Inter Office Memo

DATE: February 7, 2022

TO: Board of Supervisors

FROM: Steven E. White, Director
Department of Public Works and Planning

SUBJECT: Advance Agenda Materials – February 22, 2022 (File No. 22-0070)
Groundwater Sustainability Plan for portions of Fresno County within the Pleasant Valley Subbasin where the County serves as the GSA

BACKGROUND AND SUMMARY OF MATERIALS:

Enclosed is a flash drive containing the Groundwater Sustainability Plan (GSP) for Pleasant Valley Subbasin, prepared for your review prior to the public hearing before your Board on February 22, 2022.

Project Location and Description: The Pleasant Valley Subbasin is located in Fresno County in the San Joaquin Valley Groundwater Basin. The Pleasant Valley Subbasin (PV Subbasin) is adjacent to the Westside Subbasin to the east and north of the Kettleman Plain Subbasin. The PV Subbasin boundary encompasses approximately 48,159 acres covered by three GSA's: The County of Fresno, City of Coalinga, and Pleasant Valley Water District.

The GSP includes background information; historic, current, and projected water budgets; sustainable management criteria; projects and management actions. Upon approval, the GSP will be submitted to Department of Water Resources (DWR) for review and evaluation under Water Code section 10733.4. as required by DWR, the GSP, must be adopted and submitted to DWR by February 28, 2022.

The Pleasant Valley GSP is also available for viewing online at:
https://sgma.pleasantvalleywaterdistrict.com

If you have questions regarding the attached material, please contact Glenn Allen, Manager, at 600-9672 or Roy Jimenez Jr., Planner at 600-4251.

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Enclosure: Flash Drive - Pleasant Valley Subbasin GSP

LIMITATION

In preparation of this Groundwater Sustainability Plan (Plan), the professional services of Provost & Pritchard Consulting Group and Kenneth D. Schmidt and Associates were consistent with generally accepted engineering and hydrogeologic principles and practices in California at the time the services were performed.

Section 3 of this Plan, Basin Setting, was prepared in general conformance with Title 23 California Code of Regulations, section 354.12 either by and /or under the direct supervision of the appropriate professional as indicated herein.

Per Regulation Requirements
§354.12 Introduction to Basin Setting
This Subarticle describes the information about the physical setting and characteristics of the basin and current conditions of the basin that shall be part of each Plan, including the identification of data gaps and levels of uncertainty, which comprise the basin setting that serves as the basis for defining and assessing reasonable sustainable management criteria and projects and management actions. Information provided pursuant to this Subarticle shall be prepared by or under the direction of a professional geologist or professional engineer.

Note: Authority cited: Section 10733.2, Water Code.
Reference: Section 10733.2, Water Code.

This GSP is a work product of the members and associated stakeholders of the Pleasant Valley Groundwater Sustainability Agency (PVGSA) members and associated stakeholders. Judgments leading to conclusions and recommendations were made based on the best available information but were made without a complete knowledge of subsurface geologic and hydrogeologic conditions. This Plan is intended to provide information from readily available published or public sources. We understand that the interpretations and recommendations are for use by the PVGSA in assisting the GSA in making decisions related to potential water supplies and groundwater management activities in light of California's new and evolving Sustainable Groundwater Management Act (SGMA) regulations.

Variations in subsurface conditions cannot be exactly known, or entirely accounted for, in spite of significant study and evaluation. Future surface water and groundwater quantity, quality, and availability cannot be precisely known. Trends have been estimated and projected based upon past historical data and events and are used for planning purposes. It should be noted that historic trends may not be indicative of future outcomes. Historic hydrology has been used to identify averages and potential extremes that may be experienced in future years; however, it will be important for the GSA to evaluate the parameters that make up the agency water budget. Additionally, the rapidly changing regulatory environment surrounding the SGMA and State regulatory agencies may render any or all recommendations invalid in the future if not implemented and necessary approvals, permits, or rights obtained in a timely manner. Information contained in this GSP should not be regarded as a guarantee that only the conditions reported and discussed are present within the PVGSA or that other conditions may exist which could have a significant effect on groundwater availability.

In developing methods, conclusions, and recommendations this GSP has relied on information that was prepared or provided by others. It is assumed that this information is accurate and correct, unless noted. Changes in existing conditions due to natural and man-made causes including climate change, operations in adjoining GSAs or subbasins, or future management actions taken by a GSAs may deem the conclusions and recommendations inappropriate. No guarantee or warranty, expressed or implied, is made by Provost & Pritchard Consulting Group or by Kenneth Schmidt & Associates by placing a Registered Professional Engineering, Registered Geologist, or Certified Hydrogeologist Stamp upon this document.

Prepared by:

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Abbreviations and Acronyms

AF	Acre-Foot
AF/YR	Acre-Foot Per Year
APE	Area of Potential Effect
CASGEM	California Statewide Groundwater Elevation Monitoring
CCGSA	City of Coalinga GSA
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFGSA-GSA	County of Fresno GSA – Pleasant Valley Area
CFS	Cubic Feet Per Second
CGPS	Continuous Global Positioning System
CSH	Coalinga State Hospital
CITY	City of Coalinga
CVP	Central Valley Project
CWC	California Water Code
DBCP	1, 2-Dibromo-3-chloropropane
DDW	Division of Drinking Water
DHS	Department of Health Services
DMS	Data Management System
DQO	Data Quality Objectives
DTSC	Department of Toxic Substance Control
DWR	Department of Water Resources
E	Eocene Marine
EC	Electrical Conductivity
EDB	Ethylene-Dibromide
EPA	Environmental Protection Agency
ESA	European Space Agency
ET	Evapotranspiration
FCPVSGA	Fresno County Pleasant Valley GSA
FMFCD	Fresno Metropolitan Flood Control District
ft/yr	Feet per Year
GAMA	Groundwater Ambient Monitoring and Assessment
GDE	Groundwater Dependent Ecosystem
GPS	Global Positioning System

GPD/FT ..... Gallons Per Day Per Foot
GPM ..... Gallons per Minute
GSA ..... Groundwater Sustainability Agency
GSP ..... Groundwater Sustainability Plan
HCM ..... Hydrogeological Conceptual Model
ILRP ..... Irrigated Lands Regulatory Program
InSAR ..... Interferometric Synthetic Aperture Radar
IRWMP ..... Integrated Regional Water Management Plan
JPL ..... Jet Propulsion Laboratory
KDSA ..... Kenneth D. Schmidt and Associates
LAFCo ..... Local Agency Formation Commission
LU ..... Land Use
M.D.B.&M ..... Mount Diablo Base and Meridian
MCL ..... Maximum Contaminant Level
MG/L ..... Milligrams per Liter
MO ..... Measurable Objectives
MOU ..... Memorandum of Understanding
MSL ..... Mean Sea Level
MT ..... Minimum Thresholds
MTBE ..... Methyl tert-Butyl Ether
NASA ..... National Aeronautics and Space Administration
NC ..... The Nature Conservancy
NCDC ..... National Climatic Data Center
NGS ..... National Geodetic Survey
NRCS ..... Natural Resource Conservation Service
P ..... Pilocene Marine
PAC ..... Policy Advisory Committee
PCE ..... Perchloroethylene
PG&E ..... Pacific Gas & Electric Company
Plan ..... Groundwater Sustainability Plan
PVSP ..... Pleasant Valley State Prison
PV Subbasin ..... Pleasant Valley Subbasin
PVWD ..... Pleasant Valley Water District
Qoa ..... Quaternary Older Alluvium
QPc ..... Pilo-Pleistocene nonmarine, Pilocene nonmarine.

Q ..... Quaternary Alluvium
R&R ..... Recharge and Restoration
RC ..... Resource Conservation
RMS ..... Representative Monitoring Site
RWQCB ..... Regional Water Quality Control Board
SAGBI ..... Soil Agricultural Groundwater Banking Index
SAR ..... Sodium Adsorption Ratio
SGMA ..... Sustainable Groundwater Management Act
SMC ..... Sustainable Management Criteria
SWP ..... State Water Project
SWRCB ..... State of California Water Resources Control Board
TAC ..... Technical Advisory Committee
TCE ..... Tricholoroethylene
TCP ..... 1, 2, 3 -Trichloropropane
TDS ..... Total Dissolved Solids
UNAVCO ..... University NAVSTAR Consotrium
USACE ..... US Army Corps of Engineers
USGS ..... United States Geological Survey
VOC ..... Volatile Organic Compound
WHPA ..... Wellhead Protection Area
WSIP ..... Water Storage Investment Program

Executive Summary

The Pleasant Valley Subbasin (PV Subbasin or Subbasin) (DWR Basin 5-022.10) is located in Fresno County in the San Joaquin Valley Groundwater Basin. The Subbasin is adjacent to the Westside Subbasin of the San Joaquin Valley Basin to the east and north of the Kettleman Plain Subbasin. The Subbasin is bounded on the north by the Joaquin Ridge, on the west by the Tertiary and older marine sediments of the Coast Ranges, on the south by the Kettleman Hills and Plains and Kings County line, and on the east by the Guijarral Hills and Westside Subbasin. **Figure ES-1** depicts the regional location of the Subbasin.

In the late 19th century, the Pleasant Valley area and the city of Coalinga experienced significant development over a short period of time as a result of oil production. The Coalinga Oil Field was the largest oil field in the western US at that time. Agriculture developed in the valley as a result of both oil development and the establishment of the city of Coalinga. The city of Coalinga sprung up and became one of the largest cities west of the Mississippi.

The Pleasant Valley Subbasin is in the Southern Coast Range in California. The coastal ranges are predominantly dominated by a marine environment and the rocks are of marine origin and were uplifted. When rain events occur within the watershed above the valley, excess run off may generate stream runoff that traverses across the Subbasin. Therefore, significant amounts of streamflow percolates into the Subbasin. The Subbasin contains marginal groundwater quality predominantly dominated by sulfate chloride, boron, and a number of other constituents. Because of the high salinity, the city of Coalinga realized early on that the water quality was poor for human consumption of drinking water so efforts to import surface water by rail from Armona began as early as the 1930s. Subsequently, the city operated one of the only desalination plants in the country. The city ultimately developed surface water resources. The historical cropping patterns were adapted to be susceptible to the high salinity of the groundwater. The high electrical conductivity of groundwater limited the types of crops historically grown in the Subbasin. Over time, around the early 2000s, individuals started experimenting with pistachio crops. There was a recognition that pistachios had tolerance for higher concentrations of salts. Over time the production of pistachios throughout the Subbasin accelerated given the market value for pistachios. This expansion of pistachio crops surpassed the groundwater supply's ability to remain sustainable. Groundwater levels have been declining and continue to do so due to agricultural demand.

Current cropping and irrigation practices throughout the Subbasin are the driving force in determining the parameters of this Groundwater Sustainability Plan (Plan). There is a need to balance the groundwater levels and a significant need for the importation of new surface water supplies to maintain successful crop production of pistachios in the valley and to prolong the life of the aquifer. One significant project outlined in this Plan is to build new and to expand current conveyance facilities to bring additional surface water supplies into the Subbasin, promoting and prolonging agricultural production.

Groundwater quality in the Subbasin tends to be predominately marginal to brackish, ranging from 1,500-3000 mg/L of TDS. Available research suggests that pistachios in particular are capable of thriving in salinity conditions up to 5000 mg/L TDS.

The City of Coalinga (City) maintains a contract with the Bureau of Reclamation (USBR) and has been importing surface water since the Central Valley Project was expanded to serve the San Luis Unit. The first surface water deliveries to the city occurred in 1971.

The city treats diverted surface water at its treatment facility at the Coalinga Canal and delivers it to their facilities as well as to a nearby prison and a hospital. A 100-acre area called the Lost Hills community in the

southern portion of the district relies on individual domestic wells on 2- to 5-acre lots. As previously noted, the groundwater quality is poor to marginal for residential use and consumption.

The Plan

The Pleasant Valley Plan Area includes the Pleasant Valley Groundwater Sustainability Agency (**PVGSA**), County of Fresno GSA – Pleasant Valley Area (**CFFSA-GSA**), and City of Coalinga GSA (**CCGSA**). **Figure ES-2** identifies the GSA boundaries and the additional jurisdictional boundaries adjacent to the Plan Area.

No Federal owned lands exist within the Plan Area; however, the State owned and operated California Department of Corrections and Rehabilitation's Pleasant Valley State Prison (**PVSP**) and the Coalinga State Hospital (**CSH**), operated by the Department of State Hospitals, reside within the Plan Area. The PVSP and CSH combined span approximately 640-acres and receive water from the City of Coalinga. In addition, a portion of the Pleasant Valley Ecological Preserve, operated by the California Department of Fish and Wildlife, is located within the Subbasin. **Figure ES-3** clarifies the locations the State lands within the Subbasin.

No adjudicated areas exist within the Subbasin; therefore, the entirety of the estimated 48,159 acres of the Subbasin is subjected to GSP regulations. An outline of the GSA acreages is available in **Table 2-1.**

Monitoring and Management Programs

Following are discussions of several active and proposed monitoring and water management programs within the Subbasin. More details on monitoring can be found in **Chapter 5**.

Groundwater Level Monitoring

Pleasant Valley Water District performs periodic (typically spring and fall) groundwater level monitoring at select locations as part of the California Statewide Groundwater Elevation Monitoring (**CASGEM**) Program. Historically, DWR has done these measurements, but it is expected that they will discontinue these and the District will need to maintain the monitoring effort. To comply with SGMA, these efforts may be expanded to include groundwater levels from additional areas and continuous water level measurements utilizing transducers with continued preparation for GSP implementation and associated reporting. **Chapter 5** details the monitoring efforts associated with GSP implementation.

Groundwater Pumpage Monitoring

The GSAs in the Subbasin do not own any operating wells. It is believed that many irrigation wells have flow meters, and the pumping volume is recorded by the landowners. The pumpage must be estimated by other means, such as typical per crop water demands per acre. This results in groundwater pumpage estimates with varying levels of accuracy. More details on proposed monitoring can be found in **Chapter 5 and Chapter 6**.

Groundwater Quality Monitoring

The requirements for groundwater quality testing and reporting are based on the water use and, if for drinking water, the size of the community system. Groundwater quality monitoring activities performed within PVGSA and the FCPVGSA and the associated primary aquifer are not related to community water system drinking water production and, therefore, are not publicly reported to the state. The City of Coalinga does not have any drinking water wells in operation. Therefore, any monitoring regarding drinking water quality standards is performed privately and is not generally publicly available.

Section 3.1 includes more information regarding the groundwater quality in the Subbasin.

Land Surface Subsidence Monitoring

While some local agencies in the San Joaquin Valley monitor for land subsidence, the majority rely on monitoring performed by regional water agencies or the State and Federal government. Lands within the Plan Area have been monitored for land subsidence for many years. United States Geological Survey (USGS), National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory (JPL), and University NAVSTAR Consortium (**UNAVCO**) measure subsidence in the Central Valley. There are several UNAVCO land surface elevation monitoring locations near the Subbasin. USGS and JPL have maps on their websites that show the subsidence for a defined time period, but there is limited information shown for the Subbasin. The Nevada Geodetic Laboratory GPS Network includes data since 2017 from a single GPS monitoring station (CACO – IGS14) at West Hills Community College in the City of Coalinga. More data would be helpful to assess the quality assurance of the site's data.

For more information on subsidence in the Subbasin, see **Section 3.2**. For more information on land subsidence monitoring, see **Chapter 5**. Chapter 5 includes information from 2007 to 2011 for vertical ground surface displacement rates, which are derived from Interferometric Synthetic Aperture Radar (InSAR) data that are collected by the European Space Agency (ESA) Sentinel-1A satellite and processed by the NASA JPL under contract with to the California Department of Water Resources (DWR).

Surface Water Monitoring

Historical data are available on stream flow from the USGS or DWR. In recent years, PVWD has started to monitor flows in the creeks and natural waterway flows coming into the Subbasin. For more information on stream flow in the Subbasin, see **Section 3.1** and **Section 3.3**. Surface water imports in the area are monitored by the USBR and City of Coalinga.

Projects & Management Actions

As a part of this Plan, several projects and management actions have been preliminarily proposed and can be reviewed in greater detail in **Chapter 6**. Some of the projects & management actions discussed therein include but are not limited to the following:

Proposed Projects

- North Canal Pipeline
- South Canal Pipeline Expansion
- Los Gatos Creek Gravel Pits
- Zapato Creek Instream
- Import Surface Water Supplies

Proposed Management Actions

- Install Flowmeters to measure pumpage
- Rules and Regulations
- Water Recharge and Banking Policy
- Transfer Policy
- Pumping Limits Policy
- Fill Data Gaps

Consideration of Beneficial Uses and Users and Comments during the review period.

A number of comments were received that specially questioned the thoroughness and identification of disadvantaged communities, domestic water users, interconnected surface waters, groundwater dependent ecosystems, native vegetation and managed wetlands. To this end additional information can be found within this update or revision of the plan. It was also felt that a summary of this information was warranted and included in this summary so that the updated data and information can be found in one place.

Beneficial users

As noted in the document beneficial users include the City of Coalinga as a disadvantaged community. The City constructed a surface water treatment plant and constructed a surface water system to serve not only the city proper as well as the Prison and State hospital as well as houses and businesses along the conveyance routes. The routes are shown on Figure 3-15 and is reproduced here as Figure ES-4. Also shown on Figure ES-4 is the location by section of the eight domestic wells identified in the State well construction database as well as the Lost Hills community that has approximately a half dozen wells. Shown on Figure ES-5, are the interconnected surface water locations (see Figure 3-36) that may be identified as ISW sites per the plan. Recognizing that the City system supplies surface water and not groundwater and the location of the ISW sites from irrigation wells (groundwater extraction site), both Figures ES-4 and ES -5 were developed to identify the possible locations that may have the potential to experience undesirable results due to management of the groundwater basin. From review of the Management Objectives found in chapter 4, it doesn't appear at this time that these sites would have undesirable affects based upon the Management Objectives proposed. Care will be taken to continue to monitor these locations to see if these conclusions continue to be valid.

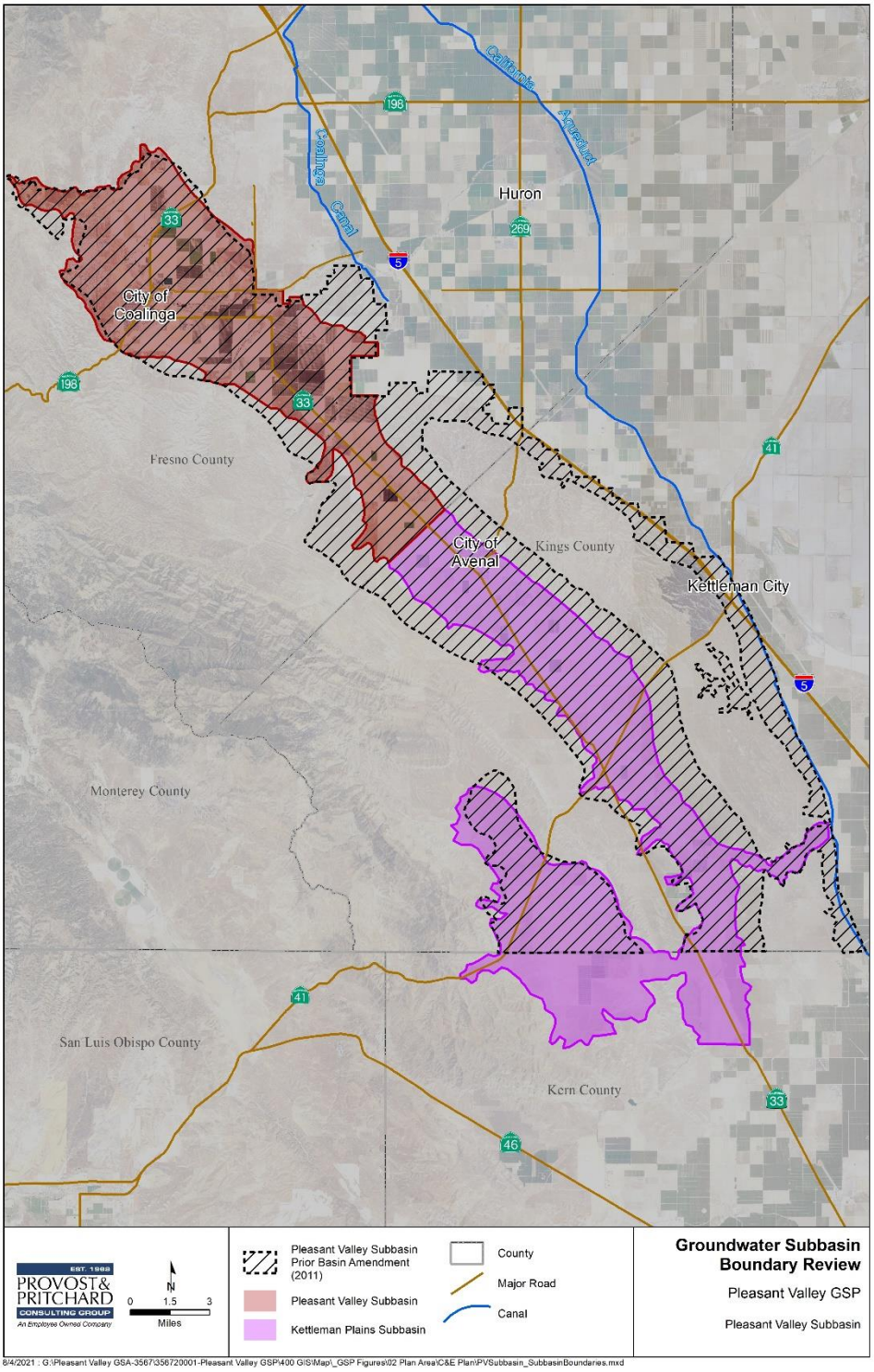


Figure ES-1 Regional Location of Pleasant Valley Subbasin

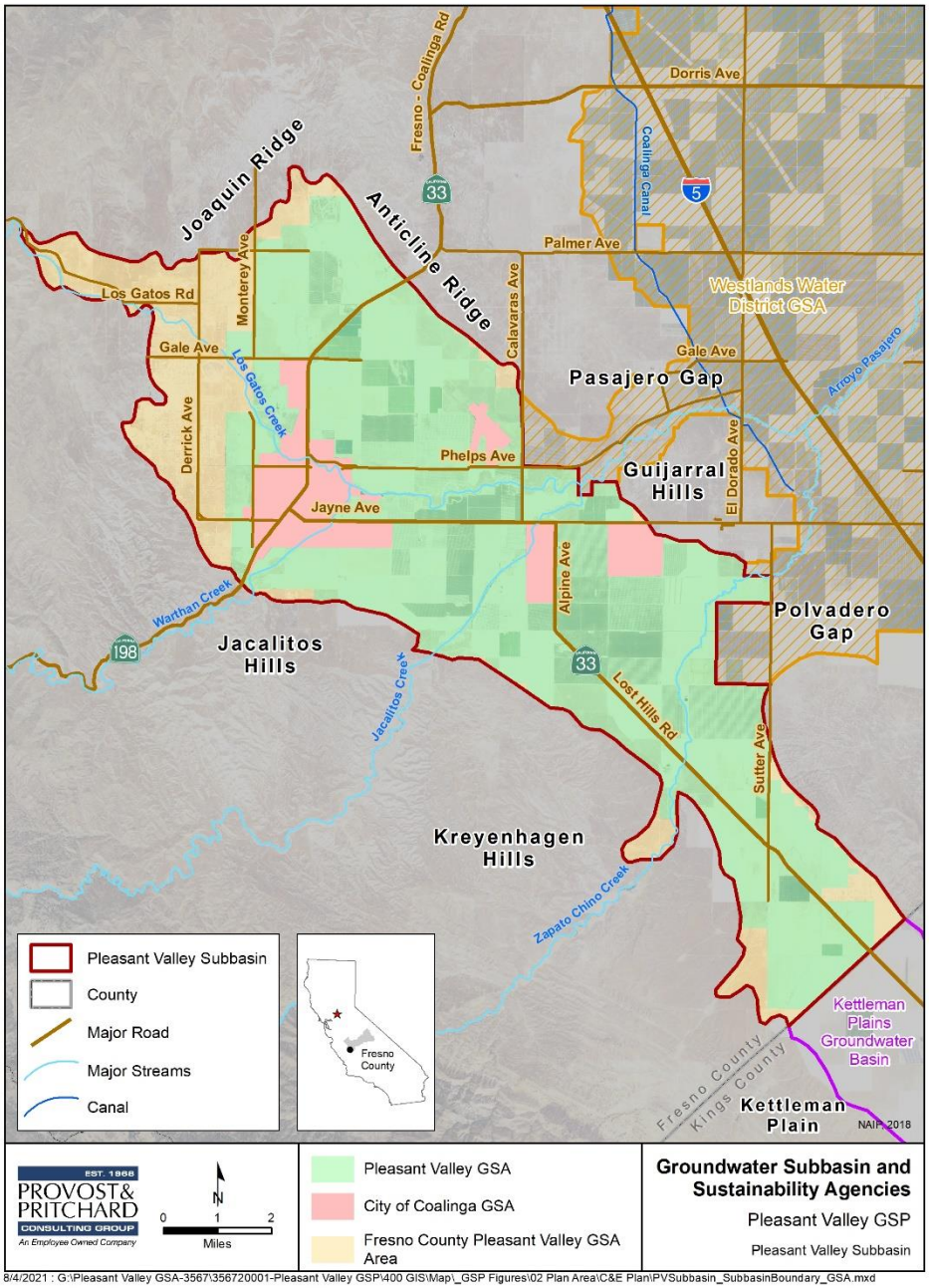


Figure ES-2 GSAs within the Pleasant Valley Subbasin

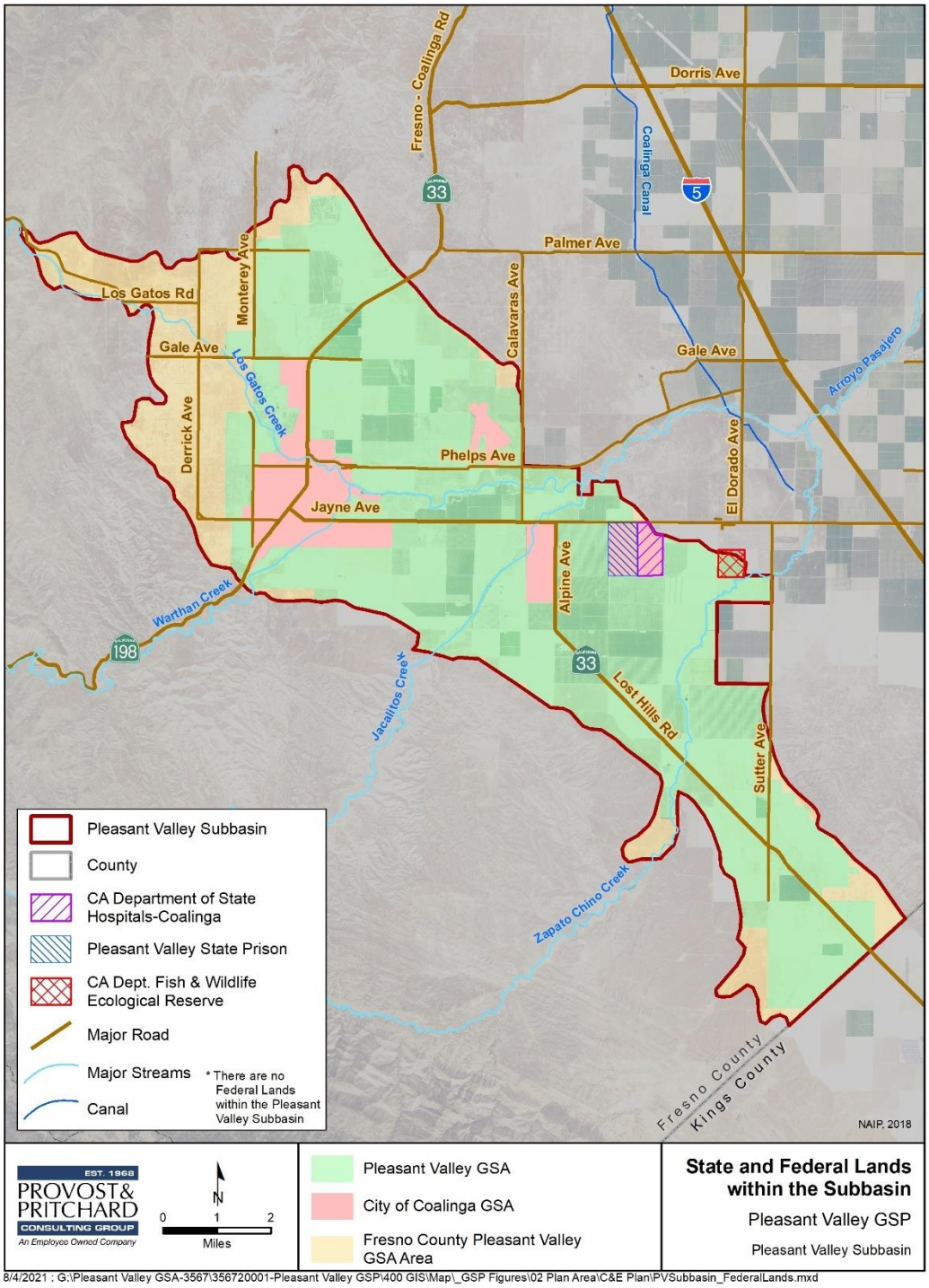


Figure ES-3 State and Federal Lands within the Subbasin

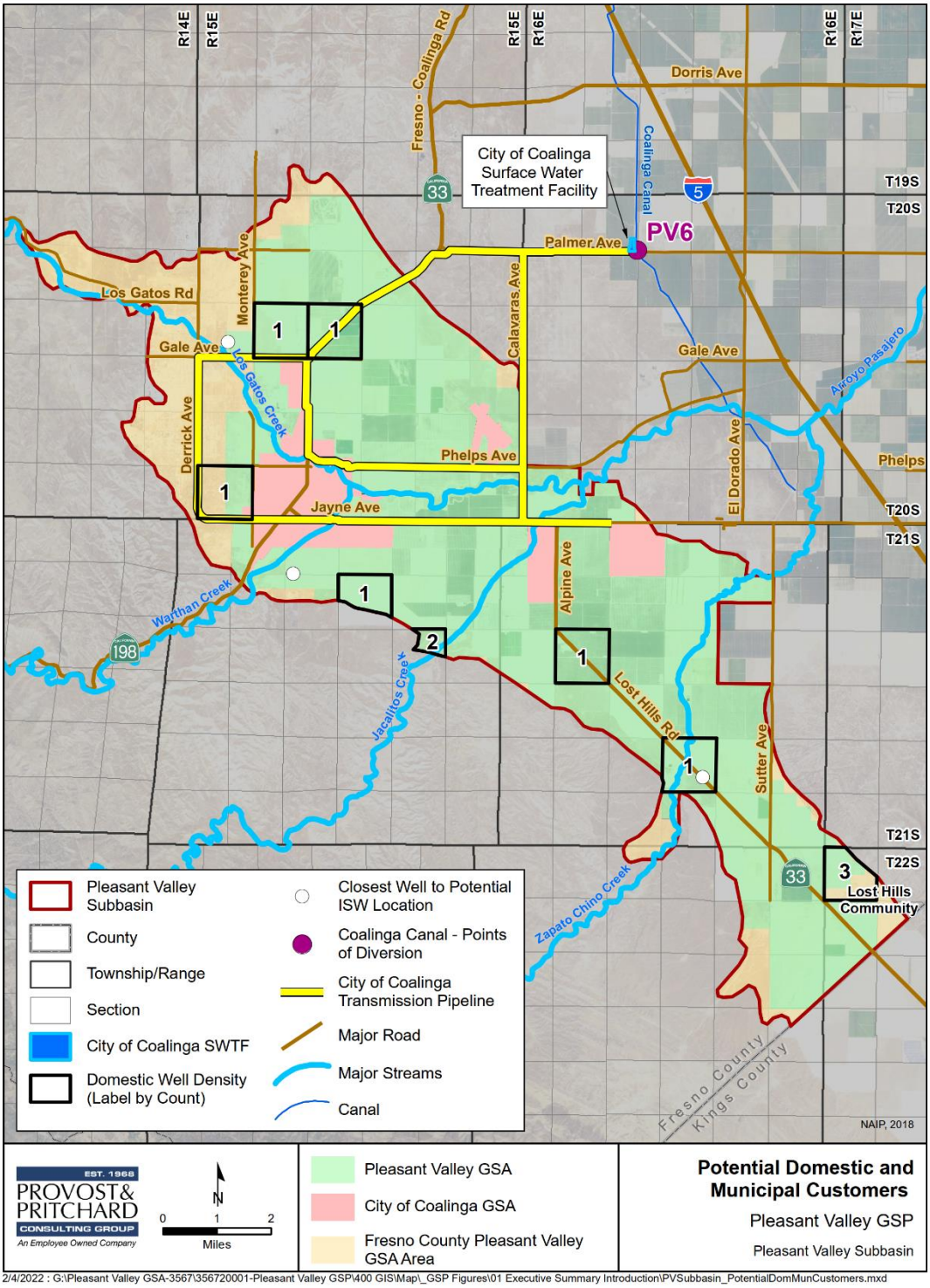


Figure ES-4 Potential Domestic and Municipal Customers

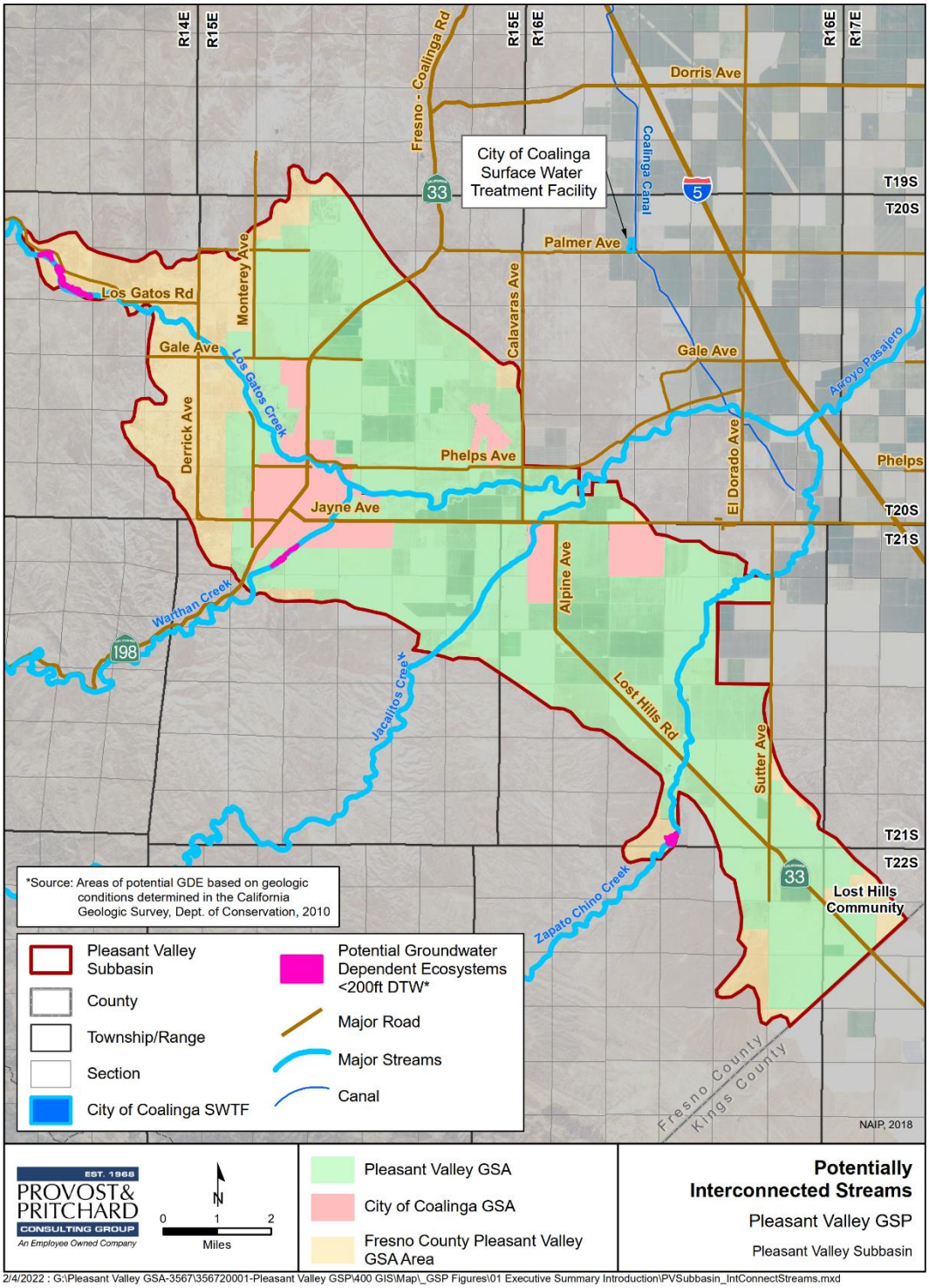


Figure ES-5 Potentially Interconnected Streams

1 Introduction

1.1 Subbasin Overview

The Pleasant Valley Subbasin (California Department of Water Resources (**DWR**) Basin 5-022.10) is located in Fresno County in the San Joaquin Valley Groundwater Basin and is estimated to total 48,159 acres. In November 2018, DWR reclassified the basin's groundwater overdraft conditions from a low-priority basin to a medium-priority basin. The Pleasant Valley Subbasin (**PV Subbasin or Subbasin**) is adjacent to the Westside Subbasin (Basin 5-022.09) of the San Joaquin Valley Basin to the east and north of the Kettleman Plain Subbasin (Basin 5-022.17). The PV Subbasin is bounded on the north by the Joaquin Ridge, on the west by the Tertiary and older marine sediments of the Coast Ranges, on the south by the Kettleman Hills and Plains and Kings County line, and on the east by the Guijarral Hills and Westside Subbasin.

1.2 Purpose of Groundwater Sustainability Plan (GSP)

On September 16, 2014, Governor Jerry Brown signed into law a three-bill legislative package, composed of AB 1739 (Dickinson), SB 1168 (Pavley), and SB 1319 (Pavley), collectively known as the Sustainable Groundwater Management Act (SGMA) which was passed in 2014 and is codified in Section 10720 et seq. of the California Water Code. This legislation created a statutory framework for developing local groundwater management that can be sustained during planning and implementation without causing undesirable results.

SGMA requires governments and water agencies of high- and medium-priority basins to halt overdraft and bring groundwater basins into balanced levels of pumping and recharge. Under SGMA, these basins should reach sustainability within 20 years of implementing their sustainability plans. For medium priority basins, the deadline for achieving sustainability is 2040. With the reclassification of the basin from low to medium by DWR in 2018, the Pleasant Valley GSP is due to the state by 2023 and sustainability is required by 2043. The grant from DWR contractually requires the GSP and the grant to be concluded by February 28, 2022.

In his signing statement, Governor Brown emphasized that "groundwater management in California is best accomplished locally." With ongoing financial and technical assistance from DWR, the three Groundwater Sustainability Agencies (GSAs) in the Subbasin (Pleasant Valley GSA [PVGSA], Fresno County Pleasant Valley GSA—Pleasant Valley [County], and City of Coalinga GSA [City]) have coordinated to develop this one GSP and are working together to achieve groundwater sustainability.

Table 1-1 GSP Requirements

GSP Requirements
Groundwater conditions must be adequately defined and monitored to demonstrate the GSAs are achieving the sustainability goals for the basin.
GSAs must be sufficiently defined and compatible to evaluate the effect of GSPs on adjacent basins.
GSPs must meet substantial compliance standards.
A GSA shall provide a description of basin setting and establish criteria that will maintain or achieve sustainable groundwater management.
DWR will consider state policy to the human right to water when implementing these regulations.
The GSP sustainable groundwater management criteria, projects, and management actions should be based on the level of understanding of uncertainty and data gaps.
A GSP must achieve the sustainability goals for the basin in 20 years.

1.3 Sustainability Goal

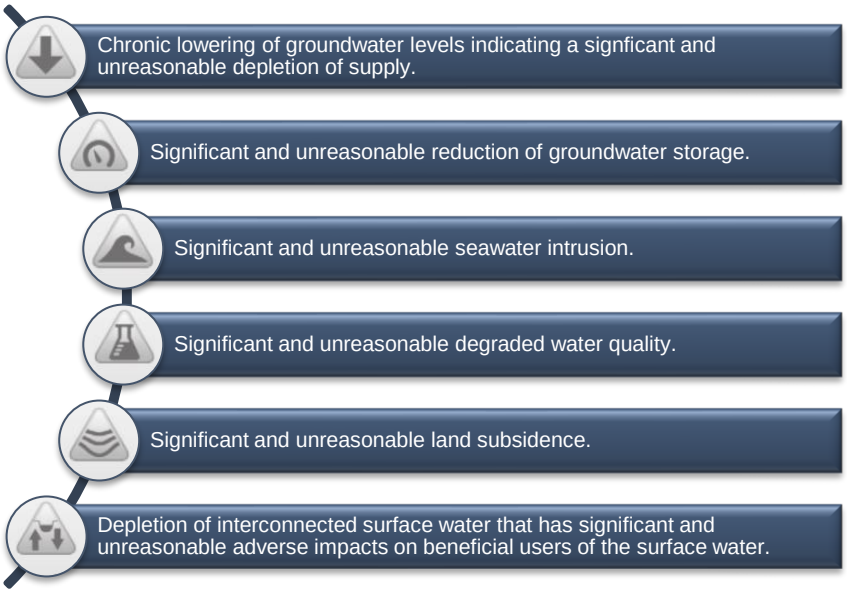


Figure 1-1 Six Categories of Undesirable Results

The sustainability goal of the Pleasant Valley Subbasin and this GSA is to ensure that by 2042 the basin is being managed in a sustainable manner to maintain a reliable water supply for current and future beneficial uses without experiencing undesirable results. A more detailed description of the Sustainability Goal for the Subbasin and Sustainable Management Criteria for the Subbasin and this GSA is included in **Chapter 4.**

The San Joaquin Valley Basin, including the Pleasant Valley Subbasin, has been determined to be in a state of overdraft consistently since the first edition of the DWR Bulletin 118 in 1978. Since that time, the Pleasant Valley Subbasin has lost subsurface storage through a combination of groundwater pumping and several years of below-normal recharge driven by drought conditions and low surface water flows. **Chapter 3** of this Groundwater Sustainability Plan (GSP) discusses this chronic water imbalance in more depth.

While the Pleasant Valley Subbasin has lost a great deal of its stored groundwater in recent decades, the aquifers beneath the Subbasin still contain extensive supplies. That extensive storage volume has long obscured the effects of overdraft from year to year, providing a buffer against what would otherwise be extreme fluctuations in recharge depending on the climatic conditions. Water agencies in the Subbasin must work together to maintain the viability of the aquifer.

To that end, this GSP proposes measures to reduce and eventually eliminate overdraft within the PV Subbasin area. Eliminating overdraft is defined as balancing average groundwater withdrawals with average groundwater recharge over a hydrologic base period. The variability in recharge, in contrast to the steady nature of water demands, makes it infeasible to achieve stable groundwater levels every year. In reality, there will be years where the Subbasin area gains storage, and other years where the storage balance declines. Overall, the average Subbasin area basin storage will no longer be in decline.

In order to accomplish this overarching goal, this Plan identifies undesirable results, which are outcomes that will be realized should the Plan's strategies not be effective or not be effectively implemented. Undesirable results are marked by minimum thresholds or data points which if not met mean an undesirable result has

been realized. Positive outcomes defined in this GSP will take time to achieve; none of the goals can be realized in a year. Many will not be fully achieved until well into the 20-year attainment period defined in the SGMA legislation. Measurable objectives have been defined to gauge progress during the intervening years and to help assure not only that the Subbasin is moving toward its sustainability goals, but also that the rate of progress is as planned and sufficient to meet the overall implementation schedule.

Sustainability goals, undesirable results, minimum thresholds, and measurable objectives are all defined and discussed in detail in **Chapter 4** of this GSP.

Table 1-2 Sustainability Indicators

Sustainability Indicators
Groundwater Levels
Groundwater Storage Volume
Seawater Intrusion
Water Quality
Land Subsidence
Interconnected Surface Water

1.3.1 Goal Description

The goal of the GSP is to provide a tool for managing groundwater that will assist in maintaining basin-wide sustainability for the long-term for existing beneficial uses and users while avoiding undesirable results. Throughout the SGMA phases, the PV Subbasin GSA's Boards of Directors and technical teams will be responsible for collecting and organizing data, engaging and retaining experts and consultants, and soliciting feedback from beneficial users of groundwater and interested parties within the Subbasin boundary. The Pleasant Valley GSP participants intend to work collaboratively to continue to better understand the basin characteristics by establishing a coordinated network of monitoring points and reporting requirements. This will help to recognize existing hydrogeological patterns and to better refine Sustainable Management Criteria (SMC) in future Plan updates. The Pleasant Valley GSP participants also plan to establish criteria and implement programs and projects to monitor and manage groundwater levels and storage, protect groundwater quality, and reduce the effects of subsidence in a manner that is open to the public and stakeholders and considers the needs of all beneficial users.

1.3.2 Discussion of Measures

The establishment of criteria and implementation of programs, projects, and management actions will help to achieve the goals of the GSP. Infrastructure projects and additional surface water supply will be crucial components. Existing and planned projects and management actions to aid in GSP implementation are identified in detail in **Chapter 6**.

1.3.3 Explanation of How the Goal will be Achieved in 20 years

The Sustainable Management Criteria will be evaluated in conjunction with the data obtained via monitoring efforts identified in **Chapter 5**. Every five years, the PV GSP participants can revise the GSP with the intention of refining the course to sustainability, if necessary, based on information learned.

The measurable objective quantitatively reflects the sustainability goal for 2042 and the interim goals quantitatively represent the sustainability goal at five-year increments, corresponding with Plan update periods. Monitoring results will be compared to the interim goals, measurable objectives, and minimum thresholds during Annual Report and GSP update development. The analysis will assess the ability to prevent undesirable results in the PV Subbasin as they relate to the other SMCs.

The sustainability goal for the Pleasant Valley GSP is to increase the importation of surface water to the region for direct irrigation use as well as for intentional recharge to the groundwater. If additional mitigation is needed, then the GSP may consider reductions in crop acreage to further reduce the amount of groundwater pumping in the basin.

1.4 Groundwater Sustainability Agency Information

Regulation Requirements:
§**354.6(a)** The name and mailing address of the Agency

Pleasant Valley Groundwater Sustainability Agency
P.O. Box 468
Coalinga, CA 93210

Contact: Brad Gleason
Phone: (559) 216-1411
Email: info@pleasantvalleywaterdistrict.com

County of Fresno Groundwater Sustainability Agency
2220 Tulare St. 6th Floor
Fresno, CA 93721

Contact: Roy Jimenez, Jr
Phone: (559) 600-4292
Email: RJJimenez@fresnocountyca.gov

Glenn Allen
Phone: (559) 600-9672
Email: GLAllen@fresnocountyca.gov

City of Coalinga GSA
155 W. Durian
Coalinga, CA 93210

Contact: Sean Brewer
Phone: (559)935-1533 Ext. 143
Email: sbrewer@coalinga.com

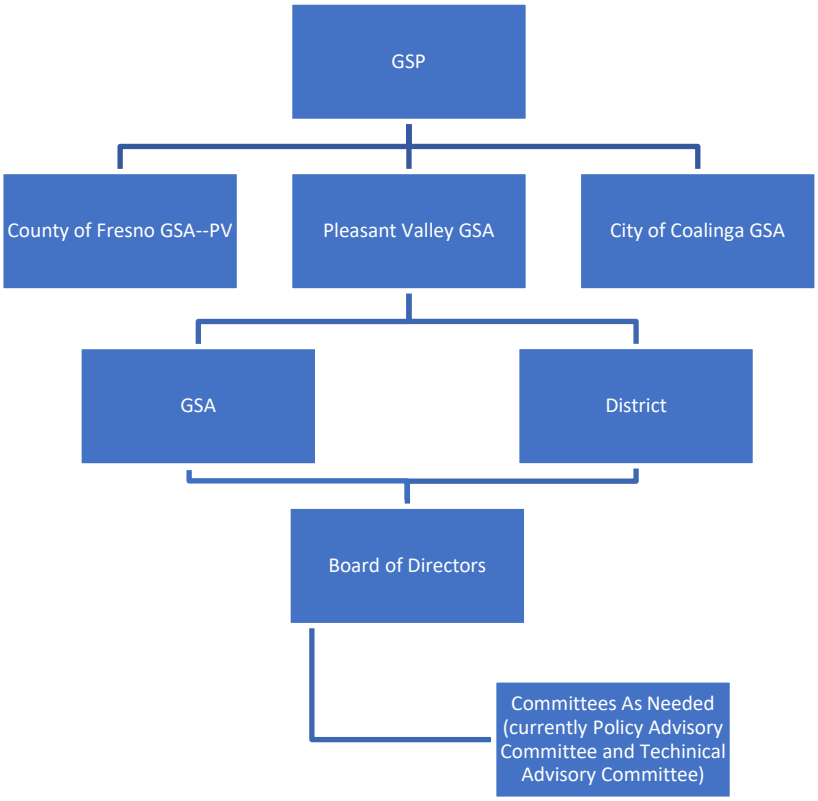
1.4.1 Organization and Management Structure of the GSA(s)

Regulation Requirements:
§**354.6(b)** The organization and management structure of the Agency, identifying persons with management authority for implementation of the Plan.
§**354.6(c)** The name and contact information, including the phone number, mailing address and electronic mail address, of the plan manager.

The Subbasin is covered by the three Groundwater Sustainability Agencies: County, City, and PVGSA.

The PVGSA Board of Directors has met every two months while developing this plan. It is expected that in 2022 the Board will revert to regularly meeting on the 2nd Tuesday of January, April, July, and October after the District Board meeting. The Agency is governed by a board of directors made up of seven directors who also serve on the Pleasant Valley Water District Board of Directors.

The following graphic illustrates the organizational structure.



The GSA may form committees on an as-needed basis. The Technical Advisory Committee (TAC) reviews and provides technical input on the preparation of the GSP. The TAC is comprised of a liaison with the GSAs, Kenneth Schmidt (hydrogeologist), Brian Ehlers (engineer), and a local agronomist. The Policy Advisory Committee, which reviews the recommendations of the TAC and recommends to the stakeholders policy issues, consists of five members (one representative from both the city and county GSAs and three representatives from the PVGSA).

At the time of writing this Plan, the following is the current contact information for the Plan Manager:

GSA Plan Manager:

Name:	Brad Gleason
Phone:	(559) 216-1411
Mailing Address:	Pleasant Valley GSA P.O. Box 468 Coalinga, CA 93210
Email:	info@pleasantvalleywaterdistrict.com

The basin is preparing a single GSP.

Table 1-3 Participating GSAs Contact Information

Pleasant Valley Subbasin Participating GSAs				
GSA	**Plan Manager**	**Mailing Address**	**Phone**	**Email**
Pleasant Valley GSA	Brad Gleason	P. O. Box 468 Coalinga, CA 93210	(559) 216-1411	info@pleasantvalleywaterdistrict.com
County of Fresno GSA-Pleasant Valley	Glenn Allen Roy Jimenez	2220 Tulare St., 6th floor Fresno, CA 93721	(559) 600-9672 (559) 600-4292 (559) 600-4251	glallen@fresnocountyca.gov rjimenez@fresnocountyca.gov
City of Coalinga GSA	Sean Brewer	155 West Durian Coalinga, CA 93210	(559) 935-1533	sbrewer@coalinga.com

1.4.2 Legal Authority of the GSA(s)

The Pleasant Valley Groundwater Sustainability Agency (PVGSA or Agency) was formed in 2016 as part of its compliance effort to meet California's SGMA legislation enacted in 2014. The Agency's boundaries overlay the boundaries of Pleasant Valley Water District (District) excluding the City of Coalinga.

The Pleasant Valley Subbasin was amended in 2016 following an application made by the District to the State Department of Water Resources (DWR). The revised Subbasin boundary encompasses approximately 48,159 acres entirely in Fresno County of which about 21,000 acres is currently cultivated.

The DWR reclassified the Subbasin from a low- to medium-priority designation in November 2018. In cooperation with the City and County, the PVGSA has until February 2022 due to grant contract requirements to submit its GSP for the Subbasin and has undertaken a series of steps to develop and meet the GSP submission deadline.

The three GSAs have established Memorandums of Understanding (MOUs) to ensure coordination in developing and implementing the GSP. See **Section 1.5** for more about the MOUs.

Pleasant Valley Water District was formed in 1963 to provide agricultural water to landowners. The District was formed under California Water Code section 34000-38500 which enables the formation of Water Districts to acquire, plan, construct, maintain, improve, operate, and keep in repair the necessary works for the production, storage, transmission, and distribution of water for irrigation, domestic, industrial, and municipal purposes.

The Fresno County Local Agency Formation Commission (LAFCo) recognizes the District as a qualified public agency that provides its landowners with representation, information services regarding statewide water policy, water rights, new state legislation, water agency coordination, and other issues affecting local water resources.

The District is an independent special district which has a seven-member board of directors not governed by another legislative body (either a city council or county board of supervisors). Candidates eligible to serve on the board of directors must be a holder of title to land within the District boundaries or the legal representative of the holder of title to land within the District boundaries. District board members are subject to election of four-year staggered terms; in the event that the number of candidates filing with County elections is equal to the number of open seats on the board, the Board of Supervisors may appoint members in-lieu of an election; in the event no candidates file election papers, members may be appointed by the Fresno County Board of Supervisors based on a recommendation provided by the District's board of directors.

The District has authority to manage the groundwater resources within its service area through CWC, Division 6, Part 2.75 (Sections 10750 et seq.) It is the primary agency responsible for its groundwater management plan, and it provides for management of the groundwater basin within its political boundary. The groundwater management plan complies with CWC, Sections 10750 et seq., as amended January 1, 2003.

The PVGSA, County of Fresno GSA, and City of Coalinga GSA have the responsibility to monitor for compliance of sustainable groundwater management within its service area. The powers given to GSAs are enumerated in CWC, Division 6, Part 2.74 and include but are not limited to the following: the ability to acquire personal property of any kind, such as land, rights-of-way, water rights, etc.; the authority to mandate the registration of groundwater extraction facilities; the authority to regulate groundwater extractions; and the ability to impose well operation requirements. Legal authority given to the GSAs by SGMA will not be used to its maximum extent unless deemed necessary.

Regulation Requirements:
§**354.6(d)** The legal authority of the Agency, with specific reference to citations setting forth the duties, powers, and responsibilities of the Agency, demonstrating that the Agency has the legal authority to implement the plan.

1.4.3 Estimated Cost of Implementing the GSP and the GSA's Approach to Meeting Costs

The costs associated with implementation of the GSP are discussed in detail in **Section 7.1**.

As will be described later in this document, the County of Fresno GSA and the City of Coalinga GSA do not pump significant groundwater and thus the majority of the management and costs will be borne by the PVGSA. The following describes the estimated costs for administration operations and capital expenses into the future.

PVGSA and the Pleasant Valley Water District will experience two types of implementation costs – ongoing administrative expenses and project costs. Ongoing administrative expenses are anticipated to initially include fiscal agent and legal counsel expenses, audits, annual data collection and reporting, outreach, and consultant expenses for preparing funding reports and updating the GSP. Although project implementation costs are likely to be excluded from PVGSA-related expenses to landowners and possibly negligible during the first interim GSP milestone period, a future scenario may require PVGSA to support capital costs for improvement of the monitoring network or another type of project with a collective benefit to local landowners. Total administrative costs for this initial interim five-year period are estimated to vary from $150,000 to $373,000 per annum and will be presented to PVGSA's Board of Directors for consideration and approval annually. Costs associated with implementing the GSP will require PVGSA to pursue funding mechanisms such as Proposition 26 or Proposition 218, in order to provide a steady stream of revenue for a specific period. PVGSA has not determined which funding mechanism will be utilized to provide future revenue, at a minimum, for the first interim milestone period (five years).

Administrative Expenses. PVGSA must consider other funding mechanisms, such as through Propositions 26 or Proposition 218, to secure funds for the next five years leading up to the first interim milestone.

Projected costs and expenses include such items as administrative support, GSP update and implementation, stakeholder outreach and engagement, consulting firms and legal counsel for SGMA compliance, etc. and estimated costs can be found in table 7.2 below. Given that project costs are not the current responsibility of PVGSA, the proposed budget included herein will be the basis for anticipated costs incurred during this first five-year interim milestone period. Annually, PVGSA Board of Directors will consider budget needs to ensure fiscal solvency with the understanding that adjustments may be required if budget assumptions do not hold true.

Table 1-4 Estimated Costs

Item	2022	2023	2024	2025	2026
Administration	$5,000	$10,000	$10,000	$10,000	$10,000
Groundwater Monitoring and Measurement	$10,000	$25,000	$25,000	$25,000	$25,000
Legal	$2,000	$10,000	$10,000	$10,000	$10,000
Annual Reporting	$75,000	$75,000	$75,000	$75,000	$75,000
Coordination with adjacent Basins	$2,000	$4,000	$4,000	$3,000	$3,000
Plan Update				$250,000	$250,000
Totals	$94,000	$124,000	$124,000	$373,000	$373,000

Project Costs. At this time, project costs are not the responsibility of PVGSA and will be borne solely by a project proponent. Such projects may be funded by existing capital improvement budgets, grant funding, propositions (26 or 218), low interest loans, or other methods. Each project will be required to develop and secure funding needed to ensure their sustainability by 2042. In total, projects described in **Section 6** have an estimated cost of over $20 million. Member agencies will re-evaluate their respective SGMA efforts periodically in order to determine whether an adjustment is necessary in their project implementation plan.

Item	2022	2023	2024	2025	2026
North Canal Pipeline	$14,000,000				
South Canal Pipeline Exp			$2,500,000		
Los Gatos Gravel Pits		$2,100,000		$400,000	
Metering Devices	$350,000				
Rules and Regulations	$20,000				
Transfer Policy	$20,000				
Pumping Limits Policy	$50,000				
Monitor Well Installation	$100,000				
Surface water Purchase		$1,500,000	$1,500,000	$1,500,000	$3,000,000
Totals	$14,540,000	$3,600,000	$4,000,000	$1,900,000	$3,000,000

[1]Assumes a rate of $200-400/AF

Grant Funding. PVGSA recognizes that grants provide a key source of funding that can be utilized to offset fiscal burdens to stakeholders and beneficial users. While the foregoing is true, PVGSA also knows that such funds should not be factored into any budget projections because of the time lag between reimbursement and date expense is incurred.

Operational Costs: The most significant cost the landowners will face is the ongoing cost to purchase and deliver surface water. It is assumed that the basin will expand surface water imports an average of 6,000 acre

per year (AF/YR) at a rate of $250/AF during the first implementation period. This results in an annual operating cost of over $1.5 million a year.

Regulation Requirements:
§**354.6(e)** An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.

1.5 Interim Operating Agreement

On February 25, 2020, the County of Fresno and the Pleasant Valley Water District (District) entered into a Memorandum of Understanding (MOU) for implementation of the SGMA and the development and implementation of a single GSP for the entire Pleasant Valley Subbasin.

On January 2, 2020, the City of Coalinga GSA and Pleasant Valley GSA entered into a MOU. On February 25, 2020, the County of Fresno and Pleasant Valley GSA entered into a revised MOU.

The MOUs have the following objectives: to achieve sustainable groundwater management, to work cooperatively with each other and with adjacent GSAs in the PV Subbasin to prepare a single GSP that covers the Pleasant Valley Subbasin, and to work cooperatively with each other and with adjacent GSAs in the PV Subbasin to achieve sustainable groundwater management in the PV Subbasin

The individual MOUs are included in **Appendix A**.

1.6 GSP Organization

This GSP is organized in accordance with the outline in the GSP Guidelines published by DWR.

Section 2 describes the Plan area, including geographic setting, existing water resources planning and programs, relationship of the GSP to other general plan documents within the Agency boundary, and additional GSP components.

Section 3 describes the basin setting. It includes a detailed discussion of the hydrogeologic conceptual model used to prepare the GSP, current and historical groundwater conditions, a discussion of the area groundwater budget, and a description of why there are no management areas.

Section 4 sets forth the Agency's adopted sustainability goals, addresses the mandated undesirable outcomes, defines minimum thresholds for each undesirable outcome, and sets measurable outcomes for both intermediate Plan years and for the Plan's complete implementation.

Section 5 describes the network of monitoring wells and other facilities adopted by the Agency to measure Plan outcomes and assesses the need for improvements to the network in order to provide fully representative data. Monitoring protocols and data analysis techniques are also addressed.

Section 6 lists and describes each project and management action adopted by the Agency in pursuit of sustainability. The section includes project details, required permits, anticipated benefits, project capital and operations/maintenance costs, project schedule, and required ongoing management operations.

Section 7 describes the Plan implementation process, including costs, sources of funding, an overall schedule through full implementation, description of the required data management system, methodology for annual reporting, and how progress evaluations will be made over time.

Section 8 summarizes the references and sources used to prepare and document this Plan.

2 Plan Area

Regulation Requirements:
§354.8 Each Plan shall include a description of the geographic areas covered, including the following information:
(a) One or more maps of the basin that depict the following, as applicable:
- **(1)** The area covered by the Plan, delineating areas managed by the Agency as an exclusive Agency and any areas for which the Agency is not an exclusive Agency, and the name and location of any adjacent basins.
- **(2)** Adjudicated areas, other Agencies within the basin, and areas covered by an Alternative.
- **(3)** Jurisdictional boundaries of federal or state land (including the identity of the agency with jurisdiction over that land), tribal land, cities, counties, agencies with water management responsibilities, and areas covered by relevant general plans.
- **(4)** Existing land use designations and the identification of water use sector and water source type.
- **(5)** The density of wells per square mile, by dasymetric or similar mapping techniques, showing the general distribution of agricultural, industrial, and domestic water supply wells in the basin, including de minimis extractors, and the location and extent of communities dependent upon groundwater, utilizing data provided by the department, as specified in section 353.2, or best available information.

This chapter describes the Pleasant Valley GSA, Fresno County Pleasant Valley GSA Area, and City of Coalinga GSA that comprise the Pleasant Valley Subbasin (Subbasin or Plan Area). The GSP is prepared jointly by the three GSAs in the Subbasin and the GSP covers the entire Pleasant Valley Subbasin. Specifically, this chapter describes the geographic areas, governing entities, jurisdictional boundaries, existing water sources, land use and land use planning, and well density within the Subbasin covered by this GSP.

The Pleasant Valley Water District (**Figure 2-1**) is located in western Fresno County on the westside of the San Joaquin Valley. The District has an irrigable acreage of approximately 28,000 acres and is situated in its own valley on the easterly edge of the Coast Range mountains.

The District was organized on January 23, 1963, in accordance with the Water District Law of the State of California, for the purpose of contracting with the United States Bureau of Reclamation (USBR) for a water supply. This water supply was to be delivered through the Coalinga Canal also known as the Pleasant Valley Canal, a branch of the San Luis Canal. Although the canal and pumping plant were constructed with the capacity to deliver water to the Pleasant Valley Water District, a distribution system for the District is yet to be constructed.

The lands within the boundaries of the District have been irrigated since the early 1900s using groundwater. The existing groundwater basin is being overdrafted and the source is declining in level and deteriorating in supply and quality.

2.1 Summary of Jurisdictional Areas and Other Features

Regulation Requirements:
§354.8(b) A written description of the Plan area, including a summary of the jurisdictional areas and other features depicted on the map.

The Pleasant Valley Subbasin (DWR Basin 5-022.10) is located in Fresno County in the San Joaquin Valley Groundwater Basin. The Subbasin is adjacent to the Westside Subbasin of the San Joaquin Valley Basin to the east and north of the Kettleman Plain Subbasin. The Subbasin is bounded on the north by the Joaquin Ridge, on the west by the Tertiary and older marine sediments of the Coast Ranges, on the south by the Kettleman Hills and Plains and Kings County line, and on the east by the Guijarral Hills and Westside Subbasin. **Figure 2-2** depicts the regional location of the Subbasin.

2.1.1 Groundwater Sustainability Plan (GSP) Area

The Pleasant Valley Plan Area includes the Pleasant Valley Groundwater Sustainability Agency (**PVGSA**), Fresno County Pleasant Valley GSA Area (**FCPVGSA**), and City of Coalinga GSA (**CCGSA**). **Figure 2-3** identifies the GSA boundaries and the additional jurisdictional boundaries within the Plan Area as well as the Pleasant Valle WD boundary.

There are no Federal owned lands within the Plan Area; however, the State owned and operated California Department of Corrections and Rehabilitation's Pleasant Valley State Prison (**PVSP**) and the Coalinga State Hospital (**CSH**), operated by the Department of State Hospitals reside within the Plan Area. The PVSP and CSH combined span approximately 640-acres and receive water from the City of Coalinga. In addition, a portion of the Pleasant Valley Ecological Preserve, operated by the California Department of Fish and Wildlife, is located within the Subbasin. **Figure 2-4** clarifies the locations the State lands within the Subbasin.

No adjudicated areas exist within the Subbasin; therefore, the entirety of the estimated 48,159 acres of the Subbasin is subjected to GSP regulations. An outline of the GSA acreages is available in **Table 2-1**.

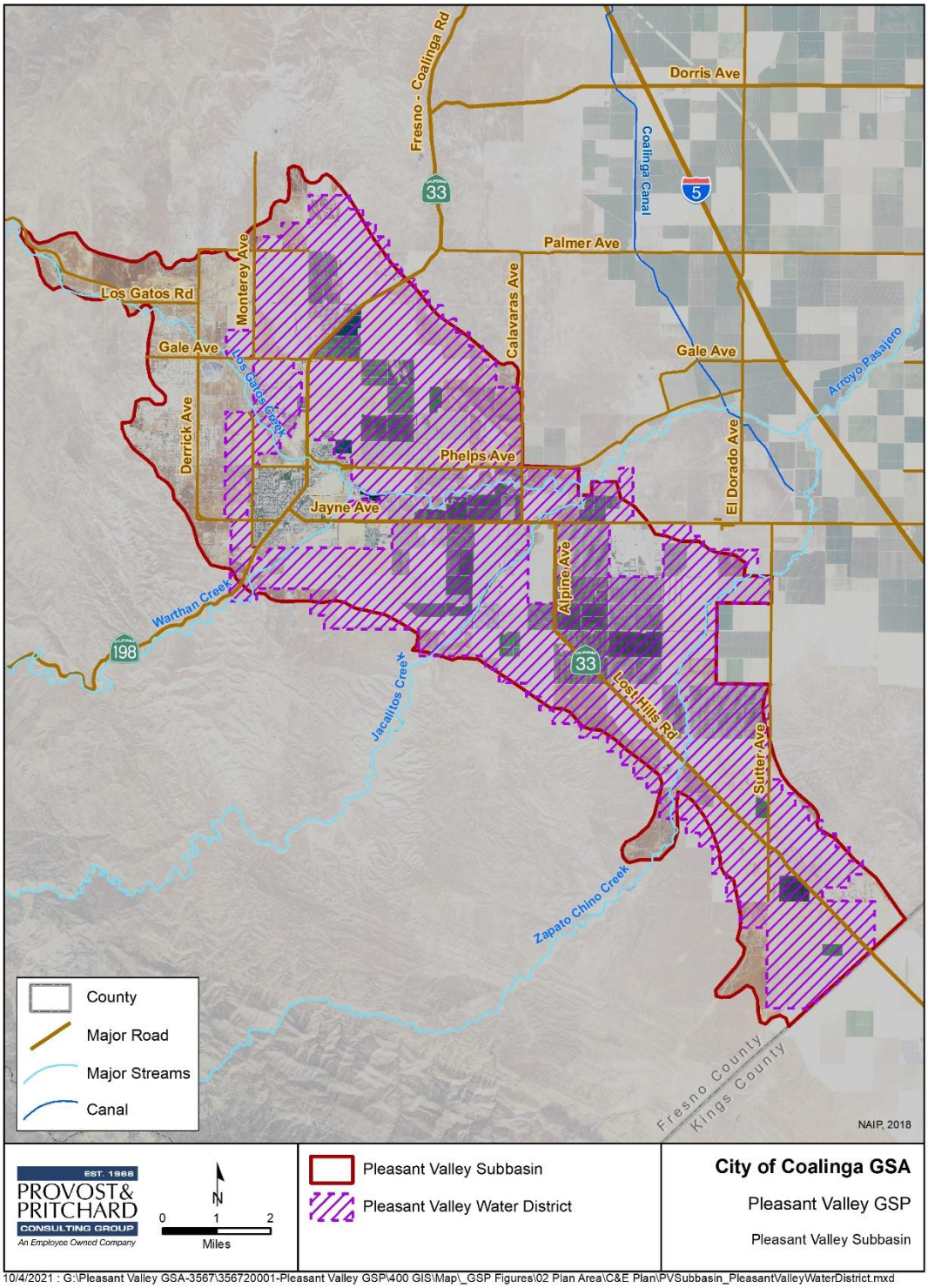


Figure 2-1 Pleasant Valley Water District

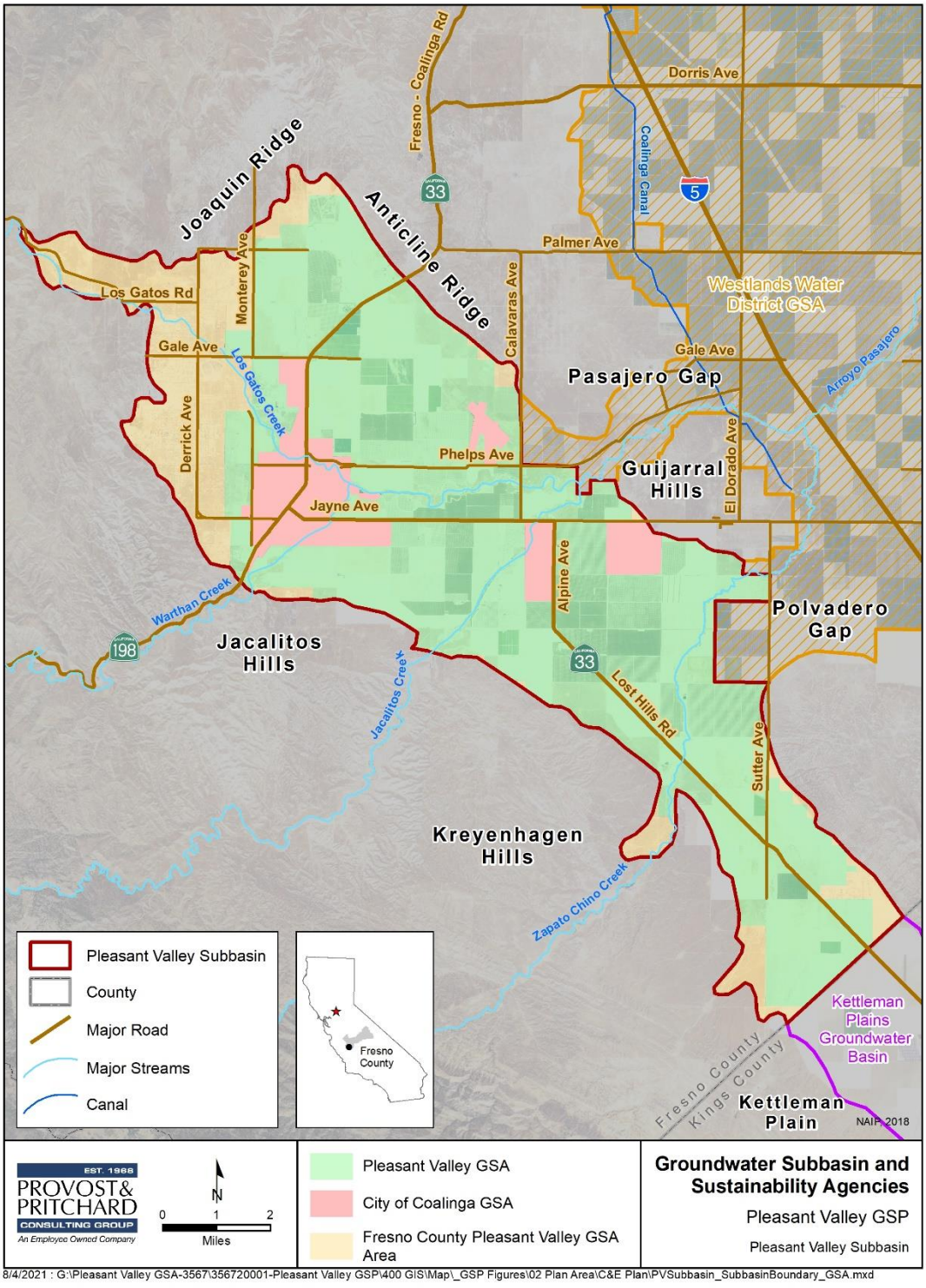


Figure 2-2 Pleasant Valley Subbasin

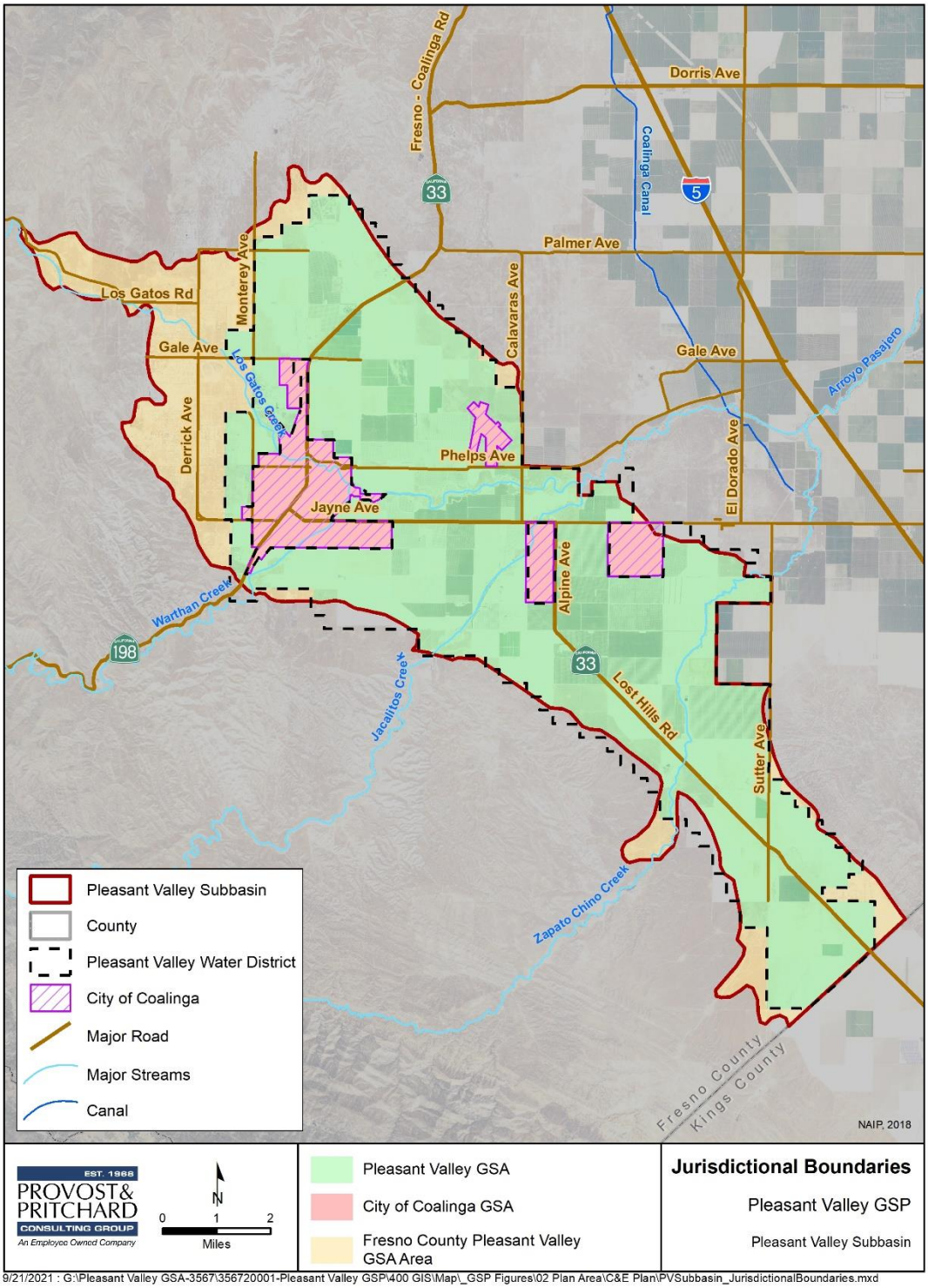


Figure 2-3 Jurisdictional Areas within the Pleasant Valley Subbasin

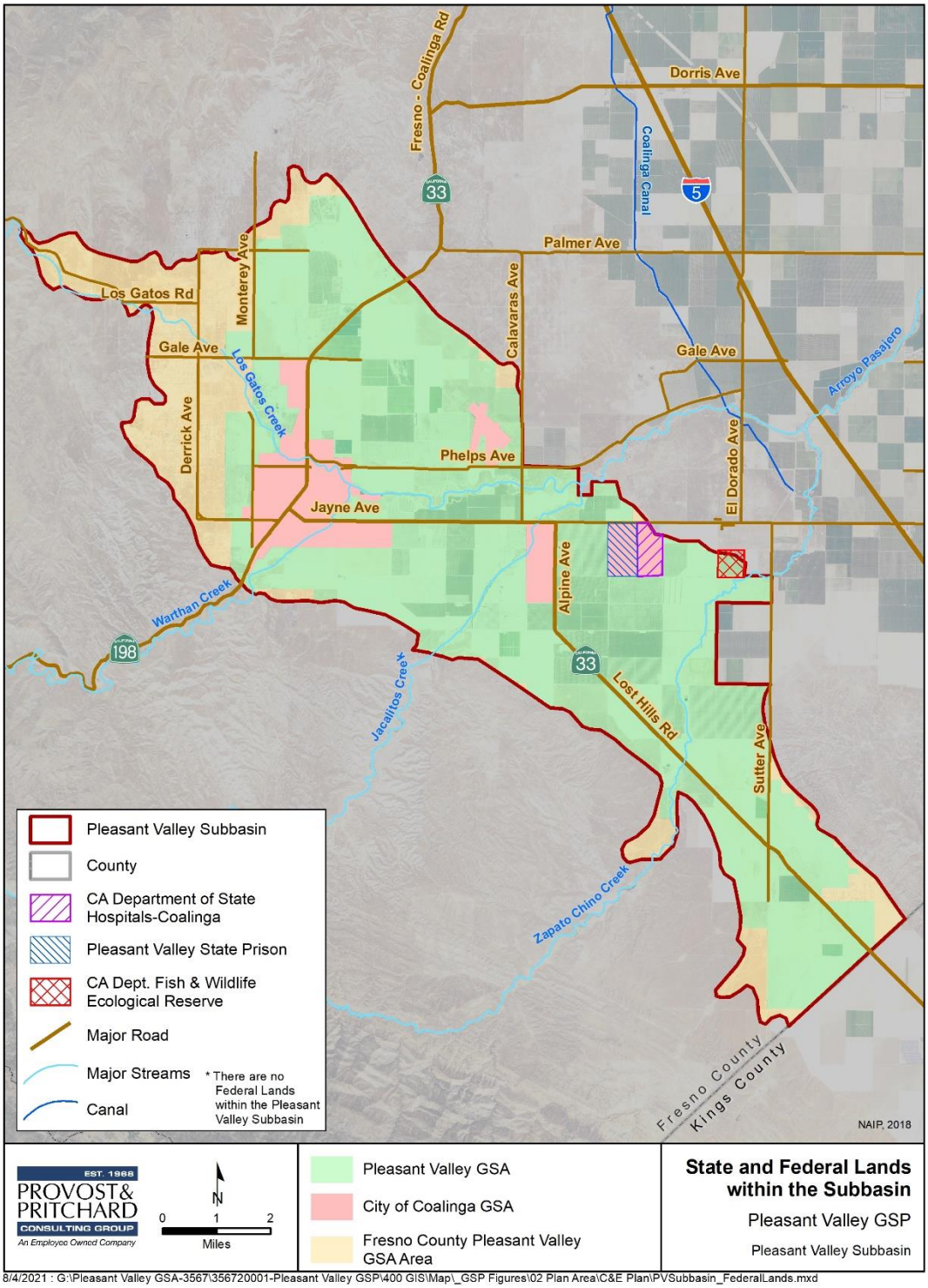


Figure 2-4 State and Federal Lands within the Pleasant Valley Subbasin

Table 2-1 Approximate GSA Acreages

Jurisdiction	Approximate Acres	Approximate Percent of PV Subbasin
Pleasant Valley GSA	34,569	72
City of Coalinga GSA	4,251	9
Fresno County Pleasant Valley GSA Area	9,249	19
Pleasant Valley Plan Area	**48,159**	**100%**

The intent of the boundary determinations of the Groundwater Sustainability Agencies (**GSA**) within the Subbasin were outlined in the Resolutions produced for the Department of Water Resources (**DWR**) in accordance with the Notice of Intent of GSA Formation requirements, including Fresno County Resolution No. 19-192 and the City of Coalinga Resolution No. 3893.

