	250	Sand, Hard
250	270	Sand & Gravel
270	290	Hard Sand
290	380	Sand, Gravel, & Rock
380	430	Sand & small Gravel
430	480	Sand & Gravel
480	490	Sand
490	550	Hard Sand & Gravel
550	630	Sand & Gravel
630	700	Hard Sand & Gravel
700	770	Sand & Gravel
770	870	Gravel & Rocks
870	950	Sand & Gravel Granite
950	1000	Sand & Gravel
1000	1050	Hard Sand & Gravel
1050	1070	Granite & Rocks

TOTAL DEPTH OF BORING 1070 (Feet)
TOTAL DEPTH OF COMPLETED WELL 1050 (Feet)

WELL OWNER

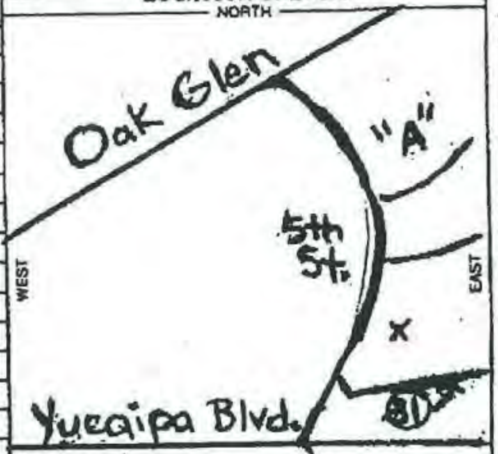
Name [redacted]
Mailing Address [redacted]
[redacted] CA 92399
CITY STATE ZIP

WELL LOCATION

Address ¼ mile South Oak Glen Rd 100 East of 5th
City Yucaipa
County San Bernardino
APN Book 0303 Page 151 Parcel 31
Township 1S Range 2W Section 35
Latitude ___ NORTH DEG. MIN. SEC. Longitude ___ WEST DEG. MIN. SEC.

LOCATION SKETCH

NORTH



SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
___ Domestic X Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 232' (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 232' (Ft.) & DATE MEASURED 6-18-01
ESTIMATED YIELD * 1500 (GPM) & TEST TYPE Constant
TEST LENGTH 24 (Hrs.) TOTAL DRAWDOWN 144 (Ft.)
* May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	50	42			x		A53 GradeB	30	5/16	
+2	460	26	x				CopperBearing	16	5/16	
460	1030	26		x			FulFlo	16	5/16	.050
1030	1050	26	x				CopperBearing	16	5/16	
+2	459	26				x	A53 GradeB	2	Sch 40	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50	x			
50	1070				6x16 Tacna Sand & Gravel

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Bakersfield Well & Pump Co.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

7212 Fruitvale Ave. Bakersfield CA 93308
ADDRESS CITY STATE ZIP

Signed [signature] 8-6-01 448537
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 11-97 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

AUG. 06 '01 (MON) 13:19 COMMUNICATION No: 19 PAGE. 2

ORIGINAL 1S/2W-35
File with DWR
Page 1 of 2
Owner's Well No. 57
Date Work Began 1-18-01 , Ended 7-30-02
Local Permit Agency San Bernardino Environmental Health Services
Permit No. 2001010029 Permit Date 1-18-01

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 788723

STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD Reverse Circulation FLUID Poly Bore

DEPTH FROM SURFACE Ft. to Ft.		DESCRIPTION - Describe material, grain size, color, etc.
40	130	sand & gravel
130	140	coarse gravel, sand, rock
140	160	sand, gravel, & rock
160	170	sand
170	180	gravel, sand , & rock
180	190	sand and small gravel
190	200	sand, some short cut gravel
200	210	sand,little clay, & gravel
210	230	sand with clay and small gravel
230	240	sand and gravel
240	250	sand and small gravel
250	260	sand, gravel,and different colors
260	270	sand, gravel, & granite
270	280	sand, gravel, sharp cuttings
280	290	sand and gravel
290	300	sand and large gravel
300	310	sand and mediam sharp
310	320	sand and gravel
320	330	sand and gravel (fine sharp)
330	390	sand and gravel
390	410	sand and mediam gravel
410	420	gravel and rock
420	440	sand and gravel
440	450	large gravel and different colors
450	470	sand and gravel
470	480	granite and gravel
480	490	sand and hard gravel
490	500	sand, gravel and little clay
500	520	sand and hard gravel
520	540	sand and mediam gravel

TOTAL DEPTH OF BORING 900 (Feet)
TOTAL DEPTH OF COMPLETED WELL N/A (Feet)

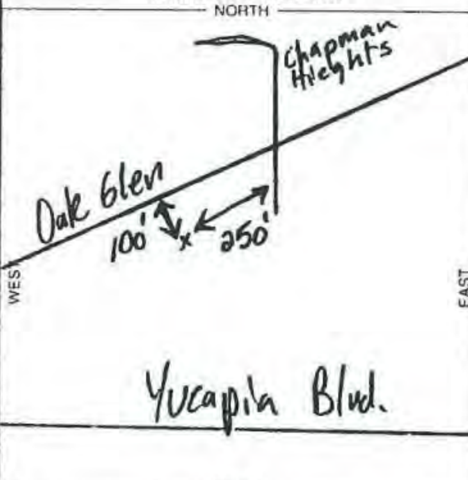
WELL OWNER

Name [redacted]
Mailing Address [redacted]
Yucaipa CA. 92399
CITY STATE ZIP

WELL LOCATION

Address 100' South of Oak Glen Rd. 250' West Chapman
City Yucaipa
County San Bernardino
APN Book 0303 Page 131 Parcel 66
Township 1S Range 2W Section 35
Latitude ___ NORTH DEG MIN SEC Longitude ___ WEST DEG MIN SEC

LOCATION SKETCH



Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL X
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 259 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 259 (Ft.) & DATE MEASURED 2-29-01
ESTIMATED YIELD * 100 (GPM) & TEST TYPE Air Lift
TEST LENGTH 3 (Hrs.) TOTAL DRAWDOWN N/A (Ft.)
* *May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.		BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	50	42			x		A53 Grade B	30	5/16	
0	100	17½	x				PVC	5	Sch.40	
100	650	17½		x			PVC	5	Sch.40	.040

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.		CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50	x			
50	650				
650	900			x	

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Bakersfield Well & Pump Co.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

7212 Fruitvale Ave Bakersfield CA. 93308
ADDRESS CITY STATE ZIP

Signed [signature] 8-10-02 440537
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

Page 2 of 2

Owner's Well No. 57

Date Work Began 1-18-02 Ended 7-30-02

Local Permit Agency San Bernardino Environmental Health services

Permit No. 2001010029 Permit Date 1-18-02

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 788724

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD Reverse Circulation FLUID Poly Bore

DEPTH FROM SURFACE Ft. to Ft.		DESCRIPTION Describe material, grain size, color, etc.
540	550	rock
550	560	sand, gravel, and little clay
560	570	some white gravel and clay
570	580	white gravel and granite
580	600	brown clay and white gravel
600	610	sand and fine gravel
610	630	granite and brwn clay
630	640	clay and mediam gravel
640	650	gravel and little clay
650	670	gravel and black & green clay
670	680	gravel and small cuttings
680	690	gray clay
690	700	gravel
700	710	clay brown green gravel
710	720	brown clay
720	730	sand, gravel & sharp cuttings
730	740	gravel and sand
740	750	sand and gravel & clay
750	760	granite
760	770	sand and clay
770	780	sand gravel and smallcuttings
780	800	granite
800	840	gravel and sand
840	860	mediam cuttings, sand & gravel
860	870	coarse large granite cut.
870	880	granite and some gravel
880	900	granite

TOTAL DEPTH OF BORING ________ (Feet)

TOTAL DEPTH OF COMPLETED WELL ________ Feet

WELL OWNER

Name [redacted]

Mailing Address [redacted]

Yucaipa CA. 92399

CITY STATE ZIP

WELL LOCATION

Address ________

City ________

County ________

APN Book ____ Page ____ Parcel ____

Township ____ Range ____ Section ____

Latitude ____ DEG MIN SEC NORTH Longitude ____ DEG MIN SEC WEST

LOCATION SKETCH

NORTH

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

___ NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ___ Public
___ Irrigation ___ Industrial

MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ________ (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL ________ (Ft.) & DATE MEASURED ________

ESTIMATED YIELD * ________ (GPM) & TEST TYPE ________

TEST LENGTH ____ (Hrs.) TOTAL DRAWDOWN ____ (Ft.)

* May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ________

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Bakersfield Well & Pump Co.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

7212 Fruitvale Ave. Bakersfield CA. 93308
ADDRESS CITY STATE ZIP

Signed ________ 8-10-02 440537
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 11/97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR
Page 1 of 1
Owner's Well No. 57
Date Work Began 8-29-02 , Ended 9-20-02
Local Permit Agency San Bernardino Environmental Health Services
Permit No. 2002 08 0700 Permit Date 8-29-02

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 788719

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD Abandon Well FLUID ___

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION Describe material, grain size, color, etc.
0 to 10	fill
10 to 650	cement

TOTAL DEPTH OF BORING 650 (Feet)
TOTAL DEPTH OF COMPLETED WELL 650 (Feet)

WELL OWNER

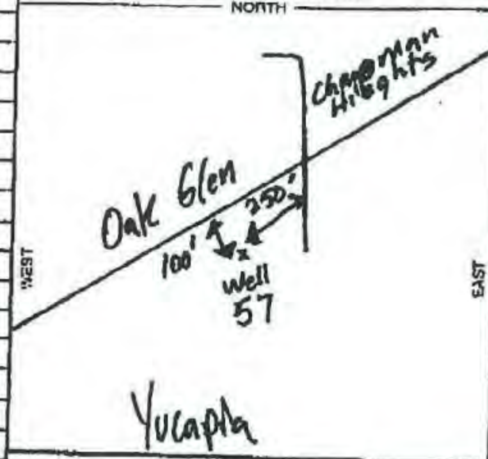
Name [redacted]
Mailing Address [redacted]
Yucaipa CA. 92399
CITY STATE ZIP

WELL LOCATION

Address 100' South of Oak Glen Rd. 250' West Chapman
City Yucaipa
County San Bernardino
APN Book 0303 Page 131 Parcel 66
Township 1S Range 2W Section 35
Latitude ___ NORTH Longitude ___ WEST
DEG. MIN. SEC. DEG. MIN. SEC.

LOCATION SKETCH

NORTH



WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

___ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
X DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 259 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___
ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
* *May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 to 10			x	
10 to 650	x			

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Bakersfield Well & Pump Co.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

7212 Fruitvale Ave. Bakersfield CA. 93308
ADDRESS CITY STATE ZIP

Signed [signature] 11-20-02 440537
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

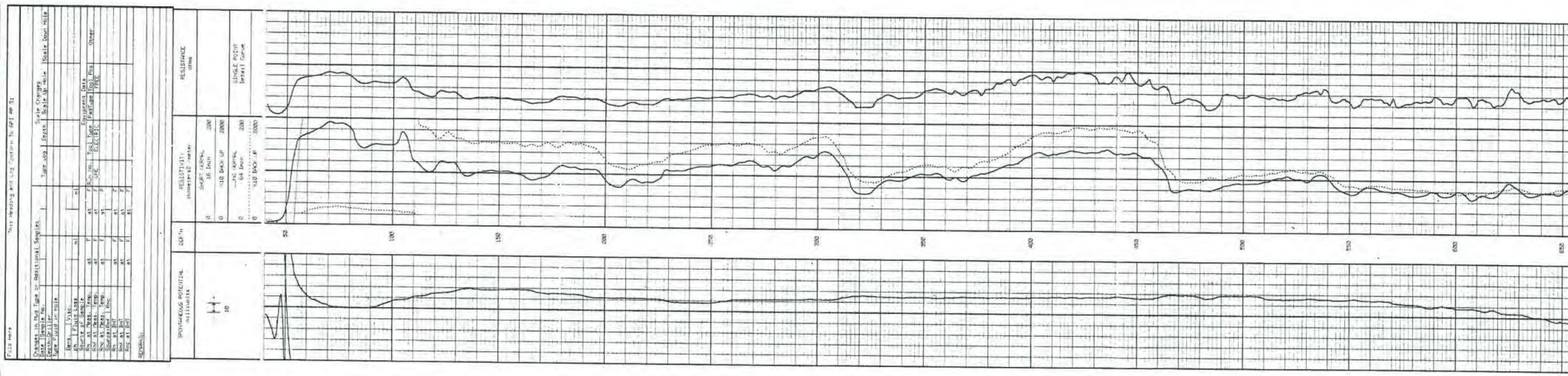
Well 57
1S/2W-35

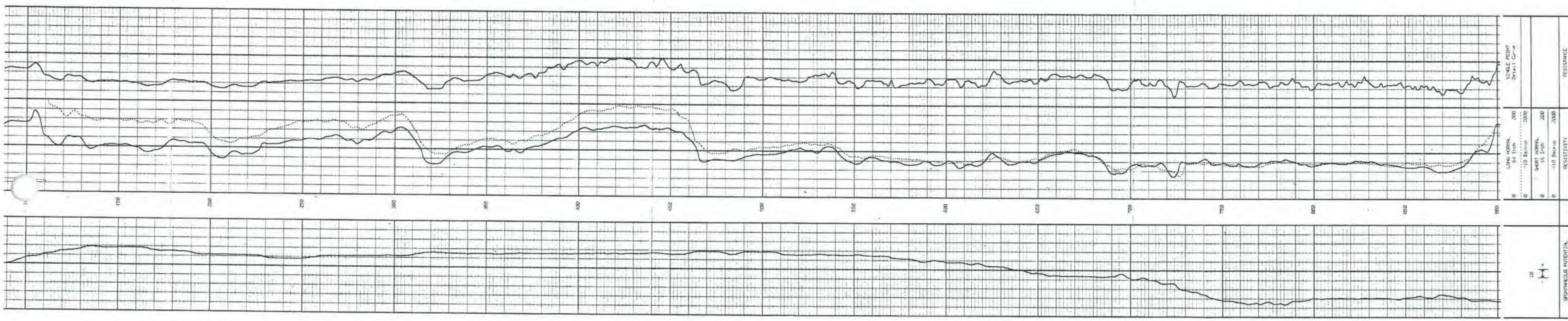
welenco

ELECTRIC LOG

FILING NO.	COMPANY KRIEGER & STEWART 57		
	WELL 57		
	FIELD YUCAIPA		
	COUNTY RIVERSIDE STATE CALIFORNIA		
JOB NO. 33869	LOCATION: OAK GLEN ROAD SEC TWP RGE		OTHER SERV GAMMA RAY SONIC/VDL
Permanent Datum: GROUND LEVEL Elev:			K.B.
Log Measured From G.L. 0 Ft Above Perm Datum			D.F.
Drilling Measured From GROUND LEVEL			G.L.

Date	02-10-2001	- -	- -
Run No.	ONE		
Depth - Driller	900'		
Depth - Logger	900'		
Log Inter.	900'		
Log Inter.	40'		
Casing-Driller	30" at 50'	at	at
Casing-Logger	at 50'	at	at
Bit Size	17.5"		
Type Fluid In Hole	POLY BORE		
Dens. / Visc.	N/A / N/A		
pH / Fluid Loss	N/A / N/A ml	ml	ml
Source of Sample	PIT		
Rm at Meas. Temp	16.6 at 75 F	at 75 F	at 75 F
Rmf at Meas. Temp	15.2 at 75 F	at 75 F	at 75 F
Rmc at Meas. Temp	N/A at -- F	at F	at F
Source: Rmf Rmc	MEAS / N/A		
Rm at BHT	N/A at F	at F	at F
Time Since Circ.	14 HOURS		
Max. Rec. Temp.	N/A F	F	F
Equip / Location	L-16 / BFL		
Recorded By	D. JACKSON		
Witnessed By	M. S. L.		




SINGLE POINT
Detail Curve
RESISTANCE
LONG NORMAL
64 Inch
0 200
x10 Backup
0 2000
SHORT NORMAL
16 Inch
0 200
x10 Backup
0 2000
RESISTIVITY
DEPTH
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
SPONTANEOUS POTENTIAL
millivolts
10

well 57

1S/2W-35

welenco

GAMMA RAY - SONIC - VDL LOG

FILING NO.	COMPANY KRIEGER & STEWART WELL 57 FIELD YUCAIPA COUNTY RIVERSIDE STATE CALIFORNIA		
JOB NO 33069	LOCATION: OAK GLEN ROAD SEC TWP RGE		OTHER SERV: ELOG
PERMANENT DATUM: GROUND LEVEL ELEV: LOG MEASURED FROM G.L. 0 FT ABOVE PERM DATUM DRILLING MEASURED FROM GROUND LEVEL			ELEVATION: KB DF GL

	02-10-2001	02-10-2001	
TYPE OF LOG	GAMMA RAY	SONIC - VDL	
RUN NO.	ONE	ONE	
DEPTH - DRILLER	900'	900'	
DEPTH - LOGGER	900'	900'	
BOTTOM LOGGED INT	900'	892'	
TOP LOGGED INT	0'	0'	
TYPE FLUID IN HOLE	POLY BORE	POLY BORE	
FLUID LEVEL	FULL	FULL	
MAX TEMP DEG F	N/A	N/A	
OPERATING RIG TIME	1 HOUR	1.5 HOURS	
EQUIP. LOCATION	L-16 BFL	L-16 BFL	
OPERATOR	D. JACKSON	D. JACKSON	
WITNESSED BY	M. S. L.	M. S. L.	

RUN	BORE HOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	TYPE	FROM	TO
ONE	17.5"	50'	900'	30"	STEEL	5'	50'

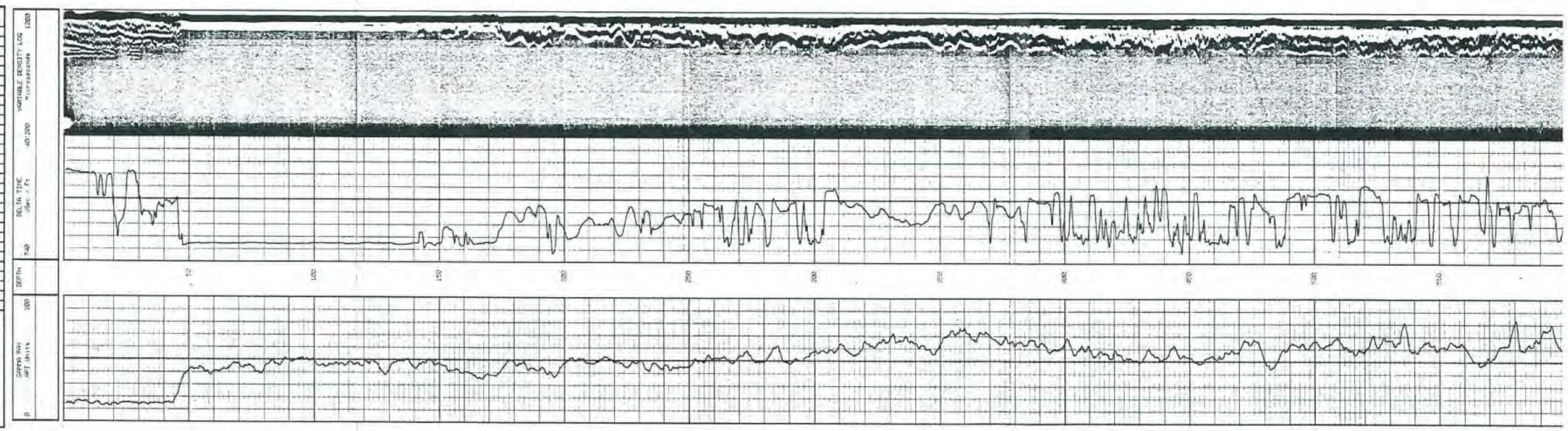
EQUIPMENT DATA

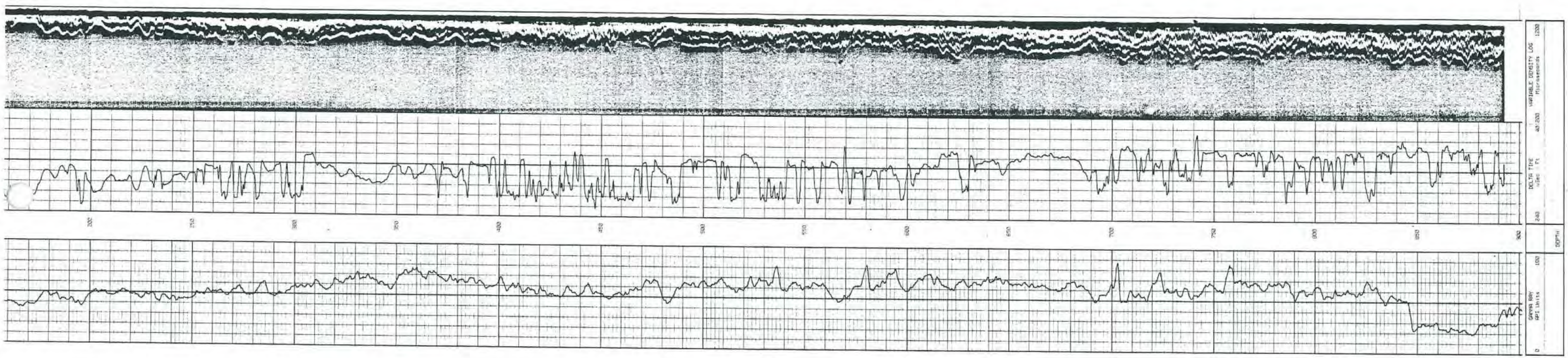
LOG TYPE	GAMMA RAY	SONIC - VDL	
RUN NO.	ONE	ONE	
TOOL MODEL NO.	DRS	MLS	
TOOL SERIAL NO	T-34	T-32	
DIAMETER	1.0"	2.125"	
DETECTOR TYPE	SCINT.	PIEZO.	
DETECTOR LENGTH	8"	3' & 5'	
UNITS/DIV.	10 API	20 uSec/Ft.	
SENSITIVITY	100/122	4	
ZERO DIV L OR R	0 - L	2 - R	
SPEED-FPM	30	17	
DATA SAMPLES/FT	10	10	
FORMATION FACTOR	N/A	N/A	
TIME CONSTANT	3	N/A	
PUMP RATE-GPM	N/A	N/A	
PUMP RATE-GPM	N/A	N/A	
PUMP RATE-GPM	N/A	N/A	

SOURCE TYPE	STRENGTH	SPACING	MODEL NO	SERIAL NO

PERFORATIONS:

REMARKS: VDL RECORDED FROM 5' RECIEVER




VARIABLE DENSITY LOG
Microseconds
200
1200
DELTA TIME
uSec / Ft
240
40
DEPTH
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
GAMMA RAY
API Units
0
100

DUPLICATE
Owner's Copy

WELL 60

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

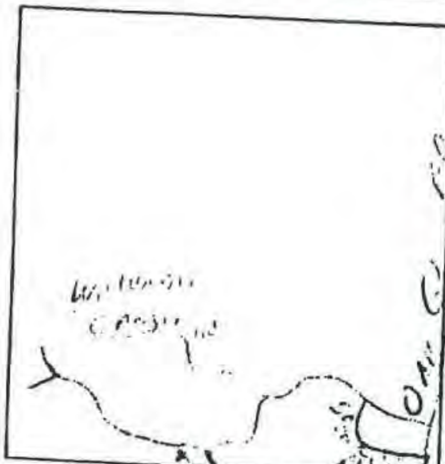
No. 253147

Notice of Intent No. F
Local Permit No. or Date 014773

State Well No. 02S-01W-15F02S
Other Well No.

(1) OWNER: Name [redacted]
Address [redacted]
City LOS ANGELES, CA. ZIP 90004

(2) LOCATION OF WELL (See instructions): W-60
County RIVERSIDE Owner's Well Number #26
Well address if different from above OFF WILDWOOD CYN. RD.
Township 2S Range 1W Section 15F02
Distance from cities, roads, railroads, fences, etc.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☐
Other ☒
(Describe) COMMERCIAL

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 3/8"
Diameter of bore
Packed from 50 to 462 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	462	9 5/8	188	189	399	.060
				399	462	.0120

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing STEEL CASING & CEMENT

(10) WATER LEVELS:
Depth of first water, if known 140 ft.
Standing level after well completion 140 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? DRILLER
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test 140 ft. At end of test ft.
Discharge 500 gal/min after 2 hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 0 ft. Completed depth 462 ft.
from ft. 0 to 462 Formation (Describe by color, character, size or material)

0-20' - FIRM BROWN DIRT
20-25' - FIRM BLUE DG
25-115' - FIRM BROWN DG
115-140' BROKEN UP BLUE GRANITE/LITTLE WATER
140-180' BROKEN UP BLACK GRANITE/WHITE QUARTZ
180-260' BROKEN UP BLUE GRANITE
260-280' BLUE & GREEN GRANITE/LITTLE WATER
280-340' HARD BLUE GRANITE
340-360' HARD BLACK GRANITER
360-380' BROKEN UP BLUE-GREEN GRANITE/WATER
380-400' BROKEN UP BLUE & WHITE GRANITE/WATER
400-420' BROKEN UP BLUE-GREEN GRANITE/WATER
420-440' BROKEN UP BLUE, GREEN, WHITE GRANITE/WA
440-462' HARD BLUE GRANITE

Work started 11-29 19 88 Completed 12-8 19 88

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed Sam Crum
(Well Driller)
NAME SAM CRUM WATER WELL DRILLING
(Person, firm, or corporation) (Typed or printed)
Address 1803 MARYVALE LN.
City HEMET, CA. ZIP 92344
License No. 534298 Date of this report 12-13-88

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

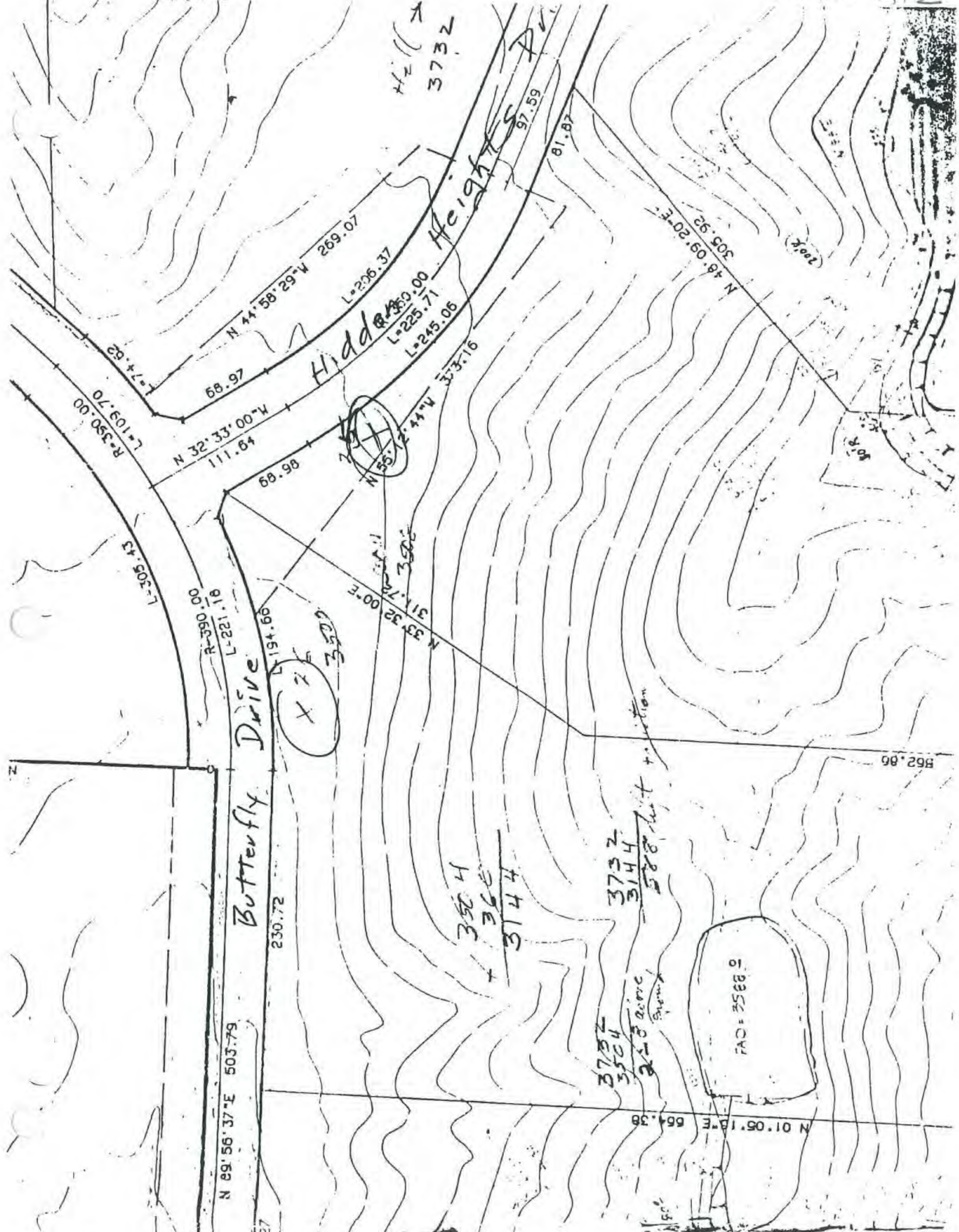
DWR 188 (REV. 12-86)

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

86 96355

Well 60

2S/1W-15F2



Miller Pump Service

Deep Well Turbine Specialists

January 16, 1989

[redacted]
Los Angeles,Ca. 90004

SUBJECT: Well test information:

Dear Mr. [redacted];

Please find enclosed test reports on Wells # 25, and # 26, tested on January 12th., and 13th., 1989.

Well # 25 - I would suggest a pump setting of 300 feet at 150 GPM. Pressure above ground would determine the horse-power of the pump.

Well # 26 - I would suggest a pump setting of 300 feet at 550 GPM maximum in order to stay away from the air being produced from cascading water. I believe the well is capable of producing 800 GPM on a daily basis, 24 hours a day. Pressure above ground would determine the horse-power of the pump.

If you have any questions, please feel free to call me.

Sincerely,

Robert W. Miller

RWM/gf

24041 Mesa View Street • San Jacinto, California 92383 • Telephone (714) 654-8466

Well-61

DUPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 253143

State Well No. 02S/01W-15F01S
Other Well No. ______

Notice of Intent No. ______
Local Permit No. or Date 014770

(1) OWNER: Name [redacted]
Address [redacted]
City LOS ANGELES, CA. ZIP 90004

(2) LOCATION OF WELL (See instructions): W-61
County RIVERSIDE Owner's Well Number #25
Well address if different from above OFF WILDWOOD CYN. RD
Township 2S Range 1W Section 15F01
Distance from cities, roads, railroads, fences, etc. ______

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well [X] Deepening [ ]
Reconstruction [ ]
Reconditioning [ ]
Horizontal Well [ ]
Destruction [ ] (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic [ ]
Irrigation [ ]
Industrial [ ]
Test Well [ ]
Municipal [ ]
Other [X]
(Describe) COMMERCIAL

(5) EQUIPMENT:
Rotary [ ] Reverse [ ]
Cable [ ] Air [X]
Other [ ] Bucket [ ]

(6) GRAVEL PACK:
Yes [XX] No [ ] Size 3/8"
Diameter of bore 12"
Packed from 50 to 462 ft.

(7) CASING INSTALLED:
Steel [XX] Plastic [ ] Concrete [ ]

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	480	8 5/8	180	189	399	.060
				399	462	.0120

(9) WELL SEAL:
Was surface sanitary seal provided? Yes [X] No [ ] If yes, to depth DRILLER ft.
Were strata sealed against pollution? Yes [ ] No [X] Interval ______ ft.
Method of sealing STEEL CASING & CEMENT

(10) WATER LEVELS:
Depth of first water, if known 260 ft.
Standing level after well completion 143 ft.

(11) WELL TESTS:
Was well test made? Yes [X] No [ ] If yes, by whom? DRILLER
Type of test Pump [ ] Bailer [ ] Air lift XX
Depth to water at start of test 143 ft. At end of test ______ ft.
Discharge 475 gal/min after 2 hours Water temperature ______
Chemical analysis made? Yes [ ] No [X] If yes, by whom? ______
Was electric log made Yes [ ] No [X] If yes, attach copy to this report

(12) WELL LOG: Total depth 480 ft. Completed depth 480 ft.
from ft. 0 to 480 Formation (Describe by color, character, size or material)

0-40' - SOFT BROWN DG
40-120' FIRM BROWN DG
120-180' FIRM BLUE DG
180-240' HARD BLUE DG
240-260' BROKEN-UP BLUE DG
260-320' BROKEN-UP BLUE & GREEN DG/WATER
320-340' BLUE & BROWN DG MIX
340-380' BROKEN-UP BLUE DG/WHITE QUARTZ
& MORE WATER
380-480' BROKEN-UP BLUE & GREEN DG WITH
LOTS OF WATER

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

Work started 12-8 19 88 Completed 12-14 19 88

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed ______ (Well Driller)
NAME SAM CRUM WATER WELL DRILLING (Person, firm, or corporation) (Typed or printed)
Address 1803 MARYVALE LN.
City HEMET, CA. ZIP 92344
License No. 534298 Date of this report ______

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

DWR 188 (REV. 12-86)

Miller Pump Service

Deep Well Turbine Specialists

January 16, 1989

[redacted]
Los Angeles,Ca. 90004

SUBJECT: Well test information:

Dear Mr. Dickinson;

Please find enclosed test reports on Wells # 25, and # 26, tested on January 12th., and 13th., 1989.

Well # 25 - I would suggest a pump setting of 300 feet at 150 GPM. Pressure above ground would determine the horse-power of the pump.

Well # 26 - I would suggest a pump setting of 300 feet at 550 GPM maximum in order to stay away from the air being produced from cascading water. I believe the well is capable of producing 800 GPM on a daily basis, 24 hours a day. Pressure above ground would determine the horse-power of the pump.

If you have any questions, please feel free to call me.

Sincerely,

Robert W. Miller

RWM/gf

24041 Mesa View Street • San Jacinto, California 92383 • Telephone (714) 654-8466

Miller Pump Service

Deep Well Turbine Specialists

FIELD TEST REPORT

Owner: [redacted] Well No. 25

Pump Mfr. Goulds Ser. No. ______ Well Dia. 8" Depth 462

Motor Mfr. ______ Ser. No. ______ Frame ______

H.P. 25 RPM 3500 Volts 400 Amps ______ Cycle ______

Power Co. ______ Meter No. ______ Kh ______ C.T. Ratio ______

Engine Mfr. Generator

TEST DATES:		1/12/89	1/13/89			
Pressure Readings in Lbs.	Airline, Static	109	104			
	Airline, Pumping					
	Discharge Head					
Airline Length – Feet		395	395			
Airline Static Pressure – Feet						
STATIC WATER LEVEL		144	155			
Airline Length – Feet						
Airline Pumping Pressure – Feet						
PUMPING LEVEL		201	252			
Discharge Head – Feet						
TOTAL HEAD – Feet		Ø	Ø			
Pumping Level – Feet		201	252			
Static Level – Feet		144	155			
DRAWDOWN		57	97			
Flow Reading	Pitot					
	Orifice					
	Other					
CAPACITY	GPM	185	165			
	Miners Inches					
GPM Per Foot Drawdown		3.24	1.70			
METER DATA: Revs/Sec						
KW Input						
HP Input						
BHP Input to Pump @ % Motor eff.						
PUMP RPM						
LOAD Volts						
LOAD Amps						
Water Horsepower						
Pump Efficiency						
Overall Efficiency						
KWH per Acre Foot						

Pump Setting: 395 ft. 395 ft.