Henceforward, the Subbasin's Groundwater Sustainability Plan (**GSP**) development will include GIS mapping and analyses in accordance with the intended GSA boundaries communicated in the GSA Formation Resolutions and not in accordance with other planning documentation. For further clarity, the GSA boundary extents are explained in **Table 2-2.**

Table 2-2 GSA Boundaries Extent

Pleasant Valley Subbasin Intended GSA Boundaries		
City of Coalinga GSA	Pleasant Valley GSA	Fresno County Pleasant Valley GSA Area
City of Coalinga's jurisdictional boundary	Pleasant Valley Water District's jurisdictional boundary except those portions within the City of Coalinga and outside the Basin boundaries	All portions of the Subbasin outside of the City of Coalinga and Pleasant Valley Water District jurisdictional boundaries

2.1.2 Pleasant Valley GSA

The Pleasant Valley GSA was officially formed by the Pleasant Valley Water District (**PVWD**) on January 24, 2017, to meet the compliance requirements of California's SGMA legislation. The GSA's boundaries overlay the boundaries of the PVWD, except that portion of the PVWD that lies within the City of Coalinga as well as smaller portions of property that are within the Pleasant Valley Water District and outside the Subbasin boundary.

The primary industry within PVWD and the associated Pleasant Valley GSA is agriculture with nearly one/third of the producing acreage in pistachios.

PVWD was formed in 1963 to provide agricultural surface water from the Central Valley Project (**CVP**) to landowners. A contract for CVP supplies was not executed; however, the Coalinga Canal was constructed by the United States Bureau of Reclamation (**USBR**) as part of the federal CVP project and built with capacity to serve the valley. Some temporary water transfers have occurred resulting in surface supplies delivered for irrigation use in the valley. The PVWD includes approximately 38,000 total acres, of which around 28,000 are in agriculture production, and nearly 10,000 of those acres are pistachios. The district has identified 80 to 90 active irrigation wells. Prior studies conducted by the PVWD indicate a potential water storage space of 1

million acre-feet. Landowners within the southeastern area of the PVGSA have already begun importing surface water to help offset the overdraft of groundwater.

The Pleasant Valley GSA has a Memorandum of Understanding (**MOU**) with City of Coalinga GSA and Fresno County Pleasant Valley GSA Area to take the lead in preparing the Subbasin-wide GSP, while communicating and collaborating with management of the other two GSAs throughout the development, public review, and implementation phases.

2.1.3 City of Coalinga GSA

The City of Coalinga GSA boundary includes the city limits, which includes the city central, the New Coalinga Municipal Airport, Pleasant Valley State Prison (PVSP) and Coalinga State Hospital (CSH), and a parcel being considered for a potential future sewage treatment site. **Figure 2-3** visually clarifies the jurisdictional boundary of the City of Coalinga GSA.

Industry within the City of Coalinga is diverse. The economy is driven by the surrounding agricultural interests; small businesses; schools, including West Hills Community College; CSH; PVSP; and a library, museum, and other recreational facilities.

The City of Coalinga's water supply is imported from CVP. They have received water under a service contract with the USBR since 1971. The City generally does not rely on groundwater supplies. However, the Farm of the Future at the West Hills Community College and other agricultural lands within the City of Coalinga GSA pump groundwater to irrigate farmland. The City also manages the treatment and distribution of the water for municipal use and for the PVSP and CSH. Due to the brackish groundwater in the Subbasin, drinking water was initially brought into the area on rail cars prior to formation of the City of Coalinga in 1906. Sometime prior to 1959, the City installed a demineralization plant for the treatment of the saline groundwater for drinking. This was halted when aqueduct water became available.

2.1.4 Fresno County Pleasant Valley GSA Area

The unincorporated lands in Fresno County that are not within Pleasant Valley Water District or City of Coalinga are included in the Fresno County Pleasant Valley GSA Area. In addition to the Pleasant Valley Subbasin, Fresno County is included in the critically overdrafted: Kings Subbasin, Westside Subbasin, and Delta-Mendota Subbasin. To accommodate the various approaches and unique challenges across the various regions, Fresno County areas in each of the noted subbasins are defined by distinct GSAs corresponding to the subbasin in which they reside. **Figure 2-3** further depicts the jurisdictional boundaries within the FCPVGSA.

The Fresno County Pleasant Valley GSA Area predominantly relies on groundwater. The primary industry within the Fresno County Pleasant Valley GSA Area is oil production. A small rural residential community toward the southern end (the "Lost Hills Community") of the GSA also relies on groundwater pumped from individual domestic wells.

2.1.5 Management Areas

The Subbasin has three GSAs, and each GSA will be responsible for implementing projects and management actions for the GSA. For purposes of the GSP, the three member GSAs collectively will report to cover the extent of the basin.

2.1.6 Land Use within the Pleasant Valley Subbasin

General 2018 land use maps depicting DWR's LandIQ survey of land use for the three GSAs in the Plan Area are provided in **Figure 2-5**, **Figure 2-6**, and **Figure 2-7**. The Plan Area is comprised primarily of agricultural designations with most residential, municipal, and commercial development in the City of Coalinga GSA. **Table 2-3** outlines DWR's 2018 land use determinations across GSAs and the Subbasin by general land use categories. It should be noted that those areas not mapped, generally include rangeland, oil fields, native ground, and a non-incorporated area.

Table 2-3 Major Land Use in the Pleasant Valley Subbasin

Pleasant Valley Subbasin 2018 Land Use				
GSA	**Land Use**	**Approximate Acres**	**Approximate Percent of GSA**	**Approximate Percent of Subbasin**
City of Coalinga GSA	Grain and Hay Crops	81	2%	0%
	Pistachios	41	1%	0%
	Truck, Nursery, and Berry Crops	33	1%	0%
	Urban	2,396	56%	5%
	Young Perennials	12	0%	0%
	Unknown	1,694	40%	4%
	City of Coalinga GSA Total	**4,257**	**100%**	**9%**
Fresno County Pleasant Valley GSA Area	Grain and Hay Crops	211	2%	0%
	Truck, Nursery, and Berry Crops	98	1%	0%
	Urban	14	0%	0%
	Unknown	8,904	97%	19%
	FCPVGSA Area Total	**9,227**	**100%**	**19%**
Pleasant Valley GSA	Field Crops	242	1%	1%
	Grain and Hay Crops	6,137	18%	13%
	Pasture	125	0%	0%
	Pistachios	9,444	28%	20%
	Truck, Nursery, and Berry Crops	1,168	4%	3%
	Urban	1,441	4%	3%
	Young Perennials	240	1%	1%
	Unknown	14,708	44%	31%
	PVGSA Total	**33,505**	**100%**	**72%**
Total Subbasin		**46,988**		
Data Source: DWR 2018 LandIQ Land Use Survey				

Table 2-4 Pleasant Valley Subbasin Land Use with Provost & Pritchard Field Review

Pleasant Valley Subbasin Land Use with Provost & Pritchard Field Review				
GSA	**Land Use**	**Approximate Acres**	**Approximate Percent of GSA**	**Approximate Percent of Subbasin**
City of Coalinga GSA	Grain and Hay Crops	99	2%	0%
	Pistachios	41	1%	0%
	Truck, Nursery, and Berry Crops	33	1%	0%
	Urban Developed	3,729	88%	8%
	Young Perennials	12	0%	0%
	Idle	294	7%	1%
	Unknown	49	1%	0%
	City of Coalinga GSA Total	**4,257**	**100%**	**9%**
Fresno County Pleasant Valley GSA Area	Grain and Hay Crops	211	2%	0%
	Truck, Nursery, and Berry Crops	98	1%	0%
	Urban Developed	390	4%	1%
	Oil Fields	4,600	50%	10%
	Pasture	3,829	42%	8%
	Unknown	99	1%	0%
	FCPVGSA Area Total	**9,227**	**100%**	**19%**
Pleasant Valley GSA	Field Crops	242	1%	0%
	Grain and Hay Crops	8,756	26%	19%
	Pasture	3,674	11%	8%
	Pistachios	9,444	28%	20%
	Truck, Nursery, and Berry Crops	1,973	6%	4%
	Urban Developed	1,835	5%	4%
	Young Perennials	240	1%	0%
	Cattle and Dairy	185	1%	0%
	Idle	1,772	5%	5%
	Oil Fields	84	0%	0%
	Seasonal Fallow	3,635	11%	8%
	Unknown	1,665	5%	4%
	PVGSA Total	**33,505**	**100%**	**72%**
Total Subbasin		**46,988**		
Data Source: DWR 2018 LandIQ Land Use Survey and P&P Field Review				

2.1.7 Water Use and Water Sources within the Pleasant Valley Subbasin

Water use and water sources for each GSA are shown in **Table 2-5**. The primary water use designation is related to agricultural production and the primary water source in the Subbasin is groundwater. The City of Coalinga, however, is supplied by imported CVP water, which they receive under a water service contract with the USBR. The City of Coalinga's water uses are predominantly municipal, residential, commercial, and industrial, as well as for landscaping and providing water services to the PVSP and CSH. The City of Coalinga also has a rural water service area, where they supply drinking water to rural residences within the PVGSA, primarily along Palmer and Jayne Avenues. Additionally, private landowners within the PVGSA have been importing surface water through pipelines into the Subbasin in recent years.

Although, groundwater is the primary water source in the Plan Area, those agencies and landowners with access to imported surface water utilize it whenever available. As described in the SGMA Act section 10720.5(b), water rights stay with the water rights holder. The United States Bureau of Reclamation has Water Rights for diversion of Central Valley Project South of Delta San Luis Unit. Water for the Pleasant Valley

through the Coalinga Canal is serviced off of the California Aqueduct/San Luis Canal and imported for use by the City of Coalinga. Surface water supplies are utilized for direct deliveries for crop irrigation and surface water treatment for urban and rural residential domestic purposes.

The State of California Department of Corrections operates a prison facilty located within the PVGSA: A private landowner has an agreement to use the prison's treated wastewater for agricultural irrigation.

Table 2-5 Water Uses and Water Sources

Pleasant Valley Subbasin Water Sources and Water Use by GSA		
Entity	**Water Use**	**Water Source**
Pleasant Valley Water District	Agricultural, Residential	Groundwater, Imported Surface Water, Recycled Water
City of Coalinga - DAC	Municipal, Residential, Agricultural, Industrial	Imported Surface Water and Groundwater
Fresno County Unincorporated Lands[1]	Agriculture, Residential, Industrial	Groundwater

1 – Fresno County does not directly provide groundwater, but groundwater is pumped from wells owned by private landowners, private industries, and small communities.

Well Density

Figure 2-8 is a map of well density in the Plan Area. The Subbasin has an estimated 80 to 90 active large capacity wells. The map is based on best available data including known well locations for each water agency and private well locations as determined by well canvassing efforts in 2004, 2016, and 2020. The map excludes monitor wells and test wells. The map does not necessarily show where pumping is concentrated, since there is no differentiation between whether the wells are active or inactive.

Figure 2-9 is a well density map for domestic wells in the subbasin. Kenneth Schmidt and Associates accessed the Water Well Drillers logs and completion reports from the DWR website for the area covered by the Pleasant Valley GSA. Excluding the Lost Hills Community, (section 6, T22S/R17E), logs for 12 domestic wells were obtained. **Table 2-6** shows the perforated intervals for these wells. Of the wells four were less than about 300 feet and would be expected to not be active. The remaining wells have tops of perforations ranging from 224 to 480 feet deep and the bottom ranging from 400 to 980 feet deep. It should be realized that depth the water contours, and setting of management objectives as well as minimum thresholds were developed from deeper agricultural production wells which are deeper and would be expected to have lower groundwater levels due to their deeper construction. In general, shallower wells have shallower water levels than those for deep wells.

Table 2-6 Domestic Wells with logs in Pleasant Valley GSA

Location	Date Constructed	Perforated Interval (Feet)
T20S/R15E-16M1	10/56	340-400
T20S/R15E-17	6/92	486-980
T20S/R15E-31 P or Q	11/66	224-464
T21S/R15E-10	6/93	480-630
T21S/R15E-14	7/90	380-480
T21S/R15E-14	3/90	360-440
T21S/R16E-17	6/03	420-460
T21S/R16E-27	2/78	407-516

Figure 2-10 shows a map that depicts the location of oil and gas fields within the GSP plan area. This GSP does not cover the drilling and development of oil wells or oil wells that produce water in association with oil development. The area shown on the map has been used and is associated with oil development.

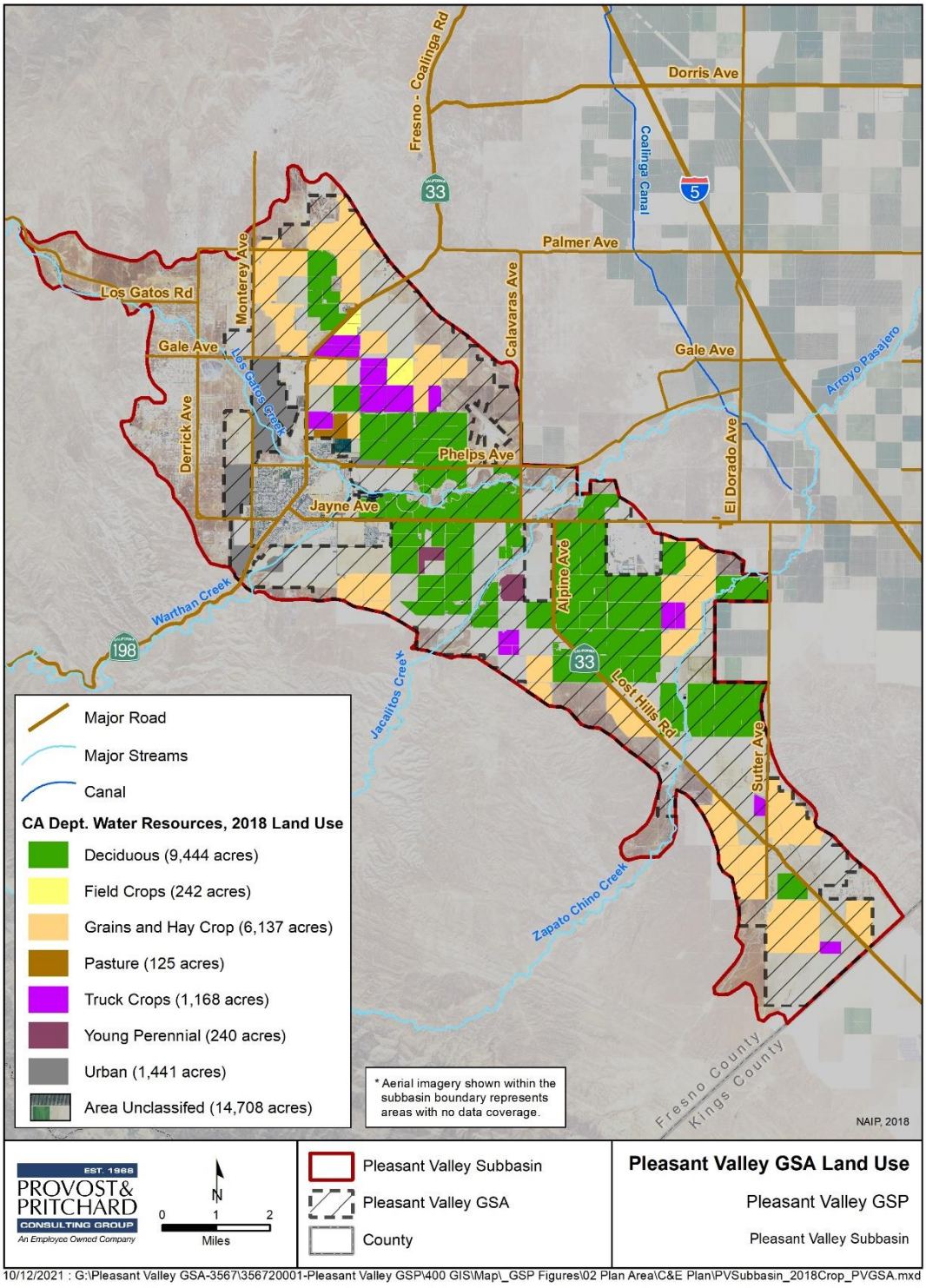


Figure 2-5 Pleasant Valley GSA Land Use Classifications

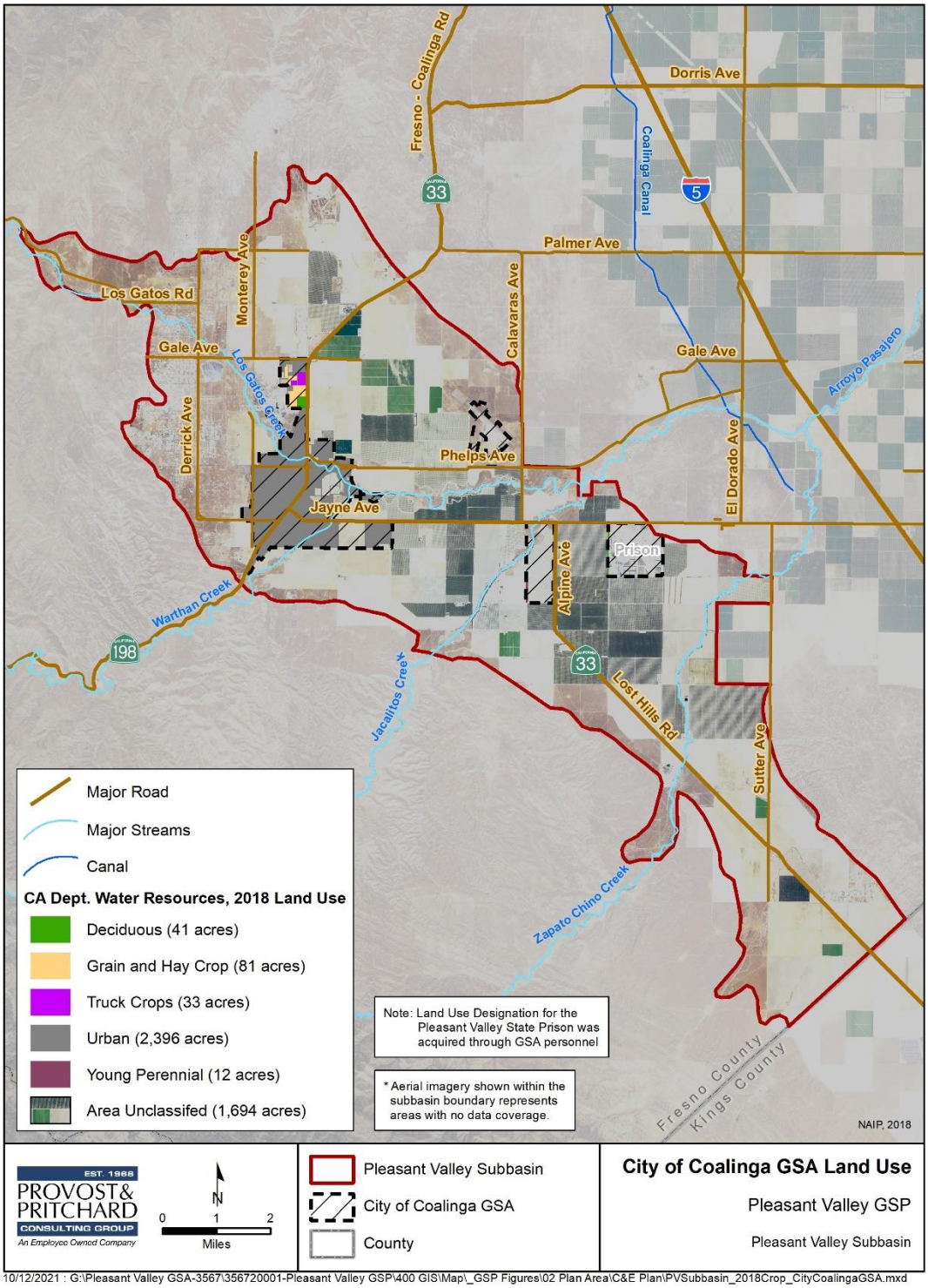


Figure 2-6 City of Coalinga GSA Land Use Classifications

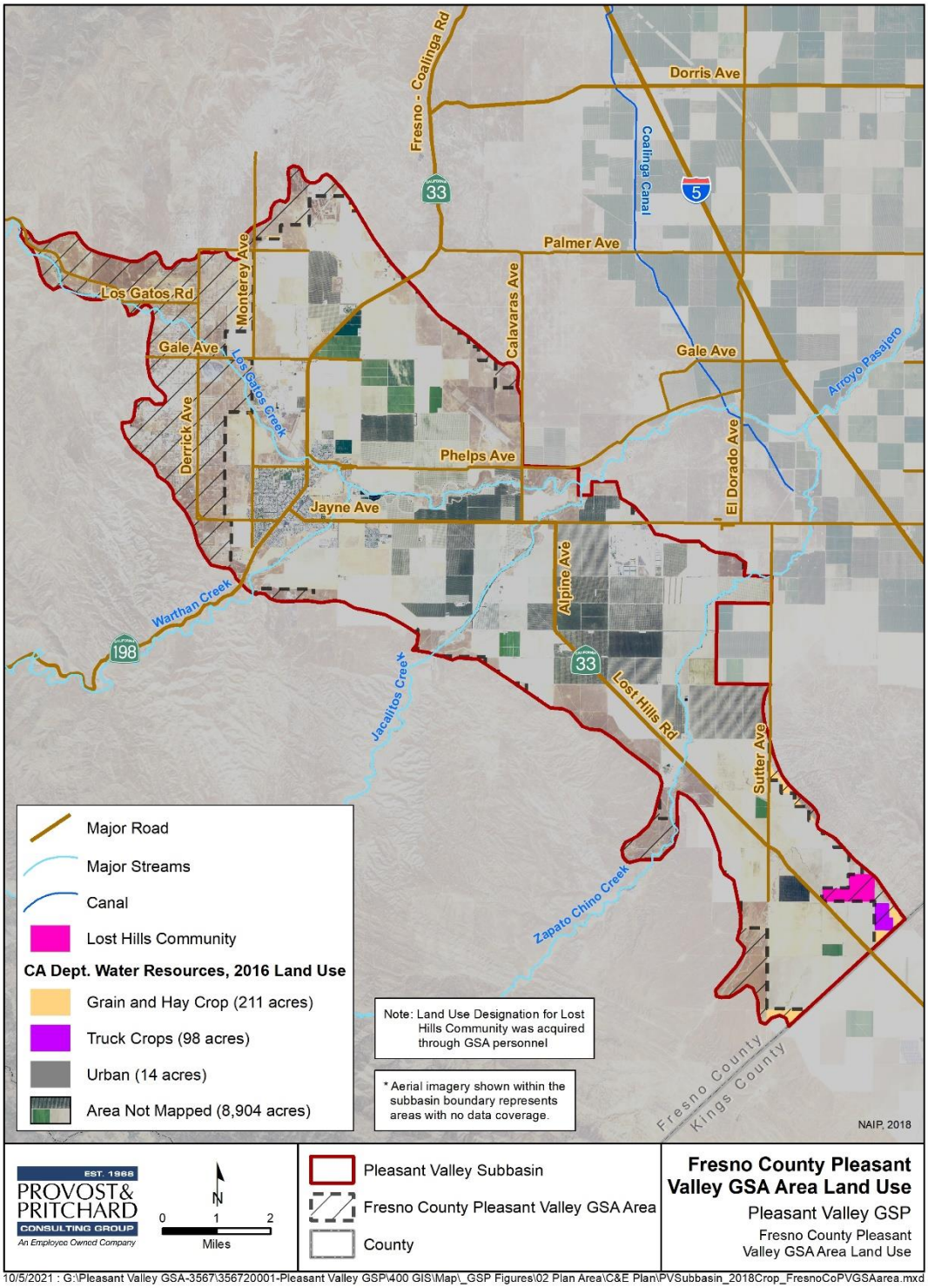


Figure 2-7 Fresno County Pleasant Valley GSA Area Land Use Classifications

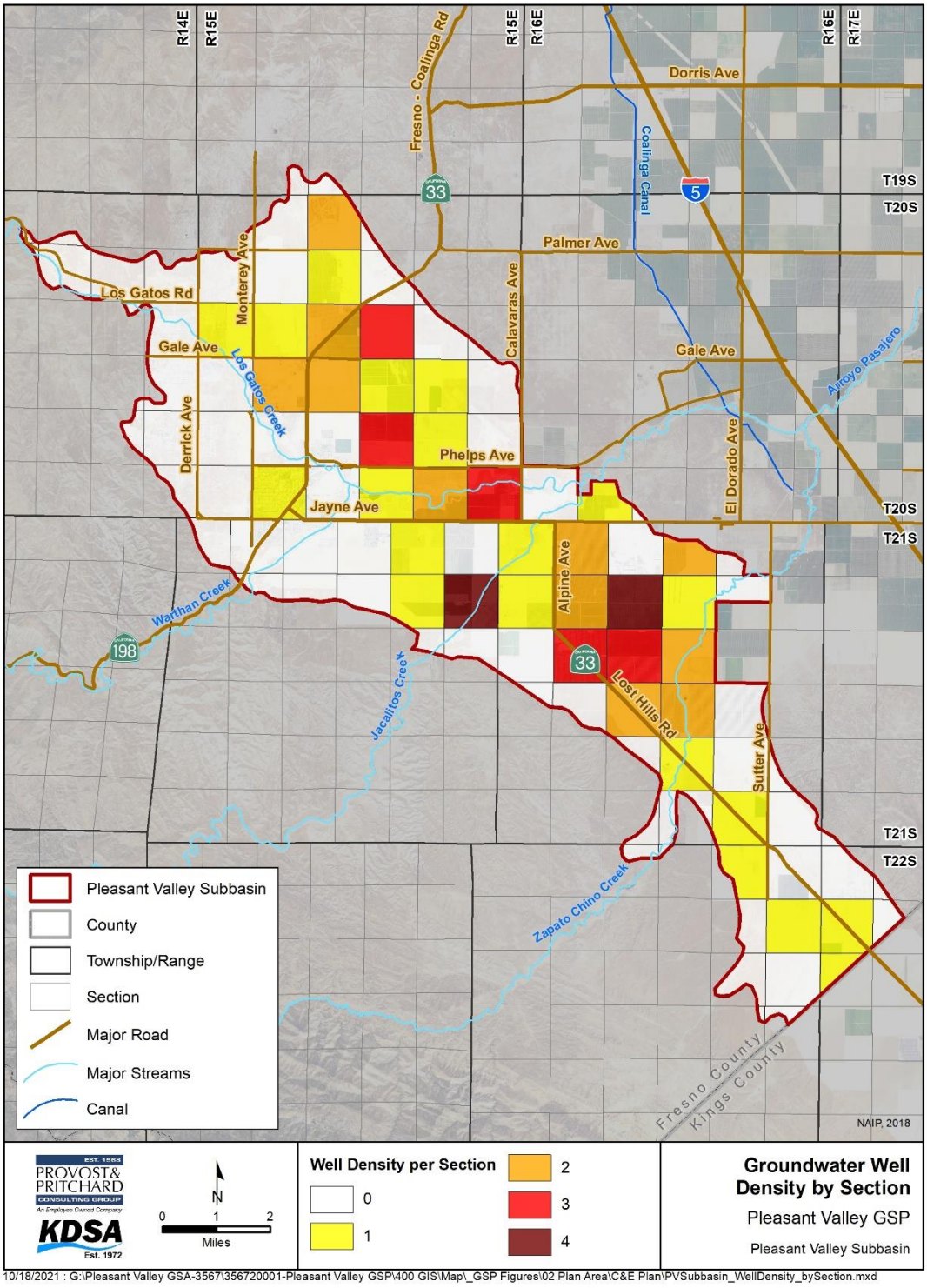


Figure 2-8 Groundwater Well Density by Section

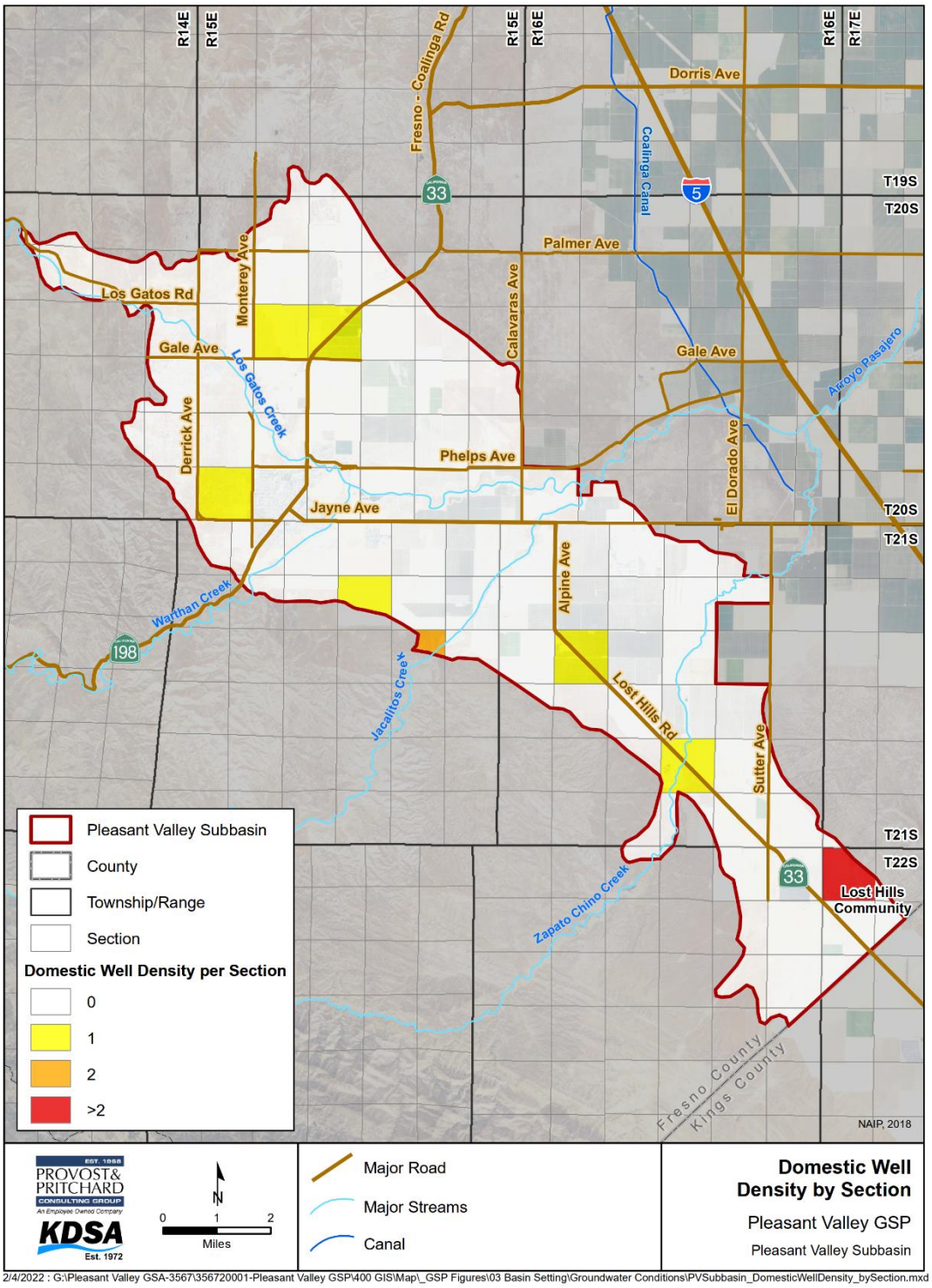


Figure 2-9 Domestic Well Density by Section

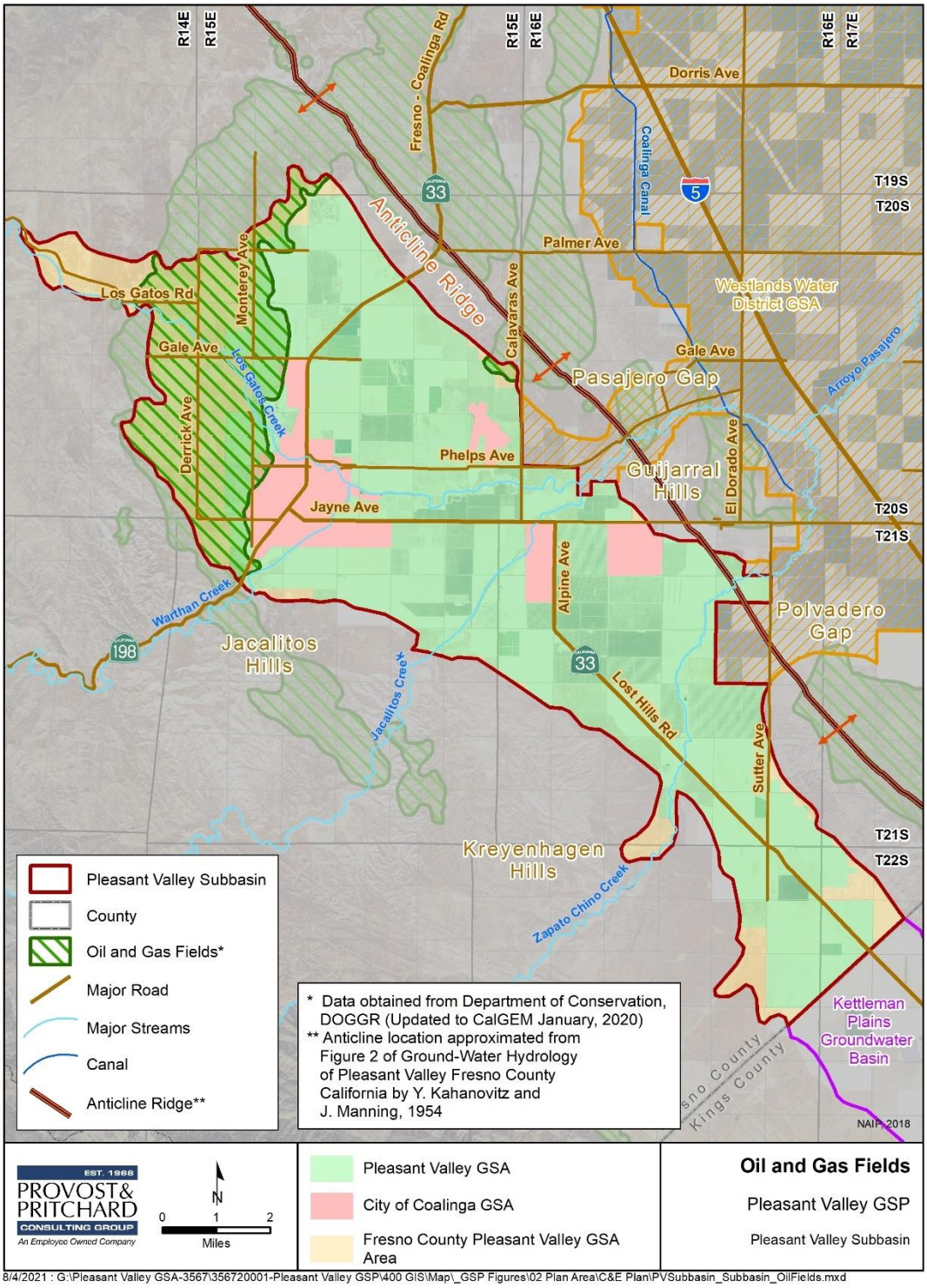


Figure 2-10 Oil and Gas Fields

2.2 Relation to General Plans

2.2.1 Summary of General Plans/Other Land Use Plans

Regulation Requirements:
§354.8(f) A plain language description of the land use elements or topic categories of applicable general plans that include the following:
(1) A summary of general plans and other land use plans governing the basin.

California Government Code (§65350-65362) requires that each county and city in the state develop and adopt a general plan. The General Plan consists of a statement of development policies and includes diagrams and text setting forth objectives, principles, standards, and plan proposals. It is a comprehensive long-term plan for the physical development of the county or city. In this sense, it is a blueprint for development.

The General Plan must contain eight (8) state-mandated elements. It may also contain any other elements that the legislative body of the county or city wishes to adopt. The eight (8) mandated elements are: Land Use, Open Space, Conservation, Housing, Circulation, Noise, Safety, and Environmental Justice. The General Plan may be adopted in any form deemed appropriate or convenient by the legislative body of the county or city, including the combining of elements. The following agencies within the Plan area have general plans:

- City of Coalinga - 2025 General Plan (Produced June 2009)
- Fresno County - 2000 General Plan (Produced October 2000)

2.2.2 Impact of GSP on Water Demands

Regulation Requirements:
§354.8(f) (2) A general description of how implementation of existing land use plans may change water demands within the basin or affect the ability of the Agency to achieve sustainable groundwater management over the planning and implementation horizon, and how the Plan addresses those potential effects.

Regulation Requirements:
§354.8(f) (3) A general description of how implementation of the Plan may affect the water supply assumptions of relevant land use plans over the planning and implementation horizon.

All of the General Plans in the Plan area were adopted prior to the development of the three GSAs in the Subbasin and prior to the inception of the PVGSP development. Therefore, the current General Plans did not consider the impacts of this Plan's implementation. The Fresno County and City of Coalinga land use plans make assumptions for urban development.

The assumed land use changes and growth rate are addressed in the Urban Water Management Plans for the City of Coalinga. This GSP used each agency's land use change assumptions and associated water demand in the water budget, described later in this GSP (**Section 3.3**). The growth projections were considered in determining the future water budget and targeted amount of mitigation required for each agency. Growth projections and projected water use change due to potential land development can be accommodated under the existing contract for surface water supplies with the USBR. The collective identification of potential projects and management actions in the Subbasin has been considered regarding groundwater impacts based on, among other factors, land use changes and associated water demands. A description of this process is included in **Section 3.3** and in **Chapter 6**.

2.2.3 Impact of GSP on Water Supply Assumptions within Land Use Plans

In general, all future land use changes will need to consider the net groundwater impact to the Subbasin, and updates to agency General Plans will need to consider this GSP and the responsibility of each member and participating agency. A discussion of some potential management actions, including potential policy changes, are described in **Chapter 6**.

As mentioned earlier (**Section 2.1.4**), there are two General Plans within the Plan Area. The General Plan sections that cover water supply are summarized below. As noted, both of these plans were developed prior to the development of the GSP.

City of Coalinga 2025 General Plan

The Land Use, Open Space and Conservation, Public Facilities and Services Elements of the City of Coalinga General Plan discuss various topics including water supply and sustainability. The primary water supply goal in this Plan is for reliable and cost-effective infrastructure systems that permit the city to sustainably manage its diverse water resources and needs. The City of Coalinga adopted an Urban Water Management Plan as well. Within the adopted plan is drought contingency plan which is intended to assist the City of Coalinga prepare and manage for drought. The relevant policies are listed below:

- Policy LU1-6 - The City shall encourage proposals that help to create a more sustainable community.
- Policy OSC1-1 - Secure a diverse network of open land encompassing valuable natural and agricultural resources within and around the Coalinga urban area. Valuable resources include creek corridors, wetlands, native grassland communities and woodlands, wildlife habitat and corridors, groundwater resources, hills and ridgelines, open-space settings for cultural resources and prime agricultural soils and economically viable farmland.
- Policy PFS8-3 - The City shall reduce per capita per day water consumption from 271 gpcd to 200 gcpd by the year 2015. The City relies on imported surface water from the CVP. The City currently uses a portion of its contract supply to meet its needs.

Fresno County General Plan

The Public Facilities and Services section of the Fresno County General Plan discusses general public facilities and services; funding; water supply and delivery; wastewater collection, treatment, and disposal; storm drainage and flood control; and numerous other services. The goal of the water supply and delivery section is to ensure the availability of an adequate and safe water supply for domestic and agricultural consumption. The relevant policies are listed below:

- Policy PF-C.12 - The County shall approve new development only if an adequate sustainable water supply to serve such development is demonstrated.
- Policy PF-C.13 - In those areas identified as having severe groundwater level declines or limited groundwater availability, the County shall limit development to uses that do not have high water usage or that can be served by a surface water supply.
- Policy PF-C.23 - The County shall regulate the transfer of groundwater for use outside of Fresno County. The regulation shall extend to the substitution of groundwater for transferred surface water.
- Policy PF-C.26 - The County shall encourage the use of reclaimed water where economically, environmentally, and technically feasible.

Implementation of the GSP will be consistent with the policies described above.

2.2.4 Permitting Process for New or Replacement Wells

Regulation Requirements:
§354.8(f) (4) A summary of the process for permitting new or replacement wells in the basin, including adopted standards in local well ordinances, zoning codes, and policies contained in adopted land use plans.

The following Fresno County General Plan (2000) policies pertain to the process of permitting new or replacement wells in Fresno County:

- Policy LU-E.6 - The County shall allow planned residential developments consisting of a minimum two (2) acre lot in areas designated for rural residential development subject to specified conditions.
- Policy PF-C.20 - The County shall not permit new private water wells within areas served by a public water system.
- Policy PF-C.21 - The County shall promote the use of surface water for agricultural use to reduce groundwater table reductions.

Fresno County coordinated with PVGSA to include GSAs in the well permitting process. Newly implemented GSA involvement includes:

- Permit applicants are required to identify the proposed well's GSA association in the application.
- Permit applicants are required to identify well depth and well perforated intervals in the application.
- The County of Fresno will provide notification and copies of the well permit applications to respective GSAs for review and comment.
- GSAs may request a delay in permit approval should significant concerns exist or should a well proposed for destruction be considered for potential future monitoring efforts. Land Use Plans Outside the Basin

2.2.5 Land Use Plans Outside the Basin

Regulation Requirements:
§354.8(f) (5) To the extent known, the Agency may include information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management.

Kings County 2035 General Plan

The Kings County General Plan discusses water supplies, water quality, and groundwater use. The goal for water supply and delivery is to ensure the availability of an adequate and safe water supply and the maintenance of high-quality water in water bodies and aquifers used as sources of domestic and agricultural water supply.

None of the Kings County 2035 General Plan policies are expected to impede the ability of the Pleasant Valley Subbasin participants to achieve sustainability. Several of the policies will support the goal of sustainability.

2.3 Water Resources Monitoring and Management Programs

2.3.1 Monitoring and Management Programs

Regulation Requirements:
§354.8(c) Identification of existing water resource monitoring and management programs, and description of any such programs the Agency plans to incorporate in its monitoring network or in development of its Plan. The Agency may coordinate with existing water resource monitoring and management programs to incorporate and adopt that program as part of the Plan.
§354.8(d) A description of how existing water resource monitoring or management programs may limit operational flexibility in the basin, and how the Plan has been developed to adapt to those limits.

Following are discussions of several monitoring and water management programs in the Plan Area. More details on monitoring can be found in **Chapter 5**.

Groundwater Level Monitoring

Pleasant Valley Water District performs periodic (typically spring and fall) groundwater level monitoring at select locations as part of the California Statewide Groundwater Elevation Monitoring (**CASGEM**) Program. To comply with SGMA, these efforts may be expanded to include groundwater levels from additional areas and continuous water level measurements with transducers with continued preparation for GSP implementation and associated reporting. **Chapter 5** details the monitoring efforts associated with GSP implementation.

Groundwater Pumpage Monitoring

The GSAs in the Subbasin do not own any operating wells. It is believed that many private wells have flow meters, and the pumping volume is recorded by the landowners. The pumpage must be estimated by other means, such as typical per crop water demands per acre. This results in groundwater pumpage estimates with varying levels of accuracy.

Groundwater Quality Monitoring

The requirements for groundwater quality testing and reporting are based on the water use and, if for drinking water, the size of the community system. Groundwater quality monitoring activities performed within PVGSA and the FCPVGSA are not related to community water system drinking water production and, therefore, are not publicly reported to the state. The City of Coalinga does not have any drinking water wells in operation. Therefore, any monitoring regarding drinking water quality standards is performed privately and is not publicly available.

Section 3.1 includes more information regarding the groundwater quality in the Subbasin.

Land Surface Subsidence Monitoring

While some local agencies in the San Joaquin Valley monitor for land subsidence, the majority rely on monitoring performed by regional water agencies or the State and Federal government. A Global Positioning System (**GPS**) control network has been established in the hills surrounding the Plan Area, and there is one within the Plan Area. With significant effort, the control network outside of the area could potentially be utilized to survey existing benchmarks in the Plan Area to see if change has occurred in their elevation. USGS, JPL, and University NAVSTAR Consortium (**UNAVCO**) also measure subsidence in the Central Valley. There are several UNAVCO land surface elevation monitoring locations near the Subbasin; however, a more robust public network may be helpful to provide regional context. USGS and JPL have maps on their websites that show the subsidence for a defined time period, but there is limited to no information shown for the Subbasin and immediate surrounding area. The Nevada Geodetic Laboratory GPS Network includes data since 2017 from a single GPS monitoring station (CACO – IGS14) at West Hills Community College in the City of Coalinga. More data would be helpful to assess the quality assurance of the site's data.

For more information on subsidence in the Subbasin, see **Section 3.2**. For more information on land subsidence monitoring, see **Chapter 5**. Chapter 5 includes information from 2007 to 2011 for vertical ground surface displacement rates, which are derived from Interferometric Synthetic Aperture Radar (InSAR) data that are collected by the European Space Agency (ESA) Sentinel-1A satellite and processed by the National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory (JPL) under contract with to the California Department of Water Resources (DWR).

Surface Water Monitoring

In recent years, PVWD has started to monitor flows in the creeks or natural waterway flows coming into the Subbasin. Historical data are available on-stream flow from the USGS or DWR. For more information on stream flow in the Subbasin, see **Section 3.1** and **Section 3.3**. Surface water imports in the area are monitored by the USBR and City of Coalinga.

Irrigated Lands Regulatory Program

The Irrigated Lands Regulatory Program (**ILRP**) was initiated in 2003 to address pollutant discharges to surface water and groundwater from commercially irrigated lands. The primary purpose of the ILRP is to address key pollutants of concern including salinity, nitrates, and pesticides introduced through runoff or infiltration of irrigation water and stormwater. Surface water quality has been monitored for several years, and in the future groundwater quality will also be monitored. The program is administered by the Central Valley Regional Water Quality Control Board (**RWQCB**). On January 9, 2014, the RWQCB adopted new regulatory requirements (General Order) that affect irrigated lands within the California's Central Valley, including the Subbasin.

Under the ILRP rules, growers may form "third party" coalitions to assist with required monitoring, reporting, and education requirements for irrigated agriculture. The Westlands Water Quality Coalition was established to pool resources and combine regional efforts to comply with the regulatory requirements of the ILRP. The Westlands Water Quality Coalition (**Coalition**) has been approved by the RWQCB to serve as a third-party coalition for administering the terms and conditions of the LTILRP as described in General Order. All of the Subbasin properties fall within the boundary served by the Coalition. Growers also have the option to complete regulatory requirements independently of the Coalition, but this is not recommended due to the high cost and complexity of performing required studies. Therefore, most growers have opted to join the Coalition. Additional information on the Coalition is located on their website at http://wwd.ca.gov/resource-management/irrigated-lands-management-program/. The Coalition area and supplemental areas cover the Plan Area. Regional information on surface and groundwater quality is available from the Coalition.

GSP Monitoring and Management Plans

The individual agencies located within the Plan Area will be responsible for collecting data for any monitoring or management plan for which they are already collecting data. As needed, the agencies will report the water quality, water level, and water supply data to their respective GSA for upload to the Subbasin's data management system (**DMS**). The monitoring program is described later in this GSP in **Chapter 5**.

2.3.2 Impacts to Operational Flexibility

Existing water management constraints impact operational flexibility and water operations. The primary concern is the availability and accessibility of surface water. Historically, the surface water allocations to the City of Coalinga have been less than the contracted supply, but as a municipal and industrial contractor the city has been able to receive sufficient supplies. In drought years, conservation measures have been employed to protect the limited supply. This may be attributed to climactic conditions and changes in environmental legislation. In addition, groundwater quality issues impact the usability for the beneficial users of groundwater

in the Plan Area. The high level of Total Dissolved Solids (TDS) in the Subbasin groundwater has limited the crops that are grown and the use of groundwater as a domestic supply. More discussion on the plans to monitor water quality and assign sustainable management criteria can be found in **Chapter 4** and **Chapter 5**.

2.3.3 Conjunctive Use Programs

Regulation Requirements:
§354.8(e) A description of conjunctive use programs in the basin.

Conjunctive use is the coordinated and planned management of both surface and groundwater resources to maximize their efficient use. Conjunctive use is utilized to improve water supply reliability and environmental conditions, reduce groundwater overdraft and land subsidence, and protect water quality.

The PVWD and City of Coalinga may consider conjunctive use areas that rely on groundwater extractions to supplement limited available surface water supplies in meeting water demands. However, to date, none are known.

Outflows to other GSAs, basins, or subbasins should not be included as inflow in GSPs for those GSAs. Beneficial users of water in the Pleasant Valley Subbasin do not intend to control, distribute, store, spread, sink, treat, purify, recapture, and salvage any such water. This is including but not limited to groundwater, surface water, sewage and storm waters, imported or native return flows for the beneficial use or uses of the Plan Area's inhabitants or the owners of rights to water in the Pleasant Valley Subbasin.

2.4 Additional GSP Components

Regulation Requirements:
§354.8(g) A description of any of the additional Plan elements included in the Water Code Section 10727.4 that the Agency determines to be appropriate.

Following are discussions on several groundwater management topics relevant to protecting groundwater quality and preserving groundwater levels including:

- Wellhead protection
- Migration of contaminated groundwater
- Well abandonment/well destruction program
- Replenishment of groundwater extractions
- Well construction policies
- Groundwater projects
- Efficient water management practices
- Land use planning
- Impacts to groundwater dependent ecosystems
-

2.4.1 Saline Water Intrusion

Not applicable.

2.4.2 Wellhead Protection

A Wellhead Protection Area (**WHPA**) is defined by the Safe Drinking Water Act Amendment of 1986 as "*the surface and subsurface area surrounding a water well or wellfield supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield.*" The WHPA may also be the recharge area that provides the water to a well or wellfield. Unlike surface watersheds that can be easily determined from topography, WHPAs can vary in size and shape depending on subsurface geologic conditions, the direction of groundwater flow, pumping rates, and aquifer characteristics.

The Federal Wellhead Protection Program was established by Section 1428 of the Safe Drinking Water Act Amendments of 1986. The purpose of the program is to protect groundwater sources of public drinking water supplies from contamination, thereby eliminating the need for costly treatment to meet drinking water standards. The program is based on the concept that the development and application of land use controls, usually applied at the local level, and other preventative measures can protect groundwater.

Under the Act, States are required to develop an EPA-approved Wellhead Protection Program. To date, California has no state-mandated program but instead relies on local agencies to plan and implement programs. Wellhead Protection Programs are not regulatory in nature, nor do they address specific sources. They are designed to focus on the management of the resource rather than control a limited set of activities or contaminant sources.

Contaminants from the surface can enter an improperly designed or constructed well along the outside edge of the well casing or directly through openings in the wellhead. A well is the direct supply source to the customer, and such contaminants entering the well could then be pumped out and discharged directly into the distribution system. Therefore, essential to any wellhead protection program are proper well design, construction, and site grading to prevent intrusion of contaminants into the well from surface sources.

Wellhead protection is performed primarily during design and can include requiring annular seals at the well surface, providing adequate drainage around wells, constructing wells at high locations, and avoiding well locations that may be subject to nearby contaminated flows. Wellhead protection is required for potable water supplies and is not generally required, but is still recommended, for agricultural wells.

Municipal and agricultural wells constructed by the member agencies are designed and constructed in accordance with DWR Bulletin 74-81 and 74-90. Also, a permit is needed from the County to construct a new well. In addition, the member agencies encourage landowners to follow the same standards for privately owned wells. DWR Bulletins 74-81 and 74-90 provide specifications pertaining to wellhead protection including:

- Methods for sealing the well from intrusion of surface contaminants
- Covering or protecting the boring at the end of each day from potential pollution sources or vandalism
- Site grading to assure drainage is away from the wellhead

2.4.3 Migration of Contaminated Groundwater

Groundwater contamination can be human induced or caused by naturally occurring processes and chemicals. Sources of groundwater contamination can include irrigation, pesticide applications, septic tanks, industrial sources, stormwater runoff, and disposal sites. Contamination can also spread through improperly constructed wells that provide a connection between two aquifers or improperly abandoned/destroyed wells that provide a direct conduit of contaminants to aquifers. Groundwater within the Plan Area is primarily limited to agricultural use due to the relatively high salinity.

Information on existing contaminant plumes is voluminous, particularly for those plumes that have been assessed and are in various stages of remediation. Therefore, specific information on the plumes is not provided here. However, some of the main constituents of concern related to groundwater plumes in the greater Central Valley region include nitrate, DBCP, TCP, and gasoline. **Section 3.1** explores groundwater quality specifically in the Pleasant Valley Subbasin.

Several State of California online databases provide information and data on known groundwater contamination, planned and current corrective actions, investigations into groundwater contamination, and groundwater quality from select water supply and monitoring wells. These databases are discussed below:

California Water Resources Control Board

The State of California Water Resources Control Board (**SWRCB**) maintains an online database that identifies known contamination cleanup sites, known leaky underground storage tanks, and permitted underground storage tanks. The online database contains records of investigation and actions related to site cleanup activities at http://geotracker.waterboards.ca.gov.

The Department of Toxic Substances Control

The State of California Department of Toxic Substances Control (**DTSC**) provides an online database with access to detailed information on permitted hazardous waste sites, corrective action facilities, as well as existing site cleanup information. Information available through the online database includes investigation, cleanup, permitting, and/or corrective actions that are planned, being conducted, or have been completed under DTSC's oversight. The online database can be accessed at http://www.envirostor.dtsc.ca.gov.

Groundwater Ambient Monitoring and Assessment Program

The State Water Resources Control Board Groundwater Ambient Monitoring and Assessment (**GAMA**) program collects data by testing untreated raw water for naturally occurring and man-made

chemicals and compiles all of the data into a publicly accessible online database. The online database can be accessed at http://geotracker.waterboards.ca.gov/gama/.

2.4.4 Well Abandonment/Well Destruction Program

Well abandonment generally includes properly capping and locking a well that has not been used in over a year. Well destruction includes completely filling in a well in accordance with DWR standard procedures. Proper well destruction and abandonment are necessary to protect groundwater resources and public safety. Improperly abandoned or destroyed wells can provide a conduit for surface or near surface contaminants to reach the groundwater. In addition, undesired mixing of water with different chemical properties from strata with different depths can occur in improperly destroyed wells.

The administration of a well construction, abandonment, and destruction program has been delegated to the Counties by the State legislature. Fresno County requires that wells be abandoned according to State standards documented in DWR Bulletins 74-81 and 74-90. California Health & Safety Code Section 115700 considers an inactive well "abandoned" if it has not been used for a period of one year and must be destroyed. Due to staff and funding limitations, enforcement of the well abandonment policies is limited.

The Plan Participants will encourage private landowners with abandoned wells to properly destroy their wells that are no longer used. In addition, the GSAs may encourage landowners and developers to convert some unusable wells to monitor wells, rather than destroy them, so that they can become a part of the region's groundwater monitoring program.

2.4.5 Replenishment of Groundwater Pumpage

Replenishment of groundwater is an important technique in the management of a groundwater supply to mitigate groundwater overdraft. Groundwater replenishment in Pleasant Valley occurs naturally through stream/river seepage and through other means including deep percolation of crop and landscape irrigation and intentional treated wastewater effluent percolation. The primary local water sources for groundwater replenishment include imported CVP water and various local streams.

For more information, refer to **Section 2.3.3**. Refer to **Section 3.3** for discussions on how groundwater recharge is quantitatively accounted for.

2.4.6 Well Construction Policies

Proper well construction is important to ensure reliability, longevity, and protection of groundwater resources from contamination. All of the member agencies follow state standards (DWR Bulletin 74-81 and 74-90) when constructing municipal and agricultural wells. Fresno County has adopted a well construction permitting program consistent with State Well Standards to help assure proper construction of private wells. The County maintains records of all wells drilled in the Plan Area. As of 2017, there were no limits on well construction, which is in the process of being revisited by the County.

The City of Coalinga does not allow construction of private wells in their water service boundary, except under very limited circumstances. The purpose of these regulations is to keep the water system under central control by the municipal water agency. Outside of the City of Coalinga, private domestic or agricultural wells can be drilled with a County permit.

State well standards address annular seals, surface features, well development, water quality testing, and various other topics. Refer to DWR Bulletins 74-81 and 74-90 for more details. Well construction policies intended to ensure proper wellhead protection are discussed in Section 2.4.2 – Wellhead Protection.

Fresno County has designated Pleasant Valley Subbasin as a Water Short Area and will only issue building permits or permits granting mobile home occupancy once evidence that adequate water is available and can be served to the property upon which construction is proposed. For properties served by a community water system, evidence consists of written confirmation by the system operator. For properties to be served by a private well, evidence consists of sustainable well yield testing following a procedure developed by the county.

This section has discussed the current policies for well construction; when future policies are developed, the opportunity to address those policies may be available during the development of future GSP Updates.

2.4.7 Groundwater Projects

All the Plan Participants share responsibility for development and operation of recharge, storage, conservation, water recycling, and extraction projects. The Plan Participants in general develop their own projects to help meet their water demands and will develop additional future projects to meet sustainability within their GSA. Developing more groundwater recharge and banking projects is considered key to stabilizing groundwater levels. **Chapter 6** provides descriptions, estimated costs, and estimated yield for numerous proposed projects. The role of the Subbasin's GSAs is to promote cooperation and sharing of information and ideas between the agencies.

The GSAs will also support measures to identify funding and implement regional projects that help the region achieve groundwater sustainability. This can include recharge projects that take advantage of local areas conducive to recharge and areas where recharge provides the most benefit to the Subbasin. This can reduce the burden for certain agencies from having to recharge within their boundaries if they do not have suitable land or soils.

2.4.8 Efficient Water Management Practices

Water conservation has been and will continue to be an important tool in local water management, as well as a key strategy in achieving sustainable groundwater management. All of the Plan Participants engage in some form of water conservation, which can include water use restrictions, water metering, education, tiered rates, and more. These water conservation programs were tested during the 2014-2015 drought, which included State-mandated urban water restrictions for the first time.

Details of water conservation programs can be found in various documents, such as the City of Coalinga's Urban Water Management Plan. Efficient water management practices primarily include furthering the City's effort to secure water reliability and continued use of surface water. Future efforts may include an increased focus on elevating awareness on groundwater overdraft and land subsidence and explaining the requirements of SGMA. Some or all of these conservation efforts will be helpful in achieving groundwater sustainability.

For more information on efficient water management practices being considered, see **Chapter 6**.

2.4.9 Relationships with State and Federal Agencies

From a regulatory standpoint, the Plan Participants have numerous relationships with State and Federal agencies related to water supply, water quality, and water management. Those relationships that are common

to all water agencies, such as regulation of municipal water by the California Division of Drinking Water, are not discussed here. Relationships unique to the region are briefly summarized below.

United States Bureau of Reclamation – South of Delta CVP Water: Imported water from the Coalinga Canal by way of the San Luis Canal (California Aqueduct) provides the majority of the surface water used in the area. The City of Coalinga receives CVP water imported from the Coalinga Canal through a water contract with the USBR.

California Department of Corrections and Rehabilitation – Pleasant Valley State Prison: The approximately 320-acre PVSP is a treated drinking water customer of the City of Coalinga. Treated wastewater effluent from the PVSP is applied for agricultural purposes.

California Department of State Hospitals – Coalinga Facility: The Department of State Hospitals owns and operates a maximum-security 1,500-bed psychiatric hospital for those who have completed their prison sentence and are committed for extended treatment. The Facility is adjacent to the PVSP on about 320 acres and receives treated drinking water from the City of Coalinga. Wastewater from the CSH is placed in evaporation ponds on site.

California Department of Fish and Wildlife: The Pleasant Valley Ecological Reserve contains about 1,200 acres, is owned and operated by the Department, and consists of three separate units, two of which are located outside of the Subbasin. The purpose of the acquisition was to protect valley annual grasslands and saltbush scrub habitats for sensitive animal species. Only a portion of the Southern Unit is located within the subbasin north of Zapato Creek and west of Sutter Avenue, for about 130 of the approximate 160 acres of Reserve. The Southern Unit has at least two abandoned wells, but the Department does not use or plan to rehabilitate these wells, nor does it plan to drill new wells on the property.

In addition to the State and Federal facilities and water sources identified above, many of the Plan Participants receive grants from various agencies for water related projects. Grants are obtained from the DWR, SWRCB, USBR, and others. The member agencies work closely with these State and Federal agencies to track grant programs and administer and implement grant contracts.

2.4.10 Land Use Planning

Some of the member agencies have direct land use planning authority while others do not. However, all of the Plan Participants have an interest in land use planning policies and how they will impact their continued development and water supplies. **Figure 2-5**, **Figure 2-6**, and **Figure 2-7** depict the land use in the various GSAs of the Plan Area, including areas that are developed for urban and agricultural use.

Land use policies are documented in various reports, such as General Plans, Specific Plans, and plans for proposed developments. Updating some of these plans is a multi-year process and not all could be fully updated concurrently with the GSP development. Some smaller communities have no formal land use policies or rely on County policies. These smaller communities will need to develop new policies and long-term plans as part of the SGMA process.

2.4.11 Impacts on Groundwater Dependent Ecosystems

Groundwater Dependent Ecosystems (**GDEs**) are defined under SGMA as "*ecological communities of species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface*" (23 CCR § 351(m)). The Subbasin GSP Participants coordinated and conducted an evaluation of potential GDEs based on depth to

water and proximity to surface water bodies within the Subbasin. See **Section 3.2** for additional information on methodology and figures depicting the possible GDEs in the Subbasin.

2.5 Notice and Communication

2.5.1 Description of Beneficial Uses and Users

Regulation Requirements:
§354.10 Each plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:
(a) A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties.
(b) A list of public meetings at which the Plan was discussed or considered by the Agency.
(c) Comments regarding the Plan received by the Agency and a summary of any responses by the Agency.

Stakeholders and interested parties are invited to public meetings through distribution of meeting notices to the Subbasin GSAs' member agency distribution lists, community organizations' contact lists, and press releases and public service announcements.

A list of public meetings and more information on the methods of notification, communication, and outreach are available in **Appendix B.**

Table 2-7 Beneficial Uses and Users

SGMA, Section 10723.2. Consideration of All Interests of All Beneficial Uses and Users of Groundwater		
Agricultural Users	Domestic Well Owners	Municipal Well Operators
Public Water Systems	Local Land Use Planning Agencies	Environmental Users of Groundwater
Surface Water Users	Federal Government	California Native American Tribes
Disadvantaged Communities	Entities monitoring and reporting groundwater elevations in all or part of a groundwater basin	

2.5.2 Decision-Making Process

Regulation Requirements:
§354.10 (d) A communication section of the Plan that includes the following:
An explanation of the Agency's decision-making process.

The Subbasin GSAs recognize the responsibilities of the Groundwater Sustainability Agencies and their associated member agencies to adhere to the agreed upon decision-making protocols and voting structure of the Pleasant Valley Subbasin GSP.

During the GSP development process, the Pleasant Valley GSAs formed a Policy Advisory Committee (**PAC**) and a Technical Advisory Committee (**TAC**) charged with coordinating implementation of the required policy and technical elements of the GSP (e.g., water budgets, monitoring networks) as well as implementing the Communication and Engagement Plan (workshops, outreach). The PAC is comprised of up to three representatives from the Pleasant Valley GSA, one from the City of Coalinga GSA, and one from

the Fresno County Pleasant Valley GSA Area, working cooperatively to achieve sustainable groundwater management in the Subbasin. The TAC includes a hydrogeologist, an engineer, and an agronomist.

In general, the Pleasant Valley Subbasin's decision-making process includes developing agendas for each meeting of the Pleasant Valley GSP development and public workshops and the PAC and TAC working together to develop consensus and make recommendations to the Agency decision-making bodies. The agendas are developed and agreed upon by a respective representative of each GSA Group. Agenda items are either educational, informational, or requiring direction or decision.

Pleasant Valley GSA has a MOU with City of Coalinga GSA and also with the Fresno County Pleasant Valley GSA Area to take the lead in preparing the Subbasin-wide GSP, while communicating and collaborating with management of the other two GSAs throughout the development, public review, and implementation phases. See **Appendix A** for copies of the MOUs. The City of Coalinga GSA and Fresno County Pleasant Valley GSA Area each respectively in the MOU with Pleasant Valley GSA will provide advisory input to Pleasant Valley GSA in the preparation of the Pleasant Valley Subbasin GSP.

The coordination framework in the MOUs stipulates the following:

- That each party will consider the interests of the other Party
- That the PVGSA will consider advisory input in the development and implementation of the GSP by the City of Coalinga and Fresno County
- That the PVGSA shall notify the other GSAs at least 90 days before adoption or modifying the GSP or policies or procedures
- That the PVGSA shall consider any comments or recommendations provided by the other GSAs
- That the City of Coalinga and County of Fresno shall provide written notice at least 90 days before adopting or taking any action related to groundwater resources within the Subbasin
- That the City of Coalinga and Fresno County shall consider any comments or recommendations provided by PVGSA

2.5.3 Public Engagement / Public Outreach Plan

Regulation Requirements:
§354.10 (d)(2) Identification of opportunities for public engagement and a discussion of how public input and response will be used.

See **Appendix B** – Stakeholder Communication and Engagement Plan for more information regarding the development of opportunities for public engagement and methods of incorporating public input.

2.5.4 Encouraging Active Involvement

Regulation Requirements:
§354.10 (d)
(3) A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of population within the basin.
(4) The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.

To encourage active involvement that recognizes the diverse social, cultural, and economic elements of the Subbasin, the GSAs are reaching out through their websites and to individual stakeholders in the Subbasin.

More information on methods of Public Outreach regarding plan implementation and development can be found in **Appendix B.**

2.5.5 Interbasin Communications

The GSP development process is made more helpful with regional discussions and coordination. Interbasin coordination that includes Pleasant Valley GSP participants' engagement includes a meeting held with representatives of the Westside Subbasin on December 22, 2021 to discuss the contents of this GSP. Although employee turnover and schedule conflicts have thus far prevented a meeting with staff of Kings County, email communication has been ongoing throughout the finalization process.

3 Basin Setting

3.1 Hydrogeologic Conceptual Model

Regulation Requirements:
§354.12 Introduction to Basin Setting
This Subarticle describes the information about the physical setting and characteristics of the basin and current conditions of the basin that shall be part of each Plan, including the identification of data gaps and levels of uncertainty, which comprise the basin setting that serves as the basis for defining and assessing reasonably sustainable management criteria and projects and management actions. Information provided pursuant to this Subarticle shall be prepared by or under the direction of a professional geologist or professional engineer.

3.1.1 Introduction

Regulation Requirements:
§354.14(a) Each Plan shall include a descriptive hydrogeologic conceptual model of the basin based on technical studies and qualified maps that characterizes the physical components and interaction of the surface water and groundwater systems in the basin.

The purpose of a Hydrogeologic Conceptual Model (**HCM**) is to provide an easy-to-understand description of the general physical characteristics of the regional hydrology, land use, groundwater-surface water interaction, geology, geologic structure, water quality, principal aquifers, and principal confining beds in the basin setting. Once developed, an HCM is useful in providing the context to develop water budgets, identification of data gaps, and monitoring networks.

An HCM is not a numerical groundwater model or a water budget model. An HCM is rather a written and graphical description of the hydrologic and hydrogeologic conditions that lay the foundation for future evaluation. In addition, this HCM supports and provides the hydrogeologic setting to support Groundwater Conditions, **Section 3.2**, and Water Budget, **Section 3.3**, of this GSP.

This HCM has been written by adhering to the requirements set forth in the California Code of Regulations, Title 23, Division 2, Chapter 1.5, Subchapter 2, Article 5, Subarticle 2 (§354.14). Several topics are touched on in the HCM, including groundwater flow, groundwater budget, land subsidence, and groundwater quality which are discussed in greater detail in Groundwater Conditions (**Section 3.2**) and Water Budget (**Section 3.3**).

The narrative HCM description provided in this chapter is accompanied by graphical representations to portray the geographic setting, regional geology, basin geometry, and general water quality. This HCM will be periodically updated as data gaps are addressed and new information becomes available.

3.1.2 Lateral Basin Boundaries

Regulation Requirements:
§354.14(b)(2) The hydrogeologic conceptual model shall be summarized in a written description that includes lateral basin boundaries, including major geologic features that significantly affect groundwater flow.

According to DWR Bulletin 118 (2006) Pleasant Valley Subbasin (DWR Groundwater Subbasin 5-22.10) is in the San Joaquin Valley Groundwater Basin in the Tulare Lake Hydrologic Region. As shown in **Figure 3-1**,

the Subbasin lies along the west side of the San Joaquin Valley, north of the Fresno-Kings County Line. The major geologic features surrounding the Subbasin are anticlinal structures and an intervening syncline within Pleasant Valley. These anticlinal features include: Anticline Ridge on the north-northeast, the Jacalitos and Kreyenhagen Hills on the west, and the Guijarral and Kettleman Hills to the east (KDSA, 2016). These anticlines are major barriers to groundwater flow from the Pleasant Valley Subbasin to the San Joaquin Valley except through the Pasajero and Polvadero Gaps. The Pasajero and Polvadero Gaps are north and south of Guijarral Hills and the Pleasant Valley Subbasin abuts the Westside Subbasin on the east side of these two gaps. South of the Fresno-Kings County line Pleasant Valley Subbasin shares a border with the Kettleman Plains Subbasin. The Subbasin is surrounded throughout most of its perimeter by folded Tertiary continental and marine sedimentary rocks of the Coast Ranges and the west flank of the Kettleman Hills. The Subbasin includes the older and younger alluvium (DWR, 2006). The Subbasin boundaries have been derived from both hydrologic and institutional criteria. Several intermittent streams enter the basin from the mountains to the west; these streams include Los Gatos, Warthan, Jacalitos, and Zapato Chino Creeks (DWR, 2006).

A basin boundary modification for the Pleasant Valley Subbasin was approved by DWR in September 2016. The basin boundary modification removed Pliocene-Pleistocene non-marine rocks from the Subbasin margins and split the original Pleasant Valley Subbasin into the Pleasant Valley Subbasin north of the Fresno-Kings County line and the Kettleman Plains Subbasin south of the county line. Unless specified otherwise, figures presented herein are based on the 2016 basin boundary modification.

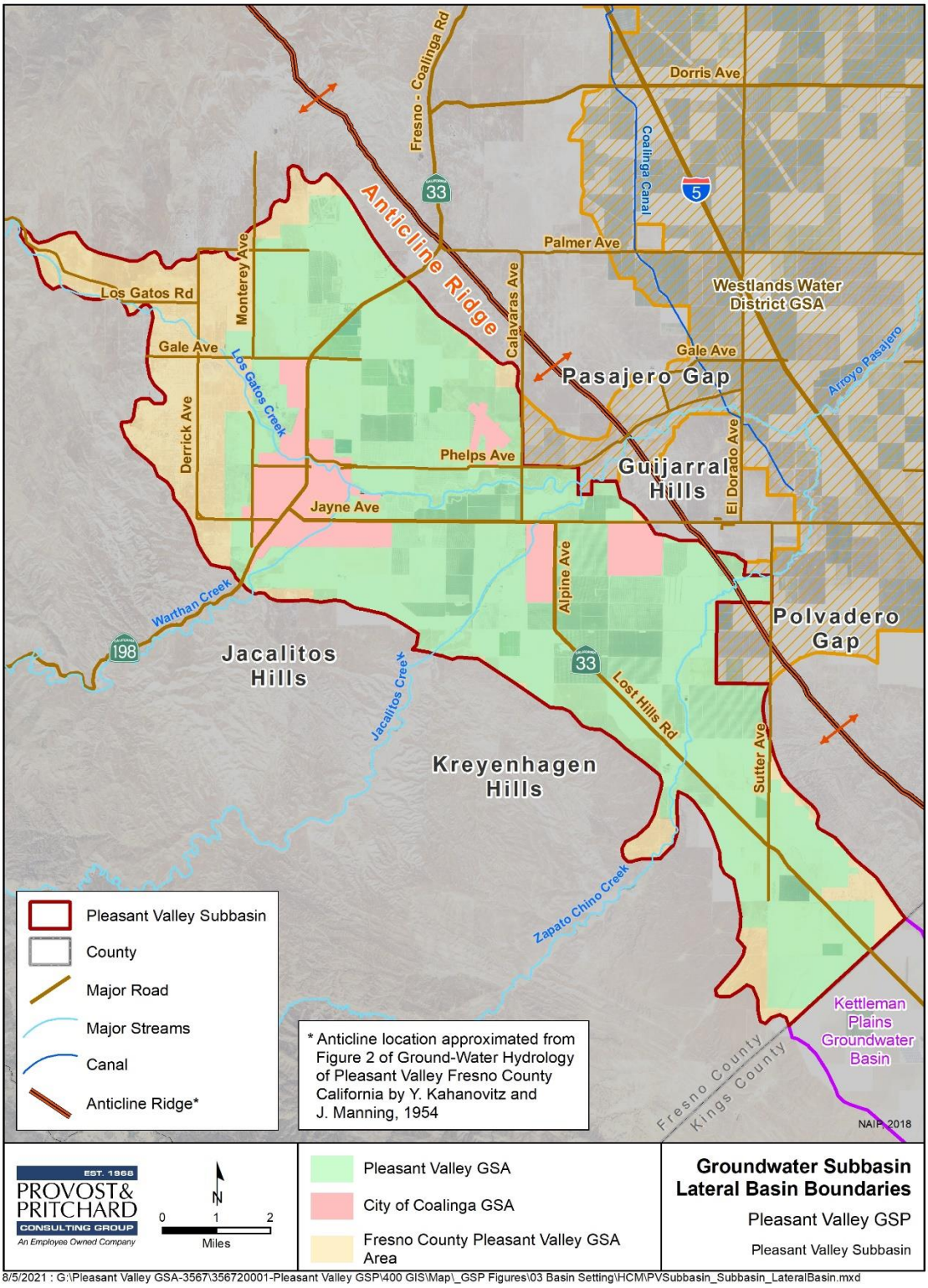


Figure 3-1 Groundwater Subbasin Lateral Basin Boundaries

3.1.3 Regional Geologic and Structural Setting

Regulation Requirements: **§354.14(b)(1)** The hydrogeologic conceptual model shall be summarized in a written description that includes the regional geologic and structural setting of the basin including the immediate surrounding area, as necessary for geologic consistency.
Regulation Requirements: **§354.14(b)(3)** The hydrogeologic conceptual model shall be summarized in a written description that includes the definable bottom of the basin.

The San Joaquin Valley is surrounded on the west by the Coast Ranges, on the south by the San Emigdio and Tehachapi Mountains, on the east by the Sierra Nevada and on the north by the Sacramento-San Joaquin Delta and Sacramento Valley. The central portion of the San Joaquin Valley drains toward the Delta by the San Joaquin River and its tributaries, the Fresno, Merced, Tuolumne, and Stanislaus Rivers. The southern portion of the valley is internally drained by the Kings, Kaweah, Tule, and Kern Rivers that flow into the Tulare drainage basin including the beds of the former Tulare, Buena Vista, and Kern Lakes. The Subbasin lies along the west side of the San Joaquin Valley, north of the Fresno-Kings County line. The Subbasin is surrounded throughout most of its perimeter by Tertiary continental and marine sediments of the Coast Ranges and west flank of the Kettleman Hills. The Subbasin includes the older and younger alluvium. The eastern boundary of the Subbasin abuts the Westside Subbasin at the Pasajero and Polvadero Gaps. The southern boundary abuts the Kettleman Plains Subbasin. These Subbasin boundaries have been derived from geologic, hydrologic, and institutional criteria. Several intermittent streams enter the basin from the surrounding mountains; these streams include Los Gatos, Warthan, Jacalitos, and Zapato Chino Creeks (DWR, 2006). Below the confluence of these streams is the Arroyo Pasajero. **Figure 3-1 Groundwater Subbasin** Lateral Basin Boundaries depicts the regional geology of the Pleasant Valley Subbasin. In general terms, the Subbasin is essentially a closed basin with limited connection to the greater San Joaquin Valley.

Oil production, regulated by the California Department of Conservation – Division of Oil and Gas, occurs generally in the northern portion of the Subbasin.

For the practical purposes of this HCM, the definable bottom of basin is assumed to be the bottom of the usable aquifer, which based on water quality (TDS) in most of the Subbasin, is at approximately 3,000 feet below ground (KDSA, 2016). It thins towards the mountain fronts to about 1,000 feet deep or less. Shallow oil is located west of the Coalinga Airport and usable groundwater is present only above approximately 500 feet in some westerly locations (KDSA, 2016).

3.1.1 Topographic Information

Regulation Requirements: **§354.14(d)(1)** Physical characteristics of the basin shall be represented on one or more maps that depict topographic information derived from the U.S. Geological Survey or another reliable source.

A topographic map of the Subbasin is presented as **Figure 3-2**. The topography of the Subbasin is shaped like an elongated trough tilted to the northeast. The Subbasin is drained to the east. The northern Subbasin boundaries are at elevations of approximately 1,060 feet above mean sea level (**msl**). From the northern boundaries in the hills, the topography slopes to the southeast towards Los Gatos Creek and Jacalitos Creek that are at elevations of approximately 580 feet above msl where they leave the Subbasin at its northeast boundary through the Pasajero Gap. From the south the topography slopes from the flanks of the surrounding hills from elevations of approximately 880 feet to the valley floor and then northeast through the valley to about Zapato Chino Creek. From about Zapato Chino Creek the topography slopes northeastward

towards the Polvadero Gap where Zapato Chino Creek leaves the Subbasin south of Guijarral Hills at approximately 560 feet above msl.

The general geomorphology of the Subbasin is of several alluvial fans originating from the creeks to the west, including the Los Gatos Creek, Warthan Creek, Jacalitos Creek, and Zapato Chino Creek. Relatively steep slopes exist in the areas adjacent to the Coast Ranges, particularly between Warthan Creek and Zapato Chino Creek.

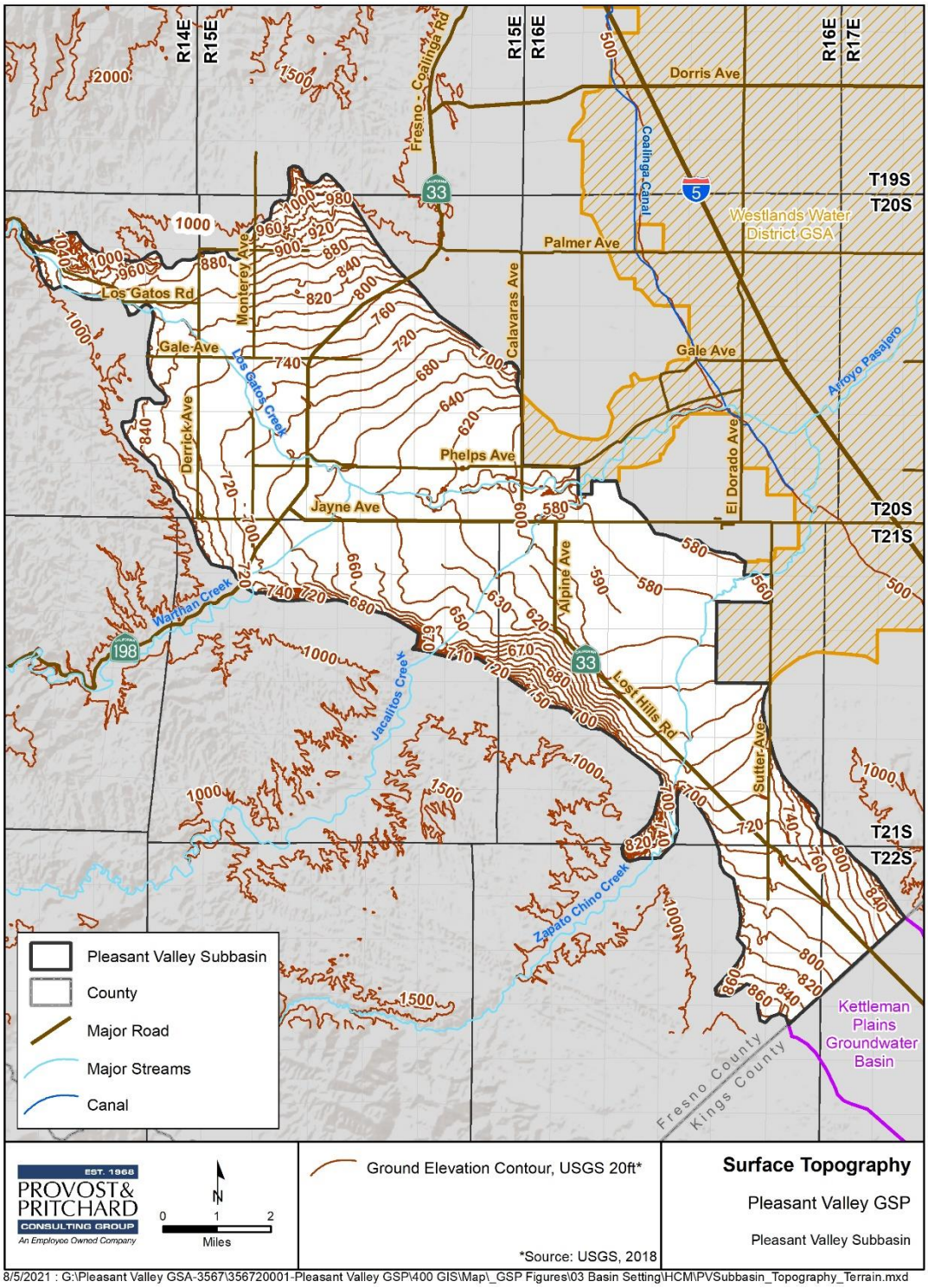


Figure 3-2 Topographic Map

3.1.2 Surficial Geology

Regulation Requirements:
§354.14(d)(2) Physical characteristics of the basin shall be represented on one or more maps that depict surficial geology derived from a qualified map including the locations of cross-sections required by this Section.

As shown in on **Figure 3-3**, Quaternary alluvium (Q) (2.6 million years ago to present) covers the majority of the Subbasin. Pockets of older Quaternary alluvium (Qoa) are located around the margins of the basin and between the streams, where more recent Quaternary stream channel deposits are present. The Quaternary alluvium within the Subbasin is a result of erosion of the mountain ranges to the west and subsequent deposition on the valley floor.

The Subbasin is generally bound on the east and the southwest by non-marine deposits. On the eastern side of the Subbasin, Anticline Ridge is formed by folded Nonmarine Pliocene and (or) Pleistocene sandstone, shale, and gravel deposits (QPc) and Marine Pliocene sandstone, siltstone, shale, and conglomerate (P). To the northwest, northeast, and southeast, the Subbasin is bounded by Lower to Middle Pliocene marine deposits (P).

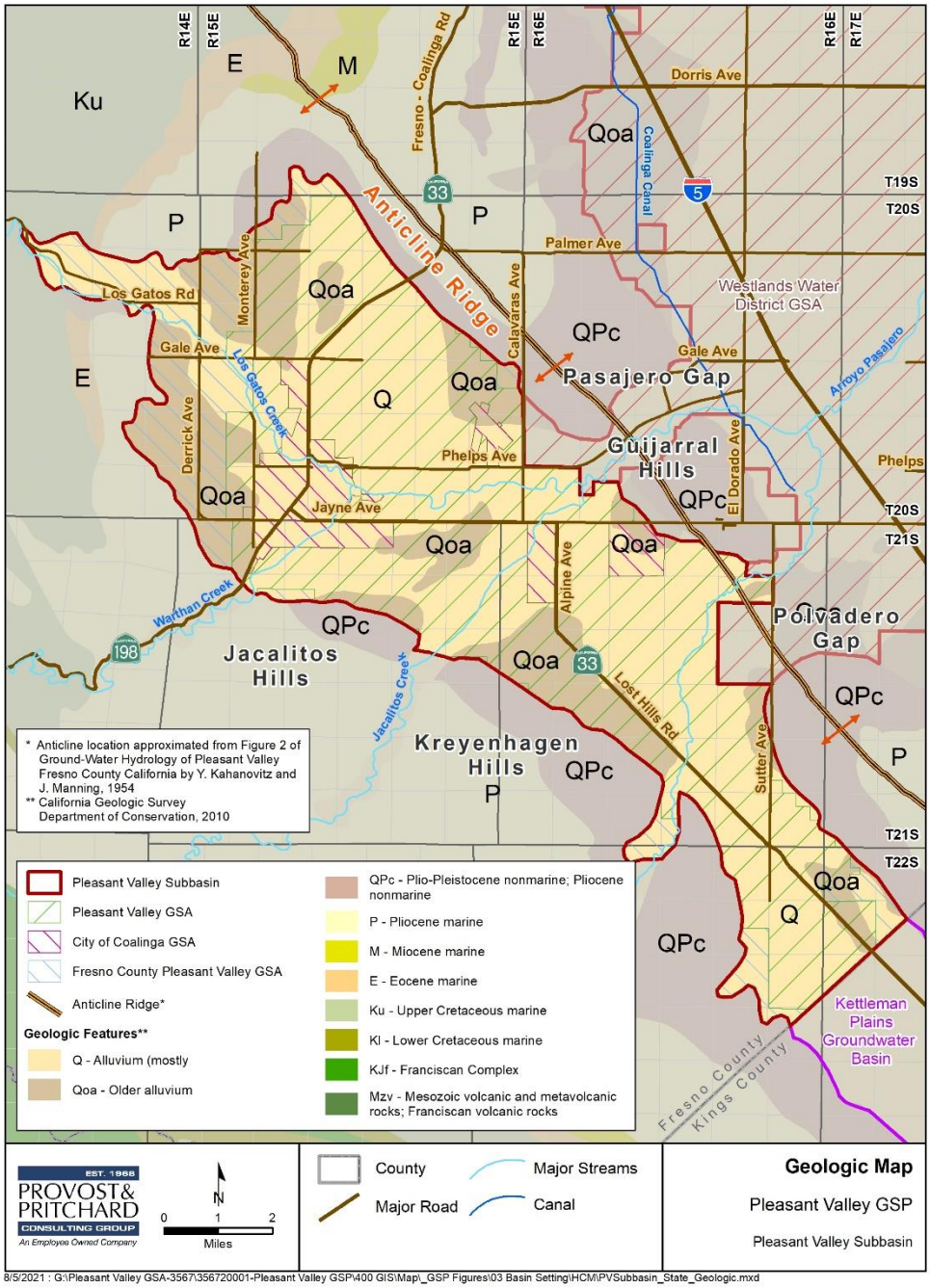


Figure 3-3 Geologic Map

3.1.3 Soil Characteristics

Regulation Requirements:
§354.14(d)(3) Physical characteristics of the basin shall be represented on one or more maps that depict soil characteristics as described by the appropriate Natural Resource Conservation Service soil survey or other applicable studies.

A soils map based on Natural Resources Conservation Service (NRCS) soil textural classes is presented as **Figure 3-4**. Other than recent alluvium along stream channels, the topsoil within the basin is loamy sand, sandy loam, loam, and clay loam. Loamy sand is generally the most permeable of these four soil types. One of the largest areas mapped as loamy sand is east of Highway 33 and west of Zapato Chino Creek in parts of T21S, R16E, Sections 15, 16, 21, and 22 Mount Diablo Base and Meridian (M.D.B.&M). Although soils mapped as loamy sand or sandy loam are generally highly permeable within the upper several feet, the underlying subsoil may contain silt loam layers of much lower permeability (Provost & Pritchard Consulting Group & KDSA, 2003).

In **Figure 3-5**, topsoil textural classes have additionally been related to Saturated Hydraulic Conductivity based on NRCS general categories. For the Subbasin, the NRCS has generally described soils to depths of less than 3 to 5 feet. The hydraulic conductivity values shown on the map are expressed in general terms ranging from relatively rapid for coarse grained soils to relatively slow for fine and very fine-grained soils. **Figure 3-5** can be useful for initial screening of potential surficial recharge and groundwater banking sites, but the information should be supplemented with information on deeper deposits with on-site investigations before projects are pursued. Deeper conditions, down to at least 50 feet deep, are important for recharge projects.

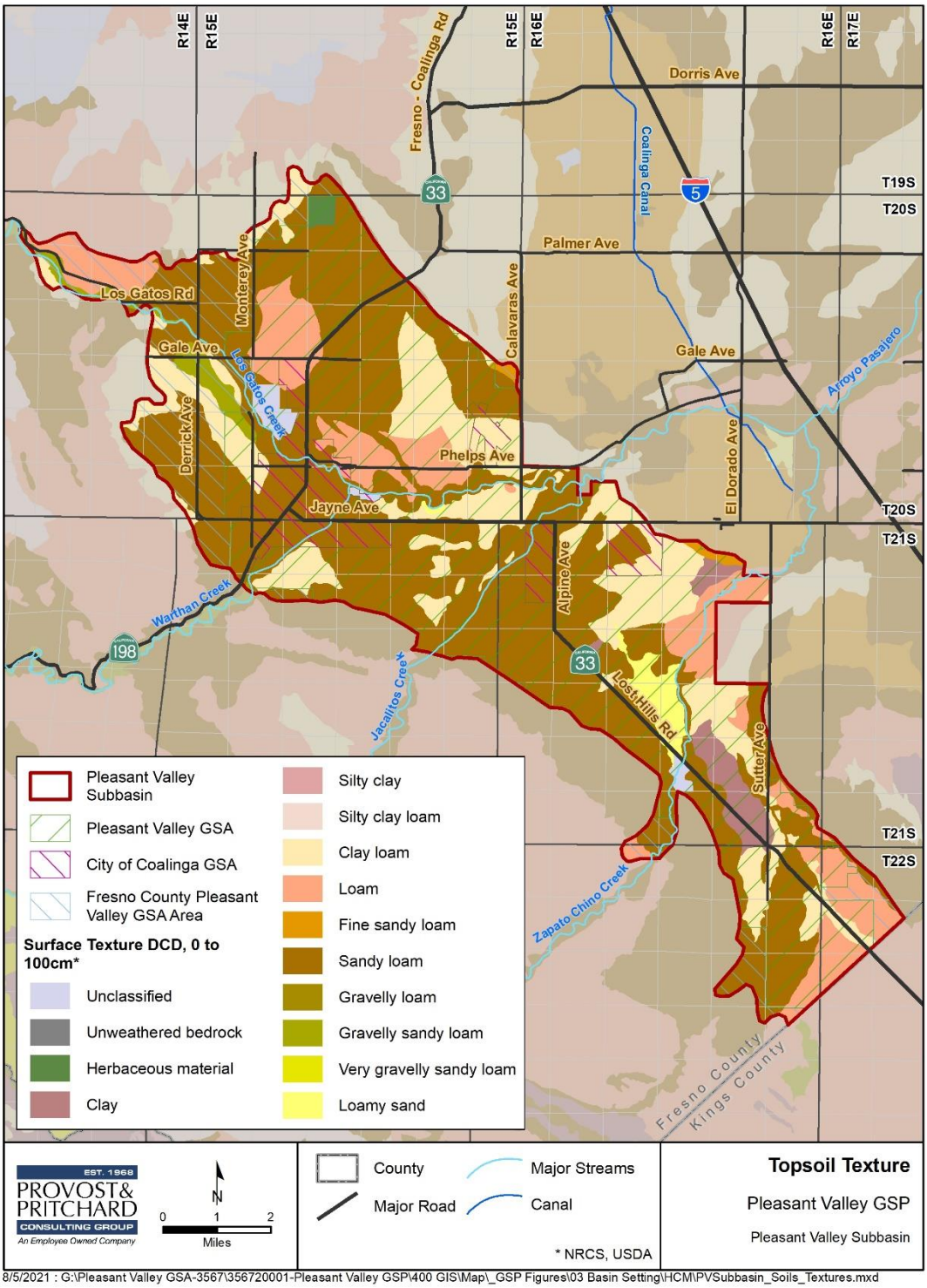


Figure 3-4 Topsoil Texture

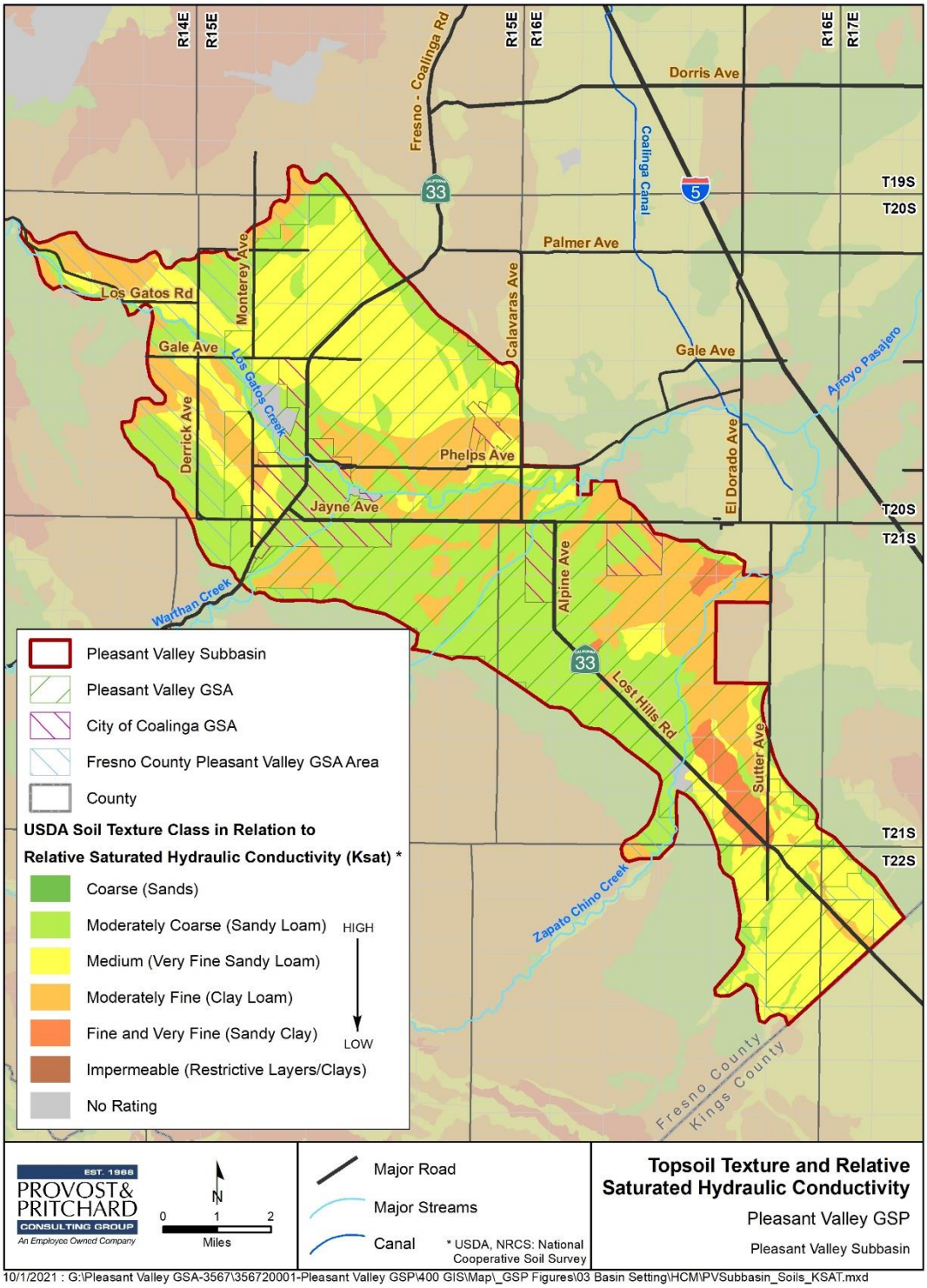


Figure 3-5 Topsoil Texture and Relative Saturated Hydraulic Conductivity

3.1.4 Subsurface Geologic Cross-sections

Regulation Requirements:
§354.14(c) The hydrogeologic conceptual model shall be represented graphically by at least two scaled cross-sections that display the information required by this section and are sufficient to depict major stratigraphic and structural features in the basin.

Kenneth D. Schmidt and Associates (KDSA, 2020) prepared four subsurface geologic cross-sections through the Subbasin. A cross-section location map is shown on **Figure 3-6**. Subsurface geologic cross-sections from KDSA that transverse the Subbasin are presented as **Figure 3-7** through **Figure 3-10**. Geologic Cross-Section A-A' extends just east of Coalinga to east of the Pasajero Gap (**Figure 3-7**). Cross-Section B-B' (**Figure 3-8**) extends from the southern end of the Subbasin to east of the Polvadero Gap. Cross-Section C-C' (**Figure 3-9**) runs southeast from north of Coalinga to where Los Gatos Creek exits the Subbasin on the east. Cross-Section D-D' (**Figure 3-10**) runs approximately due east from approximately southeast of Coalinga through the Polvadero Gap to outside the Subbasin. Cross-Section E-E' was developed from information from the previous cross sections and runs generally longitudinal through the trough of the valley. These cross-sections are discussed in more detail by KDSA in **Appendix E**, (KDSA, 2020). Since the majority of wells in the Subbasin have been located within the Pleasant Valley GSA, the sections are limited to the areas within PVGSA or Pleasant Valley WD and do not transverse the entire Subbasin. The cross-sections may be extended in future updates.

Cross-Section A-A'
This cross-section extends from depths of approximately 1,290 feet below ground inside the Subbasin, near the Pasajero Gap, to 1,885 feet below ground outside the Subbasin east of the gap. The unconsolidated alluvial deposits at Wells 28D and 21Q1 extend to depths of at least 1,200 feet, and the cross-section indicates that the alluvial deposits are thick beneath the gap. Spring water level elevations plotted on Cross-Section A-A' indicate groundwater flows from Pleasant Valley through the Pasajero Gap into the main San Joaquin Valley (KDSA, 2020). The presence and magnitude of flow through this gap needs to continue to be evaluated.

Cross-Section B-B'
This cross-section extends from as deep as 1,762 feet inside the Subbasin to as deep as approximately 1,300 feet just outside the Subbasin and across the Polvadero Gap. The unconsolidated alluvial deposits extend to depths of at least 1,240 feet near the Polvadero Gap. Spring 2019 groundwater elevations along the cross-section indicate a cone of depression in Pleasant Valley and a groundwater divide near Polvadero Gap. No groundwater flow was indicated through the gap at this time (KDSA, 2020).

Cross-Section C-C'
In general, wells along the cross-section are as deep as approximately 2,000 feet. Stream channel deposits (coarser than sand) are primarily present above the Spring 2019 groundwater levels but extend to depths of 900 to 1,100 feet near Los Gatos Creek. Clay is predominant below depths of 1,000 feet and above a depth of about 1,600 feet along the northwest part of the cross-section and below a depth of about 600 feet and above a depth of about 1,600 feet along the east part. Deep sands are common along the section below a depth of about 1,600 feet (KDSA, 2020).

Cross-Section D-D'
Stream channel deposits extend to a depth of about 1,000 feet along the central part of the section. Most of the shallow wells along the section tap stream channel deposits. Substantial clays are indicated along the section below a depth of about 1,000 feet and above a depth of about 1,600 feet. Where data are available, thick sand layers extend to at least 2,300 to 2,700 feet in depth (KDSA, 2020).

Cross-Section E-E'
This is a summary of the cross sections and well information along the center of the valley. See other cross-section descriptions.

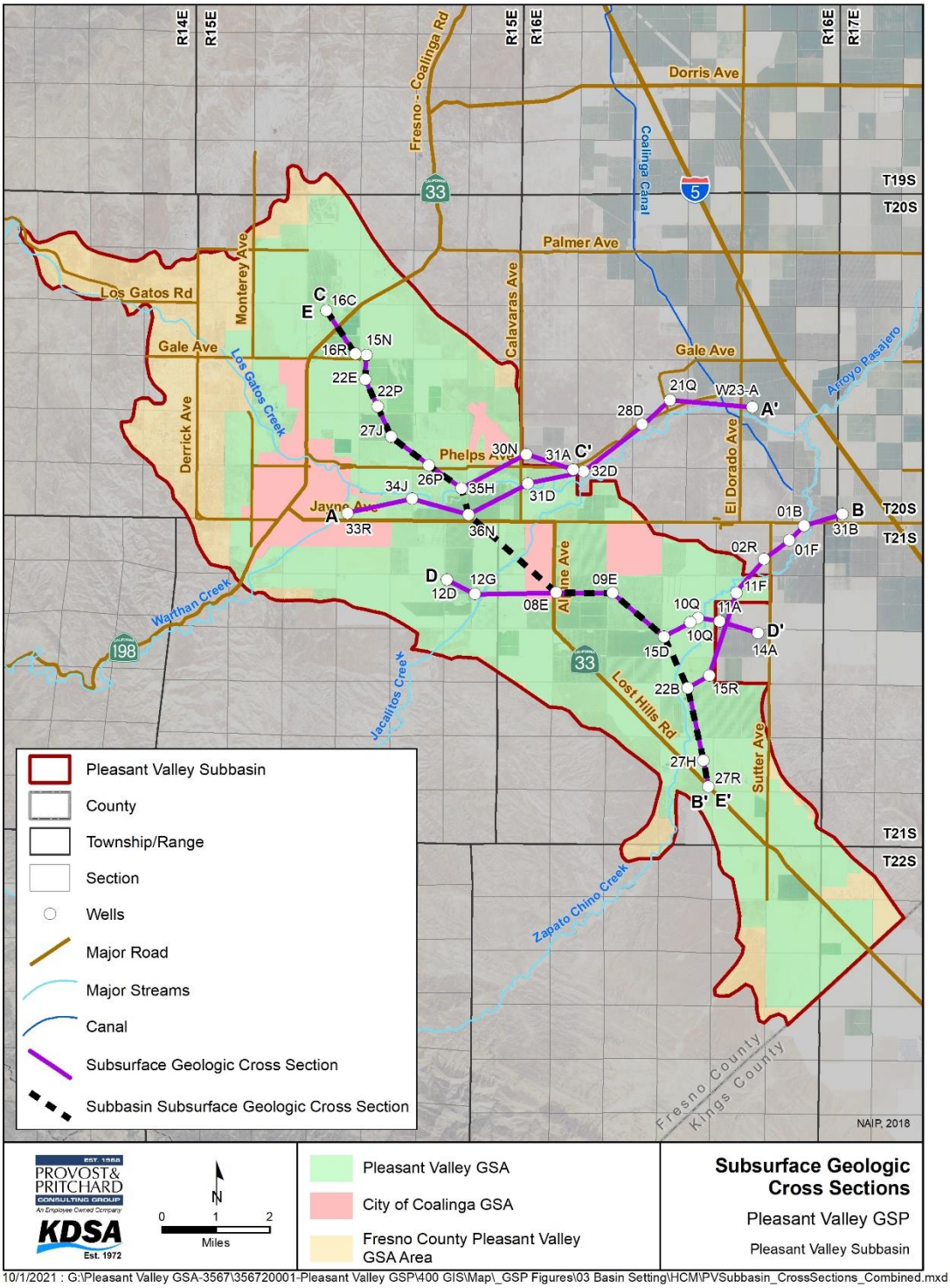


Figure 3-6 Location of Subsurface Geologic Cross Sections

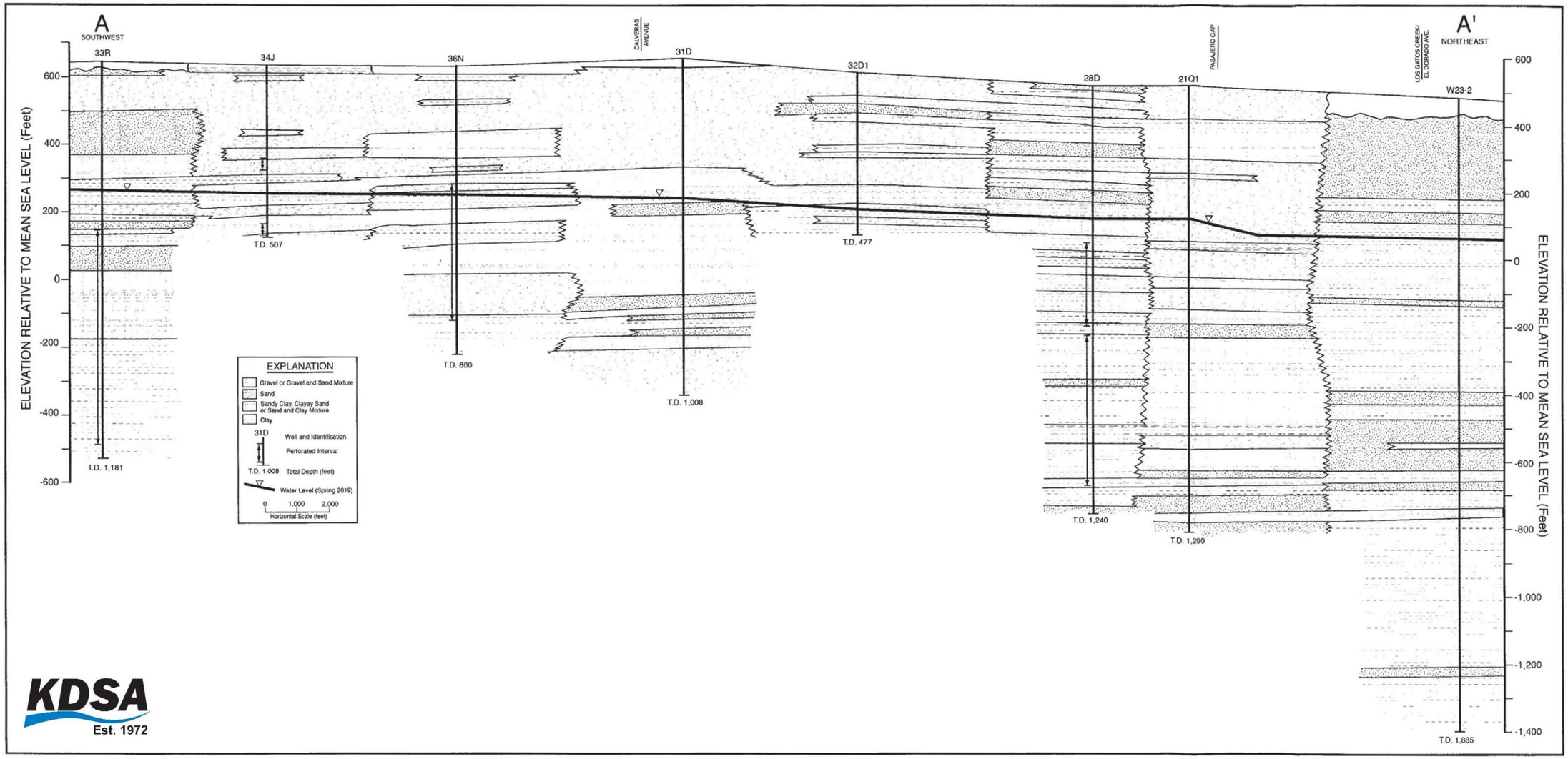


Figure 3-7 Cross Section A-A'

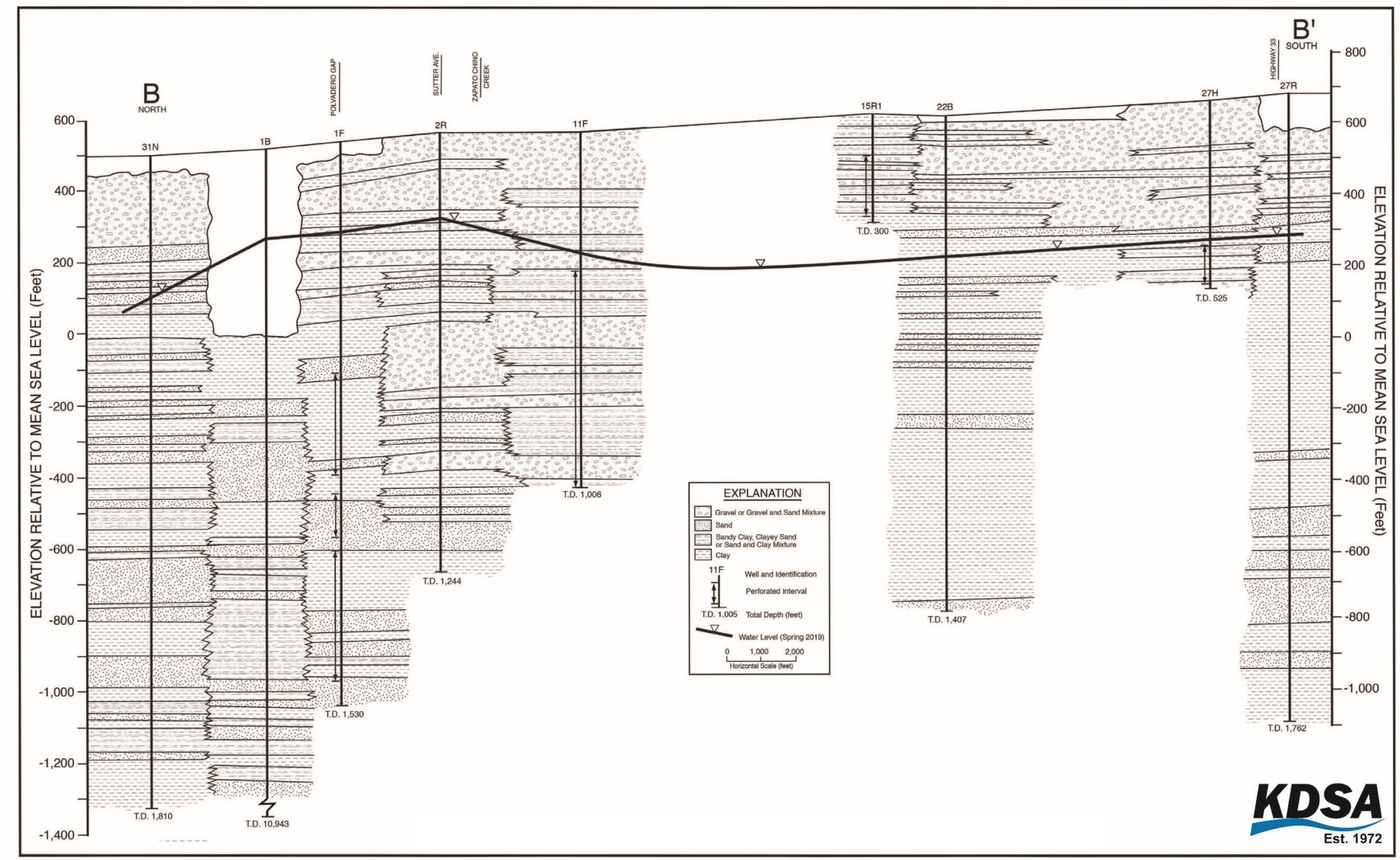


Figure 3-8 Cross Section B-B'

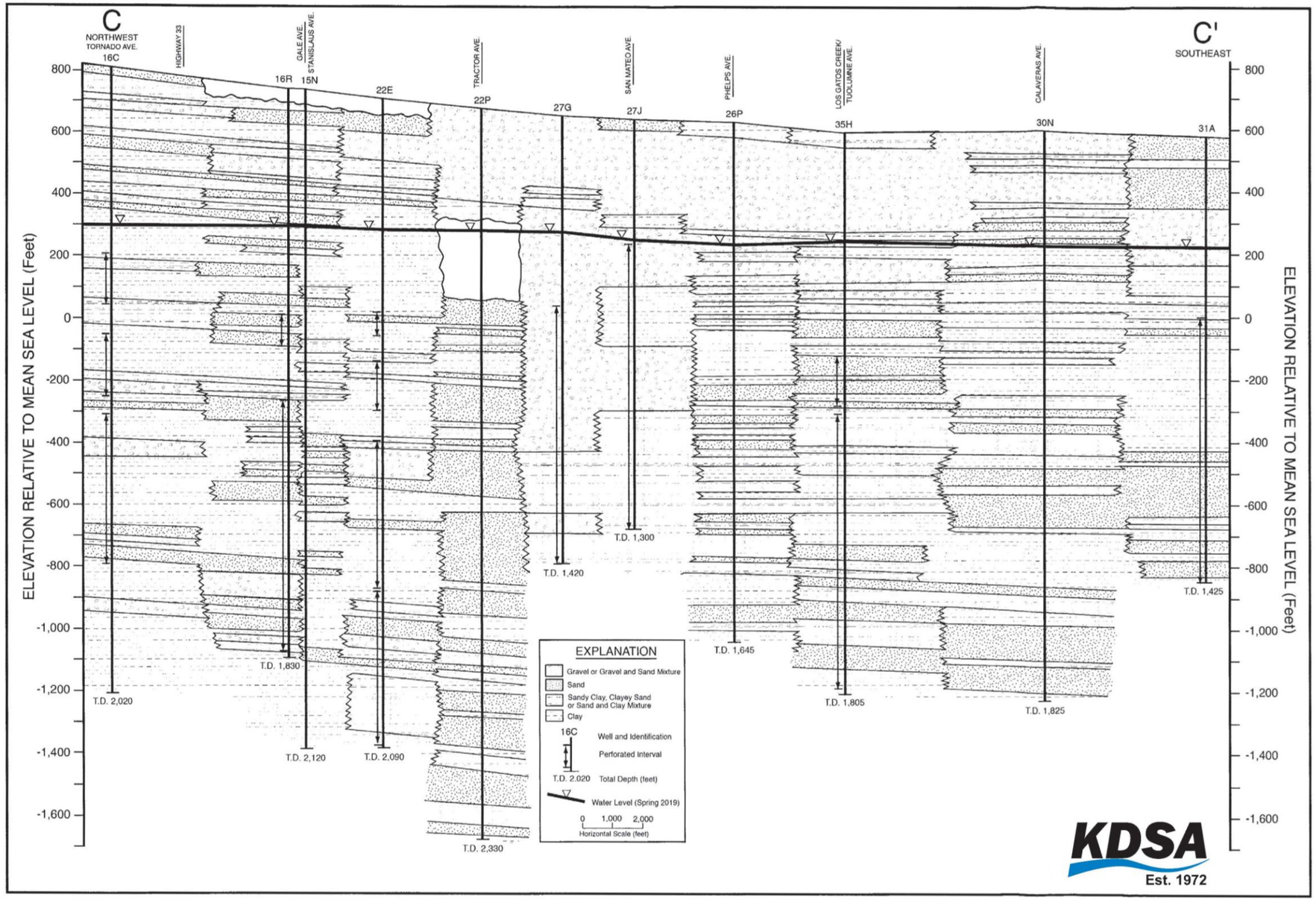


Figure 3-9 Cross Section C-C'

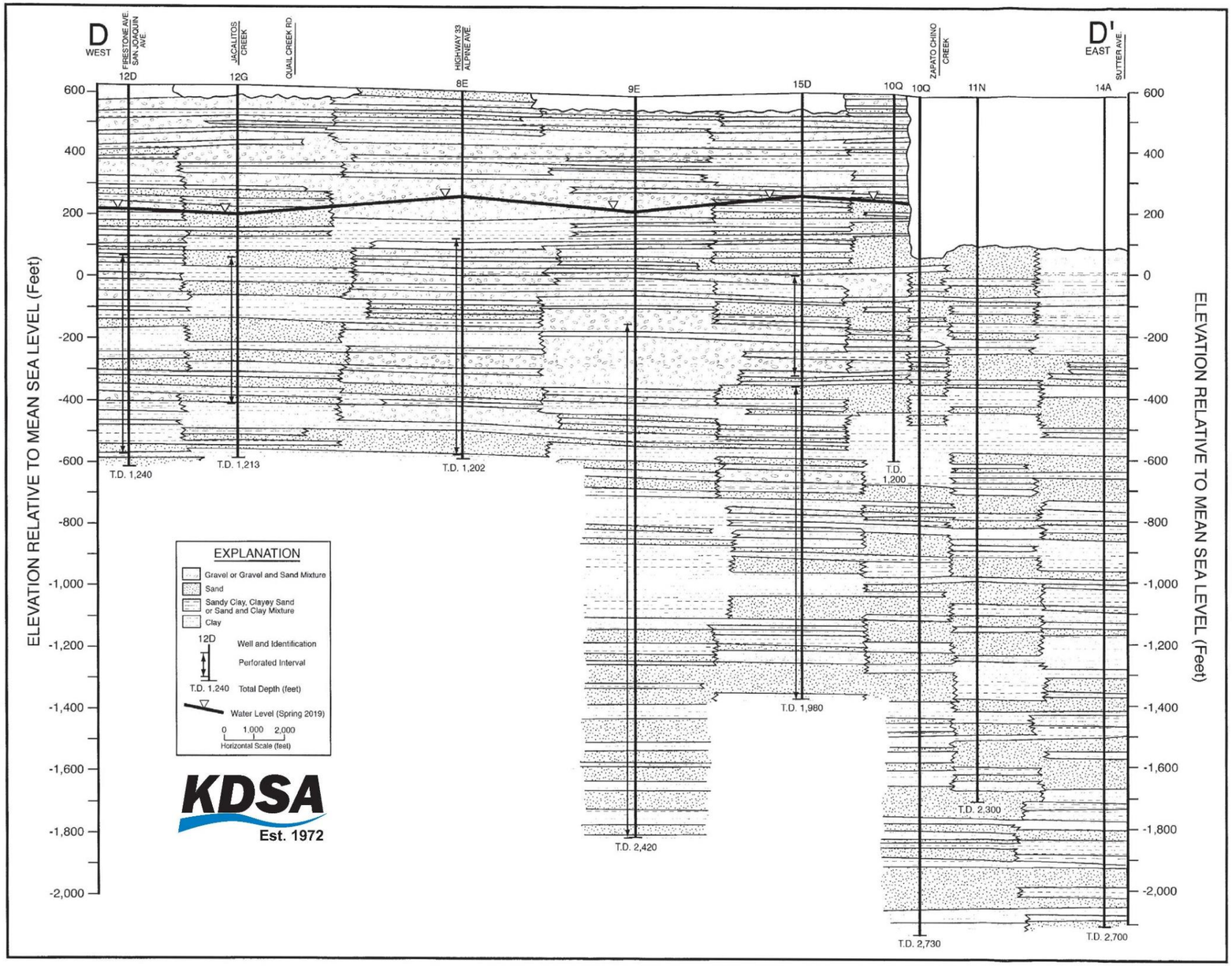


Figure 3-10 Cross Section D-D'

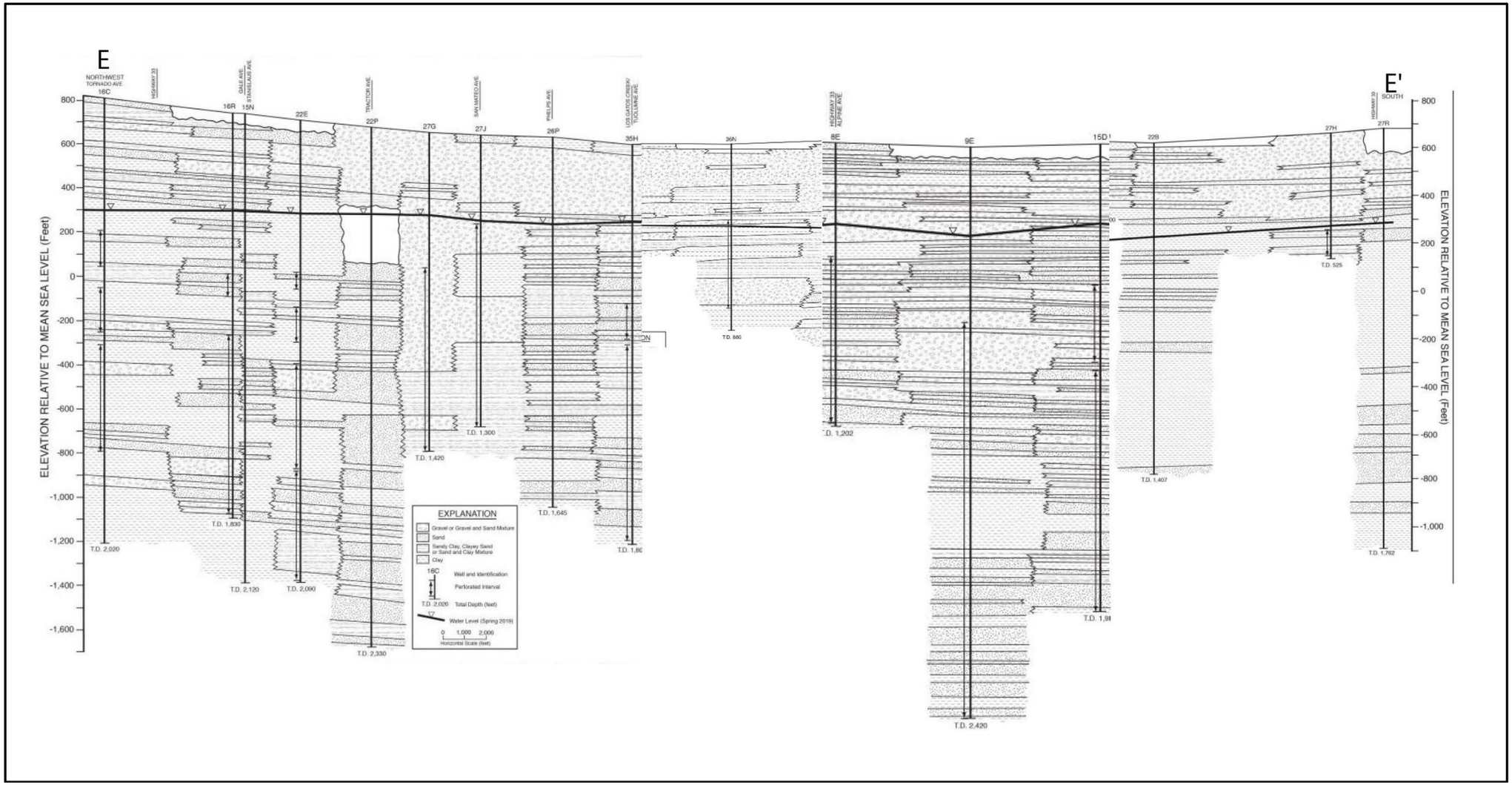


Figure 3-11 Cross Section E-E'

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3.1.5 Aquifer System

Regulation Requirements:
§354.14(b)(4) The hydrogeologic conceptual model shall be summarized in a written description that includes the principal aquifers and aquitards.

Regulation Requirements:
§354.14(b)(4)(c) Structural properties of the basin that restrict groundwater flow within the principal aquifers, including information regarding stratigraphic changes, truncation of units, or other features.

The groundwater system in the Subbasin is generally comprised of an upper unconfined aquifer and a semi-confined aquifer at deeper depths. The major component of aquifer recharge comes from streamflow seepage (Kahanovitz & Manning, 1954) and to a much lesser degree mountain front recharge from the ranges that define the western boundary of the Subbasin. As shown in **Figure 3-12**, the depth to water in the Subbasin ranges from approximately 350 feet in the south to 500 feet below ground in the north.

As shown in **Figure 3-13**, as a result of pumping, the groundwater flow in the Subbasin is from the north and south towards southwest of the confluence of Jacalitos Creek and Los Gatos Creek in the central eastern portion of the Subbasin. Groundwater now flows toward a pumping depression located near the east central portion of the Subbasin between Jacalitos and Zapato Chino Creeks south of Pleasant Valley State Prison.

Under natural conditions, groundwater generally flowed easterly and exited Pleasant Valley through both the Pasajero and Polvadero Gaps. Due to the lowered water levels in Subbasin from overdraft, groundwater no longer flows easterly through the Polvadero Gap. A recent evaluation indicates that some groundwater still flows through the Pasajero Gap.

Oil production occurs on a limited basis within the Subbasin; and it is regulated by the California Department of Conservation – Division of Oil and Gas.

3.1.5.1 Aquifer Characteristics and Properties

Regulation Requirements:
§354.14(b)(4)(b) Physical properties of aquifers and aquitards, including the vertical and lateral extent, hydraulic conductivity, and storativity, which may be based on existing technical studies or other best available information.

<u>Aquifer Extent</u>
Based on groundwater quality (TDS), the bottom of the usable aquifer in most of the Subbasin is at approximately 3,000 feet (KDSA, 2016). It thins towards the mountain fronts to about 1,000 feet deep or less. Relatively shallow oil is located west of the Coalinga Airport and usable groundwater is present only above approximately 500 feet in some westerly locations (KDSA, 2016).

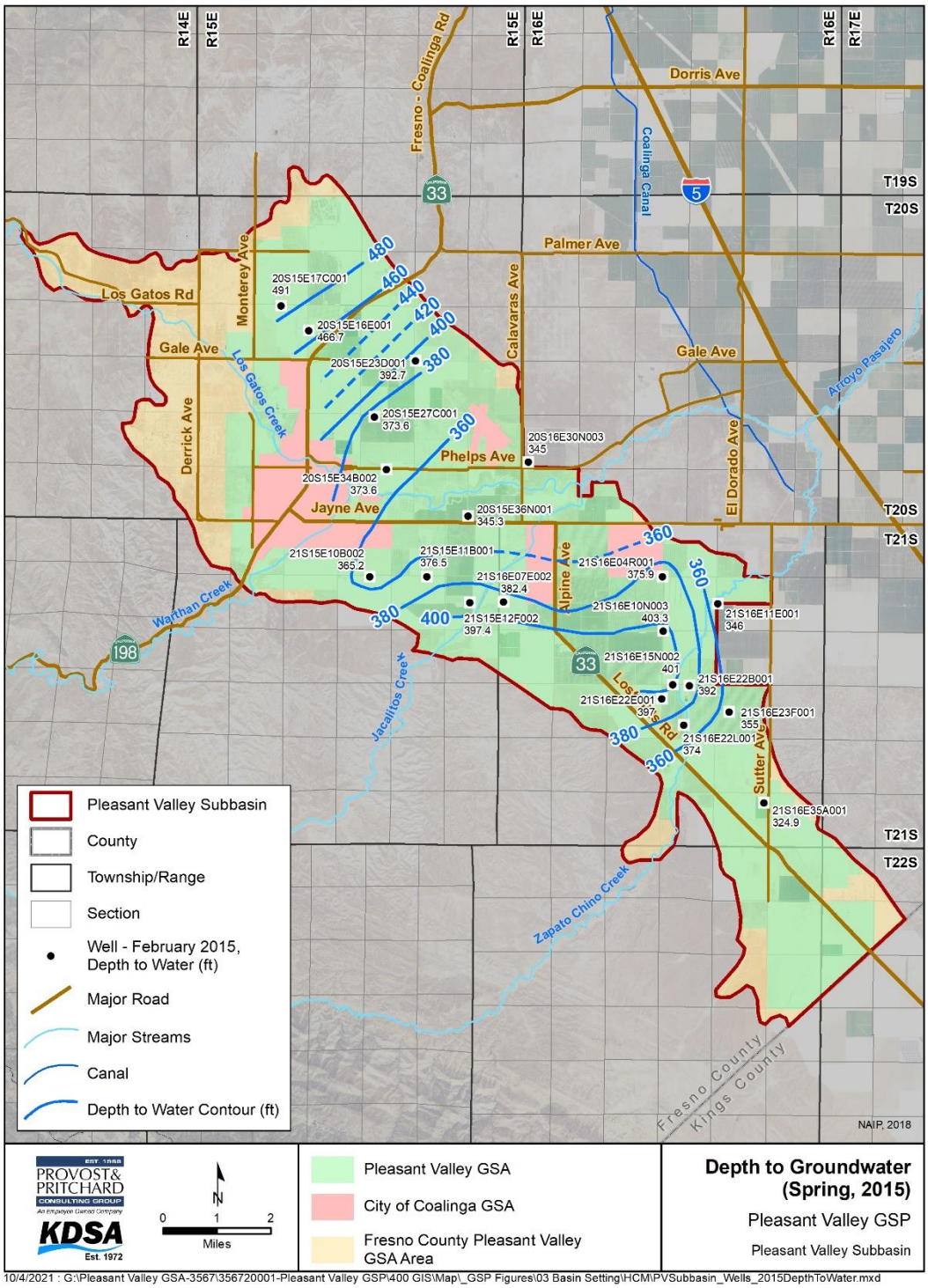


Figure 3-12 Depth to Groundwater (Spring, 2015)

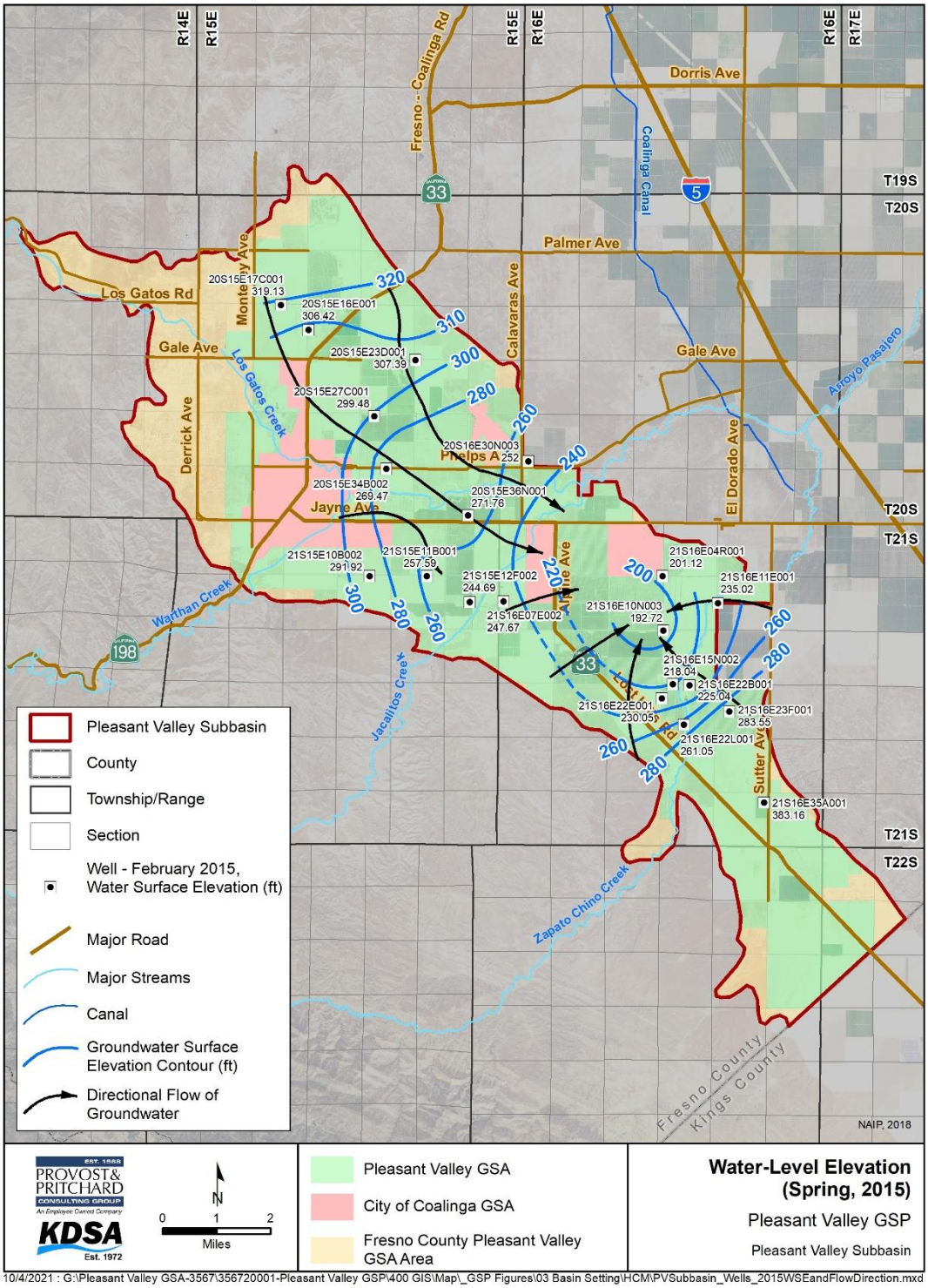


Figure 3-13 Water-Level Elevations (Spring 2015)

Specific Capacities

Pacific Gas & Electric pump test data are available for some irrigation wells in Pleasant Valley. The pumping rates for most irrigation wells range from about 600 to 1,100 gpm. The specific capacities (pumping rate divided by drawdown) of most of these wells range from about 10 to 40 gpm/ft **(Provost & Pritchard Consulting Group & KDSA, 2003)**. A more recent evaluation of specific capacities was performed by KDSA in 2020 (KDSA, 2020), in which specific capacities in Pleasant Valley ranged from 7 to 32 gpm/ft for wells with bottom perforations to depths ranging from 764 feet to 1,200 feet. Deeper wells, with the bottoms of the perforations ranging from 1,760 feet to 2,070 feet, had specific capacities of 11 to 26 gpm/ft.

Aquifer Transmissivities

K.D. Schmidt and Associates (KDSA, 2020) evaluated aquifer transmissivity values at numerous well locations within Pleasant Valley based on specific capacities of the wells from available pump test data. As shown in **Appendix E**, transmissivity values from most tests ranged from 15,000 gallons per day per foot (**gpd/ft**) to 73,000 gpd/ft. A transmissivity of 119,000 gpd/ft was indicated at one site by a 96-hour aquifer pump test (Provost & Pritchard Consulting Group & KDSA, 2003).

Specific Yield

Specific yield is defined as the ratio of the volume of water that a given mass of saturated rock or soils will yield by gravity to the volume of that mass. Williamson and others (1989) provide estimates of specific yields in the Subbasin based on texture of logged deposits utilizing a weighted average method whereby clay layers were assigned a value of 3%, sandy clay 5%, fine sand 10%, and sand and gravel 25%. As shown on **Figure 3-14**, the specific yield values estimated by Williamson and others (1989) by weighted averages ranged from 0.08 in the southern portion of the GSA to 0.13 in the northern portion of the GSA.

The specific yield of the coarse-grained deposits within the upper several hundred feet have previously been estimated to be around 12 to 15 percent, based on texture (Provost & Pritchard Consulting Group & KDSA, 2003). These deep pits are above the water level in most of the valley. A value of 10.3% was estimated by Summers Engineering, Inc. (Summers Engineering, Inc., 1986) and a value as high as 15.7% was estimated by HydroDevelopment, Inc. (HydroDevelopment, Inc., 1967).

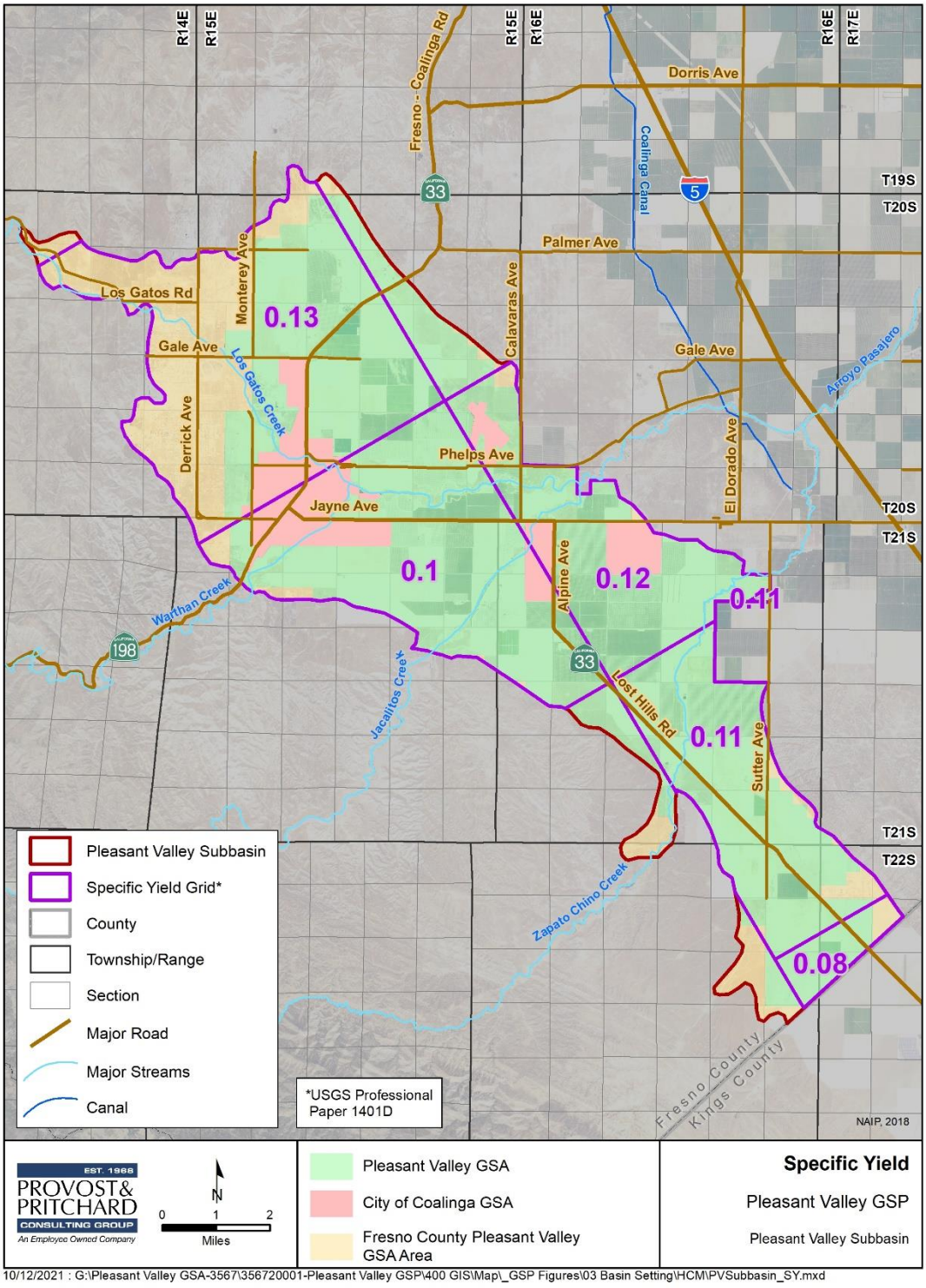


Figure 3-14 Specific Yield Map

3.1.5.2 Aquifer Uses

Regulation Requirements:
§354.14(b)(4)(e) Identification of the primary use or uses of each aquifer, such as domestic, irrigation, or municipal water supply.

Groundwater quality in the Subbasin is generally not as good as it is in many other parts of the San Joaquin Valley, and due to high concentrations of total dissolved solids, sulfate, and other constituents, pumping for drinking water is not extensive. The primary use of groundwater is agricultural and the moderate salinity groundwater is still suitable for irrigating some crops, such as pistachios. Small amounts of groundwater are pumped from individual domestic wells, typically in isolated areas without access to City of Coalinga water. The City of Coalinga does not use groundwater for potable uses and has met their demands with surface water from a diversion off the Coalinga Canal since 1971 (**Figure 3-15**).

3.1.5.3 Geologic Formations

Regulation Requirements:
§354.14(b)(4)(a) Formation names, if defined.

Geologic units that comprise the Subbasin include the following formations, which have been listed in general sequence from the land surface to greater depths:

- Holocene Alluvium: which consists of highly lenticular deposits of poorly sorted clay, silt, and sand with occasional interbeds of well-sorted fine-to-medium-grained sand; assumed to have an approximate thickness of no more than 300 feet (DWR, 2006). These deposits are above the water level in most of the valley.

- Plio-Pleistocene Tulare Formation: which is alluvium consisting of highly lenticular deposits of poorly sorted clay, silt, and sand with occasional interbeds of well-sorted fine-to-medium grained sand. (DWR, 2006). The Tulare Formation has been estimated at approximately 3,000 feet thick and unconformably overlies the San Joaquin Formation; and in places upper Tulare beds overlap the San Joaquin and cover nearly all of the older formations (Kahanovitz & Manning, 1954).

- San Joaquin Formation: which consists of non-fossil-containing silt and clay beds alternating with beds of sandstone and conglomerate that contains marine and non-marine fossils (Kahanovitz & Manning, 1954).

3.1.6 General Groundwater Quality

Regulation Requirements:
§354.14(b)(4)(d) General water quality of the principal aquifers, which may be based on information derived from existing technical studies or regulatory programs.

Kenneth D. Schmidt and Associates (KDSA, 2000) have stated that the TDS of groundwater in Pleasant Valley WD ranged from 1,000 to 3,000 mg/L with an average of 1,500 mg/L. The major constituents of concern in groundwater for irrigation use include sodium adsorption ratio, bicarbonate, boron, and pH.

More in-depth discussions on groundwater quality are included in this GSP in **Section 3.2.5 Groundwater Quality Issues.**

3.1.7 Surface Water Features

Regulation Requirements:

> **§354.14(d)(5)** Physical characteristics of the basin shall be represented on one or more maps that depict surface water bodies that are significant to the management of the basin.

The surface water features significant to the management of the Subbasin are illustrated on **Figure 3-15**. The most significant feature in terms of imported water supply is the Coalinga Canal located to the east of the basin along the eastern side of Anticline Ridge. The City of Coalinga surface water treatment facility is also located on the eastern side of Anticline Ridge where the Coalinga Canal intersects Palmer Avenue. The point of diversion from the Coalinga Canal that is currently used for the importation of agricultural surface water supplies is also shown on **Figure 3-15**.

Additional surface water features within the Subbasin include the intermittent streams (Los Gatos Creek, Warthan Creek, Jacalitos Creek, and Zapato Chino Creek) and the City of Coalinga Wastewater Treatment ponds located just east of the City of Coalinga at the confluence of the Los Gatos Creek and the Warthan Creek.

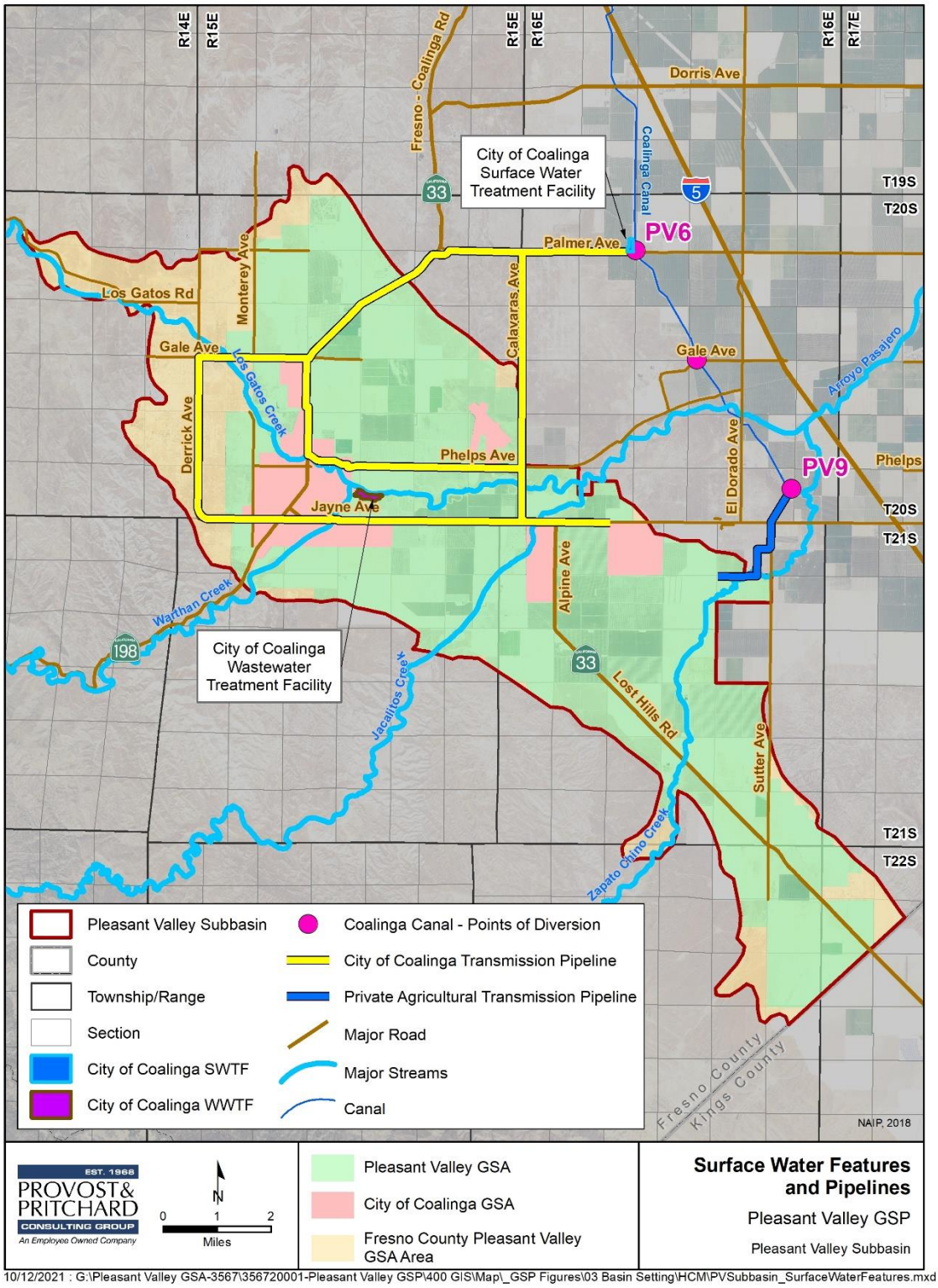


Figure 3-15 Surface Water Features and Pipelines

3.1.8 Source and Point of Delivery of Imported Water

Regulation Requirements:
§354.14(d)(6) Physical characteristics of the basin shall be represented on one or more maps that depict the source and point of delivery for imported water supplies.

As shown in **Figure 3-15**, treated surface water is imported into the Subbasin from off the Coalinga Canal and the City of Coalinga Surface Water Treatment Plant at Coalinga Canal Turnout PV6 located east of the Subbasin. Untreated surface water from off the Coalinga Canal is imported into the Subbasin at Turnout PV9 located at the southern end of the canal for agricultural uses.

Significant oil fields exist within the Subbasin. Pumping oil from these deposits generates some amount of water that comes from the same depths as the oil deposits. Water generated due to oil pumping is discussed in more detail in **Section 3.2.5.3**.

3.1.9 Recharge and Discharge Areas

Regulation Requirements:
§354.14(d)(4) Physical characteristics of the basin shall be represented on one or more maps that depict delineation of existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas, including significant active springs, seeps, and wetlands within or adjacent to the basin.

The main source of groundwater recharge in the Subbasin is from streamflow seepage (Kahanovitz & Manning, 1954). Streamflow sources include the Los Gatos, Warthan, Jacalitos, and Zapato Chino Creeks.

Areas favorable for intentional recharge by basins or in creeks within the Pleasant Valley Water District (PVWD) were previously assessed in 2000 by KDSA (**Figure 3-16**). In this study, areas adjacent to Los Gatos Creek and Zapato Chino Creek within the PVWD were identified as areas favorable for intentional groundwater recharge by surficial means. An additional smaller area was identified adjacent to the Jacalitos Creek, approximately between the alignments of Jayne Avenue to the north and Lost Hills Road to the south.

Figure 3-5, which shows topsoil texture and relative saturated hydraulic conductivity, can be useful for initial screening of potential surficial recharge and groundwater banking sites. Information should be confirmed with on-site investigations. Deeper conditions are important, down to a depth of at least 50 feet, in order to evaluate the potential for basin recharge.

No active springs, seeps, or wetlands are known or have been observed by the GSAs. However as shown on **Figure 3-17**, the National Wetland Inventory shows several possible wetlands within the Subbasin, generally along the intermittent streams. Due to the deep groundwater levels and perennial, intermittent nature of the local streams, the accuracy of these mapped wetlands is questionable and is currently under assessment by the GSAs. The small Freshwater Ponds dotted throughout **Figure 3-17** are farm ponds and are not considered to be potential wetlands.

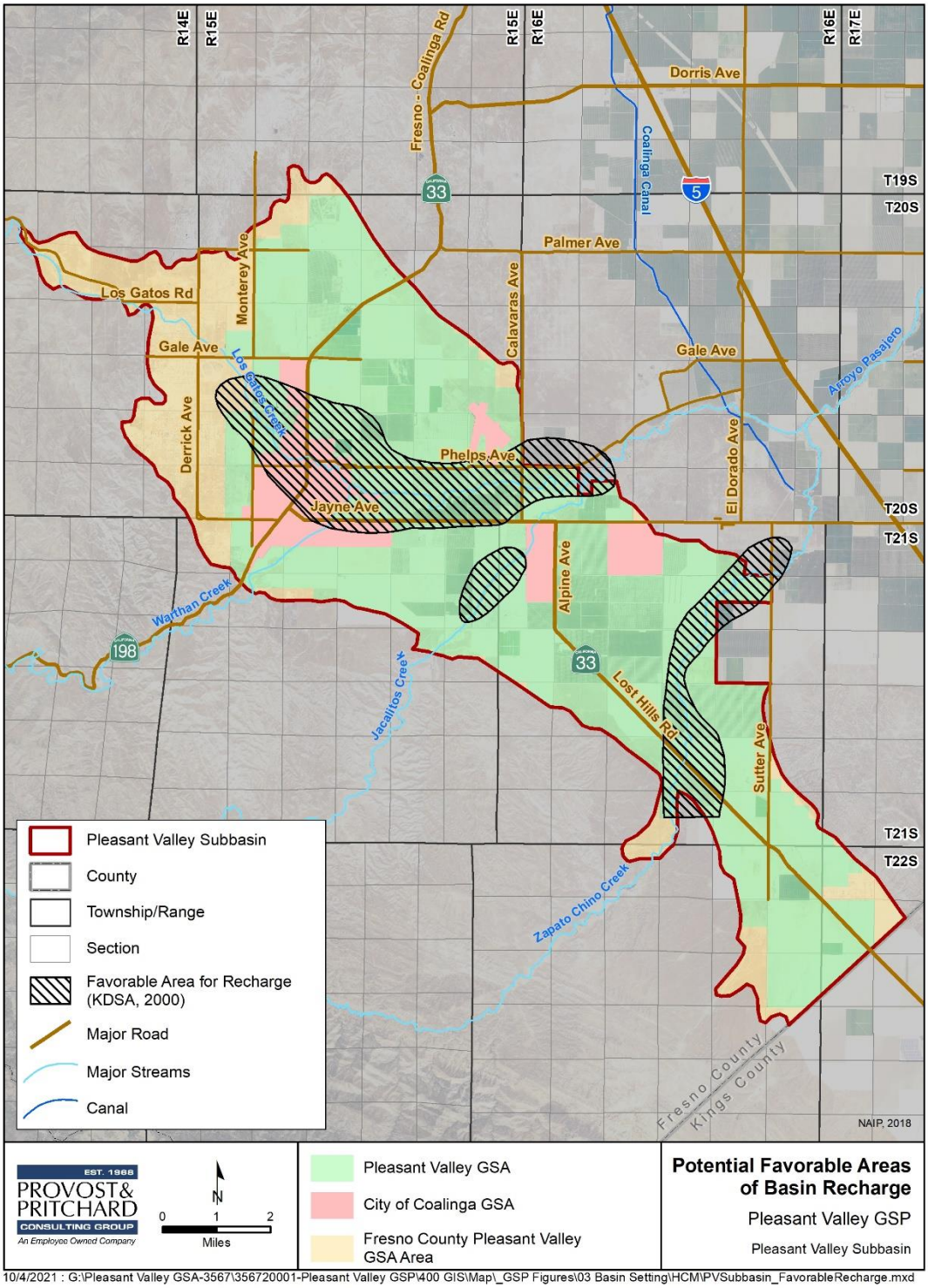


Figure 3-16 Potential Favorable Areas of Basin Recharge

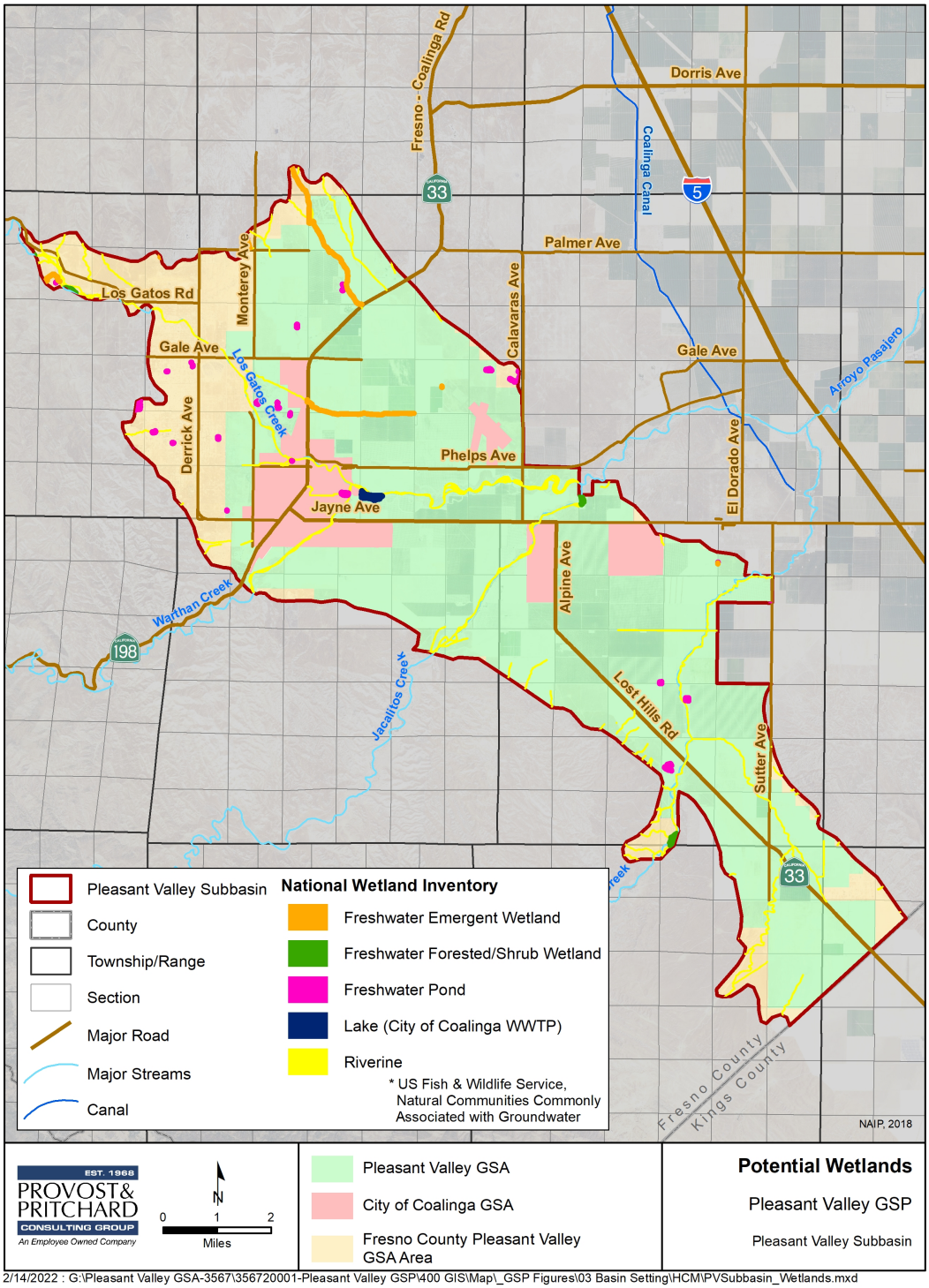


Figure 3-17 Pleasant Valley Subbasin Potential Wetlands Map

3.1.10 Identification of Data Gaps in Hydrologic Conceptual Model

Regulation Requirements:
§354.14(b)(5) Identification of data gaps and uncertainty within the hydrogeologic conceptual model.

Data gaps and uncertainties within the HCM include the following:

- Pumpage which has not been measured and reported.
- Annual Crop surveys have not been conducted.
- Transducer water level measurements are not available in parts of the basin.
- The magnitude of groundwater flow through the Pasajero Gap.
- Water level data from the southeast portion of the Subbasin and on both sides of the Fresno-Kings County line.
- The extent to which oil field derived water is used and or disposed of in the Subbasin.
- The accuracy of mapped wetlands by the National Wetland Inventory.

These will be investigated in the future, pending available funding.

3.2 Current and Historical Groundwater Conditions

Regulation Requirements:
§354.16 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 that includes the following:

This section includes discussions on the current and historical groundwater conditions in the Subbasin. Available data was used to establish groundwater trends in the Subbasin. The main topics addressed in this section include these sustainability indicators:

- Groundwater Levels
- Groundwater Storage
- Groundwater Quality
- Land Subsidence
- Surface Water and Groundwater Interconnections
- Groundwater Dependent Ecosystems

As will be documented later in this chapter, the most significant condition that impacts the historical and current groundwater levels in the basin is cropping patterns and the resultant groundwater demand. **Section 3.3.1** documents historical and current information which recognizes the historical development of field crops, the changing agricultural economics that caused a large reduction in crop cultivation in the 1990s through the early part of this century, and then the more recent establishment of permanent planting of pistachios around 2010. These recent developments have caused the pumpage to surpass the pumpage of the early 1960s. Coupled with lower amounts of streamflow and recharge the change in storage now experienced within the Subbasin could be at one of the highest experienced.

This section provides monitoring data collected by various agencies. Refer to **Chapter 5** for descriptions of the monitoring programs used to collect the data going forward. **Section 3.1** (HCM), provides background information on the hydrogeologic setting, aquifers, soils, and stratigraphy that relate to this section. The groundwater system in the Subbasin is generally comprised of an upper unconfined aquifer and a semi-confined aquifer at greater depths. The major component of aquifer recharge comes from streamflow seepage (Kahanovitz & Manning, 1954). Relatively little aquifer recharge comes from mountain front recharge from the ranges that define the eastern boundary of the Subbasin. Also, losses of well production, air production, and well plugging are discussed in this section. References contributing to these evaluations include HydroDevelopment (1967), Summers Engineering (1985), and Kenneth Schmidt and Associates (2000, 2016).

3.2.1 Groundwater Level Data

Regulation Requirements:
§354.16(a) Groundwater elevation data demonstrating flow directions, lateral and vertical gradients, and regional pumping patterns, including:
1. Groundwater elevation contour maps depicting the groundwater table or potentiometric surface associated with the current seasonal high and seasonal low for each principal aquifer within the basin.
2. Hydrographs depicting long-term groundwater elevations, historical highs and lows, and hydraulic gradients between principal aquifers.