Column Size: 3" Discharge dia. 4" meter

Bowl Assembly (Stages & Type) ______

Remarks:

Miller Pump Service

Deep Well Turbine Specialists

[redacted]

Well # 25 1/12/89

SWL - standing	water level	144 ft.	
9:30 A:M	100 GPM	109 PSI	144 ft. p/L
10:30 A:M	200 GPM	108 PSI	145 ft.
11:30 A:M	220 GPM	106 PSI	149 ft.
12:30 P:M	220 GPM	106 PSI	149 ft.
1:30 P:M	220 GPM	104 PSI	155 ft.
2:30 P:M	200 GPM	94 PSI	179 ft.
3:30 P:M	190 GPM	88 PSI	192 ft.
4:30 P:M	185 GPM	84 PSI	201 ft.

1/13/89

SWL - standing	water level	155 ft.	
8:30 A:M	220 GPM	104 PSI	155 ft. p/L
9:30 A:M	185 GPM	84 PSI	201 ft.
10:30 A:M	177 GPM	76 PSI	219 ft.
11:30 A:M	170 GPM	72 PSI	229 ft.
12:30 P:M	165 GPM	70 PSI	233 ft.
1:30 P:M	165 GPM	66 PSI	243 ft.
2:30 P:M	165 GPM	62 PSI	252 ft.
4:00 P:M	165 GPM	62 PSI	252 ft.

24041 Mesa View Street • San Jacinto, California 92383 • Telephone (714) 654-8466

NOW YUVD WELL #64

H

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in

No. 074476

Notice of Intent No. Well #6
Local Permit No. or Date 08037902

State Well No.
Other Well No.

(1) OWNER: Name [redacted]
Address [redacted]
City Los Angeles, Ca. Zip 90057

(2) LOCATION OF WELL (See instructions): San Bernardino
County Owner's Well Number
Well address if different from above
Township 2S Range 1W Section 2
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☒ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☒
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☒ Size
Diameter of bore 6.218
Packed from to ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☐ No ☒ If yes, to depth ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge 5-6 gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 360 ft. Depth of completed well 360 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	145	DG
145	168	White Quartz, & black rock
168	200	DG
200	210	Fractured granite & DG
210	230	DG
230	258	Fractured granite & DG
258	265	Firmer DG
265	280	Softer- lots of white clay
280	360	Granite & DG
360		STOP-------------------

-Method of Destruction-

Hole filled in with earth & natural cuttings, as per County requirements.

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

Work started 8-13 19 79 Completed 8-14 19 79

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED Joseph L W. Granmer (Well Driller)

NAME Jack Jones Wells & Pumps
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 2031
City Hemet, Ca. Zip 92343
License No. 281601 Date of this report 9-19-79

188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Well 5 V Completely

CATE
er's Copy

Well #5

Very Good

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in

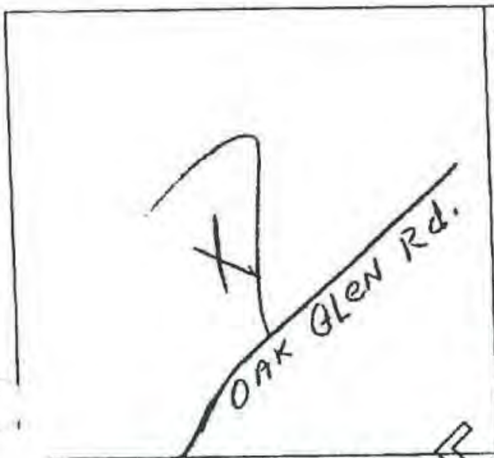
No. 068637

State Well No. ______
Other Well No. ______

...ce of Intent No. ______
...ocal Permit No. or Date ______

(1) OWNER: Name [redacted]
Address [redacted]
City Los Angeles CA. Zip 90057

(2) LOCATION OF WELL (See instructions):
County San Bernardino Owner's Well Number Oak Glen Piggah Peak Truck Tr.
Well address if different from above ______
Township ______ Range ______ Section ______
Distance from cities, roads, railroads, fences, etc. ______



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size ______
Diameter of bore ______
Packed from ______ to ______ ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	200	6	.125

(8) PERFORATIONS:
Type of perforation or size of screen ______

From ft.	To ft.	Slot size
0	200	.188

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth ______ ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ______ ft.
Method of sealing Concrete & Steel

(10) WATER LEVELS:
Depth of first water, if known 115 ft.
Standing level after well completion 140 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? ______
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test ______ ft. At end of test ______ ft.
Discharge 120 gal/min after ______ hours Water temperature ______
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? ______
Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 200 ft. Depth of completed well 200 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	50	Sealed Off
50	95	Fractured Granite & DG
95		Hard Granite
98		Broken Up
99		Hard
105		Broken Granite
115	118	Soft Broken (First Water)
120		15 GPM Hard White Rock
122	123	Broken Up
123		Hard Gray Rock
125		Hard Black Rock
127		Broken Up (More Water)
128		Hard
135		Softer Black (Broken up)
138		DG (Brown) Firm
140		50 GPM
155		Grey DG & Quartz (Firm to Soft)
160		60 GPM
165		Light Gray Rock Almost Quartz (Firm to 50 Ft.)
180		60 GPM
182		Fairly Hard
200 STOP		

Work started 10-3-79 Completed 10-8 19 79

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED Wayne Le Brigne (Well Driller)
NAME Jack Jones Wells & Pumps (Person, firm, or corporation) (Typed or printed)
Address P.O. Box 2031
City Hemet Zip Ca. 92343
License No. 281601 Date of this report 10-20-80

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Well 5 Vert

DUPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

No Good

Do not fill in

No. 074477

State Well No.
Other Well No.

Notice of Intent No. Well #7
Local Permit No. or Date 08147901

(1) OWNER: Name [redacted]
Address [redacted]
City Los Angeles, Ca. Zip 90057

(2) LOCATION OF WELL (See instructions):
County San Bernardino Owner's Well Number
Well address if different from above
Township 2S Range 1W Section 2
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well [X] Deepening [ ]
Reconstruction [ ]
Reconditioning [ ]
Horizontal Well [ ]
Destruction [X] (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic [ ]
Irrigation [ ]
Industrial [ ]
Test Well [X]
Stock [ ]
Municipal [ ]
Other [ ]

(5) EQUIPMENT:
Rotary [ ] Reverse [ ]
Cable [ ] Air [X]
Other [ ] Bucket [ ]

(6) GRAVEL PACK:
Yes [ ] No [ ] Size 6.218
Diameter of bore
Packed from to ft.

(7) CASING INSTALLED:
Steel [ ] Plastic [ ] Concrete [ ]

From ft.	To ft.	Dia. in	Gage or Wall

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes [ ] No [X] If yes, to depth ft.
Were strata sealed against pollution? Yes [ ] No [X] Interval ft.
Method of sealing

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes [ ] No [X] If yes, by whom?
Type of test Pump [ ] Bailer [ ] Air lift [ ]
Depth to water at start of test ft. At end of test ft.
Discharge 125 gal/min after hours Water temperature
Chemical analysis made? Yes [ ] No [X] If yes, by whom?
Was electric log made? Yes [ ] No [X] If yes, attach copy to this report

(12) WELL LOG: Total depth 180 ft. Depth of completed well 180 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	65	Broken rock & clay
65	115	Broken rock & some clay
115	160	Fractured rock (60-120 GPM)
160	180	Hard rock
180		STOP----------------------

-Method of Destruction-

Hole filled in with earth & Natural cuttings, as per County requirements.

Work started 8-15 1979 Completed 8-16 1979

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

SIGNED (Well Driller)

NAME Jack Jones Wells & Pumps (Person, firm, or corporation) (Typed or printed)
Address P.O. Box 2031
City Hemet, Ca. Zip 92343
License No. 281601 Date of this report 9-19-79

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

TRIPLICATE
Owner's Copy

Notice of Intent No. Well #5
Local Permit No. or Date 08107901

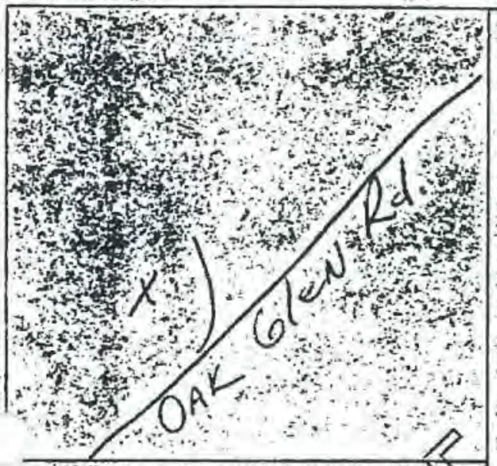
STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

6 — 17

Do not fill in
No. 074475
State Well No.
Other Well No.

(1) OWNER: Name [redacted]
City Los Angeles, Ca. Zip 90057

(2) LOCATION OF WELL (See instructions):
County San Bernardino Owner's Well Number
Well address if different from above
Township 2S Range 1W Section 2
Distance from cities, roads, railroads, fences, etc.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☒ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☒
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size
Diameter of bore 6.218
Packed from to

(7) CASING INSTALLED:
Steel ☐ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☐ No ☒ If yes, to depth ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge 1 gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 240 ft. Depth of completed well 240 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	18	Clay & Broken rock
18	29	Red clay
29	70	Clay, DG, & broken rock
70	115	Soft brittle rock
115	140	Darker-Broken rock
140	145	Fractured black rock
145	154	Black Rock
154	185	Large fractured area
185	200	Soft black rock
200	210	Fractured rock
210	218	Black rock
218	220	White Quartz
220	230	Soft Rock
230	231	White Quartz
231	240	Granite & fractured rock
240		STOP

-Method of Destruction-

Hole filled in with earth & natural cuttings, as per County requirements.

VOID

CONFIDENTIAL NOT FOR PUBLIC WATER CODE SEC 13752

Work started 8-10 19 79 Completed 8-10 19 79

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED Joseph W. Grammer
(Well Driller)
NAME Jack Jones Wells & Pumps
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 2031
City Hemet, Ca. Zip 92343
License No. 281601 Date of this report 9-19-79

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

CC, NWA WELL # 3
Wks eh's DWR

NOW YVWD
WELL 66

WATER WELL DRILLERS REPORT

(Sections 7076, 7080, 7081, 7082, Water Code)

THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

Do Not Fill In

Nº 48782

State Well No. ______

Other Well No. ______

(1) OWNER:

Name [redacted]

Address [redacted] ANAHEIM, CA. 92807

(2) LOCATION OF WELL:

County SAN BERDO Owner's number, if any 3

Township, Range, and Section T2S, R1W, SEC. 2

Distance from cities, roads, railroads, etc. APPROX. 1½ MI. IN A NORTHERLY DIRECTION FROM INTERSECTION OF WILDWOOD CYN & OAK GLEN RDS.

(3) TYPE OF WORK (check):

New Well ☑ Deepening ☐ Reconditioning ☐ Destroying ☐

If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☑ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☑
Cable ☐
Other ☐

(6) CASING INSTALLED:

STEEL: ✓ OTHER:

SINGLE ☑ DOUBLE ☐

~~If gravel packed~~

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
0	180	2" SD.	STD.	2⅞"	0	180
		GALV. PIPE		2"	180	506
				1⅞"	506	550

Size of shoe or well ring: | Size of gravel:

Describe joint COUPLED

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen 1½" I.D. STD. GALV. PIPE

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
300	394½	7	13	3/16" DRILLED HOLES
(PERFORATIONS FROM 311' TO 372')				

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes ☑ No ☐ To what depth 180 ft.

Were any strata sealed against pollution? Yes ☑ No ☐ If yes, note depth of strata

ALL STRATA – ft. 0 TO 180 FT.

From ft. to ft.

Method of sealing

(9) WATER LEVELS: SEE NOTE —— **

Depth at which water was first found, if known ft.

Standing level before perforating, if known ft.

Standing level after perforating and developing ft.

(10) WELL TESTS: SEE NOTE —— *

Was flow test made? Yes ☑ No ☐ If yes, by whom? PIERSON DRILLING

Yield: 44 gal./min. with ft. drawdown after hrs.

Temperature of water 60° Was a chemical analysis made? Yes ☐ No ☑

Was electric log made of well? Yes ☐ No ☑ If yes, attach copy

(11) WELL LOG:

Total depth 550 ft. Depth of completed well 550 ft.

Formation: Describe by color, character, size of material, and structure

FT. TO FT.

0 - 30 - OVERBURDEN
30-156 FT. - MED. RK.
156-157 FT. - CLAY
157-190 FT. - MED. RK.
190-196 FT. - ALT. MED. & HARD RK.
196-256 FT. - MED. RK.
256-309½ FT. - ALT. MED. & HARD RK.
309½ FT.-310 FT. - CLAY
310-375 FT. - ALT. MED. & HARD RK.
375-376 FT. - CLAY
376-497 FT. ALT. MED. & HARD RK.
497-550 FT. - HARD RK.

** WATER PICKUPS (INITIAL FLOWS)
FROM - TO FLOW
0 - 180 FT. - 1 GPM (SEALED OFF)
180-196 FT. - 2 GPM
196-310 FT. - 1 GPM
310 - 315 FT. - 2 GPM
315 - 430 FT. - 4 GPM
430 - 480 FT. - 10 GPM
480 - 512 FT. - 8 GPM
512 - 550 FT. - 17 GPM
TOTAL INITIAL FLOW - 44 GPM

NOTE: WHEN CAPPED, WELL WILL STORE WATER UNDERGROUND UNTIL THE PRESSURE AT COLLAR LEVEL REACHES 14(?) PSI.

* DURING DRILLING OPERATIONS AND AFTER COMPLETION, WELL WAS ALLOWED TO FLOW UN-RESTRICTED FOR PERIODS OF UP TO 48 HRS. & FLOW NEVER DROPPED BELOW 28 GPM. WHEN CAPPED, WELL STORED BACK TO MAXIMUM PRESSURE OVER-NIGHT.

Work started 7/20 1972 Completed 3/29 1973

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME PIERSON DRILLING
(Person, firm, or corporation) (Typed or printed)

Address 23003 OAK LN. (P.O. BOX 1020)
CRESTLINE, CALIF. 92325

[SIGNED] Gene P. Nelson
(Well Driller)

License No. 207691 Dated 3/30, 1973

SKETCH LOCATION OF WELL ON REVERSE SIDE

ORIGINAL WELL # 3
File with DWR

WATER WELL DRILLERS REPORT

(Sections 7079, 7080, 7081, 7082, Water Code)

THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

Do Not Fill In

№ 48782

State Well No. ____

Other Well No. ____

(1) OWNER:

Name [redacted]

Address [redacted]

[redacted] ANAHEIM, CA. 92807

(2) LOCATION OF WELL:

County SAN BERND Owner's number, if any 3

Township, Range, and Section 7 S, 7 W, SEC. 2

Distance from cities, roads, railroads, etc. APPROX. 1 ½ MI. IN A NORTHERLY DIRECTION FROM INTERSECTION OF WILDWOOD CYN & OAK GLEN RDS.

(3) TYPE OF WORK (check):

New Well ☒ Deepening ☐ Reconditioning ☐ Destroying ☐

If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒
Cable ☐
Other ☐

(6) CASING INSTALLED:

STEEL ✓ OTHER:
SINGLE ☒ DOUBLE ☐

~~If gravel packed~~

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
0	180	2" GA.	STD.	2 ⅞"	0	180
		GALV. PIPE		2"	180	506
				1 ½"	506	550

Size of shoe or well ring: ____ Size of gravel: ____

Describe joint COUPLED

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen 1 ½" GA. STD. GALV. PIPE

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
300	394 ½	2	13	¼" DRILLED HOLES
		(PERFORATIONS FROM 311' TO 378')		

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes ☒ No ☐ To what depth 180 ft.

Were any strata sealed against pollution? Yes ☒ No ☐ If yes, note depth of strata

ALL STRATA – ft. 0 TO 180 FT.

From ____ ft. to ____ ft.

Method of sealing ____

(9) WATER LEVELS: SEE NOTE ——— * *

Depth at which water was first found, if known ____ ft.

Standing level before perforating, if known ____ ft.

Standing level after perforating and developing ____ ft.

(10) WELL TESTS: SEE NOTE ——— *

Was pump test made? Yes ☒ No ☐ If yes, by whom? PIERSON DRILLING

Yield: 44 gal./min. with ____ ft. drawdown after ____ hrs.

Temperature of water 60° Was a chemical analysis made? Yes ☐ No ☒

Was electric log made of well? Yes ☐ No ☒ If yes, attach copy

(11) WELL LOG:

Total depth 550 ft. Depth of completed well 550 ft.

Formation: Describe by color, character, size of material, and structure

FT. TO FT. ft. to ft.

0 - 30 - OVERBURDEN
30 - 156 FT. - MED. RK.
156 - 157 FT. - CLAY
157 - 190 FT. - MED. RK.
190 - 196 FT. - ALT. MED. & HARD RK.
196 - 256 FT. - MED. RK.
256 - 309 ½ FT. - ALT. MED. & HARD RK.
309 ½ FT. - 310 FT. - CLAY
310 - 375 FT. - ALT. MED. & HARD RK.
375 - 376 FT. - CLAY
376 - 497 FT. ALT. MED. & HARD RK.
497 - 550 FT. - HARD RK.

** WATER PICKUPS (INITIAL FLOWS)
FROM - TO - FLOW
0 - 180 FT. - 1 GPM (SEALED OFF)
180 - 196 FT. - 2 GPM
196 - 310 FT. - 1 GPM
310 - 315 FT. - 2 GPM
315 - 430 FT. - 4 GPM
430 - 460 FT. 10 GPM
460 - 512 FT. - 8 GPM
512 - 550 FT. - 17 GPM
TOTAL INITIAL FLOW - 44 GPM

NOTE: WHEN CAPPED, WELL WILL STORE WATER UNDERGROUND UNTIL THE PRESSURE AT COLLAR LEVEL REACHES 14.1 PSI.

* DURING DRILLING OPERATIONS AND AFTER COMPLETION, WELL WAS ALLOWED TO FLOW UN-RESTRICTED FOR PERIODS OF UP TO 48 HRS. & FLOW NEVER DROPPED BELOW 28 GPM. WHEN CAPPED, WELL STORED BACK TO MAXIMUM PRESSURE OVER-NIGHT.

Work started 7/20 1972. Completed 7/29 1973

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME PIERSON DRILLING
(Person, firm, or corporation) (Typed or printed)

Address 23003 OAK LN. (P.O. BOX 1028)
CRESTLINE, CALIF. 92325

[SIGNED] [signature]
(Well Driller)

License No. 207491 Dated 9/30, 1973

SKETCH LOCATION OF WELL ON REVERSE SIDE

DWR 188 (REV. 9-88)

ARROWHEAD ; NA S [illegible]

TRIPLICATE
Owner's Copy

NOW YVWD
WELL # 68

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in

No. 069416

DEPARTMENT OF HEALTH SERVICES
JUL 6 - 1982
SAN BERNARDINO

Notice of Intent No. 193717

Permit No. or Date 05068201

State Well No. ____

Other Well No. ____

OWNER: Name [redacted]

Address [redacted]

City Los Angeles Zip 90057

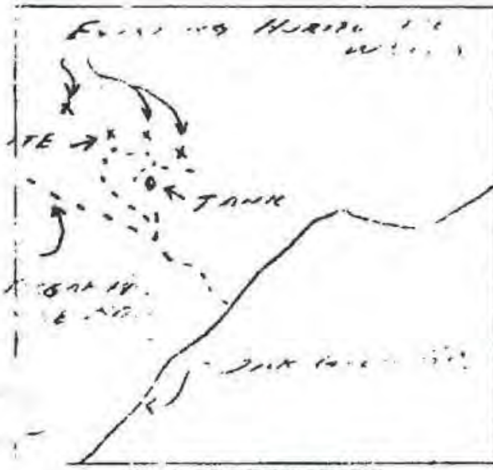
(2) LOCATION OF WELL (See instructions):

County San Berdo. Owner's Well Number 10

Well address if different from above In S.W. ¼ of N.W. ¼

Township 2S Range 1W Section 2

Distance from cities, roads, railroads, fences, etc. Approx. 1½ mi. N. of intersection of Oak Glen rd. & Wildwood Cyn. rd.



WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☒
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

Domestic ☒
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:

Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:

Yes ☐ No ☐ Diameter of bore 2½" - 0 to 284, 2" - 284 to 400

Packed from ____ to ____ ft.

(7) CASING INSTALLED:

Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS: 1½" std. galv. pipe

Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	284	2	schd. 40	283	400	3/16"
	284				drilled holes	

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 384 ft.

Were strata sealed against pollution? Yes ☐ No ☒ Interval ____ ft.

Method of sealing Grout under pressure

(10) WATER LEVELS: See note - - - - - - *

Depth of first water, if known ____ ft.

Standing level after well completion ____ ft.

(11) WELL TESTS: See note - - - - - - - **

Was well test made? Yes ☒ No ☐ If yes, by whom? Pierson Drilling

Type of test Flow Pump ☐ Bailer ☐ Air lift ☐

Depth to water at start of test ____ ft. At end of test 60 ft.

Discharge 67 gal/min after 1 hours Water temperature ____

Chemical analysis made? Yes ☐ No ☒ If yes, by whom? ____

Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 400 ft. Depth of completed well 400 ft.

from ft. to ft. Formation (Describe by color, character, size or material)

0 - 10 - rky overburden
10 - 30 - decomposed granite
30 - 201 - med. hard rk
201 - 203 - clay
203 - 282 - alt. med. & hard rk
282 - 283 - clay
283 - 344 - alt. med. & hard rk
344 - 354 - unstable fault material
354 - 380 - fract. med. rk
380 - 400 - med. hard rk

* Water Pick-ups (Initial Flows)

From	To	Flow
0	283	1½ gpm (sealed off)
283	344	4 gpm
344	350	55 gpm
350	380	8 gpm
380	400	0

Total initial flow - 67 gpm

Note: When capped, well will store water underground until the pressure at collar level reaches 28+ psi.

** After completion, well was allowed to flow unrestricted for 72 hrs. During this time, flow dropped to 64 gpm. where it appeared to be holding steady.

Work started 5/10 19 82 Completed 5/21 19 82

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED ____ (Well Driller)

NAME Pierson Drilling
(Person, firm, or corporation) (Typed or printed)

Address P.O. Box 1028

City Crestline Zip 92325

License No. 304075 Date of this report 6/5/82

188 (REV. 7-78) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

YVWD # 68

TRIPLICATE
Owner's Copy

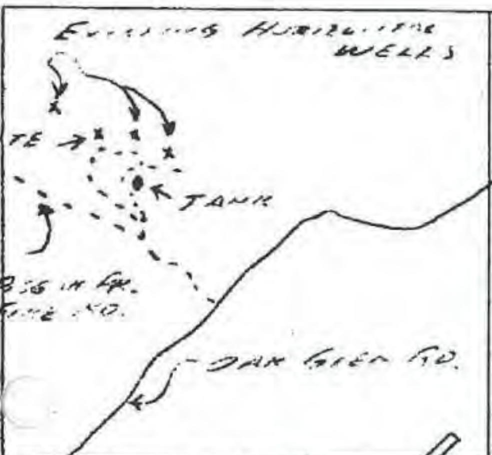
Intent No. 193717
Local Permit No. or Date 05068201

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in
No. 069416
State Well No. ____
Other Well No. ____

(1) OWNER: Name [redacted]
Address [redacted]
City Los Angeles Zip 90057

(2) LOCATION OF WELL (See instructions):
County San Berdo. Owner's Well Number 10
Well address if different from above In S.W. ¼ of N.W. ¼
Township 2S Range 1W Section 2
Distance from cities, roads, railroads, fences, etc. Approx. 1½ mi. N. of intersection of Oak Glen rd. & Wildwood Cyn. rd.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well [X] Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well [X]
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic [X]
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary [X] Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No [X] Size 2½" - 0 to 284
Diameter of bore 2" - 284 to 400
Packed from ____ to ____ ft.

(7) CASING INSTALLED:
Steel [X] Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	284	2	sch. 40

(8) PERFORATIONS: 1½" galv. pipe
Type of perforation or size of screen

From ft.	To ft.	Slot size
283	400	3/16" drilled holes

(9) WELL SEAL:
Was surface sanitary seal provided? Yes [X] No ☐ If yes, to depth 284 ft.
Were strata sealed against pollution? Yes ☐ No [X] Interval ____ ft.
Method of sealing Grout under pressure

(10) WATER LEVELS: See note - - - - - - *
Depth of first water, if known ____ ft.
Standing level after well completion ____ ft.

(11) WELL TESTS: See note - - - - - - - **
Was well test made? Yes [X] No ☐ If yes, by whom? Pierson Drilling
Type of test Flow Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ____ ft. At end of test 60 ft
Discharge 67 gal/min after 1 hours Water temperature ____
Chemical analysis made? Yes ☐ No [X] If yes, by whom? ____
Electric log made? Yes ☐ No [X] If yes, attach copy to this report

(12) WELL LOG: Total depth 400 ft. Depth of completed well 400 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	10	rky overburden
10	30	decomposed granite
30	201	med. hard rk
201	203	clay
203	282	alt. med. & hard rk
282	283	clay
283	344	alt. med. & hard rk
344	354	unstable fault material
354	380	fract. med. rk
380	400	med. hard rk

* Water Pick-ups (Initial Flows)

From	To	Flow
0	283	½ gpm (sealed off)
283	344	4 gpm
344	350	55 gpm
350	380	8 gpm
380	400	0

Total initial flow - 67 gpm

Note: When capped, well will store water underground until the pressure at collar level reaches 28+ psi.

** After completion, well was allowed to flow unrestricted for 72 hrs. During this time, flow dropped to 64 gpm. where it appeared to be holding steady.

Work started 5/10 19 82 Completed 5/21 19 82

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SIGNED ____ (Well Driller)
NAME Pierson Drilling
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 1028
City Crestline Zip 92325
License No. 304075 Date of this report 6/5/82

DWR 188 REV. 7-76 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

TRIPLICATE
Owner's Copy

4 Horiz

THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

YVWD # 69

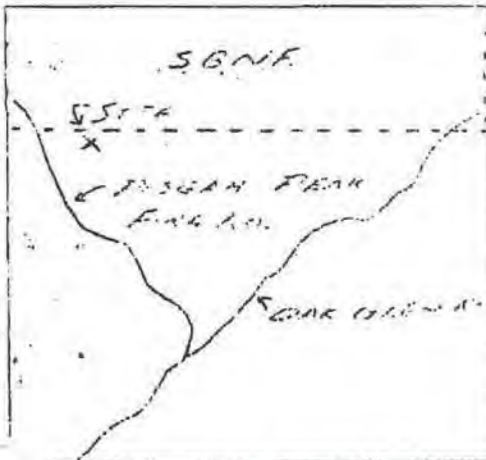
No. 04281

Notice of Intent No. 10583
Local Permit No. or Date 09217802

State Well No.
Other Well No.

(1) OWNER: Name [redacted]
Address [redacted]
City Los Angeles Zip 90057

(2) LOCATION OF WELL (See instructions):
County San Berdo. Owner's Well Number #2
Well address if different from above Old Oak Glen Ranch
Township 2S. Range 1W. Section 2
Distance from cities, roads, railroads, fences, etc. Approx. 1½ mi. N. of intersection of Wildwood Cyn. Rd. & Oak Glen Rd.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well X Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well X
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic X
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary X Reverse ☐
Cable ☐ Air ☐
Other X Horizontal ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size
Diameter of bore 2⅝" 0 to 333½'
2" 333½ to 455ft.
Packed from 1⅞" 455 to 520'

(7) CASING INSTALLED:
Steel X Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen 1¼" std. galv. pipe

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	333½	2" I.D. std. galv.		328.8	455	3/16" drilled holes

(9) WELL SEAL:
Was surface sanitary seal provided? Yes X No ☐ If yes, to depth 333-6 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing Grout under pressure

(10) WATER LEVELS: See note - - - - - - - - *
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS: See note - - - - - - - **
Was well test made? Yes X No ☐ If yes, by whom? Pierson Drilling
Type of test Flow Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge 30 gal/min after hours Water temperature 59°
Chemical analysis made? Yes ☐ No X If yes, by whom?
Was electric log made? Yes ☐ No X If yes, attach copy to this report

(12) WELL LOG: Total depth 520 ft. Depth of completed well 520 ft.
from ft. to ft. Formation (Describe by color, character, size or material)

From ft.	To ft.	Formation
0	5	loose fractured rk.
5	47	Med. hard rk.
47	49	tough clay
49	160	Med. hard rk.
160	196	alt. med. and hard rk.
196	200	very hard rk.
200	332	alt. med. & hard rk.
332	333	tough clay
333	452	Med. hard rk.
452	466	very hard rk.
466	520	alt. med.hard & hard rk.

* Water pick-ups (Initial Flows)

From	To	Flow
0	333	3 G.P.M. (sealed off)
333	390	35 G.P.M.
390	430	15 G.P.M.
430	470	10 G.P.M.

Total initial flow - 60 G.P.M.

Note - When capped, well will store water underground until the pressure at collar level reaches 30+ p.s.i.

** After completion, well was allowed to run unrestricted for periods of up to 72 hrs. several times. During these periods, the flow dropped off from its initial flow of 60 G.P.M. to approx. 30 G.P.M. within 12 hrs. and then held steady for the remainder of the test.

Work started 3/26 1979 Completed 4/27 1979

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SIGNED (Well Driller)
NAME Pierson Drilling (Person, firm, or corporation) (Typed or printed)
Address P.O.Box 1028
City Crestline Zip 92325
License No. 304075 Date of this report 5/8/79

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

TRIPLICATE
Owner's Copy

Well 4 H

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

NOW YVWD
WELL # 69

WATER WELL DRILLERS REPORT

Do not fill in

No. 04281

Notice of Intent No. 10583

Permit No. or Date 09217802

State Well No.

Other Well No.

(1) OWNER: Name [redacted]

[redacted]

City Los Angeles Zip 90057

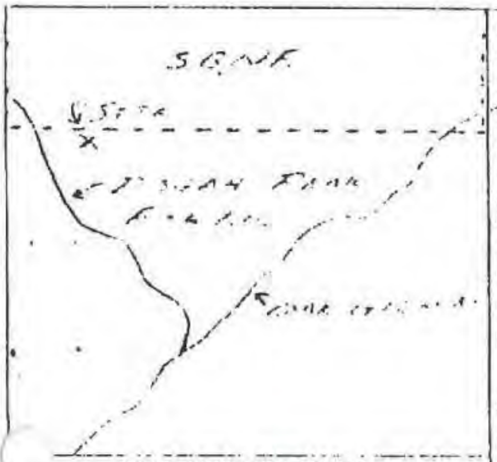
(2) LOCATION OF WELL (See instructions):

County San Berdo. Owner's Well Number

Well address if different from above Old Oak Glen Ranch

Township 2S. Range 1W. Section 2

Distance from cities, roads, railroads, fences, etc. Approx. 1½ mi. N. of intersection of Wildwood Cyn. Rd. & Oak Glen Rd.



WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well [X] Deepening [ ]
Reconstruction [ ]
Reconditioning [ ]
Horizontal Well [X]
Destruction [ ] (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

Domestic [X]
Irrigation [ ]
Industrial [ ]
Test Well [ ]
Stock [ ]
Municipal [ ]
Other [ ]

(5) EQUIPMENT:

Rotary [X] Reverse [ ]
Cable [ ] Air [ ]
Other [X] Horizontal [ ]

(6) GRAVEL PACK:

Yes [ ] No [ ] Size

Diameter of bore 2½" 0 to 333½'
Packed from 2" 333½ to 455ft.
1½" 455 to 520'

(7) CASING INSTALLED:

Steel [X] Plastic [ ] Concrete [ ]

(8) PERFORATIONS:

Type of perforation 1½" std. galv. pipe

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	333½	2" I.D. std. galv.		328-8	455 drilled holes	3/16"

(9) WELL SEAL:

Was surface sanitary seal provided? Yes [X] No [ ] If yes, to depth 333-6 ft.

Were strata sealed against pollution? Yes [ ] No [ ] Interval ft.

Method of sealing Grout under pressure

(10) WATER LEVELS: See note - - - - - - - *

Depth of first water, if known ft.

Standing level after well completion ft.

(11) WELL TESTS: See note - - - - - - - **

Was well test made? Yes [X] No [ ] If yes, by whom? Pierson Drilling

Type of test Flow Pump [ ] Bailer [ ] Air lift [ ]

Depth to water at start of test ft. At end of test ft.

Discharge 30 gal/min after hours Water temperature 59°

Chemical analysis made? Yes [ ] No [X] If yes, by whom?

Was electric log made? Yes [ ] No [X] If yes, attach copy to this report

(12) WELL LOG: Total depth 520 ft. Depth of completed well 520 ft.

from ft. to ft. Formation (Describe by color, character, size or material)

0 5 - loose fractured rk.
5 47 - Med. hard rk.
47 49 - tough clay
49 160 - Med. hard rk.
160 196 - alt. med. and hard rk.
196 200 - very hard rk.
200 332 - alt. med. & hard rk.
332 333 - tough clay
333 452 - Med. hard rk.
452 466 - very hard rk.
466 520 - alt. med.hard & hard rk.

* Water pick-ups (Initial Flows)
From - To Flow
0 333 - 3 G.P.M. (sealed off)
333 390 - 35 G.P.M.
390 430 - 15 G.P.M.
430 470 - 10 G.P.M.
Total initial flow - 60 G.P.M.

Note - When capped, well will store water underground until the pressure at collar level reaches 30+ p.s.i.

** After completion, well was allowed to run unrestricted for periods of up to 72 hrs. several times. During these periods, the flow dropped off from its initial flow of 60 G.P.M. to approx. 30 G.P.M. within 12 hrs. and then held steady for the remainder of the test.

Work started 3/26 19 79 Completed 4/27 19 79

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (Well Driller)

NAME Pierson Drilling (Person, firm, or corporation) (Typed or printed)

Address P.O.Box 1020

City Crestline Zip 92325

License No. 304075 Date of this report 5/8/79

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

NOW YVWD WELL # 70

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

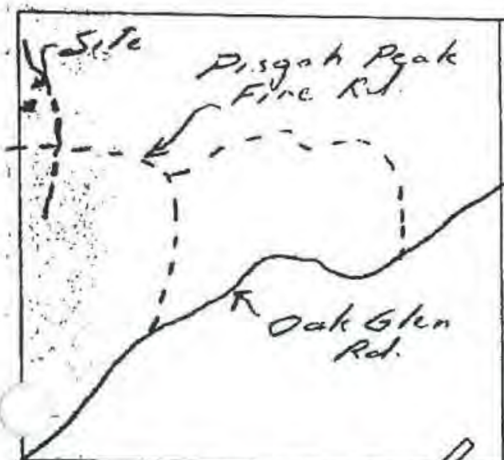
Do not fill in
No. 069452

Intent No. 193755
Local Permit No. or Date 01288601

State Well No. ______
Other Well No. ______

(1) OWNER: Name [redacted]
Address [redacted]
City Los Angeles Zip 90057

(2) LOCATION OF WELL (See instructions):
County San Berdo. Owner's Well Number 13
Well address if different from above ______
Township 2S Range 1W Section 2
Distance from cities, roads, railroads, fences, etc. In the westerly portion of the SW 1/4 of NW 1/4 of NW 1/4, Sec. 2



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other Horizontal Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☒ Size 0 - 273
Diameter of bore 2" 273 - 496
Packed from ______ to ______ ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	273	2"	std.
galv. pipe			

(8) PERFORATIONS:
Type of perforation or size of screen 1 1/2 galv. pipe

From ft.	To ft.	Slot size
272	496	3/16"
drilled holes		

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 273 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ______ ft.
Method of sealing Grout under pressure

(10) WATER LEVELS: See note
Depth of first water, if known ______ ft.
Standing level after well completion ______ ft.

(11) WELL TESTS: See note
Was well test made? Yes ☒ No ☐ If yes, by whom? Pierson Drlg.
Type of test Flow Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ______ ft. At end of test ______ ft.
Discharge 38 gal/min after 72 hours Water temperature 60°
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? ______
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 496 ft. Depth of completed well 496 ft.
from ft. to ft. Formation (Describe by color, character, size or material)

0 - 3 - overburden
3 - 70 - decomposed granite
70 - 128-6 - Med. rk.
128-6 - 129 - clay
129 - 272-6 - alt. Med. & hard rk.
272-6 - 273 - clay
273 - 330 - Med. rk.
330 - 410 - alt. Med. hard & hard rk.
410 - 456 - Med. rk
456 - 467 - Fault zone
467 - 476 - alt. Med. & hard rk.

Water Pickups (Initial Flows)
From - To - Flow
0 - 273 - 0
273 - 370 - 2 gpm
374 - 456 - 2 gpm
456 - 467 - 25 gpm
467 - 480 - 15 gpm
480 - 496 -
Total Initial Flow - 45 gpm

Note: When capped, well will store water underground until the pressure at collar level reaches 21(+) psi.

** During drilling operations and after completion, well was allowed to flow unrestricted for periods of up to 72 hrs. Initial flow of 45 gpm drops to 42 gpm in 1 hr and 38 gpm after 24 hrs - then no further drop was noted.

Work started 1/27 1986 Completed 2/20 1986

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED Gene P. Nelson (Well Driller)
NAME Pierson Drilling
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 1028
City Crestline Zip 92325
License No. 304075 Date of this report 3/4/86

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

YVWD # 71

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 069445

State Well No. ______
Other Well No. ______

Notice of Intent No. 193748
Local Permit No. or Date 05088501

(1) OWNER: Name [redacted]
Address [redacted]
City Los Angeles Zip 90057

(2) LOCATION OF WELL (See instructions):
County San Berdo Owner's Well Number 12
Well address if different from above ______
Township 2N Range 1W Section 2
Distance from cities, roads, railroads, fences, etc. in SW¼ of NW¼ of NW¼, Sec. 2, T2B, R1W.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☒
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☒
Other ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size 0-295
Diameter of bore 7"-295-445
Packed from ______ to ______ ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen 12 gal. galv. pipe

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	295	8	std.	294	399	none
	galv. pipe			399	445	3/16"
				drilled holes		

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 295 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ______ ft.
Method of sealing Grout under pressure

(10) WATER LEVELS: See note — *
Depth of first water, if known ______ ft.
Standing level after well completion ______ ft.

(11) WELL TESTS: See note — **
Was well test made? Yes ☐ No ☐ If yes, by whom? Pierson Drilling
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ______ ft. At end of test ______ ft
Discharge 50 gal/min after 72 hours Water temperature 60°
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? ______
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 445 ft. Depth of completed well 445 ft.
from ft. to ft. Formation (Describe by color, character, size or material)

0 - 3 - overburden
3 - 105 - decomposed granite
105 - 291 - alt. Med. & Med Hard rk.
291 - 294 - clay (fault)
294 - 380 - alt. Med & hard rk
380 - 400 - Med rk & unstable (fault)
400 - 445 - Med rk.

*Water Pick-ups (Initial Flows)
From To Flow
0 - 294 - 1 gpm (sealed off)
294 - 380 - 5 gpm
380 - 400 - 4 gpm
400 - 410 - 45 gpm
410 - 445 - 10 gpm
Total Initial Flow - 60 gpm

Note: When capped well will stop water under ground until the pressure at collar level reaches 24(+) psi.

** After completion, well was allowed to flow unrestricted for 72 hrs. During first 12 hrs, initial flow dropped to 50 gpm - Then no further drop was noted.

Work started 5/10 19 85 Completed 5/31 19 85

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SIGNED Gene P. Nelson (Well Driller)
NAME Pierson Drilling (Person, firm, or corporation) (Typed or printed)
Address P.O. Box 1028
City Crestline Zip 92325
License No. 304075 Date of this report 6/6/85

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

- NOW YVWD. WELL # 72

TRIPLICATE
Owner's Copy

2S/1W-3H1

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 322799

Notice of Intent No. ______
Local Permit No. or Date 02279013

State Well No. ______
Other Well No. ______

(1) OWNER: Name [redacted]
Address [redacted]
City [illegible] ANGELES, CA. ZIP 90004

(2) LOCATION OF WELL (See instructions):
County SAN BERNARDINO Owner's Well Number 28
Well address if different from above OFF OAK GLEN RD IN
Township 2S Range 1W Section 3
Distance from cities, roads, railroads, fences, etc. APP. 3 MILES OFF OAK GLEN RD. IN OAK GLEN CA.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well [X] Deepening [ ]
Reconstruction [ ]
Reconditioning [ ]
Horizontal Well [ ]
Destruction [ ] (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic [ ]
Irrigation [ ]
Industrial [X]
Test Well [ ]
Municipal [ ]
Other [ ]
(Describe)

(5) EQUIPMENT:
Rotary [ ] Reverse [ ]
Cable [ ] Air [X]
Other [ ] Bucket [ ]

(6) GRAVEL PACK:
Yes [X] No [ ] Size 3/8"
Diameter of bore 8"
Packed from 50 to 500 ft.

(7) CASING INSTALLED:
Steel [X] Plastic [X] Concrete [ ]

From ft.	To ft.	Dia. in.	Gage or Wall
0	10	8 5/8"	.250
0	500	5"	200

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size
300	500	.032

(9) WELL SEAL:
Was surface sanitary seal provided? Yes [X] No [ ] If yes, to depth 50 ft.
Were strata sealed against pollution? Yes [ ] No [X] Interval ______ ft.
Method of sealing STEEL & CONCRETE

(10) WATER LEVELS:
Depth of first water, if known 320 ft.
Standing level after well completion 300 ft.

(11) WELL TESTS:
Was well test made? Yes [X] No [ ] If yes, by whom? DRILLER
Type of test Pump [ ] Bailer [ ] Air lift [X]
Depth to water at start of test ______ ft. At end of test ______ ft.
Discharge 60 gal/min after ______ hours Water temperature ______
Chemical analysis made? Yes [ ] No [X] If yes, by whom? ______
Was electric log made Yes [ ] No [X] If yes, attach copy to this report

(12) WELL LOG: Total depth 500 ft. Completed depth 500 ft.
from ft. 0 to 500 ft. Formation (Describe by color, character, size or material)

0-160'	-	FIRM BROWN DG
160-200'		BROKENUP BLUE GRANITE
200-280'		BROKENUP BLACK GRANITE
280-360'		BROKENUP BLUE GRANITE/WATER
360-440'		BROKENUP BLUE & BLACK GRANITE
440-460'		BROKENUP BLUE-GREEN GRANITE/WATER
460-500'		BROKENUP BLACK & BLUE GRANITE
500'	-	STOP

Work started 3-8 19 90 Completed 3-13-90 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed ______ (Well Driller)
NAME SAM CRUM WATER WELL DRILLING, INC.
(Person, firm, or corporation) (Typed or printed)
Address 1803 MARYVALE LN.
City HEMET, CA. ZIP 92344
License No. 534298 Date of this report 3-16-90

DWR 188 (REV. 12-86)

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

86 96355

3ˡ #28

County of San Bernardino — Environmental Public Works Agency
ENVIRONMENTAL HEALTH SERVICES DEPARTMENT
385 North Arrowhead Avenue, San Bernardino, CA 92415-0160

Do Not Fill In
Permit No. 022 79613
Expiration 2-27-91
FF
FA
SN

WELL PERMIT

Well #72

2S/1W-3H1

PLEASE PRINT:

1. OWNER: Name [redacted]
Mailing Address [redacted]

City Los Angeles Zip 90004

Phone No. (213) 463-1181

2. DATE OF WORK *(approximate)*:

Start 3/1/90 Complete 3/6/90

3. WELL DRILLER *(Check One)*:

☐ Owner ☒ Contractor SAM CRUM WATER WELL DRILLING
Name

4. WELL USE *(check)*:

☐ Community ☐ Horizontal ☐ Other
☐ Individual ☒ Test
☐ Agricultural ☐ Monitoring
☐ Dairy ☐ Public Water Supply

5. TYPE OF WORK *(check)*:

☒ New ☐ Reconstruction ☐ Destruction

Items 6 through 10 to be estimated for new wells, and exact for all other wells.

6. ANNULAR SEAL: Seal Depth ______ ft.

Furnished by: ☐ Owner ☐ Contractor

☐ Driven Conductor Dia. ______ in., Wall (Gage) ______

☐ Sealing Material ______, Thickness ______ in.

7. DEPTH OF WELL *(feet)*:

Proposed 500 Existing ______

DIAMETER OF BORE *(in.)*: 8

8. CASING INSTALLED:

☐ Steel ☐ Plastic ☐ Other

From (ft.)	To (ft.)	Dia. (in.)	Wall (Gage)

GRAVEL PACK: ☐ Yes ☐ No

From ______ to ______ ft.

9. PERFORATIONS *(if applicable)*:

From ______ to ______ ft.

10. SEALED ZONES *(if applicable)*:

From ______ to ______ ft.

11. LOCATION INFORMATION: 20C-6D

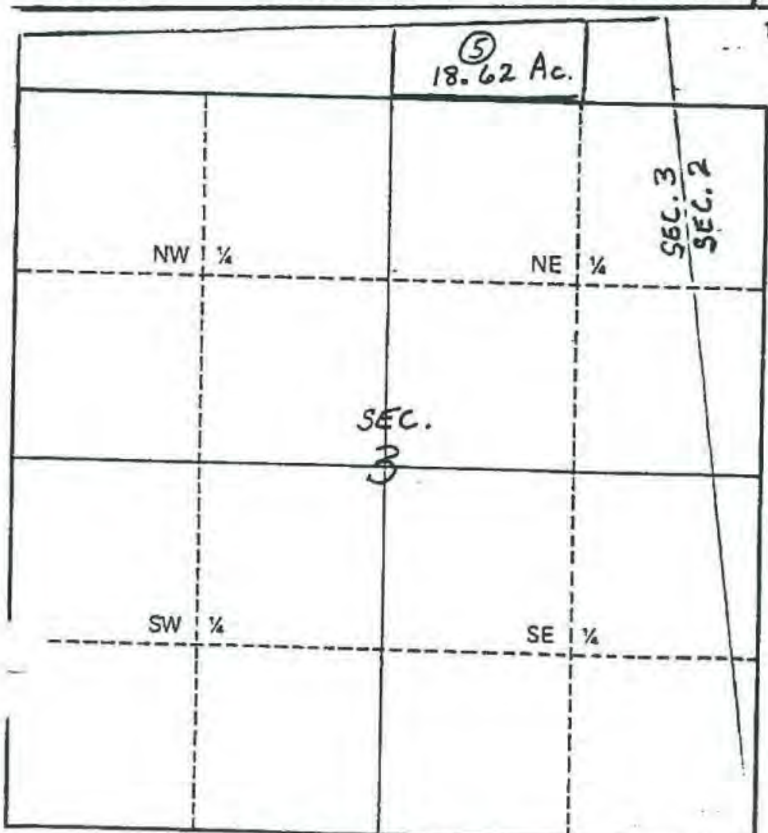
(a) Township 2S N/S Range 1W E/W

Section 3

(b) Assessor's Parcel No. 325 011 05

(c) Solid or liquid waste disposal site within two miles?
☐ Yes ☒ No

Location Gov. Lot #2 - Off Fisgah Peak Fire R



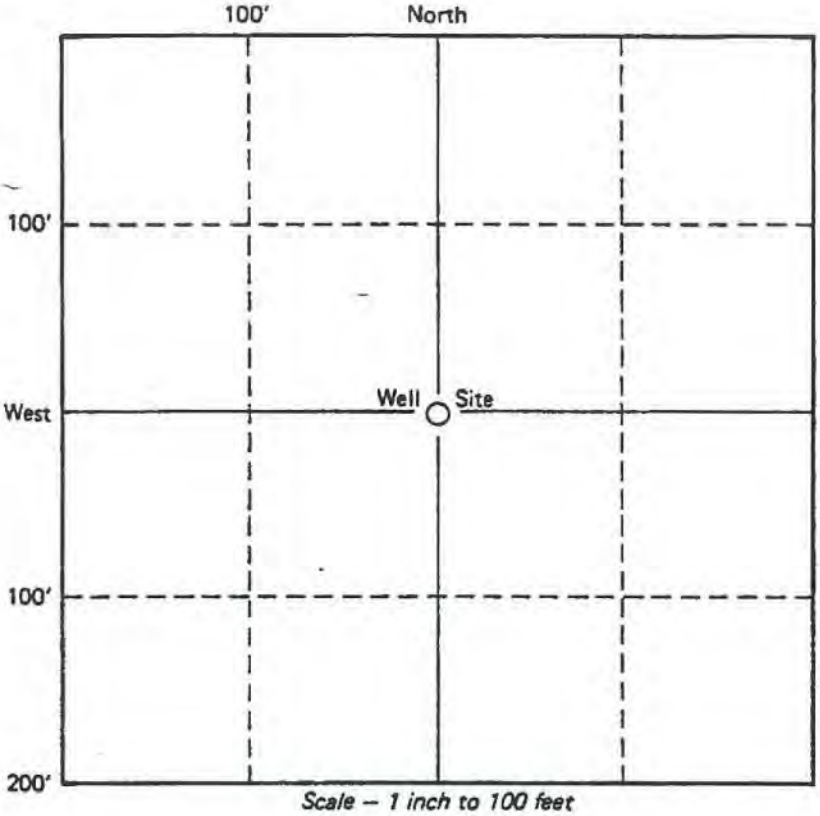
Scale — 1 inch to 1/4 mile

Do Not Fill In

SAN BERNARDINO CO.
LAND MANAGEMENT - E.P.W.A.
01 00027239 0045 CHR 02/20/90 15:01
005 ENV HEALTH SERV TOT PAID: 110.00
0 00000000
561 EHS 110.00

03-14785-631 Rev. 8/88

well #72 2S/1W-34I



12. PLOT PLAN:

(a) In perspective to the well site, sketch and label the following items: well lot property lines, other wells *(include abandoned wells)*, sewage disposal systems *(sewers, septic tanks, leaching fields, seepage pits, cesspools)*, lakes and ponds, water courses and animals or fowl kept.

(b) Indicate the distance in *feet*, of any of the following which are within 200 ft. of the well site:

Other wells	
Sewers	
Septic tanks	
Leaching fields	
Seepage pits	
Cesspools	
Lakes and ponds	
Water courses	
Animals or fowl kept	

(c) ☒ None of the above are within 200 feet of the well site.

---

13. I have read this application and agree to comply with all laws regulating the type of work being performed. The California Labor Code requires Workers' Compensation Insurance as a prerequisite to permit issuance unless the applicant signs the following certificate:

☐ I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner so as to become subject to the Workers' Compensation laws of California.

Owner's Signature ______________________ Date ______________

☒ Contractor's Signature Sam Crum Date 2/7/90 Reg. No. 134

DISPOSITION OF PERMIT

(Do Not Fill In)

☒ Approved subject to the following:

A. Notify the Department, Jon Tracey (714) 387-4666, twenty-four (24) hours in advance to make an inspection of the following operations:

3/26/90

☒ Prior to sealing of the annular space or filling of the conductor casing.

☐ Verify the depth of the conductor (outer) casing prior to further drilling and installation of the inner casing.

AB ☒ After installation of the surface protective slab and pumping equipment.

☐ During destruction of wells, prior to pouring the sealing material.

B. Submit to the Department within thirty (30) days after completion of work, a copy of:

☒ Water Well Driller's Report ☐ Bacteriological Analysis ☐ Inorganic Chemical Analysis

☐ Radiological Analysis ☐ General Mineral ☐ Organic Chemical Analysis ☐ General Physical

C. Other Test wells shall be amended or destroyed under permit within 24 hours of completion of test work.

☐ DENIED ______________________________

Well # 18 NOW YVWD WELL # 73

TRIPLICATE
Owner's Copy 2S/W-3B1

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in
No. 204467

Notice of Intent No. ______
Permit No. or Date ______

State Well No. ______
Other Well No. ______

(1) OWNER: Name [redacted]
Address [redacted]
City Los Angelds, CA Zip 90057

(2) LOCATION OF WELL (See instructions):
County San Bernadino Owner's Well Number 18
Well address if different from above Wildwood Cyan Rd.
Township ______ Range ______ Section ______
Distance from cities, roads, railroads, fences, etc. ______

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well [X] Deepening [ ]
Reconstruction [ ]
Reconditioning [ ]
Horizontal Well [ ]
Destruction [ ] (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic [X]
Irrigation [ ]
Industrial [ ]
Test Well [ ]
Stock [X]
Municipal [ ]
Other [ ]

(5) EQUIPMENT:
Rotary [ ] Reverse [ ]
Cable [ ] Air [X]
Other [ ] Bucket [ ]

(6) GRAVEL PACK:
Yes [ ] No [ ] Size ______
Diameter of bore ______
Packed from ______ to ______ ft.

(7) CASING INSTALLED:
Steel [ ] Plastic [X] Concrete [ ]

(8) PERFORATIONS:
Type of perforation or size of screen ______

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	400	8				

(9) WELL SEAL:
Was surface sanitary seal provided? Yes [X] No [ ] If yes, to depth 50 ft.
Were strata sealed against pollution? Yes [ ] No [ ] Interval ______ ft.
Method of sealing Steel- cement

(10) WATER LEVELS:
Depth of first water, if known 240 ~~XXXXXX~~ ft.
Standing level after well completion 145 ft.

(11) WELL TESTS:
Was well test made? Yes [ ] No [ ] If yes, by whom? ______
Type of test Pump [ ] Bailer [ ] Air lift [ ]
Depth to water at start of test ______ ft. At end of test ______ ft
Discharge ______ gal/min after ______ hours Water temperature ______
Chemical analysis made? Yes [ ] No [ ] If yes, by whom? ______
Was electric log made? Yes [ ] No [ ] If yes, attach copy to this report

(12) WELL LOG: Total depth 400 ft. Depth of completed well 400 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	- 20	Broken brown DG
20	- 60	Broken to hard blue green roc
60	- 80	Broken up blue green rock
80	-120	clay brown white mix
1200	-140	Blck gran
140	-180	Broken up blue/green
180	-200	Brown & green boke up
200	-240	water brown
240	-280	brown & green broken up
280	-320	water- green broken up
320	-340	green & brown broken up
340	-400	Black granite- STOP

Work started 1-18 19 88 Completed 1-26 19 88

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED ______ (Well Driller)

NAME Jack Jones WElls & Pumps
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 250
City Hemet, CA 92343
License No. 436011 Date of this report 3-18-88

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

2S/1W-3A1 NOW YVWD WELL # 74

ORIGINAL

File with DWR

Notice of Intent No. ____

Permit No. or Date 08158807

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

R

Do not fill in

No. 217126

State Well No. ____

Other Well No. ____

(1) OWNER: Name [redacted]

Address [redacted]

City Los Angeles, CA Zip 90004

(2) LOCATION OF WELL (See instructions):

County San Bernardino Owner's Well Number 20

Well address if different from above Parcel 325-011-08

Township 2S Range 1W Section 3

Distance from cities, roads, railroads, fences, etc. ____

WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well ☒ Deepening ☐

Reconstruction ☐

Reconditioning ☐

Horizontal Well ☐

Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

Domestic ☒

Irrigation ☐

Industrial ☐

Test Well ☐

Stock ☒

Municipal ☐

Other ☐

(5) EQUIPMENT:

Rotary ☐ Reverse ☐

Cable ☐ Air ☒

Other ☐ Bucket ☐

(6) GRAVEL PACK:

Yes ☒ No ☐ Size 614 Wall Rock

Diameter of bore 12¼"

Packed from 50 to 583 ft.

(7) CASING INSTALLED:

Steel ☒ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	200	8-5/8	.188

(8) PERFORATIONS:

Type of perforation or size of screen ____

From ft.	To ft.	Slot size
200	583	.100

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.

Were strata sealed against pollution? Yes ☒ No ☐ Interval ____ ft.

Method of sealing ____

(10) WATER LEVELS:

Depth of first water, if known ____ ft.

Standing level after well completion 232 ft.

(11) WELL TESTS:

Was well test made? Yes ☒ No ☐ If yes, by whom? ____

Type of test Pump ☐ Bailer ☐ Air lift ☐

Depth to water at start of test ____ ft. At end of test ____ ft

Discharge ____ gal/min after ____ hours Water temperature ____

Chemical analysis made? Yes ☐ No ☐ If yes, by whom? ____

Electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 0 ft. Depth of completed well 583 ft.

from ft. to ft. Formation (Describe by color, character, size or material)

0 - 18 - Fine sand & brown clay.

18 - 39 - Fine sand & shale.

39 - 78 - Fine sand & rock with shale mix.

78 - 129 - Fine & medium coarse sand with streaks of shale & granite.

129 - 318 - Decomposed granite - blue in color.

318 - 583 - Decomposed granite - solid formation - blue green in color.

NOT FOR PUBLIC USE
WATER CODE SEC. 13752

Work started ____ 19__ Completed ____ 19__

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED William Steese (Well Driller)

NAME William Steese - SoCal Pump & Well Service
(Person, firm, or corporation) (Typed or printed)

Address 585 W. Valley Blvd.

City Bloomington, CA Zip 92316

License No. 510836 Date of this report 11/29/88

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Well #16 NOW YVWD WELL # 75

1S/1W-34Q1

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in
No. 193900

State Well No.______
Other Well No.______

Notice of Intent No.______
Permit No. or Date______

(1) OWNER: Name [redacted]
Address [redacted]
City Los Angeles, Ca. Zip 90057

(2) LOCATION OF WELL (See instructions):
County San Bernadino Owner's Well Number______
Well address if different from above______
Township______ Range______ Section______
Distance from cities, roads, railroads, fences, etc.______

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size______
Diameter of bore______
Packed from______ to______ ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen______

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
	420	8"				

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval______ ft.
Method of sealing Cement-Steel/10"

(10) WATER LEVELS:
Depth of first water, if known 240 ft.
Standing level after well completion 145 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom?______
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test______ ft. At end of test______ ft
Discharge 150gal/min after______ hours Water temperature______
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?______
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 420 ft. Depth of completed well 420 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	20	Broke Up Brown DG
20	40	Broke Up blue/green rock
40	60	Hard blue/green rock
60	80	Broke Up Blue/green rock
80	100	Hard blue/green rock
100	120	Clay brown/white mix broke up
120	140	Black gran. & blue/green mix
140	160	Broke Up Blue/Green
160	180	Brke Up Blue/ Green
180	200	Broke Up blue/green rock
200	220	Brown & green broke up
220	240	" " water
240	260	water " "
260	280	" " water
280	300	" " water
300	320	" " water
320	340	" " water
340	360	" " water
360	380	" " water
380	400	" " water
400	420	Hard black granite

Work started 3-13 19 87 Completed 4-1 19 87

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED______ (Well Driller)

NAME Ron Engeldinger (Person, firm, or corporation) (Typed or printed)
Address P.O. Box 250
City Hemet, Ca. Zip 92343
License No. 294625 Date of this report 4-16-878

188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Well 10b

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0107583

Page 1 of 1

Owner's Well Number MW-4

Date Work Began 11/18/2009 Date Work Ended 11/18/2009

Local Permit Agency Riverside County Department of Environmental Health

Permit Number WP 20441 Permit Date 11/10/09

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Hollow Stem Auger Drilling Fluid Air

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	4	Silty sand, fine to medium with gravel, light brown
4	9	Sand, fine to coarse with silt and gravel, brown
9	27	Silty sand, fine with medium and clay, brown
27	46	Silty sand, fine to medium with clay, brown
46	54	Silty sand, fine, gray brown
54	82	Sandy silt, fine with clay, brown

Total Depth of Boring 82 Feet

Total Depth of Completed Well 80 Feet

Well Owner

Name [redacted]

Mailing Address [redacted]

City Yucaipa State CA Zip 92399

Well Location

Address San Timoteo Canyon Road

City Calimesa County Riverside

Latitude 33 Deg. 59 Min. 15 Sec. N Longitude 117 Deg. 8 Min. 4 Sec. W

Datum NAD83 Decimal Lat. 33.987 Decimal Long. 117.134

APN Book 413 Page 380 Parcel 004

Township 2S Range 2W Section 19

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West East South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy (Describe procedures and materials under "GEOLOGIC LOG")

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
⦿ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water 60 (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	65	10	Blank	PVC Sch. 40		4		
65	80	10	Screen	PVC Sch. 40		4	Milled Slots	0.020

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	51	Cement	seal
51	55	Bentonite	seal
55	80	Filter Pack	sand

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Jay J. Martin for C.H.J., Incorporated, Vice President, CEG 1529 (Person, Firm or Corporation)

1355 E. Cooley Drive (Address) Colton (City) CA (State) 92324 (Zip)

Signed [signature] (C-57 Licensed Water Well Contractor) 3/18/2010 (Date Signed) 766402 (C-57 License Number)

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

MONITORING WELL NO. MW-4

Date Drilled: 11/18/09 | Client: [redacted]

Equipment: B-61 Hollow-Stem Auger | Driving Weight / Drop: 140 lbs./30 in.

Coordinates: 33.987°-117.134° | Logged by: VJR | Groundwater First Encountered (ft): 60.0

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	SAMPLE NO.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/FOOT (Equiv. SPT)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
		(SM) Silty Sand, fine to medium, gravel, light brown	Native						
				X		4 4 4			SPT
		(SP-SM) Sand, fine to coarse with silt, gravel, brown							
5				X		5 7 10			SPT
		(SM) Silty Sand, fine with medium, clay, brown							
10				X		5 8 13			SPT
15				X		6 9 13			SPT
20				X		6 10 18			SPT
25									
		(SM) Silty Sand, fine to medium, clay, brown							
30				X		9 15 19			SPT

MONITORING_WELL 09631-8.GPJ CHJ.GDT 11/24/09

MONITORING WELL NO. MW-4

Date Drilled: 11/18/09 | Client: [redacted]

Equipment: B-61 Hollow-Stem Auger | Driving Weight / Drop: 140 lbs./30 in.

Coordinates: 33.987°-117.134° | Logged by: VJR | Groundwater First Encountered (ft): 60.0

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	SAMPLE NO.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/FOOT (Equiv. SPT)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
40				X		10 20 26			SPT
45									
		(SM) Silty Sand, fine, gray brown							
50				X		8 14 28			SPT
		(ML) Sandy Silt, fine with clay, brown							
55									
60			Groundwater	X		9 16 24			SPT
65									

MONITORING_WELL 09631-8.GPJ CHJ.GDT 11/24/09

MONITORING WELL NO. MW-4

Date Drilled: 11/18/09 | Client: [redacted]

Equipment: B-61 Hollow-Stem Auger | Driving Weight / Drop: 140 lbs./30 in.

Coordinates: 33.987°-117.134° | Logged by: VJR | Groundwater First Encountered (ft): 60.0

DEPTH (ft)	GRAPHIC LOG	VISUAL CLASSIFICATION	SAMPLE NO.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/FOOT (Equiv. SPT)	FIELD MOISTURE (%)	DRY UNIT WT. (pcf)	LAB/FIELD TESTS
				X		45 50/3"			SPT
75									
80				X		14 27 46			SPT
		END OF BORING	Refusal						
		REFUSAL AT 81.5', NO BEDROCK NO FILL, SLIGHT CAVING PERCHED LAYER OF GROUNDWATER ENCOUNTERED AT 60.0'							
85									
90									
95									
100									

MONITORING_WELL 09631-8.GPJ CHJ.GDT 11/24/09

C.H.J.

WELLS - SAN TIMOTEO & LIVE OAK CANYONS
RIVERSIDE COUNTY, CALIFORNIA

Job No. 09631-8

Enclosure B-4c

WCR 107

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0115380

Page 1 of 2

Owner's Well Number

Date Work Began 07/29/2010 Date Work Ended 8/4/2010

Local Permit Agency San Bernardino Department of Public Health

Permit Number 7010070342 Permit Date 7/23/10

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ◉ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Reverse Rotary Drilling Fluid Fresh Water

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
35	90	Sand Gravel
90	120	Sand Clay
120	200	Sand Gravel
200	250	Sand Gravel Clay
250	310	Sand Gravel
310	340	Sand Gravel Clay
340	417	Sand Gravel

Total Depth of Boring 417 Feet

Total Depth of Completed Well 415 Feet

Well Owner

Name [redacted]

Mailing Address [redacted]

City [redacted] State CA Zip 92399

Well Location

Address San Timoteo Canyon Road

City Yucaipa County San Bernardino

Latitude Deg. Min. Sec. N Longitude Deg. Min. Sec. W

Datum Decimal Lat. Decimal Long.

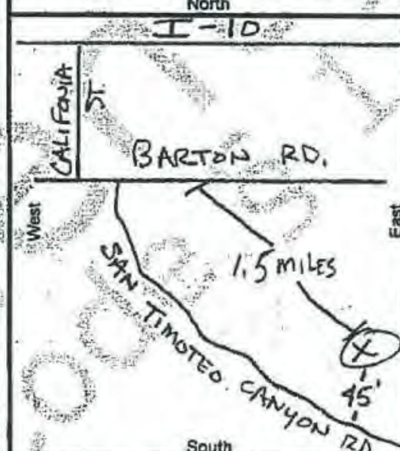
APN Book 0175 Page 221 Parcel 06

Township 2S Range 3W Section 4

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North



West East South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

◉ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield* (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	35	32	Conductor	Low Carbon Steel	.250	20		
0	340	17.5	Blank	PVC Sch. 80	.214	5		
340	360	17.5	Screen	PVC Sch. 80	.214	5		0.050
0	285	17.5	Blank	PVC Sch. 80	.214	5		
285	305	17.5	Screen	PVC Sch. 80	.214	5		0.050
0	120	17.7	Blank	PVC Sch. 80	.214	5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	225	Filter Pack	8x16 Midcal
225	230	Fill	Sand
230	250	Bentonite	Seal
250	255	Fill	Sand
255	310	Filter Pack	8x16 Gravel
310	315	Fill	Sand

Attachments

☐ Geologic Log

☐ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Bakersfield Well & Pump Co.
Person, Firm or Corporation

7212 Fruitvale Ave (Address) Bakersfield (City) CA (State) 93308 (Zip)

Signed C-57 Licensed Water Well Contractor 8/20/2010 (Date Signed) 440537 (C-57 License Number)

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0115380

Page 2 of 2

Owner's Well Number

Date Work Began 07/29/2010 Date Work Ended 8/4/2010

Local Permit Agency San Bernardino Department of Public Health

Permit Number 7010070342 Permit Date 7/23/10

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Reverse Rotary Drilling Fluid Fresh Water

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
35	90	Sand Gravel
90	120	Sand Clay
120	200	Sand Gravel
200	250	Sand Gravel Clay
250	310	Sand Gravel
310	340	Sand Gravel Clay
340	417	Sand Gravel

Total Depth of Boring 417 Feet

Total Depth of Completed Well 415 Feet

Well Owner

Name [redacted]

Mailing Address [redacted]

City [redacted] State CA. Zip 92399

Well Location

Address San Timoteo Canyon Road

City Yucaipa County San Bernardino

Latitude Deg. Min. Sec. N Longitude Deg. Min. Sec. W

Datum Decimal Lat. Decimal Long.

APN Book 0175 Page 221 Parcel 06

Township 2S Range 3W Section 4

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
⦿ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
120	140	17.5	Screen	PVC Sch. 80	.214	5		0.050

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
315	330	Bentonite	Seal
330	335	Fill	Sand
335	415	Filter Pack	8x16 Midcal

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Bakersfield Well & Pump Co.
Person, Firm or Corporation

7212 Fruitvale Ave Bakersfield CA 93308
Address City State Zip

Signed Ken Weel 8/20/2010 440537
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Appendix 3-B

Monitoring Forms and Protocols

WATER-LEVEL MEASUREMENT FIELD FORM

Date (YYYY/MM/DD): Site ID:

Well Type: Production / Monitoring / Private Measuring Agency/Entity:

Well Pumping? Is Water Level Static?

Method of Water Level Measurement (see below): Site Status (see below):

Measuring Equipment ID: Measuring Point Elevation (ft NAVD88):

WATER LEVEL DATA

Time of Measurement					
Measurement (feet)					
Tape Correction (feet)					
Water Level below MP (feet)					
Measuring Point Correction					
Water Level below Land Surface					
Water Elevation (ft NAVD88)					

Measured by: Comments:*

*Comments should include quality concerns and changes that affect the representativeness of the measurements (e.g., changes in MP elevation, ownership, well operations, access to measure DTW, etc.)

Site Status: D = dry; O = obstructed; P = pumping; R = recently pumped and recovering; NP = nearby pumping; V = foreign substance; WD = well destroyed; SW = surface water effects; Z = other; S = Static

Method of Water Level Measurement: A = airline; B = analog; C = calibrated airline; E = estimated; G = pressure gauge; H = calibrated pressure gage; M = manometer; R = reported; S = steel tape; T = electric tape; V = calibrated electric tape; Z = other.

NOTES:

Measuring Protocol:

1. Check circuitry of electrical tape before lowering the probe into the well by dipping probe into tap water.
2. Make all readings using the same indicator for consistency (light intensity or sound).
3. Lower electrode probe slowly into the well until the indicator shows that the circuit is closed and contact with the water surface is made. Place the nail of the index finger on the insulated wire at the MP (Measuring Point) and read the depth-to-water.
4. Record time of measurement. Record depth to water in the row “Measurement (feet)”. If the tape has been repaired and spliced or has a calibration correction, subtract the “Tape Correction” value from the “Measurement” value and record the difference in the row “Water Level below MP”.
5. Pull the tape up and make a check measurement by repeating steps 3-4. Record the check measurement in column 2. If check measurement does not agree with the original measurement within 0.02 foot, continue to make measurements until the reason of lack of agreement is determined or the results are shown to be reliable. If more than 2 measurements are made, use best judgment to select measurement most representative of field conditions.
6. Disinfect and rinse that part of tape that was submerged below water. Dry tape and rewind.