A basin boundary modification for the Pleasant Valley Subbasin was approved by DWR in September 2016. The basin boundary modification removed Pliocene-Pleistocene non-marine rocks from the Subbasin margins and split the original Pleasant Valley Subbasin into the Pleasant Valley Subbasin north of the Fresno-Kings County line and the Kettleman Plains Subbasin south of the county line (see **Figure 3-1**). Unless specified otherwise, figures presented herein are based on the 2016 basin boundary modification.

This section presents historical groundwater level data in the form of groundwater depth maps, groundwater elevation maps, and water-level hydrographs. Contour maps are presented for Spring 1998 and Spring 2017 (which represent the beginning and end of a water budget period evaluated in Section 3.3). Spring represents seasonal high groundwater levels in the Subbasin.

Depth to Water

Depth to water maps are provided for Spring 1998 and Spring 2017. Depth to water in Spring 1998 ranged from less than 300 feet near Los Gatos Creek, west of Calaveras Avenue, to more than 500 feet in the north part of the valley (**Figure 3-17).** Depth to water in the Spring 2017 ranged from less than 350 feet near Coalinga and the south part of the basin to more than 475 feet in the north part of the basin **(Figure 3-18).** These maps are developed from measurements of irrigation wells both in production as well as unused wells. In general, the depth of the irrigation wells vary from _600 to over 2,400 feet with the average depth on the order of 1,200 feet. Perforated intervals range from approximately 400 to 2400 feet with the average length of about 400 feet._

Water Level Elevations and Direction of Groundwater Flow

Figure 3-20 shows water level elevations and the direction of groundwater flow in Spring 1998. There was a groundwater flow divide between Jacalitos and Zapato Chino Creek. Northwest of the divide, groundwater flowed to the east or southeast. Southeast of the divide the direction of groundwater flow was to the northwest. The highest water level elevations exceede 380 feet above mean sea level and were in the central part of the basin. The lowest water level elevations were near the divide, and were less than 240 feet above mean sea level.

Figure 3-21 shows water level elevations and the direction of groundwater flow for Spring 2017. The same directions of groundwater flow were present as in Spring 1998. The highest water level elevations exceeded 360 feet and were in the southeast part of the basin. The lowest water level elevations were near the divide and were less than 180 feet.

With the drop in groundwater levels in Pleasant Valley, it was believed that the Subbasin became isolated with regards to groundwater flows to or from the San Joaquin Valley Subbasin (Summers Engineering, Inc., 1985). The Subbasin is comprised primarily of alluvium. Approximately parallel to and easterly of the valley is the geologic feature known as Anticline Ridge, which is an arch-shaped fold in rock in which rock layers are upwardly convex. Anticline Ridge, shown on **Figure 3-22**, is the hydrogeologic separation between Pleasant Valley and the more easterly rest of the San Joaquin Valley groundwater basins. When groundwater levels were shallower, groundwater historically flowed through the Polvadero and Pasajero Gaps (Summers Engineering, Inc., 1986). Kenneth D. Schmidt and Associates as part of this work has estimated the groundwater outflow through the Pasajero Gap, which is indicated to still be occurring. Groundwater movement is discussed in Section 3.2.2.

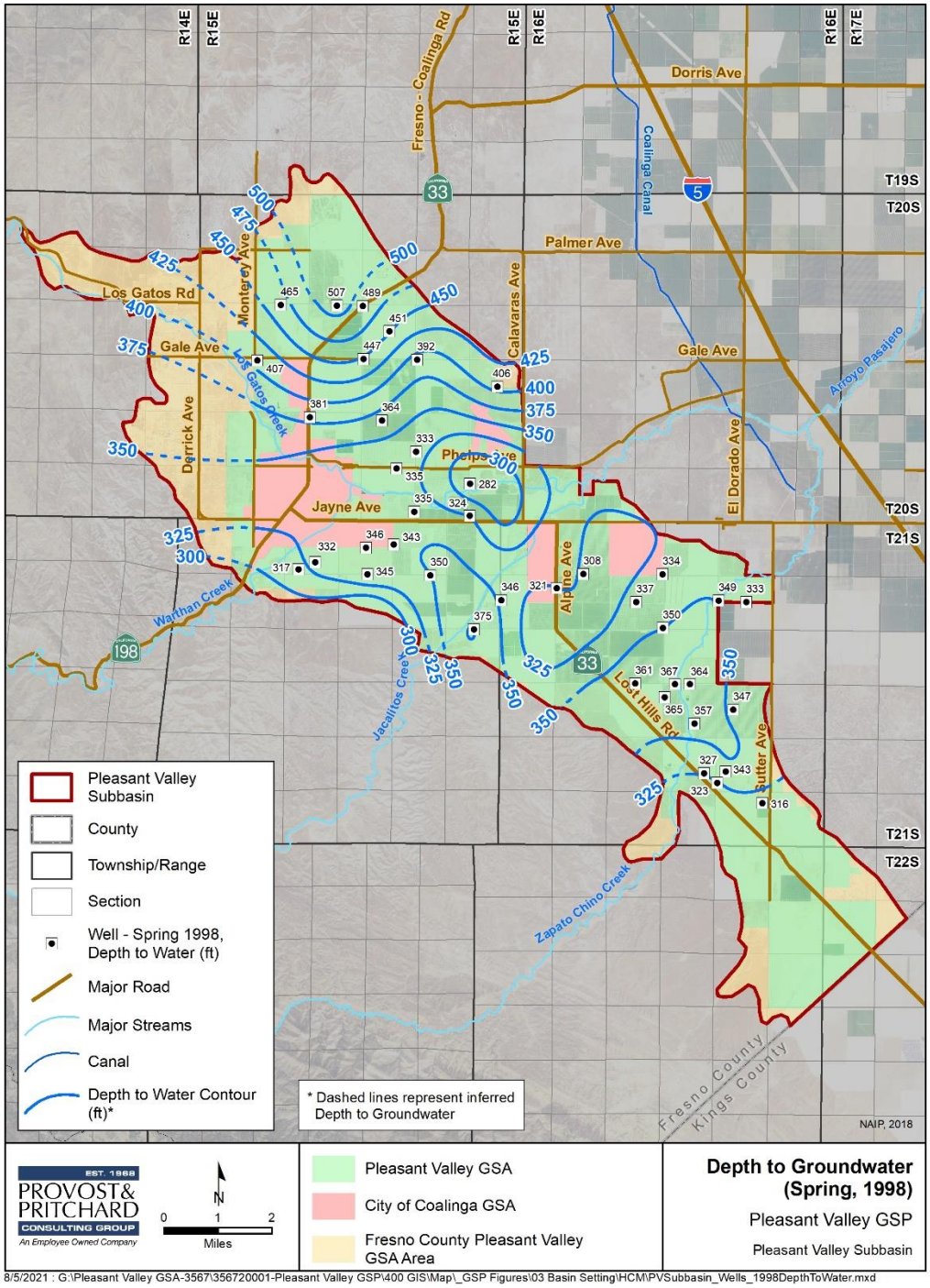


Figure 3-18 Depth to Groundwater (Spring 1998)

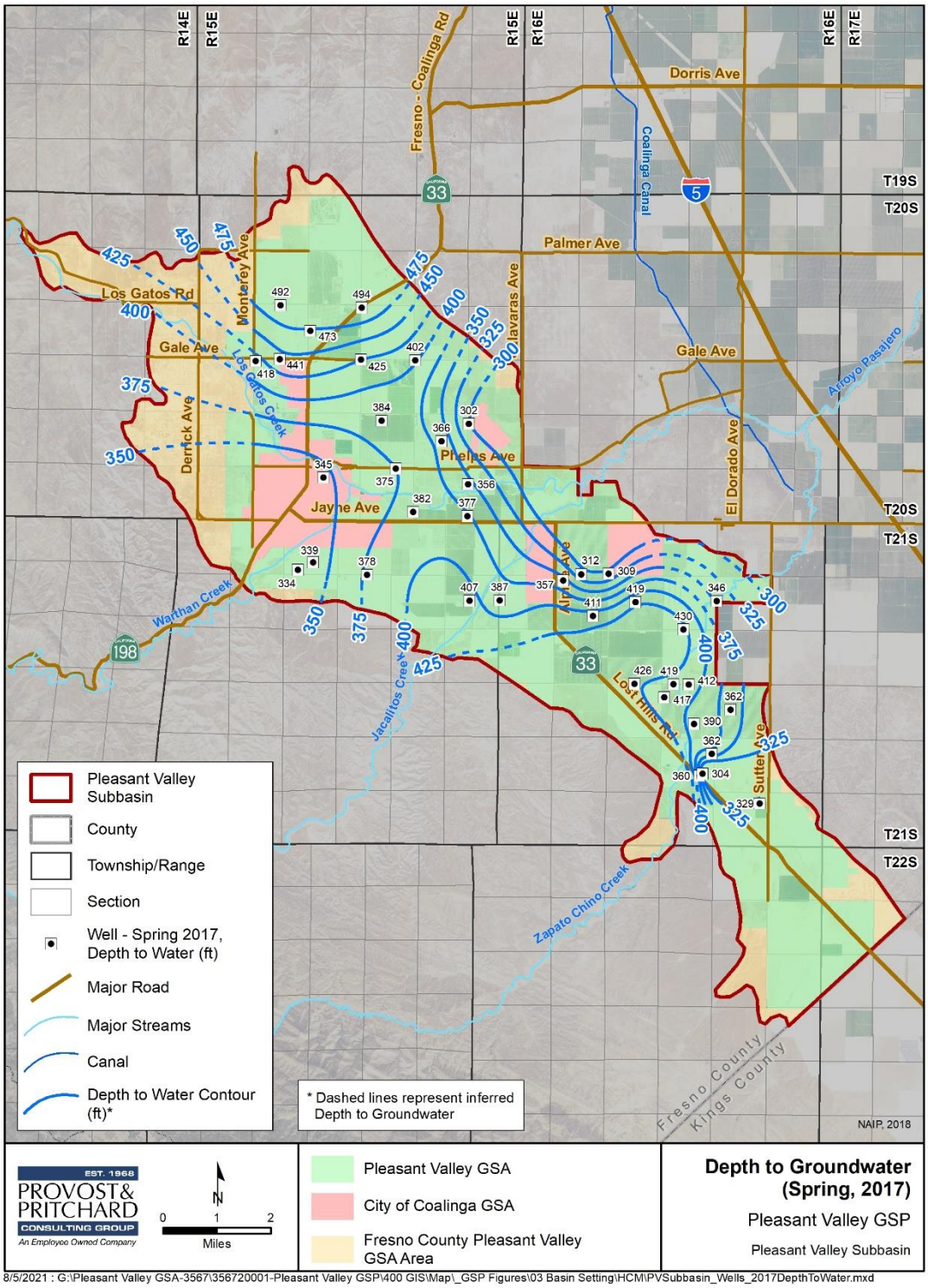


Figure 3-19 Depth to Groundwater Map (Spring 2017)

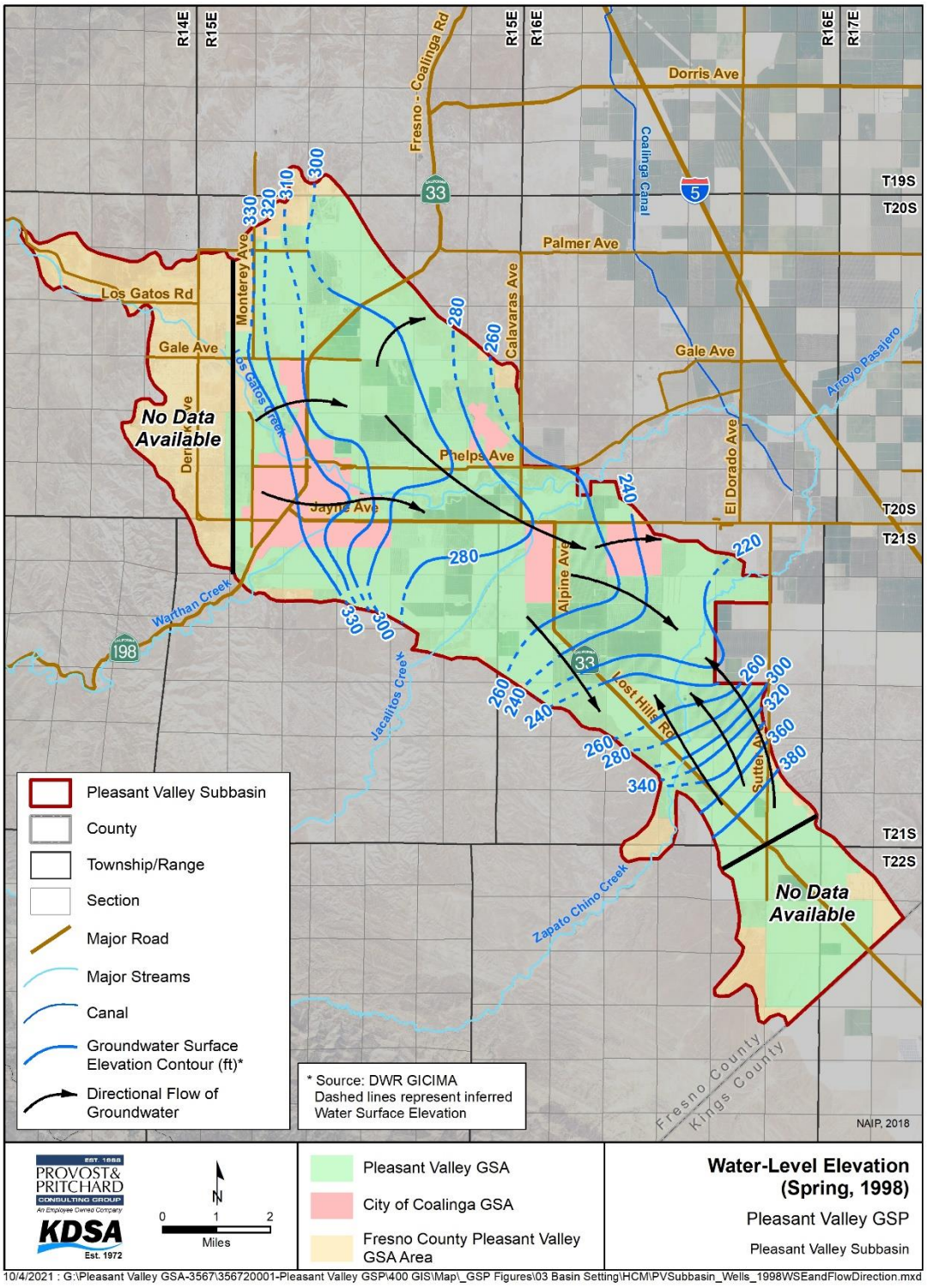


Figure 3-20 Water-Level Elevations and Direction of Groundwater Flow (Spring 1998)

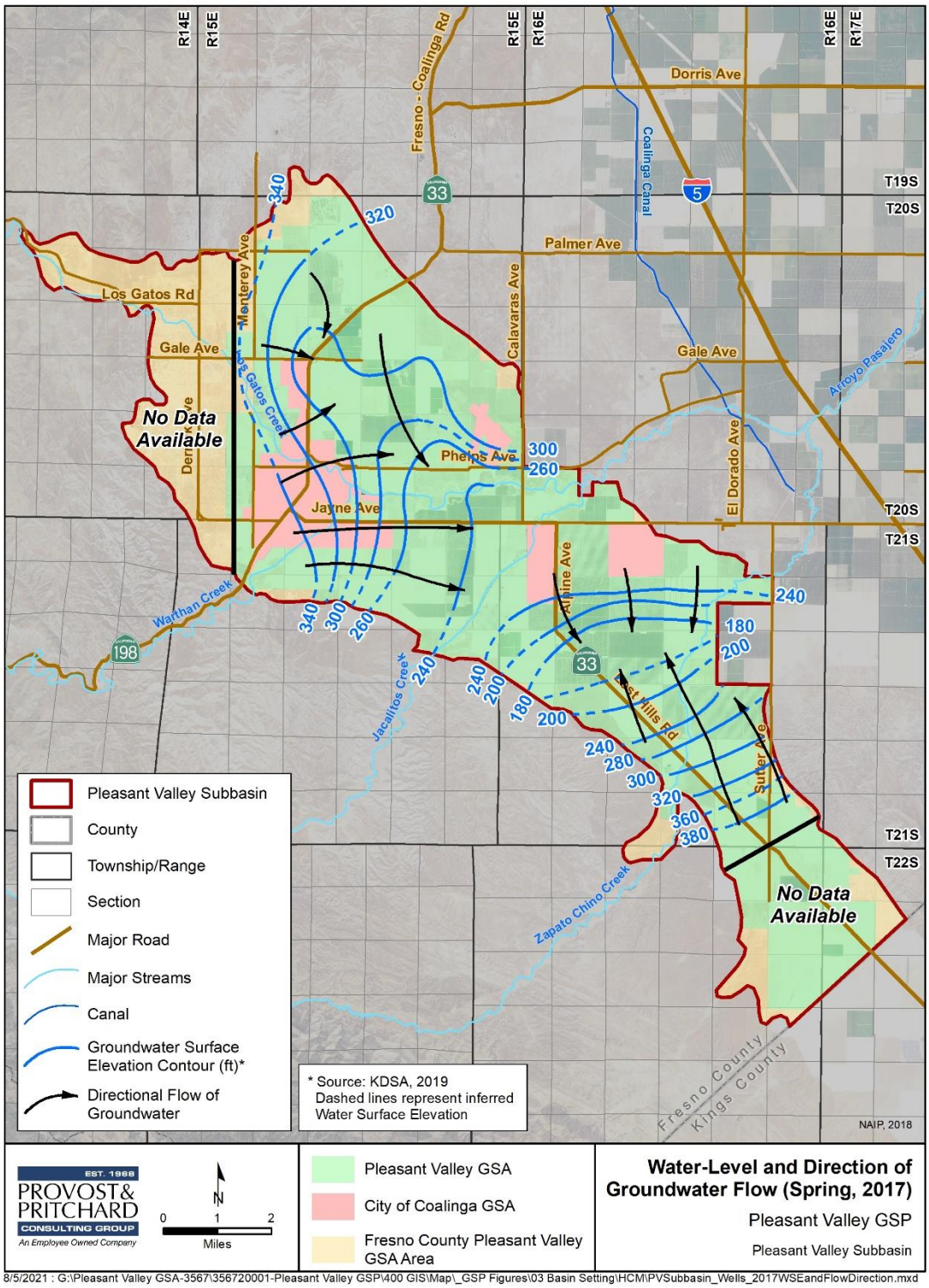


Figure 3-21 Water-Level Elevations and Direction of Groundwater Flow (Spring 2017)

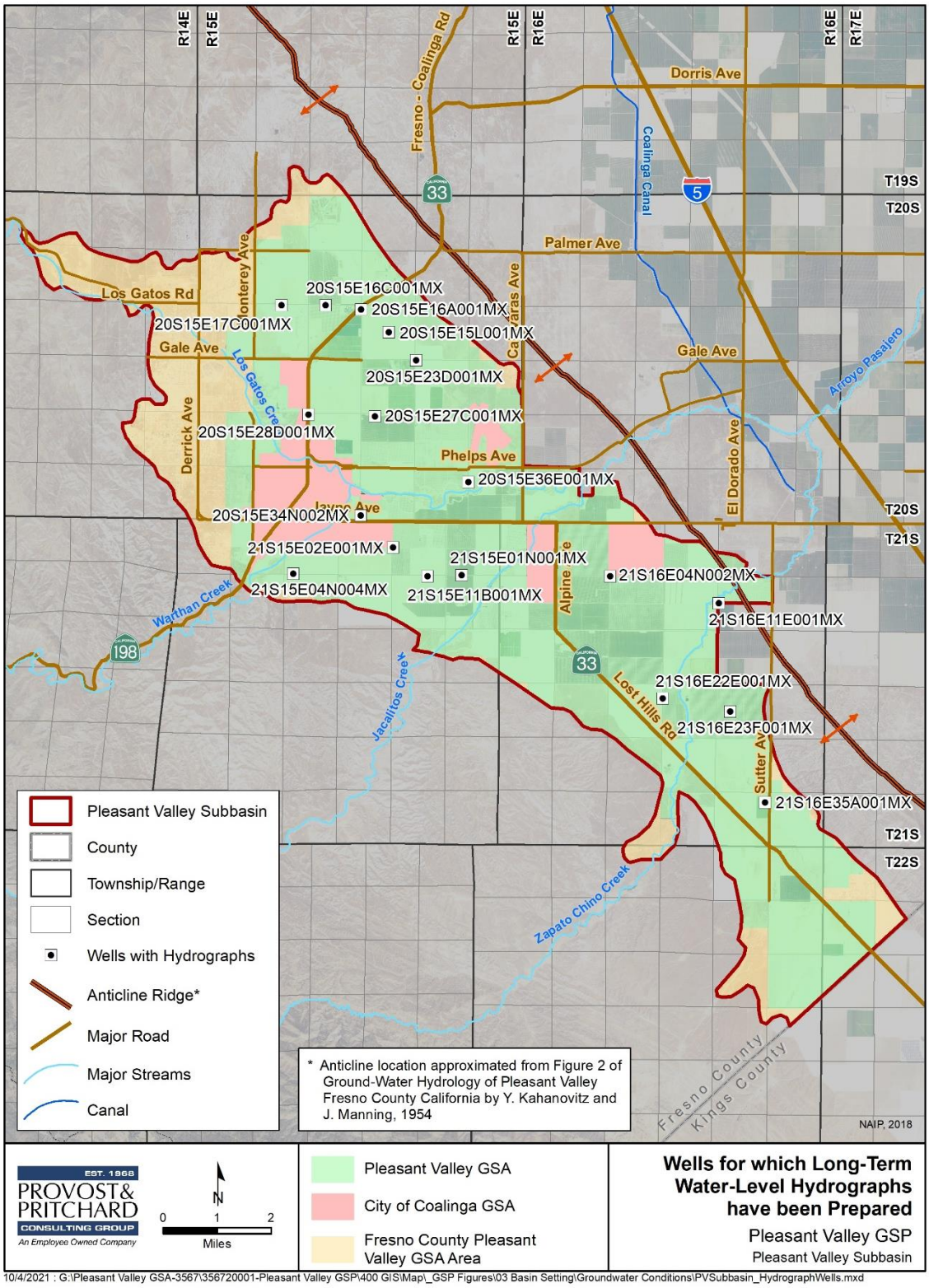


Figure 3-22 Wells for which Long-Term Water-Level Hydrographs have been Prepared

3.2.2 Groundwater Movement

The main source of groundwater recharge into the Subbasin is from streamflow seepage (Kahanovitz & Manning, 1954). The main streams are Los Gatos, Warthan, Jacalitos, and Zapato Chino Creeks originating west of the Subbasin in the foothills and flowing east.

Figure 3-21 shows the Spring 2017 groundwater surface elevation contours and general direction of groundwater flow within the Subbasin. As a result of pumping, the current groundwater flow in the Subbasin is from the north and south towards the pumping depression near the confluence of Jacalitos Creek and Los Gatos Creek in the central eastern portion of the Subbasin south of Pleasant Valley State Prison. South of the depression groundwater flows in a northerly direction.

The southern end of the Subbasin includes an approximately three-mile border with the Kettleman Plains Groundwater Subbasin. This is also the Fresno County/Kings County line or border. No recent groundwater level data are available within several miles of the border in either subbasin. Hence, no groundwater contours can be developed in the area for estimating groundwater flows or storage change. Lacking specific data, flow across the boundary is assumed to be negligible for the following reasons:

- As part of the basin boundary modification discussed in **Section 3.2.1**, Kenneth D. Schmidt Associates (KDSA, Technical Report on Hydrogeologic Conditions in Pleasant Valley Subbasin, 2016) suggested that groundwater flows at the boundary flow north into Pleasant Valley and south into Kettleman Plains, which would result in essentially no flow across the boundary. In other words, there is believed to be a groundwater divide near the County Line.

- The southern boundary of Subbasin generally lines up with the southern end of the Zapato Chino Creek watershed and the northern end of the Arroyo Ramoso/El Rincon watershed. The topographic divide splits runoff in this area. Hydrogeologic boundaries are not necessarily the same as surface watershed divides; however, there are no significant geologic barriers known that would affect groundwater flow patterns, so the surface watershed divide may also represent a hydrogeologic divide.

- Crop maps developed with 2017 USDA Cropscape as well as DWR mapping data show that many areas within a few miles of the boundary are fallow or are winter wheat. In addition, the City of Avenal in Kettleman Plains Groundwater Subbasin uses surface water. These factors indicate that groundwater pumping in the area is minimal, and hence there is minimal pumping to induce groundwater flows in the area.

Water-Level Hydrographs

Two types of water-level hydrographs have been prepared for wells in the PVWD. The first type shows long-term water-level trends, generally extending from about 1960 to 2021. These are generally based on semi-annual (spring and fall) water-level measurements that were acquired from a DWR website (see **Figure 3-22**). These semi-annual measurements were more useful when field crops were grown in the valley. At that time, pumpage usually stopped in about late August and was minimal during the winter. The fall measurements weren't intended to represent the lowest seasonal levels, but rather the measurements were usually not done until most pumping had stopped for the season. This was necessary to obtain representation of static water-level measurements. The spring measurements can be used to determine changes in water levels and changes in groundwater storage for specific periods. Long-term hydrographs are not available for the deeper wells that have been drilled beyond a depth of about 1,200 feet in recent years. The second type of hydrographs are based on continuous measurements made with pressure

transducers installed in the wells. Both static and pumping levels are shown. This type of hydrograph is generally only available in the valley for the past two or three years. A number of these are available for the newer deeper wells. This type of hydrograph is especially valuable for several reasons. First, the annual shallowest and deepest water levels can readily be determined. These levels (particularly the deepest) aren't necessarily shown by the semi-annual measurements. With the development of orchards, significant pumping is often still occurring in the fall. In addition, drawdowns due to well pumping can readily be determined by comparing static water levels with pumping levels on the hydrographs. Third, at a number of sites, pumping rates are measuredwith totalizing flowmeters. Pumping rates can be shown on the hydrographs along with the pumping levels for when the well is pumping. This allows specific capacities (pumping rate divided by drawdown) to be frequently determined. Reductions in specific capacities can provide indications of well plugging, due to encrustation or other factors.

Long Term Hydrographs

Appendix F contains long-term water-level hydrographs for 48 wells in the PVWD. A review of hydrographs for most of these wells indicates either three or four major trends (See **Figure 3-24 for a summary of the water level hydrographs' spring readings.**).

The first trend is from about 1960 to the mid- or late-1980s. The maximum historical irrigated crop acreage during that period was indicated to be about 29,000 acres. Field crops such as cotton were grown during this period. Water-level declines during this period averaged about 5.8 feet per year in the area north of Jayne Avenue and about 6.7 feet per year in the area south of Jayne Avenue.

A second trend occurred from about the early-1990s through the mid-2000s, when crop acreages and pumping were reduced significantly. Water levels in some wells rose and were relatively stable in many wells.

As more orchards were developed in the valley in the mid to late 2000s, water-level declines ensued. Water-level declines between about 2007-09 through about 2016 ranged from 3.8 to 6.8 feet per year and averaged 5.1 feet per year in the area north of Jayne Avenue. Water-level declines between about 2007-09 through about 2017 ranged from 4.0 to 8.8 feet per year and averaged 5.6 feet per year in the area south of Jayne Avenue (extending four miles to the south). These declines were slightly less than those that occurred between about 1960 and the mid- to late-1980s.

After about 2017, rates of water-level declines increased again, as the pumping for orchards increased. The irrigated crop acreage in the valley as of 2020 was estimated to have been about 18,000 acres. The most recent water-level trends (2017-21) are discussed for four geographic areas. The northern area is generally north of Phelps Avenue, and the average water-level decline in this area for 2017-21 is 7.6 feet per year. The second area is between Los Gatos Creek and Jayne Avenue and the average tracking water-level decline is 11.0 feet per year during this period. The greatest water-level declines are in the area south of Jayne Avenue, extending to the south for about four miles. The average water-level decline in this area is about 17 feet per year during 2017-21. The fourth area is for the southern two rows of sections in T21S, where the average water-level decline was about 5.4 feet per year during 2017-21. There are fewer wells in this area than in the other three areas.

Relation of Long-Term Water-Level Changes and Pumpage

Provost & Pritchard have estimated the crop consumptive use for the Pleasant Valley WD for a number of years between 1975 and 2019. The consumptive use (rounded) was 45,000 acre-feet in 1975 and 49,000 acre-feet in 1982. The consumptive use decreased to about 26,000 to 28,000 acre-feet per year during 1995-98. The consumptive use decreased to about 21,000 acre-feet in 1999 and about 18,000 acre-feet in 2000. The lowest consumptive use for an estimated year was about 9,300 acre-feet in 2002. By

2007, following development of a number of orchards, the consumptive use increased to 18,000 acre-feet per year, and by 2014 had increased to about 32,500 acre-feet per year. During 2016-18, the consumptive use averaged about 41,000 acre-feet per year. In 2019, the consumptive use was about 46,000 acre-feet, close to the values in 1975 and 1983.

Table 3-1 Estimated Crop Consumptive Use Over Time

Year	Consumptive Use (AF)
1975	45,000
1982	49,000
1996	27,000
1999	21,000
2000	18,000
2002	9,300
2007	18,000
2014	32,500
2017	41,000
2019	46,000

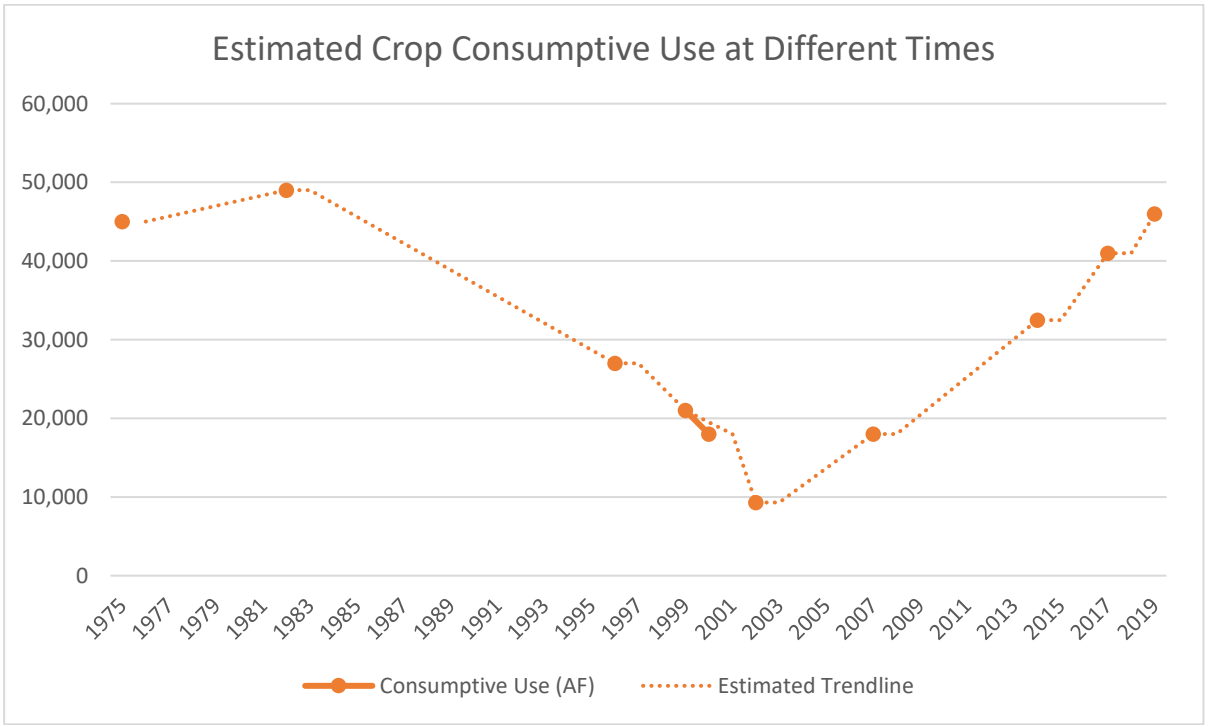


Figure 3-23 Estimated Crop Consumptive Use Over Time

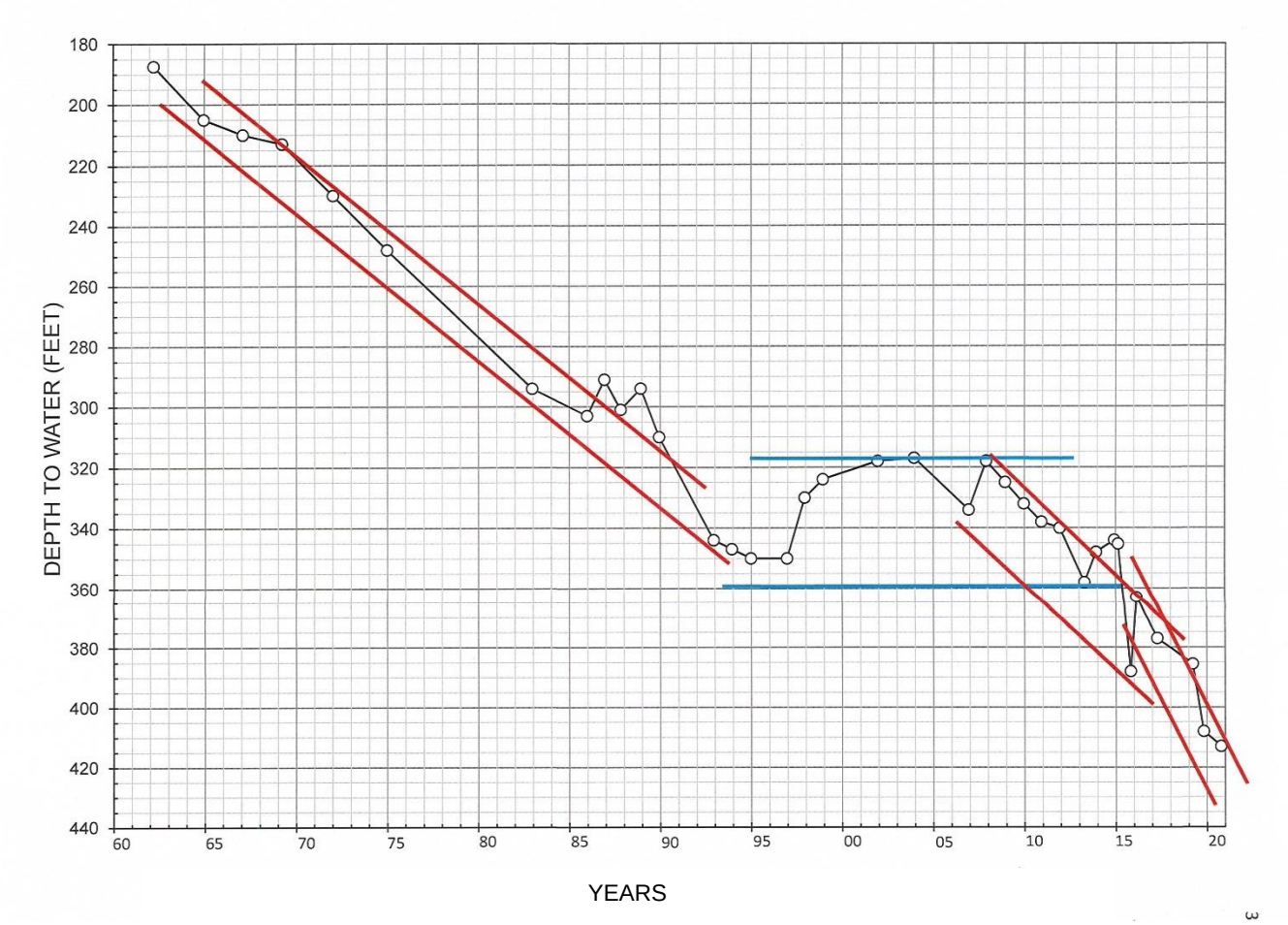


Figure 3-24 Representative and Time Trends Water-Level Hydrograph

Pumpage can be estimated by dividing the consumptive use of applied water by the irrigation efficiency. For the period prior to 2000, when field crops were predominant, sprinkler irrigation was widely used and the average irrigation efficiency was about 67 percent. This means that the estimated pumpage was about 67,000 acre-feet per year in 1975 and about 73,000 acre- feet in 1987. During 1995-98, the pumpage averaged about 40,000 acre-feet per year. In 2002, the pumpage was about only 14,000 acre-feet. By 2014, orchards were predominant. For drip irrigation, the average irrigation efficiency is about 85 percent. This means that the estimated pumpage was about 39,000 acre-feet per year in 2014, about 49,000 acre-feet per year in 2016, and about 54,000 acre-feet per year in 2019.

Losses of Well Production, Air Production, and Well Plugging

There have been reports of significant decreases in pumping rates with the falling water levels in Pleasant Valley. These decreases can be caused by several factors. One is a decreased pump capacity with increased pumping levels. The flatter the pump curve is, the less water the pump can produce with a greater pumping level. If pump curves and perforated intervals are available for specific wells, one can determine whether or not the pump is the problem for the decreased pumping rate.

Another factor is increased air production with declining pumping levels. In general, the deeper the pumping level is below the top of the perforations, the more air that can be produced. Because there are clay layers at various depths, groundwater can be perched above these layers, and where perforations or other openings are present in the well casing, water can enter the casing and fall down the well. This water is termed falling water or cascading water, and air is commonly entrained in the water.

Recent Transducer Measurements

Appendix G contains hydrographs based on transducer measurements for 20 wells in the PVWD. Many of these wells with transducer hydrographs are deep wells (more than about 1,200 feet deep). In contrast to the long-term hydrographs, which are based only on static water levels, the transducer hydrographs show both static and pumping levels. The drawdowns during pumping can be readily determined by subtracting the shallowest levels from the deeper levels. **Figure 3-25** is a transducer hydrograph for Well T20S/R15E-16HI. Static levels are the shallowest levels and in this well, the level ranged from about 485 to 500 feet deep during July 2019 to April 2021. The pumping levels ranged from about 580 to 660 feet during this period. Drawdowns during pumping ranged from about 100 to 150 feet. The drawdowns can be variable for wells equipped with variable speed pumps, that may not have constant pumping rates. Of particular interest are the shallowest static water levels each year. For Well 16Hl, the shallowest static level was about 481.8 feet on December 31, 2019, and 490.9 feet on November 30, 2020. This indicates a 9.1-foot water level decline in one year. Water levels shown in **Figure 3-25** are well above the perforated interval of the well. Thus, there would have been no reduction in the saturated thickness of the deposits tapped by the well. In this case, the only reason for a decrease in specific capacity would be well plugging.

Flowmeters have been installed at a number of wells with transducers, and pumping rates can be readily determined and plotted on the hydrographs. This allows one to determine the specific capacity (pumping rate divided by drawdown). Reductions in specific capacities are an indication of well plugging, in cases where the water level is under pressure.

Figure 3-26 is a water-level hydrograph for another well (T20S/R15E-26Ql), that has pumping levels well below the top of the perforations. In such cases, specific capacities could decrease over the long term due to water-level declines and a decreasing saturated thickness of the aquifer. For Well T20S/R15E-26Ql, the pumping levels have been about 800 feet deep, which is almost 400 feet below the top of the

perforations. This is a very conducive situation for having an air problem. The drawdowns in this well have approached 400 feet, which are considered very large. Plugging, commonly due to calcium carbonate encrustation or biological plugging, can exacerbate air production problems by increasing the drawdowns in wells.

Drawdowns in the wells equipped with transducers have been as small as 15 to 25 feet (indicative of either unconfined conditions or very low pumping rates) to as high as 400 feet (indicative of a confined aquifer). Drawdowns in many of the wells with transducers ranged from about 100 to 200 feet.

A comparison of the shallowest levels each year indicated annual water-level declines ranging from about six to twelve feet per year (within the past two or three years).

Hydrographs depicting long-term groundwater elevations in the Subbasin are presented in **Appendix F**.

Well Plugging

Well plugging due to encrustation is common, particularly for wells that are idle for long periods. Drawdowns in wells are due to 1) formation losses (occurring outside of the well casing and gravel pack), and 2) plugging of the perforations. The drawdowns due to formation losses are directly related to the pumping rate. That is, if the pumping rate is doubled, the drawdown is doubled. In contrast to this, the drawdowns due to well losses are directly related to the square of the pumping rate. Well losses can be considered as friction losses and turbulent flow, which is enhanced by well plugging. Well efficiency is often used to show the extent of well plugging. A 100 percent efficient well would have no well losses. Well efficiencies were determined for hundreds of wells in the west part of the San Joaquin Valley in the 1990s as part of a PG&E energy rebate program. Conventionally constructed wells had average efficiencies of about 50 percent. These wells generally had inferior well gravel and were constructed with inferior well development techniques. In contrast, wells constructed with better gravel and better drilling and development techniques had well efficiencies averaging about 90 percent.

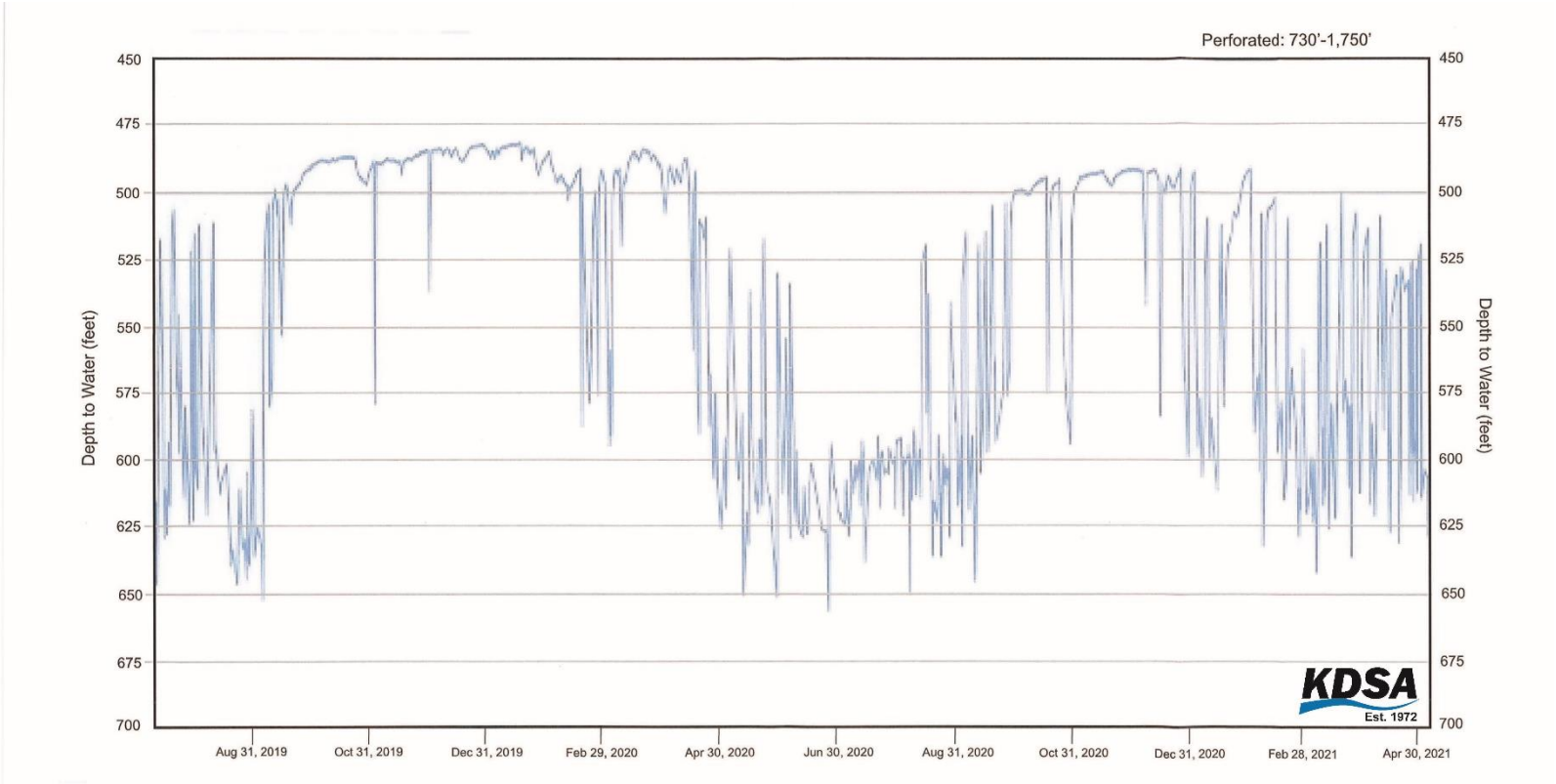


Figure 3-25 Transducer Water-Level Hydrograph for Well T20S/R15E-16H1

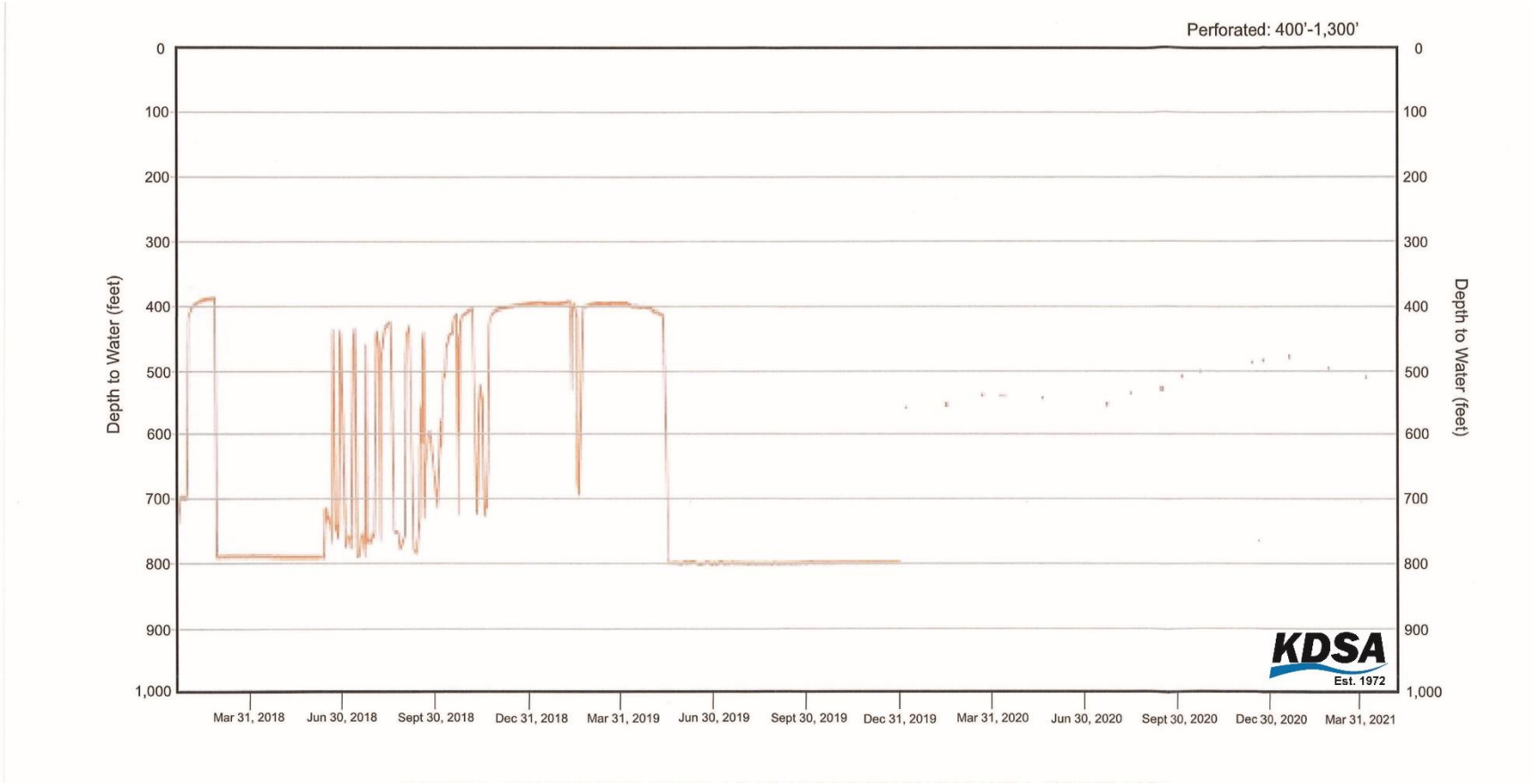


Figure 3-26 Transducer Water-Level Hydrograph for Well T20S/15E-26Q1

Well Efficiencies

Well efficiencies can be determined from step drawdown tests.Thus an evaluation was done of step tests that are available for wells in the valley. Step drawdown tests from which well efficiency can be determined were available for 14 wells that were constructed since 2000. Well efficiencies are the percentage of the drawdown due to formation losses, as opposed to well losses. The equation used is:

$$s = AQ + BQ^2,$$

where s= drawdown in feet
Q = pumping rate in cfs

The formation loss part of the drawdown (A) is directly related to the pumping rate, while the well loss part of the drawdown (B) is directly related to the square of the pumping rate. Most of the step tests in Pleasant Valley were done during or after 2011. **Table 3-2** summarizes the results of the evaluation. The range in well efficiencies (45 to 87 percent) is considered typical for wells tapping alluvial deposits in the San Joaquin Valley. Relatively high well efficiencies (75 to 87 percent) were indicated for eight wells. Five of these are considered higher technology wells, where special drilling fluid handling, gravel gradation, and well development techniques were used, whereas the other three of these are considered conventional wells.

In contrast, four wells had well efficiencies ranging from 45 to 54 percent, which are considered relatively low. Of these four wells, two were higher technology wells and the other two were conventional wells. Two other wells had well efficiencies ranging from 63 to 70 percent, which are considered moderate. The average well efficiency in Pleasant Valley when the wells were new was 70 percent.

Efficiencies of wells that are not new could be considerably less than the values discussed for new wells. This means that more than half of the drawdowns for wells could be due to well losses, which can be minimized by good management. Determination of specific capacities from transducer measurements can provide a periodic review of possible well losses.

Table 3-2 Well Efficiencies in Pleasant Valley

State Well Location	Local No.	Perforated Interval (ft)	Date of Test	Pumping Rate (gpm)	Well Efficiency (%)
T20S/R15E-16C	Dust Bowl No. 2	740-1,760	Dec 2011	2,500-3,500	54
T20S/R15E-22E	HTW Farms	686-2,070	Oct 2016	1,500-3,000	83
T20S/Rl5E-26P	Valley Nut Growers No. 3	660-800 & 845-1,625	Mar 2011	1,000-1,400	63
T20S/R15E-32C	City of Coalinga No. 3	400-1,115	Aug 2012	585-945	75
T20S/R15E-35J	PV Pistachios No.1	360-972	Feb 2011	1,500-3,000	77
T20S/R16E-21R	Turk SP Well No. 5	675-1,300	Oct 2018	700-1,500	70
T20S/R16E-30Q	Turk SP Well No. 3	470-710	May 2011	600-1,000	45
T21S/R15E-2B	Valley Nut Growers No. 1	460-780	Oct 2011	1,006-2,000	87
T21S/R15E-12C	Jacalitos Ck Pist	557-1,200	Jun 2019	1,000-1,500	87
T21S/Rl5E-12L	Jacalitos Ck Pist 3	435-952	Dec 2015	1,400-2,200	75
T21S/R16E-8H	Devine Farms AS&R	500-1,000	Nov 2000	2,000-3,000	82
T21S/R16E-10L	Double D Farms	570-1,730	Oct 2013	1,200-1,800	85
T21S/R16E-16J	Kreyenhagen Farm No. 1	600-1,960	Dec 2014	1,245-2,730	47
T21S/R16E-16J	RTS C-16	460-750 & 810-1,130	Dec 2008	900-1,500	52

Vertical Gradients

Vertical (downward) head gradients are downward in most of the San Joaquin Valley. In some areas of the San Joaquin Valley, vertical gradients vary considerably, and it has been shown that they vary through time with lesser vertical gradients generally in the winter and early spring and increased gradients during summer months with increased pumping.

At this time, the existence and magnitude of vertical gradients within Subbasin are a data gap and will be assessed in the future as data become available.

3.2.3 Estimate of Groundwater Storage Change

Regulation Requirements:
§354.16(b) A graph depicting estimates of the change in groundwater in storage, based on data, demonstrating the annual and cumulative change in the volume of groundwater in storage between seasonal high groundwater conditions, including the annual groundwater use and water year type.

The process for calculating storage change between two given years can be summarized in the following steps:

1. Determine the difference in the average aquifer volumes between any two years by the differences in groundwater level between the two years at specific wells; and
2. Multiply the resulting water-level change by the specific yield to calculate storage change between the two years.

A map of the estimated specific yield values based on Williamson and other (1989) estimates for the Subbasin was prepared as part of the HMC **Section 3.1** For the entire basin a specific yield value of 0.12 was calculated based on a weighted average of the specific yield values in **Figure 3-14.** This number falls within the ranges estimated by several others as discussed in **Section 3.3**

Historical Estimates

Historic estimated overdraft has ranged from 0 to 29,000 acre-feet per year (AF/yr). As was discussed in **Section 3.2.1** and shown on **Figure 3-24**, and as can be found later in **Table 3-3,** overdraft occurred during the periods from 1945 through 1951, from the 1960s through the 1980s and now more recently from 2006 to the present. There were periods when overdraft slowed and was essentially zero from 1937 through 1945 and then again from the 1980s through 2000.

The change in rates of decline in water levels, either flatter or steeper slopes of the line in the hydrographs, likely corresponds to changes in pumpage and recharge. At one time the area was heavily planted in cotton, and then there were more fallow areas. Then, many fallow or less intensively farmed areas were followed recently by large areas of pistachios, which take many years to mature and reach full water demand.

Simplified Method by Change in Level in Wells

Groundwater storage change was etimated for the period of 2017 to 2021, which was selected to be the most recent period for determining overdraft (see **Section 3.3**). The average difference between groundwater levels between 2017 and 2021 was calculated at approximately 40 feet for the area identified by the maps in the Subbasin. The area covers approximately 27,000 acres of the basin. The difference was calcualted for each well and then an average taken of the wells with data. Since this number can only be calculated where groundwater information for both years is available, the portions of the Subbasin where water level

measurements were lacking (i.e., northwest and southern portions of the Subbasin) are not included in the average depth difference.

Using the method described above, the average depth to water difference, the total area of the Subbasin for which there is data is about 27,000 acres, with the specific yield value of 0.12. A storage change was estimated for the Subbasin to be approximately 130,000 acre-feet (AF) during the period from Spring 2017 to Spring 2021, or an average of about 30,000 AF/year.

Change in Groundwater Elevation Surface
Estimates of year-to-year storage change (annual storage change) can be found in **Table 3-3**. Cumulative change in storage has not been computed but could be estimated based upon **Table 3-3** as well.

3.2.4 Seawater Intrusion

Regulation Requirements:
§354.16(c) Seawater intrusion conditions in the basin, including maps and cross-sections of the seawater intrusion front for each principal aquifer.

By definition, seawater intrusion occurs when saline water from the ocean infiltrates the groundwater system and begins to flow into areas of freshwater due to water level decline, in many cases caused by groundwater pumping. The Coastal Range lies between the Central Valley and the Pacific Ocean. The Subbasin is over 100 miles from the Sacramento-San Joaquin Delta, which would be the only means for seawater to enter the Central Valley. Due to the great distance and the current groundwater elevations, the Subbasin does not need to account for seawater intrusion.

3.2.5 Groundwater Quality Issues

Regulation Requirements:
§354.16(d) 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.

Kahanovitz and Manning (1954) reported that the total dissolved solids (TDS) concentrations ranged from about 1,200 to 2,000 mg/1 and boron concentrations ranged from about 1.5 to 5.2 mg/1 in groundwater in Pleasant Valley as of the 1950s. The alluvium in Pleasant Valley contains significant amounts of gypsum, and much of the groundwater is of the calcium-sodium sulfate type. Hydro Development Inc. (1969) reported on the results of sampling water from a 3,000-feet deep test hole in Section 9, T21S/R15E. The results of this hole indicated that the chemical quality of groundwater below a depth of 1,500 feet and above a depth of 2,400 feet at this location was similar to that pumped from most wells in the valley, which were less than about 1,000 feet deep at that time. Water samples were collected from three depth intervals between 1,874 and 2,427 feet in depth. TDS concentrations ranged from 1,007 to 1,629 mg/1 and were lowest (less than 1,030 mg/1) in samples from above a depth of 2,150 feet. The waters were of the sodium sulfate type, and boron concentrations ranged from 0.6 to 0.8 mg/1.

As part of an AB3030 grant funded study, water samples were collected from 16 wells in the valley during 2004-5. Chemical analyses were available for an additional 53 wells. Electrical conductivities of well water were shown in **Figure 3-27** by Provost & Pritchard. Electrical conductivities ranged from about 1,600 to 3,560 micromhos/cm at 25°C. These are equivalent to TDS concentrations of about 1,070 to 2,370 mg/l. Moderate problems for micro-plugging of drip irrigation systems can occur when

TDS concentrations exceed 500 mg/l, and severe problems can occur when TDS concentrations exceed 2,000 mg/l. The highest ECs were generally in water from wells within a few miles of Jayne Avenue, to the north and south.

Figure 3-28 shows boron concentrations in well water. Boron concentrations ranged from about 0.4 to 3.2 mg/1. The desirable boron concentration for boron sensitive crops is less than 0.5 mg/1. The lowest boron concentrations (0.4 to 0.8 mg/1) were found in water from wells near Zapato Chino Creek. As for TDS, the highest concentrations in water were from wells within about two miles of Jayne Avenue.

Figure 3-29 shows chloride concentrations in well water. Chloride concentrations ranged from 26 to 301 mg/1. The lowest concentrations (26 to 106 mg/1) were found near Zapato Chino Creek. The highest chloride concentrations were in wells within about two miles of Jayne Avenue. The desirable chloride concentration for irrigation for some crops is less than 106 mg/1. The recommended MCL for public water supplies is 500 mg/L. Sulfate concentrations in well water ranged from 251 to 1,910 mg/1 (**Figure 3-30**). The lowest sulfate concentrations (251 to 500 mg/1) were found in water from wells near Zapato Chino Creek. The highest sulfate concentrations were generally found in water from wells in the west part of the valley. Sulfate is generally not a concern for irrigation.

Problems can occur with plugging of drip systems for bicarbonate concentrations exceeding about 120 mg/1. Severe problems can occur when bicarbonate concentrations exceed about 245 mg/1. Of the wells sampled in 2004-05, almost all had bicarbonate concentrations exceeding 120 mg/1. Two of these wells had bicarbonate concentrations exceeding 245 mg/1.

In summary, the inorganic chemical quality of groundwater in Pleasant Valley is unsuitable for public supply and marginal for irrigation of some crops. The groundwater quality is generally suitable for irrigation of pistachios, except for the micro irrigation system plugging hazard. Moderate plugging problems are indicated when TDS concentrations exceed 500 mg/1 and bicarbonate concentrations exceed about 120 mg/1. Severe problems are indicated when TDS concentrations exceed 2,000 mg/1 and bicarbonate concentrations exceed about 245 mg/1.

3.2.5.1 Groundwater Quality - Historical Aspects

Provost & Pritchard (2005) provided a fairly comprehensive review of the available information on groundwater quality in Pleasant Valley Water District through 2005. Additional data covering other areas of the basin and data collected since 2005, though both limited, were gathered as part of this GSP.

Before the arrival of the Central Valley Project (CVP) water in the 1970s, the local groundwater was generally the only source of supply for agriculture, municipal, and industrial uses. It should be recognized that because of groundwater quality issues, drinking water has always been a problem in Pleasant Valley, and as a result Coalinga's drinking water has almost always been imported. Until 1972, every Coalinga residence had three water faucets in the kitchen; hot water, cold water, and drinking water. Until 1960 the major source of drinking water was water wells in Armona. This water was shipped to Coalinga in rail tank cars by Southern Pacific for distribution. In 1960, Coalinga was a site selected for experimental systems to desalt groundwater to a point where it was palatable for human consumption. The first of these was an ionic system that was later replaced by the reverse osmosis method that was eventually to be commonly used throughout the world to convert even sea water to a drinkable state. A separate irrigation system was also plumbed to the residences within the city to allow for untreated groundwater to be used for irrigation. This separate system was used until 1972 when Coalinga received its first delivery of Central Valley Project surface water (Davis, Green, Olmsted, & Brown, 1959).

The City of Coalinga's 2015 Draft Urban Water Management Plan (City of Coalinga, 2015) indicated:

- *Due to the poor groundwater quality in the area, all potable water utilized by the City of Coalinga is imported through the federal Central Valley Project (CVP) – U.S. Bureau of Reclamation (Reclamation).*
- *The City of Coalinga does not currently use groundwater as part of its potable water supply as groundwater in the area is unsuitable for drinking without treatment or blending. Due to poor groundwater quality, potable water utilized by the City consists of surface water from the California Aqueduct that is treated at the City's surface water treatment plant.*
- *The City's groundwater is of poor quality due to the high concentrations of sodium, sulfates and total dissolved solids (TDS). This condition occurs at depths between 500 and 1,500 feet; therefore, groundwater is not considered a viable source of potable water within the Coalinga planning area.*
- *Due to the poor groundwater quality in the area, the City of Coalinga intends to meet its projected water demands through the continued use of surface water alone.*

3.2.5.2 Groundwater Quality - Contemporary Aspects

While current day groundwater levels are lower than in the early-to-mid-1900s, groundwater quality in the Subbasin has apparently not changed significantly. The groundwater in much of the Subbasin is of moderate to high salinity and has high concentrations of sodium and sulfate. Furthermore, from the experience of the major agricultural operations in the valley, the total salt content and the potential for micro plugging of irrigation systems due to high bicarbonate and pH in the groundwater are the most limiting factor for irrigation use in the area.

Groundwater Quality in Zapato Chino Area

Based on the 2005 water quality study (P&P, 2005), EC and Sulfate were identified as the main conditions of concern with regards to drinking water standards. Boron and Chloride were identified as chemicals of concern with regards to USBR quality standards for acceptance into the Coalinga Cannel, which is principally an issue only if future management plans call for groundwater to be pumped from Pleasant Valley and transported via the canal, which at one time was being considered for a proposed water banking project along Zapato Chino Creek. This is now considered unlikely due to the area being planted in permanent crops and as surface water is being brought into Pleasant Valley via pipeline for recharge or direct irrigation of crops. At the time, the area along Zapato Chino Creek was a potentially favorable area for recharge as it appeared to be an area of better groundwater quality and was closer to the Coalinga Canal than other areas in Pleasant Valley. As described below, the 2005 water quality study generally indicates that groundwater quality in the area around Zapato Chino Creek is of higher quality than the other areas within the Subbasin.

Electrical Conductivity (EC)

California drinking water standards list an upper secondary MCL of 1,600 micromhos/cm for EC. An EC values map is presented as **Figure 3-27**. As shown on the map, EC values less than 1,600 micromhos/cm are generally found around Zapato Chino Creek. EC values in other areas of the Subbasin ranged between 1,601 to 3,560 micromhos/cm.

Bicarbonate

One of the most common problems with irrigation water is excess bicarbonates. Bicarbonates get into water when it passes through a calcium carbonate or magnesium carbonate (limestone or dolomite) rock formation. The stone dissolves into calcium and/or magnesium ions and bicarbonate ions.

Sodium Adsorption Ratio (SAR)

High sodium ions in water affects the permeability of soil and causes infiltration problems. This is because sodium when present in the soil in exchangeable form replaces calcium and magnesium

adsorbed on the soil clays and causes dispersion of soil particles (i.e., if calcium and magnesium are the predominant cations adsorbed on the soil exchange complex, the soil tends to have a permeable and granular structure).

This dispersion results in the breakdown of soil aggregates. The soil becomes hard and compact when dry and reduces infiltration rates of water and air into the soil affecting its structure.

This problem is also related to salinity and type of soil. For example, sandy soils may not get damaged as easily as other heavier soils when it is irrigated with a high SAR water.

pH

Water quality is a key factor affecting pH and nutritional management in crops. Water pH is important for crop management. Water pH affects the solubility of fertilizers and the efficacy of insecticides and fungicides before they are applied to the crop. Generally, the higher the water pH is, then lower the solubility of these materials.

Boron

There are no California drinking water standards for Boron; however, concentrations above 0.5 mg/L have been recognized as detrimental to boron sensitive crops. The USBR Water Quality Standards for Acceptance of Water into the Coalinga Canal is 0.8 mg/L. As shown on **Figure 3-28**, boron concentrations of 0.4 to 0.8 are generally found around Zapato Chino Creek. Boron concentrations in other areas of the Subbasin ranged between 0.81 to 3.20 mg/L.

Chloride

California drinking water standards list an upper secondary MCL for chloride of 500 mg/L. Concentrations above 105 mg/L have been recognized as detrimental to yield for certain crops such as almonds. The USBR Water Quality Standard for Acceptance of Water into the Coalinga Canal is 106 mg/L. As shown on **Figure 3-29**, chloride concentrations ranging from 26 to 106 mg/L have been found in groundwater in the general areas around Zapato Chino Creek. Chloride concentrations in other areas of the Subbasin have concentrations that ranged from 107 to 301 mg/L.

Sulfate

California drinking water standards list an upper secondary MCL for sulfate of 500 mg/L. The USBR Water Quality Standard for Acceptance of Water into the Coalinga Canal is 250 mg/L for sulfate. As shown on **Figure 3-30**, sulfate concentrations ranged from 251 mg/L to 500 mg/L have been detected in groundwater in the general areas around Zapato Chino Creek. Sulfate concentrations in other areas of the Subbasin have concentrations that ranged from 601 to 1,910 mg/L.

Groundwater Ambient Monitoring and Assessment Program

A review of the California Water Boards GAMA Groundwater Information System (https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/) indicates that pesticides 1,2-Dibromo-3-chloropropane (DBCP) and 1,2,3-Trichloropropane (1,2,3-TCP), or naturally occurring uranium, are not groundwater issues within the Pleasant Valley Subbasin, as they are within other parts of the San Joaquin Valley.

Lost Hills Community

Fresno County provided information from well permits and subsequently performed one-time sampling of six domestic wells in the rural residential "Lost Hills Community" (**Figure 3-27** through **Figure 3-30** show location of the Lost Hills Community) at the time of well construction for the years 1993 to 1999. The Lost Hills Community is located along State Route 33 (Lost Hills Road) and approximately 12 miles southeast of

the City of Coalinga and approximately one-mile northwest of the Kings County line. The community includes 172 parcels totaling approximately 162 acres, though only a portion of the parcels are developed. Private wells provide water to the residents of the community and only one well drilling permit was approved for a mobile home from 2009 to 2019. Groundwater analytical results for the sampled domestic wells indicated that chemicals of concern for groundwater in this area included:

- Nitrate as NO3, ranging from 9 mg/L to 64 mg/L (California Drinking Water Standard MCL of 45 mg/L), with one well out of the six sampled exceeding the MCL;
- Sulfate, ranging from 385 mg/L to 926 mg/L (California Drinking Water Standard Secondary MCL of 500 mg/L), with four wells out of the six sampled exceeding the MCL; and
- EC, ranging from 1050 micromhos/cm to 1850 micromhos/cm (California Drinking Water Standard Secondary MCL of 1600 micromhos/cm) with three wells out of the six sampled exceeding the MCL.

Summary

In summary, the groundwater in Pleasant Valley is generally of poor quality for drinking water. The area has been known to have poor quality drinking water for many years. These conditions are the result of natural processes, and groundwater treatment is not practical on a large scale.

However, with proper irrigation management, the Pleasant Valley groundwater is usable for irrigation of some crops. Landowners select crops that are somewhat tolerant to salinity. Crops like cotton and hay and now pistachios have been planted in Pleasant Valley since they are more tolerant to salinity and boron. Pistachios also have the ability to tolerate much higher levels of boron than other crops.

3.2.5.3 Oil and Gas Fields

Oil fields in the Subbasin around the City of Coalinga have been in production since about 1909 with the first well drilled in the area in 1887. Large quantities of salt water are usually associated with the oil reservoir. Since the water is typically under pressure, as oil is produced, the water follows the oil, causing this salt water or brine to also come to the surface with the oil. Prior to approximately the 1950s, brine that came up with the oil or gas was at times sprinkled on the ground in the hills in the oil fields or placed in unlined oilfield sumps. The oilfield sumps were open depressions used to separate the oil and water mixture. Depending on the configuration of these sumps, the brine sprinkled on the ground or placed in the sumps could over time have percolated to the groundwater. In 1964, there were approximately 17 sumps being used for water disposal with an average areal size of one acre each (McIntyre, Meffley, & Stetson, 1964). Ponds are apparently no longer used. Based on a review of aerial photographs, several ponds are observable today. A map of the oil field locations is presented in **Chapter 2** as **Figure 2-10**.

Today, steam injection wells may be used to assist in the production of oil and to dispose of the brine which may come to the surface. This water is supposed to be injected much deeper than the useable groundwater. The process is highly regulated and a cement seal is placed outside the well casing from the surface to the base of the fresh water to prevent the brine from contaminating the useable groundwater. Of note, the California Division of Oil and Gas has maintained an office in Coalinga since 1918 for the supervision of the oil and gas industry. Current information on the oil field operations has been requested from the oil companies, but as of the date of the GSP, no additional information has been provided. This discussion is for general information only to provide some context on the historical development and history of the area. Produced water from oil operations is not regulated under SGMA and both the produced water and any water placed in ponds has been regulated by the State of California Division of Oil and Gas and any percolated water has been required to recharge lower geologic formations and not those geologic formations that contribute to water production from the Pleasant Valley Subbasin.

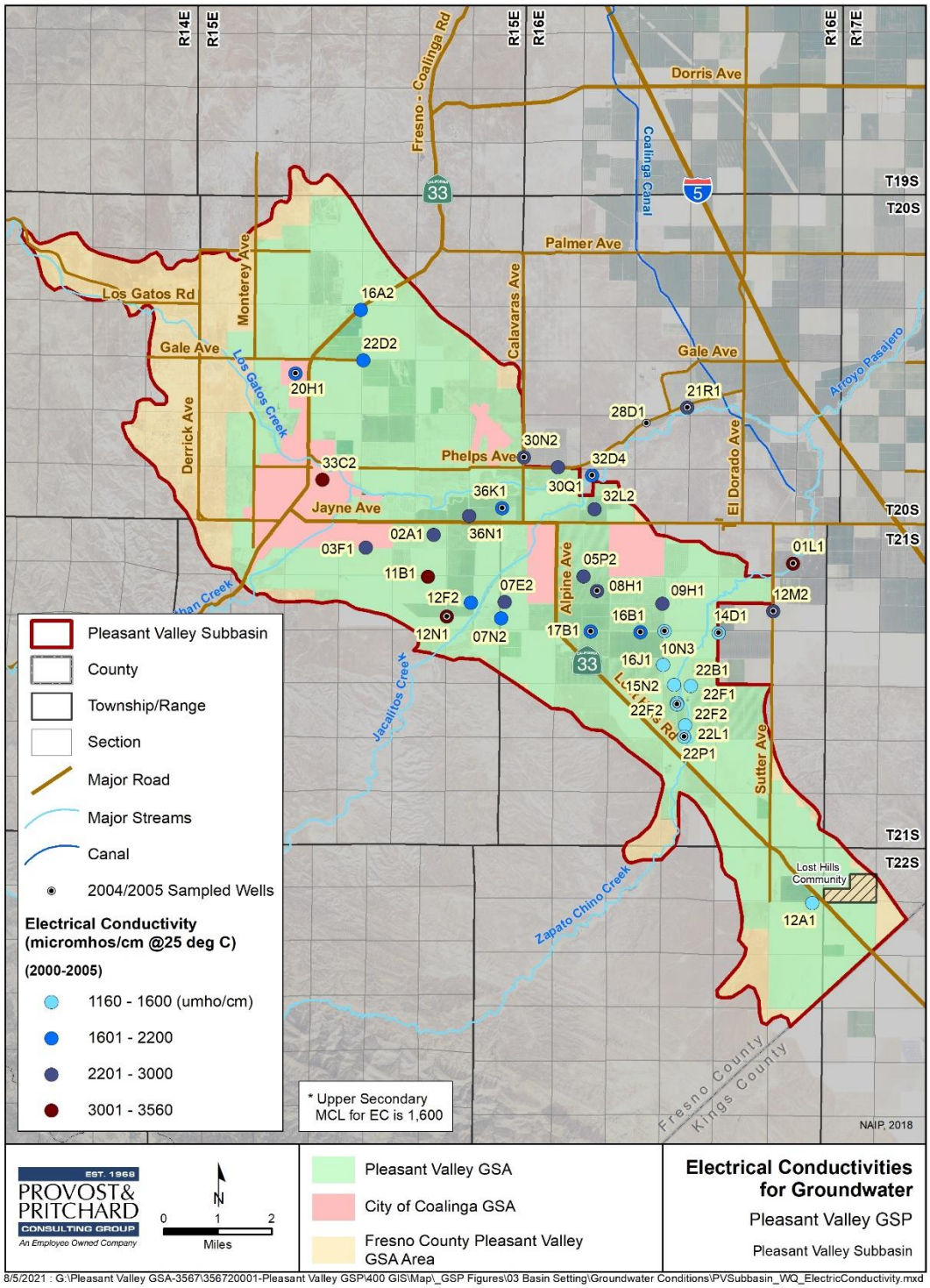


Figure 3-27 Electrical Conductivities for Groundwater

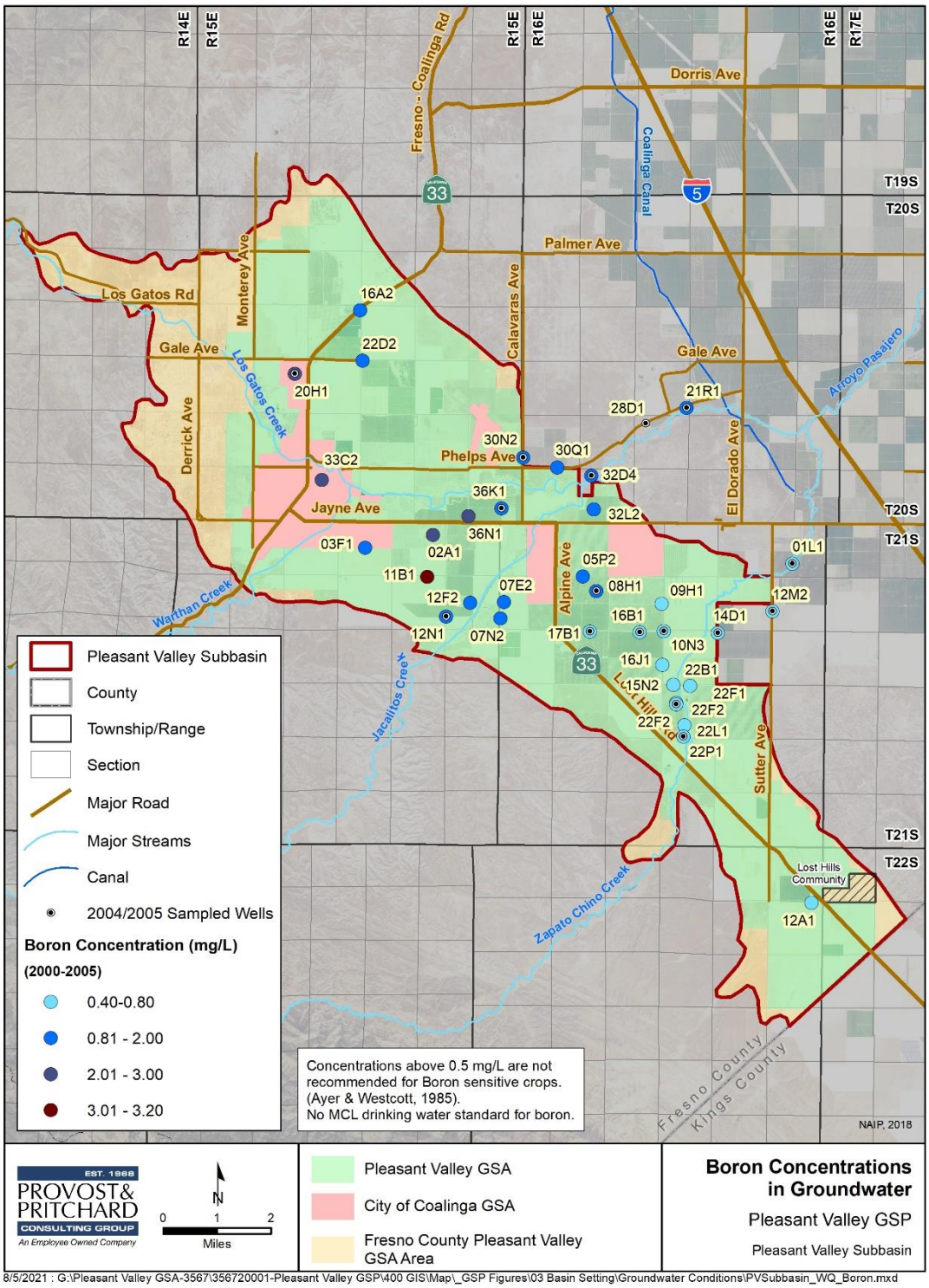


Figure 3-28 Boron Concentrations in Groundwater

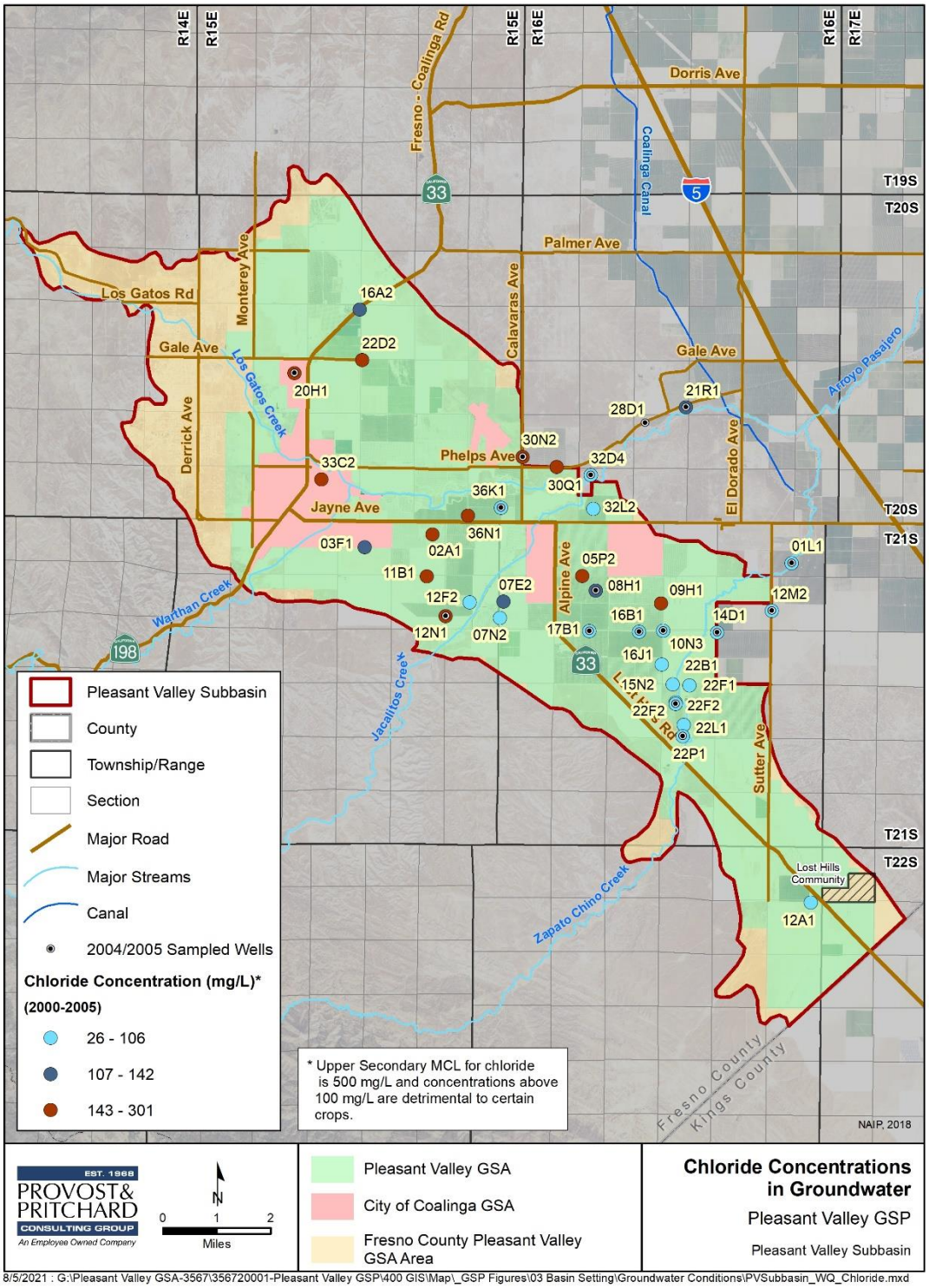


Figure 3-29 Chloride Concentrations in Groundwater

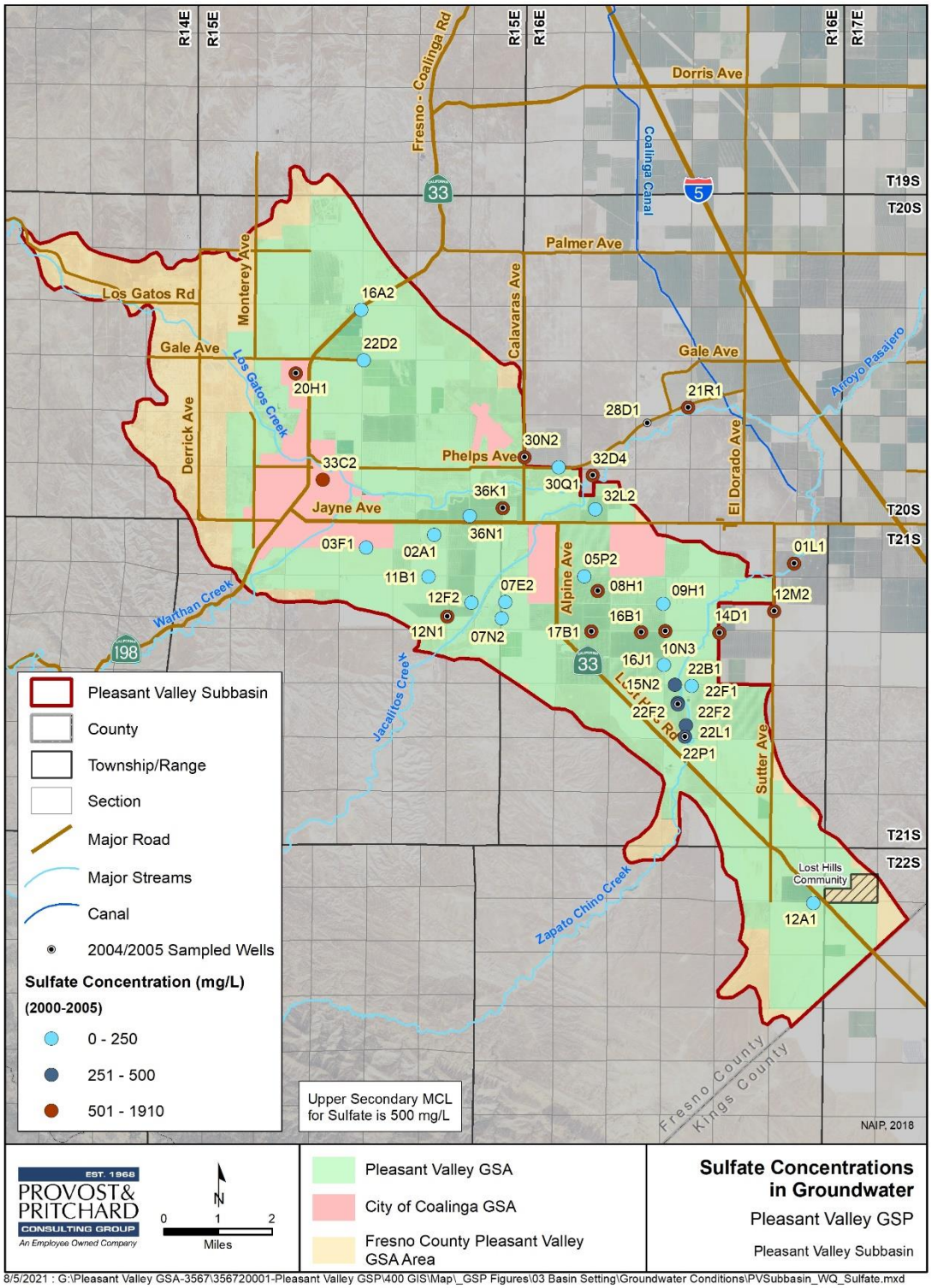


Figure 3-30 Sulfate Concentrations in Groundwater

3.2.6 Land Subsidence

Regulation Requirements:
§354.16(e) The extent, cumulative total, and annual rate of land subsidence, including maps depicting total subsidence, utilizing data available from the Department, as specified in Section 353.2, or best available information.