Format instructions and notes:

Site ID:	Well identified or State Well No.
MP:	measuring point
ft NAVD88:	feet above the National Vertical Datum of 1988.
Measuring Equipment ID:	serial number or identifier of measuring equipment

WELL PRODUCTION RECORD

Date	Time	Well ID	Totalizer Reading (Gallons)	Instantaneous Pumping Rate (GPM)	Estimated Pumping Rate (GPM)	Model and Make of Totalizer

WATER QUALITY FIELD FORM

Date (YYYY/MM/DD): Site ID:

Well Type: Production / Monitoring / Private Measuring Agency/Entity:

Well Pumping? If so, how long? Is Initial Water Level Static?

Method of Well Purging (see below): Site Status (see below):

Purging Equipment ID: Water Quality Meter ID:

Purge Volume Calculation:

[A] Total depth of well casing (ft bls): [C] Well Casing Inside Diameter (inches):

[B] Static depth to water, if not pumping (ft bls): [D] Length of Water Column, [A] - [B] (ft):

Purge Volume (3 Casing Volumes), ([D] * $\pi/4$ * ([C]/12)^2) * 3 =

WATER QUALITY PARAMETERS

Time	Purge Rate	Temperature (^{o}C)	pH	Conductivity ( )	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)

Measured by: Comments:*

WATER QUALITY FIELD FORM

*Comments should include quality concerns and changes that affect the representativeness of the measurements (e.g., changes in pump placement, ownership, well operations, access to sampling port, etc.)

Site Status: D = dry; O = obstructed; P = pumping; R = recently pumped and recovering; NP = nearby pumping; V = foreign substance; WD = well destroyed; SW = surface water effects; Z = other; S = Static

Method of Well Purging: B = bailer; D = dedicated submersible pump; P = portable submersible pump; T = dedicated turbine pump; S = peristaltic pump.

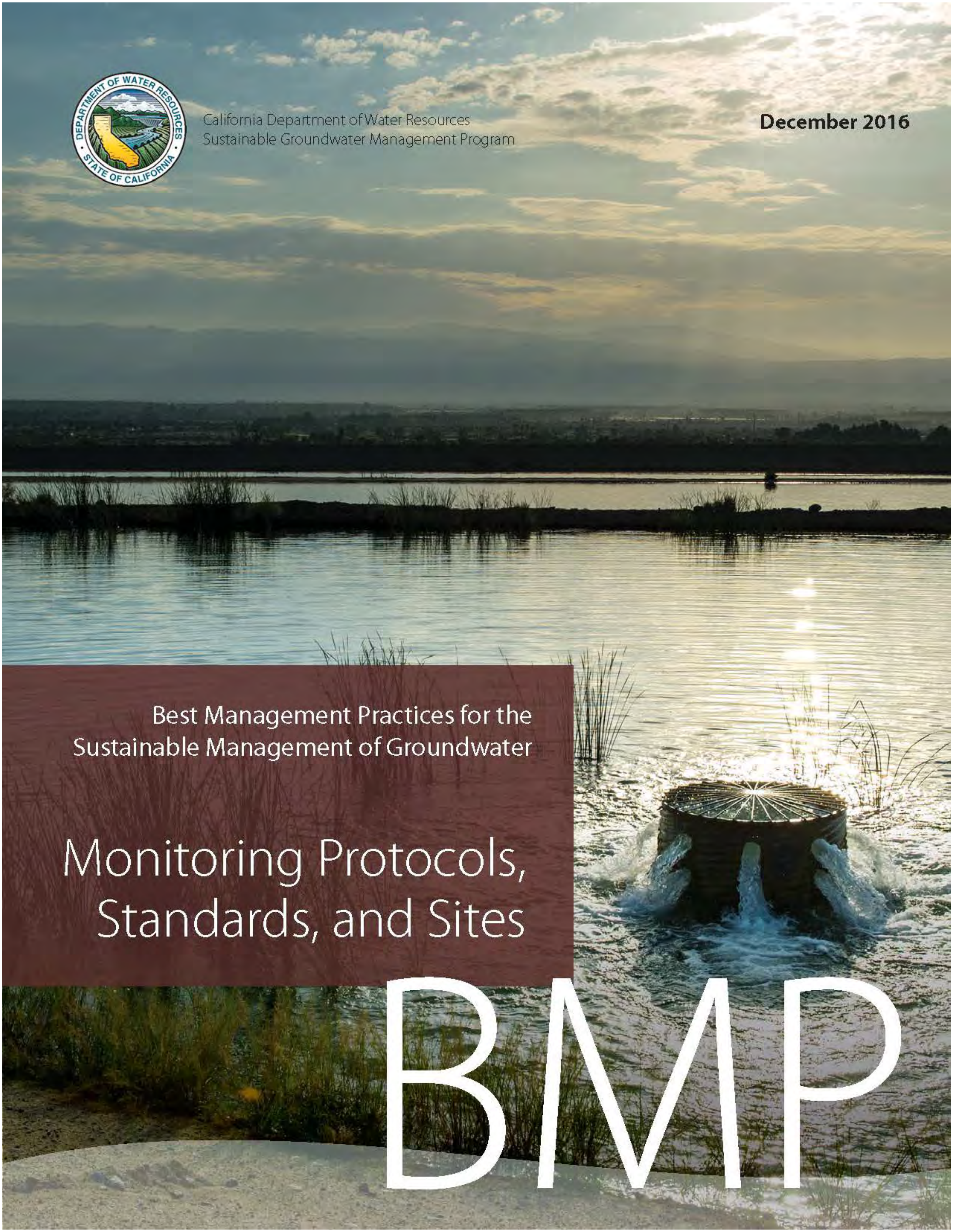
NOTES:

Purging and Sampling Protocol:

1	If the well has a dedicated pump and it is operating, ensure that it has been operating consistently and at least three (3) casing volumes have been pumped. If not, note pumping rate and time to purge 3 casing volumes before collecting representative samples. Measure and record water quality parameters through purging process.
2	If the well does not have a dedicate pump, then use purging equipment (e.g., portable submersible pump, bailer) to purge well. If using a portable submersible pump, lower pump to depth (consistent with previous smapling events) that ensures pump will not draw water level down to intake and, if possible, is positioned above the top of the well screen.
3	Ensure that portable purging equipment is properly decontaminated prior to use. Any decontamination must be documented (e.g., material used to decontaminate equipment, rinsing method, containment of waste, waste disposal).
4	Measure and/or record purge rate periodically. Collect purge sample to measure parameters periodically. Parameters should stablize (within 10% of previous three readings) before collecting the water quality sample.
5	Use the appropriate sample containers provided by the analytical laboratory. Sample containers shoud be labeled prior to sample collection. The sample label should include: Sample ID (often well ID), sample date and time of collection, sampling personnel, preservative used (if any), and the analytical method to be used on the sample.
6	All samples should be preserved as soon as possible in an ice chest containing ice. The samples should be chilled and maintained at 4 ^{o}C.
7	The Chain-of-Custory form should be filled out as the sample is collected and preserved.

Format instructions and notes:

Site ID:	Well identifier or State Well No.
ft bls:	feet below land surface
Purging Equipment ID/description:	serial number or identifier of measuring equipment



California Department of Water Resources
Sustainable Groundwater Management Program

December 2016

Best Management Practices for the Sustainable Management of Groundwater

Monitoring Protocols, Standards, and Sites

BMP

State of California
Edmund G. Brown Jr., Governor

California Natural Resources Agency
John Laird, Secretary for Natural Resources

Department of Water Resources
Mark W. Cowin, Director

Carl A. Torgersen, Chief Deputy Director

Office of the Chief Counsel Spencer Kenner	Public Affairs Office Ed Wilson	Government and Community Liaison Anecita S. Agustinez
Office of Workforce Equality Stephanie Varrelman	Policy Advisor Waiman Yip	Legislative Affairs Office Kasey Schimke, Ass't Dir.

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Division of Integrated Regional Water Management

Arthur Hinojosa Jr., Chief

Prepared under the direction of:

David Gutierrez, Sustainable Groundwater Management Program Manager
Rich Juricich, Sustainable Groundwater Management Branch

Prepared by:

Trevor Joseph, BMP Project Manager

Timothy Godwin
Dan McManus
Mark Nordberg
Heather Shannon
Steven Springhorn

With assistance from:

DWR Region Office Staff

Groundwater Monitoring Protocols, Standards, and Sites Best Management Practice

1. OBJECTIVE

The objective of this *Best Management Practice* (BMP) is to assist in the development of Monitoring Protocols. The California Department of Water Resources (the Department or DWR) has developed this document as part of the obligation in the Technical Assistance chapter (Chapter 7) of the Sustainable Groundwater Management Act (SGMA) to support the long-term sustainability of California's groundwater *basins*. Information provided in this BMP provides technical assistance to Groundwater Sustainability Agencies (GSAs) and other stakeholders to aid in the establishment of consistent data collection processes and procedures. In addition, this BMP can be used by GSAs to adopt a set of sampling and measuring procedures that will yield similar data regardless of the monitoring personnel. Finally, this BMP identifies available resources to support the development of monitoring protocols.

This BMP includes the following sections:

1. Objective. A brief description of how and where monitoring protocols are required under SGMA and the overall objective of this BMP.
2. Use and Limitations. A brief description of the use and limitations of this BMP.
3. Monitoring Protocol Fundamentals. A description of the general approach and background of groundwater monitoring protocols.
4. Relationship of Monitoring Protocols to other BMPs. A description of how this BMP is connected with other BMPS.
5. Technical Assistance. Technical content providing guidance for regulatory sections.
6. Key Definitions. Descriptions of definitions identified in the GSP Regulations or SGMA.
7. Related Materials. References and other materials that provide supporting information related to the development of Groundwater Monitoring Protocols.

2. USE AND LIMITATIONS

BMPs developed by the Department provide technical guidance to GSAs and other stakeholders. Practices described in these BMPs do not replace the GSP Regulations, nor do they create new requirements or obligations for GSAs or other stakeholders. In addition, using this BMP to develop a GSP does not equate to an approval determination by the Department. All references to GSP Regulations relate to Title 23 of the California Code of Regulations (CCR), Division 2, Chapter 1.5, and Subchapter 2. All references to SGMA relate to California Water Code sections in Division 6, Part 2.74.

3. MONITORING PROTOCOL FUNDAMENTALS

Establishing data collection protocols that are based on best available scientific methods is essential. Protocols that can be applied consistently across all basins will likely yield comparable data. Consistency of data collection methods reduces uncertainty in the comparison of data and facilitates more accurate communication within basins as well as between basins.

Basic minimum technical standards of accuracy lead to quality data that will better support implementation of GSPs.

4. RELATIONSHIP OF MONITORING PROTOCOL TO OTHER BMPS

Groundwater monitoring is a fundamental component of SGMA, as each GSP must include a sufficient network of data that demonstrates measured progress toward the achievement of the sustainability goal for each basin. For this reason, a standard set of protocols need to be developed and utilized.

It is important that data is developed in a manner consistent with the basin setting, planning, and projects/management actions steps identified on **Figure 1** and the GSP Regulations. The inclusion of monitoring protocols in the GSP Regulations also emphasizes the importance of quality empirical data to support GSPs and provide comparable information from basin to basin.

Figure 1 provides a logical progression for the development of a GSP and illustrates how monitoring protocols are linked to other related BMPs. This figure also shows the context of the BMPs as they relate to various steps to sustainability as outlined in the GSP Regulations. The monitoring protocol BMP is part of the Monitoring step identified in **Figure 1**.

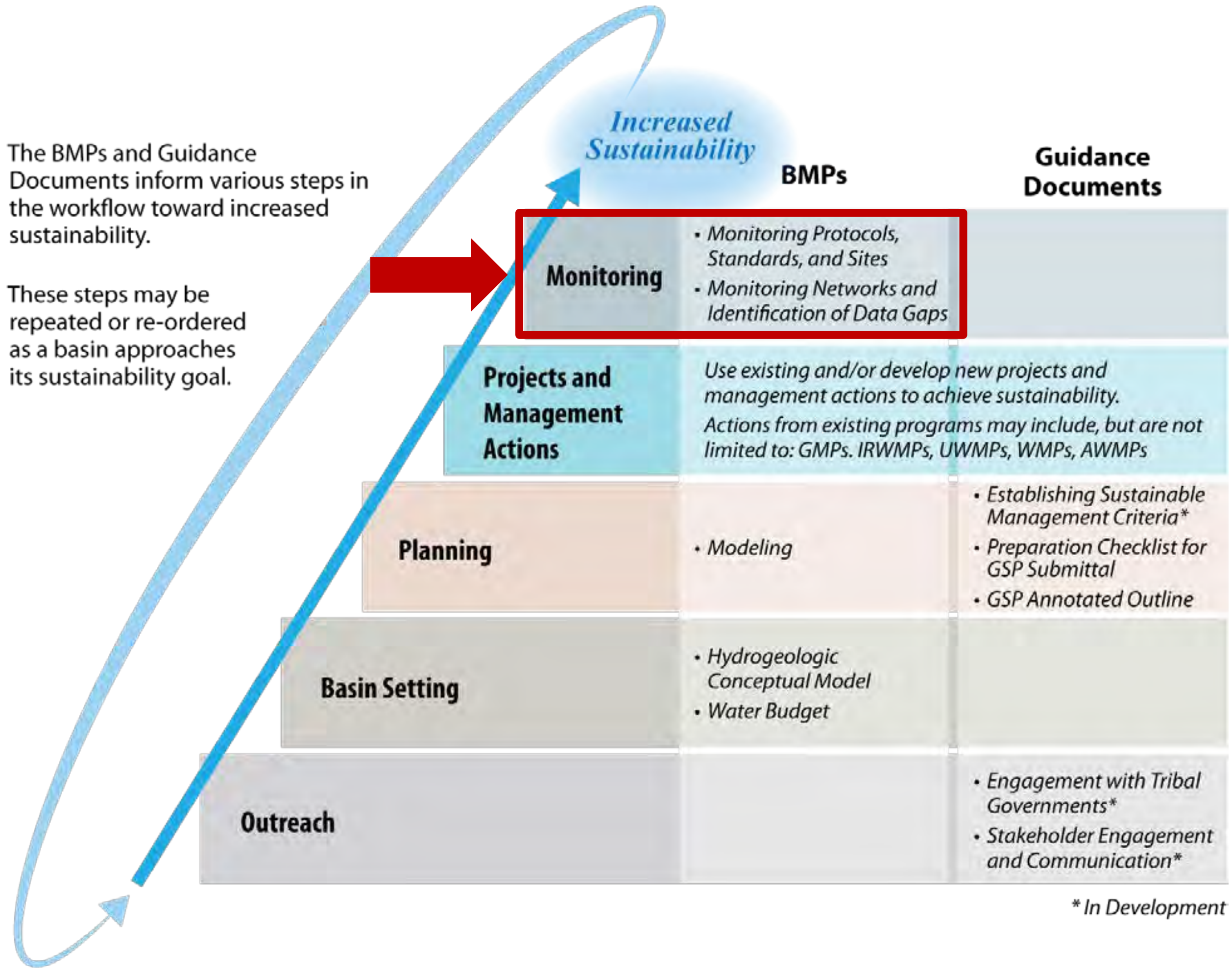

Figure 1 – Logical Progression of Basin Activities Needed to Increase Basin Sustainability

5. TECHNICAL ASSISTANCE

23 CCR §352.2. Monitoring Protocols. Each Plan shall include monitoring protocols adopted by the Agency for data collection and management, as follows:
(a) Monitoring protocols shall be developed according to best management practices.
(b) The Agency may rely on monitoring protocols included as part of the best management practices developed by the Department, or may adopt similar monitoring protocols that will yield comparable data.
(c) Monitoring protocols shall be reviewed at least every five years as part of the periodic evaluation of the Plan, and modified as necessary.

The GSP Regulations specifically call out the need to utilize protocols identified in this BMP, or develop similar protocols. The following technical protocols provide guidance based upon existing professional standards and are commonly adopted in various groundwater-related programs. They provide clear techniques that yield quality data for use in the various components of the GSP. They can be further elaborated on by individual GSAs in the form of standard operating procedures which reflect specific local requirements and conditions. While many methodologies are suggested in this BMP, it should be understood that qualified professional judgment should be used to meet the specific monitoring needs.

The following BMPs may be incorporated into a GSP's monitoring protocols section for collecting groundwater elevation data. A GSP that adopts protocols that deviate from these BMPs must demonstrate that they will yield comparable data.

PROTOCOLS FOR ESTABLISHING A MONITORING PROGRAM

The protocol for establishment of a monitoring program should be evaluated in conjunction with the *Monitoring Network and Identification of Data Gaps* BMP and other BMPs. Monitoring protocols must take into consideration the *Hydrogeologic Conceptual Model, Water Budget, and Modeling* BMPs when considering the data needs to meet GSP objectives and the sustainability goal.

It is suggested that each GSP incorporate the Data Quality Objective (DQO) process following the U.S. EPA *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA, 2006). Although strict adherence to this method is not required, it does provide a robust approach to consider and assures that data is collected with a specific purpose in mind, and efforts for monitoring are as efficient as possible to achieve the objectives of the GSP and compliance with the GSP Regulations.

The DQO process presents a method that can be applied directly to the sustainability criteria quantitative requirements through the following steps.

1. State the problem – Define sustainability indicators and planning considerations of the GSP and sustainability goal.
2. Identify the goal – Describe the quantitative measurable objectives and minimum thresholds for each of the sustainability indicators.
3. Identify the inputs – Describe the data necessary to evaluate the sustainability indicators and other GSP requirements (i.e. water budget).
4. Define the boundaries of the study – This is commonly the extent of the Bulletin 118 groundwater basin or subbasin, unless multiple GSPs are prepared for a given basin. In that case, evaluation of the coordination plan and specifically how the monitoring will be comparable and meet the sustainability goals for the entire basin.
5. Develop an analytical approach – Determine how the quantitative sustainability indicators will be evaluated (i.e. are special analytical methods required that have specific data needs).
6. Specify performance or acceptance criteria – Determine what quality the data must have to achieve the objective and provide some assurance that the analysis is accurate and reliable.
7. Develop a plan for obtaining data – Once the objectives are known determine how these data should be collected. Existing data sources should be used to the greatest extent possible.

These steps of the DQO process should be used to guide GSAs to develop the most efficient monitoring process to meet the measurable objectives of the GSP and the sustainability goal. The DQO process is an iterative process and should be evaluated regularly to improve monitoring efficiencies and meet changing planning and project needs. Following the DQO process, GSAs should also include a data quality control and quality assurance plan to guide the collection of data.

Many monitoring programs already exist as part of ongoing groundwater management or other programs. To the extent possible, the use of existing monitoring data and programs should be utilized to meet the needs for characterization, historical record documentation, and continued monitoring for the SGMA program. However, an evaluation of the existing monitoring data should be performed to assure the data being collected meets the DQOs, regulatory requirements, and data collection protocol described in this BMP. While this BMP provides guidance for collection of various regulatory based requirements, there is flexibility among the various methodologies available to meet the DQOs based upon professional judgment (local conditions or project needs).

At a minimum, for each monitoring site, the following information or procedure should be collected and documented:

- Long-term access agreements. Access agreements should include year-round site access to allow for increased monitoring frequency.
- A unique identifier that includes a general written description of the site location, date established, access instructions and point of contact (if necessary), type of information to be collected, latitude, longitude, and elevation. Each monitoring location should also track all modifications to the site in a modification log.

PROTOCOLS FOR MEASURING GROUNDWATER LEVELS

This section presents considerations for the methodology of collection of groundwater level data such that it meets the requirements of the GSP Regulations and the DQOs of the specific GSP. Groundwater levels are a fundamental measure of the status of groundwater conditions within a basin. In many cases, relationships of the sustainability indicators may be able to be correlated with groundwater levels. The quality of this data must consider the specific aquifer being monitored and the methodology for collecting these levels.

The following considerations for groundwater level measuring protocols should ensure the following:

- Groundwater level data are taken from the correct location, well ID, and screen interval depth
- Groundwater level data are accurate and reproducible
- Groundwater level data represent conditions that inform appropriate basin management DQOs
- All salient information is recorded to correct, if necessary, and compare data
- Data are handled in a way that ensures data integrity

General Well Monitoring Information

The following presents considerations for collection of water level data that include regulatory required components as well as those which are recommended.

- Groundwater elevation data will form the basis of basin-wide water-table and piezometric maps, and should approximate conditions at a discrete period in time. Therefore, all groundwater levels in a basin should be collected within as short a time as possible, preferably within a 1 to 2 week period.
- Depth to groundwater must be measured relative to an established Reference Point (RP) on the well casing. The RP is usually identified with a permanent marker, paint spot, or a notch in the lip of the well casing. By convention in open casing monitoring wells, the RP reference point is located on the north side of the well casing. If no mark is apparent, the person performing the measurement should measure the depth to groundwater from the north side of the top of the well casing.
- The elevation of the RP of each well must be surveyed to the North American Vertical Datum of 1988 (NAVD88), or a local datum that can be converted to NAVD88. The elevation of the RP must be accurate to within 0.5 foot. It is preferable for the RP elevation to be accurate to 0.1 foot or less. Survey grade global navigation satellite system (GNSS) global positioning system (GPS) equipment can achieve similar vertical accuracy when corrected. Guidance for use of GPS can be found at USGS http://water.usgs.gov/osw/gps/. Hand-held GPS units likely will not produce reliable vertical elevation measurement accurate enough for the casing elevation consistent with the DQOs and regulatory requirements.
- The sampler should remove the appropriate cap, lid, or plug that covers the monitoring access point listening for pressure release. If a release is observed, the measurement should follow a period of time to allow the water level to equilibrate.
- Depth to groundwater must be measured to an accuracy of 0.1 foot below the RP. It is preferable to measure depth to groundwater to an accuracy of 0.01 foot. Air lines and acoustic sounders may not provide the required accuracy of 0.1 foot.
- The water level meter should be decontaminated after measuring each well.

Where existing wells do not meet the base standard as described in the GSP Regulations or the considerations provided above, new monitoring wells may need to be constructed to meet the DQOs of the GSP. The design, installation, and documentation of new monitoring wells must consider the following:

- Construction consistent with California Well Standards as described in Bulletins 74-81 and 74-90, and local permitting agency standards of practice.
- Logging of borehole cuttings under the supervision of a California Professional Geologist and described consistent with the Unified Soil Classification System methods according to ASTM standard D2487-11.
- Written criteria for logging of borehole cuttings for comparison to known geologic formations, principal aquifers and aquitards/aquicludes, or specific marker beds to aid in consistent stratigraphic correlation within and across basins.
- Geophysical surveys of boreholes to aid in consistency of logging practices. Methodologies should include resistivity, spontaneous potential, spectral gamma, or other methods as appropriate for the conditions. Selection of geophysical methods should be based upon the opinion of a professional geologist or professional engineer, and address the DQOs for the specific borehole and characterization needs.
- Prepare and submit State well completion reports according to the requirements of §13752. Well completion report documentation should include geophysical logs, detailed geologic log, and formation identification as attachments. An example well completion as-built log is illustrated in **Figure 2.** DWR well completion reports can be filed directly at the Online System for Well Completion Reports (OSWCR) http://water.ca.gov/oswcr/index.cfm.

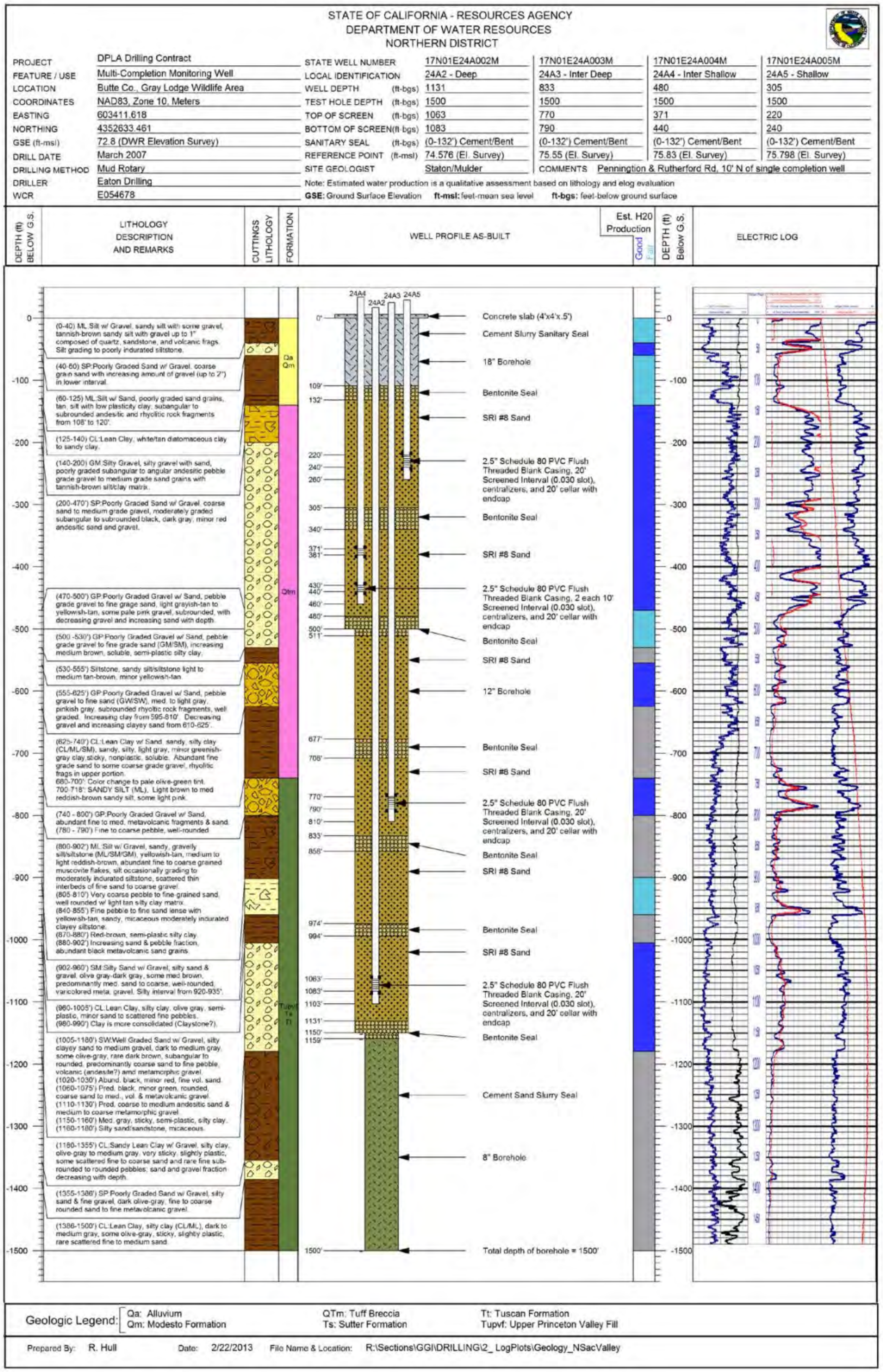

Figure 2 – Example As-Built Multi-Completion Monitoring Well Log

Measuring Groundwater Levels

Well construction, anticipated groundwater level, groundwater level measuring equipment, field conditions, and well operations should be considered prior collection of the groundwater level measurement. The USGS *Groundwater Technical Procedures* (Cunningham and Schalk, 2011) provide a thorough set of procedures which can be used to establish specific Standard Operating Procedures (SOPs) for a local agency. **Figure 3** illustrates a typical groundwater level measuring event and simultaneous pressure transducer download.

Figure 3 – Collection of Water Level Measurement and Pressure Transducer Download

The following points provide a general approach for collecting groundwater level measurements:

- Measure depth to water in the well using procedures appropriate for the measuring device. Equipment must be operated and maintained in accordance with manufacturer's instructions. Groundwater levels should be measured to the nearest 0.01 foot relative to the RP.
- For measuring wells that are under pressure, allow a period of time for the groundwater levels to stabilize. In these cases, multiple measurements should be collected to ensure the well has reached equilibrium such that no significant changes in water level are observed. Every effort should be made to ensure that a representative stable depth to groundwater is recorded. If a well does not stabilize, the quality of the value should be appropriately qualified as a

questionable measurement. In the event that a well is artesian, site specific procedures should be developed to collect accurate information and be protective of safety conditions associated with a pressurized well. In many cases, an extension pipe may be adequate to stabilize head in the well. Record the dimension of the extension and document measurements and configuration.

- The sampler should calculate the groundwater elevation as:

$$GWE = RPE - DTW$$

Where:

GWE = Groundwater Elevation
RPE = Reference Point Elevation
DTW = Depth to Water

The sampler must ensure that all measurements are in consistent units of feet, tenths of feet, and hundredths of feet. Measurements and RPEs should not be recorded in feet and inches.

<u>Recording Groundwater Levels</u>

- The sampler should record the well identifier, date, time (24-hour format), RPE, height of RP above or below ground surface, DTW, GWE, and comments regarding any factors that may influence the depth to water readings such as weather, nearby irrigation, flooding, potential for tidal influence, or well condition. If there is a questionable measurement or the measurement cannot be obtained, it should be noted. An example of a field sheet with the required information is shown in **Figure 4**. It includes questionable measurement and no measurement codes that should be noted. This field sheet is provided as an example. Standardized field forms should be used for all data collection. The aforementioned USGS *Groundwater Technical Procedures* offers a number of example forms.
- The sampler should replace any well caps or plugs, and lock any well buildings or covers.
- All data should be entered into the GSA data management system (DMS) as soon as possible. Care should be taken to avoid data entry mistakes and the entries should be checked by a second person for compliance with the DQOs.

STATE OF CALIFORNA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WELL DATA

STATE WELL NUMBER	COUNTY	REFERENCE POINT ELEV.	MEASURING AGENCY
			DWR

NO MEASUREMENT	QUESTIONABLE MEASUREMENT
0. Measurement discontinued	0. Caved or deepened
1. Pumping	1. Pumping
2. Pump house locked	2. Nearby pump operating
3. Tape hung up	3. Casing leaky or wet
4. Can't get tape in casing	4. Pumped recently
5. Unable to locate well	5. Air or pressure gauge measurement
6. Well has been destroyed	6. Other
7. Special	7. Recharge operation at or nearby well
8. Casing leaky or wet	8. Oil in casing
9. Temporarily inaccessible	

DATE	N M	Q M	TAPE AT RP	TAPE AT WS	RP to WS	OBSR VR	COMMENTS

DWR 1213

Figure 4 – Example of Water Level Well Data Field Collection Form

Pressure Transducers

Groundwater levels and/or calculated groundwater elevations may be recorded using pressure transducers equipped with data loggers installed in monitoring wells. When installing pressure transducers, care must be exercised to ensure that the data recorded by the transducers is confirmed with hand measurements.

The following general protocols must be followed when installing a pressure transducer in a monitoring well:

- The sampler must use an electronic sounder or chalked steel tape and follow the protocols listed above to measure the groundwater level and calculate the groundwater elevation in the monitoring well to properly program and reference the installation. It is recommended that transducers record measured groundwater level to conserve data capacity; groundwater elevations can be calculated at a later time after downloading.
- The sampler must note the well identifier, the associated transducer serial number, transducer range, transducer accuracy, and cable serial number.
- Transducers must be able to record groundwater levels with an accuracy of at least 0.1 foot. Professional judgment should be exercised to ensure that the data being collected is meeting the DQO and that the instrument is capable. Consideration of the battery life, data storage capacity, range of groundwater level fluctuations, and natural pressure drift of the transducers should be included in the evaluation.
- The sampler must note whether the pressure transducer uses a vented or non-vented cable for barometric compensation. Vented cables are preferred, but non-vented units provide accurate data if properly corrected for natural barometric pressure changes. This requires the consistent logging of barometric pressures to coincide with measurement intervals.
- Follow manufacturer specifications for installation, calibration, data logging intervals, battery life, correction procedure (if non-vented cables used), and anticipated life expectancy to assure that DQOs are being met for the GSP.
- Secure the cable to the well head with a well dock or another reliable method. Mark the cable at the elevation of the reference point with tape or an indelible marker. This will allow estimates of future cable slippage.
- The transducer data should periodically be checked against hand measured groundwater levels to monitor electronic drift or cable movement. This should happen during routine site visits, at least annually or as necessary to maintain data integrity.

- The data should be downloaded as necessary to ensure no data is lost and entered into the basin's DMS following the QA/QC program established for the GSP. Data collected with non-vented data logger cables should be corrected for atmospheric barometric pressure changes, as appropriate. After the sampler is confident that the transducer data have been safely downloaded and stored, the data should be deleted from the data logger to ensure that adequate data logger memory remains.

PROTOCOLS FOR SAMPLING GROUNDWATER QUALITY

The following protocols can be incorporated into a GSP's monitoring protocols for collecting groundwater quality data. More detailed sampling procedures and protocols are included in the standards and guidance documents listed at the end of this BMP. A GSP that adopts protocols that deviate from these BMPs must demonstrate that the adopted protocols will yield comparable data.

In general, the use of existing water quality data within the basin should be done to the greatest extent possible if it achieves the DQOs for the GSP. In some cases it may be necessary to collect additional water quality data to support monitoring programs or evaluate specific projects. The USGS *National Field Manual for the Collection of Water Quality Data* (Wilde, 2005) should be used to guide the collection of reliable data. **Figure 5** illustrates a typical groundwater quality sampling setup.

Figure 5 – Typical Groundwater Quality Sampling Event

All analyses should be performed by a laboratory certified under the State Environmental Laboratory Accreditation Program. The specific analytical methods are beyond the scope of this BMP, but should be commiserate with other programs evaluating water quality within the basin for comparative purposes.

Groundwater quality sampling protocols should ensure that:

- Groundwater quality data are taken from the correct location
- Groundwater quality data are accurate and reproducible
- Groundwater quality data represent conditions that inform appropriate basin management and are consistent with the DQOs
- All salient information is recorded to normalize, if necessary, and compare data
- Data are handled in a way that ensures data integrity

The following points are general guidance in addition to the techniques presented in the previously mentioned USGS *National Field Manual for the Collection of Water Quality Data.*

Standardized protocols include the following:

- Prior to sampling, the sampler must contact the laboratory to schedule laboratory time, obtain appropriate sample containers, and clarify any sample holding times or sample preservation requirements.
- Each well used for groundwater quality monitoring must have a unique identifier. This identifier must appear on the well housing or the well casing to avoid confusion.
- In the case of wells with dedicated pumps, samples should be collected at or near the wellhead. Samples should not be collected from storage tanks, at the end of long pipe runs, or after any water treatment.
- The sampler should clean the sampling port and/or sampling equipment and the sampling port and/or sampling equipment must be free of any contaminants. The sampler must decontaminate sampling equipment between sampling locations or wells to avoid cross-contamination between samples.
- The groundwater elevation in the well should be measured following appropriate protocols described above in the groundwater level measuring protocols.
- For any well not equipped with low-flow or passive sampling equipment, an adequate volume of water should be purged from the well to ensure that the groundwater sample is representative of ambient groundwater and not stagnant water in the well casing. Purging three well casing volumes is generally

considered adequate. Professional judgment should be used to determine the proper configuration of the sampling equipment with respect to well construction such that a representative ambient groundwater sample is collected. If pumping causes a well to be evacuated (go dry), document the condition and allow well to recover to within 90% of original level prior to sampling. Professional judgment should be exercised as to whether the sample will meet the DQOs and adjusted as necessary.

- Field parameters of pH, electrical conductivity, and temperature should be collected for each sample. Field parameters should be evaluated during the purging of the well and should stabilize prior to sampling. Measurements of pH should only be measured in the field, lab pH analysis are typically unachievable due to short hold times. Other parameters, such as oxidation-reduction potential (ORP), dissolved oxygen (DO) (in situ measurements preferable), or turbidity, may also be useful for meeting DQOs of GSP and assessing purge conditions. All field instruments should be calibrated daily and evaluated for drift throughout the day.
- Sample containers should be labeled prior to sample collection. The sample label must include: sample ID (often well ID), sample date and time, sample personnel, sample location, preservative used, and analytes and analytical method.
- Samples should be collected under laminar flow conditions. This may require reducing pumping rates prior to sample collection.
- Samples should be collected according to appropriate standards such as those listed in the *Standard Methods for the Examination of Water and Wastewater*, USGS *National Field Manual for the Collection of Water Quality Data,* or other appropriate guidance. The specific sample collection procedure should reflect the type of analysis to be performed and DQOs.
- All samples requiring preservation must be preserved as soon as practically possible, ideally at the time of sample collection. Ensure that samples are appropriately filtered as recommended for the specific analyte. Entrained solids can be dissolved by preservative leading to inconsistent results of dissolve analytes. Specifically, samples to be analyzed for metals should be field-filtered prior to preservation; do not collect an unfiltered sample in a preserved container.
- Samples should be chilled and maintained at 4 °C to prevent degradation of the sample. The laboratory's Quality Assurance Management Plan should detail appropriate chilling and shipping requirements.

- Samples must be shipped under chain of custody documentation to the appropriate laboratory promptly to avoid violating holding time restrictions.
- Instruct the laboratory to use reporting limits that are equal to or less than the applicable DQOs or regional water quality objectives/screening levels.

Special protocols for low-flow sampling equipment

In addition to the protocols listed above, sampling using low-flow sample equipment should adopt the following protocols derived from EPA's *Low-flow (minimal drawdown) ground-water sampling procedures* (Puls and Barcelona, 1996). These protocols apply to low-flow sampling equipment that generally pumps between 0.1 and 0.5 liters per minute. These protocols are not intended for bailers.

Special protocols for passive sampling equipment

In addition to the protocols listed above, passive diffusion samplers should follow protocols set forth in USGS Fact Sheet 088-00.

PROTOCOLS FOR MONITORING SEAWATER INTRUSION

Monitoring seawater intrusion requires analysis of the chloride concentrations within groundwater of each principal aquifer subject to seawater intrusion. While no significant standardized approach exists, the methodologies described above for degraded water quality can be applied for the collection of groundwater samples. In addition to the protocol described above, the following protocols should be followed:

- Water quality samples should be collected and analyzed at least semi-annually. Samples will be analyzed for dissolved chloride at a minimum. It may be beneficial to include analyses of iodide and bromide to aid in determination of salinity source. More frequent sampling may be necessary to meet DQOs of GSP. The development of surrogate measures of chloride concentration may facilitate cost-effective means to monitor more frequently to observe the range of conditions and variability of the flow dynamics controlling seawater intrusion.
- Groundwater levels will be collected at a frequency adequate to characterize changes in head in the vicinity of the leading edge of degraded water quality in each principal aquifer. Frequency may need to be increased in areas of known preferential pathways, groundwater pumping, or efficacy evaluation of mitigation projects.
- The use of geophysical surveys, electrical resistivity, or other methods may provide for identification of preferential pathways and optimize monitoring well placement and evaluation of the seawater intrusion front. Professional judgment

should be exercised to determine the appropriate methodology and whether the DQOs for the GSP would be met.

PROTOCOLS FOR MEASURING STREAMFLOW

Monitoring of streamflow is necessary for incorporation into water budget analysis and for use in evaluation of stream depletions associated with groundwater extractions. The use of existing monitoring locations should be incorporated to the greatest extent possible. Many of these streamflow monitoring locations currently follow the protocol described below.

Establishment of new streamflow discharge sites should consider the existing network and the objectives of the new location. Professional judgment should be used to determine the appropriate permitting that may be necessary for the installation of any monitoring locations along surface water bodies. Regular frequent access will be necessary to these sites for the development of ratings curves and maintenance of equipment.

To establish a new streamflow monitoring station special consideration must be made in the field to select an appropriate location for measuring discharge. Once a site is selected, development of a relationship of stream stage to discharge will be necessary to provide continuous estimates of streamflow. Several measurements of discharge at a variety of stream stages will be necessary to develop the ratings curve correlating stage to discharge. The use of Acoustic Doppler Current Profilers (ADCPs) can provide accurate estimates of discharge in the correct settings. Professional judgment must be exercised to determine the appropriate methodology. Following development of the ratings curve a simple stilling well and pressure transducer with data logger can be used to evaluate stage on a frequent basis. A simple stilling well and staff gage is illustrated in **Figure 6**.

Streamflow measurements should be collected, analyzed, and reported in accordance with the procedures outlined in USGS Water Supply Paper 2175, *Volume 1. – Measurement of Stage Discharge* and *Volume 2. – Computation of Discharge.* This methodology is currently being used by both the USGS and DWR for existing streamflow monitoring throughout the State.

Figure 6 – Simple Stilling Well and Staff Gage Setup

PROTOCOLS FOR MEASURING SUBSIDENCE

Evaluating and monitoring inelastic land subsidence can utilize multiple data sources to evaluate the specific conditions and associated causes. To the extent possible, the use of existing data should be utilized. Subsidence can be estimated from numerous techniques, they include: level surveying tied to known stable benchmarks or benchmarks located outside the area being studied for possible subsidence; installing and tracking changes in borehole extensometers; obtaining data from continuous GPS (CGPS) locations, static GPS surveys or Real-Time-Kinematic (RTK) surveys; or analyzing Interferometric Synthetic Aperture Radar (InSAR) data. No standard procedures exist for collecting data from the potential subsidence monitoring approaches. However, an approach may include:

- Identification of land subsidence conditions.
    - Evaluate existing regional long-term leveling surveys of regional infrastructure, i.e. roadways, railroads, canals, and levees.
    - Inspect existing county and State well records where collapse has been noted for well repairs or replacement.
    - Determine if significant fine-grained layers are present such that the potential for collapse of the units could occur should there be significant depressurization of the aquifer system.

  - Inspect geologic logs and the hydrogeologic conceptual model to aid in identification of specific units of concern.
  - Collect regional remote-sensing information such as InSAR, commonly provided by USGS and NASA. Data availability is currently limited, but future resources are being developed.
- Monitor regions of suspected subsidence where potential exists.
  - Establish CGPS network to evaluate changes in land surface elevation.
  - Establish leveling surveys transects to observe changes in land surface elevation.
  - Establish extensometer network to observe land subsidence. An example of a typical extensometer design is illustrated in **Figure 7**. There are a variety of extensometer designs and they should be selected based on the specific DQOs.

Various standards and guidance documents for collecting data include:

- Leveling surveys must follow surveying standards set out in the California Department of Transportation's Caltrans Surveys Manual.
- GPS surveys must follow surveying standards set out in the California Department of Transportation's Caltrans Surveys Manual.
- USGS has been performing subsidence surveys within several areas of California. These studies are sound examples for appropriate methods and should be utilized to the extent possible and where available:
  - http://ca.water.usgs.gov/land_subsidence/california-subsidence-measuring.html
- Instruments installed in borehole extensometers must follow the manufacturer's instructions for installation, care, and calibration.
- Availability of InSAR data is improving and will increase as programs are developed. This method requires expertise in analysis of the raw data and will likely be made available as an interpretative report for specific regions.

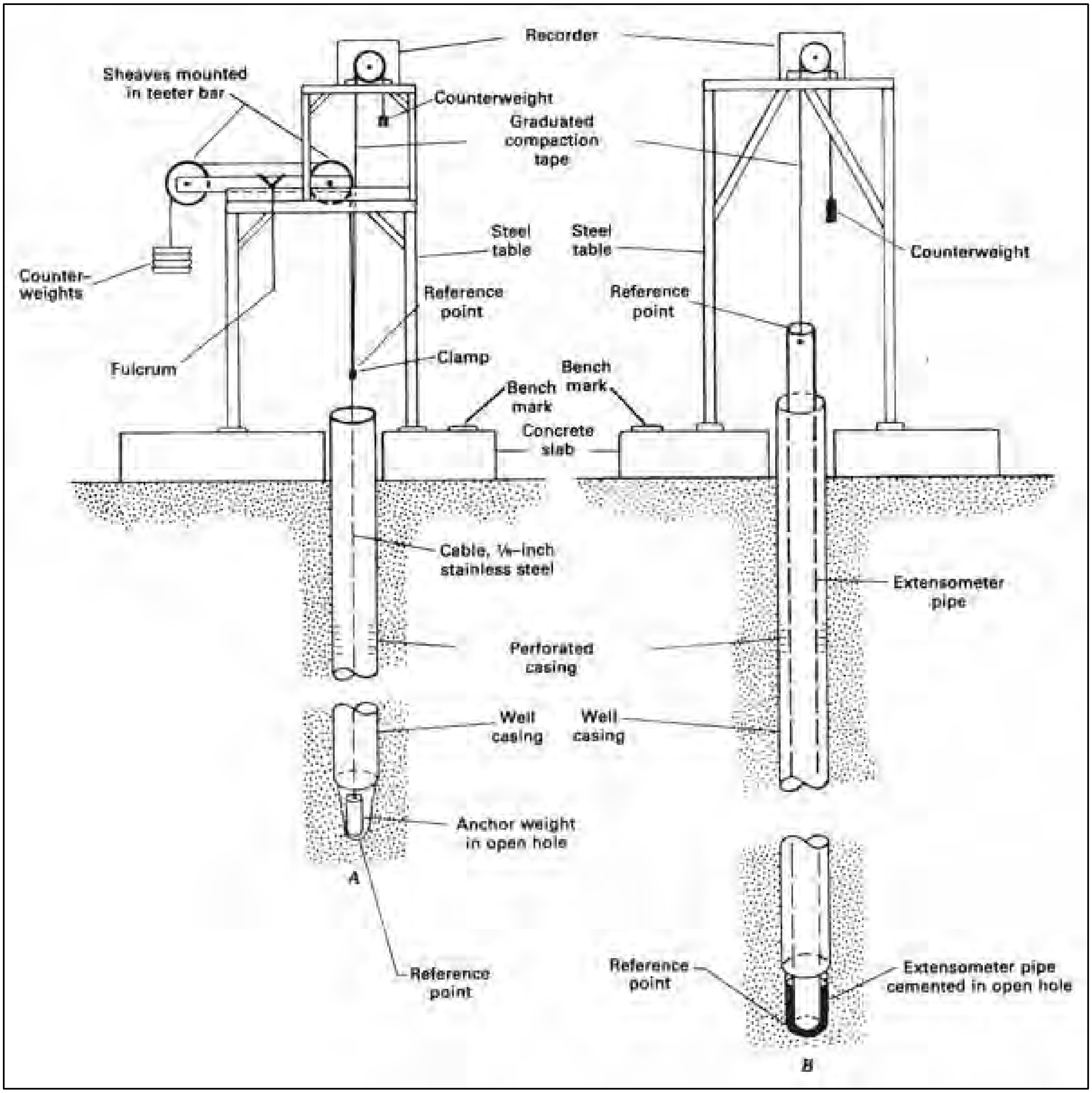

Figure 7 – Simplified Extensometer Diagram

6. KEY DEFINITIONS

The key definitions and sections related to Groundwater Monitoring Protocols, Standards, and Sites outlined in applicable SGMA code and regulations are provided below for reference.

Groundwater Sustainability Plan Regulations (California Code of Regulations §351)

- §351(h) "Best available science" refers to the use of sufficient and credible information and data, specific to the decision being made and the time frame available for making that decision, that is consistent with scientific and engineering professional standards of practice.
- §351(i) "Best management practice" refers to a practice, or combination of practices, that are designed to achieve sustainable groundwater management and have been determined to be technologically and economically effective, practicable, and based on best available science.

Monitoring Protocols Reference

§352.2. Monitoring Protocols

Each Plan shall include monitoring protocols adopted by the Agency for data collection and management, as follows:

(a) Monitoring protocols shall be developed according to best management practices.

(b) The Agency may rely on monitoring protocols included as part of the best management practices developed by the Department, or may adopt similar monitoring protocols that will yield comparable data.

(c) Monitoring protocols shall be reviewed at least every five years as part of the periodic evaluation of the Plan, and modified as necessary.

SGMA Reference

§10727.2. Required Plan Elements

(f) Monitoring protocols that are designed to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence for basins for which subsidence has been identified as a potential problem, and flow and quality of surface water that directly affect groundwater levels or quality or are caused by groundwater extraction in the basin. The monitoring protocols shall be designed to generate information that promotes efficient and effective groundwater management.

7. RELATED MATERIALS

CASE STUDIES

Luhdorff & Scalmanini Consulting Engineers, J.W. Borchers, M. Carpenter. 2014. *Land Subsidence from Groundwater Use in California*. Full Report of Findings prepared for California Water Foundation. April 2014. 151 p. http://ca.water.usgs.gov/land_subsidence/california-subsidence-cause-effect.html

Faunt, C.C., M. Sneed, J. Traum, and J.T. Brandt, 2015. *Water availability and land subsidence in the Central Valley, California, USA*. Hydrogeol J (2016) 24: 675. doi:10.1007/s10040-015-1339-x.
https://pubs.er.usgs.gov/publication/701605

Poland, J.F., B.E. Lofgren, R.L. Ireland, and R.G. Pugh, 1975. *Land subsidence in the San Joaquin Valley, California, as of 1972*; US Geological Survey Professional Paper 437-H; prepared in cooperation with the California Department of Water Resources, 87 p.
http://pubs.usgs.gov/pp/0437h/report.pdf

Sneed, M., J.T. Brandt, and M. Solt, 2013. *Land subsidence along the Delta-Mendota Canal in the northern part of the San Joaquin Valley, California, 2003-10*; USGS Scientific Investigations Report 2013-5142, prepared in cooperation with U.S. Bureau of Reclamation and the San Luis and Delta-Mendota Water Authority.
https://pubs.er.usgs.gov/publication/sir20135142

Sneed, M., J.T. Brandt, and M. Solt, 2014. *Land subsidence, groundwater levels, and geology in the Coachella Valley, California, 1993–2010*: U.S. Geological Survey, Scientific Investigations Report 2014–5075, 62 p.
http://dx.doi.org/10.3133/sir20145075.

STANDARDS

California Department of Transportation, various dates. *Caltrans Surveys Manual*. http://www.dot.ca.gov/hq/row/landsurveys/SurveysManual/Manual_TOC.html

U.S. Environmental Protection Agency, 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4 https://www.epa.gov/sites/production/files/documents/guidance_systematic_planning_dqo_process.pdf

Rice, E.W., R.B. Baire, A.D. Eaton, and L.S. Clesceri ed. 2012. *Standard methods for the examination of water and wastewater*. Washington, DC: American Public Health Association, American Water Works Association, and Water Environment Federation.

GUIDANCE

Barcelona, M.J., J.P. Gibb, J.A. Helfrich, and E.E.Graske. 1985. *Practical Guide for Ground-Water Sampling*. Illinois State Water Survey, Champaign, Illinois, 103 pages. www.orau.org/ptp/PTP%20Library/library/epa/samplings/pracgw.pdf

Buchanan, T.J., and W.P. Somers, 1969. *Discharge measurements at gaging stations; techniques of water-resources investigations of the United States Geologic Survey chapter A8*, Washington D.C. http://pubs.usgs.gov/twri/twri3a8/html/pdf.html

Cunningham, W.L., and Schalk, C.W., comps., 2011, *Groundwater technical procedures of the U.S. Geological Survey*: U.S. Geological Survey Techniques and Methods 1–A1. https://pubs.usgs.gov/tm/1a1/pdf/tm1-a1.pdf

California Department of Water Resources, 2010. *Groundwater elevation monitoring guidelines*. http://www.water.ca.gov/groundwater/casgem/pdfs/CASGEM%20DWR%20GW%20Guidelines%20Final%20121510.pdf

Holmes, R.R. Jr., P.J. Terrio, M.A. Harris, and P.C. Mills, 2001. *Introduction to field methods for hydrologic and environmental studies*, open-file report 01-50, USGS, Urbana, Illinois, 241 p. https://pubs.er.usgs.gov/publication/ofr0150

Puls, R.W., and Barcelona, M.J., 1996, *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*; US EPA, Ground Water Issue EPA/540/S-95/504. https://www.epa.gov/sites/production/files/2015-06/documents/lwflw2a.pdf

Rantz, S.E., and others, 1982. *Measurement and computation of streamflow*; U.S. Geological Survey, Water Supply Paper 2175. http://pubs.usgs.gov/wsp/wsp2175/#table

Subcommittee on Ground Water of the Advisory Committee on Water Information, 2013. *A national framework for ground-water monitoring in the United States*. http://acwi.gov/sogw/ngwmn_framework_report_july2013.pdf

Vail, J., D. France, and B. Lewis. 2013. *Operating Procedure: Groundwater Sampling SESDPROC-301-R3*.

https://www.epa.gov/sites/production/files/2015-06/documents/Groundwater-Sampling.pdf

Wilde, F.D., January 2005. *Preparations for water sampling (ver. 2.0)*: U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chap. A1, http://water.usgs.gov/owq/FieldManual/compiled/NFM_complete.pdf

ONLINE RESOURCES

Online System for Well Completion Reports (OSWCR). California Department of Water Resources. http://water.ca.gov/oswcr/index.cfm

Measuring Land Subsidence web page. U.S. Geological Survey. http://ca.water.usgs.gov/land_subsidence/california-subsidence-measuring.html

USGS Global Positioning Application and Practice web page. U.S. Geological Survey. http://water.usgs.gov/osw/gps/

California Statewide Groundwater Elevation Monitoring (CASGEM) Program

Procedures for Monitoring Entity Reporting

December 2010

Department of Water Resources (DWR) will use the internet as the primary communication tool to notify interested parties and groundwater Monitoring Entities of the status of the CASGEM program on an ongoing basis. Information will be posted at the following website: http://www.water.ca.gov/groundwater/casgem

In addition to the above-referenced website, DWR will distribute information via email. In order to be placed on the CASGEM contact list, please register your contact information at the following website: http://www.water.ca.gov/groundwater/casgem/register/

For questions about the Reporting Procedures, or other technical issues, please contact:

DWR Headquarters
Mary Scruggs
901 P Street
Sacramento, CA 95814
(916) 654-1324
mscruggs@water.ca.gov

Northern Region Office
Kelly Staton
2440 Main Street
Red Bluff, CA 96080
530-529-7344
staton@water.ca.gov

North Central Region Office
Chris Bonds
3500 Industrial Avenue
West Sacramento, CA 95691
(916) 376-9657
cbonds@water.ca.gov

South Central Region Office
Dane Mathis
3374 Shields Avenue
Fresno, CA 93726
(559) 230-3354
dmathis@water.ca.gov

Southern Region Office
Tim Ross
770 Fairmont Avenue
Suite 102
Glendale, CA 91203
(818) 500-1645 x278
tross@water.ca.gov

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INTRODUCTION TO CASGEM PROGRAM

In November 2009 Part 2.11 (Groundwater Monitoring) was added to Division 6 of the Water Code by Senate Bill 6 (7th Extraordinary Session) (SB 6), a copy of which is included in the Appendix. (All statutory references in this document are to the Water Code.) The new law directs that groundwater elevations in all basins and subbasins in California be regularly and systematically monitored, preferably by local entities, with the goal of demonstrating seasonal and long-term trends in groundwater elevations. The Department of Water Resources (DWR) is directed to make the resulting information readily and widely available.

DWR developed the California Statewide Groundwater Elevation Monitoring (CASGEM) program in accordance with SB 6 to establish a permanent, locally-managed system to monitor groundwater elevation in California's alluvial groundwater basins and subbasins identified in DWR Bulletin 118. The CASGEM program will rely and build on the many, established local long-term groundwater monitoring and management programs. DWR's role is to coordinate information collected locally through the CASGEM program and to maintain the collected groundwater elevation data in a readily and widely available public database. DWR will also continue measuring its current network of groundwater monitoring wells as funding allows.

The goals of the CASGEM program are to:

- Establish procedures for notification and data reporting by prospective Monitoring Entities (this document)
- Verify local Monitoring Entities in accordance with the Water Code
- Develop an interface for local entities to enter data into a database compatible with DWR's Water Data Library
- Maintain the database and make it easily accessible to the public and local entities for use in water supply planning and management

If no local entities volunteer to monitor groundwater elevations in a basin or part of a basin, DWR may be required to develop a monitoring program for that part. If DWR takes over monitoring of a basin, certain entities in the basin may not be eligible for water grants or loans administered by the state.

During August and September 2010, DWR held 10 workshops throughout the state in cooperation with Association of California Water Agencies (ACWA) to introduce the CASGEM program and explain the purpose and process of the program to local agencies and stakeholders. A copy of the DWR presentation is available on the CASGEM website (http://www.water.ca.gov/groundwater/casgem). A summary of

Frequently Asked Questions (FAQs), primarily from the workshops, is provided in on the CASGEM website.

DWR's main role is to administer the CASGEM program through providing public outreach; creating and maintaining the CASGEM website and online data submittal system; and, supporting local entities through the process of becoming a Monitoring Entity and preparing Monitoring Plans. DWR will use the CASGEM website to provide up-to-date information on the program. The website will also be the access point for the online notification and data submittal systems.

Staff from the DWR regional offices will be available to assist potential Monitoring Entities with the online notification submittal process. After receiving notification from prospective Monitoring Entities, DWR will review them for completeness, verify the authority of the applying entity under Section 10927, and check for overlapping monitoring areas. DWR will advise each party on the status of their notification within three months of submittal and will work with entities to address any deficiencies in their submittals.

DWR encourages local agencies and groups to collaborate to determine who will serve as the Monitoring Entity for the area. However, if more than one party seeks to become the Monitoring Entity for the same area and overlapping monitoring area issues cannot be resolved locally, DWR will make a final determination of the Monitoring Entity for the area. DWR's determinations will consider the order in which entities are identified in Section 10927 and other factors as described in the Water Code.

DWR will post the selection of each Monitoring Entity and its monitoring area on the CASGEM website and will notify each Monitoring Entity in writing. A map-based interface will be available for users to identify the Monitoring Entity for each basin in the state.

DWR will prepare the first status report on the CASGEM program for the Governor and Legislature by January 1, 2012. In this initial report, DWR will report on the extent of groundwater elevation monitoring within each basin. This report will include a statewide prioritization of basins based on water supply, water demand, and other factors identified in Section 10933. DWR will explore options for basins without identified monitoring, with a focus on identifying options for local monitoring. Future status reports on the CASGEM program will be prepared by DWR in years ending in 5 or 0.

Purpose of Monitoring Entity Reporting Procedures

The purpose of these procedures is to introduce the CASGEM program and its components as the framework for implementing SB 6, with particular emphasis on the initial step of establishing Monitoring Entities for each Bulletin 118 basin in the state.

A summary of the requirements of local entities to comply with the CASGEM program is presented in Table 1.

Table 1. Quick Guide for Local Entities

- Determine whether you qualify as a potential Monitoring Entity (see “Requirements to become Monitoring Entity” on pages 9-13)
- Identify the basins within your area (see Bulletin 118)
- Collaborate with other local entities to identify and choose the prospective Monitoring Entity (or Entities) for your area
- Submit Monitoring Entity notification to DWR through CASGEM website (http://www.water.ca.gov/groundwater/casgem) on or before January 1, 2011
- DWR will review the notification and advise the prospective Monitoring Entity of the status of the notification within 3 months of submittal
- Work with staff of the DWR regional office to address any deficiencies in the submittal
- If more than one party seeks to become the Monitoring Entity for the same area, work with staff of the DWR regional office to resolve
- Check the CASGEM website for a listing of the selected Monitoring Entities
- Develop and submit a Monitoring Plan to DWR through the CASGEM website
- Staff from the DWR regional office are available to assist with the Monitoring Plan and to recommend changes
- Submit monitoring data to DWR through the CASGEM website on or before January 1, 2012

CASGEM SCHEDULE

CASGEM Schedule		DWR Activities		Local Entity Activities
2010	July-September	ACWA/DWR Workshops		Collaborate to identify prospective Monitoring Entities
	October-December	•Draft Procedures and Guidelines •Solicit Comments •Finalize Procedures and Guidelines		
		Notification System ready online		Prospective Monitoring Entities submit notifications to DWR
2011	January 1, 2011	Review and designation of Monitoring Entities	Review Monitoring Plans and provide recommendations	Monitoring Entity notifications due to DWR on or before 1/1/2011
	January-March			Monitoring Entities develop and submit Monitoring Plans to DWR
	April-June			
	July-September			Groundwater elevation monitoring begins and continues
	October-December	Preparation of first CASGEM status report		
2012	January 1, 2012	DWR submits first CASGEM status report to Governor and Legislature		First CASGEM data submittals due to DWR on or before 1/1/2012

A timetable for implementing the CASGEM schedule is shown above.

MONITORING ENTITIES

The CASGEM program establishes the framework for collaboration between local monitoring parties and DWR to collect groundwater elevation data throughout the state's 515 basins as defined in Bulletin 118. A Monitoring Entity is a local agency or group that voluntarily takes responsibility for conducting or coordinating groundwater elevation monitoring and reporting for all or part of a groundwater basin.

To determine if you are within a Bulletin 118 basin, please refer to maps and descriptions in Bulletin 118, available online at: http://www.water.ca.gov/groundwater/bulletin118/gwbasin_maps_descriptions.cfm. Geographic Information System (GIS) shapefiles of the basins are also available at this website. DWR can assist in identifying other potential local monitoring parties in each basin.

ROLES AND RESPONSIBILITIES OF MONITORING ENTITIES

Through the CASGEM program, local entities with appropriate authority may notify DWR of their intent to be a Monitoring Entity. Monitoring Entities will have specific responsibilities, including:

- Coordinate with DWR to establish a Monitoring Plan
- Conduct or coordinate the regular and systematic monitoring of groundwater elevations as specified in the Monitoring Plan
- Submit monitoring data to DWR in a timely manner

A Monitoring Entity can perform monitoring for any number of basins or portions thereof, but no area can have more than one Monitoring Entity. While the Monitoring Entity is responsible for compiling the data and submitting it to DWR for a particular area, the actual measurements can be taken by any number of agencies that would work under the direction of the Monitoring Entity. (Cooperating agencies would submit data to the Monitoring Entity, not to DWR.) Thus, assuming there are no overlapping areas or gaps in basin coverage for a given area, there are three possible basic scenarios, illustrated in Figure 1:

- A single Monitoring Entity that collects and reports groundwater elevation data for the entire basin (Scenario A);
- Multiple Monitoring Entities that collect and report groundwater elevation data for their portion of the basin (Scenario B); or

- An umbrella Monitoring Entity that coordinates and reports groundwater elevation data collected by multiple agencies within the basin (Scenario C).

Scenario A. One Monitoring Entity collects and reports data for entire basin

Scenario B. One basin, several Monitoring Entities collecting and submitting data

Scenario C. One basin, one Monitoring Entity coordinating and submitting data collected by several agencies

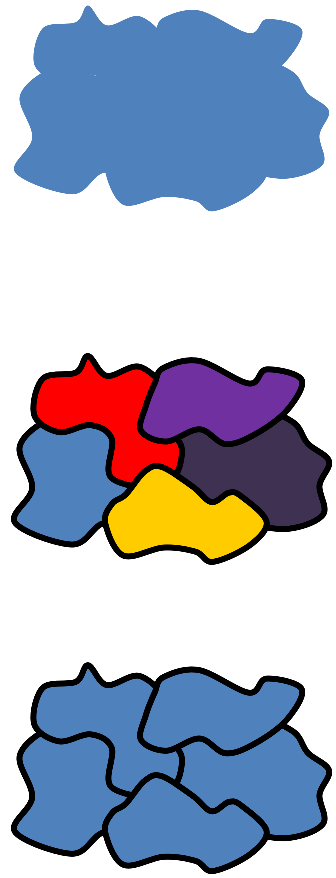

Figure 1. Illustration of possible Monitoring Entity scenarios for a monitored basin.

DWR currently monitors water elevations in about 4,000 wells statewide and cooperates with local and federal agencies to monitor roughly an additional 6,000 wells. DWR plans to continue monitoring groundwater elevations, contingent upon available funding. In some basins DWR currently does most, if not all, of the water-elevation monitoring. In these basins, a local entity still needs to notify DWR of their intent to become the Monitoring Entity. The Monitoring Entity must determine which DWR wells will be included in their CASGEM monitoring network. As long as DWR continues its monitoring program, the department will transmit its groundwater elevation data to the CASGEM system. However, if DWR is unable to continue monitoring for any reason, the Monitoring Entity will be required to re-evaluate its monitoring network to determine which wells to retain in its monitoring network.

REQUIREMENTS TO BECOME MONITORING ENTITY

Section 10927 of the Water Code defines the types of entities that may assume responsibility for monitoring and reporting groundwater elevations as part of the CASGEM program.

A summary list of eligible entities, in order of priority, and notification requirements for each entity is provided below:

1. A **watermaster or water management engineer** appointed by a court or pursuant to statute to administer a final judgment determining rights to groundwater [Section 10927(a)].
   Notification Requirements:
   - Name of Agency
   - Agency Contact Name
   - Address
   - Telephone Number
   - Email Address
   - Any other relevant contact information
   - Authority (as listed in Section 10927)
   - Name and number of basin to be monitored (from Bulletin 118)
   - Map and shapefile showing area to be monitored (Shapefiles do not need to be submitted by the initial January 1, 2011 notification date; Regional Offices can provide assistance to potential Monitoring Entities with shapefiles.)
   - Statement that the entity will comply with the requirements of Water Code Part 2.11
   - Additional information deemed necessary by DWR to identify monitoring area or qualifications of the Monitoring Entity

2. A **groundwater management agency** with statutory authority to manage groundwater pursuant to its principal act that is monitoring groundwater elevations in all or a part of a groundwater basin on or before January 1, 2010 [Section 10927(b)(1)].
   Notification Requirements:
   - Name of Agency
   - Agency Contact Name
   - Address
   - Telephone Number
   - Email Address
   - Any other relevant contact information
   - Authority (as listed in Section 10927)

- Name and number of basin to be monitored (from Bulletin 118)
- Map and shapefile showing area to be monitored (Shapefiles do not need to be submitted by the initial January 1, 2011 notification date; Regional Offices can provide assistance to potential Monitoring Entities with shapefiles.)
- Statement that the entity will comply with the requirements of Water Code Part 2.11
- Additional information deemed necessary by DWR to identify monitoring area or qualifications of the Monitoring Entity

3. A **water replenishment district** established pursuant to Water Code Division 18 (commencing with Section 60000). This part does not expand or otherwise affect the authority of a water replenishment district relating to monitoring elevations [Section 10927(b)(2)].

   Notification Requirements:

   - Name of Agency
   - Agency Contact Name
   - Address
   - Telephone Number
   - Email Address
   - Any other relevant contact information
   - Authority (as listed in Section 10927)
   - Name and number of basin to be monitored (from Bulletin 118)
   - Map and shapefile showing area to be monitored (Shapefiles do not need to be submitted by the initial January 1, 2011 notification date; Regional Offices can provide assistance to potential Monitoring Entities with shapefiles.)
   - Statement that the entity will comply with the requirements of Water Code Part 2.11
   - Additional information deemed necessary by DWR to identify monitoring area or qualifications of the Monitoring Entity

4. A **local agency that is managing all or part of a groundwater basin pursuant to Water Code Part 2.75** (commencing with Section 10750) and that was monitoring groundwater elevations in all or part of a groundwater basin on or before January 1, 2010, or a local agency or county that is managing all or part of a groundwater basin pursuant to any other legally enforceable groundwater management plan with provisions that are substantively similar to those described in that part and that was monitoring groundwater elevations in all or a part of a groundwater basin on or before January 1, 2010 [Section 10927(c)].

Notification Requirements:

- Name of Agency
- Agency Contact Name
- Address
- Telephone Number
- Email Address
- Any other relevant contact information
- Authority (as listed in Section 10927)
- Name and number of basin to be monitored (from Bulletin 118)
- Map and shapefile showing area to be monitored (Shapefiles do not need to be submitted by the initial January 1, 2011 notification date; Regional Offices can provide assistance to potential Monitoring Entities with shapefiles.)
- Statement that the entity will comply with the requirements of Water Code Part 2.11
- Copy of current groundwater management plan
- Statement describing the ability or qualifications of the entity to conduct the groundwater monitoring functions required
- Additional information deemed necessary by DWR to identify monitoring area or qualifications of the Monitoring Entity

5. A **local agency that is managing all or part of a groundwater basin pursuant to an integrated regional water management plan** prepared pursuant to Water Code Part 2.2 (commencing with Section 10530) that includes a groundwater management component that complies with the requirements of Section 10753.7 [Section 10927(d)].

Notification Requirements:

- Name of Agency
- Agency Contact Name
- Address
- Telephone Number
- Email Address
- Any other relevant contact information
- Authority (as listed in Section 10927)
- Name and number of basin to be monitored (from Bulletin 118)
- Map and shapefile showing area to be monitored (Shapefiles do not need to be submitted by the initial January 1, 2011 notification date; Regional Offices can provide assistance to potential Monitoring Entities with shapefiles.)
- Statement that the entity will comply with the requirements of Water Code Part 2.11
- Copy of current groundwater component of integrated regional water management plan
- Statement describing the ability or qualifications of the entity to conduct the groundwater monitoring functions required

- Additional information deemed necessary by DWR to identify monitoring area or qualifications of the Monitoring Entity

6. A **county** that is not managing all or a part of a groundwater basin pursuant to a legally enforceable groundwater management plan with provisions that are substantively similar to those described in Water Code Part 2.75 (commencing with Section 10750) [Section 10927(e)].
   Notification Requirements:
   - Name of County
   - County Contact Name
   - Address
   - Telephone Number
   - Email Address
   - Any other relevant contact information
   - Authority (as listed in Section 10927)
   - Name and number of basin to be monitored (from Bulletin 118)
   - Map and shapefile showing area to be monitored (Shapefiles do not need to be submitted by the initial January 1, 2011 notification date; Regional Offices can provide assistance to potential Monitoring Entities with shapefiles.)
   - Statement that the entity will comply with the requirements of Water Code Part 2.11
   - Statement describing the ability or qualifications of the entity to conduct the groundwater monitoring functions required
   - Additional information deemed necessary by DWR to identify monitoring area or qualifications of the Monitoring Entity

7. A **voluntary cooperative groundwater monitoring association** formed pursuant to Section 10935 [Section 10927(f)]. As described in the Water Code Section 10935, the voluntary associations may be established by contract, a joint powers agreement, a memorandum of agreement, or other form of agreement deemed acceptable by DWR, so long as it contains: the names of the participants; the boundaries of the area covered by the agreement; the name or names of the parties responsible for meeting the requirements; the method of recovering the costs associated with meeting the requirements; and other provisions that may be required by DWR. Entities seeking to form a voluntary association should notify DWR, which will work cooperatively with the interested parties to facilitate the formation of the association.