Relative subsidence or land surface elevation changes in Subbasin could be the result of a combination of a number of activities, including groundwater pumping, tectonic activity, and to lesser extent possibly oil pumping. To date, measured subsidence in recent years is considered small and no long-term data are available.

Land subsidence can occur when groundwater levels decline due to excessive withdrawals of groundwater. There are two types of subsidence due to excessive withdrawals of groundwater from the groundwater aquifer: elastic and inelastic. The majority of elastic subsidence occurs in the coarser-grained deposits, sands, and gravels and is recoverable if water levels later rise. Inelastic subsidence is caused by the rearrangement of clay minerals, especially montmorillonite, and is permanent.

Although there are several causes of inelastic land subsidence, the compression of clay as a result of groundwater extraction from confined aquifers is the cause of the vast majority of subsidence documented in the San Joaquin Valley. This results in compaction of fine-grained confining beds (clays) predominately within the confined portion of the aquifer system as water is removed from pores between the sediment grains. Once water is squeezed out of the compressible clay, the clay compacts, resulting in the lowering of the overlying land surface. The compressed clays, in which the clay particles have been re-arranged, can no longer re-absorb water, thus the subsidence in these areas cannot be reversed. This process is known as aquifer system compaction.

The Corcoran clay has been mapped beneath much of the western side of the San Joaquin Valley and the aquifer beneath it is confined. Most of the permanent subsidence in the San Joaquin Valley has historically been correlated to overdraft in the confined aquifer below the Corcoran clay. The Corcoran clay does not underlie the Subbasin; however, other clays that can compact are present, particularly below a depth of about 1,000 feet.

Review of Existing Data

Available land subsidence data was reviewed to assist in determining what information is available. The effort included a review of hydrogeologic conditions, available recorded subsidence data, historic groundwater levels, historic infrastructure impacts, remote sensing data, and Continuous Global Positioning System stations. A summary of existing data is provided below. Refer to **Section 5.1.3 – Description of Monitoring Network** for detailed discussions on the technologies available for monitoring subsidence and the existing monitoring programs in the region.

Review of historic range of groundwater levels in the principal aquifer of the Subbasin.

Groundwater levels are discussed in **Section - 3.2.1 Groundwater Levels.** Groundwater levels have been declining, leading to the potential for land subsidence.

Review of historic records of infrastructure impacts, including, but not limited to, damage to pipelines, canals, roadways, or bridges, or well collapse potentially associated with land surface elevation changes.

There are no known infrastructure impacts in the Subbasin area.

Review of existing CGPS stations.

Continuous Global Positioning System (**CGPS**) stations can be used to monitor land subsidence. One CGPS station (CACO–IGS14) has Leica SmartNet North America network listed as the Observer/Agency and the data can be obtained from the Nevada Geodetic Laboratory. This station is located north of the City of Coalinga on the West Hills Community College Farm of the Future. Several other CGPS stations are located in the surrounding watersheds to monitor tectonic induced movement and are part of the Plate Boundary Observatory by UNAVCO, Inc. (**Figure 3-31 through Figure 3-33**).

Review of remote sensing results such as InSAR or other land surface monitoring data.

A review of existing land subsidence data from remote sensing is discussed below.

3.2.6.1 Subsidence Monitoring Results

No data collected prior to 2015 on subsidence were found during this assessment and there were no physical observations of subsidence either. For the Subbasin, Interferometric Synthetic Aperture Radar (**InSAR**) land subsidence data, provided by DWR, is available for the years 2015 through 2019. Continuous Global Positioning System Station (CGPS) data, provided by Nevada Geodetic Laboratory, is available from approximately the beginning of 2017 until the present. In the discussions and maps below, a decline in land surface elevation is reported as a negative number, and a rise in land elevation is shown as a positive number.

InSAR Subsidence Data represents measurements of vertical ground surface displacement rates derived from InSAR data that are collected by the European Space Agency Sentinel-1A satellite and processed by the National Aeronautics and Space Administration (**NASA**) Jet Propulsion Laboratory (**JPL**), under contract with to the DWR. GeoTIFF pixel values are in inches equal to the cumulative vertical displacement from the first date. The advantage of using the InSAR data is the ability to map surface deformation of a fraction of an inch over large areas at spatial resolutions of 100 feet or finer. These are the most recent data available that covers the Subbasin. "Uncertainties associated with the vertical displacement (subsidence/uplift) measurements were determined to be less than 1-inch and usually less than 0.5 inches" (Farr, Jones, & Liu, 2016).

As shown in **Figure 3-31**, from 2015 to 2017 subsidence ranged from 0 to 0.5 of an inch in the Subbasin.

As shown in **Figure 3-32**, similar measurements across the Subbasin are shown for the time period of 2015 to 2018. An area of measured subsidence of 0.5 inches to 0.99 of an inch was shown near the intersection of Jayne Avenue and Alpine Avenue. As shown on **Figure 3-33**, the reported area of subsidence of 0.5 to 0.99 of an inch has grown approximately four times larger by 2019. This area of apparent subsidence corresponds to the pumping depression shown in **Figure 3-21.**

CGPS data for the station located in Coalinga (**Figure 3-34**) shows measured subsidence of -24 millimeters (-0.94 of an inch) between January 2017 and July 2020.

In summary, land subsidence in the Basin has been smaller, has increased in recent years, and will continue to be monitored.

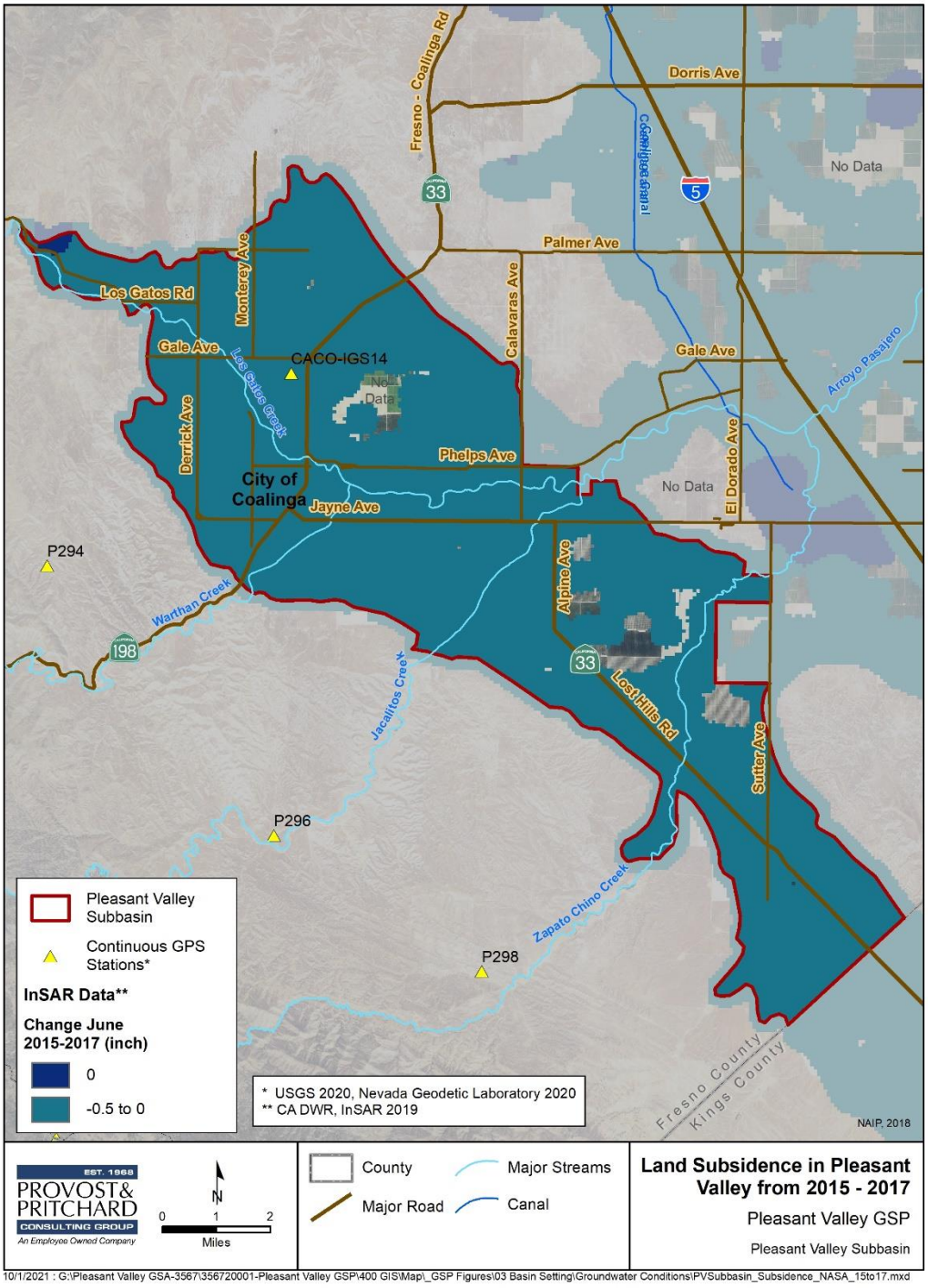


Figure 3-31 Regional Land Subsidence in Pleasant Valley from 2015 to 2017 (InSAR Data)

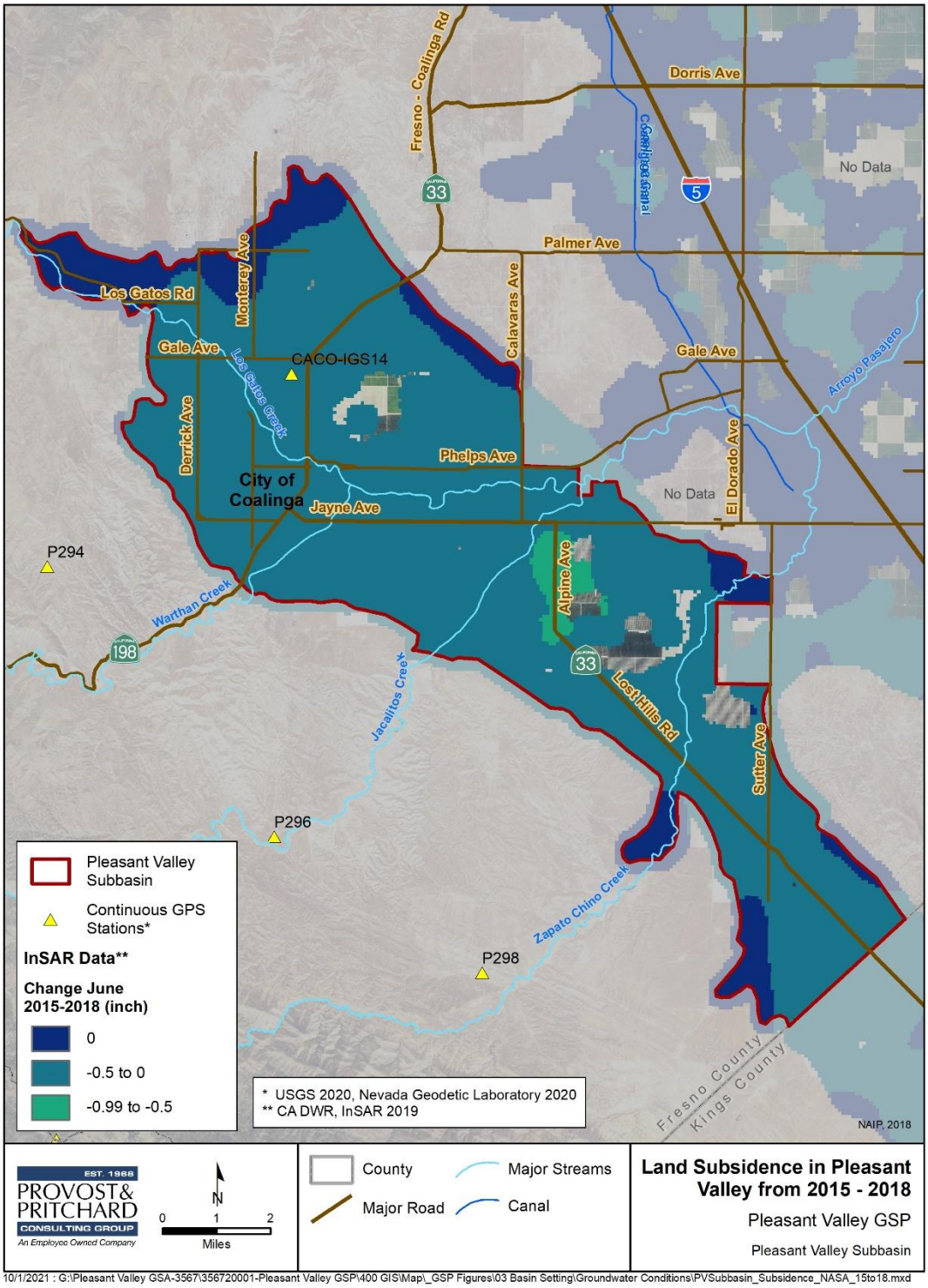


Figure 3-32 Regional Land Subsidence in Pleasant Valley from 2015 to 2018 (InSAR Data)

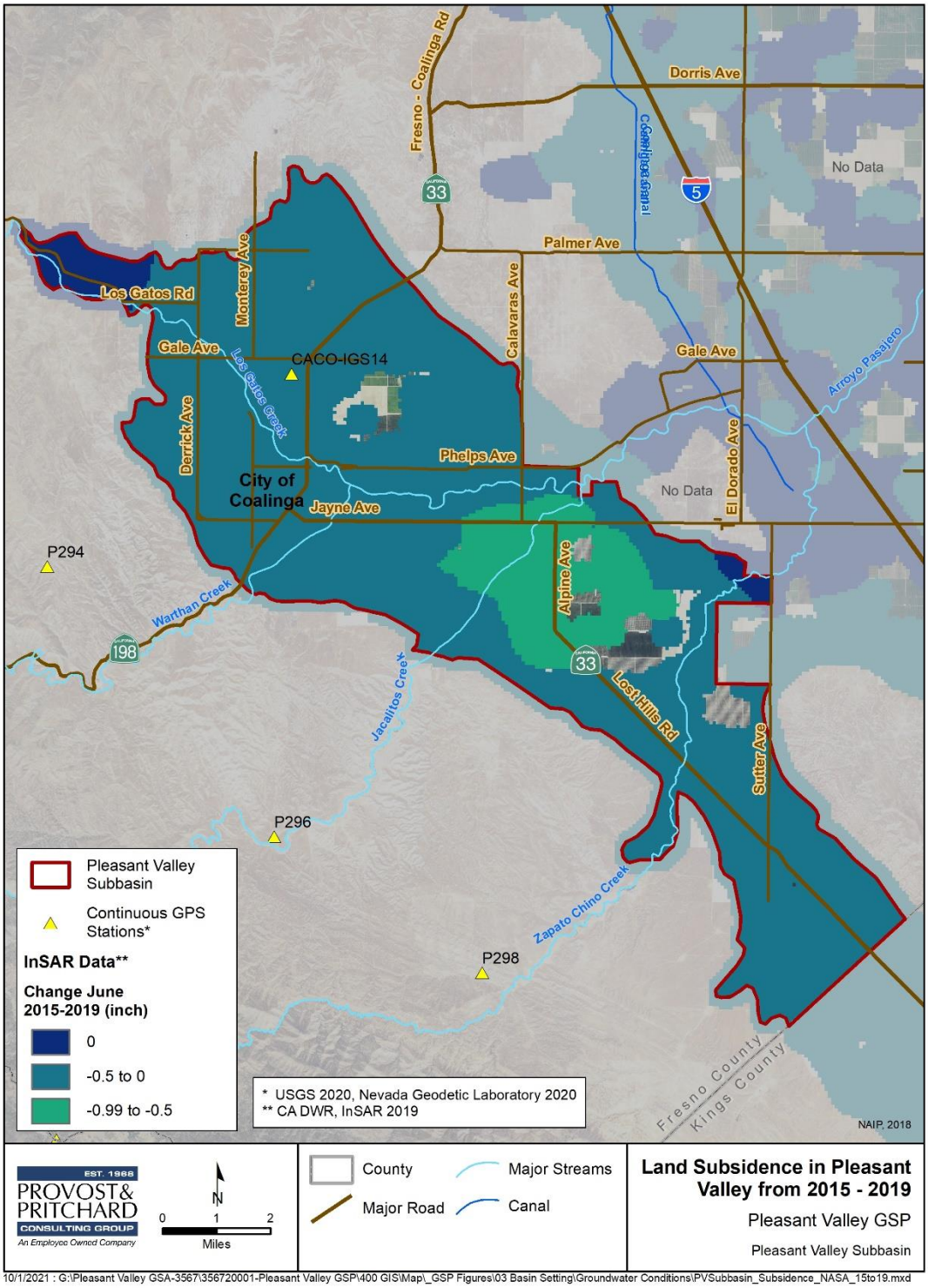


Figure 3-33 Regional Land Subsidence in Pleasant Valley from 2015 to 2019 (InSAR Data)

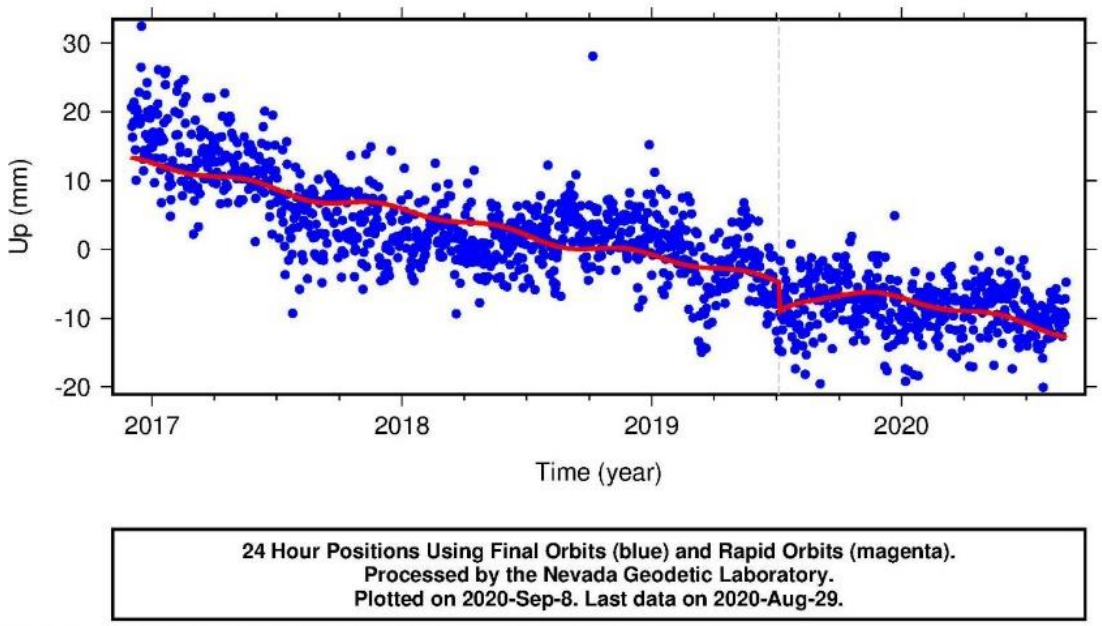


Figure 3-34 Nevada Geodetic Laboratory – Station CACO-IGS14 Subsidence Data (2017-2020)

3.2.7 Surface Water and Groundwater Interconnections

Regulation Requirements:
§354.16(f) Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or best available information.

SGMA Regulations require the GSA to quantify the volume or rate of surface water depletion caused by groundwater pumping in basins where surface water and groundwater are interconnected. Interconnected surface water systems are defined as surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer.

As discussed in other parts of this GSP, surface water within the Subbasin is limited to the local intermittent and perennial streams that flow generally from west to east through the Subbasin. Water only flows in the streams after periods of moderate or substantial rainfall, which typically only occurs between November and April. In between rain events the streams are typically dry. As a result, the streams can be dry any time of the year. Records for Los Gatos Creek show that, during significant droughts, no flow occurs for a period of 12 months or more.

Groundwater within the Subbasin is generally encountered at depths between 300 to 500 feet below ground. Due to the natural intermittent nature of surface water in the Subbasin and the depths to groundwater, the Subbasin does not have interconnected surface water and groundwater as defined in the SGMA regulations.

3.2.8 Groundwater Dependent Ecosystems

Regulation Requirements:
§354.16(g) Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or best available information.

Groundwater Dependent Ecosystems (**GDEs**) are defined under SGMA as "ecological communities of species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" (23 CCR § 351(m)). While GDEs are not one of the six groundwater conditions that can lead to undesirable results, they can be related to sustainable management criteria identified in Chapter 4. The Nature Conservancy's Natural Communities Dataset Viewer (https://gis.water.ca.gov/app/NCDatasetViewer/) (**NC**) Vegetative GDE and Wetland GDE map with basin-wide marked revisions is provided below as **Figure 3-35**. Recognizing that the Subbasin has a depth to groundwater greater than the generally accepted 30-foot proxy for confirming that polygons in the NC dataset are supported by groundwater, the GDEs identified in the NC Dataset Viewer are believed to be largely mischaracterized.

As a conservative approach, Spring 2019 depth to groundwater contours and NC Dataset Viewer GDEs were overlaid to identify NC Dataset Viewer called out GDEs in areas with depth to groundwater greater than 200 feet. By assigning a 200-foot vertical buffer, the assessment accounts for variability in rooting depth exceeding the reported deepest GDE rooting depth of thirty-feet. NC Dataset Viewer-called out GDEs located in areas with groundwater depths exceeding the 200-foot vertical buffer were categorized as "Incorrectly Characterized as a GDE" and are therefore rejected as potential GDEs. The aquifer is thinner near the edges of the Subbasin and the 200-foot vertical buffer may or may not be appropriate in the areas of limited to no information. The Subbasin GSAs will continue to investigate the areas indicated in **Figure 3-36** in order to fill the data gap. The areas in **Figure 3-36** are the only potential locations for GDEs in the Subbasin.

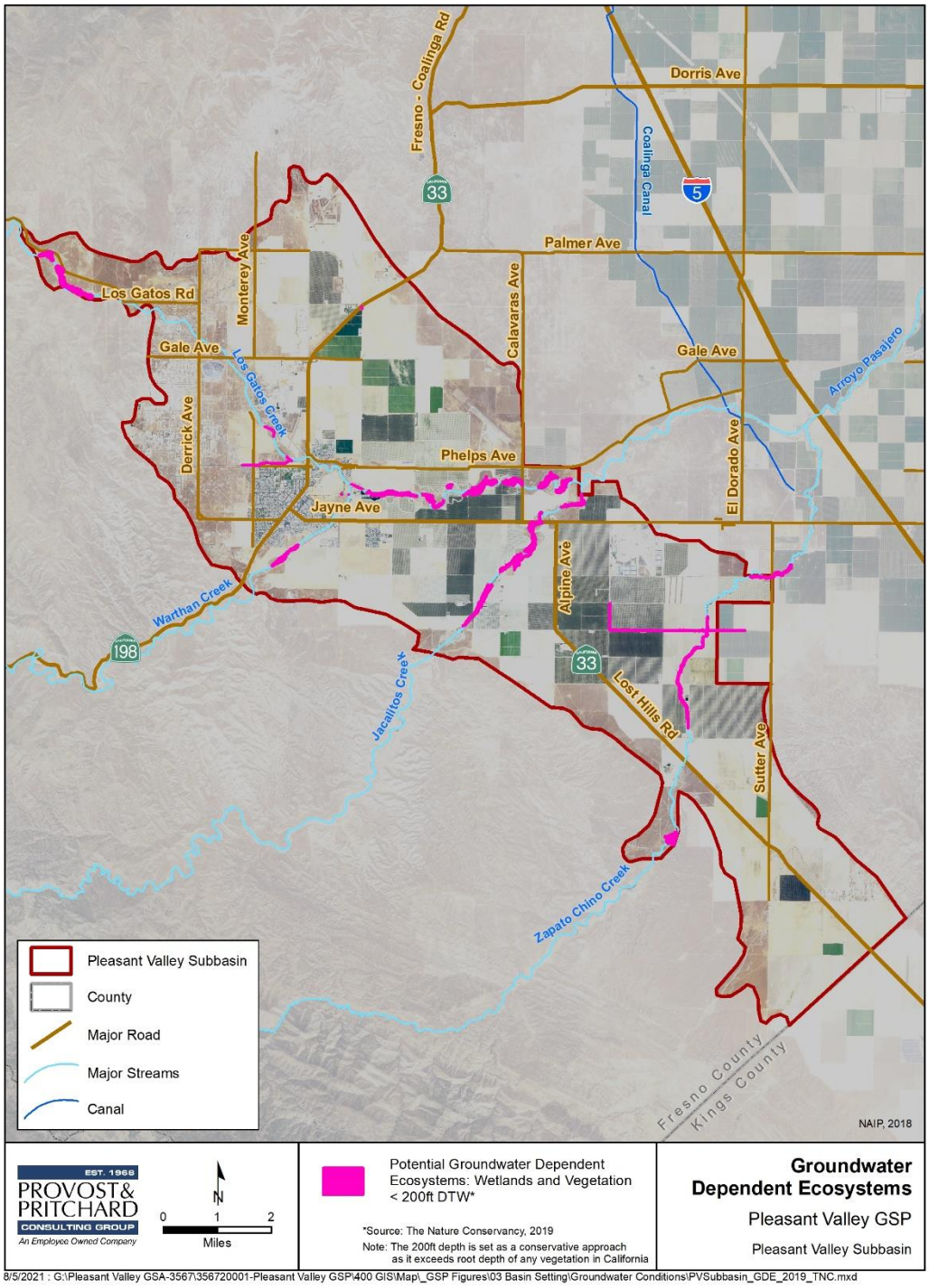


Figure 3-35 Potential Wetlands and Vegetation of Groundwater Dependent Ecosystems

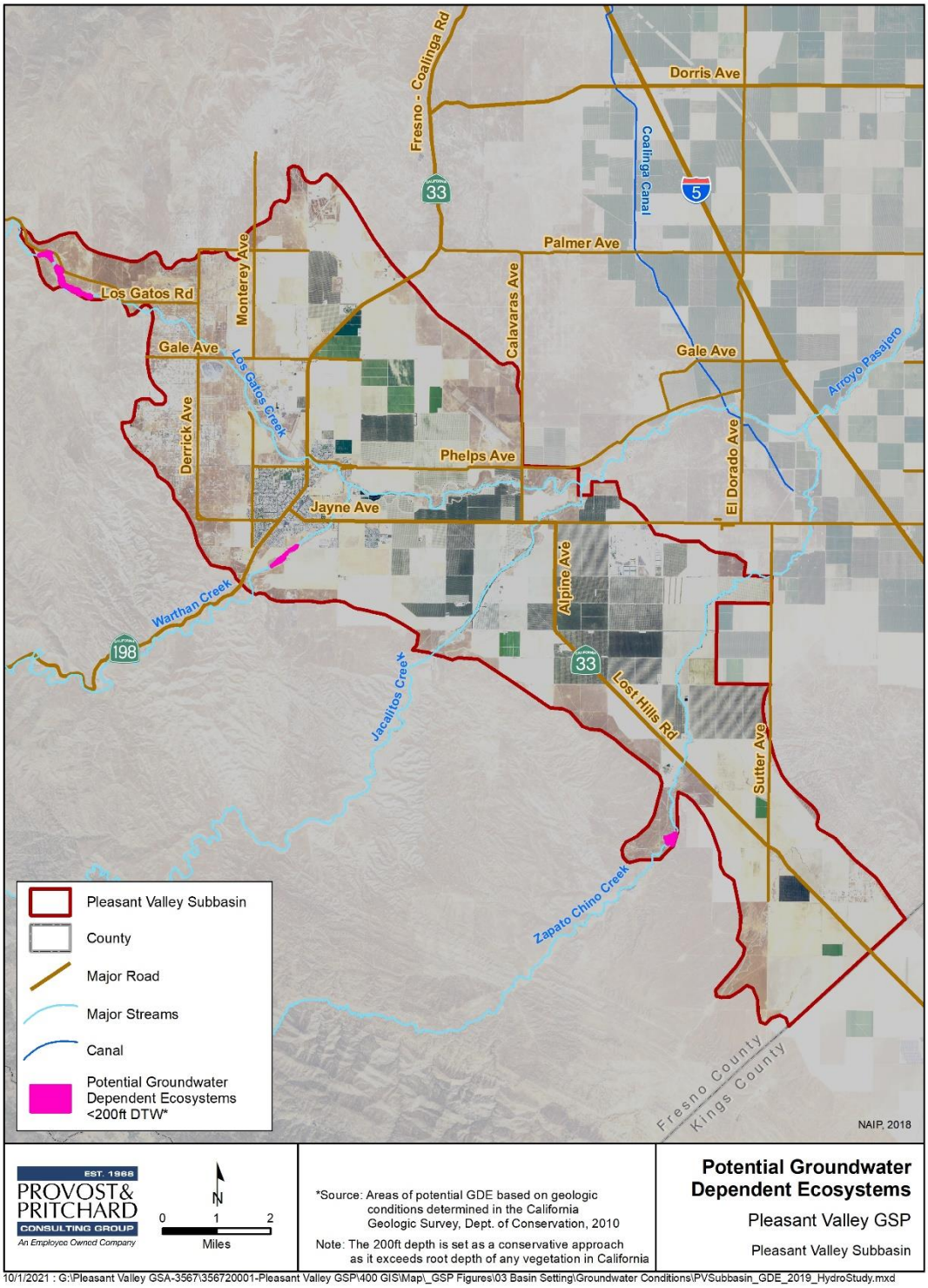


Figure 3-36 Potential Groundwater Dependent Ecosystems

3.3 Water Budget Information

3.3.1 Introduction

Regulation Requirements:
§354.18 (a) Each Plan shall include a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored. Water budget information shall be reported in tabular and graphical form.

A water budget is an accounting of all the water that flows into and out of a specified area and any resulting water storage change; it also describes the various components of the hydrologic cycle. Categories of a water budget includes all the water supplies, demands, groundwater recharge, and change in storage. A water budget can be used to identify how much water is stored in a groundwater system as well as changes in groundwater storage during a given period. The purpose of a water budget will be further explained in this section. A schematic diagram of a water budget indicating the primary inflows and outflows and impacts on the groundwater system is shown in **Figure 3-37** below:

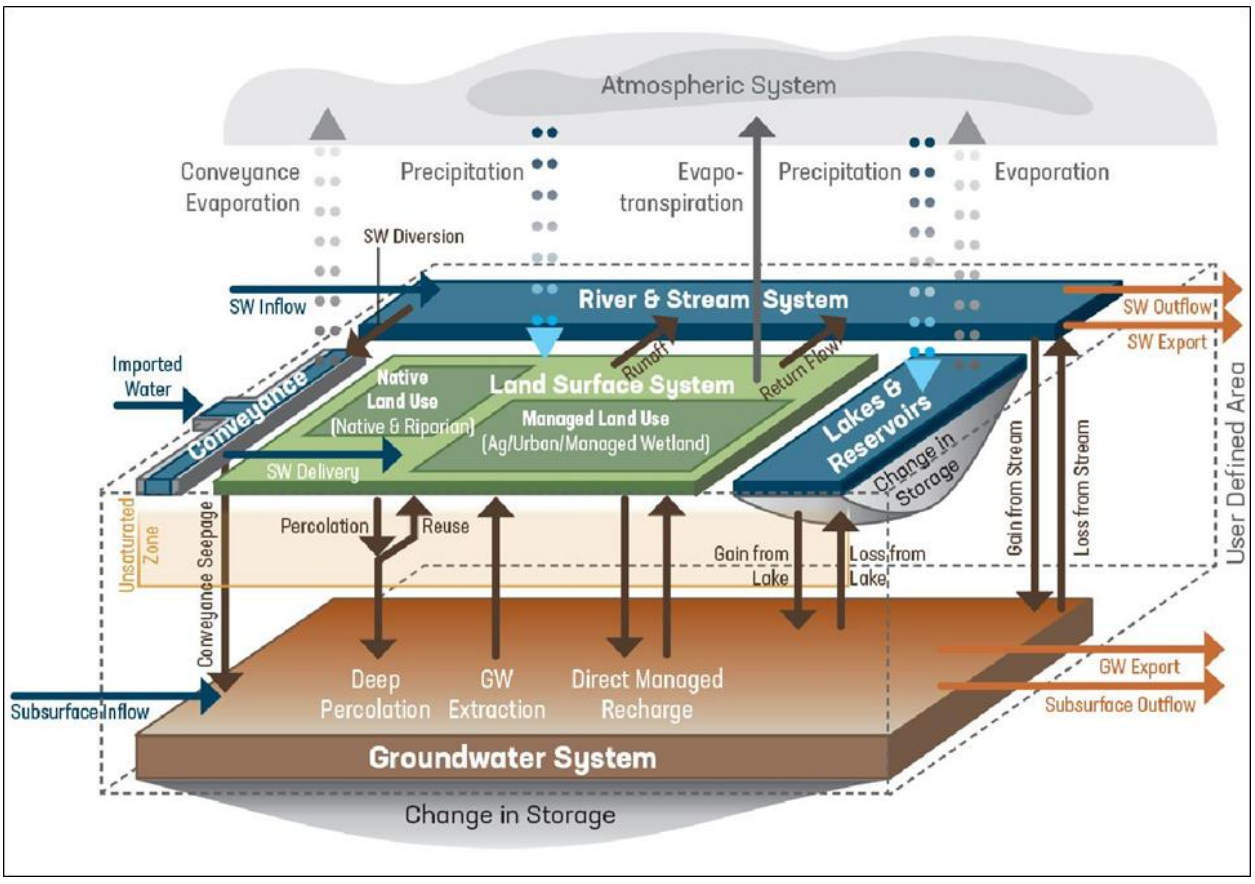


Figure 3-37 Water Budget Schematic

Purpose of Water Budget
Water budgets quantify the components of water supply, water use, and change in groundwater storage. The water budgets can be used as tools in numerous aspects of groundwater sustainability management including:

- Determining sustainable yield

- Determining changes in groundwater storage
- Identifying data uncertainties and monitoring needs
- Quantifying the effects of proposed projects and management actions

Water Budget Methodology

The methods used in developing the water budgets vary depending on the water budget (historical, current, or projected) being discussed. Historical, current, and projected water budgets have been developed from direct measurements and/or estimates based on available data. An analytical water budget (spreadsheet) approach has been used, which has the advantage of clearly showing the origin of data used for the water budget, as opposed to extracting disaggregated data from a numerical groundwater model that does not explicitly identify the data source or computation method. Overall, the GSAs in the Subbasin agreed that an analytical water budget would be a more practical and useful tool and, therefore, offer greater value in managing groundwater. Limited data was available for several water budget variables, so additional monitoring and water budget enhancements will be needed in the future. Due to these data limitations, the water budget has limited accuracy but is still considered a valuable tool. The data for each variable was also rounded to the nearest 100 AF, which represents the relative accuracy of the measured and calculated data.

Water Budget Requirements

Water budgets quantify the following information in conformance with §354.18 (b) of the GSP requirements:

(1) Total surface water entering and leaving the Subbasin
(2) Inflows to the groundwater system by water source type, including subsurface groundwater inflow and infiltration of precipitation, applied water, and surface water systems, such as lakes, streams, rivers, canals, springs, and conveyance systems
(3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow
(4) The change in the annual volume of groundwater in storage between seasonal high conditions
(5) Identification of overdraft over a period of years during which water year and water supply conditions approximate average conditions
(6) The water year type associated with the annual supply, demand, and change in groundwater stored
(7) An estimate of sustainable yield for the Subbasin

Two approaches were utilized to quantify the changing groundwater levels and the groundwater overdraft. The first was by an evaluation of change in groundwater levels corresponding to pumpage and recharge. The second was by identifying and quantifying the individual categories identified in the schematic above and then summing the values to arrive at a result.

Historic Period Evaluation

A review of the water-level hydrographs since 1960 and an examination of data for 1937-51 from the Stanford University studies indicate that there are six historical periods that should be examined. Examination of groundwater budgets for these periods, while they may not be precise, provides an insight into the importance of streamflow seepage. Estimates of pumpage and water-level declines for each of these periods are available. For the two earlier periods (before 1952), water from the California Aqueduct was not yet

available in the valley. Groundwater supplied virtually all of the irrigation use. Water levels were relatively stable during two of the periods (1937-45 and mid-1980s to 2005). During two other periods (1945-51 and 2017-21), water levels fell an average of 9 to 10 feet per year. Other than pumpage, streamflow seepage is the main item in the groundwater budget. During two of the periods (1945-51 and 2006-17), there was little or no streamflow seepage indicated. In contrast, streamflow seepage was significant during 1937-45, 1960-mid-1980s, mid-1980s to early 2000s, and 2017-21.

Another source of recharge is deep percolation from irrigation. Deep percolation is the part of the water applied for irrigation that is not consumed by evapotranspiration. Records indicate that significant groundwater pumping for irrigation in the valley began between 1914 and 1924. Records indicate that about 8,000 acres of crops were irrigated during 1937-45 and 10,000 acres during 1945-51. During 1960 to the mid-1980s, about 29,000 acres were irrigated (the maximum historical average). During the mid-1980s to the early 2000s about 16,000 acres were irrigated, and during 2006-17 about 11,500 acres were irrigated. In 2020 about 17,600 acres were irrigated. Prior to the 2000s, when orchards were planted that used drip irrigation, sprinkler irrigation was common. The percent of the applied water that is consumed by evapotranspiration is termed the irrigation efficiency. An irrigation efficiency of about 67 percent is typical for sprinkler irrigation. This means that about one-third of the water applied for irrigation before 2000 percolated to the groundwater. A major difference between streamflow recharge and deep percolation from irrigation is the rate of downward flow. Experience indicates that streamflow seepage can move downward hundreds of feet (and to the water level) within several weeks or months. However, recharge from deep percolation likely moves downward at a rate of only about 10 to 20 feet per year. This means that in areas where the water level is 300 feet deep, that the deep percolation may not reach the groundwater level until about 15 to 30 years after the water was applied at the land surface. In addition, it is believed that the alluvial deposits away from streams were moisture deficient prior to irrigation. In this case, some of the deep percolation had to satisfy this deficiency (field capacity minus wilting point) before downward flow could occur.

In this evaluation, it is assumed that for the two periods prior to 1952, only some of the deep percolation had reached the water level. In contrast, it is assumed that after 1960, significant amounts of deep percolation had reached the groundwater level.

Table 3-3 shows major components of the groundwater budget for the six periods. It can be seen that pumpage ranged from about 28,000 to 56,000 acre-feet per year. Streamflow recharge ranged from about zero to 23,000 acre-feet per year. The streamflow recharge from 1937-45 and from the early 1980s to the mid-2000s ranged from 22,000 to 23,000 acre-feet per year. These values are larger than previous estimates but are necessary to balance the water budgets for these two periods. Some of the recharge attributed to streamflow seepage was from mountain front recharge to the west part of the basin. Recharge from deep percolation reaching the groundwater level ranged from about 6,000 to 20,000 acre-feet per year and was significantly greater after 1951.

Average water-level declines in wells in the irrigated areas ranged from about zero to ten feet per year. Average water-level declines ranged from 5.3 to 6.3 feet per year during 1945-51, 1960 to the mid-1980s, and 2006-17. Average water-level declines ranging from 9 to 10 feet per year occurred during 2017-21. Stable water levels were predominant during 1937-45 and from the early 1980s to the mid-2000s. The pumpage ranged from 28,000 to 35,000 acre-feet per year and the streamf1ow seepage ranged from about 22,000 to 23,000 acre-feet per year during these two periods.

Table 3-3 Summary of Groundwater Budgets

Period	Pumpage (AF/yr)	Streamflow Recharge (AF/yr)	Deep Percolation Reaching GW (AF/yr)	Avg Water-Level Decline (ft/yr)	Change in Storage (AF/yr)
1937-45	28,000	22,000	6,000	0	0
1945-51	35,000	0	8,500	5.3	-26,500
1960 to Mid-1980s	55,000	16,000	17,000	6.2	-28,000
Mid-1980s-Early 2005	35,000	23,000	12,000	0	0
2006-17	40,000	0	12,000	5.3	-24,000
2017-21	56,000	8,000	20,000	10.0	-28,000

Prior to 1960, the City of Coalinga imported groundwater from Armona for M&I use. From 1960 to 1972, the City pumped and desalinated local groundwater for M&I use. After 1972, the City used aqueduct water for M&I use. For the 2017-21 period, an average of 3,700 acre-feet per year of surface water was used for irrigation, 1,800 acre-feet per year of effluent was recharged, 550 acre-feet per year of effluent was consumed by crops, and the groundwater outflow through Pasajero Gap was about 1,700 acre-feet per year. Prior to 2017, no surface water was used for irrigation.

The groundwater overdraft was about zero in 1937-45 as well as from the early 1980s to the mid-2000s. During the other four periods, the groundwater overdraft ranged from about 22,000 to 28,000 acre-feet per year. The overdraft averaged about 15,600 acre-feet per year over a 79-year period. It should also be noted that the estimated average streamflow recharge approximates 14,000 AF/yr for the longer period. The most recent budget periods evaluated (from 2006 to the present) estimate that the streamflow recharge was less than the average.

Other items in the water budget that were considered are sur face water used for M&I and irrigation, consumptive use and deep percolation of sewage effluent, and groundwater outflow. KDSA determined a groundwater outflow of about 1,700 acre-feet per year through the Pasajero Gap in 2020. The City has supplied water to the former prison, the state hospital, the community college, the Coalinga-Huron Recreation and Parks District, and oil companies.

Table 3-3 indicates that the average streamflow recharge between 1937 and 2021 has been about 14,000 acre-feet per year. However, there have been periods as long as about two decades when the streamflow recharge was insignificant. The sustainable pumpage in the future would include this 14,000 acre-feet per year and deep percolation (15 percent of 20,000 acre-feet per year, or 3,500 acre-feet per year, or about 17,500 acre-feet per year). In addition, surface water is planned to be imported (3,700 + 2,350 acre-feet per year as of 2020), which would add to the sustainable yield if it was all recharged. As of 2020 the **sustainable pumpage** would be about **23,550 acre-feet per year** if all the surface water were to be recharged.

Water Budget Periods

Development of water budgets were performed for historical, current, and future (projected) periods.

Historical. Historical groundwater budgets were developed as shown in **Table 3-2**. For the development of the water budget based upon individual inputs, the period of 1998 through 2017 was chosen. This historical

period was selected based on surface water recharge from streams. The crop patterns are the most recent and represent conditions in the past twenty years, and this period represents the most recent period after the Subbasin saw relatively stable ground water level conditions. **Figure 3-38** represents a simplified diagram of the calculations considered for the Historical Water Budget.

Current. A current water budget was prepared to represent recent hydrologic conditions. This water budget includes water demands from 2020 and long-term average recharge and surface water supplies.

Future. Future water budgets were prepared for 2042, which is the year when the Subbasin must reach sustainability, and 2072, which represents a 50-year planning horizon. These water budgets include estimated changes in demands and impacts from climate change as well as incorporation of planned surface water deliveries.

The historical water budget includes a long-term average water budget.

As required by the SGMA regulations, the water budget was prepared according to the Water Year (October to September). For example, the 2010 Water Year would cover October 1, 2009 to September 30, 2010. When data was not available for the Water Year, then calendar year data were used.

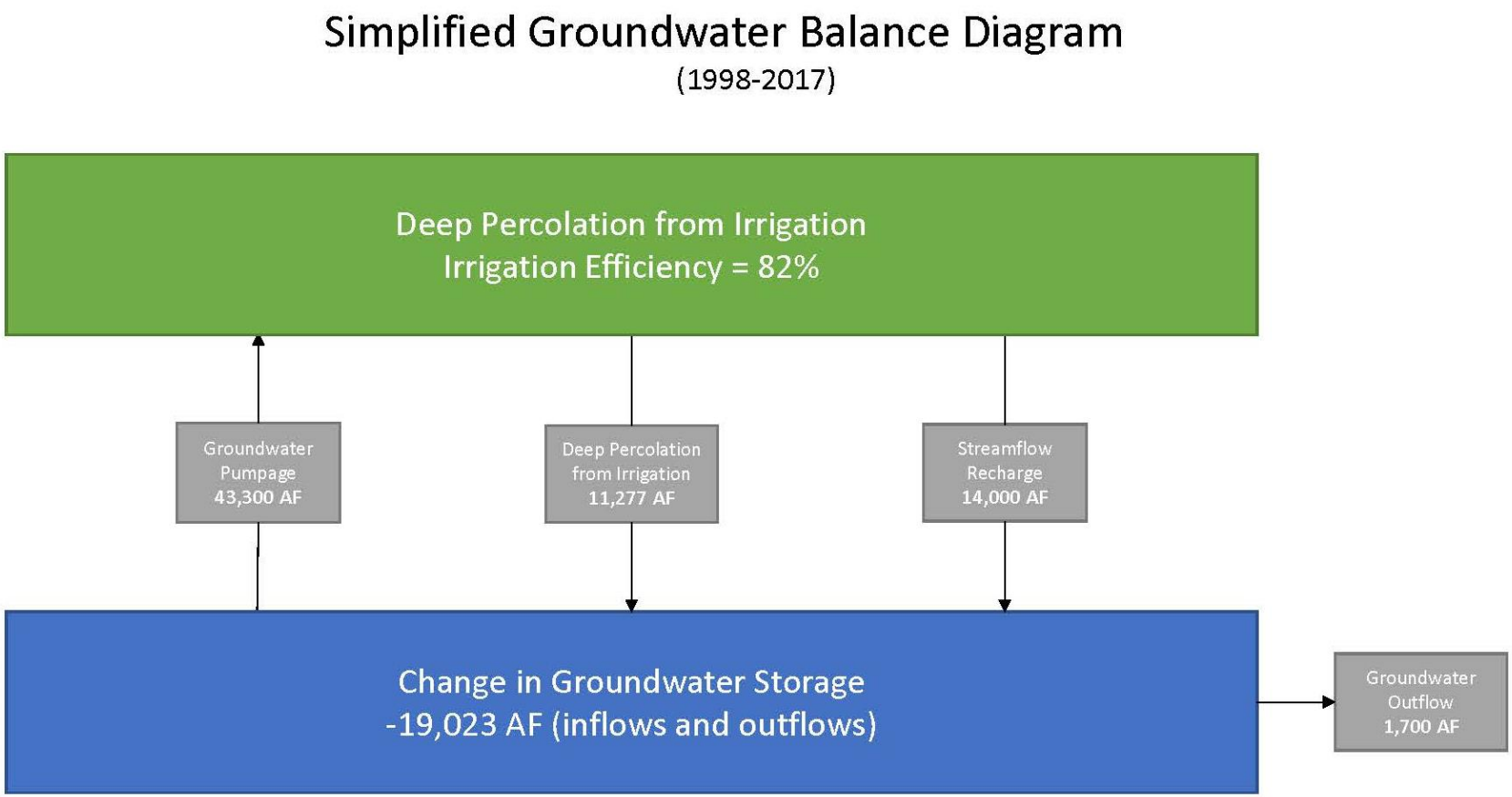


Figure 3-38 Simplified Groundwater Balance Diagram

3.3.2 Best Available Information

Regulation Requirements:
§354.18 (e) 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. If a numerical groundwater and surface water model is not used to quantify and evaluate the projected water budget conditions and the potential impacts to beneficial uses and users of groundwater, the Plan shall identify and describe an equally effective method, tool, or analytical model to evaluate projected water budget conditions.

GSP regulations stipulate the need to use the *best available information* and the *best available science* to quantify the water budget for the Subbasin. Best available information is common terminology that is not defined under SGMA or the GSP Regulations. Best available science, as defined in the GSP Regulations, refers to the use of sufficient and credible information and data, that is specific to the decision being made and the time frame available for making that decision, which is also consistent with scientific and engineering professional standards of practice. It is understood that initial steps to compile and quantify water budget components may be constrained by GSP timelines, limited data, and limited funding and may consequently need to rely on the best available information obtainable at the time the GSP is developed. The best available data for the water budget was often incomplete, had to be estimated, or was based on assumptions. The confidence intervals for the parameters vary from 5% to as high as 50%. As a result, the water budgets only give an approximation of the hydrologic system in the Subbasin.

3.3.3 Description of Water Budget

Regulation Requirements:
§354.18 (f) The Department shall provide the California Central Valley Groundwater-Surface Water Simulation Model (C2VSIM) and the Integrated Water Flow Model (IWFM) for use by Agencies in developing the water budget. Each Agency may choose to use a different groundwater and surface water model, pursuant to Section 352.4.

Following is a description of the water budget including the selection of the hydrologically average period for the historical water budget, a description of different water year types analyzed, and a list of variables in the water budget.

Hydrologically Average Period

Based upon **Table 3-2**, an average period would be from the mid-1990s through 2021. This hydrologic period was selected since it is a relatively long period during which "…*water supply conditions approximate average conditions*" as specified in DWR Groundwater Regulations at §354.18 (b) (5). A hydrologically average period is generally best for calibrating a water budget, as opposed to a period with abnormal weather. This period was identified by review of the hydrographs as well as review of streamflow records to identify a near current period when hydrology approximates normal conditions as well as capturing the more normal development of agriculture within the valley.

Water Year Types

The annual water budgets consider average conditions and do not necessarily reflect the variations that occur in dry and wet years. There is a lack of precipitation data from the weather stations within the water shed above the Subbasin. This is because streamflow associated with this precipitation contributes to the runoff in the streams that cross the valley and recharge the basin. The following **Table 3-3** estimates the volume of recharge that corresponds to different type years and the average precipitation in the watershed.

Table 3-4 Water Year Type

Water Year Type	Streamflow Recharge (AF)	Average Precipitation
Dry	0	4.39
Normal	14,000	7.40
Wet	22,500	12.50

Table 3-4 is based on past hydrologic conditions, including stream hydrology and the frequency of wet and dry years, resulting in higher standard deviations for total water supplies. This could impact several variables in the water budget. While this is difficult to predict, the Subbasin will continue to monitor climate and stream flows for long-term changes. It should also be noted that these watersheds are precipitation driven and little to no snowpack accumulates due to the location on the easterly side of the Coast Range. Climate change is discussed in more detail in **Section 3.3.10**.

The following sections describe the variables used in the water budget, as well as assumptions and criteria used. **Table 3-5** below lists the water budget inflows and outflows.

Table 3-5 Water Budget Variables

A. Surface Water Entering and Leaving (Section 3.3.4)	B. Inflows to Groundwater System (Section 3.3.5)
A.1 - Surface Water for Irrigation A.2 - Surface Water for M&I A.3 - Precipitation A.4 - Spill Inflows	B.1 - Groundwater Inflows B.2 - Deep Percolation of Irrigation Water B.3 - Deep Percolation of M&I Water B.4 - Deep Percolation of Precipitation B.5 - Seepage of Channels and Pipelines B.6 - Seepage of Reservoirs B.7 - Urban Stormwater – Recharge B.8 - Streams – Recharge
C. Outflows from Groundwater System (Section 3.3.6)	**D. Change in Groundwater Storage (Section 3.3.7)**
C.1 - Groundwater Pumping for Irrigation C.2 - Groundwater Pumping for M&I C.3 - Evapotranspiration of Applied Water -Irrigation C.4 - Evapotranspiration of Applied Water – M&I C.5 - Evapotranspiration of Effective Precipitation C.6 - Evaporation of Conveyance Channels C.7 - Evaporation of Reservoirs and Recharge Basins C.8 - Evaporation and Runoff of Precipitation C.9 - Operational Spills C.10 - Groundwater Exports C.11 - Groundwater Outflows C.12 - Irrigation Efficiencies	D.1 - Groundwater Storage Change D.2 - Groundwater Released from Aquifer Compaction

3.3.4 Surface Water Entering and Leaving

Regulation Requirements:
§354.18(b) The water budget shall quantify the following, either through direct measurements or estimates based on data:
(1) Total surface water entering and leaving a basin by water source type.

Quantities of water entering the Subbasin at the surface, either as surface flows or precipitation, are described and quantified in this section.

A.1 - Surface Water for Agricultural Irrigation
Surface water for agricultural irrigation comes from a group of private landowners that purchase and import surface water through the CVP off the Coalinga Canal. These landowners are able to make short-term purchases from the City of Coalinga and/or other CVP contract agencies. These purchases began in 2017 and averaged about 3,700 AF/year between 2017 and 2019. The water is delivered to properties within the Subbasin through the "Southern Pipeline" off the Coalinga Canal as shown on **Figure 3-15**. Private landowners are in the process of developing plans to construct additional pipelines and import more water in the future.

Wastewater effluent from the Pleasant Valley State Prison has been used by a landowner for irrigation of non-edible crops since about 1996. The average supply was about 540 AF/year (2005 to 2019). In the early years, the landowner indicated that the supplies were higher than the 2005 to 2019 average, but supporting data were not available.

A.2 - Surface Water for M&I
The City of Coalinga uses surface water to meet all of their demands. From 1998 to 2017, they diverted on average about 5,500 AF/year from the Coalinga Canal. The City of Coalinga provides water to several types of water users including City residents, some rural residents outside of the City (indoor use only), oil companies, the local Community College, Coalinga-Huron Recreation and Parks District, Pleasant Valley State Prison, and the Coalinga State Hospital.

A.3 - Precipitation
Precipitation data was gathered from the National Climatic Data Center (NCDC) Station No. 041864 (Coalinga). Precipitation data is available from 1942 to 2020. The average precipitation was 7.46 inches from 1942 to 2019, and the average precipitation during the historical period (1998-2017) was 7.05 inches. As stated earlier, the Coalinga station does not represent the climatic conditions of the watersheds. It is more important to be able to gather data from weather stations at higher elevations within the watershed as the rainfall. Resultant stream flows are the major local contributor to recharge of the basin.

A.4 - Spill Inflows
This represents spills of surface water into an irrigation or water district and therefore is a source of water. No operational spills into the Subbasin were identified, and consequently they were assumed to be zero.

3.3.5 Inflows to Groundwater System

Regulation Requirements:
§354.18(b) The water budget shall quantify the following, either through direct measurements or estimates based on data:
(2) Inflow to the groundwater system by water source type, including subsurface groundwater inflow and infiltration of precipitation, applied water, and surface water systems, such as lakes, streams, rivers, canals, springs and conveyance systems.

Inflows to groundwater in the Subbasin are groundwater inflow, streamflow seepage, and deep percolation from irrigation are described and quantified in this section using the procedures described below.

B.1 - Groundwater Inflows
No groundwater is believed to flow into the Subbasin through adjacent alluvial basins to the east. Some groundwater may enter the Subbasin from mountain-front inflow from the west (from mountain bedrock to alluvial basin). It is believed that water from the mountains enters the alluvial basin primarily through streamflows. There is some streamflow seepage upstream of the alluvial basin. Consequently, in the water budget evaluations, the recharge for both stream seepage and other groundwater inflow will be computed and shown under one classification (see B.8 - Streams – Recharge below). Refer to **Section 3.2.2** for more details on groundwater flow conditions and the potential locations for groundwater flows across subbasin boundaries.

B.2 - Deep Percolation of Irrigation Water
Deep percolation of irrigation was estimated by assuming that the amount of water applied above and beyond the evapotranspiration rate (due to irrigation inefficiencies or over-irrigation) infiltrates past the root zone and into the groundwater system. As a result, the quantity of deep percolation of irrigation water is computed as a function of irrigation efficiency. The Subbasin irrigation efficiency was estimated to be 82% during the historical period based on the mix of annual and permanent crops. As a result, deep percolation of irrigation water is estimated at 100% – 82% = 18% of the applied water for that period.

Rates of Downward Flow of Deep Percolation
There are two basic situations to consider when evaluating the rate of downward flow of deep percolation beneath irrigated lands. One is in an area that has been irrigated for many decades, perhaps up to a century or more. In this case, the sub-surface deposits above the water level are expected to be at field capacity. When more water is added, such as from deep percolation, this added water will tend to move downward. A second case is in areas not previously irrigated, such as arid lands that were newly developed for irrigation on the west side of the San Joaquin Valley, once aqueduct water became available. In this case, the subsurface deposits away from streams were indicated to be moisture deficient. When a source of water such as deep percolation is added, this moisture deficiency must first be satisfied, before downward movement can occur. That is, the moisture content would have to be raised from near the wilting point to the field capacity, before downward flow of deep percolation could occur. This situation results in longer travel time before the deep percolation reaches the groundwater level, than in areas that have been irrigated for many decades. Field capacity is a soil scientist term, that is probably nearly equivalent to the specific yield, a term used by hydro-geologists. The wilting point is another soil scientist term, that is probably nearly equivalent to specific retention, a term used by hydrogeologists.

Studies on East Side of the San Joaquin Valley
In much of this area, fairly permeable deposits are present above the water level, which are often less than about 100 feet deep. The average specific yield of these deposits is about 15 percent. This means there is a storage space of about seven feet for each foot of downward percolating water. If the deposits above the water level are not saturated, then one foot per year of deep percolation would have to move downward at least seven feet. Thus, the downward low rate of deep percolation would be at least about 10 feet per year.

There are two constituents in the deep percolation that can be used as tracers as part of the eastside areas. These are nitrate and DBCP. Fertilizer sources of nitrogen, such as anhydrous ammonia, began to be used by the early 1950s. DBCP was used to control nematodes and began to be used by the late 1950s. Both of these constituents reached the groundwater. By the late 1970s, both of those reached the groundwater and were primarily present above a depth of about 250 feet. Thus, for nitrate, a rate of downward flow of deep percolation was at least 250 feet divided by 25 years or 10 feet per year. For DBCP, a rate of downward flow of about 250 feet in 20 years or 12.5 feet per year was apparent.

In summary, for the east side of the San Joaquin Valley in Fresno County, deep percolation beneath irrigated lands probably takes an average of about 7 years to move to a depth of about 50 feet or an average of about 15 years to move to a depth of 100 feet.

An interesting evaluation of deep percolation was done in 1968 by The California Department of Water Resources in the Delano-McFarland area. High nitrate concentrations in the groundwater as of the late 1960s were attributed to large water-level rises following the importation of Friant-Kern Canal water to the area, beginning in the 1950s. The increases in nitrate concentrations were attributed to the interception of downward moving deep percolation by the rising groundwater levels, which in some cases rose by more than 200 feet.

Studies in Arizona

In central southern Arizona, water-level declines in basins where only groundwater was available for irrigation ranged from about 15 to 20 feet per year. Sampling of irrigation well water in these areas generally indicated no influence of deep percolation. The irrigation wells were generally perforated over intervals that exceeded 400 feet. However, sampling of cascading water (water entering the well from openings above the water level) indicated an influence of deep percolation (the salinity was about triple that of the water pumped from the well). This deep percolation may have moved only about half or two-thirds of the way to the water level since irrigation began. In this situation, the water level was apparently falling at a faster rate than the deep percolation was moving downward. Thus most of the deep percolation had not reached the groundwater level.

Monitoring of deep percolation was accomplished in the Salt River Valley of central Arizona in the mid-1970s. This area had been irrigated for more than a century, and a lot of deep percolation has reached the groundwater. Both samples of cascading water and samples from specially installed shallow monitor wells were collected and analyzed. The deep percolation (away from canals) had TDS concentrations about three times greater than that of the applied water, consistent with an average irrigation efficiency at the time of about 70 percent. Notably, the primary chemical constituents in the applied water were sodium and chloride, neither of which tends to be removed from solution by precipitation.

SALT CONCENTRATION DUE TO EVAPOTRANSPIRATION

Irrigation Efficiency = Consumptive Use of Applied Water
Applied Water
Furrow Irrigation 50%
Sprinkler Irrigation 67%
Drip Irrigation 85%

If all of the salt constituents in the applied water are not subject to a net precipitation (removal from solution) in the topsoil and vadose zone, then the deep percolation would contain all of the salts in the applied water. A salt concentration occurs because these salts then are in a smaller volume of water in the deep percolation, compared to in the applied water.

For a 50% irrigation efficiency, the TDS concentration in the deep percolation would be double the TDS concentration in the applied water.

For a 67% irrigation efficiency, the TDS concentration in the deep percolation would be triple the TDS concentration in the applied water.

For an 85% irrigation efficiency, the TDS concentration in the deep percolation would be 8.5 times the TDS concentration in the applied water.

If the average TDS concentration in well water in Pleasant Valley is 1,500 mg/1, then the TDS concentration in deep percolation from sprinkler irrigated lands would be 4,500 mg/1. For drip irrigation, the TDS in the deep percolation would be almost 13,000 mg/1.

However, not all of the cations and anions in the applied water are considered 100 percent mobile in the topsoil and vadose zone. In particular, calcium and bicarbonate can be precipitated from solution and become solid calcium carbonate. This could occur during drying out periods between irrigation periods. All of this removed calcium carbonate may not re-enter solution during subsequent irrigation events. Calcium and sulfate can also precipitate from solution and become solid gypsum. This could also occur during drying out periods between irrigation periods. All of this gypsum may not re-enter solution during subsequent irrigation events. The U.S. Salinity Laboratory in Riverside has conducted a substantial amount of research on irrigation and deep percolation.

It would appear that TDS concentrations of at least 4,500 mg/1 would readily have occurred in deep percolation in Pleasant Valley. However, greater increases in TDS would at least partly be controlled by salt precipitation.

Because of the expected eventual TDS increases in the groundwater, as more and more deep percolation reaches the groundwater, it is recommended that a monitoring program be developed to evaluate this process in more detail.

MIXING OF DEEP PERCOLATION WITH GROUNDWATER

Most irrigation wells in Pleasant Valley are perforated opposite at least several hundred feet of saturated deposits. Once the deep percolation reaches the groundwater, it is not expected to mix with all of this groundwater but rather to reside in the upper part of the aquifer, probably within the uppermost 100 feet or so of the water level. Sampling of water from irrigation wells represents a mixture of water from many permeable layers of alluvium at different depths that are tapped by the wells. Because the deep percolation would be present only in the upper part of the aquifer, increases in TDS concentrations due to deep percolation would be difficult to detect by supply well sampling. However, information on deep percolation in the vadose zone (above the water table) can be obtained by analyzing water samples from cascading wells. Cascading water occurs when water trapped above clay or other low permeability layers enters shallow perforations or other openings above the water level, then falls down inside the casing to the water level. Samples of this water can be obtained when the pump is removed by bailing water from the well below where the water enters the casing. In addition, shallow monitor wells can be installed, tapping groundwater within about 30 feet of the water level.

B.3 - Deep Percolation of Precipitation

The following empirical equation was developed for the San Joaquin Valley by estimating soil moisture budgets over a 50-year period.

DP = 0.64 x P – 6.2

Where:

DP = Deep percolation (inches)
P = Annual precipitation (inches)
Source: Williamson, Prudic and Swain, 1989

Note, that when using this equation, if annual precipitation is less than 9.69 inches, then deep percolation will not occur.

Several references suggest that deep percolation of precipitation is relatively low or negligible in the subbasin and thus is estimated to be zero. Kahanovitz (1954) says "*It therefore seems safe to assume that all of the direct rainfall on the valley floor either evaporates or infiltrates and is subsequently lost by evapotranspiration.*"

B.4 - Deep Percolation of M&I Water

Deep percolation of M&I water includes two components: 1) Indoor water usage sent to treatment plants and septic systems and 2) Outdoor landscape and wash water that percolates past the root zone to the groundwater.

When sewer flows are known, the volume percolated is equal to wastewater plant deliveries minus percolation pond evaporation. Data from the City of Coalinga from 2014-2019 showed that 11% of the wastewater is lost through the treatment process. An additional 4% is assumed lost to evaporation resulting in 15% total lost before the effluent is percolated. As a result, it was assumed that 85% of effluent percolates to the groundwater.

It is assumed that 15% of outdoor water percolates to the groundwater with the remainder lost primarily to evapotranspiration of landscaping and smaller amounts to evaporation of swimming pool water and wash water.

City of Coalinga water is used in five different ways: 1) Urban use, 2) Rural Use, 3) Oil Companies, 4) Pleasant Valley State Prison, and 5) Coalinga State Hospital. Each of these have different percentages of water that eventually percolate into the aquifer based on records provided by the City of Coalinga and several assumptions.

- Urban Use: This represents single- and multi-family home use and other uses not listed below. All of the water is sent to a wastewater treatment plant and the effluent is percolated.
- Rural Use: This represents indoor drinking water that the City of Coalinga sends to an estimated 300 people in areas near Coalinga. Ninety percent of the water is returned to the groundwater through septic systems.
- Oil Companies. This water is used by oil companies for various purposes. All of the water is assumed to be lost due to evaporation or deep injection below the usable groundwater.
- Prison and State Hospital. Water use data for these two facilities was available, but the amount used indoors versus outdoors was not provided. It was assumed that 20% was used outdoors and that indoor water is treated and sent to percolation ponds for the State Hospital, and the Prison water was sent to a combination of percolation ponds and agricultural irrigation as previously indicated.

Deep percolation of M&I water is an important component in the water budget and was estimated at about 1,800 AF/year during the historical period of 1998-2017.

B.5 - Seepage of Channels and Pipelines
There are no open channels in the Subbasin. Water is conveyed through pipelines in the City of Coalinga system and the Southern Pipeline used for agricultural irrigation surface water (see **Figure 3-15** for location). No information was available on pipeline leakage rates. As a result, leakage rates were assumed to be 4% for the City of Coalinga system, which is a typical rate for a city water system, and essentially 0% for the recently constructed Southern Pipeline.

B.6 - Seepage of Reservoirs
The City of Coalinga has several steel water tanks; these are assumed to have no seepage. Percolation from small grower-owned irrigation ponds was assumed to be negligible. This variable does not include wastewater effluent percolation ponds which are covered under B.4 - Deep Percolation of M&I Water. Several reservoirs owned by oil companies are located in the Subbasin. These are used for storing surface water purchased from the City of Coalinga or "produced water," which is water that is brought up to the surface with oil. These types of ponds are typically lined, and it is assumed that there is no seepage and all the water evaporates or is injected back in the oil wells below the usable aquifer.

B.7 - Urban Stormwater – Recharge
The City of Coalinga has several stormwater basins for collecting urban runoff. The City does not monitor flow into the basins or estimate the volume infiltrated. Consequently, guidelines established by other stormwater management agencies were researched. Fresno Metropolitan Flood Control District (FMFCD) operates stormwater ponds that capture runoff from the Fresno/Clovis urban area, located east of the Subbasin. FMFCD maintains records of operations, and based on local rainfall records over the Fresno-Clovis areas, their records indicate that about 20% of the local rainfall percolated through stormwater basins. It was assumed that deep percolation of precipitation in landscape and bare soils areas is negligible in urban areas. It was therefore assumed that 20% of the rainfall in the City of Coalinga percolates in their stormwater basins.

B.8 - Streams – Recharge
Four primary streams flow into the Subbasin: Los Gatos Creek, Warthan Creek, Jacalitos Creek, and Zapato Chino Creek. These four streams ultimately combine to form the Arroyo Pasajero. The Arroyo Pasajero begins at the confluence of Los Gatos and Zapato Chino Creeks and flows easterly into a retention basin east of Huron. The Los Gates Creek passes through the Pasajero Gap, and Zapato Chino Creek passes through the Polvadero Gap. The Arroyo Pasajero Watershed encompasses approximately 529 square miles over an area of about 35 miles wide by 16 miles long. The watershed area is illustrated in **Figure 3-39**.

As shown in **Figure 3-39**, four watersheds drain into Pleasant Valley and are the major source of recharge to groundwater. Some of the streamflow entering the valley percolates, but some in the Arroyo Pasajero flows out of the Valley. Flow in these streams is intermittent due to the watershed's relatively low precipitation rates

Kahanovitz and Manning (Kahanovitz & Manning, 1954) attempted to estimate stream flows into Pleasant Valley from some limited Los Gatos Creek flow data. They stated, "The total runoff in Pleasant Valley is unknown but, based on the figures for Los Gatos Creek above Nunez and the rainfall at Parkfield, at least the magnitude of total runoff can be estimated. Assuming the runoff in the entire valley is proportional to that in Los Gatos Creek drainage, a rough estimate of average runoff for the period 1937 to 1951 would be about 16,000 AF/year for the valley." This represents flow into Pleasant Valley but not all of this flow would necessarily percolate in the valley.

Los Gatos' stream flow has been measured since the 1930s by the DWR. The other streams have been measured sporadically over time. The Pleasant Valley Water District has recently expanded streamflow measurements effort with the installation of several new stream gauges.

Flow in the streams are difficult to measure because of the flashy nature of the streamflow. DWR (1990) stated that "Accurate streamflow measurements along the Arroyo and its tributaries are difficult to obtain by conventional means during high flows, due to extremely high velocities, unstable streambeds on some tributaries, and considerable floating debris." After several years of data are collected with the new gauging stations, future estimates of the flows will be more reliable.

The watershed also contributes water to the Subbasin through mountain-front groundwater inflow. Consequently, streamflow seepage in the watershed is estimated to average about 14,000 AF/year based on evaluation of historical water budgets. It is recognized that the historic information is sporadic and of a definition and detail that should continue to be better defined and documented.

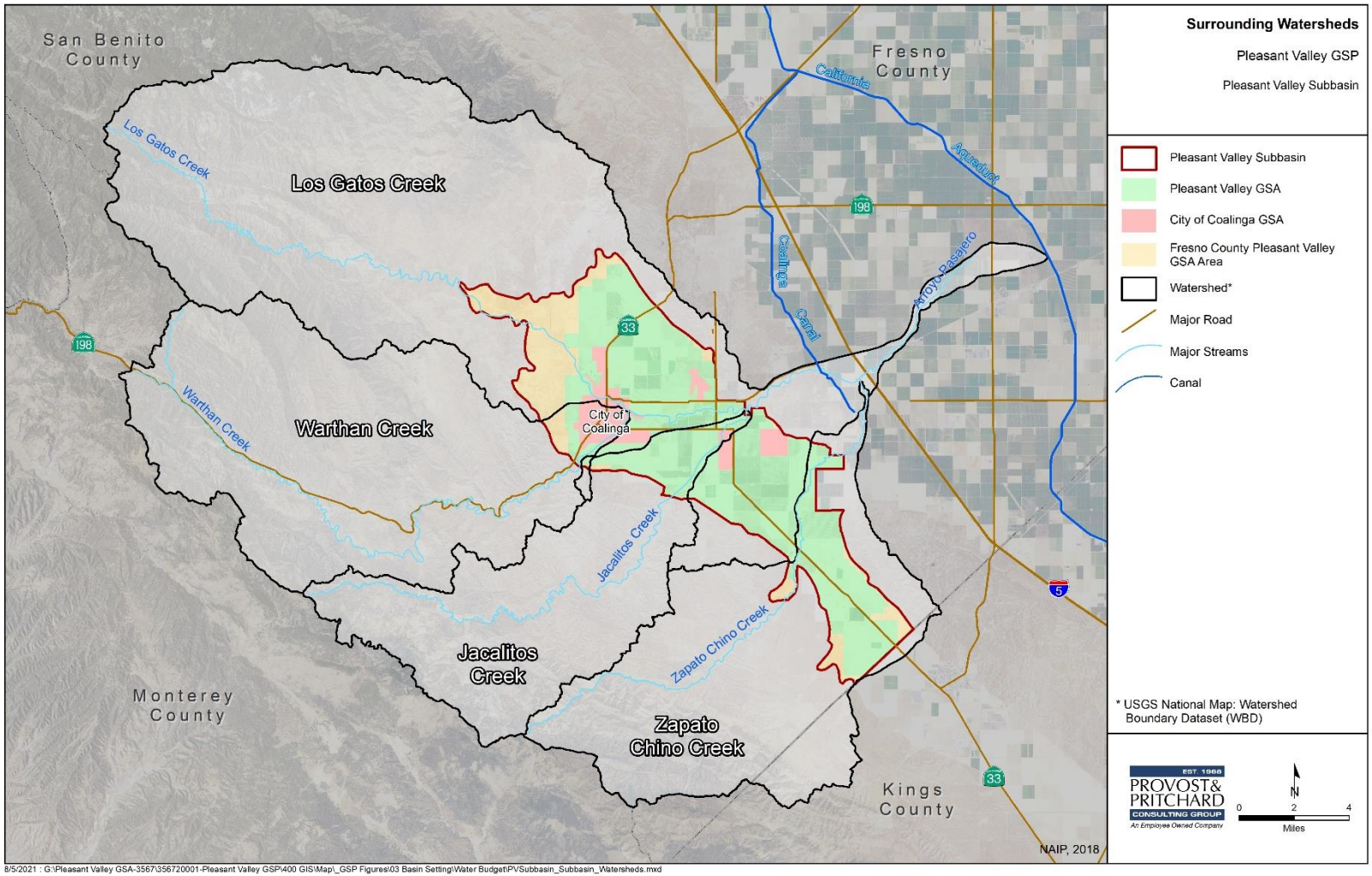


Figure 3-39 Tributary Watersheds

3.3.6 Outflows from Groundwater System

Regulation Requirements:
§354.18(b) 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.

The primary outflow from the groundwater is pumping, which was estimated for agricultural and domestic purposes as described below. Other outflows from the groundwater basin are also summarized.

C.1 - Groundwater Pumping for Irrigation
Most irrigation groundwater pumping in the Subbasin has either not been measured or has not been reported to the GSAs. In groundwater only areas, the groundwater pumping is the crop evapotranspiration demand less effective precipitation, divided by an average irrigation efficiency. In conjunctive use areas with surface water and groundwater, the groundwater pumping must be back calculated using several water budget variables if well pumpage is not metered. In a simple situation, the following formula is used:

Private Irrigation Pumping = Crop applied water demands – Surface water deliveries to growers

where:

Crop applied water demands = (Crop evapotranspiration less effective precipitation) / Irrigation efficiency

and

Surface Water Deliveries to Growers = Headgate diversions – System leakage

As a result, private irrigation pumping can be calculated with the following formula:

Private Irrigation Pumping = (Crop evapotranspiration less effective precipitation) / Irrigation efficiency – Headgate diversions + System leakage

Agricultural groundwater pumping during the 1998-2017 historical period was estimated to average about 43,100 AF/year based on land use maps and crop evapotranspiration rates. Most of the groundwater pumping was performed by private landowners; however, a small amount was pumped by West Hills Community College at their on-campus farm "Farm of the Future." This farm is located within the City of Coalinga GSA. Moving forward, it is recognized that the best way to track and account for groundwater pumpage is to measure it with totalizing flowmeters.

C.2 - Groundwater Pumping for M&I
M&I groundwater pumping comes from domestic water users outside of the City of Coalinga. In some areas near Coalinga, treated surface water is delivered by the City to rural residents for indoor water use only. In these areas, domestic wells may be used to meet outdoor water demands. In other areas of the Subbasin, all domestic demands are met by domestic wells.