Notification Requirements:

- Name of Association
- Association Contact Name
- Address
- Telephone Number
- Email Address
- Any other relevant contact information
- Authority (as listed in Section 10927)
- Name and number of basin to be monitored (from Bulletin 118)
- Map and shapefile showing area to be monitored (Shapefiles do not need to be submitted by the initial January 1, 2011 notification date; Regional Offices can provide assistance to potential Monitoring Entities with shapefiles.)
- Statement that the entity will comply with the requirements of Water Code Part 2.11
- Statement describing the ability or qualifications of the entity to conduct the groundwater monitoring functions required
- Statement of intent to meet the association formation requirements described in Section 10935
- Additional information deemed necessary by DWR to identify monitoring area or qualifications of the Monitoring Entity

Local agencies are encouraged to coordinate among themselves to determine the proposed Monitoring Entity or Entities that best suits their area. The resulting interested entity (or entities) should notify DWR of its intent to become a groundwater Monitoring Entity for one or more basins, or portions thereof by the January 1, 2011 deadline. Certain basic information is required for notification, including contact information and additional details depending on the authority of the entity desiring to monitor groundwater (Section 10928), as listed above. This notification information will be submitted to DWR using an online system that will be available by mid-December 2010.

MONITORING PLANS

Monitoring Entities will each develop a Monitoring Plan that includes the following sections: Monitoring Sites and Timing, Field Methods, and Data Reporting. Monitoring Plans should be completed and submitted to DWR by summer 2011. Staff from the DWR regional offices will be available to assist Monitoring Entities with the development of Monitoring Plans, if needed. In determining what information should be reported to DWR, the department will defer to existing monitoring programs if those programs result in information that demonstrates seasonal (annual high and low groundwater elevations) and long-term trends in groundwater elevations. Staff from the DWR regional offices will assist Monitoring Entities to address any gaps in basin coverage (see below) and other monitoring issues and may make recommendations for the location of additional wells. However, the department has no authority to require a Monitoring Entity to install additional wells unless funds are provided for that purpose. Once a Monitoring Plan is established with DWR, Monitoring Entities should notify DWR of any changes to the plan.

Key Components of Monitoring Plans

Submit to DWR by summer 2011

- Monitoring Sites and Timing
  - Well Network Design
  - Selected wells (current)
  - Planned (future) wells
  - Frequency to capture seasonal highs and lows
  - Map and shapefile of monitoring area and well locations

Field Methods for groundwater monitoring

- Methods for measuring
  - Reference Point
  - Static water level
  - Depth to water
  - Standardized form for data collection

Data Reporting

- Online data submittal, minimum July & January each year

DATA GAPS

A data gap refers to a basin or portion of a basin that is not included in any of the Monitoring Plans submitted to DWR. This is essentially an area that lacks the density of monitoring wells that would allow seasonal and long-term trends in groundwater elevations to be determined for the basin, subbasin, or a portion thereof. Among the 515 basins defined by Bulletin 118, data gaps may exist for a variety of reasons, including a lack of suitable monitoring wells, lack of groundwater use, access issues, and jurisdictional issues, among others.

If no local entity is able and/or willing to fill a data gap, the department may be required to perform groundwater monitoring functions. If DWR performs this monitoring, local agencies and the county that have the authority under Section 10927 to monitor the area of the data gap would be potentially ineligible for a water grant or loan awarded or administered by the state. The Monitoring Entity or entities with the authority to monitor the area of the data gap should provide detailed information regarding the nature of and reason for the data gap so that DWR may include such information in the prioritization of groundwater basins and subbasins as appropriate.

Agencies and counties that are eligible to be designated Monitoring Entities but choose not participate in the CASGEM program will not lose their state water grant and loan eligibility if their entire service area qualifies as a disadvantaged community (Water Code Section 10933.7(b)). It will be the responsibility of the local agency or county applying for a state water grant or loan to demonstrate their disadvantaged community status at the time they are applying for the grant or loan.

Monitoring Sites and Timing

The Monitoring Plan will identify the wells to be monitored and the frequency with which they will be monitored. The Monitoring Plan should explain how proposed monitoring will be sufficient to demonstrate the seasonal and long-term groundwater elevation trends in the monitored area. The density of monitoring locations will depend on the complexity of the basin.

Because of security concerns, the California Department of Public Health (DPH) routinely limits the disclosure of detailed public water supply well location information. Pursuant to Water Code Section 10931, the DWR is required to collaborate with DPH to ensure that the information reported to the CASGEM program will not result in the inappropriate disclosure of information of concern to DPH. At this time, DWR has reached no agreement with DPH regarding the appropriate treatment of public water supply well data. As a result, CASGEM does not currently plan to use such well information in its database.

The Monitoring Plan should contain a table identifying the wells to be monitored and the timing of that monitoring. Because the law specifies that information should demonstrate seasonal and long-term trends in groundwater elevations, at a minimum monitoring should be conducted at each location for the yearly high and low for the basin. The yearly high and low groundwater elevations typically occur in spring and fall, but this may vary from basin to basin. It is very important that the timing of all the measurements in the basin is coordinated. Rationale for selection of the timing (seasonal highs and lows) should be included in the Monitoring Plan.

The information on the monitoring sites and timing to be submitted in the online system should include:

- Well identification number
- State well number
- Location (decimal latitude and longitude, North American Datum (NAD) 83)
- Reference point elevation (feet, North American Vertical Datum (NAVD) 88)
- Land surface datum (feet, NAVD88)
- Map and shapefile with monitoring locations, Bulletin 118 groundwater basin boundary, and boundary of monitoring area
- Frequency and timing of measurements

FIELD METHODS

The consistent and documented collection of groundwater elevation data is important for ensuring that the data can be used across the state, regardless of the Monitoring Entity. The field methods should meet a common set of basic requirements; however, the methods do not have to be exactly the same. Many entities already have in place monitoring efforts that are successful in meeting local needs and that can meet the needs for this program, either as-is or with the incorporation of individual components. The CASGEM program wishes to maintain, to the greatest extent possible, the procedures of high-quality local groundwater elevation monitoring programs, so long as they meet the overall program goals and policies. Of particular concern are the following basic requirements:

- Method(s) to establish the Reference Point, including step-by-step instructions
- Method(s) to ensure static groundwater elevation
- Method(s) to measure depth to water, including step-by-step instructions
- Method(s) and form(s) for recording measurements

It is the responsibility of each Monitoring Entity to develop and implement monitoring protocols that are appropriate to local groundwater basin conditions, protect the water quality of its monitoring wells, and maintain the quality of the data that it submits to the CASGEM Program. DWR has developed field guidelines (Department of Water Resources Groundwater Elevation Monitoring Guidelines) based on a review of existing field methods from DWR and other organizations, which is available on the CASGEM website. Monitoring Entities are welcome to refer to these guidelines when developing field methods for their own Monitoring Plans. However, the DWR guidelines are for internal use in the event that the Department is required to perform groundwater monitoring functions pursuant to Section 10933.5 and are not binding on any other agency. The core of the CASGEM program will rely and build on the many, established local long-term groundwater monitoring and management programs. The department will defer to existing monitoring programs that result in information that demonstrates seasonal and long-term trends in groundwater elevations.

DATA REPORTING

DWR will develop an online data submittal system for Monitoring Entities to submit their groundwater elevation data. Several methods of submitting data will be available, such as direct online data entry, or upload of data files for batch entry. Initial groundwater elevation data should be submitted to DWR by January 1, 2012. Thereafter, data should be submitted as soon as possible after collection, but no later than January 1st and July 1st of each year, at the minimum. Historical data can also be submitted via the DWR data system to aid in data interpretation. All submitted data will be available to the public, except for confidential data.

Each groundwater elevation data measurement submitted to the online system should include:

- Well identification number
- Measurement date
- Reference point and land surface elevation
- Depth to water
- Method of measuring water depth
- Measurement quality codes

The Monitoring Entity information, well information, and groundwater elevation information is to be provided by the Monitoring Entity. Items labeled as required must be submitted to DWR to report groundwater elevations. Items labeled as recommended should be submitted to DWR if they are available, as they assist in fully evaluating the quality of measurements. DWR will provide standard form(s) for Monitoring Entities to submit groundwater elevation data online. However, if Monitoring Entities cannot use the standard form(s) or provide the data elements listed below, DWR will work cooperatively with Monitoring Entities to develop alternate methods of submitting data.

Entity Information

All entities assuming groundwater monitoring functions as delineated in Section 10927 (a)-(f) are required to submit the following information:

- Monitoring Entity's name, address, telephone number, contact person name and email address, and any other relevant contact information (Section 10928 (a) (1), 10928 (b) (1))
- Name, address, telephone number, email address and any other relevant contact information for entities collecting data that is submitted by a designated submitting entity (Monitoring Entity)
- Groundwater basins being monitored
    - Identify entire basins monitored
    - Identify partial basins monitored

Well Information

The following information about each well is required for the CASGEM online system:

- Unique well identification number. Agencies may use an existing State Well Number, an existing local well designation, or develop their own identification name, using the following protocol:
    - Agency name, abbreviation, or acronym followed by a sequential number (e.g., SGA 01)
    - Groundwater basin – followed by a sequential number (e.g., Llagas 03)
    - Geographic name – followed by a sequential number (e.g., Yolo 12)
    - Well names should be 15 characters long or less
    - Avoid using owner/business names or specific locational information for privacy and security
- Decimal latitude/longitude coordinates of well, using horizontal datum NAD83, and the method of determining coordinates (Actual coordinates are preferred; however, Monitoring Entities may submit approximate locations, as needed, to protect the privacy of well owners. For example, to protect the privacy of a well owner, a Monitoring Entity may submit well coordinate locations that are only within 1000-feet of the actual well location.)
- Groundwater basin or sub-basin
- Reference point elevation of the well (feet) using NAVD88 vertical datum
- Elevation of land surface datum at the well (feet) using NAVD88 vertical datum
- Use of well (e.g., dedicated monitoring, irrigation, domestic, etc)
- Well completion type (e.g. single well, nested, or multi-completion wells)
- Depth of screened interval(s) and total well depth of well, if available (feet)
- Well Completion Report number (DWR Form 188), if available

The following information about each well is recommended for the CASGEM online system:

- State Well Number – assigned by DWR in most cases
- Method by which land surface elevation was determined (for example, topographic map, GPS, etc.)
- Written description of location of well, including distance from nearby landmarks and location of reference point in relation to well appurtenances (DWR Form 429)
- Well information comments

Groundwater Elevation Information

The following information for each groundwater elevation measurement is required for the CASGEM online system:

- Well identification number (see Well Information, above)
- Measurement date
- Reference point elevation of the well (feet) using NAVD88 vertical datum
- Elevation of land surface datum at the well (feet) using NAVD88 vertical datum
- Depth to water below reference point (feet) (unless no measurement was taken)
- Method of measuring water depth
- Measurement Quality Codes

    - If no measurement is taken, a specified “no measurement” code, must be recorded. Standard codes will be provided by the online system. If a measurement is taken, a “no measurement” code is not recorded.)
    - If the quality of a measurement is uncertain, a “questionable measurement” code can be recorded. Standard codes will be provided by the online system. If no measurement is taken, a “questionable measurement” code is not recorded.)
- Measuring agency identification

The following information for each groundwater elevation measurement is recommended for the CASGEM online system:

- Measurement time (PST/PDT with military time/24 hour format)
- Comments about measurement, if applicable

Groundwater elevation data shall be submitted electronically to DWR’s online system. DWR will develop electronic data transmittal (EDT) alternatives and data standards to permit bulk data transfer and assist Monitoring Entities in EDT reporting to DWR. As stated above, if Monitoring Entities cannot use the standard form(s) or provide the necessary groundwater elevation data elements, DWR will work cooperatively with Monitoring Entities to develop alternate methods of submitting data.

The CASGEM online data submittal system will be compatible with the Water Data Library (WDL) (http://www.water.ca.gov/waterdatalibrary/), DWR’s existing groundwater elevation database. The CASGEM system will include data reporting options similar to those in WDL, such as hydrographs, seasonal contour data, and data downloads. The combined accessibility of the WDL and the CASGEM system will be a significant resource for local agencies in making sound groundwater management decisions.

REFERENCES

California Departement of Water Resources. (2003). *California's Groundwater, Bulletin 118-03.*

California Department of Water Resources. (2009). *California Water Plan Update 2009, Bulletin 160-09.*

APPENDIX – SENATE BILL 6 (7TH EXTRAORDINARY SESSION) - GROUNDWATER MONITORING

Senate Bill No. 6

CHAPTER 1

An act to add Part 2.11 (commencing with Section 10920) to Division 6 of, and to repeal and add Section 12924 of, the Water Code, relating to groundwater.

[Approved by Governor November 6, 2009. Filed with Secretary of State November 6, 2009.]

Legislative Counsel's Digest

SB 6, Steinberg. Groundwater.

(1) Existing law authorizes a local agency whose service area includes a groundwater basin that is not subject to groundwater management to adopt and implement a groundwater management plan pursuant to certain provisions of law. Existing law requires a groundwater management plan to include certain components to qualify as a plan for the purposes of those provisions, including a provision that establishes funding requirements for the construction of certain groundwater projects.

This bill would establish a groundwater monitoring program pursuant to which specified entities, in accordance with prescribed procedures, may propose to be designated by the Department of Water Resources as groundwater monitoring entities, as defined, for the purposes of monitoring and reporting with regard to groundwater elevations in all or part of a basin or subbasin, as defined. The bill would require the department to work cooperatively with each monitoring entity to determine the manner in which groundwater elevation information should be reported to the department. The bill would authorize the department to make recommendations for improving an existing monitoring program, and to require additional monitoring wells under certain circumstances. Under certain circumstances, the department would be required to perform groundwater monitoring functions. In that event, prescribed entities with authority to assume groundwater monitoring functions with regard to a basin or subbasin for which the department has assumed those functions would not be eligible for a water grant or loan awarded or administered by the state.

(2) Existing law requires the department to conduct an investigation of the state's groundwater basins and to report its findings to the Governor and the Legislature not later than January 1, 1980.

This bill would repeal that provision. The department would be required to conduct an investigation of the state's groundwater basins and to report its findings to the Governor and the Legislature not later than January 1, 2012, and thereafter in years ending in 5 or 0.

(3) The bill would take effect only if SB 1 and SB 7 of the 2009–10 7th Extraordinary Session of the Legislature are enacted and become effective.

The people of the State of California do enact as follows:

SECTION 1. Part 2.11 (commencing with Section 10920) is added to Division 6 of the Water Code, to read:

PART 2.11. GROUNDWATER MONITORING

Chapter 1. General Provisions

10920. (a) It is the intent of the Legislature that on or before January 1, 2012, groundwater elevations in all groundwater basins and subbasins be regularly and systematically monitored locally and that the resulting groundwater information be made readily and widely available.

(b) It is further the intent of the Legislature that the department continue to maintain its current network of monitoring wells, including groundwater elevation and groundwater quality monitoring wells, and that the department continue to coordinate monitoring with local entities.

10921. This part does not require the monitoring of groundwater elevations in an area that is not within a basin or subbasin.

10922. This part does not expand or otherwise affect the powers or duties of the department relating to groundwater beyond those expressly granted by this part.

Chapter 2. Definitions

10925. Unless the context otherwise requires, the definitions set forth in this section govern the construction of this part.

(a) “Basin” or “subbasin” means a groundwater basin or subbasin identified and defined in the department’s Bulletin No. 118.

(b) “Bulletin No. 118” means the department’s report entitled “California’s Groundwater: Bulletin 118” updated in 2003, or as it may be subsequently updated or revised in accordance with Section 12924.

(c) “Monitoring entity” means a party conducting or coordinating the monitoring of groundwater elevations pursuant to this part.

(d) “Monitoring functions” and “groundwater monitoring functions” means the monitoring of groundwater elevations, the reporting of those elevations to the department, and other related actions required by this part.

(e) “Monitoring groundwater elevations” means monitoring groundwater elevations, coordinating the monitoring of groundwater elevations, or both.

(f) “Voluntary cooperative groundwater monitoring association” means an association formed for the purposes of monitoring groundwater elevations pursuant to Section 10935.

Chapter 3. Groundwater Monitoring Program

10927. Any of the following entities may assume responsibility for monitoring and reporting groundwater elevations in all or a part of a basin or subbasin in accordance with this part:

(a) A watermaster or water management engineer appointed by a court or pursuant to statute to administer a final judgment determining rights to groundwater.

(b) (1) A groundwater management agency with statutory authority to manage groundwater pursuant to its principal act that is monitoring groundwater elevations in all or a part of a groundwater basin or subbasin on or before January 1, 2010.

(2) A water replenishment district established pursuant to Division 18 (commencing with Section 60000). This part does not expand or otherwise affect the authority of a water replenishment district relating to monitoring groundwater elevations.

(c) A local agency that is managing all or part of a groundwater basin or subbasin pursuant to Part 2.75 (commencing with Section 10750) and that was monitoring groundwater elevations in all or a part of a groundwater basin or subbasin on or before January 1, 2010, or a local agency or county that is managing all or part of a groundwater basin or subbasin pursuant to any other legally enforceable groundwater management plan with provisions that are substantively similar to those described in that part and that was monitoring groundwater elevations in all or a part of a groundwater basin or subbasin on or before January 1, 2010.

(d) A local agency that is managing all or part of a groundwater basin or subbasin pursuant to an integrated regional water management plan prepared pursuant to Part 2.2 (commencing with Section 10530) that includes a groundwater management component that complies with the requirements of Section 10753.7.

(e) A county that is not managing all or a part of a groundwater basin or subbasin pursuant to a legally enforceable groundwater management plan with provisions that are substantively similar to those described in Part 2.75 (commencing with Section 10750).

(f) A voluntary cooperative groundwater monitoring association formed pursuant to Section 10935.

10928. (a) Any entity described in subdivision (a) or (b) of Section 10927 that seeks to assume groundwater monitoring functions in accordance with this part shall notify the department, in writing, on or before January 1, 2011. The notification shall include all of the following information:

(1) The entity's name, address, telephone number, and any other relevant contact information.

(2) The specific authority described in Section 10927 pursuant to which the entity qualifies to assume the groundwater monitoring functions.

(3) A map showing the area for which the entity is requesting to perform the groundwater monitoring functions.

(4) A statement that the entity will comply with all of the requirements of this part.

(b) Any entity described in subdivision (c), (d), (e), or (f) of Section 10927 that seeks to assume groundwater monitoring functions in accordance with this part shall notify the department, in writing, by January 1, 2011. The information provided in the notification shall include all of the following:

(1) The entity's name, address, telephone number, and any other relevant contact information.

(2) The specific authority described in Section 10927 pursuant to which the entity qualifies to assume the groundwater monitoring functions.

(3) For entities that seek to qualify pursuant to subdivision (c) or (d) of Section 10927, the notification shall also include a copy of the current groundwater management plan or the groundwater component of the integrated regional water management plan, as appropriate.

(4) For entities that seek to qualify pursuant to subdivision (f) of Section 10927, the notification shall include a statement of intention to meet the requirements of Section 10935.

(5) A map showing the area for which the entity is proposing to perform the groundwater monitoring functions.

(6) A statement that the entity will comply with all of the requirements of this part.

(7) A statement describing the ability and qualifications of the entity to conduct the groundwater monitoring functions required by this part.
(c) The department may request additional information that it deems necessary for the purposes of determining the area that is proposed to be monitored or the qualifications of the entity to perform the groundwater monitoring functions.

10929. (a) (1) The department shall review all notifications received pursuant to Section 10928.

(2) Upon the receipt of a notification pursuant to subdivision (a) of Section 10928, the department shall verify that the notifying entity has the appropriate authority under subdivision (a) or (b) of Section 10927.

(3) Upon the receipt of a notification pursuant to subdivision (b) of Section 10928, the department shall do both of the following:

(A) Verify that each notification is complete.

(B) Assess the qualifications of the notifying party.

(b) If the department has questions about the completeness or accuracy of a notification, or the qualifications of a party, the department shall contact the party to resolve any deficiencies. If the department is unable to resolve the deficiencies, the department shall notify the party in writing that the notification will not be considered further until the deficiencies are corrected.

(c) If the department determines that more than one party seeks to become the monitoring entity for the same portion of a basin or subbasin, the department shall consult with the interested parties to determine which party will perform the monitoring functions. In determining which party will perform the monitoring functions under this part, the department shall follow the order in which entities are identified in Section 10927.

(d) The department shall advise each party on the status of its notification within three months of receiving the notification.

10930. Upon completion of each review pursuant to Section 10929, the department shall do both of the following if it determines that a party will perform monitoring functions under this part:

(a) Notify the party in writing that it is a monitoring entity and the specific portion of the basin or subbasin for which it shall assume groundwater monitoring functions.

(b) Post on the department's Internet Web site information that identifies the monitoring entity and the portion of the basin or subbasin for which the monitoring entity will be responsible.

10931. (a) The department shall work cooperatively with each monitoring entity to determine the manner in which groundwater elevation information should be reported to the department pursuant to this part. In determining what information should be reported to the department, the department shall defer to existing monitoring programs if those programs result in information that demonstrates seasonal and long-term trends in groundwater elevations. The department shall collaborate with the State Department of Public Health to ensure that the information reported to the department will not result in the inappropriate disclosure of the physical address or geographical location of drinking water sources, storage facilities, pumping operational data, or treatment facilities.

(b) (1) For the purposes of this part, the department may recommend improvements to an existing monitoring program, including recommendations for additional monitoring wells.

(2) The department may not require additional monitoring wells unless funds are provided for that purpose.

10932. Monitoring entities shall commence monitoring and reporting groundwater elevations pursuant to this part on or before January 1, 2012.

10933. (a) On or before January 1, 2012, the department shall commence to identify the extent of monitoring of groundwater elevations that is being undertaken within each basin and subbasin.

(b) The department shall prioritize groundwater basins and subbasins for the purpose of implementing this section. In prioritizing the basins and subbasins, the department shall, to the extent data are available, consider all of the following:

(1) The population overlying the basin or subbasin.

(2) The rate of current and projected growth of the population overlying the basin or subbasin.

(3) The number of public supply wells that draw from the basin or subbasin.

(4) The total number of wells that draw from the basin or subbasin.

(5) The irrigated acreage overlying the basin or subbasin.

(6) The degree to which persons overlying the basin or subbasin rely on groundwater as their primary source of water.

(7) Any documented impacts on the groundwater within the basin or subbasin, including overdraft, subsidence, saline intrusion, and other water quality degradation.

(8) Any other information determined to be relevant by the department.

(c) If the department determines that all or part of a basin or subbasin is not being monitored pursuant to this part, the department shall do all of the following:

(1) Attempt to contact all well owners within the area not being monitored.

(2) Determine if there is an interest in establishing any of the following:

(A) A groundwater management plan pursuant to Part 2.75 (commencing with Section 10750).

(B) An integrated regional water management plan pursuant to Part 2.2 (commencing with Section 10530) that includes a groundwater management component that complies with the requirements of Section 10753.7.

(C) A voluntary groundwater monitoring association pursuant to Section 10935.

(d) If the department determines that there is sufficient interest in establishing a plan or association described in paragraph (2) of subdivision (c), or if the county agrees to perform the groundwater monitoring functions in accordance with this part, the department shall work cooperatively with the interested parties to comply with the requirements of this part within two years.

(e) If the department determines, with regard to a basin or subbasin, that there is insufficient interest in establishing a plan or association described in paragraph (2) of subdivision (c), and if the county decides not to perform the groundwater monitoring and reporting functions of this part, the department shall do all of the following:

(1) Identify any existing monitoring wells that overlie the basin or subbasin that are owned or operated by the department or any other state or federal agency.

(2) Determine whether the monitoring wells identified pursuant to paragraph (1) provide sufficient information to demonstrate seasonal and long-term trends in groundwater elevations.

(3) If the department determines that the monitoring wells identified pursuant to paragraph (1) provide sufficient information to demonstrate seasonal and long-term trends in groundwater elevations, the department shall not perform groundwater monitoring functions pursuant to Section 10934.

(4) If the department determines that the monitoring wells identified pursuant to paragraph (1) provide insufficient information to demonstrate seasonal and long-term trends in groundwater elevations, and the State Mining and Geology Board concurs with

that determination, the department shall perform groundwater monitoring functions pursuant to Section 10934.[1]

10933.5. (a) Consistent with Section 10933, the department shall perform the groundwater monitoring functions for those portions of a basin or subbasin for which no monitoring entity has agreed to perform the groundwater monitoring functions.

(b) Upon determining that it is required to perform groundwater monitoring functions, the department shall notify both of the following entities that it is forming the groundwater monitoring district:

(1) Each well owner within the affected area.

(2) Each county that contains all or a part of the affected area.

(c) The department shall not assess a fee or charge to recover the costs for carrying out its power and duties under this part.

(d) The department may establish regulations to implement this section.

10933.7. (a) If the department is required to perform groundwater monitoring functions pursuant to Section 10933.5, the county and the entities described in subdivisions (a) to (d), inclusive, of Section 10927 shall not be eligible for a water grant or loan awarded or administered by the state.

(b) Notwithstanding subdivision (a), the department shall determine that an entity described in subdivision (a) is eligible for a water grant or loan under the circumstances described in subdivision (a) if the entity has submitted to the department for approval documentation demonstrating that its entire service area qualifies as a disadvantaged community.

10934. (a) For purposes of this part, neither any entity described in Section 10927, nor the department, shall have the authority to do either of the following:

(1) To enter private property without the consent of the property owner.

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[1] The reference in Section 10933(e)(4) to Section 10934 has been amended by Stats. 2010, Ch. 328, sec. 237 (S.B. 1330). The new reference will be to Section 10933.5.

(2) To require a private property owner to submit groundwater monitoring information to the entity.

(b) This section does not apply to a county or an entity described in subdivisions (a) to (d), inclusive, of Section 10927 that assumed responsibility for monitoring and reporting groundwater elevations prior to the effective date of this part.

10935. (a) A voluntary cooperative groundwater monitoring association may be formed for the purposes of monitoring groundwater elevations in accordance with this part. The association may be established by contract, a joint powers agreement, a memorandum of agreement, or other form of agreement deemed acceptable by the department.

(b) Upon notification to the department by one or more entities that seek to form a voluntary cooperative groundwater monitoring association, the department shall work cooperatively with the interested parties to facilitate the formation of the association.

(c) The contract or agreement shall include all of the following:

(1) The names of the participants.

(2) The boundaries of the area covered by the agreement.

(3) The name or names of the parties responsible for meeting the requirements of this part.

(4) The method of recovering the costs associated with meeting the requirements of this part.

(5) Other provisions that may be required by the department.

10936. Costs incurred by the department pursuant to this chapter may be funded from unallocated bond revenues pursuant to paragraph (12) of subdivision (a) of Section 75027 of the Public Resources Code, to the extent those funds are available for those purposes.

SEC. 2. Section 12924 of the Water Code is repealed.

SEC. 3. Section 12924 is added to the Water Code, to read:

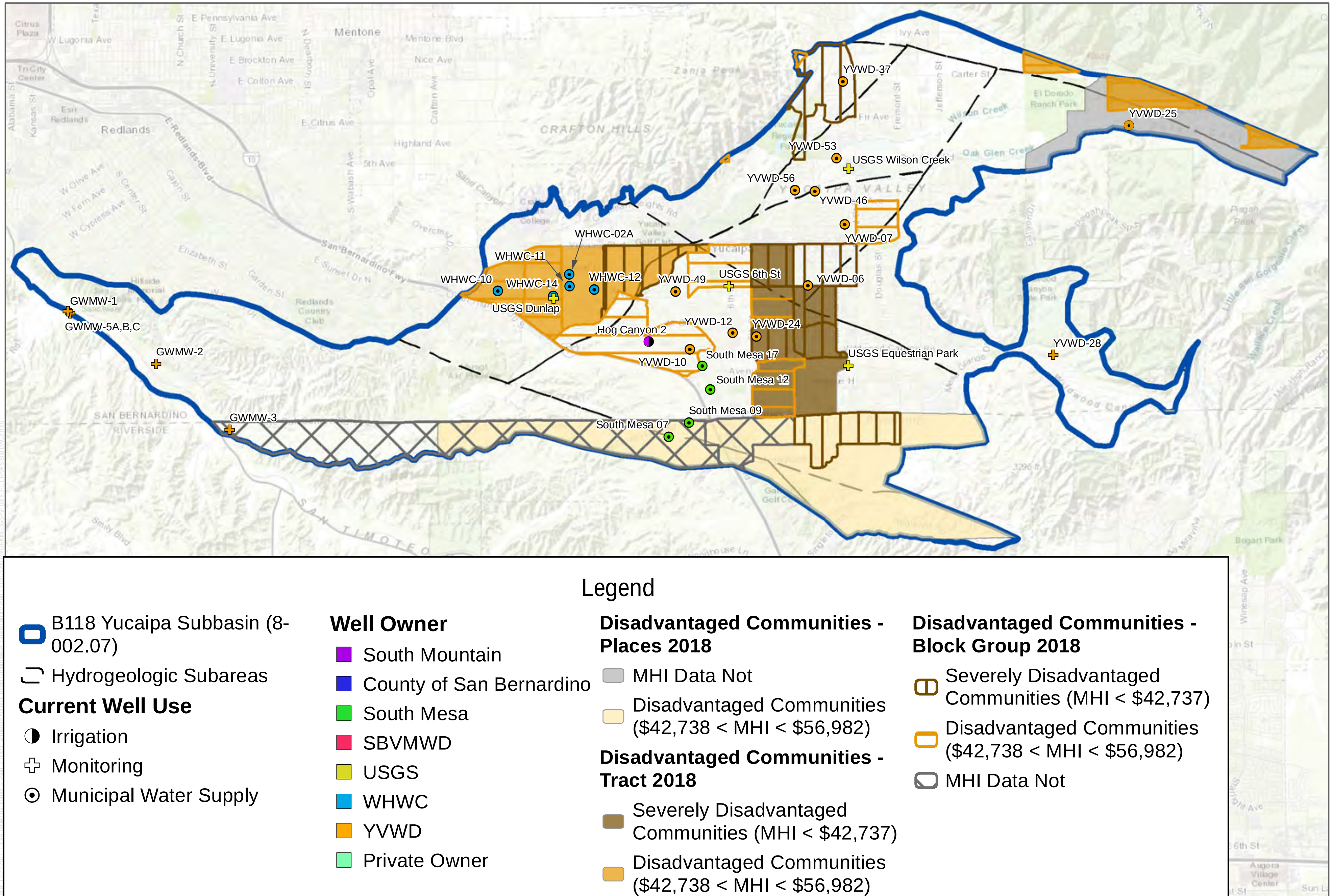
12924. (a) The department, in conjunction with other public agencies, shall conduct an investigation of the state's groundwater basins. The department shall identify the state's groundwater basins on the basis of geological and hydrological conditions and consideration of political boundary lines whenever practical. The department shall also investigate existing general patterns of groundwater pumping and groundwater recharge within those basins to the extent necessary to identify basins that are subject to critical conditions of overdraft.

(b) The department shall report its findings to the Governor and the Legislature not later than January 1, 2012, and thereafter in years ending in 5 or 0.

SEC. 4. This act shall take effect only if Senate Bill 1 and Senate Bill 7 of the 2009–10 Seventh Extraordinary Session of the Legislature are enacted and become effective.