The unincorporated population served by the City of Coalinga is estimated to be 300 people based on data from the City of Coalinga, and the population in other unincorporated areas of the Subbasin is estimated at 156 people based on 2010 Census data. Lacking any local data, per capita demands were assumed to be 0.5 AF/capita/year based on an evaluation of rural areas in the Fresno/Clovis area of Fresno County and documented in the North Kings Groundwater Sustainability Plan (Provost & Pritchard Consulting Group, 2020). Indoor water was assumed to comprise 30% of total water use, and outdoor water was assumed to

comprise the remaining 70%, which is similar to the trends in the City of Coalinga. Total domestic water pumping in the Subbasin is small and estimated to be about 200 AF/year.

Granite Construction pumps an estimated 75 AF/year for aggregate washing with 95% re-percolating to the groundwater. The net consumptive use is considered negligible, so it was ignored in the water budget.

C.3 - Evapotranspiration of Applied Water – Irrigation

This variable represents crop evapotranspiration minus effective precipitation. This was estimated using cropping land use data and selected crop evapotranspiration rates.

Cropping data was used from DWR Land Use Maps (2000), DWR Land IQ supplemented with USDA Cropscape data (2014), and USDA CropScape data (2007, 2016 and 2019). Cropping data was estimated in years with no data and areas that were not mapped.

Table 3-6 includes the selected crop evapotranspiration rates used. These are a combination of rates published by the Cal Poly Irrigation Training and Research Center for Zone 10 with some adjustments based on input from local PVWD growers who are familiar with actual water use in the area.

Table 3-6 Crop Evapotranspiration Rates

Crop Category	ET Rate (ft/yr)
Alfalfa	3.7
Field Crops	2.0
Grains and Hay Crops	1.5
Pistachios (mature)	3.25
Pistachios (immature)[1]	1.9
Winter Wheat	1.5

Notes:
1 – Average value over 10-year maturation period

The average crop water demands from applied water for the Subbasin after effective precipitation from 1998-2017 were estimated to average 23,700 AF/year.

There are several issues with the cropping and evapotranspiration data:

1) Crop water demands for wheat and winter wheat can vary, depending on whether they are grown year-round, part of the year, or rely largely on rainfall. No specific data were available to assess the multiple parcels plotted in wheat. However, former PVWD staff estimated that 1.5 AF/year was used on grain crops.
2) Grain and hay crops could have widely variable ET rates. The rates shown are estimated for grains.
3) Land use data was only available for a few years and had to be estimated for most years in the historical period. The different data sources used different terminology and crop categories, and some areas had no data available, presenting some challenges in estimating demands. In addition, most crop surveys did not differentiate between mature and immature pistachio trees, which have a significant difference in water demands. The area of immature trees was estimated based on the maturity period and the increase in planting between data sets.

To resolve these issues, it is recommended that the Subbasin perform their own crop survey annually. This is considered relatively straightforward where permanent crops are planted. In addition, it should be noted if wheat and pasture are irrigated or dry farmed.

C.4 - Evapotranspiration of Applied Water – M&I
Evapotranspiration of M&I water primarily includes landscape irrigation demands plus some additional evaporation from swimming pools and wash water. First, the quantity of M&I water used outdoors needs to be determined. When total water deliveries and sewer flows are known, then outdoor water use is simply the difference between the two values. When total pumping and sewer records are not available, then outdoor water use was assumed to be 70% of total water demands, which is based on outdoor use in the City of Coalinga. It was assumed that 85% of total outdoor water use is lost to evapotranspiration of landscaping and evaporation of swimming pools and outdoor wash water.

C.5 - Evapotranspiration of Effective Precipitation
Effective precipitation is the amount of rainfall beneficially used by crops, either directly as transpiration or through storage in the root zone and evapotranspiration in subsequent periods. The effective precipitation for the Subbasin was developed using a set of empirical formula developed for the San Joaquin Valley (MacGillivray & Jones, 1989). Where EFF is effective precipitation and GROSS is gross rainfall, the formulas for the rainy season and shoulder months are:

Oct:	EFF = -0.06+ (0.635 x GROSS)
Nov – Feb:	EFF = -0.54 + (0.94 x GROSS)
March:	EFF = -1.07 + (0.837 x GROSS)

The effective precipitation averages about 3.2 inches per year and about 4,000 AF/year over the irrigated area from 1998-2017.

C.6 - Evaporation from Conveyance Channels
All water in the Subbasin is transported by pipeline and there are no evaporative losses from conveyance channels. Surface water is delivered to the Subbasin through the Coalinga Canal, which is a concrete lined canal that is located outside of the Subbasin. However, diversions are measured at the canal turnouts where water enters pipelines, so evaporation losses in Coalinga Canal are not relevant.

C.7 - Evaporation from Reservoirs and Recharge Basins
There are no surface reservoirs (except for enclosed steel tanks) or recharge basins in the Subbasin used for urban or agricultural water. There are plans to install recharge basins or recharge in local creeks in the future. The surface water sold by the City of Coalinga to oil companies is assumed to evaporate in lined ponds or after washing equipment, etc. These losses are not reported here but rather in C.4 - Evapotranspiration of Applied Water – M&I. Lastly, some water is brought to the surface with oil drilling operations. Some may evaporate in lined ponds. However, it was assumed that this water is not pumped from below the usable aquifer and is not a relevant part of the water budget.

C.8 - Evaporation and Runoff of Precipitation
Evaporation and runoff of precipitation are a residual (i.e., left over) value in the water budget. All of the precipitation that is not used in transpiration from crops is considered to be evaporated.

This represents a non-recoverable loss that does not impact either water supplies or demands. This water either evaporates or is utilized by pasture/rangeland.

C.9 - Operational Spills
This represents spills of surface water leaving the boundary of an irrigation or water district and is considered a non-recoverable loss to that district. There are no known operational spills in the Subbasin.

C.10 - Groundwater Exports
This represents the export of groundwater from one agency into another, typically based on metered well pumping. Groundwater exports can occur from water transfers, exchanges, banking agreements, or groundwater deeds. Groundwater exports by landowners that own adjacent properties on an agency boundary (one in the agency and one just outside) were neglected, since it is assumed that they are minor and tend to balance each other out. There are no known groundwater exports from the Subbasin.

C.11 - Groundwater Outflows
A discussion on the potential for groundwater outflows is provided in **Section 3.3.6**. A preliminary analysis by KDSA indicates that there is groundwater flowing out of Pleasant Valley through the Pasajero Gap. Groundwater level data showed an 80-ft water level difference over 2.75 miles across the Gap. From this slope and transmissivity value, the groundwater outflow was estimated to be 1,700 AF/year. This estimate will be refined in the future with more data.

C.12 - Irrigation Efficiencies
Field crops and grains are assumed to use flood/furrow or sprinkler irrigation and have an efficiency of 67%. Trees are assumed to use drip or micro-spray and have an assumed irrigation efficiency of 85%. Urban landscape irrigation efficiencies are assumed to be 75% based on efficiencies in other areas of the San Joaquin Valley (Thomas Harder and Co., 2017 and Davids Engineering, 2018).

3.3.7 Change in Groundwater Storage

Regulation Requirements:
§354.18(b) The water budget shall quantify the following, either through direct measurements or estimates based on data:
(4) The change in the annual volume of groundwater in storage between seasonal high conditions.

D.1 - Groundwater Storage Change
Storage change in the aquifer for the 1998-2021 hydrologic period was estimated based on measured groundwater levels. Water-level hydrographs were used to estimate water-level changes.

Table 3-7 includes a groundwater storage change of -8,400 AF/year estimated based on a historical water budget analysis.

Note that these groundwater storage changes discussed above represent the average historical conditions , and not current conditions, which have higher overdraft and are discussed later in this section.

D.2 - Groundwater Released from Aquifer Compaction
Water release from aquifer compaction occurs when clay collapses due to lowered water levels in confined aquifers. The land subsidence is caused by groundwater over-pumping, which lowers water tables below the clay layers. This essentially squeezes water out of the clay and creates a new one-time water source that would otherwise not be available. Hence, the water is mined from the clay layers. Land subsidence primarily occurs in areas with confined aquifers.

As discussed in **Section 4.6**, available data indicate that land subsidence has been minimal in the Subbasin during the historical period (1998-2017). Subsidence generally averaged between zero and ½-inch over the Subbasin from 2015-2018. As a result, the groundwater released from aquifer compaction was assumed to be negligible in the historical water budget. It is assumed that no subsidence occurs in future water budgets (2042 and 2072) as water levels will be stabilized.

3.3.8 Historical Water Budget

Regulation Requirements:
§354.18 (c) Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:
(2) Historical water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type. The historical water budget shall include the following:
(a) A quantitative evaluation of the availability or reliability of historical surface water supply deliveries as a function of the historical planned versus actual annual surface water deliveries, by surface water source and water year type, and based on the most recent ten years of surface water supply information.
(b) A quantitative assessment of the historical water budget, starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to calibrate and reduce the uncertainty of the tools and methods used to estimate and project future water budget information and future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon.
(c) A description of how historical conditions concerning hydrology, water demand, and surface water supply availability or reliability have impacted the ability of the Agency to operate the basin within sustainable yield. Basin hydrology may be characterized and evaluated using water year type.
(d) The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget:
(1) Historical water budget information for mean annual temperature, mean annual precipitation, water year type, and land use.

A historical water budget using data on cropping and other local inputs was prepared for the Pleasant Valley Groundwater Subbasin to compare to the methodology previously described covering the period of 1998-2017.

Long-term Historical Average Water Budget
The long-term average water budget for the Subbasin is shown in **Table 3-7.**

Table 3-7 Pleasant Valley Subbasin Historical Average Water Budget (1998-2010) (AF/year)

Pleasant Valley GSP

Pleasant Valley Groundwater Sustainability Plan
Water Balance - Average Annual Values
Period of Record: 1998-2017

(all units in acre-feet)

	Irrigation Eff.	82%	
Description	**Symbol**	**Volume**	**Source**
Supply			
1) Surface Water - Irrigation	Qirr	700	Measured
2) Surface Water - M&I	Qmi	5,500	Measured
3) Groundwater Pumping - Irrigation (Agency Wells)	Gwirra	0	Measured
4) Groundwater Pumping - Irrigation (Private Wells)	Gwirrp	34,200	Calculated
5) Groundwater Pumping - M&I (Agency Wells)	Gwmia	0	Calculated
6) Groundwater Pumping - M&I (Private Wells)	Gwmip	200	Calculated
7) Precipitation	P	28,200	Measured
8) Spill Inflows	Si	0	Calculated
9) Other Supply:	Os	0	Calculated
Total Supply		**68,800**	
Demand			
Consumptive Use			
10) Evapotranspiration - Applied Water	ETc	28,610	Calculated
11) Evapotranspiration - Effective Precipitation	ETp	4,000	Calculated
12) Evapotranspiration - M&I	ETmi	2,900	Calculated
13) Other Consumptive Use:	Od	0	Calculated
Consumptive Subtotal		**35,510**	
Groundwater Recharge			
14) Groundwater - Inflow	GWi	0	Calculated
15) Deep Percolation - Irrigation	PRCirr	5,200	Calculated
16) Deep Percolation - Precipitation	PRCp	0	Calculated
17) Deep Percolation - M&I	PRCmi	1,800	Calculated
18) Seepage - Channels (& Pipeline Leakage)	Sch	200	Calculated
19) Seepage - Reservoirs	Sr	0	Calculated
20) Urban Stormwater - Recharge	Rus	500	Calculated
21) Local Streams/Rivers - Recharge	Rst	14,000	Residual
22) Groundwater - Intentional Recharge	Rint	0	Measured
23) Other Recharge:	Or	0	
GW Recharge Subtotal		**21,700**	
Nonrecoverable Losses			
24) Groundwater - Outflow	GWo	1,700	Calculated
25) Evaporation - Channels	Ech	0	Calculated
26) Evaporation - Reservoirs & Recharge Basins	Er	0	Calculated
27) Precipitation - Evaporation and Runoff	Ep	24,200	Residual
28) Operational Spills	S	0	Measured
29) Groundwater - Export	GE	0	Measured
30) Other Losses:	Ol	0	
Nonrecoverable Subtotal		**25,900**	
Method 1			
Estimated Annual Change in Groundwater Storage		**-14,400**	
GW Recharge - #14 thru #23	21,700		Calculated
GW Pumping - #3 thru #6	(34,400)		
GW Outflow - #24 and #29	(1,700)		
Method 2			
Calculated Annual Change in Groundwater Storage		**See Table 3.2**	

Note: All values in the water budget are rounded to the nearest 100 AF

Uncertainty in Water Budgets

There is uncertainty in some of the water budget parameters. The parameters with the least uncertainty, estimated at plus or minus 5%, are limited to surface water diversions which are directly measured. The largest components of water use, evapotranspiration of applied water as well as stream flows and pumpage, are estimated to have an accuracy of plus or minus 15%. Water budgets need to be verified with groundwater level monitoring and documentation of pumping.

3.3.9 Current Water Budget

Regulation Requirements:
§354.18 (c) Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:
(1) Current water budget information shall quantify current inflows and outflows for the basin using the most recent hydrology, water supply, water demand, and land use information.
(d) The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget:
(2) Current water budget information for temperature, water year type, evapotranspiration, and land use.

A Current Water Budget was prepared for the Subbasin based on the following criteria:

1. Agricultural demands were based on a 2019 USDA Cropscape use maps, which is the most recent comprehensive land use map for the area. All of the pistachio plantings were assumed to be mature, even though some may have been immature and used less water in 2019. Assuming full maturity maximizes water use and reflects what the actual water use would be in future years.
2. Urban surface water supplies were based on the long-term average supplies from the historical water budget and not the actual supplies delivered in 2019.
3. Agricultural surface supplies were based on actual surface water deliveries in 2019.
4. Other variables not described above were assumed to be the same as the historical water budget averages. This was to allow the water budget to reflect current and average conditions, rather than the specific hydrologic conditions in 2019, which were drier than normal.

The Current Water Budget is shown in **Table 3-8.** Overall, the water budget shows a higher decrease in groundwater storage compared to historical conditions, largely the result of higher crop water demands due to increased plantings and maturation of pistachio trees. The net decrease in groundwater storage is estimated to be 21,100 AF/year.

Table 3-8 Current Water Budget

Pleasant Valley GSP

Pleasant Valley Groundwater Sustainability Plan
Water Balance - Average Annual Values
Current

(all units in acre-feet)

	Irrigation Eff.	83%	
Description	Symbol	Total	Source
Supply			
1) Surface Water - Irrigation	Qirr	5,100	Measured
2) Surface Water - M&I	Qmi	5,500	Measured
3) Groundwater Pumping - Irrigation (Agency Wells)	Gwirra	0	Measured
4) Groundwater Pumping - Irrigation (Private Wells)	Gwirrp	43,100	Calculated
5) Groundwater Pumping - M&I (Agency Wells)	Gwmia	0	Calculated
6) Groundwater Pumping - M&I (Private Wells)	Gwmip	200	Calculated
7) Precipitation	P	28,200	Measured
8) Spill Inflows	Si	0	Calculated
9) Other Supply: Aquifer Compaction due to Land Subsidence	Os	0	Calculated
Total Supply		82,100	
Demand			
Consumptive Use			
10) Evapotranspiration - Applied Water	ETc	39,900	Calculated
11) Evapotranspiration - Effective Precipitation	ETp	4,800	Calculated
12) Evapotranspiration - M&I	ETmi	2,800	Calculated
13) Other Consumptive Use:	Od	0	Calculated
Consumptive Subtotal		47,500	
Groundwater Recharge			
14) Groundwater - Inflow	GWi	0	Calculated
15) Deep Percolation - Irrigation	PRCirr	9,577	Calculated
16) Deep Percolation - Precipitation	PRCp	0	Calculated
17) Deep Percolation - M&I	PRCmi	1,700	Calculated
18) Seepage - Channels (& Pipeline Leakage)	Sch	200	Calculated
19) Seepage - Reservoirs	Sr	0	Calculated
20) Urban Stormwater - Recharge	Rus	500	Calculated
21) Local Streams/Rivers - Recharge	Rst	14,000	Calculated
22) Groundwater - Intentional Recharge	Rint	0	Measured
23) Other Recharge:	Or	0	
GW Recharge Subtotal		25,977	
Nonrecoverable Losses			
24) Groundwater - Outflow	GWo	1,700	Calculated
25) Evaporation - Channels	Ech	0	Calculated
26) Evaporation - Reservoirs & Recharge Basins	Er	0	Calculated
27) Precipitation - Evaporation and Runoff	Ep	23,400	Residual
28) Operational Spills	S	0	Measured
29) Groundwater - Export	GE	0	Measured
30) Other Losses:	Ol	0	
Nonrecoverable Subtotal		25,100	
Estimated Annual Change in Groundwater Storage		***(19,023)***	
GW Recharge - #14 thru #23		25,977	Calculated
GW Pumping - #3 thru #6		(43,300)	
GW Outflow - #24 and #29		(1,700)	

Note: All variables in the water budget are rounded to the nearest 100 AF

3.3.10 Projected Water Budget

Regulation Requirements:
§354.18 (c) Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:
(3) Projected water budgets shall be used to estimate future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify the uncertainties of these projected water budget components. The projected water budget shall utilize the following methodologies and assumptions to estimate future baseline conditions concerning hydrology, water demand and surface water supply availability or reliability over the planning and implementation horizon:
(a) Projected hydrology shall utilize 50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition for estimating future hydrology. The projected hydrology information shall also be applied as the baseline condition used to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change and sea level rise.
(b) Projected water demand shall utilize the most recent land use, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demand. The projected water demand information shall also be applied as the baseline condition used to evaluate future scenarios of water demand uncertainty associated with projected changes in local land use planning, population growth, and climate.
(c) Projected surface water supply shall utilize the most recent water supply information as the baseline condition for estimating future surface water supply. The projected surface water supply shall also be applied as the baseline condition used to evaluate future scenarios of surface water supply availability and reliability as a function of the historical surface water supply identified in Section 354.18**(c)(2)(a)**, and the projected changes in local land use planning, population growth, and climate.
(d) The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget:
(3) Projected water budget information for population, population growth, climate change, and sea level rise.

Projected water budgets (future water budgets) have been developed for 2042 and 2072. The 2042 water budget is the focus of this analysis since it is the year the Subbasin must be sustainable, and it represents near term periods and requires less speculative estimates of projected future climate change impacts, population growth, and land use change. The projected water budgets are shown without the new water supplies or water conservation from future projects, so they show the net impact if no action is taken.

Projected water budgets are based initially on the current water budget with changes made to various variables. **Figure 3-40** lists various variables that could potentially impact future water budgets.

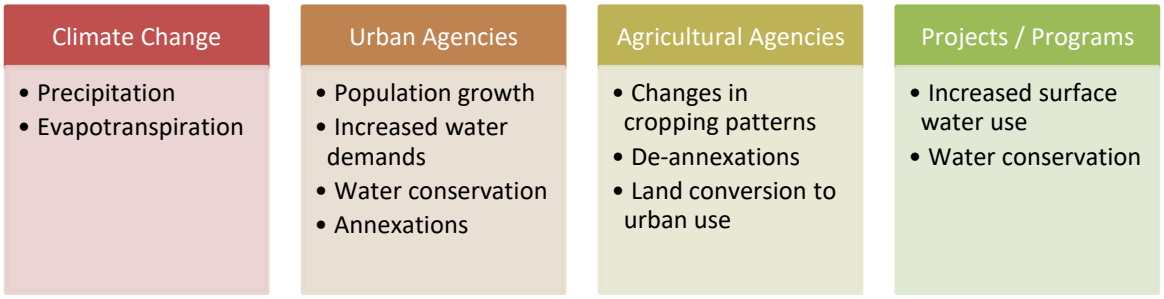


Figure 3-40 Variables Impacting Projected Water Budget

Climate Change

Climate change impacts were based on *Guidance for Climate Change Data Use During Groundwater Sustainability Plan Development* (DWR, 2018) and the related SGMA climate change website: https://data.cnra.ca.gov/dataset/sgma-climate-change-resources. This document provided estimates for 2030 and 2070. Since 2040 is the deadline for sustainability, and therefore the focus of the water budgets, impacts from 2042 were interpolated between the 2030 and 2070 results. The 2072 conditions were assumed to be the same as 2070 estimates.

The DWR climate change datasets were developed for the California Water Commission's Water Storage Investment Program (WSIP). As described by DWR, the WSIP dataset is consistent with other DWR programs, is based on best available science, builds on previous efforts, incorporates the latest advances in projections, and follows the Climate Change Technical Advisory Group's guidance. The available datasets include central tendency projections of ensembles of general circulation models for 2030 and 2070 levels. The datasets also include climatic bookends for 2070 conditions with a drier, extreme warming scenario and a wetter, moderate warming scenario being provided. Only the central tendency simulations were used for preparing the water budgets. For the Subbasin, two DWR datasets were used – projected precipitation and projected evapotranspiration.

Precipitation

The WSIP climate change datasets generally showed minimal changes to precipitation. More details are provided in the figure below.

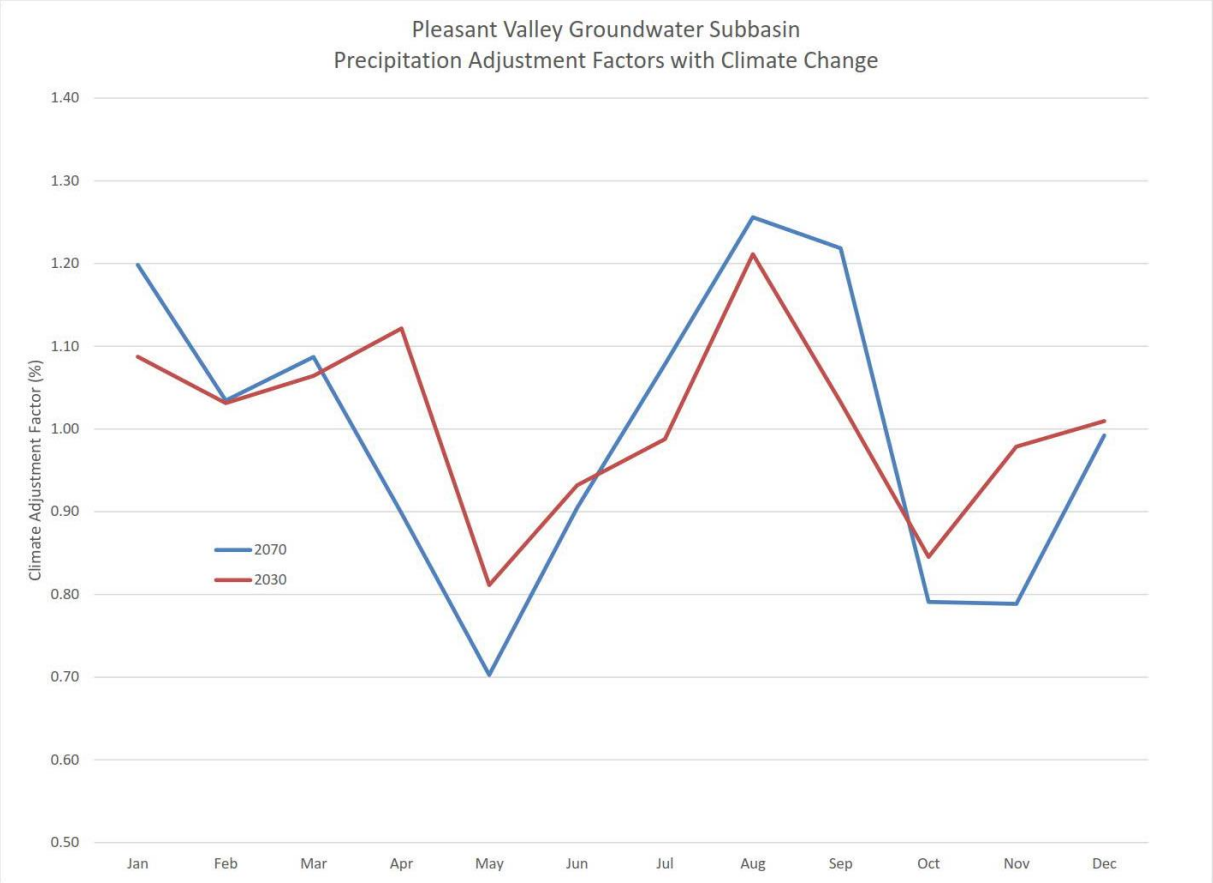


Figure 3-41 DWR Precipitation Adjustment Factors with Climate Change

Precipitation was evaluated by averaging the most recent 50 years of simulated changes to precipitation (1962-2011). The overall precipitation change factors were projected to increase by 0.9% for 2030 conditions and to decrease by 0.4% for 2070 conditions. When interpolated, this results in a 0.5% increase for 2042.

Moreover, the average monthly adjustment factors understate the effect on precipitation, as many of the months with projected decreases in precipitation (e.g., May, June, and October) are low precipitation months while months with indicated increased precipitation tend to be wetter (e.g., January and February). Given the generally low amount of precipitation in the Subbasin and the minimal changes anticipated from climate change, it is assumed that precipitation will remain the same for 2042 and 2072 projections as estimated for the historical period. Precipitation in the PV Basin is dependent on the amount that occurs in the watershed and the resulting streamflow in the streams that cross the valley. Based upon the above, it is assumed that streamflow in the future approximates the historical values.

Evapotranspiration

WISP evapotranspiration estimates were similarly evaluated by taking the average of 50 years of simulated climate change impacts (1962-2011). The projections predicted higher evapotranspiration rates for 2030

(3.1%) and 2070 (7.5%). Using interpolation, the 2042 increase is about 5%. **Figure 3-42** shows the impact on a monthly basis for 2030 and 2070.

The projections show some variation by month with higher rates in low evapotranspiration months (e.g., November, December, and January) when irrigation is small and smaller increases during the irrigation season (April through September).

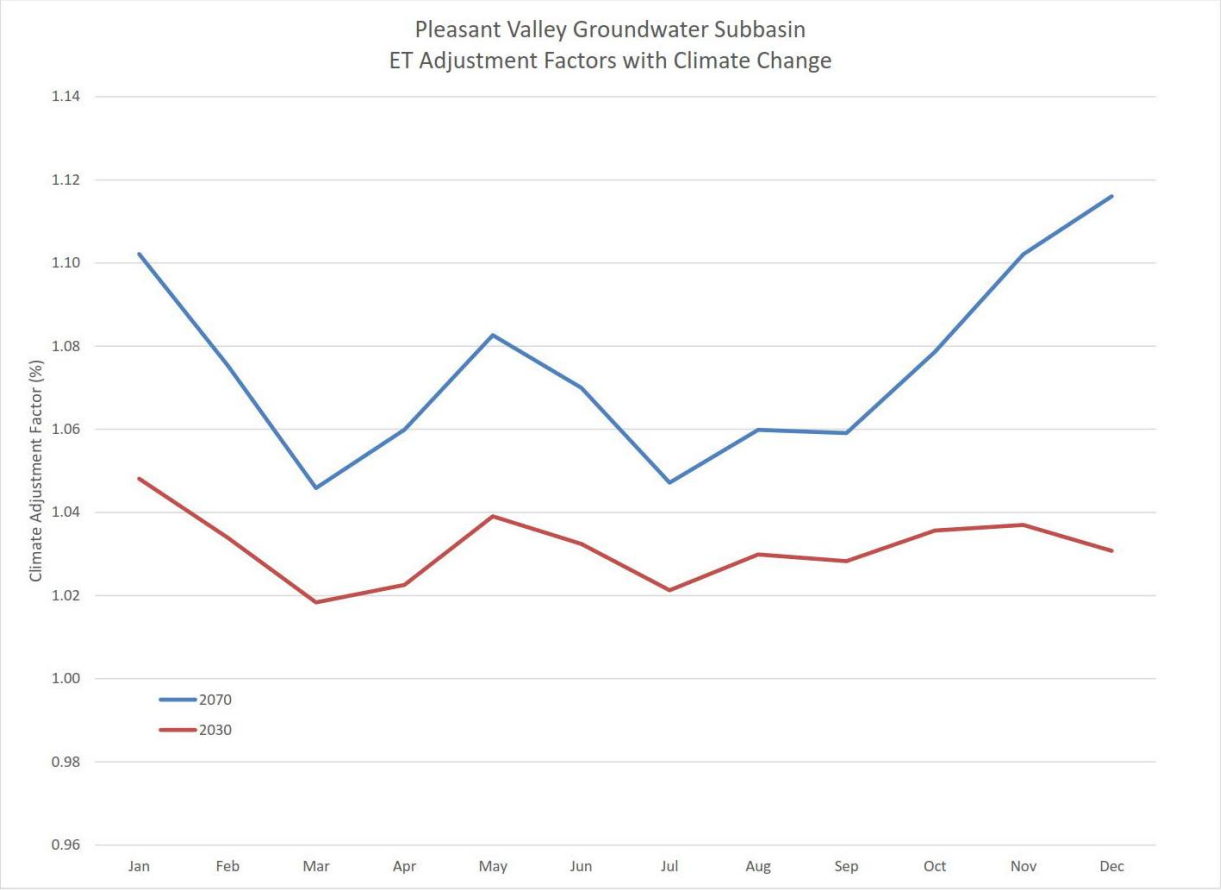


Figure 3-42 DWR ET Adjustment Factors with Climate Change

USBR (2015) predicted different impacts to annual crops versus perennial crops from climate change, as described below:

> "*Annual crop ET is projected to increase for perennial crops, with smaller increases, and sometimes slight decreases, for annual crops. Perennial crop ET increases are due to longer growing seasons and increases in ETo. While annual crops also experience increased ET rates, earlier potential planting dates and reduced growing season due to increased temperatures and crop development sometimes result in decreased annual crop ET." (USBR, 2015)*

As a result, crop evapotranspiration may only increase for perennial crops, but to be conservative, the expected increase was applied to both annual and perennial crops.

Future water use was updated for the City of Coalinga. The ratios of indoor use, outdoor use, and resulting recharge were left unchanged from the historical period. The higher anticipated ET is not expected to impact urban water use through higher landscaping demands, since urban agencies seek to manage water with per capita consumption goals, which will require less landscaping to accommodate the higher ET rates.

Urban and Agricultural Water Agencies

Urban and agricultural water agencies in Subbasin developed assumptions and estimates of future water demands through 2040. These are summarized in the table below.

Table 3-9 Future Water Demand Assumptions by Organization

Organization	Future Water Demand Assumptions[1]
City of Coalinga GSA	Demands change in 2040 based on values in 2020 Draft Urban Water Management Plan. Surface water usage increases to 6,200 AF/year up from a long-term average of 5,500 AF/year.
Pleasant Valley GSA	Cropping assumed to be similar to the Current Water Budget (2019). Evapotranspiration rates increase due to climate change, but new crops are being developed.
Fresno County Pleasant Valley GSA Area	Cropping assumed to be similar to the Current Water Budget (2019). Evapotranspiration rates increase due to climate change.

1 – Demands do not include water used for intentional recharge

Projected 2042 Water Budget

The projected water budget for 2042 is shown in **Table 3-10.** The 2042 water budget includes the aforementioned impacts from climate change and estimated demand changes provided by the water agencies. The water budget shows the conditions with mitigation (projects or management actions) amounting to an import of 20,000 AF/yr of surface supplies to address the groundwater overdraft. The blue shaded numbers were modified from the Current Water Budget to account for future changes. Actions proposed to reduce the change in groundwater storage (or overdraft) are discussed in **Chapter 6 – Projects and Management Actions** such that the Subbasin will be sustainable in the future.

This water budget is subject to change as data collection expands and the understanding of the local hydrologic systems improves. It should be noted that the single most significant value is the stream runoff as well as precipitation in the budget.

Table 3-10 Pleasant Valley Subbasin 2042 Water Budget (AF)

Pleasant Valley GSP
Pleasant Valley Groundwater Sustainability Plan
Water Balance - Average Annual Values
Period of Record: 2042

Preliminary Estimate
Not for Allocation Purposes

(all units in acre-feet)

Description	Symbol	Irrigation Eff. 83% Pleasant Valley Basin Total	Source	Changes from Current Water Budget
Supply				
1) Surface Water - Irrigation	Qirr	25,065	Measured	None
2) Surface Water - M&I	Qmi	6,200	Measured	Increased based on 2020 Coalinga UWMP
3) Groundwater Pumping - Irrigation (Agency Wells)	Gwirra	0	Measured	None
4) Groundwater Pumping - Irrigation (Private Wells)	Gwirrp	23,136	Calculated	Increases due to higher ET in 2042
5) Groundwater Pumping - M&I (Agency Wells)	Gwmia	0	Calculated	None
6) Groundwater Pumping - M&I (Private Wells)	Gwmip	200	Calculated	None
7) Precipitation	P	28,200	Measured	None
8) Spill Inflows	Si	0	Calculated	None
9) Other Supply: Aquifer Compaction due to Land Subsidence	Os	0	Calculated	None
Total Supply		85,500		
Demand				
Consumptive Use				
10) Evapotranspiration - Applied Water	ETc	42,100	Calculated	Increases 5% due to climate change
11) Evapotranspiration - Effective Precipitation	ETp	4,800	Calculated	None
12) Evapotranspiration - M&I	ETmi	3,300	Calculated	Increases due to higher M&I Water Use
13) Other Consumptive Use:	Od	0	Calculated	None
Consumptive Subtotal		50,200		
Groundwater Recharge				
14) Groundwater - Inflow	GWi	0	Calculated	None
15) Deep Percolation - Irrigation	PRCirr	7,660	Calculated	Increases due to higher water demands
16) Deep Percolation - Precipitation	PRCp	0	Calculated	None
17) Deep Percolation - M&I	PRCmi	1,900	Calculated	Increases due to higher M&I water use.
18) Seepage - Channels (& Pipeline Leakage)	Sch	200	Calculated	None, changes negligible
19) Seepage - Reservoirs	Sr	0	Calculated	None
20) Urban Stormwater - Recharge	Rus	500	Calculated	None
21) Local Streams/Rivers - Recharge	Rst	14,000	Calculated	None
22) Groundwater - Intentional Recharge	Rint	0	Measured	None
23) Other Recharge:	Or	0		None
GW Recharge Subtotal		24,260		
Nonrecoverable Losses				
24) Groundwater - Outflow	GWo	1,700	Calculated	None
25) Evaporation - Channels	Ech	0	Calculated	None
26) Evaporation - Reservoirs & Recharge Basins	Er	0	Calculated	None
27) Precipitation - Evaporation and Runoff	Ep	23,400	Residual	None
28) Operational Spills	S	0	Measured	None
29) Groundwater - Export	GE	0	Measured	None
30) Other Losses:	Ol	0		None
Nonrecoverable Subtotal		25,100		
Estimated Annual Change in Groundwater Storage		***(776)***		
GW Recharge - #14 thru #23		24,260	Calculated	
GW Pumping - #3 thru #6		(23,336)		
GW Outflow - #24 and #29		(1,700)		

Notes: All variables in the water budget are rounded to the nearest 100 AF
Values shaded in blue were modified from Current Water Budget

Projected 2072 Water Budget

A projected water budget for 2072 conditions was also prepared using the following criteria:

- Crop evapotranspiration rates increased by 7.5% over current levels. This results in an overall increase in demands of (7.5% - 5.0%) x 44,700 AF/year = 1,100 AF/year above 2042 levels.
- Precipitation is estimated to decreased by 0.4%. This change is minor and ignored.
- Stream flow amounts used the historical average. These were included in the budget. More attention should be focused on runoff from watersheds above the basin.
- No changes were made to urban water demands. The year 2072 is beyond a practical planning horizon for most urban water agencies, and little data was available for estimating demands in 2072. In the area, urban growth may take over irrigated farmland. While the two use different quantities of water, only the difference in water usage is relevant, so growth impacts may be moderate. These assumptions will be re-addressed in future GSP updates.

Table 3-11 summarizes the impacts to groundwater storage from climate change impacts in 2072.

Table 3-11 2072 Groundwater Storage Change without Mitigation

Description	Volume (AF)
Groundwater Storage Change (2042)	-22,500
Climate Change Impacts (2042 to 2072)	-1,100
Groundwater Storage Change (2072)	-23,600

While the local water agencies do not generally plan projects or funding 50 years in advance, the 2072 water budget does provide useful insight into potential challenges. As 2072 approaches and the true impacts of climate change are better understood, this water budget will be modified and updated.

3.3.11 Quantification of Overdraft

Regulation Requirements:
§354.18(b) The water budget shall quantify the following, either through direct measurements or estimates based on data:
(5) If overdraft conditions occur, as defined in Bulletin 118, the water budget shall include a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions.

The presence of overdraft in the Subbasin is documented by a historical decline in groundwater levels and is confirmed by the historical water budget presented previously. The historical water budget for the period of Water Years 2006-17 represents the most recent average hydrological period even though this period is drier than the historical long-term average. The estimated annual decline in groundwater storage for the Subbasin during this period, as "directly" estimated based on groundwater levels, specific yields, and measured groundwater subsidence is 24,000 AF/year and is increasing to 28,000 AF/yr. Using a water budget approach, the historical change in groundwater storage for 2017 is estimated to be slightly different at 19,023 AF/year. Recent conditions include more irrigated land and more pistachio trees that have matured, resulting in higher water demands.

3.3.12 Water Year Type Associated with Water Budget Comparisons

Regulation Requirements:
§354.18(b) The water budget shall quantify the following, either through direct measurements or estimates based on data:
(6) The water year type associated with the annual supply, demand, and change in groundwater stored.

Water year types were identified for the Subbasin based on streamflow seepage. Water types were identified for Wet, Normal, and Dry Years. Wet Years occur when precipitation is more than 125% of normal and Dry Years occur when streamflow seepage is less than 75% of normal. The water year types are summarized in **Table 3-4.**

3.3.13 Estimate of Sustainable Yield

Regulation Requirements:
§354.18(b) The water budget shall quantify the following, either through direct measurements or estimates based on data:
(7) An estimate of sustainable yield for the basin.

The "sustainable yield" for the Subbasin is defined as the amount of groundwater pumping that can occur while maintaining groundwater at sustainable levels and avoiding undesirable results. On average, maintaining groundwater pumping at levels that result in no long-term storage declines is used as the initial estimate of sustainable yield. The sustainable yield can be estimated as the Total Groundwater Recharge (from natural and artificial sources) minus the Groundwater Outflow. The Groundwater Recharge would include all of the recharge components shown in **Table 3-8**.

Using the change in levels methodology the sustainable yield is estimated at 23,500 AF.

Using the Current Water Budget (**Table 3-8**), the sustainable yield for the Subbasin is estimated to be:

22,577 AF – 0 AF = **22,577 AF/year**, which approximates the current groundwater pumping (43,300 AF/year) minus the overdraft (19,023 AF/year) and the groundwater outflow (1,700 AF/year).

Note: Values are rounded to the nearest 100 AF.

Due to the numerous uncertainties, assumptions, and estimates in the water budgets, the sustainable yield is considered approximate, but it gives a general idea of the groundwater available. This sustainable yield value is based on long-term average supplies under current demand and development conditions. The sustainable yield can and will likely change over time due to increased surface usage, changes in demands, and climate change impacts. As a result, the sustainable yield may go up or down over time.

It should be noted that this is a basin-wide sustainable yield, and this value cannot be used to estimate sustainable yield in local areas. The effective sustainable yield on a per acre basis may be different in different areas.

3.4 Management Areas

Regulation Requirements:
§354.20 (a) Each Agency may define one or more management areas within a basin if the Agency has determined that creation of management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives than the basin at large, provided that undesirable results are defined consistently throughout the basin.
(b) A basin that includes one or more management areas shall describe the following in the Plan:

3.4.1 Reason for Creation of Each Management Area

Regulation Requirements:
§354.20 (b) (1) The reason for the creation of each management area.

The Subbasin is home to three GSAs, and each GSA is considered its own Management Area. This is appropriate because of the variations in land uses, crop mixes, groundwater conditions, and surface water supplies between the GSAs; all of which will affect the fundamentals and details in the resulting GSP for the Subbasin.

3.4.2 Minimum Thresholds and Measurable Objectives

Regulation Requirements:
§354.20 (b) (2) The minimum thresholds and measurable objectives established for each management area, and an explanation of the rationale for selecting those values, if different from the basin at large.

The Subbasin GSAs have coordinated efforts in establishing minimum thresholds and measurable objectives. Minimum thresholds and measurable objectives for the Subbasin are discussed in **Chapter 4**.

3.4.3 Level of Monitoring and Analysis

Regulation Requirements:
§354.20 (b) (3) The level of monitoring and analysis appropriate for each management area.

The Subbasin GSAs have coordinated monitoring efforts and analysis. Monitoring within the Subbasin is discussed in **Chapter 5**.

3.4.4 Description of Management Areas

Regulation Requirements:
§354.20 (b) (4) An explanation of how the management area can operate under different minimum thresholds and measurable objectives without causing undesirable results outside the management area, if applicable.
(c) If a Plan includes one or more management areas, the Plan shall include descriptions, maps, and other information required by this Subarticle sufficient to describe conditions in those areas.

As noted above, each GSA within the Subbasin is considered its own Management Area. **Figure 2-3** illustrates the three GSAs in the Subbasin. There has been a coordinated approach within the Subbasin for each GSA so that each GSA does not cause undesirable results outside their GSA.

4 Sustainable Management Criteria

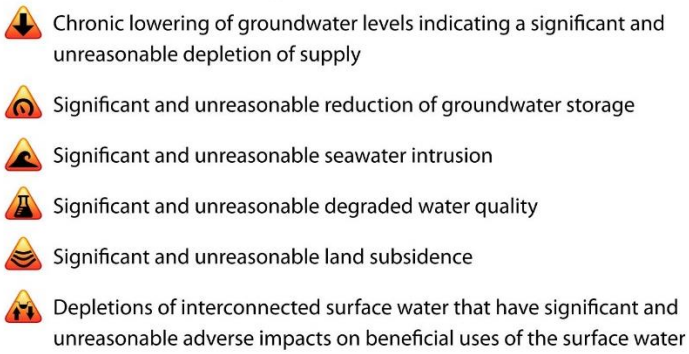
Regulation Requirements:
§354.22 This Subarticle describes criteria by which an Agency defines conditions in its Plan that constitute sustainable groundwater management for the basin, including the process by which the Agency shall characterize undesirable results, and establish minimum thresholds and measurable objectives for each applicable sustainability indicator.

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.*" The avoidance of undesirable results is important to the success of the GSP. Several requirements from GSP regulations have been grouped together under the heading of Sustainable Management Criteria (SMC), including a Sustainability Goal, Undesirable Results, Minimum Thresholds (MT), and Measurable Objectives (MO) for various indicators of groundwater conditions. Development of these Sustainable Management Criteria is dependent on basin information developed and presented in the hydrogeologic conceptual model, groundwater conditions, and water budget chapters of the Pleasant Valley GSP (DWR, 2017). These terms are provided are provided in the table below:

Table 4-1 Sustainability Criteria Definitions

Term	Definition
Sustainability Goal	A succinct qualitative statement including objectives and desired conditions of the groundwater basin, how the basin will get to that desired condition, and why the measures planned will lead to success.
Measurable Objective	Quantitative goals that reflect the basin's desired groundwater conditions and allow the GSAs to achieve the sustainability goal within 20 years.
Minimum Threshold	The quantitative value that represents the groundwater conditions at a monitoring site that, when exceeded individually or in combination with minimum thresholds at other monitoring sites, may cause undesirable result(s) in the basin.
Undesirable Result	A situation that occurs when conditions related to any of the six sustainability indicators become significant and unreasonable.

Indicators for the sustainable management of groundwater were determined by SGMA based on factors that are important to the health and general well-being of the public. Six indicators must be monitored throughout the planning and implementation period of the GSP including groundwater levels, groundwater storage volume, seawater intrusion, water quality, land subsidence, and interconnected surface water. In addition to these six indicators; this GSP recognizes that pumpage and crop consumptive use are critical to managing the resources of the basin and will include policy and actions to measure and record these occurrences on a yearly basis. This chapter will describe the indicators and why they are significant and will define the management thresholds.



The Sustainable Management Criteria described herein were prepared following the requirements set forth in the California Code of Regulations, Title 23, Division 2, Chapter 1.5, Subchapter 2, Article 5, Subarticle 3 (§354.22 through §354.30).

It should be recognized that the Subbasin that is being described for sustainable management is the unconfined/semiconfined aquifer in the Pleasant Valley. As has been described previously, the area has seen large scale oil production as is shown on the following historic photograph.

Figure 4-1 Coalinga in formative years – Pumping of a different type



Water production occurring with oil production is regulated by the State Division of Oil and Gas and is not covered under this plan.

4.1 Sustainability Goal

Regulation Requirements:
§354.24 Each Agency shall establish in its Plan a sustainability goal for the basin that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline. The Plan shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield, and an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation and is likely to be maintained through the planning and implementation horizon.

The sustainability goal of the Pleasant Valley GSP is to ensure that by 2042 groundwater pumping is measured and managed to maintain groundwater levels in the Subbasin so that a reliable water supply for current and future beneficial uses is afforded the landowners without experiencing undesirable results. This goal will be met by balancing water demand with available water supply to stabilize declining groundwater levels without significantly and unreasonably impacting water quality, land subsidence, or interconnected surface water. The goal of the subbasin is to correct and end the long-term trend of a declining water table, understanding that water levels will fluctuate based on the season, hydrologic cycle, and changing groundwater demands within the Subbasin and its proximity.

The conditions within the Subbasin and this GSA will be considered sustainable when:

- Groundwater pumping amounts are in close approximation to the estimate of the sustainable yield; and

- Groundwater levels at Representative Wells, supported by hydrographs and water-level maps, indicate that the groundwater levels are not on a consistent downward trend over a ten-year period.
- Groundwater storage indicated by changing groundwater levels also normalize over a ten-year period do not show a reduction in storage.
- Land subsidence due to the extraction of groundwater does not exceed the past land subsidence due to groundwater pumping.
- Groundwater quality is not significantly diminished.

It is the intent of Pleasant Valley GSP participants to work collaboratively to continue to better understand the basin characteristics by establishing a coordinated network of monitoring points and reporting requirements. This will help to recognize existing hydrogeological patterns and to better refine SMCs in future Plan updates. It is also the intent of the Pleasant Valley GSP participants to establish criteria and implement programs and projects to monitor and manage groundwater levels and storage, protect water quality, and reduce the effects of subsidence in a manner that is open to the public and stakeholders and considers the needs of all beneficial users.

The intent for this GSP is to provide a tool for managing groundwater that will assist in maintaining Subbasin-wide sustainability for the long term. Sustainability will be determined by the Subbasin's ability to avoid undesirable results by establishing MTs and MOs of each applicable sustainability indicator defined in **Section 4.2. Chapter 3 – Basin Setting** provides insight to current and also historical groundwater conditions demonstrating the natural variability of the region. A water budget is also included, which quantifies factors contributing to inflows and outflows as well as sustainable yield estimates.

The following are some examples of reductions in surface water supplies that have occurred in the San Joaquin Valley that, while not directly attributable to the Subbasin, have had an effect on the variability of surface water supplies that have and will be available to the Subbasin. This lack of available surface supply has resulted in more groundwater pumping and as a result had undesirable results on the sustainable indicators described under each indicator.

The reductions in surface water supplies in the San Joaquin Valley total approximately 2,155,000 acre-feet per year (AF/yr) of surface water:

- The State Water Project (SWP) and Central Valley Project (CVP) water delivery reductions through the Central Valley Project Improvement Act (CVPIA) (circa 1992) have resulted in:
  - a decrease of SWP deliveries by an average of 600,000 AF/yr;
  - decreased pumping due to Fall X-2 restrictions by an average of 300,000 AF on the SWP;
  - a decrease of CVP San Luis Unit deliveries by an average of 780,000 AF/yr;
  - a decrease of diversions of about 400,000 AF/yr due to Oroville releases that cannot be pumped into the SWP; and
  - unallocated project yield being developed into contracted supplies (Cross-Valley Contracts and Mid-Valley Canal efforts).
- Biological Opinions (circa 2007) have resulted in:
  - a decrease of SWP deliveries by an average 240,000 AF/yr; and
  - a decrease of CVP San Luis Unit deliveries by an average of 325,000 AF/yr.
- The San Joaquin River Restoration program (circa 2010) has resulted in:
  - reduced deliveries from the Friant Division CVP by an average 210,000 AF/yr.

Additionally, Subbasin-wide effects to groundwater supplies may result from the following:

- Climate Change
  - Information developed by DWR suggests that warmer conditions could lead to more rain and/or earlier snow melt runoff (DWR 2017b).
  - Studies indicate increased temperatures could result in higher evapotranspiration rates, which could increase demand.

- Changing Crop Patterns
  - An increase in crop changes from annual crops to permanent crops with a higher and more constant water demand could result in an increase in groundwater demand, assuming the same number of acres are irrigated.
- Increased Urbanization
  - Increases in land use for cities and communities in areas not currently irrigated could result in an increase in demand in certain GSAs.

Changes in crop patterns have resulted in an increase in groundwater pumping throughout the Subbasin. The potential for undesirable results to occur for each sustainability indicator due to this increase in pumping is described in following sections.

In order to achieve the goals outlined in the GSP, continued management practices, monitoring, and projects to secure alternative sources of water will be implemented over the course of the next 20 years. The PV basin has, over the past sixty years, experienced significant declines in groundwater levels and decreases in groundwater storage. The stakeholders are discussing whether unreasonable groundwater conditions have and are occurring that would lead to undesirable results. Plans to increase monitoring of the sustainability indicators will improve analysis of groundwater conditions in the future. Existing and planned projects and management actions to aid in GSP implementation are identified in further detail in **Chapter 6**.

To assess the path to sustainability, the sustainable management criteria will be evaluated in conjunction with the data obtained via monitoring efforts identified in **Chapter 5**. Every five years, the PV GSP participants can revise the GSP with the intention of refining the course to sustainability, based on information learned via monitoring, outreach, and improved data quality and quantity (i.e., adaptive management).

The measurable objective quantitatively reflects the sustainability goal for 2042 and the interim goals quantitatively represent the sustainability goal at five-year increments, corresponding with Plan update periods. Monitoring results will be compared to the interim goals, MO, and MT during Annual Report and GSP update development. The analysis will assess the Subbasin's ability to prevent undesirable results as they relate to the other SMCs.

The sustainability goal for the Pleasant Valley GSP is to increase the importation of surface water to the region for direct irrigation use as well as for intentional recharge to the groundwater basin. If additional mitigation is needed, then the GSAs may consider reductions in crop acreage to further reduce the amount of groundwater pumping in the basin.

4.2 Groundwater Levels

Water level decline has been occurring in the Subbasin since at least the early 1900s when development of the area to agriculture occurred. Over the decades, the cropping pattern has changed to meet the needs of the local area as well as reflective of the agricultural economy of the State. Current and historical information on water level decline is discussed in **Section 3.2.1** and the water level monitoring network is discussed in **Section 5.2**. The key to control groundwater level decline is to measure groundwater pumping and to control pumping to eliminate overdraft. Construction of projects to import surface water is planned to coincide with the reduction of groundwater pumping.

The plan for stabilizing water levels is to implement projects to import surface water and if needed institute demand reduction policies that will reduce the groundwater level declines over a base period first from more than 10 feet to 7 feet per year by 2025, then to 5 feet per year by 2030, to 3 feet by 2035, and to 0 feet per year by 2042. The monitoring plan envisions using all the active agricultural wells in the Subbasin for development of hydrographs to compare to the four representative monitor sites that will be used as the monitor tool for conformance with plan performance and compliance. Minimum thresholds have been developed to allow for seasonal fluctuations and hydrologic variability of watershed conditions above the Subbasin. In general, the minimum thresholds have been set about 50 feet deeper than the measurable objective.

4.2.1 Pumpage

Groundwater levels are directly related to stream flow recharge and groundwater pumpage. As has been documented, the groundwater overdraft is directly related to the cultivation of crops. At present the consumptive use of the crops has outpaced the recharge. Either surface water needs to be imported or pumpage needs to be reduced, or a combination of the two needs to be employed to maintain sustainability of the groundwater. If projects are not implemented, then progressive reductions in pumpage will need to be employed to meet sustainability.

4.2.2 Undesirable Results

The terms "significant and unreasonable" are not defined by regulations, rather the conditions leading to this classification are determined by the GSAs, beneficial users, and the subbasin they are a part of. The process used to develop criteria for determining undesirable results began with discussions with stakeholders and landowners.

The GSAs within the Subbasin have struggled to define the Undesirable Result for groundwater levels. The critical first step is identifying the specific significant and unreasonable effects that would constitute Undesirable Results. As water levels have declined, owners have continued to drill deeper wells and lower pump settings and paid higher costs for pumping water. Corresponding to these conditions, gas is now being experienced in some wells. It is possible that conditions currently being experienced could be considered undesirable. Additionally, when water levels have declined to a depth that a new productive well cannot be constructed or when the water level has declined so as to compromise the life of a useful well would be considered undesirable results for groundwater levels. It is also undesirable to have cascading water and reduced pumping rates due to excessive water-level declines.

As shown in **Chapter 3 – Basin Setting**, recent water levels are hundreds of feet above the base of the unconfined/semi-confined aquifer in much of the Subbasin. The requirement to stabilize water levels by 2042

becomes the controlling condition for setting target water levels. The water level elevation at the anticipated point of stabilization is the Measurable Objective, discussed in more detail later in this section.

The goal of this GSP is to start to slow the decline in water levels over time as quickly as possible. To this end it is not the intent to set Management Objectives or Minimum thresholds; however, based upon the plan to lessen the rate of decline of water levels, interim milestones, management objectives, and minimum thresholds have been identified based upon the plan to reduce the rate of decline in water levels. The goal is to lessen the rate of decline in water levels in the basin. To this end the following is the initial goal of this GSP:

Existing rate of decline in water levels	10 ft/yr
2025 Goal	<7 ft/yr
2030 Goal	<5 ft/yr
2042 Goal	0 ft/yr

A graph of what this transition might look like is shown in Figure 4-2 below

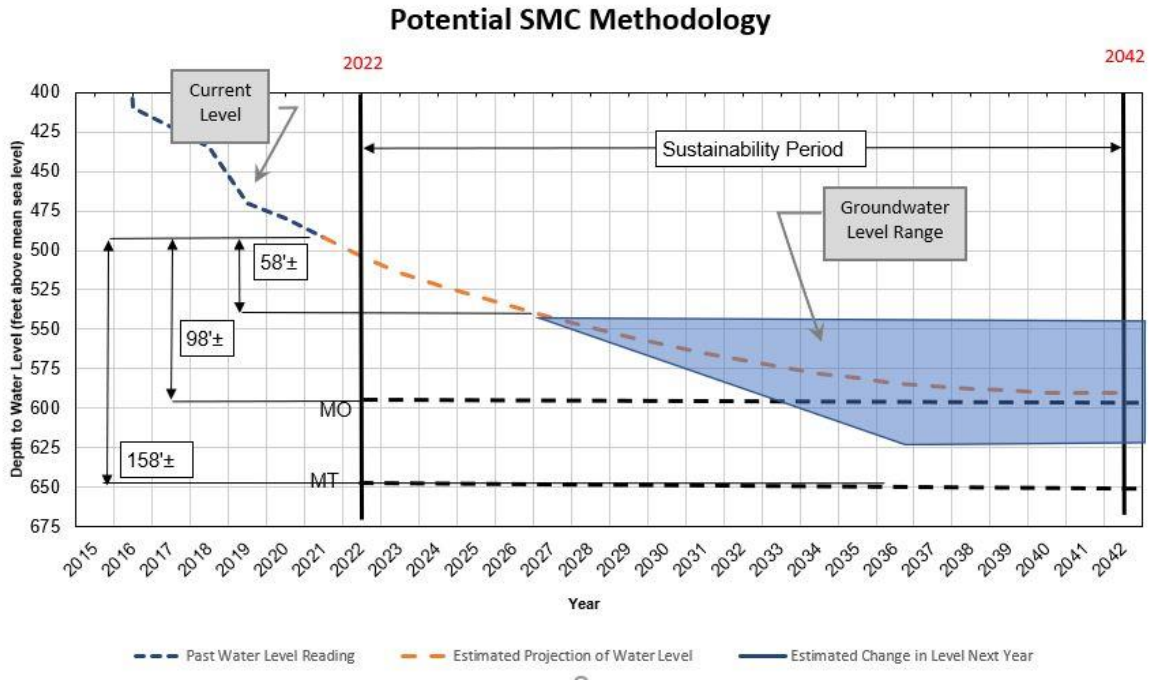


Figure 4-2 Potential SMC Methodology

The MT was set at an elevation to allow operational flexibility of the anticipated water level decline during a prolonged drought which has implications for both regional recharge and the ability to import surface water supplies. A more detailed description is provided later in this section. Also, for the different zones the shape and configuration of the curve will change based upon the local conditions of each area.

4.2.2.1 Criteria to Define Undesirable Results

Regulation Requirements:
§354.26 (a) Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.

Undesirable results related to groundwater level declines in the Subbasin would be a signal of diminished groundwater supplies for agricultural, municipal, industrial, and domestic needs. Agriculture is the main economic enterprise of the Subbasin, so effective management of groundwater for sustainable future use is critical to the continuation of current economic interests which add value to the Subbasin's communities.

Declines in groundwater levels will increase the energy needed for pumping. Continued groundwater level declines have the potential to negatively impact well capacity, requiring deepening and/or replacement to produce the desired amount of water. Continued groundwater level declines could also force some well owners to lower or replace existing pumps if the existing well casing is sufficiently deep. Although all of these potential impacts can be mitigated technically, they are considered undesirable results due to the expense involved.

4.2.2.2 Causes of Groundwater Conditions That Could Lead to Undesirable Results

Regulation Requirements:
§354.26 (b) The description of undesirable results shall include the following:
(1) The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.
(2) The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.
(3) 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.

Based on collected data in the Subbasin, certain areas show long-term decline in groundwater levels, which if not addressed, may eventually lead to a reduction in usable groundwater supplies. However, as shown in **Chapter 3**, as the water levels deepen, it is expected that more finer grained materials are present and the water yielding capacity is reduced. Also, the well capacities become reduced, and the costs for both drilling and maintaining the wells are increased.

Measurements of groundwater level depths have been collected intermittently across the Subbasin since the early 1900s as discussed in **Chapter 3.** By the 1950s, pumping had begun to alter groundwater flow conditions, so local groundwater depressions developed. Between 1990 and 2011, groundwater levels were relatively stable owing to the reduced and revised cropping in the Subbasin. Since about 2010 with the change in cropping patterns to more pistachios, groundwater levels declined once again. The more recent groundwater elevations are mostly available for the area where irrigated cropped land is in production. Water level depths range from approximately 350 feet below mean sea level in the very southern – end of the GSP area to approximately 400 feet below mean sea level in the center of the basin and up to 500 feet below mean sea level in the northern portion of the basin.

The state of current groundwater conditions mainly depends on the amount of groundwater that is pumped and streamflow recharge. Groundwater pumping patterns fluctuate in response to various scenarios described below. If the following scenarios all lead to larger volumes of groundwater being pumped, it is possible that it

may lead to undesirable results if left unchecked.

- Change in cropping patterns
- Change in land area being farmed
- Change in surface water use
- Change in streamflow recharge

Lowering groundwater levels can result in the following main impacts to beneficial users, the degree to which will determine if the conditions of lower groundwater levels are significant and unreasonable:

- Water well production problems
- Loss of groundwater storage
- Higher energy costs
- Deterioration of groundwater quality

Water Well Problems

Declining ground-water levels have three main effects on water wells. First, as the depth to water increases, the water must be lifted higher to reach the land surface. As the lift distance increases, so does the energy required to drive the pump. Thus, power costs increase as ground-water levels decline. Depending on the use of the water and the energy costs, it may no longer be economically feasible to use water for a given purpose. Second, pumping levels may decline below the bottom of existing pumps, necessitating the expense of lowering the pump or drilling a deeper replacement well. Third, the yield of the well may eventually decline below usable rates.

From review of the discussion in **Chapter 3** and the water budget, groundwater recharged, streamflow recharge, and pumpage are the main drivers of the overdraft within the basin. Continued agricultural use or expansion without the coordinated import of surface water supplies will continue to cause the Subbasin to be in a state of overdraft.

4.2.2.3 Evaluation of Multiple Minimum Thresholds

Regulation Requirements:
§354.26 (c) The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.

The plan is to use all the measured wells in the basin to develop water-level hydrographs. These well hydrographs will be compared to Representative Monitoring Sites (RMS). Based upon the foregoing discussion, minimum thresholds have been developed by establishing management objectives and then adding approximately 50 feet in depth to establish the SMC levels. As the plan is implemented, a review and revision of these levels will be undertaken.

4.2.3 Minimum Thresholds

Regulation Requirements:
§354.28 (a) Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.
(d) An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.

This section describes the MTs established for the groundwater levels sustainability indicator. The MTs quantify groundwater conditions at each RMS that, if exceeded, may lead to undesirable results. The MTs for groundwater levels are based on historic groundwater level decline at each individual RMS and are described in the following sections. The measurement and monitoring of MTs, the definition of an exceedance that may result in undesirable results, and the potential effects on beneficial uses and users of groundwater are described in subsequent sections.

For groundwater levels, it is expected that there will be different MT's based upon the location in the Subbasin. As an example, a well adjacent to the contact with the rock at the edge of the Subbasin will have a different MT than a well located in the center of the Subbasin where the aquifer has much more depth. The process for establishing the MTs for the groundwater levels sustainability indicator for the Subbasin is based on the following concepts, each of which was developed using the information developed for the HCM and as described in other portions of the GSP.

1. Groundwater levels in the Subbasin are generally declining, though at different rates in different locations in the Subbasin.
2. The continued decline of groundwater levels in the Subbasin may result in impacts to beneficial uses and users that are significant and unreasonable or undesirable. If this were to occur, it may reach a point where the GSAs may not be able to manage and/or mitigate the effects, so a proactive approach needs to be implemented now.
3. The GSAs of the Subbasin will be implementing projects and management actions designed to reduce the rate of groundwater level decline in the Subbasin and eventually stabilize groundwater levels into the future (Chapter 6).
    - Implementation of the projects and management actions by the GSAs is anticipated to begin in 2023 and be completed by 2040 (Chapter 7).
4. The results of forecast simulations indicate that the implementation of the projects and management actions by the GSAs proposed in this GSP will begin to reduce the rate of groundwater level decline in the Subbasin by 2025 and will stabilize groundwater levels by 2042.

Using the above as a guide, MTs for the groundwater levels sustainability indicator in the Subbasin were established using historical data for RMS wells as follows.

1. RMS sites were chosen based on availability of known well information, location in the GSA, and availability of historical data.
2. Groundwater levels for each RMS site in the Subbasin were graphed for the entire history of recorded data.
3. The estimated groundwater elevation in 2042, based on the current pumping patterns or the last 15 years of elevation data, is the MT at that RMS. The assumptions include:
    - Lands that are currently in production continue to stay in production.

- Water use, surface water deliveries, etc. in the Subbasin generally remain the same into the future. This is considered a reasonable assumption given the current groundwater conditions in the Subbasin. It is anticipated that there will be a slight increase in demands due to the maturing of several pistachio plantings in the Subbasin.

An example hydrograph illustrating this process is shown in **Figure 4-3**. Hydrographs at all the RMSs or substitute locations showing the MTs, MOs, and stabilized groundwater levels by 2042 are presented in **Figure 4-3** through **Figure 4-8**. The MT at each RMS is listed in **Table 4-2**.

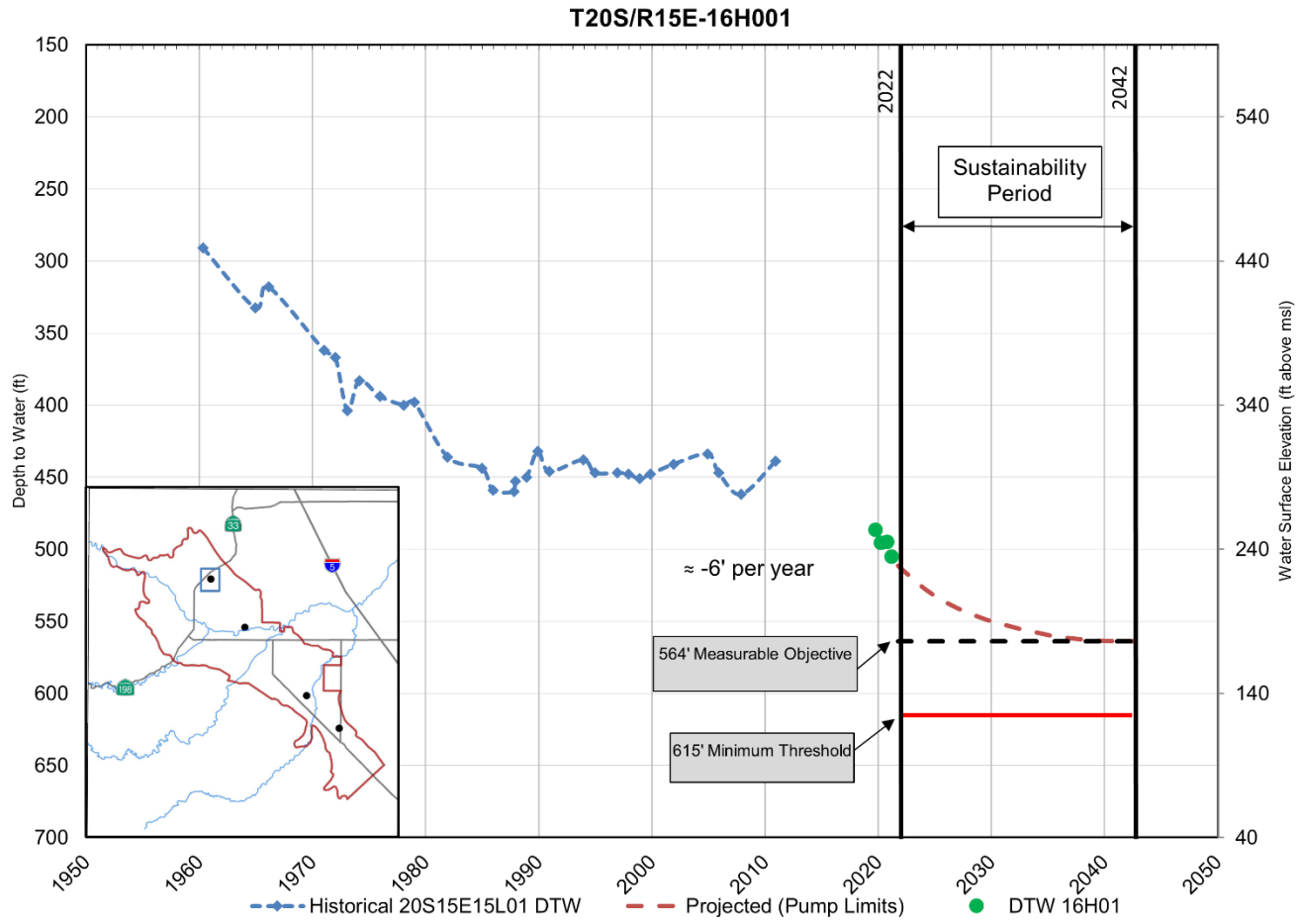


Figure 4-3 Hydrograph T20S/R15E-16H001

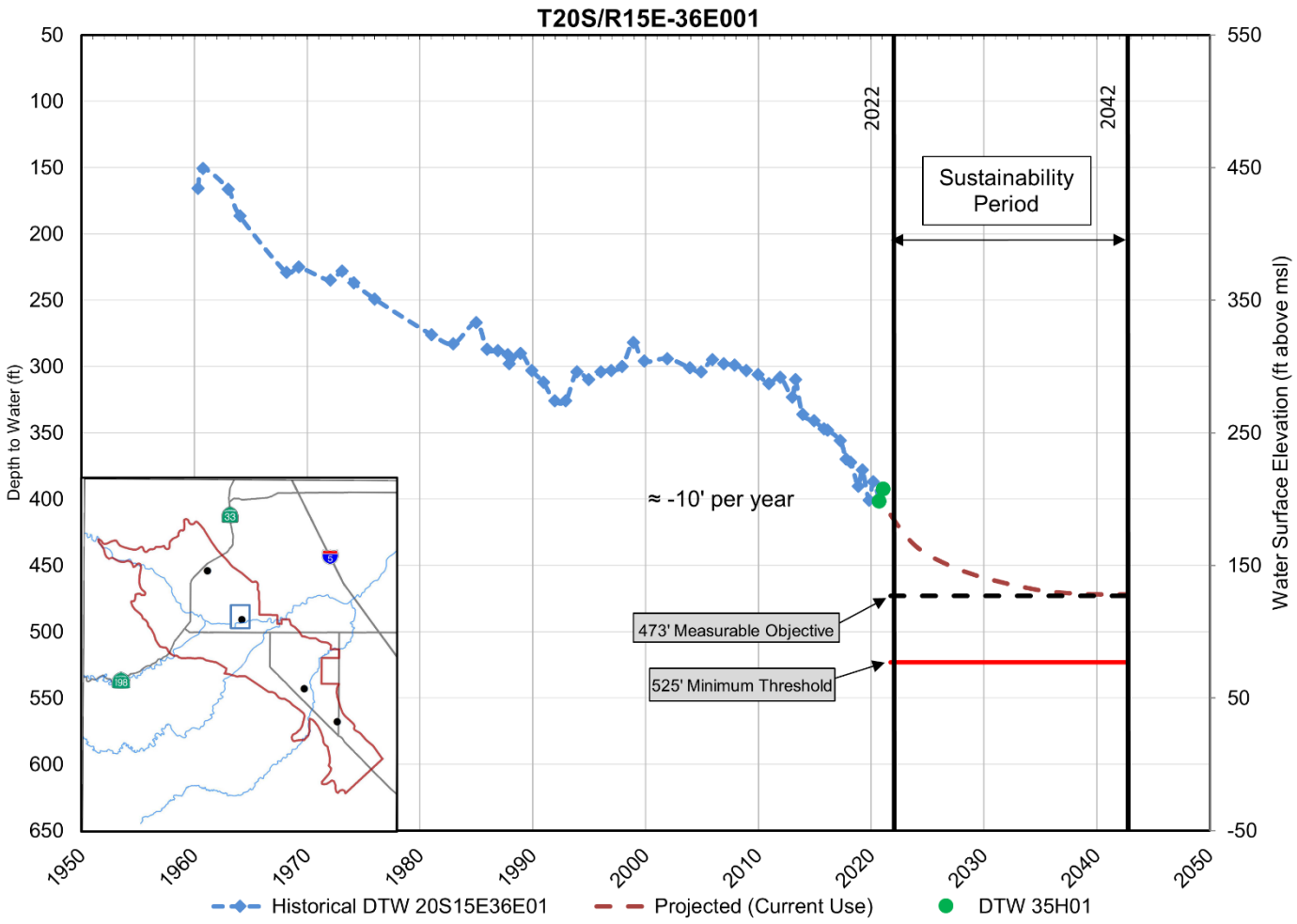


Figure 4-4 Hydrograph T20S/R15E-36E001

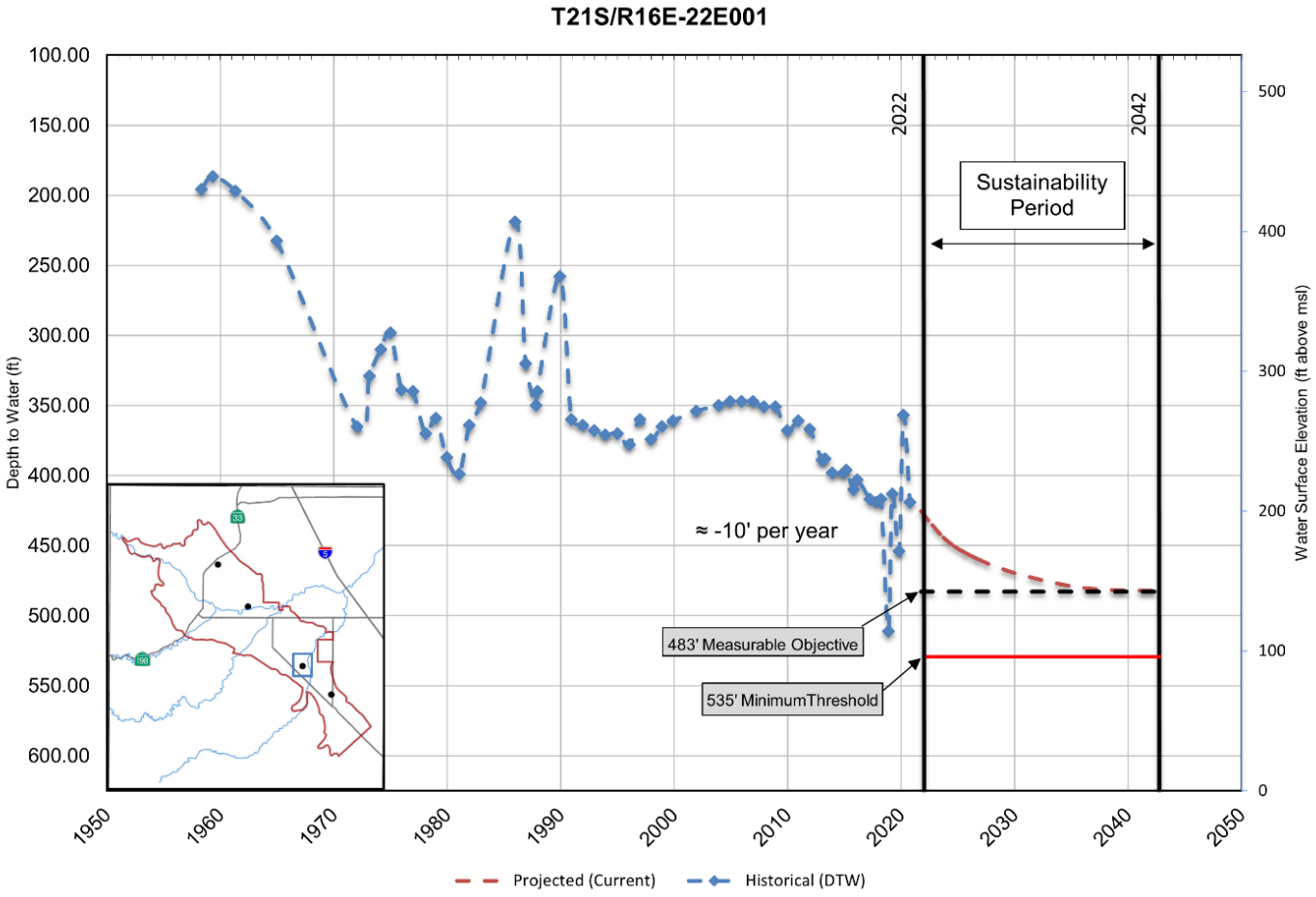


Figure 4-5 Hydrograph T21S/R16E-22E001

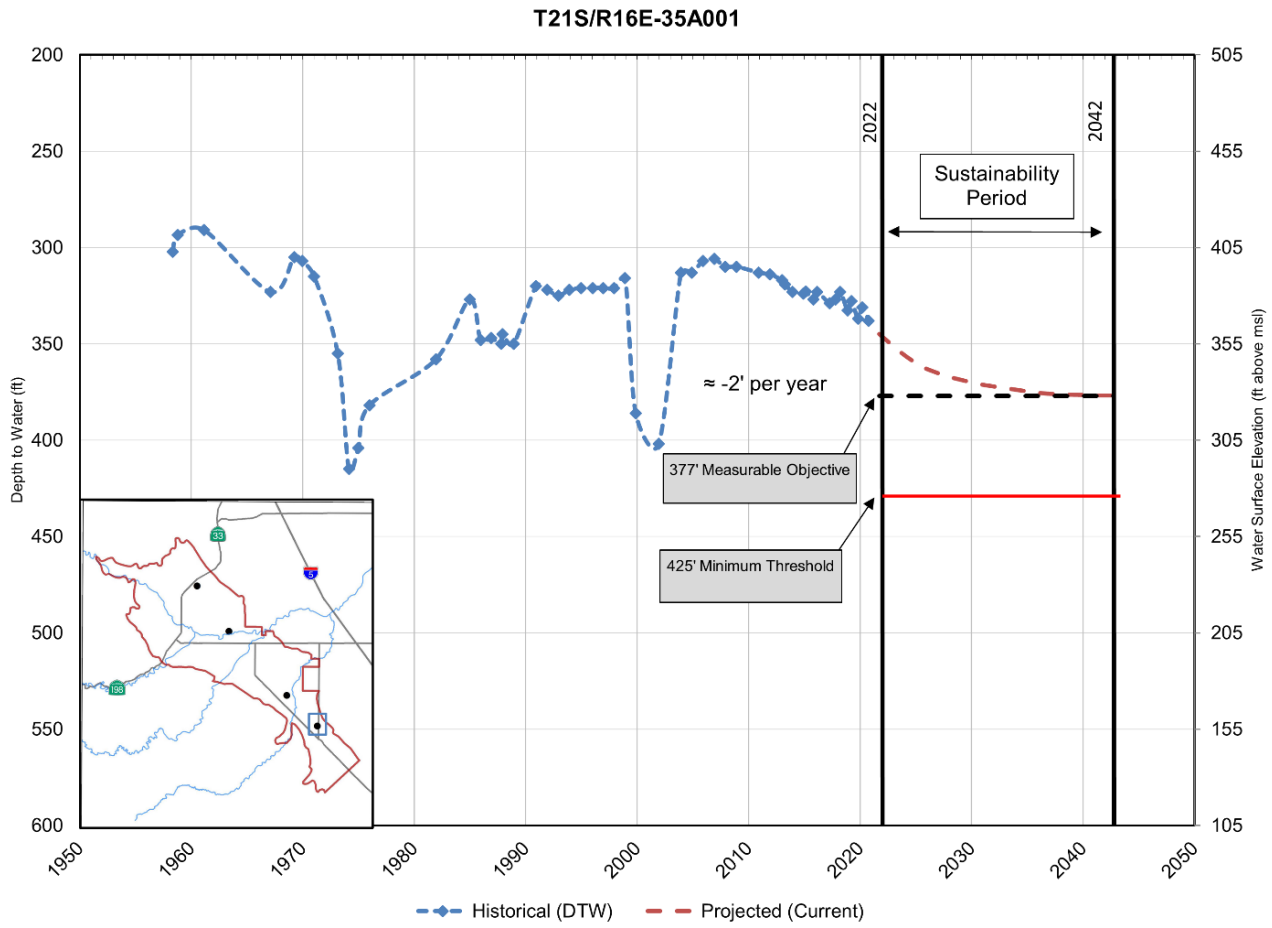


Figure 4-6 Hydrograph T21S/R16E-35A001

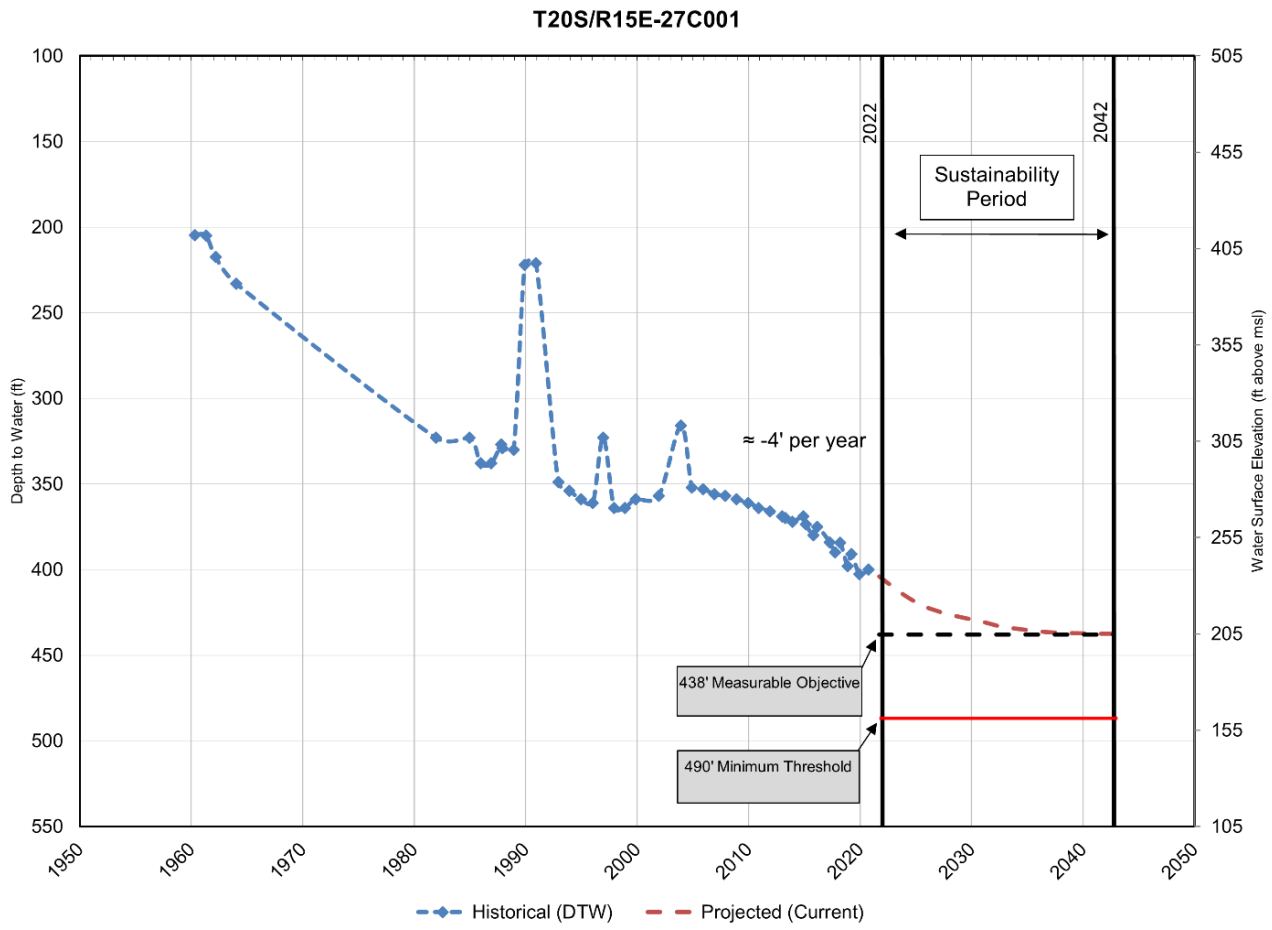


Figure 4-7 Hydrograph-T20S/R15E-27C001

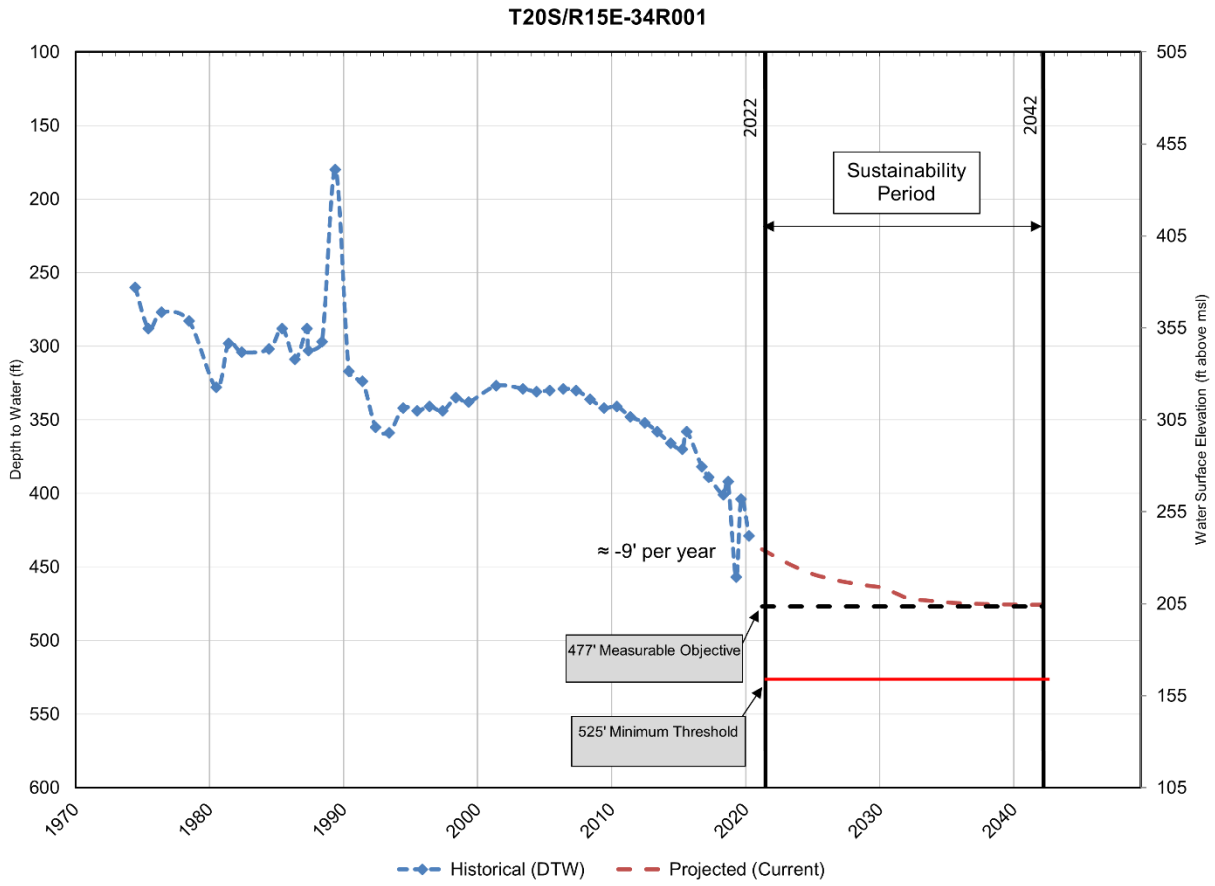


Figure 4-8 Hydrograph-T20S/R15E-34R001

Table 4-2 Groundwater Levels - Minimum Thresholds

Description	Minimum Threshold Depth (ft)	Minimum Threshold Elevation
T20SR15E-16H01	615 ft	125 ft
T20SR15E-36E01	525 ft	77 ft
T21SR16E-22E01	535 ft	91 ft
T21SR16E-35A01	425 ft	281 ft
T20SR15E-27C01	490 ft	183 ft
T20SR15E-34R01	525 ft	107 ft

4.2.3.1 Criteria to Define Minimum Thresholds

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(1) The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by uncertainty in the understanding of the basin setting.

§354.28 (c) Minimum thresholds for each sustainability indicator shall be defined as follows:
(1) Chronic Lowering of Groundwater Levels. The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results. Minimum thresholds for chronic lowering of groundwater levels shall be supported by the following:
(a) The rate of groundwater elevation decline based on historical trends, water year type, and projected water use in the basin.

MTs were defined by criteria and information discussed in the previous section including historic groundwater levels. They rely on the assumption that groundwater will continue to be pumped at a similar rate with reductions imposed by either the importation of surface water or reduction in demand. The MTs have been set at an approximate 50-foot depth lower than the MO discussed later. This represents a worst-case condition, but would also present a condition where groundwater supplies are still available.

4.2.3.2 Relationship of Minimum Thresholds Between Sustainability Indicators

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(2) The relationship between the minimum thresholds for each sustainability indictor, including and explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.

§354.28 (c) Minimum thresholds for each sustainability indicator shall be defined as follows:
(1) Chronic Lowering of Groundwater Levels. The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results. Minimum thresholds for chronic lowering of groundwater levels shall be supported by the following:
(b) Potential effects on other sustainability indicators.

The MTs represent an estimated condition which would occur by 2042 if projects or management actions are implemented. From a well canvas prepared and updated in the course of this work, it appears there are about

75 active agricultural production wells in the Subbasin. The hydrographs from these wells will be compared to the RMS.

It is believed that many of these presently operating agricultural wells will have the ability to continue operation should this occur, thus avoiding undesirable results. The groundwater level MTs will be used to set the MTs for groundwater storage change, and thus they are directly related through land area and specific yield. Groundwater quality can be qualitatively related to levels; however, water quality sampling will be utilized to set sustainability conditions.

4.2.3.3 Minimum Thresholds in Relation to Adjacent Basins

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(3) How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.

The MTs set in this Subbasin are higher than those set in the Westside Subbasin to the east. As stated in Section 3, there are two potential links between the Pleasant Valley Basin and the Westside Subbasin including the Passejero Gap and the Polvadero Gap. The hydrogeology and groundwater flow in the two areas are discussed in **Chapter 3 – Basin Setting**.

4.2.3.4 Impact of Minimum Thresholds on Beneficial Uses and Users

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.

As discussed, the MTs were established based on historical operating conditions and groundwater use. Groundwater level decline throughout the Subbasin occurs at varying rates depending on the location; therefore, the MTs and allowable water level decline will differ based on location. While there is limited available information on total well depth and current operating depth throughout the GSA, it is believed that the levels at which the MTs have been established will allow for continued operation of existing operating wells without alteration.

4.2.3.5 Current Standards Relevant to Sustainability Indicator

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(5) 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 basis for the difference.

There are no other known regulatory standards related to groundwater levels; and thus, the MTs do not conflict with other regulatory standards.

4.2.3.6 Measurement of Minimum Thresholds

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(6) How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.

Groundwater levels will be directly measured at each RMS according to the monitoring network described in **Section 5.2**. Groundwater elevations will be used to generate contour maps with the available data to show the groundwater elevations throughout the Subbasin. For more information regarding wells and RMSs in the monitoring network, refer to **Chapter 5**.

4.2.4 Measurable Objectives

4.2.4.1 Description of Measurable Objectives

Regulation Requirements:
§354.30 (a) Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin with 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.
(b) Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.

The purpose of setting MOs is to define acceptable groundwater conditions that will allow for sustainable and continued use of groundwater over time for all beneficial users. MOs were developed for the Subbasin using the method described in **Section 4.2.2**. The MOs are a result of and assume that projects and management actions such as pumping restrictions have been implemented over time and additional surface water supplies are imported into the basin through project implementation. Water-level trends need to be evaluated for all measured wells to check if representative wells are providing representative data. The following procedure was used for establishing MOs:

1. Groundwater level changes were forecasted for each RMS based on assumed pumping reductions for the Subbasin. The rate of decline in groundwater levels are as follows:
    a. Reduction in existing rate of decline of groundwater level to 7 ft/yr by 2025
    b. Reduction in rate from 7 to 5 ft/yr by 2030
    c. Reduction in rate from 5 to 3 ft/yr by 2035
    d. Reduction in rate from 3 ft/yr to 0 by 2042
    The changes in the hydrographs in wells are reflected in the RMS.
2. The projection started at the lowest water level reading within the last two years at each of the RMSs.
3. Projected groundwater level changes assume:
    a. Existing cropping patterns are maintained
    b. The average natural recharge from the surrounding watershed will be realized
    c. Pumping reduction will occur in areas being farmed and are reflective in the RMS.
    d. The specific yield of the basin deposits are uniform and unchanging.
    e. Landowners will adhere to the reduction in pumping schedule.
    f. The reduction in pumping assumes a corresponding importation of surface supplies. The analysis does assume that the reduction will occur no matter the status of import of surface supplies.
    g. Relies on the implementation schedule found in Section 7.

h. Assumes that no subsidence occurs with the continued decline in groundwater levels.

The MO at each RMS is listed in **Table 4-3** along with corresponding interim milestones.

Table 4-3 Groundwater Levels Measurable Objectives – Elevation in Wells

	Pleasant Valley RMS Interim Milestones and Measurable Objective				
Description	Interim Milestones- Depth (ft)				Measurable Objective (ft)
	2025	2030	2035	2040	
T20SR15E-16HO1	536	552	561	564	564
T20SR15E-36E01	445	461	470	472	472
T21SR16E-22E01	456	471	480	482	482
T21SR16E-35A01	362	371	375	377	377
T20SR15E-27C01	422	430	436	437	438
T20SR15E-34R01	456	464	474	476	477

4.2.4.2 Operational Flexibility

Regulation Requirements:
§354.30 (c) Measurable objectives shall 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.

The MOs and MTs have been established to help the landowners set an achievable benchmark while also being realistic about the time it takes to implement management actions and develop surface water projects, if desired. MTs were developed assuming recent historical pumping patterns and no management actions, thus the MT is the groundwater level that will occur should no restrictions occur, while the MO sets a reasonable goal for sustainable management when considering pumping restrictions discussed in Section 6. The difference between the MT and the respective MO at each site is the operational flexibility.

4.2.4.3 Representative Monitoring

Regulation Requirements:
§354.30 (d) An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.

The RMSs that have been selected for groundwater elevation monitoring and SMCs as well as the other agricultural wells will be used for groundwater storage change as well. Groundwater level MOs will serve as the representative MO for groundwater storage change and is considered a reasonable proxy. The vertical extent of the aquifer is discussed in **Section 3.1.8**.

4.2.4.4 Path to Achieve Measurable Objectives

Regulation Requirements:
§354.30 € Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.

The groundwater elevation interim milestones are presented in **Table 4-3** along with the MOs. The interim milestones provide intermediary goals between now and 2042 to make sure the Subbasin is on the correct path to sustainable management. The Subbasin plans to maintain sustainable groundwater management by implementing pumping allocations based on the sustainable yield. The implementation of the allocation will occur gradually over time as described in Section 7.

4.3 Groundwater Storage

Groundwater storage is directly related to water level change and will be calculated using all the wells within the Subbasin. From the data identified on water levels, the estimated Minimum Threshold for storage change is 500,000 AF and the Measurable Objective is 300,000 AF.

4.3.1 Undesirable Results

Undesirable results related to groundwater storage change are the same as discussed in the groundwater levels section. The decrease in aquifer volume has the same effects as decreasing water levels and is directly related. Therefore, water levels will be used to calculate storage change. As discussed in the section on groundwater level SMCs, the GSAs within the Subbasin have defined an Undesirable Result to be significant and unreasonable when either the water level has declined to a depth that a new productive well cannot be constructed or when the water level has declined so as to compromise the life of a useful well.

4.3.1.1 Criteria to Define Undesirable Results

Regulation Requirements:
§354.26 (a) Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.

As discussed, this sustainability indicator is directly proportional to the groundwater levels; therefore, criteria to define Undesirable Results is discussed further in **Section 4.2.1**.

4.3.1.2 Causes of Groundwater Conditions That Could Lead to Undesirable Results

Regulation Requirements:
§354.26 (b) The description of undesirable results shall include the following:
(1) The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.
(2) The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.
(3) 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.

See **Section 4.2.1**.

4.3.1.3 Evaluation of Multiple Minimum Thresholds

Regulation Requirements:
§354.26 (c) The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.

The multiple MTs for the RMS have been used to estimate the ultimate storage change related to the SMC. It should be noted that this calculation is only used for an estimate of setting a number on the possible storage change and actual change will be calculated on an annual basis.

4.3.2 Minimum Thresholds

Regulation Requirements:
§354.28 (a) Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.
(d) An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.

Water levels are used to calculate storage change. The volume represents the difference in aquifer storage between the current state of the water levels and the anticipated groundwater levels at MT values. This volume accounts for a storage loss.

4.3.2.1 Criteria to Define Minimum Thresholds

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(1) The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by uncertainty in the understanding of the basin setting.

§354.28 (c) Minimum thresholds for each sustainability indicator shall be defined as follows:
(2) Reduction of Groundwater Storage. The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.

See **Section 4.2.2.2** for a description of the criteria to define Minimum thresholds.

The calculation of storage change is as follows:

Storage change = Water level change x Specific yield x area of impact from level change

Where specific yield has been estimated between the range of .08 and .20 throughout the Subbasin and an average of 12% has been used in the water budget and in these calculations.

4.3.2.2 Relationships Between Minimum Thresholds and Sustainability Indicators

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(2) The relationship between the minimum thresholds for each sustainability indictor, including and explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.

Groundwater storage change is directly proportional to groundwater levels as seen by the calculation in the previous section. It is for this reason that the groundwater level thresholds are used as a proxy to determine whether an undesirable result has occurred. If the Subbasin manages to keep water levels above the MTs for groundwater levels, an undesirable result due to storage change should not occur.

4.3.2.3 Minimum Thresholds in Relation to Adjacent Basins

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(3) How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.

As described previously, the Subbasin is a separate subbasin with the exception of two alluvial deposits which connect it with the Westside Subbasin. Therefore, there are few impacts to adjacent basins.

4.3.2.4 Impact of Minimum Thresholds on Beneficial Uses and Users

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.

See **Section 4.2.3.4** for a description on potential impacts to beneficial users.

4.3.2.5 Current Standards Relevant to Sustainability Indicator

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(5) 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 basis for the difference.

See **Section 4.2.3.5**, there are no State, Federal, or local standards that are relevant to this sustainability indicator.

4.3.2.6 Measurement of Minimum Thresholds

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(6) How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.

Groundwater storage change will be calculated based on groundwater levels directly measured at each representative well and other active wells. As the plan is implemented, there will be an ability in the future to quantify pumping as well as surface water seepage to enable a comparison of water use with groundwater storage change.

4.3.3 Measurable Objectives

4.3.3.1 Description of Measurable Objectives

Regulation Requirements:
§354.30 (a) Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin with 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.
(b) Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.

The MO for groundwater storage change is represented by the groundwater levels established for each RMS. A surface using the level MOs was created and the difference between the MO surface and the current groundwater levels was calculated and multiplied by the specific yield. This was repeated for each of the interim milestones. The results are displayed in **Table 4-4** and show the change for the period between the dates. For cumulative amounts the values would be added.

Table 4-4 Measurable Objective and Interim Milestones for Groundwater Storage Change

	Pleasant Valley RMS Estimates of Storage Change				
	Interim Milestone (AF)				Measurable Objective (AF)
	2025	2030	2035	2040	2042
	80,000	80,000	50,0000	20,000	0

4.3.3.2 Operational Flexibility

Regulation Requirements:
§354.30 (c) Measurable objectives shall 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.

It is recognized that there will be hydrological variances and some years when seepage and local runoff combined with recharge activities may cause levels to rise within the basin. While there will also be periods of

drought conditions and levels may dramatically drop. The goal is to stabilize long-term groundwater trends while allowing for year-to-year swings in water levels due to the hydrological variances.

4.3.3.3 Representative Monitoring

Regulation Requirements:
§354.30 (d) An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.

Groundwater levels will be used to calculate the storage change annually and for comparison to the MOs and MTs of groundwater storage change and is discussed in Section **4.2.3.3**.

4.3.3.4 Path to Achieve Measurable Objectives

Regulation Requirements:
§354.30 (e) Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.

See Section 4.2.3.4 for a discussion on path to achieve MOs. **Table 4-4** presents the interim milestones for groundwater storage change as a metric for comparison of the Subbasin's progress.

4.4 Seawater Intrusion

Regulation Requirements: **§354.26 (d)** An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.
§354.28 (c) (3) Seawater Intrusion. The minimum threshold for seawater intrusion shall be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results. Minimum thresholds for seawater intrusion shall be supported by the following: **(a)** Maps and cross-sections of the chloride concentration isocontour that defines the minimum threshold and measurable objective for each principal aquifer. **(b)** A description of how the seawater intrusion minimum threshold considers the effects of current and projected sea levels.
§354.28 (e) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators**.**

This Subbasin is not near the ocean or the influence of the ocean. This indicator is not applicable.

4.5 Groundwater Quality

Groundwater quality in the basin is dominated by the geology of the area as well as the quality of the storm runoff from the Coastal Mountains that are of marine origin per **Chapter 3**. There is limited data from agricultural wells with some information that dates to studies by P&P in 2005. As such there is a data gap on water quality and trends in water quality over time. The implementation goal for this SMC is to collect data over the first five-year implementation period so as to allow for better goal setting in future updates. To do this, analyses for irrigation suitability will need to be obtained from well owners. This data will be obtained in 2022 and every three years thereafter from the well owners.

4.5.1 Undesirable Results

Groundwater quality conditions in the Subbasin have been detailed in the basin setting section of the GSP and are only summarized here. This basin is under considerable influence of the coastal mountains that are of marine origin. This means the geologic formations under the Subbasin are high in salts, contributing to the historically high concentration of total dissolved salts as well as boron. It is well documented that the urban and municipal uses of groundwater were replaced with surface water sources due to the high salinity groundwater. **Figure 4-9** below shows the early importation of water for municipal uses. Water quality has been marginal for some crops. Recently it has been understood that pistachios tolerate the groundwater quality rather well and have become more widespread in Pleasant Valley. Please refer to **Section 3.3.5-B2** for more description of deep percolation of irrigation. Additionally, the microclimate of the area is well suited for this crop. Current salinity data available in the region indicates EC measurements in groundwater ranges between 1,601 to 3,560 micromhos/cm for most of the Subbasin. The southern portion of the Subbasin near the Zapato Chino Creek community has EC measurements below 1,600 micromhos/cm, which is the secondary MCL for EC.



Figure 4-9 Early import of water supplies

There is a small community at the southern end of the basin that relies on groundwater, shown in **Figure 4-10**. With the planned import of surface supplies, it is expected that there will be a slight positive impact on groundwater quality, which will continue to be monitored for changes. The importation of surface supplies is

planned to include large volumes of intentional recharge. Monitor wells would be incorporated into the design of recharge basins to allow for testing for water quality.



Figure 4-10 The basin - where agriculture and development coexist

An Undesirable Result related to groundwater quality is defined as the significant and unreasonable degradation of water quality to be determined by the Subbasin and its constituents. Stakeholder meetings are held with the Pleasant Valley Subbasin to determine what is significant and unreasonable locally. Therefore, an Undesirable Result related to groundwater quality in the Subbasin is defined as the degradation of groundwater quality such that pistachios can no longer grow. It has been recognized that the City of Coalinga and surrounding municipal demands have been served surface water due to the inability of the groundwater to meet the requirements and demands of human consumption. There is a data gap for the small Lost Hills Community in the southern portion of the subbasin. It is unknown the quality of the groundwater that is developed by individual wells that serve these residences. It is expected that it is of similar quality found in the remainder of the Subbasin, and during the first 5-year implementation window, more information will be developed to understand the quality of the water serving this community.

4.5.1.1 Criteria to Define Undesirable Results

Regulation Requirements:
§354.26 (a) Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.

Undesirable Results would be the continual degradation of supplies that would not allow for the continued farming of pistachios and other salt tolerant crops. The criteria relied upon to define this result includes historical groundwater conditions related to water quality and the potential for future use. According to Ferguson, Sanden, & Grattan (2010), the groundwater will no longer provide beneficial use to pistachios when salt concentrations or TDS reach a level causing EC to measure more than 5,000 micromhos/cm or higher.

4.5.1.2 Causes of Groundwater Conditions That Could Lead to Undesirable Results

Regulation Requirements:
§354.26 (b) The description of undesirable results shall include the following:
(1) The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.
(2) The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.
(3) 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.

Groundwater conditions leading to Undesirable Results in relation to groundwater quality would be significant lowering of groundwater levels to the point at which the water becomes too high in total dissolved solids. This may occur if pumping restrictions are not followed or if surface water supplies are not developed. Climate change is also a concern for groundwater conditions. If drought years persist, groundwater levels may drop at faster rates than normal. One of the problems with the deeper groundwater appears to be gas. It has not been determined whether this is methane gas, CO_2, or air.

4.5.1.3 Evaluation of Multiple Minimum Thresholds

Regulation Requirements:
§354.26 (c) The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.

As data become available, then more specific evaluations can occur. At this time there is no need to evaluate multiple thresholds.

4.5.2 Minimum Thresholds

Regulation Requirements:
§354.28 (a) Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.
(d) An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.

The minimum threshold for groundwater quality for the Subbasin will be an EC of 5,000 micromhos/cm in water samples.

4.5.2.1 Criteria to Define Minimum Thresholds

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(1) The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by uncertainty in the understanding of the basin setting.

§354.28 (c) Minimum thresholds for each sustainability indicator shall be defined as follows:
(4) Degraded Water Quality. The minimum threshold for degraded water quality shall be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be used on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.

Criteria used in determining MTs include water quality thresholds that would not allow for the beneficial use of groundwater as it is currently used in the region.

4.5.2.2 Relationships Between Minimum Thresholds and Sustainability Indicators

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(2) The relationship between the minimum thresholds for each sustainability indictor, including and explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.

Based upon the information shown in **Chapter 3**, the basin is dominated by its location and having higher salt content than other areas in the San Joaquin Valley. This GSP plans to use this baseline and continue to compare results in the future to past measurements. It should be recognized that importation of surface supplies could cause a net import of salt to the basin. It is expected though that the salt content of imported supplies is lower than the salt content of local supplies recharged in the basin, and the net impact may be an improvement in groundwater quality. The measurement of water in wells will be employed so as to initiate measurements of salt concentrations in deep percolation and utilize in developing an understanding of the water quality implications of irrigated agriculture and the associated irrigation methods.

4.5.2.3 Minimum Thresholds in Relation to Adjacent Basins

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(3) How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.

As stated in **Chapter 3**, there are two potential links between the Pleasant Valley Subbasin and the Westside Subbasin including the Pasajero Gap and the Polvadero Gap. The hydrogeology and groundwater flow in the two areas is discussed in **Chapter 3**; however, the groundwater flow is relatively small.

4.5.2.4 Impact of Minimum Thresholds on Beneficial Uses and Users

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.

If groundwater quality conditions deteriorate, agricultural producers may experience a decrease in crop yield and/or crop quality. Applied water with worse quality could cause a buildup of salts in the topsoil.

4.5.2.5 Current Standards Relevant to Sustainability Indicator

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(5) 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 basis for the difference.

State, Federal, and Local standards do not relate to the quality of groundwater, because the use is for irrigated agriculture.

4.5.2.6 Measurement of Minimum Thresholds

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(6) How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.

In general, water samples will be taken from a set of wells identified in Section 5 – Monitoring Network and analyzed primarily for salt and TDS concentrations. The results of these tests will be compared to past test results to identify trends. Additionally, water samples will be taken from cascading water to determine the quality of deep percolating water.

4.5.3 Measurable Objectives

4.5.3.1 Description of Measurable Objectives

Regulation Requirements:
§354.30 (a) Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin with 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.
(b) Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.

The MO for groundwater quality in the Subbasin is to maintain a suitable quality of water for continued use in current irrigation practices. The goal is to keep groundwater quality as consistent as possible.

4.5.3.2 Operational Flexibility

Regulation Requirements:
§354.30 (c) Measurable objectives shall 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.

The operational flexibility is the difference between the MO and MT. This is considered adequate to accommodate annual and seasonal changes in groundwater measurements.

4.5.3.3 Representative Monitoring

Regulation Requirements:
§354.30 (d) An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.

Groundwater levels will not be directly used as a representative MO for groundwater quality. Quality data will be monitored directly according to the Monitoring Network and procedures discussed in **Section 5**.

4.5.3.4 Path to Achieve Measurable Objectives

Regulation Requirements:
§354.30 (e) Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.

It is anticipated that additional surface water supplies will be brought into the Subbasin during the implementation period of the GSP. The surface water supplies are likely to be low in total dissolved solids, especially compared to the quality of storm runoff and groundwater in the basin.

4.6 Land Subsidence

According to USGS, land subsidence is a settling or sudden sinking of the land surface. Current and historical information on land subsidence is discussed in **Section 3.2.6,** and the land subsidence monitoring network is discussed in **Section 5.6.** Of interest in the GSP is land subsidence caused by groundwater pumping. This Section will discuss the undesirable result, minimum threshold, and measurable objective set for land subsidence. A summary of the Minimum Threshold and Measurable Objective for land subsidence can be seen in **Table 4-5** and **Table 4-6** respectively. More details and the methodology to set the criteria can be found later in this section.

Table 4-5 Minimum Threshold for Land Subsidence

Minimum Threshold Parameter	Minimum Threshold Quantity
Annual Land Subsidence Rate	2 inches/year over an area of 36 square miles
Maximum Cumulative Land Subsidence	1 feet over 20 years

Table 4-6 Measurable Objective for Land Subsidence

Measurable Objective Parameter	Measurable Objective Quantity
Annual Land Subsidence Rate	1.0 inches/year over an area of 36 square miles
Maximum Cumulative Land Subsidence	0.5 foot over 20 years

4.6.1 Undesirable Results

Per **Section 3** - Basin Setting, the evidence of subsidence in the Subbasin is minimal with the highest value occurring in the central portion of the Subbasin between approximately 1.0 and 1.5 inches over a four-year span. There is only one actual on the ground measuring station in the Subbasin located at the Farm of the Future for West Hills College. Undesirable results would consist of lowering the ground surface such that buildings and surface structures are impacted, or the land topography changes such that storm runoff and/or stream aggradation or degradation occurs. The proposed monitoring network establishes an additional subsidence monitor station per **Section 5**. **Figure 4-11** shows the InSar data that suggests that subsidence is correlated with the area of pumping within the Subbasin.

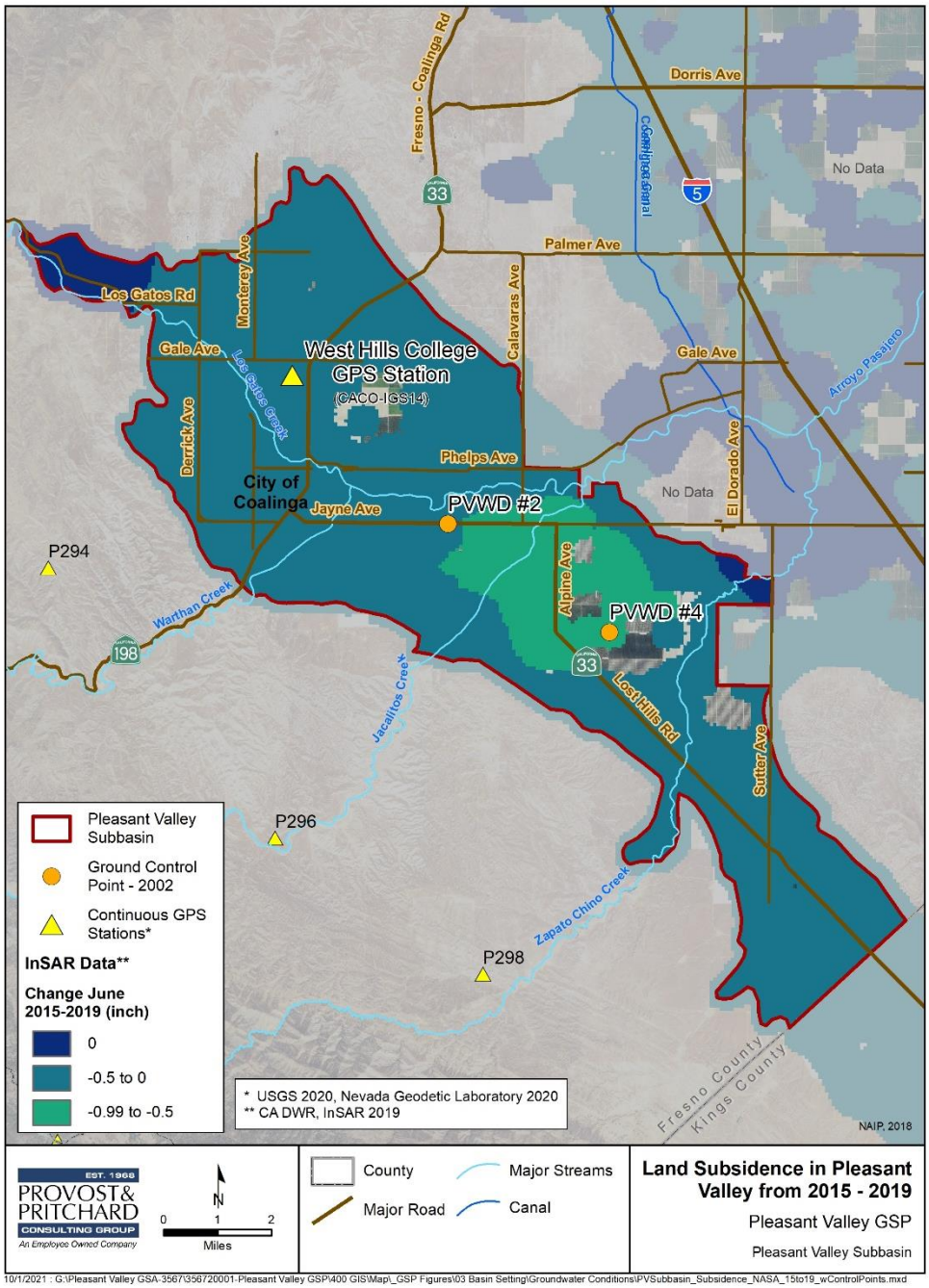


Figure 4-11 InSar Land Subsidence from 2015-2019

It should also be recognized that this area has oil exploration and pumping in deeper geologic zones as well as a recognition of being in an active seismic zone. Therefore, if ground movement is recorded it is not necessarily related to groundwater pumping as it could be associated with a number of different sources.

4.6.1.1 Criteria to Define Undesirable Results

> Regulation Requirements:
> **§354.26 (a)** Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.

If measurement of more than 0.2 feet per year of movement in either of the local import pipelines is observed in the course of one year, this would be considered and reviewed. The import pipelines are critical links to allow for the import of surface water to overcome overdraft.

4.6.1.2 Causes of Groundwater Conditions That Could Lead to Undesirable Results

> Regulation Requirements:
> **§354.26 (b)** The description of undesirable results shall include the following:
> **(1)** The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.
> **(2)** The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.
> **(3)** 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.

The historical data shows a drop in groundwater levels of approximately 200 feet from 1960 to 2020. While some drop in groundwater levels is expected until management actions and projects are implemented, ground subsidence is not expected to be significant based on historical trends. However, significant drought or non-compliance with management actions may result in continued groundwater decline. Measurement and monitoring will enable the plan to determine if this expectation will be realized.

4.6.1.3 Evaluation of Multiple Minimum Thresholds

> Regulation Requirements:
> **§354.26 (c)** The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.

The agency does not plan to evaluate multiple MTs for land subsidence.

4.6.2 Minimum Thresholds

Regulation Requirements:
§354.28 (a) Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.
(d) An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.

Land subsidence MTs are established based on the risk of an outcome should the level of subsidence occur. As discussed, the surface water import pipeline is a critical piece of infrastructure to the Subbasin and should it experience significant subsidence, an undesirable result may occur. Therefore, the MT for the Subbasin is if a monitoring site reads a land surface decline in excess of 0.2 foot per year. If so, then more attention to the area would be necessary along with potential additional management actions.

4.6.2.1 Criteria to Define Minimum Thresholds

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(1) The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by uncertainty in the understanding of the basin setting.

§354.28 (c) Minimum thresholds for each sustainability indicator shall be defined as follows:
(5) Land Subsidence. The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. Minimum thresholds for land subsidence shall be supported by the following:
(a) Identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including and explanation of how the Agency has determined and considered those uses and interests, and the Agency's rationale for establishing minimum thresholds in light of those effects.
(b) Maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum threshold and measurable objectives.

See **Section 4.6.2**.

4.6.2.2 Relationships Between Minimum Thresholds and Sustainability Indicators

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(2) The relationship between the minimum thresholds for each sustainability indictor, including and explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.

See **Section 4.3.2.2**.

Minimum Thresholds in Relation to Adjacent Basins

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(3) How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.

As described previously, the Pleasant Valley Subbasin is a separate subbasin with the exception of a limited connection with the Westside Subbasin. Therefore, there are few impacts to adjacent basins. Groundwater pumping is not expected to induce subsidence in the Westside Subbasin.

4.6.2.3 Impact of Minimum Thresholds on Beneficial Uses and Users

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.

No impacts have been observed or documented on beneficial users and no impacts are anticipated at MTs. It will just call for increased attention.

4.6.2.4 Current Standards Relevant to Sustainability Indicator

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(5) 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 basis for the difference.

There are no State, Federal, or local standards that are relevant to this indicator.

4.6.2.5 Measurement of Minimum Thresholds

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(6) How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.

Measurements will be made per the Monitoring Network – See Chapter 5.

4.6.3 Measurable Objectives

As previously mentioned, it is difficult to quantify the rate of subsidence in the Subbasin, as the current measurements are within the range of error of the measurement devices. There are other local factors that could contribute to the subsidence, making it difficult to attribute the rate of subsidence to groundwater pumping.

4.6.3.1 Description of Measurable Objectives

Regulation Requirements:
§354.30 (a) Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin with 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.
(b) Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.

Not applicable.

4.6.3.2 Operational Flexibility

Regulation Requirements:
§354.30 (c) Measurable objectives shall 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.

A subsidence of 0.1 foot per year has been established as the MO while the most recent subsidence was less than 0.1 foot over the course of four years. This provides a reasonable margin of operational flexibility should conditions arise that negatively impact the ground subsidence.

4.6.3.3 Representative Monitoring

Regulation Requirements:
§354.30 (d) An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.

Measurements will be made per the Monitor Network – See **Chapter 5**.

4.6.3.4 Path to Achieve Measurable Objectives

Regulation Requirements:
§354.30 (e) Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.

Not applicable.

4.7 Interconnected Surface Water and Groundwater

Regulation Requirements:
§354.26 (d) An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.

§354.28 (e) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators.

As described in **Chapter 3**, groundwater levels are very deep compared to surface features. There are only small areas of land where groundwater levels may be in close proximity to the surface water feature. These may occur where the creek systems exit the more mountainous terrain in the western portion of the Subbasin. In general, these areas are not developed, are still within the canyon before opening into the Subbasin, have shallow alluvium, have steep slopes, are in areas where the land activity is devoted to cattle grazing, and are more than two miles from active wells used for agricultural production. It is for these reasons that this sustainability indicator is considered not likely to occur and sustainable management criteria are not established. Monitoring of wells in the area will still occur and if there are any changes to the conditions, it will be discussed in subsequent GSP updates.

4.7.1 Undesirable Results

4.7.1.1 Criteria to Define Undesirable Results

Regulation Requirements:
§354.26 (a) Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.

4.7.1.2 Causes of Groundwater Conditions That Could Lead to Undesirable Results

Regulation Requirements:
§354.26 (b) The description of undesirable results shall include the following:
- **(1)** The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.
- **(2)** The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.
- **(3)** 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.

4.7.1.3 Evaluation of Multiple Minimum Thresholds

Regulation Requirements:
§354.26 (c) The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.

4.7.1.4 Sustainability Indicators Not Present in Basin

Regulation Requirements:
§354.26 (d) An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.

4.7.2 Minimum Thresholds

Regulation Requirements:
§354.28 (a) Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.
(d) An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.
(e) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators**.**

4.7.2.1 Criteria to Define Minimum Thresholds

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(1) The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by uncertainty in the understanding of the basin setting.

§354.28 (c) Minimum thresholds for each sustainability indicator shall be defined as follows:
(6) Depletions of Interconnected Surface Water. 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. The minimum threshold established for depletions of interconnected surface water shall be supported by the following:
(a) The location, quantity, and timing of depletions of interconnected surface water.
(b) A description of the groundwater and surface model used to quantify surface water depletion. If a numerical groundwater and surface water model is not used to quantify surface water depletion, the Plan shall identify and describe an equally effective method, tool, or analytical model to accomplish the requirements of this Paragraph.

4.7.2.2 Relationships Between Minimum Thresholds and Sustainability Indicators

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(2) The relationship between the minimum thresholds for each sustainability indictor, including and explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.

4.7.2.3 Minimum Thresholds in Relation to Adjacent Basins

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(3) How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.

4.7.2.4 Impact of Minimum Thresholds on Beneficial Uses and Users

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.

4.7.2.5 Current Standards Relevant to Sustainability Indicator

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(5) 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 basis for the difference.

4.7.2.6 Measurement of Minimum Thresholds

Regulation Requirements:
§354.28 (b) The description of minimum thresholds shall include the following:
(6) How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.

4.7.3 Measurable Objectives

4.7.3.1 Description of Measurable Objectives

Regulation Requirements:
§354.30 (a) Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin with 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.
(b) Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.

4.7.3.2 Operational Flexibility

Regulation Requirements:
§354.30 (c) Measurable objectives shall 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.

4.7.3.3 Representative Monitoring

Regulation Requirements:
§354.30 (d) An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.

4.7.3.4 Path to Achieve Measurable Objectives

Regulation Requirements:

§354.30 (e) Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.

4.8 Measurable Objectives for Additional Plan Elements

Regulation Requirements:
§354.30 (f) Each Plan may include measurable objectives and interim milestones for additional Plan elements described in Water Code Section 10727.4 where the Agency determines such measures are appropriate for sustainable groundwater management in the basin.
§354.30 (g) An Agency may establish measurable objectives that exceed the reasonable margin of operational flexibility for the purpose of improving overall conditions in the basin, but failure to achieve those objectives shall not be grounds for finding of inadequacy of the Plan.

The Sustainable Groundwater Management Act allows for Agencies, in collaboration with other local agencies, to set requirements for additional sustainability indicators, including the following:

- Wellhead Protection areas and recharge areas
- Migration of Contaminated water
- A well abandonment and well destruction program
- Replenishment of groundwater extractions
- Activities implementing conjunctive use or underground storage
- Well Construction Policies
- Measures addressing
  - Groundwater cleanup
  - Groundwater recharge
  - In-lieu use
  - Diversion to storage
  - Water recycling
  - Extraction
- Water efficiency
- Relationships with State and Federal Agencies
- Coordination on Land Use planning

Measurable Objectives are not planned to be set for any of these subjects in this plan, but all of these subjects are included in the plan. Specifically, land use planning and well construction and abandonment policies will reside with the County of Fresno and City of Coalinga, and the GSAs will continue to work together to strengthen this relationship and review of appropriate activities. As part of this joint plan, it is envisioned there will be a number of management actions found in **Chapter 6** that will develop and implement policies, ordinances, and requirements associated with:

1. Importation of surface water supplies
2. Requirement for measuring both streamflow amounts and groundwater
3. Rules and regulations regarding replenishment of groundwater extractions
4. Reduction in pumpage by reducing crop acreage

5 Monitoring Network

5.1 Introduction

Regulation Requirements:
§354.34(a) Each Agency shall develop a monitoring network capable of collecting sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate Plan Implementation.

The summary of the Monitor Program is presented in **Section 5.2.** The remaining portion of this chapter is presented to conform with SGMA regulations. This chapter describes the current and developing monitoring networks in the Subbasin that will collect data to determine short-term, seasonal, and long-term trends in groundwater and surface conditions related to the sustainability indicators. Data collected from the monitoring networks will yield information necessary to support the implementation of this Plan, evaluate the effectiveness of this Plan, and guide decision making by the GSA management. Information and data from historical monitoring efforts can be found in **Section 3.3.8**.

Figure 5-1 shows all wells measured semi-annually for depth-to-water as well as all wells with flowmeters or transducers. **Figure 5-2** shows the currently proposed representative well locations for groundwater levels. **Figure 5-3** shows the groundwater quality monitoring network. Subsidence monitoring locations are shown on **Figure 5-4**. Wells outside the Subbasin used for monitoring interbasin groundwater levels are shown in **Figure 5-5**.

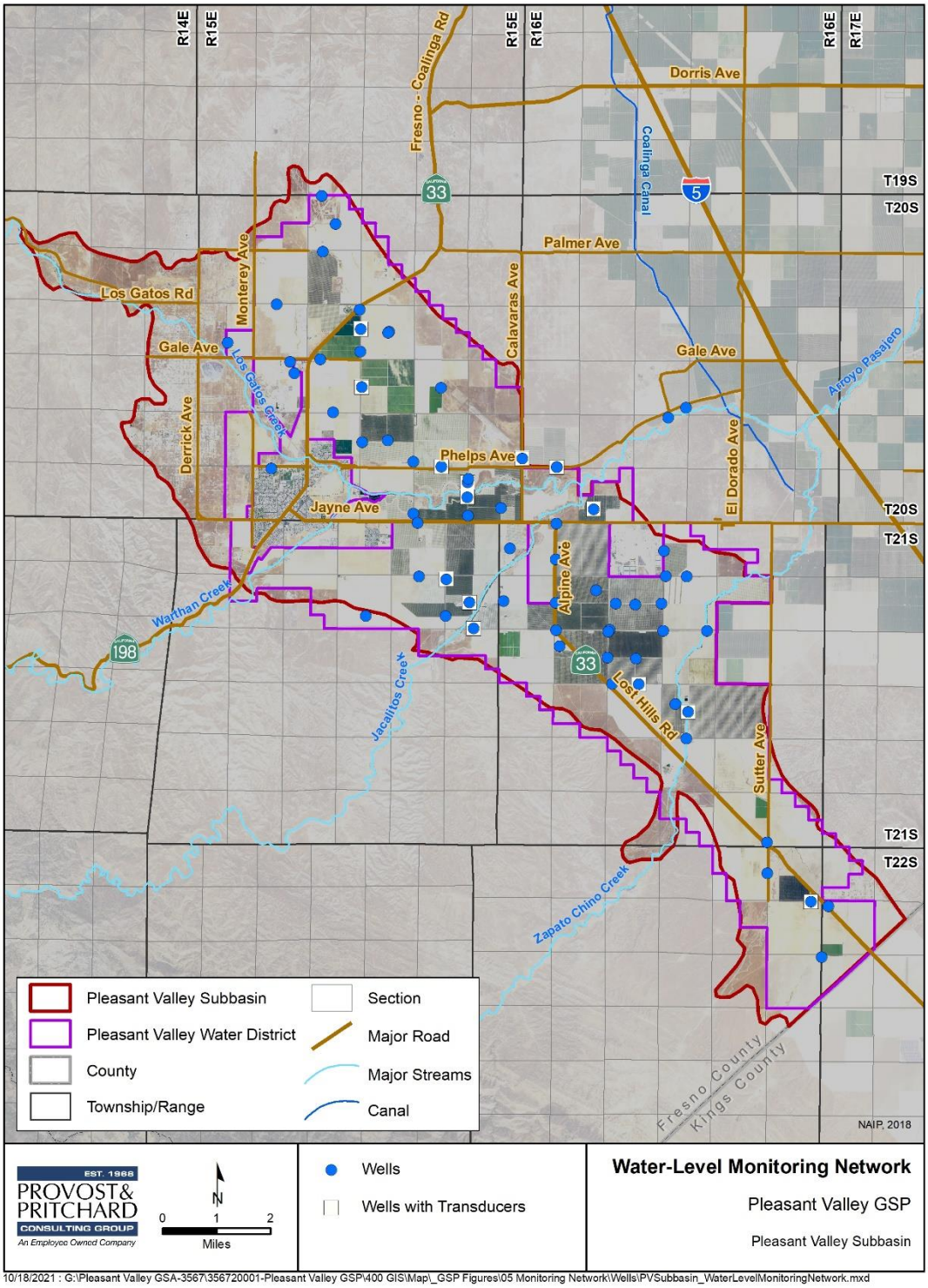


Figure 5-1 Water-Level Monitoring Network

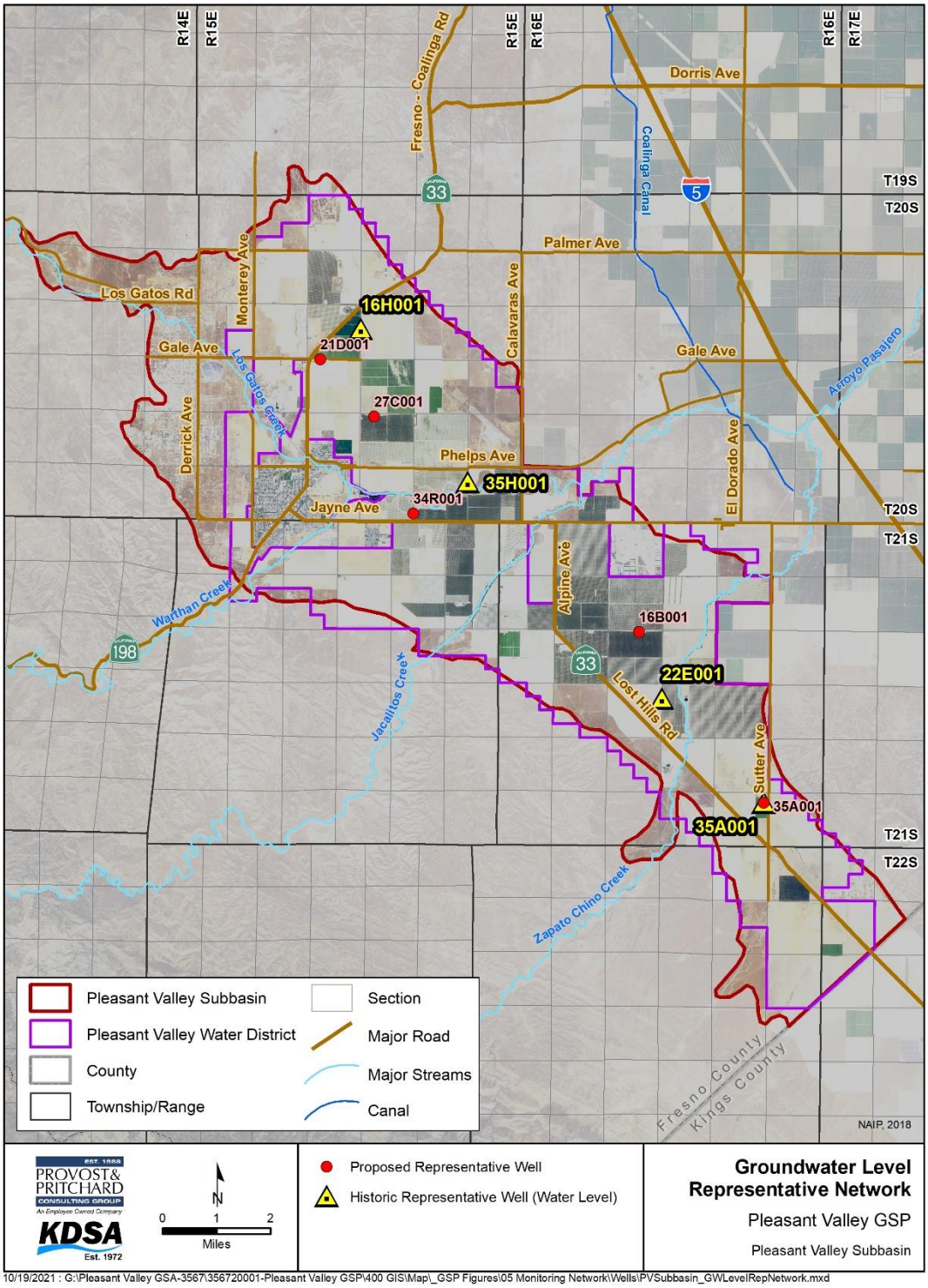


Figure 5-2 Groundwater Level Representative Network

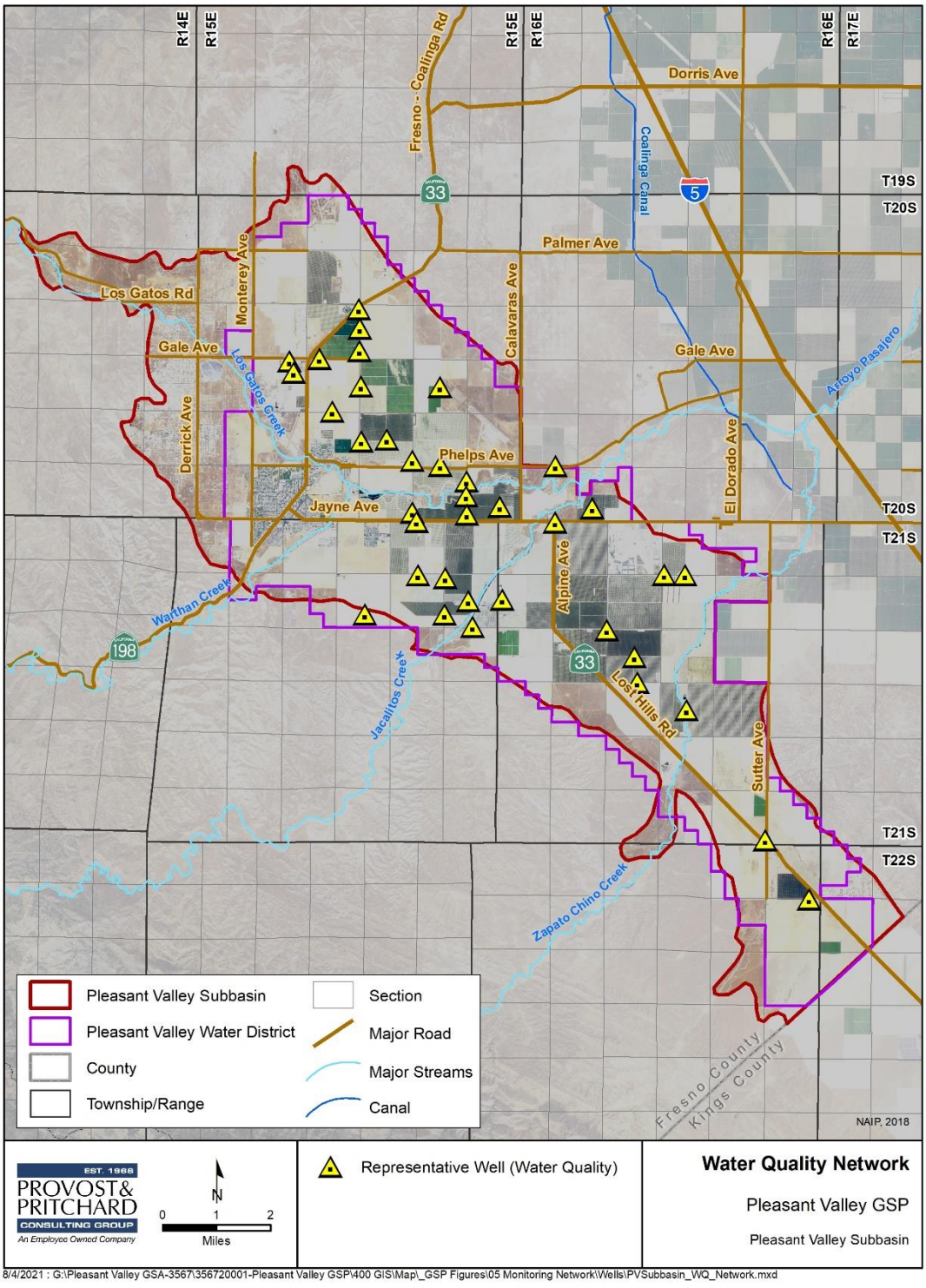


Figure 5-3 Groundwater Quality Network

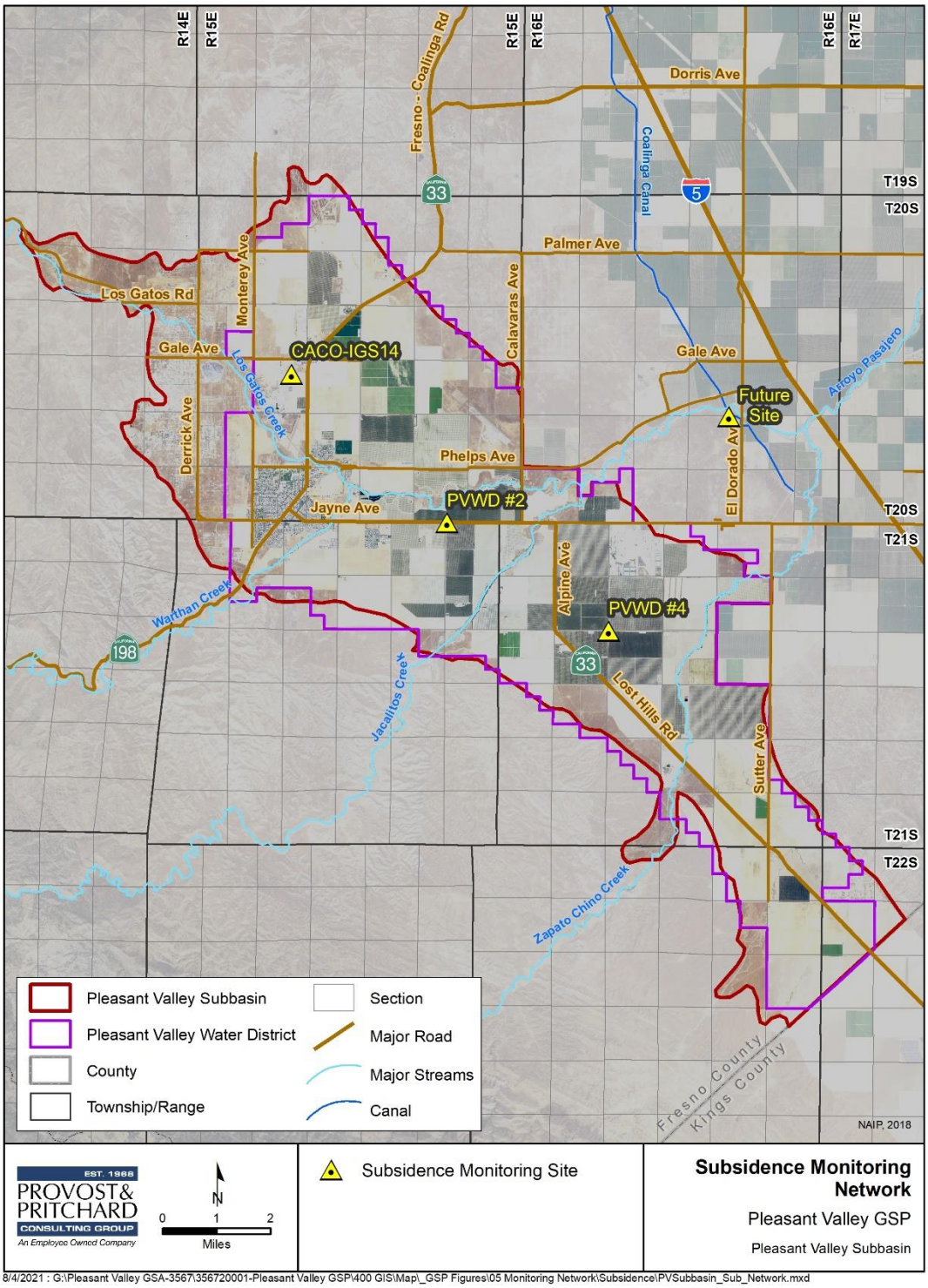


Figure 5-4 Subsidence Monitoring Network

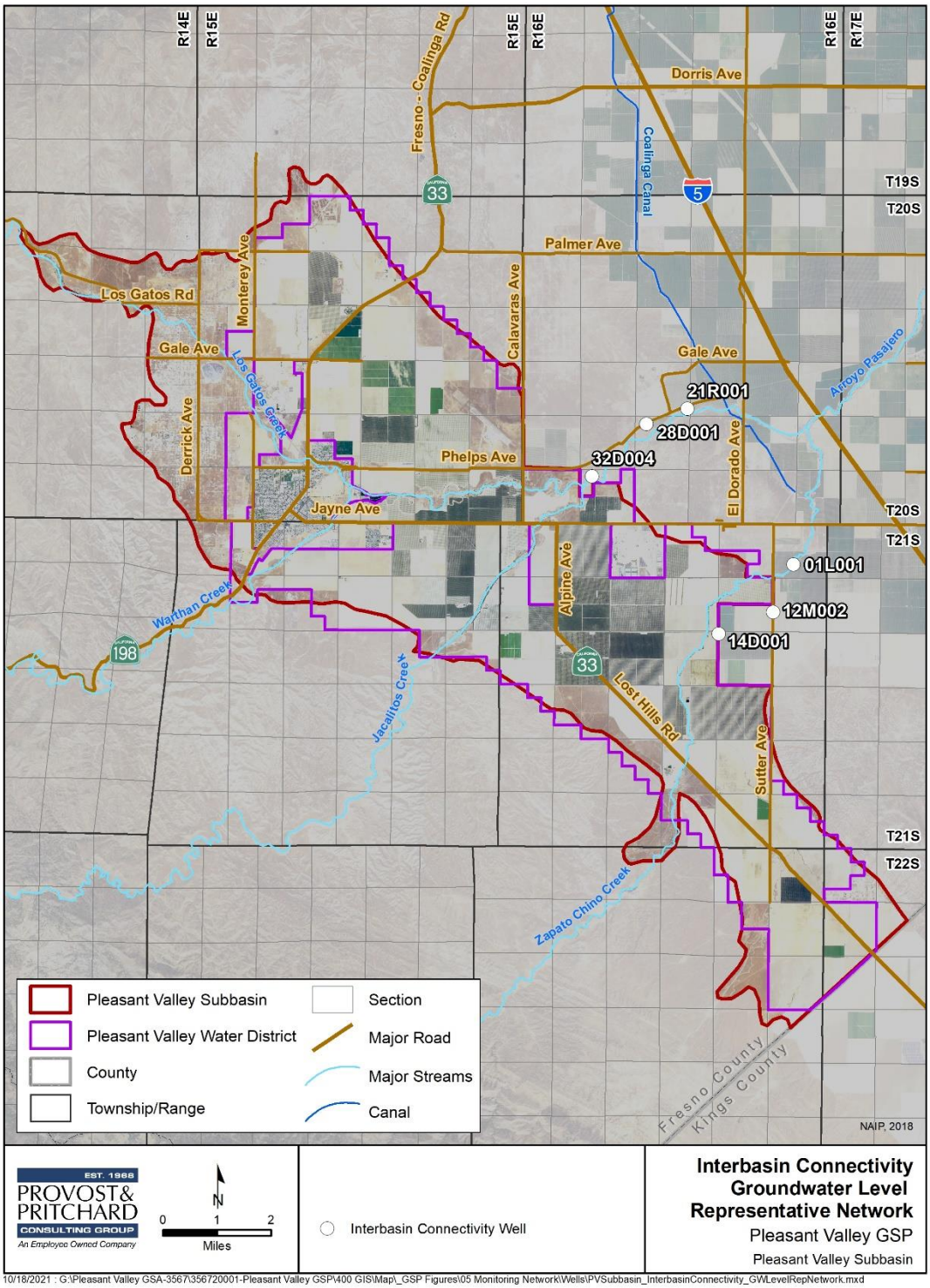


Figure 5-5 Interbasin Connectivity Groundwater Level Representative Network

5.2 Overview

Regulation Requirements:
§354.32 This Subarticle describes the monitoring network that shall be developed for each basin, including monitoring objectives, monitoring protocols, and data reporting requirements. The monitoring network shall promote the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan.

A comprehensive monitoring network is a fundamental component of groundwater management and is needed to measure progress towards groundwater sustainability. Monitoring programs needed to comply with SGMA monitoring and reporting requirements include the following:

- **Groundwater Levels**: Measuring of static groundwater levels each spring and fall
- **Groundwater Storage**: Calculations of the annual change in groundwater storage
- **Groundwater Quality**: Monitoring for water quality degradation that could impact available groundwater supplies
- **Land Subsidence**: Land subsidence caused by groundwater extraction
- **Depletion of Interconnected Surface Water**: Permanent connections between surface water and groundwater, which is not applicable to the GSAs
- **Seawater Intrusion**: Intrusion of seawater into local aquifers, which is not applicable to the GSAs

Additional requirements needed for GSP:

- **Groundwater Pumpage:** The amount and location of pumpage needs to be determined and quantified.
- **Crop Consumptive Use:** Crop consumptive use needs to be identified and quantified.
- **Stream Flow Measurement:** The amount and timing of streamflow both entering and leaving the basin will be documented.

Data Gaps in Monitoring Program

Pumpage

Measuring pumpage of each large-capacity well in the GSA with a totalizing flowmeter is essential. Knowledge of pumpage, to the accuracy provided by calibrated flowmeters, is necessary to develop the water budget and to aid in evaluating proposed projects to address groundwater overdraft. It is believed that flowmeters have been installed by landowners on the discharge lines for some wells. Values for pumpage have not been reported to the GSA yet. The first priority is to require flowmeter installation for the remaining wells and to implement a uniform measuring and reporting program. It is expected that total pumpage from each well would be determined and recorded on a monthly basis.

Water Levels

Two types of water-level measurements are available. The first is spring and fall static water levels, and records for a number of wells extend back to at least the 1960s. **Figure 5-6** shows the locations of wells with long-term water-level hydrographs. A data gap is water-level measurements in the southeast part of the Subbasin and near the County line. Another type of water-level measurement is continuous measurements provided by transducers. These are believed to have been installed in at least 30 wells in the valley**. Figure 5-7** shows the locations of about 20 wells known to have transducers. Continuous measurements provide an indication of the shallowest water level each year, from which annual changes in groundwater storage can be

determined. Transducer hydrographs also show drawdowns due to pumping of the well. A data gap is that pumping rates have not been plotted on these hydrographs. Where flowmeters are present, the pumping rates and specific capacities can be determined. Another data gap is that more transducer installations are needed in part of the valley.

In general, semi-annual water-level measurements for wells in Pleasant Valley have been reported by the DWR or by Provost & Pritchard, whereas transducer water-level hydrographs have usually not been reported.

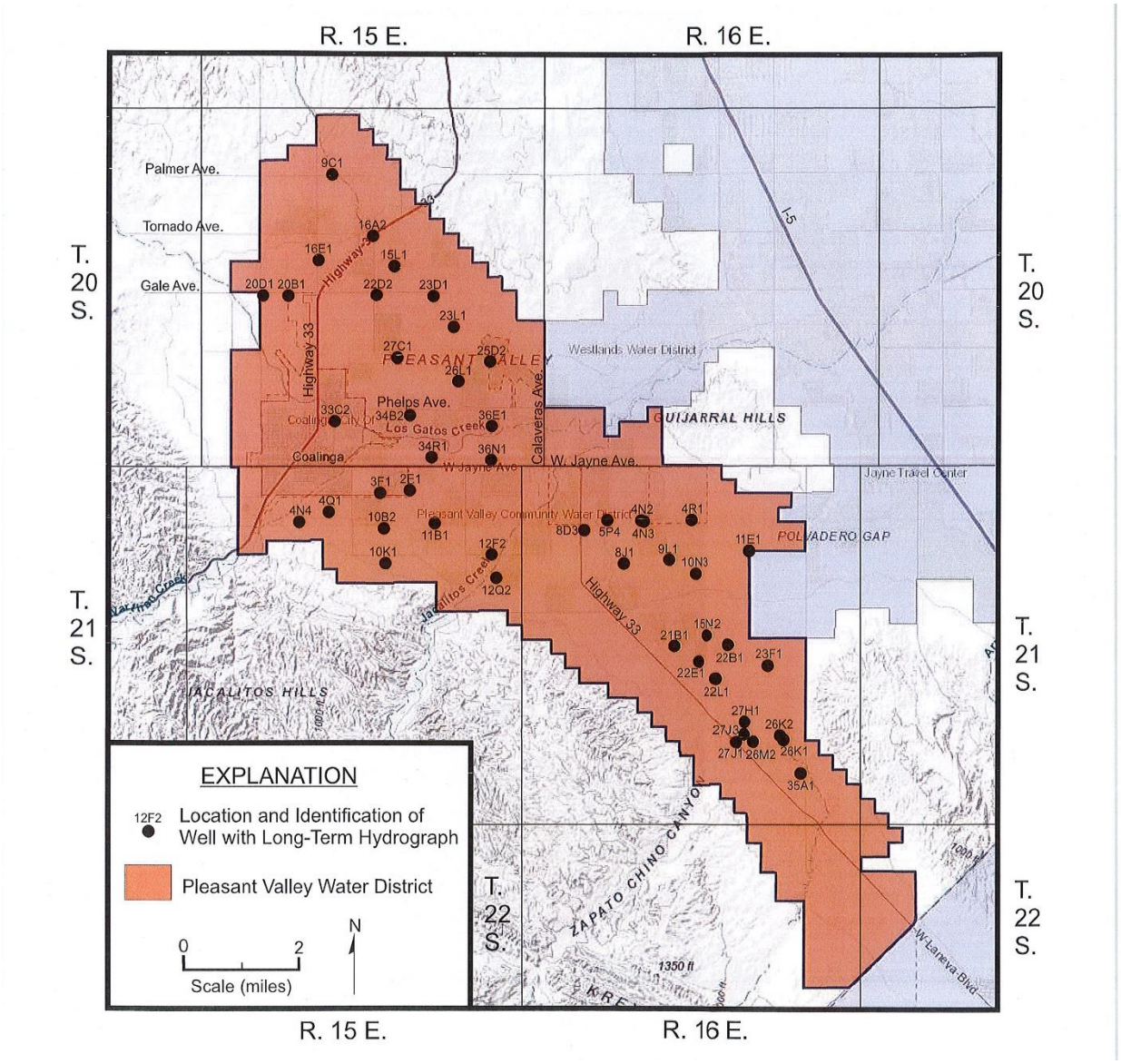


Figure 5-6 Locations of Wells with Long-Term Water-Level Hydrographs from Semi-Annual Measurements

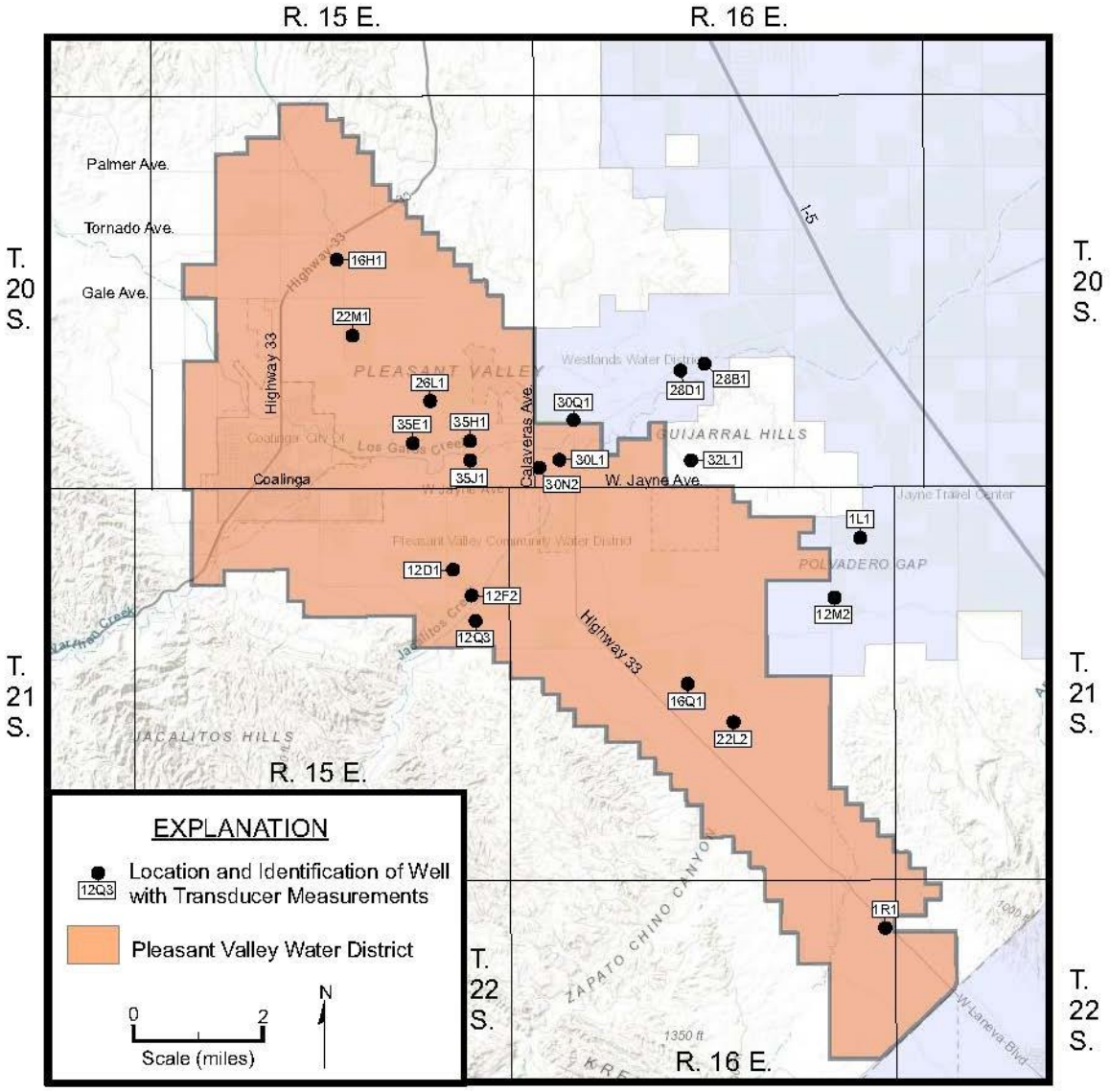


Figure 5-7 Locations of Known Wells with Transducer Water-Level Measurements

Consumptive Use

Historically, crop surveys have not been performed in the valley or recorded on an annual basis. Annual crop surveys are essential in order to determine consumptive use or evapotranspiration of water applied for irrigation. This is straight-forward in cases where permanent crops are present. Because trees use more water as they mature, records should be maintained of how old the trees are. Information from sources such as the Cal Poly Irrigation Training and Research Center can be used to determine crop consumptive use, which is an important part of the water budget.

Land Subsidence

Two types of information have been used to evaluate land subsidence. The first is from periodic remote INSAR data provided by the Jet Propulsion Laboratory. The second is from continuous recorders that continuously measure the land surface elevations. At West Hills College, there is a station with such a recorder (CACO-IGS 14). For the most part, information on land subsidence in the valley has not been interpreted in detail. For example, the West Hills College station's records from 2017-20 indicate two periods of subsidence and two other periods of little or no subsidence. The periods of varying subsidence should be related to pumpage patterns and possibly streamflow patterns to the extent possible. Also, the geographic distribution of land subsidence should be related to the distribution of pumpage. See **Figure 5-4**. In addition to this information, three additional sites will be established. Two of these additional sites will be established in the vicinity of the greatest potential movement. These sites will be measured annually.

Groundwater Quality

Many growers periodically have water samples from their wells analyzed for irrigation suitability analyses. However, standardized procedures for water sample collection and preservation have not been developed. Also, this information has not usually been reported. Time trends in key constituents, such as total dissolved solids or electrical conductivity and boron, are not well known. In order to determine this, a more comprehensive monitoring and reporting program are necessary.

Deep Percolation

Deep percolation is the amount of water applied for irrigation that is not consumed by evapotranspiration. This downward percolating water eventually reaches the groundwater level. A data gap is that the travel time for the downward percolating water is not well known. This travel time for deep percolation is important for developing water budgets. In order to help determine this, two types of information can be used. The first is to collect samples of the cascading water from supply wells. In a number of cases this represents deep percolation. The second source of information is to install shallow monitor wells tapping the uppermost fifty feet or so of saturated deposits.

PROPOSED MONITORING & REPORTING PROGRAM

Stream Gauges

Historically, stream gauge records were available for Los Gatos Creek at the Los Gatos Creek Road crossing and at the Arroyo Pasajero at El Dorado Avenue. These stations were installed by the DWR to measure flood events originating in the watersheds upstream. Interstate 5 and the California Aqueduct are downstream of the station at El Dorado Avenue, and both the Interstate and Aqueduct have suffered damage from significant flood events. Several years ago, the District recognized that information on stream runoff and infiltration of the runoff within the basin was lacking. In an effort to determine and quantify recharge within the basin, six additional stream gauge locations were established in addition to the historic two locations to make eight sites that now record stream flows as shown in **Figure 5-8**.

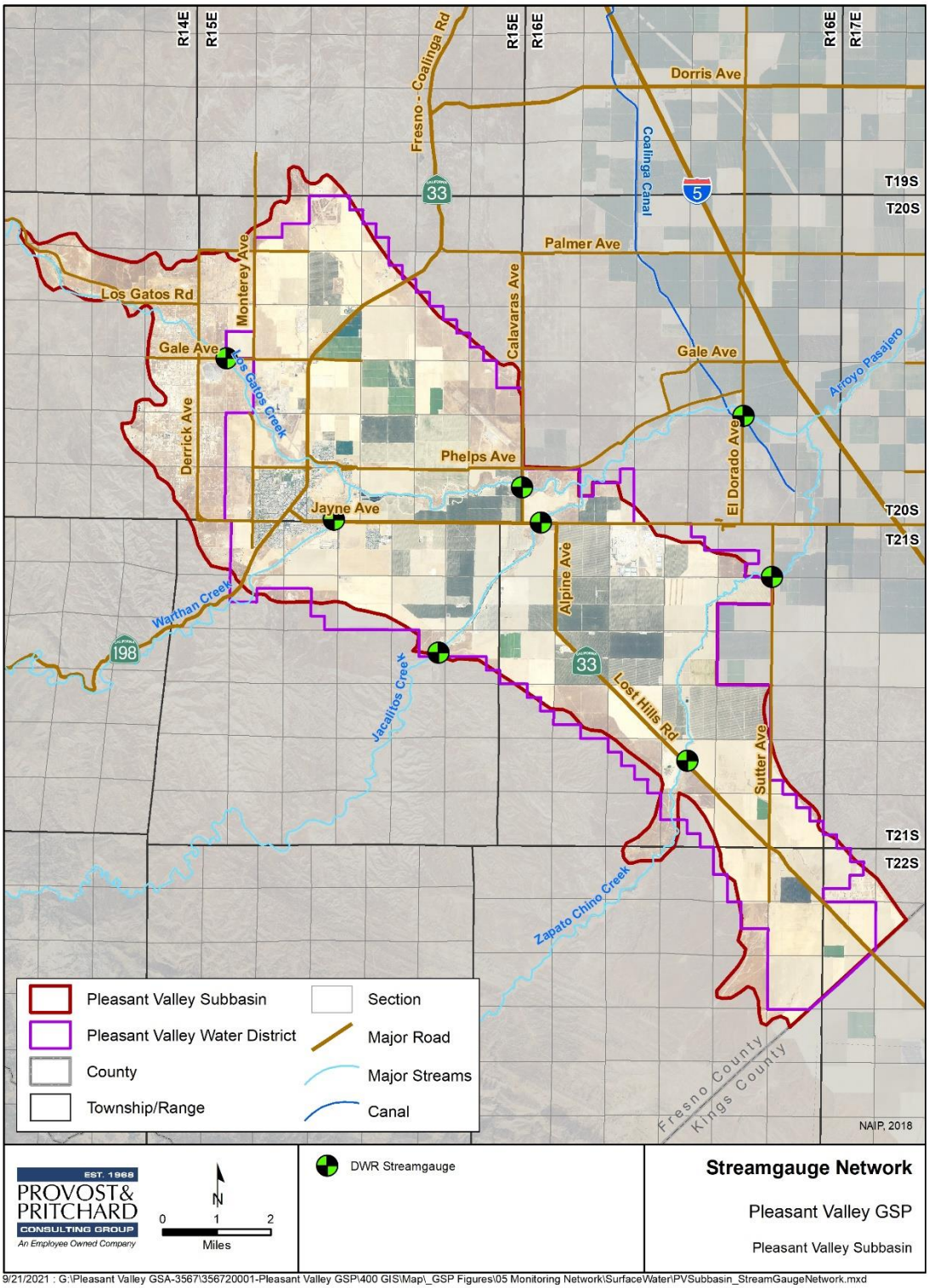


Figure 5-8 Streamgages

Data for the last several years have been quantified and suggest that an average of about 8,000 AF/yr of streamflow has infiltrated. The District will continue to evaluate the data for these sites and make adjustments to this system as needed.

Groundwater Pumpage

Installing totalizing flowmeters on all large capacity wells that do not have them is proposed. The total pumpage for each month would be read. It would be useful to have a photographic record of the totalizer readings for each well. On an annual basis, pumpage would be reported by well, and the total pumpage would be calculated for the GSA.

In addition to documenting pumpage form wells, it is also recommended that at each production well, the landowner performs and/or arranges for a pump test to be performed. This test will be performed annually and be submitted to the GSA.