Appendix 3-C

Representative Monitoring Points, Disadvantaged Communities, and Groundwater Dependent Ecosystems

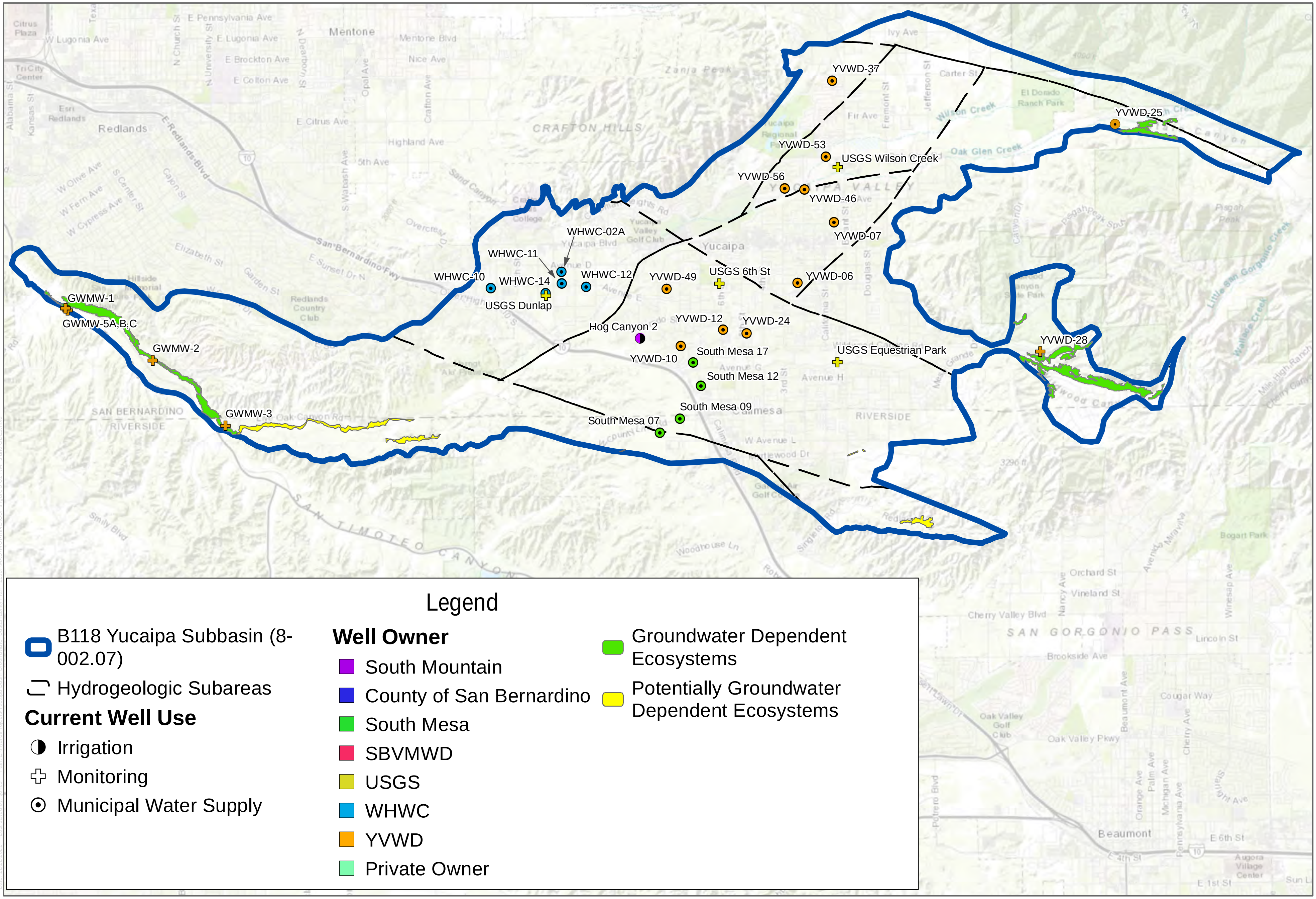


SOURCE: SBVMWD, YVWD, WHWC, SMWC, City of Redlands, USGS

FIGURE 3-C1

Representative Monitoring Points, Disadvantaged, and Severely Disadvantaged Communities in the Plan Area

DUDEK



SOURCE: SBVMWD, YVWD, WHWC, SMWC, City of Redlands, USGS

FIGURE 3-C2

Representative Monitoring Points and Groundwater Dependent Ecosystems in the Plan Area

DUDEK

0 0.5 1 Miles

Appendix 5-A

Resolutions by Yucaipa GSA Member Agencies to Adopt the GSP

Resolution No. 2021-01

by

Western Heights Water Company

RESOLUTION NO. 2021-01

RESOLUTION OF THE BOARD OF DIRECTORS OF WESTERN HEIGHTS WATER COMPANY, AS A MEMBER OF THE YUCAIPA GROUNDWATER SUSTAINABILITY AGENCY TO ADOPT THE GROUNDWATER SUSTAINABILITY PLAN FOR THE YUCAIPA SUBBASIN (BASIN NO. 8-002.07)

December 17, 2021

WHEREAS, on September 16, 2014, Governor Jerry Brown signed into law Senate Bills 1168 and 1319, and Assembly Bill 1739, collectively known as the Sustainable Groundwater Management Act ("SGMA"), codified in certain provisions of the California Government Code, including commencing with Section 65350.5, and codified in Part 2.74 of Division 6 of the California Water Code, commencing with Section 10720, and amending other provisions of the California Government Code and California Water Code; and,

WHEREAS, SGMA went into effect on January 1, 2015; and,

WHEREAS, various clarifying amendments to SGMA were signed into law in 2015, including Senate Bills 13 and 226, and Assembly Bills 617 and 939, which were codified in part in California Water Code Section 10723.6(a), authorizing a combination of local agencies to form a Groundwater Sustainability Agency ("GSA") pursuant to a joint powers agreement, a memorandum of agreement, or other legal agreement; and, California Water Code Section 10723.6(b), authorizing water corporations regulated by the California Public Utilities Commission and mutual water companies to participate in a GSA through a memorandum of agreement or other legal agreement; and,

WHEREAS, the legislative intent and effect of SGMA, as set forth in California Water Code Section 10720.1, includes the following: (1) to provide for the sustainable management of groundwater basins; (2) to enhance local management of groundwater consistent with rights to use or store groundwater and Section 2 of Article X Water of the California Constitution, and to preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater; (3) to establish minimum standards for sustainable groundwater management; (4) to provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater; (5) to avoid or minimize subsidence; (6) to improve data collection and understanding about groundwater; (7) to increase groundwater storage and remove impediments to recharge; (8) to manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner; and (9) to provide a more efficient and cost-effective groundwater adjudication process that protects water rights, ensures due process, prevents unnecessary delay, and furthers the objectives of SGMA; and,

WHEREAS, SGMA affords GSAs specific powers to manage groundwater in addition to existing legal authorities, which powers may be used to provide the maximum degree of local control and flexibility consistent with the sustainability goals of SGMA; and,

WHEREAS, SGMA includes several un-codified findings by the California Legislature, including the determination that the people of the state have a primary interest in the protection, management, and reasonable beneficial use of the water resources of the state, both surface and underground, and that the integrated management of the state's water resources is essential to meeting its water management goals; and,

WHEREAS, the Yucaipa Subbasin ("SUBBASIN") is identified by the California Department of Water Resources Bulletin 118 as Sub-basin No. 8-002.07 of the Upper Santa Ana Valley Groundwater Basin, and is designated by the California Department of Water Resources ("DWR") as a high-priority basin; and,

WHEREAS, California Water Code Section 10720.7 requires the SUBBASIN, as a high-priority basin that is not designated by DWR as being subject to critical conditions of overdraft, to be managed by a Groundwater Sustainability Plan ("GSP") by January 31, 2022; and,

WHEREAS, South Mesa Water Company ("SOUTH MESA"), South Mountain Water Company ("SOUTH MOUNTAIN"), Western Heights Water Company ("WHWC") and Yucaipa Valley Water District ("YVWD"), herein collectively referred to as the "WATER PURVEYORS"; and the City of Calimesa ("CALIMESA"), the City of Redlands ("REDLANDS") and the City of Yucaipa ("YUCAIPA"), herein collectively referred to as the MUNICIPALITIES"; and the San Bernardino Valley Municipal Water District ("SBVMWD") and the San Gorgonio Pass Water Agency ("SGPWA"), herein collectively referred to as the "REGIONALS", entered into a Memorandum of Agreement ("MOA") in June 2017 to form a GSA called the Yucaipa Groundwater Sustainability Agency ("YUCAIPA GSA"), and,

WHEREAS, each of the above-described entities is individually referred to as a "PARTY" and are collectively referred to as the "PARTIES". SOUTH MESA, SOUTH MOUNTAIN and WHWC are collectively referred to as the "MUTUALS"; and, the PARTIES other than the MUTUALS are collectively referred to as the "LOCAL AGENCIES," and,

WHEREAS, The County of Riverside ("RIVERSIDE") and the County of San Bernardino ("SAN BERNARDINO"), collectively referred to as the "COUNTIES," are stakeholders but not PARTIES in the YUCAIPA GSA, and,

WHEREAS, CALIMESA submitted a written Notice of Withdrawal dated November 19, 2018 and the Yucaipa GSA subsequently acknowledged the withdrawal of CALIMESA from the Yucaipa GSA at the January 23, 2019 YUCAIPA GSA Board meeting, and,

WHEREAS, the LOCAL AGENCIES have water supply, water management, and/or land use responsibilities for their respective jurisdictional areas overlying the SUBBASIN and are local agencies as defined by SGMA in California Water Code Section 10721(n), and thus each is authorized by SGMA to form a GSA; and,

WHEREAS, the LOCAL AGENCIES' individually have jurisdictional and/or service areas within and their collective jurisdictional areas and/or service areas that cover the entirety of the SUBBASIN, with no gaps in coverage; and,

WHEREAS, the WATER PURVEYORS, including the MUTUALS, produce groundwater and provide water service within the SUBBASIN; and,

WHEREAS, the REGIONALS are State Water Contractors, and have the rights and duties of such, including for the delivery of State Water Project Water within the SUBBASIN; and,

WHEREAS, the PARTIES have worked with local stakeholders and interested parties in the SUBBASIN that are not PARTIES in YUCAIPA GSA to carry out the policy, purposes, and requirements of SGMA in the SUBBASIN; and,

WHEREAS, the YUCAIPA GSA has developed a GSP for the SUBBASIN as required by SGMA; and,

WHEREAS, the YUCAIPA GSA has provided the public notices required by Water Code section 10727.8, including a Public Outreach and Engagement Plan, informing the public on how to participate in the development of the GSP; and,

WHEREAS, the YUCAIPA GSA has held numerous public meetings where elements of the GSP for the SUBBASIN have been presented and discussed, and where the general public has been provided the opportunity to comment on the various elements of the GSP; and,

WHEREAS, due to the COVID-19 pandemic and Executive Order N-29-20 that suspended the requirement to hold public meetings at physical locations, the YUCAIPA GSA held online public meetings and provided details in the public notices informing the public how to participate in the online meetings; and,

WHEREAS, the YUCAIPA GSA has received written public comments on the various elements of the GSP, which have been reviewed and commented on, where and as appropriate, as part of the GSP; and,

WHEREAS, the YUCAIPA GSA announced a community engagement meeting (i.e., public hearing) for November 16, 2021, as required by Water Code section 10728.4 for the purposes of considering public comments before adopting a GSP for the SUBBASIN; and,

WHEREAS, the GSP for the Subbasin contains all the elements required by Water Code sections 10727.2 and 10727.4; and,

WHEREAS, after its filing with DWR, the GSP for the Subbasin will be subject to a further public review period, and will undergo review by DWR for a period not exceeding two years; and,

WHEREAS, the GSP for the SUBBASIN will be subject to further updating during the DWR review period, and periodically thereafter via annual reports due every April 1 and evaluation reports at least every 5 years or when the GSP is amended; and,

WHEREAS, it is now necessary and appropriate for the Board of Directors to consider the adoption of the GSP for the sustainable management of the SUBBASIN, and authorizes the adoption of the GSP for the sustainable management of the SUBBASIN and directs the YUCAIPA GSA to file the GSP with DWR no later than the date required by SGMA; NOW, THEREFORE,

BE IT RESOLVED, by the Board of Directors of Western Heights Water Company, as follows:

1. The above Recitals are true and correct.
2. The GSP for the SUBBASIN is approved.
3. The Western Heights Water Company hereby authorizes the adoption of the GSP for the SUBBASIN and directs the YUCAIPA GSA to file the GSP with DWR no later than January 31, 2022, as required by SGMA.
4. The General Manager and Agency Counsel are hereby authorized and directed to take such other and further actions as may be necessary or appropriate to implement the intent and purposes of this resolution.

PASSED AND ADOPTED on this 17th day of December, 2021,by the following vote, to-wit: 5-0.

IN WITNESS WHEREOF the undersigned, acting on behalf of and at the direction of the Board of Directors, has executed this Resolution as of the date set forth above:

By: ______________________
Name: Debbie Patrick
Title: Secretary/Clerk

Resolution No. 2021-70

by

Yucaipa Valley Water District

RESOLUTION NO. 2021-70

RESOLUTION OF THE BOARD OF DIRECTORS OF THE YUCAIPA VALLEY WATER DISTRICT AS A MEMBER OF THE YUCAIPA GROUNDWATER SUSTAINABILITY AGENCY TO ADOPT THE GROUNDWATER SUSTAINABILITY PLAN FOR THE YUCAIPA SUBBASIN (BASIN NO. 8-002.07)

WHEREAS, on September 16, 2014, Governor Jerry Brown signed into law Senate Bills 1168 and 1319, and Assembly Bill 1739, collectively known as the Sustainable Groundwater Management Act ("SGMA"), codified in certain provisions of the California Government Code, including commencing with Section 65350.5, and codified in Part 2.74 of Division 6 of the California Water Code, commencing with Section 10720, and amending other provisions of the California Government Code and California Water Code; and,

WHEREAS, SGMA went into effect on January 1, 2015; and,

WHEREAS, various clarifying amendments to SGMA were signed into law in 2015, including Senate Bills 13 and 226, and Assembly Bills 617 and 939, which were codified in part in California Water Code Section 10723.6(a), authorizing a combination of local agencies to form a Groundwater Sustainability Agency ("GSA") pursuant to a joint powers agreement, a memorandum of agreement, or other legal agreement; and, California Water Code Section 10723.6(b), authorizing water corporations regulated by the California Public Utilities Commission and mutual water companies to participate in a GSA through a memorandum of agreement or other legal agreement; and,

WHEREAS, the legislative intent and effect of SGMA, as set forth in California Water Code Section 10720.1, includes the following: (1) to provide for the sustainable management of groundwater basins; (2) to enhance local management of groundwater consistent with rights to use or store groundwater and Section 2 of Article X Water of the California Constitution, and to preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater; (3) to establish minimum standards for sustainable groundwater management; (4) to provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater; (5) to avoid or minimize subsidence; (6) to improve data collection and understanding about groundwater; (7) to increase groundwater storage and remove impediments to recharge; (8) to manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner; and (9) to provide a more efficient and cost-effective groundwater adjudication process that protects water rights, ensures due process, prevents unnecessary delay, and furthers the objectives of SGMA; and,

WHEREAS, SGMA affords GSAs specific powers to manage groundwater in addition to existing legal authorities, which powers may be used to provide the maximum degree of local control and flexibility consistent with the sustainability goals of SGMA; and,

WHEREAS, SGMA includes several un-codified findings by the California Legislature, including the determination that the people of the state have a primary interest in the protection, management, and reasonable beneficial use of the water resources of the state, both surface and underground, and that the integrated management of the state's water resources is essential to meeting its water management goals; and, WHEREAS, the Yucaipa Subbasin ("SUBBASIN") is identified by the California Department of Water Resources Bulletin 118 as Sub-basin No. 8-002.07 of the Upper Santa Ana Valley Groundwater Basin, and is designated by the California Department of Water Resources ("DWR") as a high-priority basin; and,

WHEREAS, California Water Code Section 10720.7 requires the SUBBASIN, as a high-priority basin that is not designated by DWR as being subject to critical conditions of overdraft, to be managed by a Groundwater Sustainability Plan ("GSP") by January 31, 2022; and,

WHEREAS, South Mesa Water Company ("SOUTH MESA"), South Mountain Water Company ("SOUTH MOUNTAIN"), Western Heights Water Company ("WHWC") and Yucaipa Valley Water District ("YVWD"), herein collectively referred to as the "WATER PURVEYORS"; and the City of Calimesa ("CALIMESA"), the City of Redlands ("REDLANDS") and the City of Yucaipa ("YUCAIPA"), herein collectively referred to as the MUNICIPALITIES"; and the San Bernardino Valley Municipal Water District ("SBVMWD") and the San Gorgonio Pass Water Agency ("SGPWA"), herein collectively referred to as the "REGIONALS", entered into a Memorandum of Agreement ("MOA") in June 2017 to form a GSA called the Yucaipa Groundwater Sustainability Agency ("YUCAIPA GSA"), and,

WHEREAS, each of the above-described entities is individually referred to as a "PARTY" and are collectively referred to as the "PARTIES". SOUTH MESA, SOUTH MOUNTAIN and WHWC are collectively referred to as the "MUTUALS"; and, the PARTIES other than the MUTUALS are collectively referred to as the "LOCAL AGENCIES," and,

WHEREAS, The County of Riverside ("RIVERSIDE") and the County of San Bernardino ("SAN BERNARDINO"), collectively referred to as the "COUNTIES," are stakeholders but not PARTIES in the YUCAIPA GSA, and,

WHEREAS, CALIMESA submitted a written Notice of Withdrawal dated November 19, 2018 and the Yucaipa GSA subsequently acknowledged the withdrawal of CALIMESA from the Yucaipa GSA at the January 23, 2019 YUCAIPA GSA Board meeting, and,

WHEREAS, the LOCAL AGENCIES have water supply, water management, and/or land use responsibilities for their respective jurisdictional areas overlying the SUBBASIN and are local agencies as defined by SGMA in California Water Code Section 10721(n), and thus each is authorized by SGMA to form a GSA; and,

WHEREAS, the LOCAL AGENCIES' individually have jurisdictional and/or service areas within and their collective jurisdictional areas and/or service areas that cover the entirety of the SUBBASIN, with no gaps in coverage; and,

WHEREAS, the WATER PURVEYORS, including the MUTUALS, produce groundwater and provide water service within the SUBBASIN; and,

WHEREAS, the REGIONALS are State Water Contractors, and have the rights and duties of such, including for the delivery of State Water Project Water within the SUBBASIN; and,

WHEREAS, the PARTIES have worked with local stakeholders and interested parties in the SUBBASIN that are not PARTIES in YUCAIPA GSA to carry out the policy, purposes, and requirements of SGMA in the SUBBASIN; and, WHEREAS, the YUCAIPA GSA has developed a GSP for the SUBBASIN as required by SGMA; and,

WHEREAS, the YUCAIPA GSA has provided the public notices required by Water Code section 10727.8, including a Public Outreach and Engagement Plan, informing the public on how to participate in the development of the GSP; and,

WHEREAS, the YUCAIPA GSA has held numerous public meetings where elements of the GSP for the SUBBASIN have been presented and discussed, and where the general public has been provided the opportunity to comment on the various elements of the GSP; and,

WHEREAS, due to the COVID-19 pandemic and Executive Order N-29-20 that suspended the requirement to hold public meetings at physical locations, the YUCAIPA GSA held online public meetings and provided details in the public notices informing the public how to participate in the online meetings; and,

WHEREAS, the YUCAIPA GSA has received written public comments on the various elements of the GSP, which have been reviewed and commented on, where and as appropriate, as part of the GSP; and,

WHEREAS, the YUCAIPA GSA conducted a community engagement meeting (i.e., public hearing) for November 16, 2021, as required by Water Code section 10728.4 for the purposes of considering public comments before adopting a GSP for the SUBBASIN; and,

WHEREAS, the GSP for the Subbasin contains all the elements required by Water Code sections 10727.2 and 10727.4; and,

WHEREAS, after its filing with DWR, the GSP for the Subbasin will be subject to a further public review period, and will undergo review by DWR for a period not exceeding two years; and,

WHEREAS, the GSP for the SUBBASIN will be subject to further updating during the DWR review period, and periodically thereafter via annual reports due every April 1 and evaluation reports at least every 5 years or when the GSP is amended; and,

WHEREAS, it is now necessary and appropriate for the Board of Directors to consider the adoption of the GSP for the sustainable management of the SUBBASIN, and authorizes the adoption of the GSP for the sustainable management of the SUBBASIN and directs the YUCAIPA GSA to file the GSP with DWR no later than the date required by SGMA; NOW, THEREFORE,

NOW, THEREFORE, the Board of Directors of the Yucaipa Valley Water District hereby RESOLVE, DETERMINE, and ORDER as follows:

Section 1 The above Recitals are true and correct.

Section 2 The GSP for the SUBBASIN is approved.

Section 3 The Yucaipa Valley Water District hereby authorizes the adoption of the GSP for the SUBBASIN and directs the YUCAIPA GSA to file the GSP with DWR no later than January 31, 2022, as required by SGMA.

Section 4 The General Manager and Legal Counsel are hereby authorized and directed to take such other and further actions as may be necessary or appropriate to implement the intent and purposes of this resolution.

PASSED, APPROVED and ADOPTED this 21st day of December 2021.

YUCAIPA VALLEY WATER DISTRICT

Chris Mann, President Board of Directors

ATTEST:

Joseph B. Zoba, General Manager

Resolution No. 1142

by

San Bernardino Valley Municipal Water District

RESOLUTION NO. 1142

RESOLUTION OF THE BOARD OF DIRECTORS OF THE SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT AS A MEMBER OF THE YUCAIPA SUSTAINABILITY GROUNDWATER MANAGEMENT AGENCY TO ADOPT THE GROUNDWATER SUSTAINABILITY PLAN FOR THE YUCAIPA SUBBASIN (BASIN NO. 8-002.07)

WHEREAS, on September 16, 2014, Governor Jerry Brown signed into law Senate Bills 1168 and 1319, and Assembly Bill 1739, collectively known as the Sustainable Groundwater Management Act ("SGMA"), codified in certain provisions of the California Government Code, including commencing with Section 65350.5, and codified in Part 2.74 of Division 6 of the California Water Code, commencing with Section 10720, and amending other provisions of the California Government Code and California Water Code; and,

WHEREAS, SGMA went into effect on January 1, 2015; and,

WHEREAS, various clarifying amendments to SGMA were signed into law in 2015, including Senate Bills 13 and 226, and Assembly Bills 617 and 939, which were codified in part in California Water Code Section 10723.6(a), authorizing a combination of local agencies to form a Groundwater Sustainability Agency ("GSA") pursuant to a joint powers agreement, a memorandum of agreement, or other legal agreement; and, California Water Code Section 10723.6(b), authorizing water corporations regulated by the California Public Utilities Commission and mutual water companies to participate in a GSA through a memorandum of agreement or other legal agreement; and,

WHEREAS, the legislative intent and effect of SGMA, as set forth in California Water Code Section 10720.1, includes the following: (1) to provide for the sustainable management of groundwater basins; (2) to enhance local management of groundwater consistent with rights to use or store groundwater and Section 2 of Article X Water of the California Constitution, and to preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater; (3) to establish minimum standards for sustainable groundwater management; (4) to provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater; (5) to avoid or minimize subsidence; (6) to improve data collection and understanding about groundwater; (7) to increase groundwater storage and remove impediments to recharge; (8) to manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner; and (9) to provide a more efficient and cost-effective groundwater adjudication process that protects water rights, ensures due process, prevents unnecessary delay, and furthers the objectives of SGMA; and,

WHEREAS, SGMA affords GSAs specific powers to manage groundwater in addition to existing legal authorities, which powers may be used to provide the maximum degree of local control and flexibility consistent with the sustainability goals of SGMA; and,

WHEREAS, SGMA includes several un-codified findings by the California Legislature, including the determination that the people of the state have a primary interest in the protection, management, and reasonable beneficial use of the water resources of the state, both surface and underground, and that the integrated management of the state's water resources is essential to meeting its water management goals; and,

WHEREAS, the Yucaipa Subbasin (“SUBBASIN”) is identified by the California Department of Water Resources Bulletin 118 as Sub-basin No. 8-002.07 of the Upper Santa Ana Valley Groundwater Basin, and is designated by the California Department of Water Resources (“DWR”) as a high-priority basin; and,

WHEREAS, California Water Code Section 10720.7 requires the SUBBASIN, as a high-priority basin that is not designated by DWR as being subject to critical conditions of overdraft, to be managed by a Groundwater Sustainability Plan ("GSP") by January 31, 2022; and,

WHEREAS, South Mesa Water Company ("SOUTH MESA"), South Mountain Water Company ("SOUTH MOUNTAIN"), Western Heights Water Company ("WHWC") and Yucaipa Valley Water District ("YVWD"), herein collectively referred to as the “WATER PURVEYORS"; and the City of Calimesa (“CALIMESA”), the City of Redlands ("REDLANDS") and the City of Yucaipa ("YUCAIPA"), herein collectively referred to as the MUNICIPALITIES"; and the San Bernardino Valley Municipal Water District ("SBVMWD") and the San Gorgonio Pass Water Agency ("SGPWA"), herein collectively referred to as the "REGIONALS”, entered into a Memorandum of Agreement (“MOA”) in June 2017 to form a GSA called the Yucaipa Sustainability Groundwater Management Agency (“YUCAIPA-SGMA”), and,

WHEREAS, each of the above-described entities is individually referred to as a "PARTY" and are collectively referred to as the "PARTIES". SOUTH MESA, SOUTH MOUNTAIN and WHWC are collectively referred to as the "MUTUALS"; and, the PARTIES other than the MUTUALS are collectively referred to as the "LOCAL AGENCIES,” and,

WHEREAS, The County of Riverside ("RIVERSIDE") and the County of San Bernardino ("SAN BERNARDINO"), collectively referred to as the "COUNTIES," are stakeholders but not PARTIES in the YUCAIPA-SGMA, and,

WHEREAS, CALIMESA submitted a written Notice of Withdrawal dated November 19, 2018 and the Yucaipa-SGMA subsequently acknowledged the withdrawal of CALIMESA from the Yucaipa-SGMA at the January 23, 2019 YUCAIPA-SGMA Board meeting, and,

WHEREAS, the LOCAL AGENCIES have water supply, water management, and/or land use responsibilities for their respective jurisdictional areas overlying the SUBBASIN and are local agencies as defined by SGMA in California Water Code Section 10721(n), and thus each is authorized by SGMA to form a GSA; and,

WHEREAS, the LOCAL AGENCIES' individually have jurisdictional and/or service areas within and their collective jurisdictional areas and/or service areas that cover the entirety of the SUBBASIN, with no gaps in coverage; and,

WHEREAS, the WATER PURVEYORS, including the MUTUALS, produce

groundwater and provide water service within the SUBBASIN; and,

WHEREAS, the REGIONALS are State Water Contractors, and have the rights and duties of such, including for the delivery of State Water Project Water within the SUBBASIN; and,

WHEREAS, the PARTIES have worked with local stakeholders and interested parties in the SUBBASIN that are not PARTIES in YUCAIPA-SGMA to carry out the policy, purposes, and requirements of SGMA in the SUBBASIN; and,

WHEREAS, the YUCAIPA-SGMA has developed a GSP for the SUBBASIN as required by SGMA; and,

WHEREAS, the YUCAIPA-SGMA has provided the public notices required by Water Code section 10727.8, including a Public Outreach and Engagement Plan, informing the public on how to participate in the development of the GSP; and,

WHEREAS, the YUCAIPA-SGMA has held numerous public meetings where elements of the GSP for the SUBBASIN have been presented and discussed, and where the general public has been provided the opportunity to comment on the various elements of the GSP; and,

WHEREAS, due to the COVID-19 pandemic and Executive Order N-29-20 that suspended the requirement to hold public meetings at physical locations, the YUCAIPA-SGMA held online public meetings and provided details in the public notices informing the public how to participate in the online meetings; and,

WHEREAS, the YUCAIPA-SGMA has received written public comments on the various elements of the GSP, which have been reviewed and commented on, where and as appropriate, as part of the GSP; and,

WHEREAS, the YUCAIPA-SGMA announced a community engagement meeting (i.e., public hearing) for November 16, 2021, as required by Water Code section 10728.4 for the purposes of considering public comments before adopting a GSP for the SUBBASIN; and,

WHEREAS, the GSP for the Subbasin contains all the elements required by Water Code sections 10727.2 and 10727.4; and,

WHEREAS, after its filing with DWR, the GSP for the Subbasin will be subject to a further public review period, and will undergo review by DWR for a period not exceeding two years; and,

WHEREAS, the GSP for the SUBBASIN will be subject to further updating during the DWR review period, and periodically thereafter via annual reports due every April 1 and evaluation reports at least every 5 years or when the GSP is amended; and,

WHEREAS, it is now necessary and appropriate for the Board of Directors to consider the adoption of the GSP for the sustainable management of the SUBBASIN, and authorizes the adoption of the GSP for the sustainable management of the SUBBASIN and directs the YUCAIPA-SGMA to file the GSP with DWR no later than the date required by SGMA; NOW, THEREFORE,

NOW THEREFORE BE IT RESOLVED, by the Board of Directors of the San Bernardino Valley Municipal Water District as follows:

1. The above Recitals are true and correct.

2. The GSP for the SUBBASIN is approved.

3. The San Bernardino Valley Municipal Water District hereby authorizes the adoption of the GSP for the SUBBASIN and directs the YUCAIPA-SGMA to file the GSP with DWR no later than January 31, 2022, as required by SGMA.

4. The General Manager and Agency Counsel are hereby authorized and directed to take such other and further actions as may be necessary or appropriate to implement the intent and purposes of this resolution.

ADOPTED this 18th day of January 2022.
AYES: 5
NOES: 0
ABSENT: 0
ABSTAINED: 0

Paul Kielhold

Paul R. Kielhold, President

ATTEST:

Heather P. Dyer

Heather P. Dyer, Secretary

Resolution

by

South Mesa Water Company

RESOLUTION OF THE BOARD OF DIRECTORS OF SOUTH MESA WATER COMPANY AS A MEMBER OF THE YUCAIPA GROUNDWATER SUSTAINABILITY AGENCY TO APPROVE THE GROUNDWATER SUSTAINABILITY PLAN FOR THE YUCAIPA SUBBASIN (BASIN NO. 8-002.07)

WHEREAS, on September 16, 2014, Governor Jerry Brown signed into law Senate Bills 1168 and 1319, and Assembly Bill 1739, collectively known as the Sustainable Groundwater Management Act ("SGMA"), codified in certain provisions of the California Government Code, including commencing with Section 65350.5, and codified in Part 2.74 of Division 6 of the California Water Code, commencing with Section 10720, and amending other provisions of the California Government Code and California Water Code; and,

WHEREAS, SGMA went into effect on January 1, 2015; and,

WHEREAS, various clarifying amendments to SGMA were signed into law in 2015, including Senate Bills 13 and 226, and Assembly Bills 617 and 939, which were codified in part in California Water Code Section 10723.6(a), authorizing a combination of local agencies to form a Groundwater Sustainability Agency ("GSA") pursuant to a joint powers agreement, a memorandum of agreement, or other legal agreement; and, California Water Code Section 10723.6(b), authorizing water corporations regulated by the California Public Utilities Commission and mutual water companies to participate in a GSA through a memorandum of agreement or other legal agreement; and,

WHEREAS, the legislative intent and effect of SGMA, as set forth in California Water Code Section 10720.1, includes the following: (1) to provide for the sustainable management of groundwater basins; (2) to enhance local management of groundwater consistent with rights to use or store groundwater and Section 2 of Article X Water of the California Constitution, and to preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater; (3) to establish minimum standards for sustainable groundwater management; (4) to provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater; (5) to avoid or minimize subsidence; (6) to improve data collection and understanding about groundwater; (7) to increase groundwater storage and remove impediments to recharge; (8) to manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner; and (9) to provide a more efficient and cost-effective groundwater adjudication process that protects water rights, ensures due process, prevents unnecessary delay, and furthers the objectives of SGMA; and,

WHEREAS, SGMA affords GSAs specific powers to manage groundwater in addition to existing legal authorities, which powers may be used to provide the maximum degree of local control and flexibility consistent with the sustainability goals of SGMA; and,

WHEREAS, SGMA includes several un-codified findings by the California Legislature, including the determination that the people of the state have a primary interest in the protection, management, and reasonable beneficial use of the water resources of the state, both surface and underground, and that the integrated management of the state's water resources is essential to meeting its water management goals; and

WHEREAS, the Yucaipa Subbasin ("SUBBASIN") is identified by the California Department of Water Resources Bulletin 118 as Sub-basin No. 8-002.07 of the Upper Santa Ana Valley Groundwater Basin, and is designated by the California Department of Water Resources ("DWR") as a high-priority basin; and,

WHEREAS, California Water Code Section 10720.7 requires the SUBBASIN, as a high-priority basin that is not designated by DWR as being subject to critical conditions of overdraft, to be managed by a Groundwater Sustainability Plan ("GSP") by January 31, 2022; and,

WHEREAS, South Mesa Water Company ("SOUTH MESA"), South Mountain Water Company ("SOUTH MOUNTAIN"), Western Heights Water Company ("WHWC") and Yucaipa Valley Water District ("YVWD"), herein collectively referred to as the "WATER PURVEYORS"; and the City of Calimesa ("CALIMESA"), the City of Redlands ("REDLANDS") and the City of Yucaipa ("YUCAIPA"), herein collectively referred to as the MUNICIPALITIES"; and the San Bernardino Valley Municipal Water District ("SBVMWD") and the San Gorgonio Pass Water Agency ("SGPWA"), herein collectively referred to as the "REGIONALS", entered into a Memorandum of Agreement ("MOA") in June 2017 to form a GSA called the Yucaipa Groundwater Sustainability Agency ("YUCAIPA GSA"), and,

WHEREAS, each of the above-described entities is individually referred to as a "PARTY" and are collectively referred to as the "PARTIES". SOUTH MESA, SOUTH MOUNTAIN and WHWC are collectively referred to as the "MUTUALS"; and, the PARTIES other than the MUTUALS are collectively referred to as the "LOCAL AGENCIES," and,

WHEREAS, The County of Riverside ("RIVERSIDE") and the County of San Bernardino ("SAN BERNARDINO"), collectively referred to as the "COUNTIES," are stakeholders but not PARTIES in the YUCAIPA GSA, and,

WHEREAS, CALIMESA submitted a written Notice of Withdrawal dated November 19, 2018 and the Yucaipa GSA subsequently acknowledged the withdrawal of CALIMESA from the Yucaipa GSA at the January 23, 2019 YUCAIPA GSA Board meeting, and,

WHEREAS, the LOCAL AGENCIES have water supply, water management, and/or land use responsibilities for their respective jurisdictional areas overlying the SUBBASIN and are local agencies as defined by SGMA in California Water Code Section 10721(n), and thus each is authorized by SGMA to form a GSA; and,

WHEREAS, the LOCAL AGENCIES' individually have jurisdictional and/or service areas within and their collective jurisdictional areas and/or service areas that cover the entirety of the SUBBASIN, with no gaps in coverage; and,

WHEREAS, the WATER PURVEYORS, including the MUTUALS, produce groundwater and provide water service within the SUBBASIN, and it is the PARTIES' shared intent to provide for management-level participation by the MUTUALS in the GSA as set forth in the MOA; and,

WHEREAS, the REGIONALS are State Water Contractors, and have the rights and duties of such, including for the delivery of State Water Project Water within the SUBBASIN; and

WHEREAS, the PARTIES have worked with local stakeholders and interested parties in the SUBBASIN that are not PARTIES in YUCAIPA GSA to carry out the policy, purposes, and requirements of SGMA in the SUBBASIN; and,

WHEREAS, the YUCAIPA GSA has developed a GSP for the SUBBASIN as required by SGMA; and,

WHEREAS, the YUCAIPA GSA has provided the public notices required by Water Code section 10727.8, including a Public Outreach and Engagement Plan, informing the public on how to participate in the development of the GSP; and,

WHEREAS, the YUCAIPA GSA has held numerous public meetings where elements of the GSP for the SUBBASIN have been presented and discussed, and where the general public has been provided the opportunity to comment on the various elements of the GSP; and,

WHEREAS, due to the COVID-19 pandemic and Executive Order N-29-20 that suspended the requirement to hold public meetings at physical locations, the YUCAIPA GSA held online public meetings and provided details in the public notices informing the public how to participate in the online meetings; and,

WHEREAS, the YUCAIPA GSA has received written public comments on the various elements of the GSP, which have been reviewed and commented on, where and as appropriate, as part of the GSP; and,

WHEREAS, the YUCAIPA GSA announced and held a community engagement meeting (i.e., public hearing) for November 16, 2021, as required by Water Code section 10728.4 for the purposes of considering public comments before adopting a GSP for the SUBBASIN; and,

WHEREAS, the SOUTH MESA Board of Directors has had the opportunity to review the most current version of the GSP; and,

WHEREAS, the GSP for the Subbasin contains all the elements required by Water Code sections 10727.2 and 10727.4; and,

WHEREAS, pursuant to Water Code section 10720.5, neither the Yucaipa GSA nor the GSP determines water rights, which may instead be determined in an adjudication action in a court of law;

WHEREAS, after its filing with DWR, the GSP for the Subbasin will be subject to a further public review period, and will undergo review by DWR for a period not exceeding two years; and,

WHEREAS, the GSP for the SUBBASIN may be subject to further updating during the DWR review period, and periodically thereafter via annual reports and five-year update reports to DWR; and,

WHEREAS, it is now necessary and appropriate for the Board of Directors of SOUTH MESA WATER COMPANY to consider and approve the GSP, to authorize its Yucaipa GSA designated representative to vote to approve and adopt the GSP and to file the GSP with DWR no later than the date required by SGMA.

NOW, THEREFORE BE IT RESOLVED, by the Board of Directors of **SOUTH MESA WATER COMPANY**, as follows:

1. The above Recitals are true and correct and incorporated herein by this reference.

2. South Mesa Water Company does hereby approve the Final GSP for the Yucaipa Subbasin, as presented with minor, non-substantive revisions to the GSP approved by its Yucaipa GSA designated representative between today's date and the date the GSP is submitted to DWR.

3. South Mesa Water Company does hereby authorize its Yucaipa GSA designated representative to vote to formally approve and adopt the Final GSP for the Yucaipa Subbasin on behalf of South Mesa Water Company at the upcoming meeting of the Yucaipa GSA that is expected to take place on or about January 26, 2022.

4. South Mesa's Yucaipa GSA designated representative and Legal Counsel are hereby authorized and directed to take such other and further actions as may be necessary or appropriate to implement the intent and purposes of this resolution.

PASSED AND ADOPTED, this 12th day of January 2022.

George Jorritsma

George Jorritsma, President

Attest:

Secretary, Board of Directors

Resolution No. 2022-01

by

South Mountain Water Company

RESOLUTION NO. 2022-01

RESOLUTION OF THE BOARD OF DIRECTORS OF THE SOUTH MOUNTAIN WATER COMPANY AS A MEMBER OF THE YUCAIPA GROUNDWATER SUSTAINABILITY AGENCY TO ADOPT THE GROUNDWATER SUSTAINABILITY PLAN FOR THE YUCAIPA SUBBASIN (BASIN NO. 8-002.07)

WHEREAS, on September 16, 2014, Governor Jerry Brown signed into law Senate Bills 1168 and 1319, and Assembly Bill 1739, collectively known as the Sustainable Groundwater Management Act ("SGMA"), codified in certain provisions of the California Government Code, including commencing with Section 65350.5, and codified in Part 2.74 of Division 6 of the California Water Code, commencing with Section 10720, and amending other provisions of the California Government Code and California Water Code; and,

WHEREAS, SGMA went into effect on January 1, 2015; and,

WHEREAS, various clarifying amendments to SGMA were signed into law in 2015, including Senate Bills 13 and 226, and Assembly Bills 617 and 939, which were codified in part in California Water Code Section 10723.6(a), authorizing a combination of local agencies to form a Groundwater Sustainability Agency ("GSA") pursuant to a joint powers agreement, a memorandum of agreement, or other legal agreement; and, California Water Code Section 10723.6(b), authorizing water corporations regulated by the California Public Utilities Commission and mutual water companies to participate in a GSA through a memorandum of agreement or other legal agreement; and,

WHEREAS, the legislative intent and effect of SGMA, as set forth in California Water Code Section 10720.1, includes the following: (1) to provide for the sustainable management of groundwater basins; (2) to enhance local management of groundwater consistent with rights to use or store groundwater and Section 2 of Article X Water of the California Constitution, and to preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater; (3) to establish minimum standards for sustainable groundwater management; (4) to provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater; (5) to avoid or minimize subsidence; (6) to improve data collection and understanding about groundwater; (7) to increase groundwater storage and remove impediments to recharge; (8) to manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner; and (9) to provide a more efficient and cost-effective groundwater adjudication process that protects water rights, ensures due process, prevents unnecessary delay, and furthers the objectives of SGMA; and,

WHEREAS, SGMA affords GSAs specific powers to manage groundwater in addition to existing legal authorities, which powers may be used to provide the maximum degree of local control and flexibility consistent with the sustainability goals of SGMA; and,

WHEREAS, SGMA includes several un-codified findings by the California Legislature, including the determination that the people of the state have a primary interest in the protection, management, and reasonable beneficial use of the water resources of the state, both surface and underground, and that the integrated management of the state's water resources is essential to meeting its water management goals; and,

WHEREAS, the Yucaipa Subbasin ("SUBBASIN") is identified by the California Department of Water Resources Bulletin 118 as Sub-basin No. 8-002.07 of the Upper Santa Ana Valley Groundwater Basin, and is designated by the California Department of Water Resources ("DWR") as a high-priority basin; and,

WHEREAS, California Water Code Section 10720.7 requires the SUBBASIN, as a high-priority basin that is not designated by DWR as being subject to critical conditions of overdraft, to be managed by a Groundwater Sustainability Plan ("GSP") by January 31, 2022; and,

WHEREAS, South Mesa Water Company ("SOUTH MESA"), South Mountain Water Company ("SOUTH MOUNTAIN"), Western Heights Water Company ("WHWC") and Yucaipa Valley Water District ("YVWD"), herein collectively referred to as the "WATER PURVEYORS"; and the City of Calimesa ("CALIMESA"), the City of Redlands ("REDLANDS") and the City of Yucaipa ("YUCAIPA"), herein collectively referred to as the MUNICIPALITIES"; and the San Bernardino Valley Municipal Water District ("SBVMWD") and the San Gorgonio Pass Water Agency ("SGPWA"), herein collectively referred to as the "REGIONALS", entered into a Memorandum of Agreement ("MOA") in June 2017 to form a GSA called the Yucaipa Groundwater Sustainability Agency ("YUCAIPA GSA"), and,

WHEREAS, each of the above-described entities is individually referred to as a "PARTY" and are collectively referred to as the "PARTIES". SOUTH MESA, SOUTH MOUNTAIN and WHWC are collectively referred to as the "MUTUALS"; and, the PARTIES other than the MUTUALS are collectively referred to as the "LOCAL AGENCIES," and,

WHEREAS, The County of Riverside ("RIVERSIDE") and the County of San Bernardino ("SAN BERNARDINO"), collectively referred to as the "COUNTIES," are stakeholders but not PARTIES in the YUCAIPA GSA, and,

WHEREAS, CALIMESA submitted a written Notice of Withdrawal dated November 19, 2018 and the Yucaipa GSA subsequently acknowledged the withdrawal of CALIMESA from the Yucaipa GSA at the January 23, 2019 YUCAIPA GSA Board meeting, and,

WHEREAS, the LOCAL AGENCIES have water supply, water management, and/or land use responsibilities for their respective jurisdictional areas overlying the SUBBASIN and are local agencies as defined by SGMA in California Water Code Section 10721(n), and thus each is authorized by SGMA to form a GSA; and,

WHEREAS, the LOCAL AGENCIES' individually have jurisdictional and/or service areas within and their collective jurisdictional areas and/or service areas that cover the entirety of the SUBBASIN, with no gaps in coverage; and,

WHEREAS, the WATER PURVEYORS, including the MUTUALS, produce

groundwater and provide water service within the SUBBASIN; and,

WHEREAS, the REGIONALS are State Water Contractors, and have the rights and duties of such, including for the delivery of State Water Project Water within the SUBBASIN; and,

WHEREAS, the PARTIES have worked with local stakeholders and interested parties in the SUBBASIN that are not PARTIES in YUCAIPA GSA to carry out the policy, purposes, and requirements of SGMA in the SUBBASIN; and,

WHEREAS, the YUCAIPA GSA has developed a GSP for the SUBBASIN as required by SGMA; and,

WHEREAS, the YUCAIPA GSA has provided the public notices required by Water Code section 10727.8, including a Public Outreach and Engagement Plan, informing the public on how to participate in the development of the GSP; and,

WHEREAS, the YUCAIPA GSA has held numerous public meetings where elements of the GSP for the SUBBASIN have been presented and discussed, and where the general public has been provided the opportunity to comment on the various elements of the GSP; and,

WHEREAS, due to the COVID-19 pandemic and Executive Order N-29-20 that suspended the requirement to hold public meetings at physical locations, the YUCAIPA GSA held online public meetings and provided details in the public notices informing the public how to participate in the online meetings; and,

WHEREAS, the YUCAIPA GSA has received written public comments on the various elements of the GSP, which have been reviewed and commented on, where and as appropriate, as part of the GSP; and,

WHEREAS, the YUCAIPA GSA announced a community engagement meeting (i.e., public hearing) for November 16, 2021, as required by Water Code section 10728.4 for the purposes of considering public comments before adopting a GSP for the SUBBASIN; and,

WHEREAS, the GSP for the Subbasin contains all the elements required by Water Code sections 10727.2 and 10727.4; and,

WHEREAS, after its filing with DWR, the GSP for the Subbasin will be subject to a further public review period, and will undergo review by DWR for a period not exceeding two years; and,

WHEREAS, the GSP for the SUBBASIN will be subject to further updating during the DWR review period, and periodically thereafter via annual reports due every April 1 and evaluation reports at least every 5 years or when the GSP is amended; and,

WHEREAS, it is now necessary and appropriate for the Board of Directors to consider the adoption of the GSP for the sustainable management of the SUBBASIN, and authorizes the adoption of the GSP for the sustainable management of the SUBBASIN and directs the YUCAIPA GSA to file the GSP with DWR no later than the date required by SGMA; NOW, THEREFORE,

BE IT RESOLVED, by the Board of Directors of the South Mountain Water Company, as follows:

1. The above Recitals are true and correct.
2. The GSP for the SUBBASIN is approved.
3. The South Mountain Water Company hereby authorizes the adoption of the GSP for the SUBBASIN and directs the YUCAIPA GSA to file the GSP with DWR no later than January 31, 2022, as required by SGMA.
4. The General Manager and Counsel are hereby authorized and directed to take such other and further actions as may be necessary or appropriate to implement the intent and purposes of this resolution.

BE IT FURTHER RESOLVED, by the Board of Directors of the South Mountain Water Company:

5. That the Yucaipa Groundwater Management Agency reconsider the apportionment of the annual costs associated with the GSP, and;
6. That the Yucaipa Groundwater Management Agency consider apportioning said costs based on a fair distribution stemming from the amount of water extracted by each member.

PASSED AND ADOPTED on this 26th day of January 2022, by the following vote, to-wit:

Director Moore:	Aye
Director Riordan:	Aye
Director Jeffries:	Absent
Director Bingaman:	Aye
Director Pierce:	Absent

ADOPTED, SIGNED AND APPROVED this 26th day of January, 2022.

Rollie Moore, President

ATTEST:

Kristy Hoover, Secretary

Resolution No. 2022-02

by

San Gorgonio Pass Water Agency

RESOLUTION NO. 2022-02

RESOLUTION OF THE BOARD OF DIRECTORS OF THE SAN GORGONIO PASS WATER AGENCY AS A MEMBER OF THE YUCAIPA GROUNDWATER SUSTAINABILITY AGENCY TO ADOPT THE GROUNDWATER SUSTAINABILITY PLAN FOR THE YUCAIPA SUBBASIN (BASIN NO. 8-002.07)

WHEREAS, on September 16, 2014, Governor Jerry Brown signed into law Senate Bills 1168 and 1319, and Assembly Bill 1739, collectively known as the Sustainable Groundwater Management Act ("SGMA"), codified in certain provisions of the California Government Code, including commencing with Section 65350.5, and codified in Part 2.74 of Division 6 of the California Water Code, commencing with Section 10720, and amending other provisions of the California Government Code and California Water Code; and,

WHEREAS, SGMA went into effect on January 1, 2015; and,

WHEREAS, various clarifying amendments to SGMA were signed into law in 2015, including Senate Bills 13 and 226, and Assembly Bills 617 and 939, which were codified in part in California Water Code Section 10723.6(a), authorizing a combination of local agencies to form a Groundwater Sustainability Agency ("GSA") pursuant to a joint powers agreement, a memorandum of agreement, or other legal agreement; and, California Water Code Section 10723.6(b), authorizing water corporations regulated by the California Public Utilities Commission and mutual water companies to participate in a GSA through a memorandum of agreement or other legal agreement; and,

WHEREAS, the legislative intent and effect of SGMA, as set forth in California Water Code Section 10720.1, includes the following: (1) to provide for the sustainable management of groundwater basins; (2) to enhance local management of groundwater consistent with rights to use or store groundwater and Section 2 of Article X of the California Constitution, and to preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater; (3) to establish minimum standards for sustainable groundwater management; (4) to provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater; (5) to avoid or minimize subsidence; (6) to improve data collection and understanding about groundwater; (7) to increase groundwater storage and remove impediments to recharge; (8) to manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner; and (9) to provide a more efficient and cost-effective groundwater adjudication process that protects water rights, ensures due process, prevents unnecessary delay, and furthers the objectives of SGMA; and,

WHEREAS, SGMA affords GSAs specific powers to manage groundwater in addition to existing legal authorities, which powers may be used to provide the maximum degree of local control and flexibility consistent with the sustainability goals of SGMA; and,

WHEREAS, SGMA includes several un-codified findings by the California Legislature, including the determination that the people of the state have a primary interest in the protection, management, and reasonable beneficial use of the water resources of the state, both surface and underground, and that the integrated management of the state's water resources is essential to meeting its water management goals; and,

WHEREAS, the Yucaipa Subbasin ("SUBBASIN") is identified by the California Department of Water Resources Bulletin 118 as Sub-basin No. 8-002.07 of the Upper Santa Ana Valley Groundwater Basin, and is designated by the California Department of Water Resources ("DWR") as a high-priority basin and not subject to critical conditions of overdraft; and,

WHEREAS, California Water Code Section 10720.7 requires the SUBBASIN, as a high-priority basin that is not designated by DWR as being subject to critical conditions of overdraft, to be managed by a Groundwater Sustainability Plan ("GSP") by January 31, 2022; and,

WHEREAS, South Mesa Water Company ("SOUTH MESA"), South Mountain Water Company ("SOUTH MOUNTAIN"), Western Heights Water Company ("WHWC") and Yucaipa Valley Water District ("YVWD"), herein collectively referred to as the "WATER PURVEYORS"; and the City of Calimesa ("CALIMESA"), the City of Redlands ("REDLANDS") and the City of Yucaipa ("YUCAIPA"), herein collectively referred to as the MUNICIPALITIES"; and the San Bernardino Valley Municipal Water District ("SBVMWD") and the San Gorgonio Pass Water Agency ("SGPWA"), herein collectively referred to as the "REGIONALS", entered into a Memorandum of Agreement ("MOA") in June 2017 to form a GSA called the Yucaipa Groundwater Sustainability Agency ("YUCAIPA GSA"), and,

WHEREAS, each of the above-described entities is individually referred to as a "PARTY" and are collectively referred to as the "PARTIES". SOUTH MESA, SOUTH MOUNTAIN and WHWC are collectively referred to as the "MUTUALS"; and, the PARTIES other than the MUTUALS are collectively referred to as the "LOCAL AGENCIES," and,

WHEREAS, The County of Riverside ("RIVERSIDE") and the County of San Bernardino ("SAN BERNARDINO"), collectively referred to as the "COUNTIES," are stakeholders but not PARTIES in the YUCAIPA GSA, and,

WHEREAS, CALIMESA submitted a written Notice of Withdrawal dated November 19, 2018 and the Yucaipa GSA subsequently acknowledged the withdrawal of CALIMESA from the Yucaipa GSA at the January 23, 2019 YUCAIPA GSA Board meeting, and,

WHEREAS, the LOCAL AGENCIES have water supply, water management, and/or land use responsibilities for their respective jurisdictional areas overlying the SUBBASIN and are local agencies as defined by SGMA in California Water Code Section 10721(n), and thus each is authorized by SGMA to form a GSA; and,

WHEREAS, the LOCAL AGENCIES' individually have jurisdictional and/or service areas within and their collective jurisdictional areas and/or service areas that cover the entirety of the SUBBASIN, with no gaps in coverage; and,

WHEREAS, the WATER PURVEYORS, including the MUTUALS, produce groundwater and provide water service within the SUBBASIN; and,

WHEREAS, the REGIONALS are State Water Contractors, and have the rights and duties of such, including for the delivery of State Water Project Water within the SUBBASIN; and,

WHEREAS, the PARTIES have worked with local stakeholders and interested parties in the SUBBASIN that are not PARTIES in YUCAIPA GSA to carry out the policy, purposes, and requirements of SGMA in the SUBBASIN; and,

WHEREAS, the YUCAIPA GSA has developed a GSP for the SUBBASIN as required by SGMA; and,

WHEREAS, the YUCAIPA GSA has provided the public notices required by Water Code section 10727.8, including a Public Outreach and Engagement Plan, informing the public on how to participate in the development of the GSP; and,

WHEREAS, the YUCAIPA GSA has held numerous public meetings where elements of the GSP for the SUBBASIN have been presented and discussed, and where the general public has been provided the opportunity to comment on the various elements of the GSP; and,

WHEREAS, due to the COVID-19 pandemic and Executive Order N-29-20 that suspended the requirement to hold public meetings at physical locations, the YUCAIPA GSA held online public meetings and provided details in the public notices informing the public how to participate in the online meetings; and,

WHEREAS, the YUCAIPA GSA has received written public comments on the various elements of the GSP, which have been reviewed and commented on, where and as appropriate, as part of the GSP; and,

WHEREAS, the YUCAIPA GSA announced a community engagement meeting (i.e., public hearing) for November 16, 2021, as required by Water Code section 10728.4 for the purposes of considering public comments before adopting a GSP for the SUBBASIN; and,

WHEREAS, the SGPWA Board of Directors has had the opportunity to review the most current version of the GSP; and

WHEREAS, the GSP for the Subbasin contains all the elements required by Water Code sections 10727.2 and 10727.4; and,

WHEREAS, after its filing with DWR, the GSP for the Subbasin will be subject to review by DWR for a period not exceeding two years; and,

WHEREAS, it is now necessary and appropriate for the Board of Directors of the SGPWA to consider the adoption of the GSP for the sustainable management of the SUBBASIN,and authorize the adoption of the GSP for the sustainable management of the SUBBASIN and directs its Representative on the YUCAIPA GSA board to vote to approve and authorize the filing of the GSP with DWR no later than the date required by SGMA;

NOW, THEREFORE, BE IT RESOLVED, by the Board of Directors of the San Gorgonio Pass Water Agency, as follows:

1. The above Recitals are true and correct and incorporated herein by this reference.
2. The San Gorgonio Pass Water Agency does hereby approve and adopt the Final Groundwater Sustainability Plan for the Yucaipa Subbasin, as presented or with minor, non-substantive revisions to the GSP approved by its Representative between today's date and the date the GSP is submitted to DWR.
3. The San Gorgonio Pass Water Agency does hereby authorize its Representative to vote to

formally approve the Final Yucaipa Subbasin GSP on behalf of the SGPWA at the upcoming meeting of the Yucaipa GSA expected to take place on or about January 26, 2022.

4. This Resolution shall take effect immediately upon adoption.

PASSED AND ADOPTED by the Board of Directors of the San Gorgonio Pass Water Agency, this 10th day of January, 2022, by the following vote:

AYES: Directors Ball, Duncan, Letulle, Valdivia, Ybarra, Lehtonen, and President Smith
NAYS:
ABSENT:
ABSTAIN:

____
Board President

Resolution No. 2022-03

by

City of Yucaipa

RESOLUTION NO. 2022-03

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF YUCAIPA, STATE OF CALIFORNIA, AS A MEMBER OF THE YUCAIPA GROUNDWATER SUSTAINABILITY AGENCY TO ADOPT THE GROUNDWATER SUSTAINABILITY PLAN FOR THE YUCAIPA SUBBASIN (BASIN NO. 8-002.07)

WHEREAS, on September 16, 2014, Governor Jerry Brown signed into law Senate Bills 1168 and 1319, and Assembly Bill 1739, collectively known as the Sustainable Groundwater Management Act ("SGMA"), codified in certain provisions of the California Government Code, including commencing with Section 65350.5, and codified in Part 2.74 of Division 6 of the California Water Code, commencing with Section 10720, and amending other provisions of the California Government Code and California Water Code; and,

WHEREAS, SGMA went into effect on January 1, 2015; and,

WHEREAS, various clarifying amendments to SGMA were signed into law in 2015, including Senate Bills 13 and 226, and Assembly Bills 617 and 939, which were codified in part in California Water Code Section 10723.6(a), authorizing a combination of local agencies to form a Groundwater Sustainability Agency ("GSA") pursuant to a joint powers agreement, a memorandum of agreement, or other legal agreement; and, California Water Code Section 10723.6(b), authorizing water corporations regulated by the California Public Utilities Commission and mutual water companies to participate in a GSA through a memorandum of agreement or other legal agreement; and,

WHEREAS, the legislative intent and effect of SGMA, as set forth in California Water Code Section 10720.1, includes the following: (1) to provide for the sustainable management of groundwater basins; (2) to enhance local management of groundwater consistent with rights to use or store groundwater and Section 2 of Article X Water of the California Constitution, and to preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater; (3) to establish minimum standards for sustainable groundwater management; (4) to provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater; (5) to avoid or minimize subsidence; (6) to improve data collection and understanding about groundwater; (7) to increase groundwater storage and remove impediments to recharge; (8) to manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner; and (9) to provide a more efficient and cost-effective groundwater adjudication process that protects water rights, ensures due process, prevents unnecessary delay, and furthers the objectives of SGMA; and,

WHEREAS, SGMA affords GSAs specific powers to manage groundwater in addition to existing legal authorities, which powers may be used to provide the maximum degree of local control and flexibility consistent with the sustainability goals of SGMA; and,

WHEREAS, SGMA includes several un-codified findings by the California Legislature, including the determination that the people of the state have a primary interest in the protection, management, and reasonable beneficial use of the water resources of the state, both surface and underground, and that the integrated management of the state's water resources is essential to meeting its water management goals; and,

WHEREAS, the Yucaipa Subbasin ("SUBBASIN") is identified by the California Department of Water Resources Bulletin 118 as Sub-basin No. 8-002.07 of the Upper Santa Ana Valley Groundwater Basin, and is designated by the California Department of Water Resources ("DWR") as a high-priority basin; and,

WHEREAS, California Water Code Section 10720.7 requires the SUBBASIN, as a high-priority basin that is not designated by DWR as being subject to critical conditions of overdraft, to be managed by a Groundwater Sustainability Plan ("GSP") by January 31, 2022; and,

WHEREAS, South Mesa Water Company ("SOUTH MESA"), South Mountain Water Company ("SOUTH MOUNTAIN"), Western Heights Water Company ("WHWC") and Yucaipa Valley Water District ("YVWD"), herein collectively referred to as the "WATER PURVEYORS"; and the City of Calimesa ("CALIMESA"), the City of Redlands ("REDLANDS") and the City of Yucaipa ("YUCAIPA"), herein collectively referred to as the MUNICIPALITIES"; and the San Bernardino Valley Municipal Water District ("SBVMWD") and the San Gorgonio Pass Water Agency ("SGPWA"), herein collectively referred to as the "REGIONALS", entered into a Memorandum of Agreement ("MOA") in June 2017 to form a GSA called the Yucaipa Groundwater Sustainability Agency ("YUCAIPA GSA"), and,

WHEREAS, each of the above-described entities is individually referred to as a "PARTY" and are collectively referred to as the "PARTIES". SOUTH MESA, SOUTH MOUNTAIN and WHWC are collectively referred to as the "MUTUALS"; and, the PARTIES other than the MUTUALS are collectively referred to as the "LOCAL AGENCIES," and,

WHEREAS, The County of Riverside ("RIVERSIDE") and the County of San Bernardino ("SAN BERNARDINO"), collectively referred to as the "COUNTIES," are stakeholders but not PARTIES in the YUCAIPA GSA, and,

WHEREAS, CALIMESA submitted a written Notice of Withdrawal dated November 19, 2018 and the Yucaipa GSA subsequently acknowledged the withdrawal of CALIMESA from the Yucaipa GSA at the January 23, 2019 YUCAIPA GSA Board meeting, and,

WHEREAS, the LOCAL AGENCIES have water supply, water management, and/or land use responsibilities for their respective jurisdictional areas overlying the SUBBASIN and are local agencies as defined by SGMA in California Water Code Section 10721(n), and thus each is authorized by SGMA to form a GSA; and,

WHEREAS, the LOCAL AGENCIES' individually have jurisdictional and/or service areas within and their collective jurisdictional areas and/or service areas that cover the entirety of the SUBBASIN, with no gaps in coverage; and,

WHEREAS, the WATER PURVEYORS, including the MUTUALS, produce

groundwater and provide water service within the SUBBASIN; and,

WHEREAS, the REGIONALS are State Water Contractors, and have the rights and duties of such, including for the delivery of State Water Project Water within the SUBBASIN; and,

WHEREAS, the PARTIES have worked with local stakeholders and interested parties in the SUBBASIN that are not PARTIES in YUCAIPA GSA to carry out the policy, purposes, and requirements of SGMA in the SUBBASIN; and,

WHEREAS, the YUCAIPA GSA has developed a GSP for the SUBBASIN as required by SGMA; and,

WHEREAS, the YUCAIPA GSA has provided the public notices required by Water Code section 10727.8, including a Public Outreach and Engagement Plan, informing the public on how to participate in the development of the GSP; and,

WHEREAS, the YUCAIPA GSA has held numerous public meetings where elements of the GSP for the SUBBASIN have been presented and discussed, and where the general public has been provided the opportunity to comment on the various elements of the GSP; and,

WHEREAS, due to the COVID-19 pandemic and Executive Order N-29-20 that suspended the requirement to hold public meetings at physical locations, the YUCAIPA GSA held online public meetings and provided details in the public notices informing the public how to participate in the online meetings; and,

WHEREAS, the YUCAIPA GSA has received written public comments on the various elements of the GSP, which have been reviewed and commented on, where and as appropriate, as part of the GSP; and,

WHEREAS, the YUCAIPA GSA announced a community engagement meeting (i.e., public hearing) for November 16, 2021, as required by Water Code section 10728.4 for the purposes of considering public comments before adopting a GSP for the SUBBASIN; and,

WHEREAS, the GSP for the Subbasin contains all the elements required by Water Code sections 10727.2 and 10727.4; and,

WHEREAS, after its filing with DWR, the GSP for the Subbasin will be subject to a further public review period, and will undergo review by DWR for a period not exceeding two years; and,

WHEREAS, the GSP for the SUBBASIN will be subject to further updating during the DWR review period, and periodically thereafter via annual reports due every April 1 and evaluation reports at least every 5 years or when the GSP is amended; and,

WHEREAS, it is now necessary and appropriate for the City Council of the City of

Yucaipa to consider the adoption of the GSP for the sustainable management of the SUBBASIN, and authorizes the adoption of the YSGSP for the sustainable management of the SUBBASIN and directs the YUCAIPA GSA to file the GSP with DWR no later than the date required by SGMA; NOW, THEREFORE,

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF YUCAIPA HEREBY FINDS, DETERMINES, ORDERS AND RESOLVES AS FOLLOWS:

1. The above Recitals are true and correct findings of the Yucaipa City Council.

2. The Yucaipa Subbasin Groundwater Sustainability Plan is approved.

3. The City of Yucaipa hereby authorizes the adoption of the YSGSP for the SUBBASIN and directs the YUCAIPA GSA to file the YSGSP with DWR no later than January 31, 2022, as required by SGMA.

4. The City Manager (or his designee) is hereby authorized and directed to take such other and further actions as may be necessary or appropriate to implement the intent and purposes of this resolution.

PASSED, APPROVED AND ADOPTED on this 10th day of January 2022.

D Andrew Avila
DAVID AVILA, MAYOR

ATTEST:

Jennifer Crawford
CITY CLERK

Resolution No. 8290

by

City of Redlands

RESOLUTION NO. 8290

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF REDLANDS AS A MEMBER OF THE YUCAIPA GROUNDWATER SUSTAINABILITY AGENCY TO ADOPT THE GROUNDWATER SUSTAINABILITY PLAN FOR THE YUCAIPA SUBBASIN (BASIN NO. 8-002.07)

WHEREAS, on September 16, 2014, Governor Jerry Brown signed into law Senate Bills 1168 and 1319, and Assembly Bill 1739, collectively known as the Sustainable Groundwater Management Act ("SGMA"), codified in certain provisions of the California Government Code, including commencing with Section 65350.5, and codified in Part 2.74 of Division 6 of the California Water Code, commencing with Section 10720, and amending other provisions of the California Government Code and California Water Code; and

WHEREAS, SGMA went into effect on January 1, 2015; and

WHEREAS, various clarifying amendments to SGMA were signed into law in 2015, including Senate Bills 13 and 226, and Assembly Bills 617 and 939, which were codified in part in California Water Code Section 10723.6(a), authorizing a combination of local agencies to form a Groundwater Sustainability Agency ("GSA") pursuant to a joint powers agreement, a memorandum of agreement, or other legal agreement; and, California Water Code Section 10723.6(b), authorizing water corporations regulated by the California Public Utilities Commission and mutual water companies to participate in a GSA through a memorandum of agreement or other legal agreement; and

WHEREAS, the legislative intent and effect of SGMA, as set forth in California Water Code Section 10720.1, includes the following: (1) to provide for the sustainable management of groundwater basins; (2) to enhance local management of groundwater consistent with rights to use or store groundwater and Section 2 of Article X Water of the California Constitution, and to preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater; (3) to establish minimum standards for sustainable groundwater management; (4) to provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater; (5) to avoid or minimize subsidence; (6) to improve data collection and understanding about groundwater; (7) to increase groundwater storage and remove impediments to recharge; (8) to manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner; and (9) to provide a more efficient and cost-effective groundwater adjudication process that protects water rights, ensures due process, prevents unnecessary delay, and furthers the objectives of SGMA; and

WHEREAS, SGMA affords GSAs specific powers to manage groundwater in addition to existing legal authorities, which powers may be used to provide the maximum degree of local control and flexibility consistent with the sustainability goals of SGMA; and

WHEREAS, SGMA includes several un-codified findings by the California Legislature, including the determination that the people of the state have a primary interest in the protection, management, and reasonable beneficial use of the water resources of the state, both surface and underground, and that the integrated management of the state's water resources is essential to meeting its water management goals; and

WHEREAS, the Yucaipa Subbasin ("SUBBASIN") is identified by the California Department of Water Resources Bulletin 118 as Sub-basin No. 8-002.07 of the Upper Santa Ana Valley Groundwater Basin, and is designated by the California Department of Water Resources ("DWR") as a high-priority basin; and

WHEREAS, California Water Code Section 10720.7 requires the SUBBASIN, as a high-priority basin that is not designated by DWR as being subject to critical conditions of overdraft, to be managed by a Groundwater Sustainability Plan ("GSP") by January 31, 2022; and

WHEREAS, South Mesa Water Company ("SOUTH MESA"), South Mountain Water Company ("SOUTH MOUNTAIN"), Western Heights Water Company ("WHWC") and Yucaipa Valley Water District ("YVWD"), herein collectively referred to as the "WATER PURVEYORS"; and the City of Calimesa ("CALIMESA"), the City of Redlands ("REDLANDS") and the City of Yucaipa ("YUCAIPA"), herein collectively referred to as the MUNICIPALITIES"; and the San Bernardino Valley Municipal Water District ("SBVMWD") and the San Gorgonio Pass Water Agency ("SGPWA"), herein collectively referred to as the "REGIONALS", entered into a Memorandum of Agreement ("MOA") in June 2017 to form a GSA called the Yucaipa Groundwater Sustainability Agency ("YUCAIPA GSA"); and

WHEREAS, each of the above-described entities is individually referred to as a "PARTY" and are collectively referred to as the "PARTIES". SOUTH MESA, SOUTH MOUNTAIN and WHWC are collectively referred to as the "MUTUALS"; and, the PARTIES other than the MUTUALS are collectively referred to as the "LOCAL AGENCIES;" and

WHEREAS, The County of Riverside ("RIVERSIDE") and the County of San Bernardino ("SAN BERNARDINO"), collectively referred to as the "COUNTIES," are stakeholders but not PARTIES in the YUCAIPA GSA; and

WHEREAS, CALIMESA submitted a written Notice of Withdrawal dated November 19, 2018 and the Yucaipa GSA subsequently acknowledged the withdrawal of CALIMESA from the Yucaipa GSA at the January 23, 2019 YUCAIPA GSA Board meeting; and

WHEREAS, the LOCAL AGENCIES have water supply, water management, and/or land use responsibilities for their respective jurisdictional areas overlying the SUBBASIN and are local agencies as defined by SGMA in California Water Code Section 10721(n), and thus each is authorized by SGMA to form a GSA; and

WHEREAS, the LOCAL AGENCIES' individually have jurisdictional and/or service areas within and their collective jurisdictional areas and/or service areas that cover the entirety of the SUBBASIN, with no gaps in coverage; and

WHEREAS, the WATER PURVEYORS, including the MUTUALS, produce groundwater and provide water service within the SUBBASIN; and

WHEREAS, the REGIONALS are State Water Contractors, and have the rights and duties of such, including for the delivery of State Water Project Water within the SUBBASIN; and

WHEREAS, the PARTIES have worked with local stakeholders and interested parties in the SUBBASIN that are not PARTIES in YUCAIPA GSA to carry out the policy, purposes, and requirements of SGMA in the SUBBASIN; and

WHEREAS, the YUCAIPA GSA has developed a GSP for the SUBBASIN as required by SGMA; and

WHEREAS, the YUCAIPA GSA has provided the public notices required by California Water Code section 10727.8, including a Public Outreach and Engagement Plan, informing the public on how to participate in the development of the GSP; and

WHEREAS, the YUCAIPA GSA has held numerous public meetings where elements of the GSP for the SUBBASIN have been presented and discussed, and where the general public has been provided the opportunity to comment on the various elements of the GSP; and

WHEREAS, due to the COVID-19 pandemic and Executive Order N-29-20 that suspended the requirement to hold public meetings at physical locations, the YUCAIPA GSA held online public meetings and provided details in the public notices informing the public how to participate in the online meetings; and

WHEREAS, the YUCAIPA GSA has received written public comments on the various elements of the GSP, which have been reviewed and commented on, where and as appropriate, as part of the GSP; and

WHEREAS, the YUCAIPA GSA announced a community engagement meeting (i.e., public hearing) for November 16, 2021, as required by California Water Code section 10728.4 for the purposes of considering public comments before adopting a GSP for the SUBBASIN; and

WHEREAS, the GSP for the SUBBASIN contains all the elements required by California Water Code sections 10727.2 and 10727.4; and

WHEREAS, after its filing with DWR, the GSP for the SUBBASIN will be subject to a further public review period, and will undergo review by DWR for a period not exceeding two years; and

WHEREAS, the GSP for the SUBBASIN will be subject to further updating during the DWR review period, and periodically thereafter via annual reports due every April 1 and evaluation reports at least every 5 years or when the GSP is amended; and

WHEREAS, it is now necessary and appropriate for the City Council to consider the adoption of the GSP for the sustainable management of the SUBBASIN, and authorizes the adoption of the GSP for the sustainable management of the SUBBASIN and directs the YUCAIPA GSA to file the GSP with DWR no later than the date required by SGMA;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF REDLANDS AS FOLLOWS:

Section 1. The above Recitals are true and correct.

Section 2. The GSP for the SUBBASIN is approved.

Section 3. The City Council of the City of Redlands hereby authorizes the adoption of the GSP for the SUBBASIN and directs the YUCAIPA GSA to file the GSP with the DWR no later than January 31, 2022, as required by SGMA.

Section 4. The City Manager and City Attorney are hereby authorized and directed to take such other and further actions as may be necessary or appropriate to implement the intent and purposes of this resolution.

ADOPTED, SIGNED AND APPROVED this 18th day of January, 2022.

Paul T. Barich, Mayor

ATTEST:

Jeanne Donaldson, City Clerk

I, Jeanne Donaldson, City Clerk of the City of Redlands, hereby certify that the foregoing resolution was duly adopted by the City Council at a regular meeting thereof held on the 18^{th} day of January, 2022

AYES: Councilmembers Tejeda, Davis, Guzman-Lowery, Gallagher; Mayor Barich
NOES: None
ABSENT: None
ABSTAINED: None

Jeanne Donaldson

Jeanne Donaldson, City Clerk