Water Levels

Semi-Annual Measurements
Continuing this program is recommended. However, the time for the "spring" measurements should be revised to coincide better with the annual shallowest static water levels, as determined from transducer measurements. To date, most of the transducer measurements indicate that the shallowest water levels have been in December, not in the spring. Thus the "spring" water-level measurements would indicate a truer indication of the shallowest annual water levels if the measurements were made in December. On an annual basis, water-level elevation and direction of groundwater flow maps should be prepared for the period of shallowest water levels. Also, water-level hydrographs (showing depth to water) should be updated.

Transducer Hydrographs

These should be updated on an annual basis to cover the entire period of record. Both the last annual hydrograph and the long-term hydrograph would be shown. Also, where flowmeters are tied into the transducers, pumping rates should be shown on the hydrographs to coincide with pumping water levels.

Land Subsidence

The JPL maps should be obtained every two years, and the land subsidence map compared to a map showing irrigation well pumpage by section. Records for the land surface elevation station at West Hills College should be obtained as well as data from survey of filed monuments and trends related to pumpage and/or streamflow records and water-level trends, if possible.

Groundwater Quality

Standard procedures should be developed for sample collection and preservation of water from irrigation wells. Of foremost importance is the time of pumping prior to water sample collection. In general, irrigation wells should be sampled during heavy pumping periods in July or August, and after the well has been pumping for several days, if possible. The water sample needs to be collected near the well head, if possible, and prior to the addition of any chemicals.

Collection of samples of irrigation suitability is recommended every three years on each well. It is proposed that one third of the wells be sampled each year (resulting in data from a single well every three years) so that data is collected every year. If adequate chemical analyses can be obtained from the well owners, these could

be used as opposed to new sampling. Electrical conductivity (EC) would be measured in water samples collected during heavy summer pumping from each large capacity agricultural well on an annual basis. The results would be plotted on a suitable map and EC hydrographs maintained for about a quarter of these wells over the long term.

Small capacity wells are to be pumped for about 20 minutes prior to collecting the water samples. Landowners should collect samples as close to the well as possible and prior to any addition of chemicals. These samples would be collected once every three years. The chemical analyses would include TDS, EC, pH, nitrate-nitrogen, sulfate, iron, manganese, arsenic, hexavalent chromium, and alpha activity.

Deep Percolation

Samples of cascading water would be collected from active wells when the pump is pulled out of the well or from unused wells without pumps. The depth where the water enters the well would be measured and recorded. A bucket would be lowered down the well on a rope or wire and the sample collected. The samples would be analyzed for irrigation suitability parameters and stable isotopes oxygen-18 and deuterium of water. In addition, some age dating tests may be done, such as tritium.

Shallow monitor wells would be constructed at four sites. The location has yet to be determined but would be in the proximity of areas that have been in cultivation for a long time and in the vicinity of a pumping well. The general location is shown on **Figure 5-9**_.The direct rotary method would be used to drill a hole close to an existing irrigation well to a depth about 30 feet below the static water level in the well. Both an electric log and sonic log would be run. The sonic log would be used to determine the depth of the shallowest saturated deposits. Each monitor well would have 5-inch diameter Schedule 80 PVC casing installed, perforated over the lowest 50 feet with a gravel pack. After the wells are completed and developed, they would be equipped with 4-inch diameter submersible pumps for periodic water sampling.

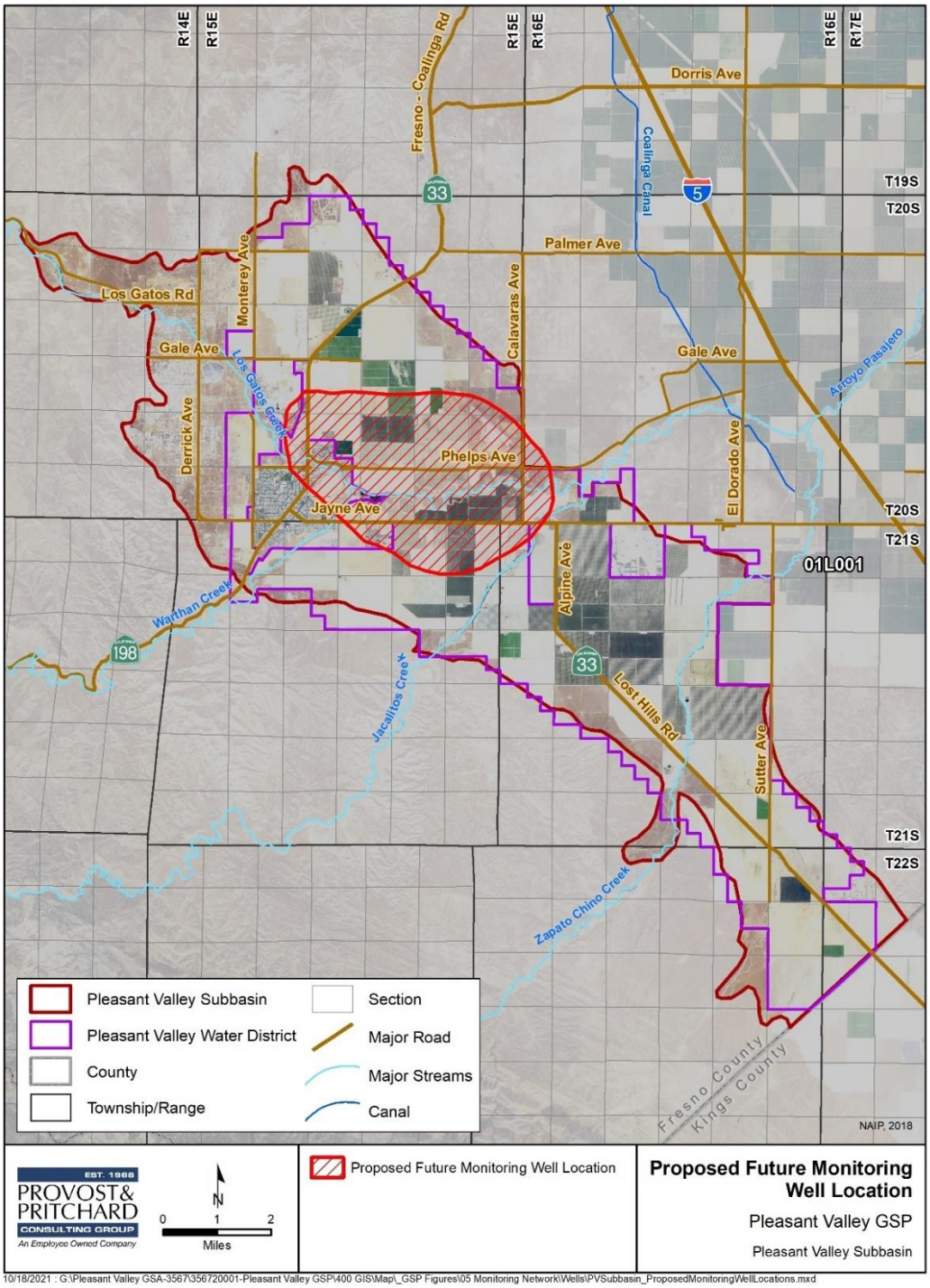


Figure 5-9 Area of Installation for Proposed Shallow Groundwater Monitoring Wells

Table 5-1 Proposed Monitoring Network Summary

Subject	Description	Figure
Streamflows	Measure flow at each site and calculate infiltration of each storm event.	**Figure 5-8**
Groundwater Pumpage	Record pumpage at each well monthly.	
Water Levels	Take spring and fall depth-to-water measurements in all production wells. Install transducers in 25 wells.	**Figure 5-6, Figure 5-7**
Consumptive Use	Perform crop survey annually.	N/A
Land Subsidence	Perform survey of sites annually. Gain CACO site info yearly.	**Figure 5-4**
Groundwater Quality	Standard procedures should be developed for sample collection and preservation of water from irrigation wells. Take quality samples from a third of the wells every year.	**Figure 5-3**
Deep Percolation	Take WQ samples of falling water or shallow water from wells that have pumps removed for repair.	N/A

5.2.1 Monitoring Network Objectives

Regulation Requirements:
§354.34(b) Each Plan shall include a description of the monitoring network objectives for the basin, including an explanation of how the network will be developed and implemented to monitor groundwater and related surface conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of Plan implementation. The monitoring network objectives shall be implemented to accomplish the following:

1) Demonstrate progress toward achieving measurable objectives described in the Plan.
2) Monitor impacts to the beneficial uses or users of groundwater.
3) Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.
4) Quantify annual changes in water budget components.

The objectives of the various monitoring programs include the following:

1. Establish a baseline for future monitoring.
2. Provide warning of potential future problems.
3. Use data gathered to generate information for water resources evaluation.
4. Help to quantify annual changes in water budget components.
5. Develop meaningful long-term trends in groundwater characteristics.
6. Provide data comparable from place to place in the Plan Area.
7. Demonstrate progress toward achieving measurable objectives described in the Plan.
8. Monitor changes in groundwater conditions relative to minimum thresholds.
9. Monitor impacts to the beneficial uses or users of groundwater.

5.2.2 Network Development Process

Regulation Requirements:
§354.34(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:
[§354.34**(c)(1)** through §354.34**(c)(6)** are individually listed below]

Sections 5.3 through **5.10** describe existing networks within the Subbasin's boundary which track groundwater levels, groundwater storage, water quality, land subsidence, and depletion of interconnected surface water. For each sustainability indicator, the adequacy of the monitoring network is discussed. The sections also include a review of each monitoring network for monitoring frequency and density, identification of data gaps, plans to fill data gaps, and future site selection. This information will be reviewed and evaluated during each five-year assessment.

Groundwater monitoring has been performed in the Subbasin for many decades by the DWR and the Pleasant Valley Water District. Much less routine groundwater monitoring has been conducted in the some of the areas outside the PVGSA boundaries, and there is a general lack of water wells in the southern and northwestern portions of the Subbasin. The monitoring program within the Subbasin will continue and be expanded to comply with SGMA monitoring requirements. Future monitoring will occur with data sharing between neighboring agencies to better understand groundwater boundary conditions such as depth to water and flow. These partnerships will also be maintained and enhanced to provide useful agency and region-wide information.

5.3 Description of Monitoring Network

5.3.1 Groundwater Levels

Regulation Requirements:
§354.34(c)(1) Chronic Lowering of Groundwater Levels. Demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods:
A) A sufficient density of monitor wells to collect representative measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer.
B) Static groundwater elevation measurements shall be collected at least two times per year, to represent seasonal low and seasonal high groundwater conditions.

Pleasant Valley GSA will utilize existing wells that are currently measured for groundwater level including but not limited to CASGEM, Pleasant Valley Water District, municipal, DWR, agency, and private wells. Data gap areas may have new monitor wells installed in the future. Groundwater level measurements will be collected every winter and fall to provide data on the seasonal low and seasonal high groundwater conditions. Based upon recent transducer measurements, the shallowest levels appear to occur in December – and the "spring" readings required for SGMA would be proposed to occur in this month (the winter). Fall measurements may be collected in October. Monitoring data will be included in the Data Management System and annual reports.

Groundwater levels have historically been measured by the Pleasant Valley Water District, the DWR, and by landowners in the GSA. Since approximately 2017, the DWR no longer routinely measures groundwater levels in the GSA. Groundwater level measurements in seven wells are now routinely collected and reported to the CASGEM program. The CASGEM program was created by SBx7-6, Groundwater Monitoring, a part of the 2009 Comprehensive Water Package. The locations of wells in the groundwater level monitoring network are shown in **Figure 5-2**. The network includes wells outside the Subbasin eastern boundary to monitor and better understand groundwater flow across the Pasajero and Polvadero Gaps, as shown in **Figure 5-5**. The current water level monitoring network is largely comprised of active and inactive production wells.

5.3.2 Groundwater Storage

Regulation Requirements:
§354.34(c)(2) Reduction of Groundwater Storage. Provide an estimate of the change in annual groundwater in storage.

Groundwater storage change will be estimated by multiplying local specific yield values by the change in groundwater levels, which are to be determined on an annual basis from water-level hydrographs.

A multi-year average of the storage change will be evaluated and compared to long-term trends to understand the impact of the implementation of the Plan. A second method of estimating the storage change that was utilized is the water budget analytical model or the checkbook balance method. It uses inputs from sources of recharge and outputs. The general methodology used in those efforts will continue to be used by the GSA; however, the water level method will be the main method employed to determine the change in storage, with the water budget used to help validate the results.

Please refer to **Section 3.1.8** for more information on specific yield values.

The monitoring network for storage change will include the wells in the groundwater water level monitoring network since water level change is an integral part of storage change. In general, as many wells as possible within the subbasin will be measured annually for the storage change calculation.

5.3.3 Seawater Intrusion

Regulation Requirements:
§354.34(c)(3) Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.
§354.34(j) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.

By definition, seawater intrusion occurs when saline water from the ocean infiltrates the groundwater system and begins to flow into areas of freshwater due to pressure differentials, in many cases caused by groundwater pumping. The Coastal Range lies between the Central Valley and the Pacific Ocean. The Subbasin is over 100 miles from the Sacramento-San Joaquin Delta, which would be the only means for seawater to enter the Central Valley. Due to the great distance and the current groundwater elevations, the Subbasin does not need to account for seawater intrusion.

5.3.4 Water Quality

Regulation Requirements:
§354.34(c)(4) 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.

Water quality monitoring is an important aspect of groundwater management and can provide many benefits, including:

1. Determining the suitability of groundwater quality for irrigation or drinking water
2. Spatially characterizing groundwater water quality
3. Comparing constituent levels at specific wells over time (i.e., years and decades)
4. Determining if groundwater quality problems exist in specific areas
5. Determining water treatment needs

The data used for the groundwater quality evaluation is primarily from test results from water samples taken from growers' wells. A secondary source is from the California Groundwater Ambient Monitoring and Assessment (GAMA) Program database, which includes water quality information collected by the DWR, SWRCB, Division of Drinking Water (DDW), and the USGS. The network of wells used for assessing groundwater quality in the Subbasin was selected to provide representative data for the basin.

As stated earlier, the data and information to be gathered is to first establish a baseline and then over time to test for degradation of quality in the agricultural production area and in the area of the Lost Hills Community for possible degradation of water supply for domestic purposes.

5.3.5 Land Subsidence

Regulation Requirements:
§354.34(c)(5) Land Subsidence. Identify the rate and extent of land subsidence, which may be measured by extensometers, surveying, remote sensing technology, or other appropriate method.

Limited land subsidence is occurring within the Subbasin due to groundwater overdraft. Land subsidence monitoring will be performed using three different methods:

1. Survey of Ground Control Points
2. Continuous Acting GPS station
3. Remote Sensing

The Land Subsidence Monitoring Network is shown on **Figure 5-4.** The monitoring network will consist of three Ground Control Points with two to be installed in 2021 selected based on the InSAR data showing areas of decline as described in **Section 3.2.6** and a fourth Ground Control Point to be installed near the proposed north pipeline outside the Subbasin. These points will be measured annually and compared to the corresponding data from the Continuous Acting GPS station at West Hills College. Available remote sensing data will also be used to help verify direct measurements and show estimated subsidence in other areas of the basin.

5.3.6 Depletion of Interconnected Surface Water

Regulation Requirements:
§354.34(c)(6) Depletions of Interconnected Surface Water. Monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions. The monitoring network shall be able to characterize the following:
A) Flow conditions including surface water discharge, surface water head, and baseflow contribution.
B) Identifying the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable.
C) Temporal change in conditions due to variations in stream discharge and regional groundwater extraction.
D) Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.

Regulation Requirements:
§354.34(j) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.

Interconnected surface water systems are surface waters that are hydraulically connected by a continuous saturated zone to an underlying aquifer. The Subbasin must monitor if depletions of surface water are caused by groundwater extractions. There are no known interconnected surface water systems within the Subbasin, although there are areas where they may exist on the western border. No information is available to assess potential surface water-groundwater interconnection in these areas since there are no wells, and hence no groundwater pumping. These areas may have thin alluvium and have slopes that could be problematic for cultivation. Currently, these areas are mostly used for rangeland. No active wells are within 2 to 3 miles of these areas, so there is no potential for interference or wells to monitor.

5.4 Adequacy of Monitoring Network

Regulation Requirements:
§354.34(d) The monitoring network shall be designed to ensure adequate coverage of sustainability indicators. If management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the basin setting and sustainable management criteria specific to that area.
§354.34(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network

Regulation Requirements:
§354.34(c)(3) Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.

§354.34(j) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.

5.4.1 Groundwater Levels

The Subbasin has a reasonable water-level monitoring density. The monitoring network will rely on existing wells. The GSAs may include additional wells in the future to monitor areas where water level information has historically been lacking, such as near the boundary with the Kettlemen Plains Subbasin, in the northwest of the Pleasant Valley Subbasin, and near the Pasajero and Polvadero Gaps.

The existing network of wells has provided data to prepare historic water level and direction of groundwater flow contour maps and identify groundwater level trends over the years in much of the Subbasin.

5.4.2 Groundwater Storage

Groundwater storage capacity will be calculated using local groundwater levels and specific yield values. This methodology has proved adequate in estimating annual change in groundwater storage in regions of the Subbasin. Groundwater storage calculations are based on the shallowest groundwater level measurements collected throughout the Subbasin each year.

5.4.3 Seawater Intrusion

See **Section 5.3.3**.

5.4.4 Groundwater Quality

As stated in **Section 0**, it is expected that the proposed network provides adequate coverage.

5.4.5 Land Subsidence

Past monitoring has shown that there has been a small amount of land subsidence due to pumping of groundwater in the area. Using the proposed monitoring network, the entire Subbasin will be monitored with possibly more detailed monitoring in potential problem areas.

5.4.6 Depletion of Interconnected Surface Water

Currently, it is believed that there are no interconnected surface water systems within the Subbasin. Should the status of interconnected surface waters within the Subbasin change, a monitoring network for this sustainability indicator will be set in future GSP updates.

5.5 Density of Monitoring Sites and Frequency of Measurements

Regulation Requirements:
§354.34(f) The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors:
1) Amount of current and projected groundwater use.
2) Aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow.
3) Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal.
4) Whether the Agency has adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response.

Regulation Requirements:
§354.34(c)(3) Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.

§354.34(j) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.

5.5.1 Groundwater Levels

Semi Annual Measurements

From **Figure 5-6**, it can be seen that there are a number of locations that will offer the data and information to continue and expand upon the historical long-term trends of water level in the basin. Groundwater levels will be measured manually in the winter (December) and fall (October) of each year. This could differ slightly from historical measurements. Winter measurements are designed to capture the shallowest levels each year. The fall measurement would capture a period after peak irrigation and summertime urban demands have ceased.

Continuous Measurements

From **Figure 5-7**, it is apparent that many continuous water-level measurements via the use of pressure transducers are now occurring. Though there is not a long-term trend for these sites, the data will be useful to identify seasonal variations in water levels over time, in particular the shallowest and deepest levels each year.

5.5.2 Groundwater Storage

Groundwater storage change will be estimated annually, based on the shallowest annual water levels from as many wells as possible. Only wells with reasonable and reliable data will be used.

5.5.3 Seawater Intrusion

See **Section 5.3.3**.

5.5.4 Groundwater Quality

See **Section 5.3.4** and **Figure 5-3**.

5.5.5 Land Subsidence

See **Section 5.3.5.**

5.5.6 Depletion of Interconnected Surface Water

Currently, it is believed that there are no interconnected surface water systems within the Subbasin. Therefore, the density of the interconnected surface water monitoring network is currently undetermined. Should the status of interconnected surface waters within the Subbasin change, a monitoring network for this sustainability indicator will be set in future GSP updates.

5.6 Monitoring Network Information

Regulation Requirements:
§354.34(g) Each Plan shall describe the following information about the monitoring network:
(1) Scientific rationale for the monitoring site selection process.
(2) Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.
(3) For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.

5.6.1 Groundwater Levels

5.6.1.1 Scientific Rationale for Site Selection

The following sections describe the monitoring network, including scientific rationale for the selection; consistency with data and reporting standards; corresponding sustainability indicator, minimum threshold, measurable objective, and interim milestone; and the locations of the monitoring sites.

The rationale for selecting monitoring points in the current groundwater-level monitoring network includes:

- The monitoring points are anticipated to be available for future measurements;
- The monitoring point has historic measurement data available and has had a measurable objective determined, if the well has existed for some time; and
- The monitoring points have well construction information available.

The following scientific rationale will be used to add new wells to the groundwater level monitoring network:

- Add wells where necessary to fill spatial data gaps laterally and vertically;
- Select wells with available construction information; and
- Select wells that will be available for monitoring in the future.

5.6.1.2 Consistency with Data and Reporting Standards

The data gathered through the monitoring networks are and will continue to be consistent with the standards identified in Section 352.4 of the California Code of Regulations related to Groundwater Sustainability Plans. The main topics of Section 352.4 are outlined below, and the full section is included as **Appendix H**.

- Data reporting units and accuracy;
- Monitoring site information;
- Well attribute reporting;
- Map standards;
- Hydrograph requirements;
- Groundwater and surface water models; and
- Availability of input and output files to DWR.

5.6.1.3 Quantitative Values

The quantitative values for minimum threshold, measurable objective, and interim milestones will be set for representative monitored wells (RMW) in the monitoring network. Refer to **Section 4.2.3.1** for the table with the criteria set for each well.

5.6.2 Groundwater Storage

The following sections describe the monitoring network, including scientific rationale for the selection; consistency with data and reporting standards; corresponding sustainability indicator, minimum threshold, measurable objective, and interim milestone; and the locations of the monitoring sites.

5.6.2.1 Scientific Rationale for Site Selection

Change in groundwater storage is based on a calculation involving the specific yield and change in groundwater levels from year to year. Levels in the semiannual water-level program will be measured each winter. Information from transducers will also be used. This approach is considered the most reliable method to estimate storage change since it is based largely on measured data. Storage change can also be estimated with a water balance exercise, but that is subject to more uncertainty.

5.6.2.2 Consistency with Data and Reporting Standards

The data gathered through the monitoring networks are and will continue to be consistent with the standards identified in Section 352.4 of the California Code of Regulations related to Groundwater Sustainability Plans. The main topics of Section 352.4 are outlined below, and the full section is included as **Appendix H**.

- Data reporting units (e.g., Water volumes shall be reported in acre-feet, etc.)
- Monitoring site information (e.g., Site identification number, description of site location, etc.)
- Streamflow measurements
- Well attribute reporting (e.g., State well numbers, CASGEM well identification number, casing perforations, etc.)
- Map standards (e.g., Data layers, shapefiles, geodatabases shall be local numbers submitted in accordance with the procedures described in Article 4, etc.)
- Depth to water level measurements
- Pumpage measurements
- Crop acreages and consumptive use

5.6.2.3 Quantitative Values

The quantitative values for minimum threshold, measurable objective, and interim milestones have been set for the Subbasin. Refer to **Section 4.3.2.1** for the set criteria.

5.6.3 Seawater Intrusion

See **Section 5.3.3**.

5.6.4 Groundwater Quality

5.6.4.1 Scientific Rationale for Site Selection

The scientific rationale for selecting water quality monitoring sites includes:

- Wells are selected that have available construction information (i.e., depth, perforated interval);
- Spatial distribution is such that groundwater quality can be characterized across the Subbasin;

5.6.4.2 Consistency with Data and Reporting Standards

The data gathered through the monitoring networks are and will continue to be consistent with the standards identified in Section 352.4 of the California Code of Regulations related to Groundwater Sustainability Plans.

5.6.4.3 Quantitative Values

Wells in the groundwater quality network will be sampled as described previously in **Section 4.5**, and the collected groundwater quality data will be evaluated for groundwater quality trends

5.6.5 Land Subsidence

The following sections describe the monitoring network, including scientific rationale for the selection; consistency with data and reporting standards; corresponding sustainability indicator, minimum threshold, measurable objective, and interim milestone; and the locations of the monitoring sites.

5.6.5.1 Scientific Rationale for Site Selection

InSAR data provided by DWR has complete coverage of the Subbasin; however, it is understood that direct measurements are generally considered more accurate than remote sensing. The monitoring points to be installed in 2021 (see **Figure 5-4**) were selected due to the corresponding locations in the area of the Subbasin that InSAR data has indicated limited subsidence has occurred (**Section 3.2.6**). The West Hills College GPS station and the location near the north pipeline outside the Subbasin will be used for comparison to data collected from other sites. InSar data will still be reviewed as a supplementary source and compared to direct measurements.

5.6.5.2 Consistency with Data and Reporting Standards

The data gathered through the monitoring networks are consistent with the standards identified in Section 352.4 of the California Code of Regulations related to Groundwater Sustainability Plans. The main topics of Section 352.4 are outlined below.

- Data reporting units (e.g., elevations shall be reported in feet relative to established datum)
- Monitoring site information (e.g., Site identification number, description of site location, etc.)
- Map standards (e.g., Data layers, shapefiles, geodatabases shall be submitted in accordance with the procedures described in Article 4, etc.)

5.6.5.3 Quantitative Values

The quantitative values for minimum threshold, measurable objective, and interim milestones will be set for the Subbasin. Refer to **Sections 4.2.4, 4.3.3, 4.5.3, 4.6.3,** and **4.7.3**.

5.6.6 Depletion of Interconnected Surface Water

5.6.6.1 Scientific Rationale for Site Selection

The following scientific rationale will be used to create and add monitoring sites to the interconnected surface water monitoring network should it become necessary in the future:

- Add monitoring sites within the vicinity of the surface water body;
- Install shallow monitor wells;
- Select monitoring sites that will be available for monitoring in the future
-

5.6.6.2 Consistency with Data and Reporting Standards

The data gathered through the Subbasin monitoring networks, either existing or yet to be established, will be consistent with the standards identified in Section 352.4 of the California Code of Regulations related to Groundwater Sustainability Plans. The main topics of Section 352.4 are outlined below, and the full section is included as **Appendix H**.

- Data reporting units and accuracy;
- Monitoring site information;
- Well attribute reporting;
- Map standards;
- Groundwater and surface water models; and
- Availability of input and output files to DWR.

5.6.6.3 Quantitative Values

5.7 Monitoring Locations

Regulation Requirements:
§354.34(h) The 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.

5.7.1 Groundwater Levels

5.7.1.1 Map

Figure 5-2 shows the groundwater level RW locations for the Subbasin. Seasonal monitoring will be compared to the interim milestones, measurable objectives, and minimum thresholds established for these indicator wells. While the RW wells will be used as described above, it should be noted that as many wells as possible will be used to calculate change in storage as well as the RWs to assure that the RWs are reflecting the change across the basin.

5.7.1.2 Table

No table is necessary or available for monitoring sites. The network may be modified and/or enhanced if deemed necessary.

5.7.2 Groundwater Storage

See **Figure 5-2**. Storage will be determined based off of data collected from the Groundwater Level Monitoring Network.

5.7.3 Seawater Intrusion

See **Section 5.3.3**.

5.7.4 Water Quality

5.7.4.1 Map

See **Section 5.3.4**.

5.7.4.2 Table

No table is necessary or available for monitoring sites. A map of the water quality monitoring network is included as **Figure 5-3.**

5.7.5 Land Subsidence

5.7.5.1 Map

Figure 5-4 is a map of the proposed land subsidence monitoring network sites.

5.7.5.2 Table

No table is necessary or available for monitoring sites.

5.7.6 Depletion of Interconnected Surface Water

Currently, it is believed that there are no interconnected surface water systems within the Subbasin. Should the status of interconnected surface waters within the Subbasin change, a monitoring network for this sustainability indicator will be set in future GSP updates.

5.8 Monitoring Protocols

Regulation Requirements:
§352.2 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.
§354.34(i) The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2**(f)** for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.

5.8.1 Groundwater Levels

The Data Quality Objectives (DQO) process will be used to develop monitoring protocols that assist in meeting measurable objectives and sustainability goals of this GSP. The DQO process includes the following:

1. State the problem;
2. Identify the goal;
3. Identify the inputs;
4. Define the boundaries of the area/issue being studied;
5. Develop an analytical approach;
6. Specify performance or acceptance criteria; and
7. Develop a plan for obtaining data.

Groundwater level monitoring will generally follow the protocols identified in the *Monitoring Protocols, Standards, and Sites BMP* (DWR, December 2016b). The GSA may develop standard monitoring forms in the future if deemed necessary. Depth to water measurements may be collected utilizing either wireline or sonic depth to water meters depending on several factors including instrument accuracy, well accessibility, and groundwater water depth.

The following comments and exceptions to the BMP should be noted:

1. SGMA regulations require that groundwater levels be measured to the nearest 0.1 feet. The BMP suggests measurements to the nearest 0.01 foot; however, this is not practical for many measurement methods. In addition, this level of accuracy would have little value since groundwater contour maps typically have 10- or 20-foot intervals, and storage calculations are based on groundwater levels rounded to the nearest foot. The accuracy of groundwater level measurements will vary based on the well type and condition. For instance, if significant oil is found in an agricultural well, then readings to the nearest foot may be the best one can achieve.
2. Unique well identifiers will be labeled on all public wells and on private wells if permission is granted to monitor these.
3. The BMP states that measurements each spring and fall should be taken "preferably within a 1- to 2-week period – As discussed previously, the shallowest levels are in the winter, not the spring. So winter measurements will be used.
4. Water level measurements will be compared to previous records; if there is a significant difference, then the measurement will be verified.

5.8.2 Groundwater Storage

Water level monitoring, which is the same as the storage change monitoring, will generally follow the protocols identified in the *Monitoring Protocols, Standards, and Sites BMP* (DWR, 2016b).

5.8.3 Seawater Intrusion

See **Section 5.3.3**.

5.8.4 Groundwater Quality

Standard procedures should be developed for sample collection and preservation of water from irrigation wells. Of foremost importance is the time of pumping prior to water sample collection. In general, irrigation wells should be sampled during heavy pumping periods in July or August and after the well has been pumping for several days, if possible. The water sample needs to be collected near the well head, if possible, and prior to the addition of any chemicals.

It is recommended that annually, electrical conductivity (EC) would be measured in water samples collected during heavy summer pumping from each large capacity well. The results would be plotted on a suitable map and EC hydrographs maintained for about a quarter of these wells over the long term.

Also, once every three years, irrigation suitability analyses would be obtained from the well owners, and the results interpreted. Samples from other wells will be collected for analyses.

Samples of cascading water would be collected from active wells when the pump is pulled out of the well or from unused wells without pumps. The depth where the water enters the well would be measured and recorded. A bucket would be lowered down the well on a rope or wire and the sample collected. The samples would be analyzed for irrigation suitability parameters and stable isotopes of water.

5.8.5 Land Subsidence

Land subsidence monitoring will generally follow the protocols identified in the Monitoring Protocols, Standards, and Sites BMP (DWR, 2016b). The GSAs may develop standard monitoring forms in the future if deemed necessary.

The following comments and exceptions to the BMP should be noted:

1. Identifying land subsidence conditions;
2. Monitoring regions of suspected subsidence where potential exists; and
3. Following surveying standards set out in the California Department of Transportation's Caltrans Surveys Manual for GPS surveys.

5.8.6 Depletion of Interconnected Surface Water

See **Section 5.3.6.**

5.9 Representative Monitoring

Regulation Requirements:
§354.36 Each Agency may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin, as follows:
a) Representative monitoring sites may be designated by the Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined.
b) Groundwater elevations may be used as a proxy for monitoring other sustainability indicators if the Agency demonstrates the following:
1) Significant correlation exists between groundwater elevations and the sustainability indicators for which groundwater elevation measurements serve as a proxy.
2) Measurable objectives established for groundwater elevation shall include a reasonable margin of operational flexibility taking into consideration the basin setting to avoid undesirable results for the sustainability indicators for which groundwater elevation measurements serve as a proxy.
c) The designation of a representative monitoring site shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area.

5.9.1 Groundwater Levels

5.9.1.1 Description of Representative Sites

See **Figure 5-2**.

5.9.1.2 Use of Groundwater Elevations as Proxy for Other Sustainability Indicators

The Subbasin plans to use change in shallowest water levels each year as a proxy for groundwater storage sustainability indicators.

5.9.2 Groundwater Storage

5.9.2.1 Description of Representative Sites

See **Figure 5-2**.

5.9.2.2 Use of Water-Level Trends as Proxy for other Sustainability Indicators

The Subbasin plans to use water-level trends as a proxy for storage change. The shallowest annual water levels will be used as a critical component of groundwater storage estimation.

5.9.3 Seawater Intrusion

See **Section 5.3.3**.

5.9.4 Water Quality

5.9.4.1 Description of Representative Sites

See **Figure 5-3.**

5.9.4.2 Use of Groundwater Elevations as Proxy for other Sustainability Indicators

The Subbasin does not plan to use water level elevations as a proxy for monitoring groundwater degradation.

5.9.5 Land Subsidence

5.9.5.1 Description of Representative Sites

The sites shown on **Figure 5-4** will be the monitoring sites.

5.9.5.2 Use of Water-Level Trends as Proxy for other Sustainability Indicators

The Subbasin does not plan to use groundwater elevations as a proxy for monitoring land subsidence.

5.9.6 Depletion of Interconnected Surface Water

5.9.6.1 Description of Representative Sites

Representative monitoring sites will not be utilized in the Subbasin.

5.9.6.2 Use of Water-Level Trends as Proxy for other Sustainability Indicators

The Subbasin does not plan to use groundwater elevations as a proxy for monitoring depletion of interconnected surface water.

5.10 Assessment and Improvement of Monitoring Network

5.10.1 Groundwater Levels

5.10.1.1 Review and Evaluation of Monitoring Network

Regulation Requirements:
§354.38(a) Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.

The following includes a description of the different types of data gaps, a summary of existing data gaps, and plans to fill the data gaps. These items will be reevaluated in each 5-year update to this Plan.

5.10.1.2 Identification of Groundwater Level Data Gaps

Regulation Requirements:
§354.38(b) 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.
.

There are three general types of data gaps to consider for monitoring networks:

1. **Temporal**: Insufficient frequency of monitoring. For instance, data may be available from a well only in the fall since it is rarely idle in the spring.
2. **Spatial**: Insufficient number or density of monitoring sites in a specific area.
3. **Insufficient quality of data**: Data may be available but be of poor or questionable accuracy. Poor data may at times be worse than no data, since it could lead to incorrection assumptions or biases. The data may not appear consistent with other data in the area or with past readings at the monitoring site. The monitoring site may not meet all the desired criteria to provide reliable data, such as having information on perforation depth, etc. For further details, see **Section 5.2**.

Wells in the monitoring network have been measured regularly in the spring and fall of each year since monitoring began at each site. It has been found that the shallowest levels occus in the winter. The spring measurements will thus be replaced with winter measurements. It is anticipated that the measuring agencies will continue to measure the wells and report the data to the CASGEM program as well as the Pleasant Valley GSA. However, some wells in the monitoring network have not been measured in the last few years, or perhaps were measured but the data has not been uploaded to CASGEM yet. While data gaps are generally not present in the frequency of groundwater level monitoring, temporal gaps are present in some of the well data.

The existing groundwater-level monitoring network has provided adequate data to prepare groundwater contour maps and water-level hydrographs over the years. The average density of the monitoring network in the region is adequate; however, there are areas in the Subbasin that have sparse coverage. From more recent work, a large number of wells included in the monitoring network have known construction information.

5.10.1.3 Plans to Fill Groundwater Level Data Gaps

Regulation Requirements:
§354.38(c) If the monitoring network contains data gaps, the Plan shall include a description of the following:
1) The location and reason for data gaps in the monitoring network.
2) Local issues and circumstances that limit or prevent monitoring **.**
§354.38 (d) Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.

See **Section 5.2**.

These data gaps can be filled using the four alternatives below:

- **Collect well completion reports and TV surveys.** Well Completion Reports can provide well construction information including perforated interval and total depth. These could be collected from the landowner or the DWR; however, several challenges exist.
- **Perform a video inspection of some wells to obtain construction information.** A video inspection can be performed on desired wells to determine the total depth and perforated interval, if a driller's log isn't available.
- **Replace well with another well.** Wells without construction information could be replaced with another private well that has well construction information. This may be simpler and less costly than a video inspection. However, replacing well locations is not always desirable, since it is preferred to continue measurements in wells that have a long period of record (i.e., long hydrograph).

5.10.1.4 Adjustment to Density of Monitoring Sites and Frequency of Measurements

Regulation Requirements:
§354.38(e) Each Agency shall 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 that include the following:
1) Minimum threshold exceedances.
2) Highly variable spatial or temporal conditions
3) Adverse impacts to beneficial uses and users of groundwater.
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.

The frequency and density of the proposed monitoring programs are discussed in previous sections. The plans to fill data gaps above will address highly variable spatial or temporal conditions currently identified in the monitoring network. Beginning in 2022, when groundwater conditions are compared to sustainability goals, the monitoring network may be modified or enhanced if deemed necessary. **Figure 5-2** is a map of the Groundwater Level Monitoring Network. This map identifies the groundwater level indicator wells, actively monitored wells with known construction information, and data gap areas.

5.10.2 Groundwater Storage

5.10.2.1 Review and Evaluation of Monitoring Network

Regulation Requirements:
§354.38(a) Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.

This section includes a description of the different types of data gaps, a summary of existing data gaps in each monitoring network, and plans to fill the data gaps.

5.10.2.2 Identification of Groundwater Storage Data Gaps

Regulation Requirements:
§354.38(b) 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.
.

See **Section 5.2** and each of the main headings.

5.10.2.3 Plans to Fill Groundwater Storage Data Gaps

Regulation Requirements:
§354.38(c) If the monitoring network contains data gaps, the Plan shall include a description of the following:
1) The location and reason for data gaps in the monitoring network.
2) Local issues and circumstances that limit or prevent monitoring **.**
§354.38 (d) Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.

The plan to fill data gaps in the monitoring network is established under Proposed Monitoring and Reporting Program described in **Section 5.2**.

5.10.2.4 Adjustment to Density of Monitoring Sites and Frequency of Measurements

Regulation Requirements:
§354.38(e) Each Agency shall 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 that include the following:
1) Minimum threshold exceedances.
2) Highly variable spatial or temporal conditions
3) Adverse impacts to beneficial uses and users of groundwater.
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.

The frequency and density of the proposed monitoring programs are discussed in previous sections. The criteria are considered adequate to provide sufficient monitoring data to satisfy SGMA requirements. Beginning in 2022, when groundwater conditions are compared to sustainability goals, the monitoring network may be modified or enhanced if deemed necessary.

5.10.3 Seawater Intrusion

Regulation Requirements:
§354.34(c)(3) Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.

§354.34(j) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.

See **Section 5.3.3**.

5.10.4 Water Quality

5.10.4.1 Review and Evaluation of Monitoring Network

Regulation Requirements:
§354.38(a) Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.

The following includes a summary of existing data gaps and plans to fill the data gaps. These items will be reevaluated in each 5-year update to this Plan.

5.10.4.2 Identification of Water Quality Data Gaps

Regulation Requirements:
§354.38(b) 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.
.

Historically the data proposed to be acquired has not been acquired. The five-year update will review and identify if data gaps occur.

5.10.4.3 Plans to Fill Water Quality Data Gaps

Regulation Requirements:
§354.38(c) If the monitoring network contains data gaps, the Plan shall include a description of the following:
1) The location and reason for data gaps in the monitoring network.
2) Local issues and circumstances that limit or prevent monitoring **.**
§354.38 (d) Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.

The five-year plan will identify if and how additional data gaps will be filled.

5.10.4.4 Adjustment to Density of Monitoring Sites and Frequency of Measurements

Regulation Requirements:
§354.38(e) Each Agency shall 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 that include the following:
1) Minimum threshold exceedances.
2) Highly variable spatial or temporal conditions
3) Adverse impacts to beneficial uses and users of groundwater.
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.

The frequency and density of the proposed monitoring programs are discussed in previous sections. The well network is considered adequate for water levels as well as for water quality. The criteria are considered adequate to provide the monitoring data to satisfy SGMA requirements. Beginning in 2022, when groundwater conditions are compared to sustainability goals, the monitoring network may be modified or enhanced if deemed necessary.

5.10.5 Land Subsidence

5.10.5.1 Review and Evaluation of Monitoring Network

Regulation Requirements:
§354.38(a) Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.

This section includes a description of the different types of data gaps, a summary of existing data gaps in each monitoring network, and plans to fill the data gaps.

5.10.5.2 Identification of Land Subsidence Data Gaps

Regulation Requirements:
§354.38(b) 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.
.

Land subsidence is often examined as an annual rate. As such, it is ideal to have survey data at monitoring points once per year at a minimum. The JPL remote sensing data is collected annually. Taking into consideration all the data, temporal data gaps are not anticipated to occur in the monitoring network in the future.

5.10.5.3 Plans to Fill Land Subsidence Data Gaps

Regulation Requirements:
§354.38(c) If the monitoring network contains data gaps, the Plan shall include a description of the following:
1) The location and reason for data gaps in the monitoring network.
2) Local issues and circumstances that limit or prevent monitoring **.**
§354.38 (d) Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.

The Subbasin will rely on, as previously discussed, other agencies to continue to collect subsidence data.

5.10.5.4 Adjustment to Density of Monitoring Sites and Frequency of Measurements

Regulation Requirements:
§354.38(e) Each Agency shall 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 that include the following:
1) Minimum threshold exceedances.
2) Highly variable spatial or temporal conditions
3) Adverse impacts to beneficial uses and users of groundwater.
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.

The frequency and density of the proposed monitoring programs are discussed in previous sections. The criteria are considered adequate to provide the monitoring data to satisfy SGMA requirements. Beginning in 2022, when land subsidence is compared to sustainability goals, the monitoring network may be modified or enhanced if deemed necessary.

5.10.6 Depletion of Interconnected Surface Water

5.10.6.1 Review and Evaluation of Monitoring Network

Regulation Requirements:
§354.38(a) Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.

The following includes a summary of existing data gaps and plans to fill the data gaps. These items will be reevaluated in each 5-year update to this Plan.

5.10.6.2 Identification of Interconnected Surface Water Data Gaps

Regulation Requirements:
§354.38(b) 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.
.

The Subbasin does not recognize any data gaps at this time.

5.10.6.3 Plans to Fill Interconnected Surface Water Data Gaps

Regulation Requirements:
§354.38(c) If the monitoring network contains data gaps, the Plan shall include a description of the following:
1) The location and reason for data gaps in the monitoring network.
2) Local issues and circumstances that limit or prevent monitoring **.**
§354.38 (d) Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.

Data gaps are not recognized at this time. This will be reevaluated in each 5-year update to this Plan.

5.10.6.4 Adjustment to Density of Monitoring Sites and Frequency of Measurements

Regulation Requirements:
§354.38(e) Each Agency shall 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 that include the following:
1) Minimum threshold exceedances.
2) Highly variable spatial or temporal conditions
3) Adverse impacts to beneficial uses and users of groundwater.
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.

Should the status of interconnected surface waters within the Subbasin change, a monitoring network for this sustainability indicator will be set in future GSP updates. Adjustments to monitoring networks within the Subbasin will be made as necessary in on-going GSP updates.

5.11 Reporting Monitoring Data to the Department

Regulation Requirements:
§354.40 Monitoring data shall be stored in the data management system developed pursuant to Section 352.6. A copy of the monitoring data shall be included in the Annual Report and submitted electronically on forms provided by the Department.

Monitoring programs data will be stored in a Data Management System described in Chapter 7. Well location, construction, and water level data and groundwater quality data will be shared as necessary. In addition, the monitoring programs described in this Chapter are generally consistent with the Subbasin's neighboring GSPs. Similarly, data reported to DWR will be collected and reported in a consistent format.

6 Projects and Management Actions to Achieve Sustainability

Regulation Requirements:

§354.42 Introduction to Projects and Management Actions. This Subarticle describes the criteria for projects and management actions to be included in a Plan to meet the sustainability goal for the basin in a manner that can be maintained over the planning and implementation horizon.

§354.44(a) Each Plan shall include a description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent. The Plan shall include the following:

(a) A description of the circumstances under which projects or management actions shall be implemented, the criteria that would trigger implementation and termination of projects or management actions, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.

(b) The process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken.

(2) If overdraft conditions are identified through the analysis required by Section 354.18, the Plan shall describe projects or management actions, including a quantification of demand reduction or other methods, for the mitigation of overdraft.

(3) A summary of the permitting and regulatory process required for each project and management action.

(4) The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.

(5) An explanation of the benefits that are expected to be realized from the project or management action, and how those benefits will be evaluated.

(6) An explanation of 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.

(7) A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.

(8) A description of the estimated cost for each project and management action and a description of how the Agency plans to meet those costs.

(9) A description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods.

(c) Projects and management actions shall be supported by best available information and best available science.

(d) An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.

6.1 Introduction

GSAs have a variety of tools that can be used to achieve sustainable groundwater management, which fall into two primary categories – 1) project development for water supply augmentation and 2) management actions for demand reduction. A combination of these actions will likely be needed to achieve sustainability. The projects described herein focus on the development, use, and recharge of available surface water supplies to reduce the lowering of the groundwater levels. Management actions have been developed that focus on reducing water demand and associated reduction of groundwater pumping, along with increased data collection and associated actions including education and outreach, regulatory policies, incentive-based programs, and enforcement actions. Projects that are currently envisioned for implementation are discussed in Section 6.2, and potential management actions that may be implemented are discussed in Section 6.3.

Some projects and management actions will benefit the entire Subbasin, while others will be implemented by individual GSAs and/or individual landowners and will benefit those GSAs and/or landowners. Some projects and management actions will be implemented sooner than others. The GSAs understand there are various levels of uncertainty with project and program implementation, and it is not unusual for project and program implementation to take longer than originally estimated. Some projects and management actions build upon others, and the accrual of expected benefits may take multiple years to be individually realized and vary

substantially from year to year due to fluctuating hydrologic cycles. Various implementation timelines may change over time and will be reevaluated each time this GSP is updated.

Implementation of this GSP over the planning horizon will require ongoing efforts to engage stakeholders and the general public in the sustainability process, communicating the statutory requirement, the objectives of the GSP, and progress toward each identified measurable objective. Ongoing public communication, announcements of upcoming environmental hearings, project presentations, bid openings, and project construction schedules will be made on a regular basis. Public forums will include opportunities for public comment and feedback. The GSAs will provide notice to the public and other agencies as the implementation of each project or management action is being considered through public meetings, newsletters, and the PVGSA website (http://sgma.pleasantvalleywaterdistrict.com/). The projects will be paid for by project participants. This may be by GSA, by water district or groups of landowners. The project participant will fund the development of the projects, construction and operation of the project and receive their proportionate benefit (based upon their proportionate share of costs) of the projects that are developed.

Table 6-1 identifies the different types of potential projects and management actions that may be considered by the GSA. They have not been prioritized because the GSAs have not selected specific projects and programs for implementation. If possible, the projects that would be constructed first would be in those areas where rates of groundwater level decline are the greatest.

Table 6-1 Projects and Programs for Mitigating Groundwater Overdraft

No.	Category	Description	Supply (S) or Demand (D) side action	Estimated Time to Potential Implementation (years)		
Projects						
1	Surface Water	Groundwater Recharge ○ Recharge basins ○ Dry wells ○ Injection wells ○ Intentional irrigation field flooding ○ Unlined canals ○ Reclaimed water	S		1 - 5	
2		Groundwater Banking	S		1 - 5	
3		Direct Use of Flood and Storm Water	S		1 - 5	
4		Import New Surface Water Supplies	S		1 - 5	
5		Increase Surface Water Storage	S			>5
6		Increase Conveyance Capacity	S		1 - 5	
Management Actions						
7	Land Management	Agricultural Land Conversion ○ Sell/lease land and reserve groundwater rights ○ Agency purchases and fallows land from willing landowners ○ Fallow land and flood fields/build recharge basins ○ Watershed management	D		1 - 5	
8		Deficit Irrigation	D	0 - 1		
9		Urban Land Use Regulations	D	0 - 1		
10	Groundwater Use Restrictions	Prohibit Groundwater Exports	S	0 - 1		
11		Groundwater Metering and Pumping Restrictions	D	0 - 1		
12		Groundwater Pumping Fees	D	0 - 1	1 - 5	
13		Wellhead Fees (annual or new wells)	D	0 - 1		
14		Additional Well Permit Requirements	D	0 - 1		
15	Water Conservation	Water Use Restrictions in Droughts	D	0 - 1		
16		Urban Water Conservation	D	0 - 1		
17		Urban Water Recycling	S			>5
18		Agricultural Water Recycling	S		1 - 5	
19		Tiered Pricing / Fines for Overuse	D	0 - 1		
20	Other	Blend Poor and Good Quality Waters	S		1 - 5	
21		Groundwater Credits	N/A	0 - 1		
22		Rainwater Harvesting	S		1 - 5	
23		Public Education	D	0 - 1		

Description of the circumstance and criteria for initiating projects or management actions:

From historical information documented in Chapter 3, it can be shown that presently there has been a lowering of groundwater levels. Thus, overdraft is occurring, and the GSAs are in the process of developing projects to correct the overdraft. PVGSA plans to add a new surface delivery pipeline (Northern Canal Pipeline Project) into the District which will allow the importation of additional surface supplies. The PVGSA as well as the other GSAs will continue to monitor groundwater level changes as the northern pipeline project is constructed and operated. Groundwater level change will be averaged over a five-year period to evaluate effectiveness of the project(s).

Process to notify the public and local agencies:

The PVGSA has initiated a website as well as outreach to its constituency through mailers and workshops. The website will be the main instrument to keep the public aware of current conditions and success in managing the groundwater resources.

What if Overdraft Continues to Occur:

With the planned approach, it is envisioned that 1) the GSAs will be successful in developing the projects needed to offset the overdraft and that 2) the landowners will be able to purchase and import additional surface water supplies. Should this not be realized, then the addition of other projects and management actions would be considered, including reductions in irrigated land.

Permitting:

The project(s) will each need to be permitted. Generally, the permitting process involves review of the project site for environmental and cultural concerns, and preparation of environmental documents to comply with California Environmental Quality Act and with the Air Resources' and Regional Water Quality Control Board's requirements and approvals. Since most of the areas planned for this development are currently cultivated to farming, it is thought that this process should be relatively straightforward. The District is presently approximately half-way through this process on the North Pipeline project.

Status of each Action:

The Action currently planned is the addition of the North Pipeline project. The District is currently initiating acquisition of right of way.

Explanation of Benefits:

The projects will allow greater ability to import surface water supplies. With the acquisition of recharge sites, there is the potential that some land is removed from agricultural production, which might yield a reduction in demand. The ponds allows surface water to be diverted and recharged for later use in the spring and summer months. If the rain/snowmelt patterns change and more surface water is available outside the normal crop irrigation demand season, these facilities will allow the District to take advantage of the timing of the surface water availability and may make even more surface water available for recharge.Accomplishment of the Projects:

District staff have relationships with its growers, as well as local real estate operatives, and it is through this network that the District will continue to pursue acquisition of property.

Legal Authority:

The PVWD has the legal authority to buy, sell, and enter into contracts for purchase of property as well as construction contracts.

Cost:

See the explanation in chapter 7.

Management:

The activities of the PVGSA and other GSAs will be handled by their staff. The PVGSA is expected to hire a manager and normal field activities are expected to be the responsibility of the individual landowners.

As stated, the District plans to develop a significant project known as the North Pipeline project. The maintenance and operation procedures of this facility have yet to be determined, but would be expected to be a mixture of contract operations along with landowner participation.

The main revenue objectives for the District involve the collection of funds to 1) fully fund the operations of the GSA, 2) fund the Pleasant Valley Water District's portion of the cost to prepare and implement a GSP, and 3) expand the ability to intentionally recharge groundwater. Ultimately, it is estimated that the cost of over $20 million will need to be generated from either assessments and or toll charges or a mixture of both.

Each potential project presented herein has a surface water supply that was identified as being the most likely to be available. Each of the current projects summarized in Section 6.2 identifies the water supplies that could be available to the project. The Priority 1 projects have been included in this chapter. Due to the location of the projects, only certain surface water supplies might be available for a particular project. As discussed in Section 3.4, a system of permits, licenses, and registrations give the right to beneficially use reasonable amounts of surface water within a specific area or Place of Use. The Place of Use for the USBR Central Valley Project (CVP), represented as the Place of Use for the City of Coalinga CVP contract, is shown in **Figure 6-1** City of Coalinga CVP Place of Use in Pleasant Valley Subbasin. When there is a willing seller, the GSAs could purchase surface water supplies from the CVP and use it for beneficial purposes within the Subbasin after completing various regulatory and environmental processes for a water transfer. Included in **Appendix J** is a contract for water supplies executed by the PVWD in 2021.

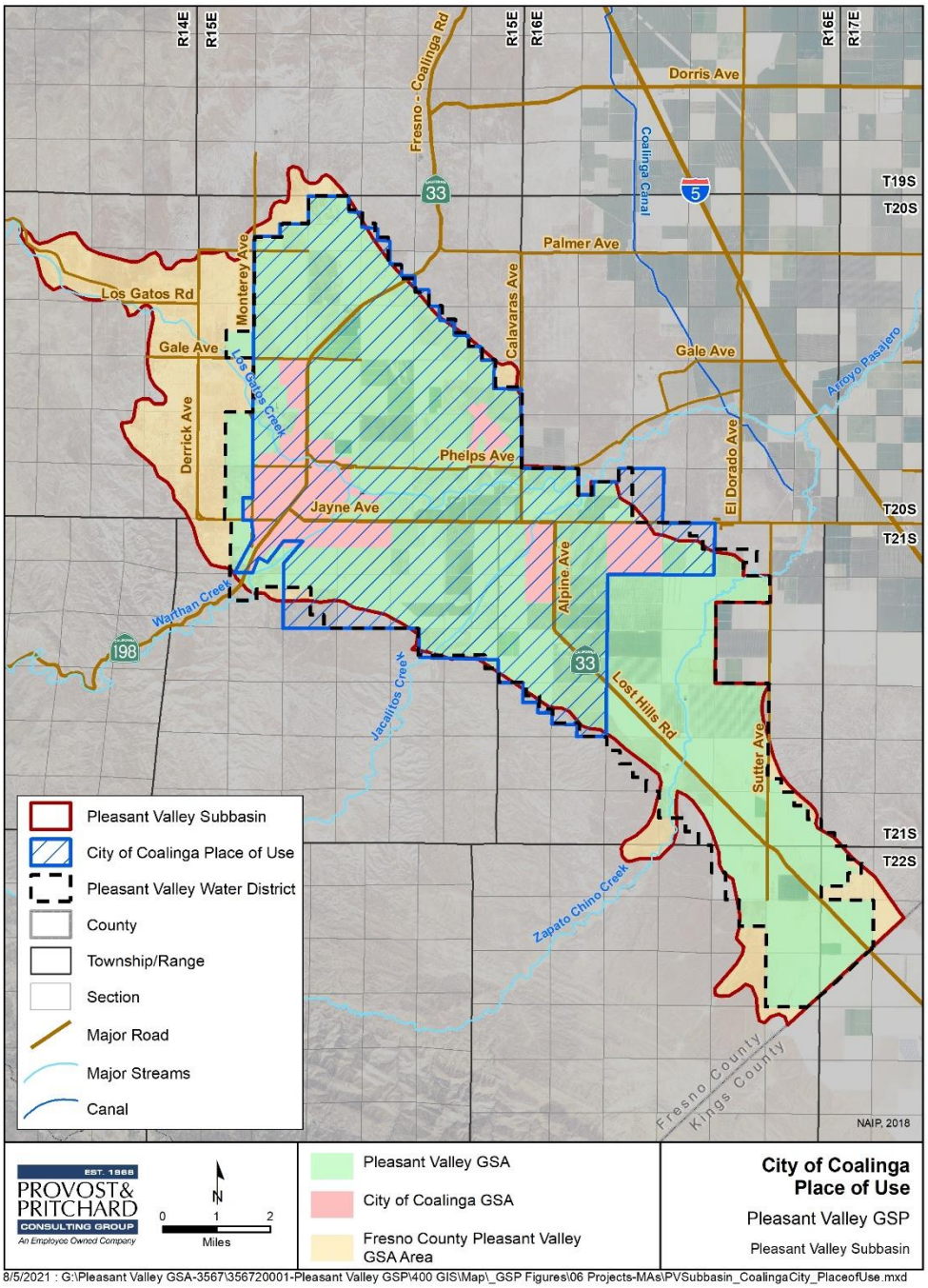


Figure 6-1 City of Coalinga CVP Place of Use in Pleasant Valley Subbasin

6.2 Projects

The GSAs have identified a number of potential projects to help achieve groundwater sustainability, and additional projects may be added or developed as GSP implementation proceeds. The existing City of Coalinga Wastewater Treatment Facility has been contributing to aquifer recharge, since it treats and percolates effluent originating from imported surface water, but additional larger projects are required to augment the water supply to help overcome the Subbasin groundwater overdraft. Some of the individual projects discussed below have been included in the Westside San Joaquin Integrated Regional Water Management Plan (IRWMP) to pursue project funding, while other projects are more Subbasin-wide projects. It is envisioned that projects will be implemented as joint GSA efforts, by individual GSAs, or implemented by individual landowners or stakeholders.

The following projects are being planned to supplement existing recharge efforts, and the projects are in various stages of development, ranging from a conceptual level to projects that are under design. A different level of investigation has been completed for each project, ranging from preliminary conceptual projects with limited information to projects with a feasibility level design completed, to projects that are "shovel ready," which is defined as having complete environmental documentation and complete design plans and specifications. Those that have had more investigation are identified as priority 1 and the others are identified as priority 2. A summary listing the projects and the associated measurable objectives is included in the report.

Table 6-2 List of Potential Projects

Project	Title	Estimated Yearly Recharge (AF)	Estimated Capital Cost ($)	Estimated Cost ($/AF)[1]
Priority 1	Description			
1	North Canal Pipeline (facility cost)	12,000	$14,000,000	$100
2	South Canal Pipeline Expansion (facility cost)	4,000	$2,500,000	$54
3	Los Gatos Creek Gravel Pits	720	$2,100,000	$254
4	Zapato Creek Instream	75	$1,600,000	$9280
	Annual Operations Costs			
5	Import surface water supplies	20,000	$5-$10,000,000[3]	$250-$500/yr
	Subtotal			
Priority 2				
6	City of Coalinga Surface Water	2-3,000	Unknown	
7	City of Coalinga WWTP Recharge	?	Unknown	
8	Los Gatos Creek Surface Water Diversion	?	Unknown	
9	Los Gatos in-Creek Recharge	?	Unknown	
10	Jacalitos Creek Surface Water Diversion	?	Unknown	
11	Jacalitos Creek in-Creek Recharge	?	Unknown	
12	Zapato Chino Surface Water Diversion	?	Unknown	
13	Zapato Chino in-Creek Recharge	?	Unknown	
14	Flood Mar	?	Unknown	
15	Intentional Recharge Basins	?	Unknown	
16	Dry Well Recharge	?	Unknown	
17	Cloud Seeding	?	Unknown	

Notes – 1 – Costs capitalized at 6% for 20 years. Cost does not include water supply.
2 – Costs are 2016 based dollars
3 – Importation of surface water costs are an annual cost and are not a one-time expenditure as shown for the other entries in the table.

The GSAs will maintain a list of proposed projects and their characteristics, along with their development status, and will use this list to prioritize and secure funding as opportunities become available. The GSAs will seek and encourage projects that provide multi-benefits if feasible. All projects will be supported by the best available information and the best available science.

Projects discussed in this GSP will remain a part of the potential projects that the GSAs may choose to implement; however, as additional information is gathered other projects may be identified and considered in the future.

Categories of the project types are listed below:

- Groundwater Recharge/Groundwater Banking
  - Infiltration Ponds
  - On-Farm Recharge
  - In-stream Recharge
  - Canals
  - Dry Wells
  - Tile Lines (Subsurface)
- Conveyance Systems
  - Pipelines
  - Canal Systems
  - In Stream Diversion Points
  - Coalinga Canal Diversion Points
- Surface Storage Ponds
- Stormwater Capture and Recharge Project
  - Watershed Management
    - Removal of non-native vegetation and overgrowth
  - Upper Watershed
  - Lower Watershed
  - Cloud seeding
- Use of recycled water
  - Use of Surface Water Treatment Facility
  - Wastewater Treatment Facility
- Demand Reduction

The projects currently being considered would yield an estimated average-annual volume needed to become sustainable. The projects listed in this document will not all be utilized during the same time. Many of the identified projects are scalable, meaning they could be expanded beyond the identified benefits by expanding acreage or having more landowners participate. The potential projects are summarized in **Table 6-2** indicating the average annual estimated benefits, the generalized priority for implementation, the estimated capital cost (current dollars) to the GSAs, and the estimated cost per acre foot of project yield. **Figure 6-2** shows the location of the main projects being considered. It is possible that the implementing entity for some projects may change in the future and that the GSAs may choose to implement more projects. Subsequently, this project list will need to be evaluated and revised each year. It will also be updated in the GSP Annual Report and/or 5-year GSP update.

The steps below can be used as a guide for a process to be used for project implementation:

1. Identify potential projects.
2. Gather required information and field data.
3. Prepare conceptual level feasibility studies and cost estimates.
4. Prioritize potential projects.
5. Obtain agreements with project partner(s).

6. Secure funding.
7. Prepare environmental documents and obtain permit and regulatory approvals.
8. Design and prepare construction documents.
9. Implement project construction.
10. Operate and maintain project for sustainability.
11. Periodically evaluate estimated benefits vs. actual benefits.

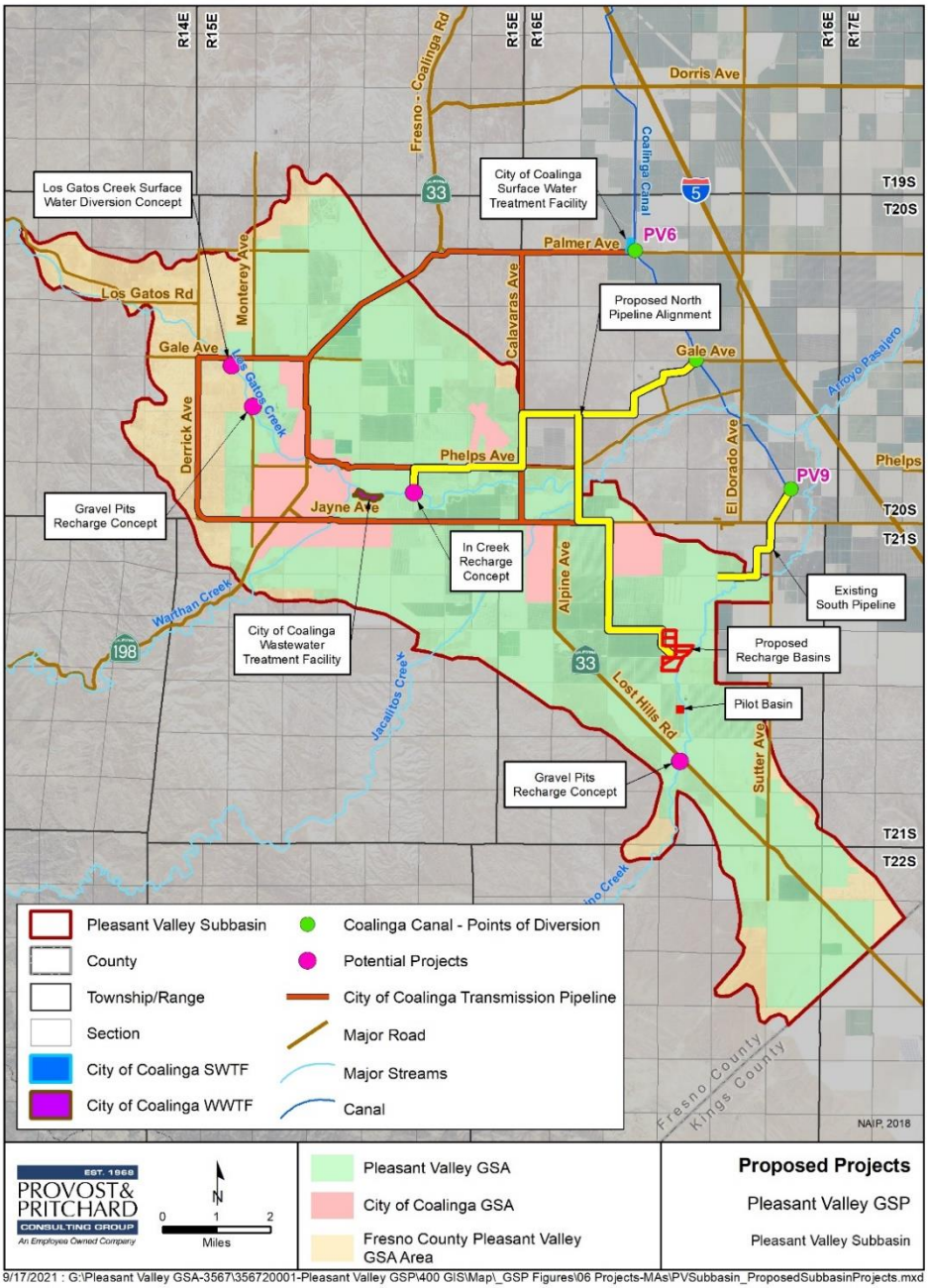


Figure 6-2 Proposed Projects

6.2.1 Project #PV 01 North Pipeline Project

Title:	**Name**	**ID: Name**

Project Type

Surface Water Recharge

Project Location

Pumps Station: Latitude: 36° 10' 51.73", Longitude: 120° 13' 33.49", Recharge Area Latitude: 36° 8' 25.59", Longitude: 120° 18' 35.57"

Implementing Agency

Pleasant Valley Water District-Funded by local Landowners

Description - 354.44**(a)**

The proposed project is for construction of a 60 cfs pump station and water pipeline and an ecological restoration for groundwater recharge near the city of Coalinga. The project has two parts: 1) Pumpstation and main pipeline from the Coalinga Canal to Los Gatos Creek, including diversion pipelines into the creek and 2) the construction of a recharge and restoration (R&R) area in and around Los Gatos Creek. Construction for the pump station and the pipeline is planned for the months of October to March, when the Coalinga Canal has minimal use, actual construction year will be based on coordination with the Bureau. The entire area of potential effect (APE) is 264 acres (90 for the main pipeline and 174 acres for the Los Gatos Creek area).

Measurable Objective(s) Addressed - 354.44**(b)(1)**

- ☒ Chronic Lowering of Groundwater Levels
- ☐ Seawater Intrusion – *not applicable*
- ☐ Land Subsidence
- ☒ Reduction of Groundwater Storage
- ☐ Degraded Water Quality
- ☐ Depletion of Interconnected Surface Water

Circumstances and Criteria for Implementation - 354.44**(b)(1)(a)**

The local landowners are in the process of funding this project. The project design and field investigation started in December of 2019.

Process to Provide Notice of Implementation - 354.44**(b)(1)(b)**

The project has been noticed at the GSA Board meetings.

Estimated Annual Project Benefits (AF/yr) - 354.44**(b)(2)**

It is estimated that the projects estimated average annual benefit is 12,000 AF/yr. Based on 100 diversion days. The project can be used throughout the year when water is available.

Permitting and Regulatory Requirements - 354.44**(b)(3)**

Army Corps (404), Stream Bed Alteration Agreement (1600), State Water Resources Control Board (401), USBR Licensing Agreement, Westlands Water District Conveyance Agreement. All these permits are estimated to be submitted by August of 2021.

Schedule - 354.44**(b)(4)** Anticipated Start & Completion, Timeframe to accrue benefits

Title: Name	**ID: Name**

The project started in December of 2019 and is currently in process.

Evaluation of Benefits - 354.44**(b)(5)**

Monitoring of Groundwater levels and pumpage; measurement of surface water impacted.

How will this be accomplished, and what is the water source? - 354.44**(b)(6)**

Each landowner will purchase water on the open market and be delivered when available.

Legal Authority - 354.44**(b)(7)**

Pleasant Valley Water District

Cost - 354.44**(b)(8)** Estimated Capital Cost

$14,000,000

Funding Source - 354.44**(b)(8)**

Local Landowners and Grant Funding when available

Management of Groundwater Extractions and Recharge - 354.44**(b)(9)**

This project will contribute to the replenishment of extracted groundwater, for later recovery. Policy for recovery will be set by the GSA Board.

Level of Uncertainty - 354.44**(d)**

To assess benefit to the Subbasin, the GSA will review groundwater level data.

6.2.2 Project #PV 02 South Pipeline Expansion and Extension Project

Title: **Name**	**ID: Name**

Project Type

Surface Water Recharge

Project Location

Pumps Station: Latitude: 36° 8' 46.95", Longitude: 120° 11' 39.20",

Implementing Agency

Pleasant Valley Water District

Description - 354.44**(a)**

This project proposes to expand the current pumping capacity out of the Coalinga canal, with an increase of 20 cfs and to connect to the existing 40 cfs booster pump station. The local landowners have been proactive and have funded and permitted the existing project. The project participants have permitted the physical improvements and it is anticipated that no additional permits will be required. This project also proposes to extend the pipeline an additional 2 miles as a lateral off one of the main lines to deliver water to areas in need.

Measurable Objective(s) Addressed - 354.44**(b)(1)**

- ☒ Chronic Lowering of Groundwater Levels
- ☐ Seawater Intrusion – *not applicable*
- ☐ Land Subsidence
- ☒ Reduction of Groundwater Storage
- ☐ Degraded Water Quality
- ☐ Depletion of Interconnected Surface Water

Circumstances and Criteria for Implementation - 354.44**(b)(1)(a)**

A board decision and compliance with the owners. When Grant funds become available.

Process to Provide Notice of Implementation - 354.44**(b)(1)(b)**

The project will be noticed at the GSA Board meetings, and on the website.

Estimated Annual Project Benefits (AF/yr) - 354.44**(b)(2)**

It is estimated that the projects estimated annual benefit is 4,000 AF/yr. Based on 100 diversion days. The project can be used throughout the year when water is available.

Permitting and Regulatory Requirements - 354.44**(b)(3)**

All these permits are in place under the previous project. No permits are anticipated. Coordination with Westlands Water District will be needed.

Schedule - 354.44**(b)(4)** Anticipated Start & Completion, Timeframe to accrue benefits

When Grant Funds become available. It is anticipated benefits will accrue in the year the project becomes online.

Evaluation of Benefits - 354.44**(b)(5)**

Monitoring of Groundwater levels and pumpage.

Title: Name	**ID: Name**

How will this be accomplished, and what is the water source? - 354.44**(b)(6)**

Each landowner will purchase water on the open market and deliver it to the area in need.

Legal Authority - 354.44**(b)(7)**

Pleasant Valley Water District

Cost - 354.44**(b)(8)** Estimated Capital Cost

$2,500,000

Funding Source - 354.44**(b)(8)**

Grant Funding when available and/or Land Based Assessments

Management of Groundwater Extractions and Recharge - 354.44**(b)(9)**

This project will contribute to the replenishment of groundwater.

Level of Uncertainty - 354.44**(d)**

There is a level of uncertainty associated with the effects of groundwater replenishment and fluctuations in groundwater elevations. The GSA will take this into account when developing the benefit to the Subbasin, through monitoring of the groundwater.

6.2.3 Project #PV 03 Los Gatos Creek Gravel Pits Recharge Project

Title: **Name**	**ID: Name**

Project Type

Surface Recharge

Project Location

Latitude: 36° 9' 27.17", Longitude: 120° 21' 55.6"

Implementing Agency

Pleasant Valley GSA

Description - 354.44**(a)**

The following groundwater recharge project is to capture seasonal surface water flows in Los Gatos Creek as it flows past Granite's Coalinga, California operations. The overall project would divert surface water flows from Los Gatos Creek into an existing gravel pit that is not currently being used just west of the airport runway. Evaluation of the potential for groundwater recharge via existing gravel pits at the Granite Construction Company Site in the City of Coalinga was evaluated in 2003 by Provost & Pritchard in the report, "Pleasant Valley Water District Groundwater Storage Pilot Project and Feasibility Study". In that report a groundwater recharge project at Granite was found to be a potentially viable project to provide water storage in the aquifer below Pleasant Valley for subsequent extraction. It includes a concrete turnout structure and a pipeline that feeds into the gravel pit. An estimated volume of 960 AF can be stored in the pit at any given time. The infiltration rate is predicted to be in the range between 2 and 4 feet per day.

Measurable Objective(s) Addressed - 354.44**(b)(1)**

- ☒ Chronic Lowering of Groundwater Levels
- ☐ Seawater Intrusion – *not applicable*
- ☐ Land Subsidence
- ☒ Reduction of Groundwater Storage
- ☐ Degraded Water Quality
- ☐ Depletion of Interconnected Surface Water

Circumstances and Criteria for Implementation - 354.44**(b)(1)(a)**

Implementation will begin when funds are available.

Process to Provide Notice of Implementation - 354.44**(b)(1)(b)**

Notice will be given at the GAS board meeting as well as posted on the website.

Estimated Annual Project Benefits (AF/yr) - 354.44**(b)(2)**

It is anticipated that during the wet part of the year that the volume can be refilled twice in a wet year and once in a normal year. A cycle of a wet, normal and two dry years are used for this analysis. Average estimated benefit is 720 AF/year.

Permitting and Regulatory Requirements - 354.44**(b)(3)**

Army Corps (404), Stream Bed Alteration Agreement (1600), State Water Resources Control Board (401), State Board Water Resource-Water Right Division

Schedule - 354.44**(b)(4)** Anticipated Start & Completion, Timeframe to accrue benefits

The project is anticipated to take 3 years to complete.

Evaluation of Benefits - 354.44**(b)(5)**

Title: Name	**ID: Name**

Groundwater monitoring will be used to evaluate the benefits.

How will this be accomplished, and what is the water source? - 354.44**(b)(6)**

Runoff water from Arroyo Pasajero Water Shed will be used. Once the project is constructed monitoring of storm events will be done to schedule the diversion.

Legal Authority - 354.44**(b)(7)**

Pleasant Valley GSA

Cost - 354.44**(b)(8)** Estimated Capital Cost

$2,100,000

Funding Source - 354.44**(b)(8)**

Grant Funding

Management of Groundwater Extractions and Recharge - 354.44**(b)(9)**

This project will contribute to the replenishment of extracted groundwater, for later recovery. Policy for recovery will be set by the GSA Board.

Level of Uncertainty - 354.44**(d)**

There is a level of uncertainty associated with the effects of groundwater replenishment and fluctuations in groundwater elevations. The GSA will take this into account when evaluating the benefit to the Subbasin, through monitoring of the groundwater.

6.2.4 Project #PV 04 Zapato Chino Creek Instream Recharge Project

Title: **Name**	**ID: Name**

Project Type

Groundwater Recharge

Project Location

Latitude: 36° 7' 7.01", Longitude: 120° 12' 55.20", Center of Zapato Chino Creek Stream within Subbasin

Implementing Agency

Pleasant Valley GSA

Description - 354.44**(a)**

This project will utilize various techniques to slow the instream flow and allow water ponding within the stream to increase the duration of water contact with the soil to increase infiltration amount within the stream. The flow in the channel is typically at a depth of 2-5 feet deep, while the channel is in places 10 15 feet deep. The goal would be to design swales within the channel to increase the depth of water but not impact or restrict the channel capacity during a high flow.

Measurable Objective(s) Addressed - 354.44**(b)(1)**

- ☒ Chronic Lowering of Groundwater Levels
- ☐ Seawater Intrusion – *not applicable*
- ☐ Land Subsidence
- ☒ Reduction of Groundwater Storage
- ☐ Degraded Water Quality
- ☐ Depletion of Interconnected Surface Water

Circumstances and Criteria for Implementation - 354.44**(b)(1)(a)**

Project will be implemented when Grant funds become available, and the GSA board make the decision to move forward.

Process to Provide Notice of Implementation - 354.44**(b)(1)(b)**

Notice will be given at the GAS board meeting as well as posted on the website.

Estimated Annual Project Benefits (AF/yr) - 354.44**(b)(2)**

The estimate annual project benefit is based on the stream running in three out of five years. The increased area expected to be 5 acres. The infiltration rate in the stream is in the range of 9 cubic feet per second to 15 cubic feet per second per mile and is expected to increase the duration of the flow to 12 hours for a total average yearly benefit in the range of 50 AF/yr to 75 AF/yr.

Permitting and Regulatory Requirements - 354.44**(b)(3)**

Army Corps (404), Stream Bed Alteration Agreement (1600), State Water Resources Control Board (401), State Board Water Resource-Water Right Division

Schedule - 354.44**(b)(4)** Anticipated Start & Completion, Timeframe to accrue benefits

The project is anticipated to take 3 years to complete.

Evaluation of Benefits - 354.44**(b)(5)**

Groundwater monitoring will be used to evaluate the benefits.

How will this be accomplished, and what is the water source? - 354.44**(b)(6)**

Title:	**Name**	**ID: Name**

The source of water will be run-of from the Arroyo Pasajero Watershed. Monitoring of storm events will be done. Once the project is constructed minimal preparation will be needed to implement the project.

Legal Authority - 354.44**(b)(7)**

Pleasant Valley GSA

Cost - 354.44**(b)(8)** Estimated Capital Cost

$1,600,000

Funding Source - 354.44**(b)(8)**

Grant Funding and Assessments

Management of Groundwater Extractions and Recharge - 354.44**(b)(9)**

This project will contribute to the replenishment of extracted groundwater, for later recovery. Policy for recovery will be set by the GSA Board.

Level of Uncertainty - 354.44**(d)**

There is a level of uncertainty associated with the effects of groundwater replenishment and fluctuations in groundwater elevations. The GSA will take this into account when developing the benefit to the Subbasin, through monitoring of the groundwater.

6.2.5 Project #PV 05 PV Water Banking Project – Section 31

Title: Name	**ID: Name**

Project Type

Groundwater Recharge/Groundwater Banking Project

Project Location

Latitude: 36° 8' 35.21", Longitude 120° 16' 29.80", Center of Section 31, 20S, 16E.

Implementing Agency

Pleasant Valley Water District

Description - 354.44**(a)**

Project is to construct 130 acres of infiltration basins on section 31 to recharge ground water to recover it in dry years. The infiltration rate in this area is estimated to range from 0.5 to 1.0 ft per day. Utilizing the North Pipeline to supply water to this project. The basins will be shallow in nature with 1 to 2 feet of cut material.

Measurable Objective(s) Addressed - 354.44**(b)(1)**

- ☒ Chronic Lowering of Groundwater Levels
- ☐ Seawater Intrusion – *not applicable*
- ☐ Land Subsidence
- ☒ Reduction of Groundwater Storage
- ☐ Degraded Water Quality
- ☐ Depletion of Interconnected Surface Water

Circumstances and Criteria for Implementation - 354.44**(b)(1)(a)**

Project will be implemented when Grant funds become available or through assessments from the board. The GSA board make the decision to move forward.

Process to Provide Notice of Implementation - 354.44**(b)(1)(b)**

Notice will be given at the GAS board meeting as well as posted on the website

Estimated Annual Project Benefits (AF/yr) - 354.44**(b)(2)**

The estimate annual project benefit is based on the water being available from an outside source 3 out 5 years and the project can be utilized for a minimum of 30 days in a normal water year. The average yearly benefit can range from 4,700 to 9,400 AF/yr.

Permitting and Regulatory Requirements - 354.44**(b)(3)**

Permits are underway for diversion from the Coalinga Canal. There are no permits required for this project.

Schedule - 354.44**(b)(4)** Anticipated Start & Completion, Timeframe to accrue benefits

This project is dependent on the construction of the North Pipeline Project. This project can be completed in 8 months.

Evaluation of Benefits - 354.44**(b)(5)**

Groundwater Monitoring

How will this be accomplished, and what is the water source? - 354.44**(b)(6)**

Open Market purchase of water.

Legal Authority - 354.44**(b)(7)**

Title: Name	**ID: Name**

Pleasant Valley Water District

Cost - 354.44**(b)(8)** Estimated Capital Cost

$4,100,000

Funding Source - 354.44**(b)(8)**

Grant or Assessments

Management of Groundwater Extractions and Recharge - 354.44**(b)(9)**

This project will contribute to the replenishment of extracted groundwater, for later recovery. Policy for recovery will be set by the GSA Board.

Level of Uncertainty - 354.44**(d)**

There is a level of uncertainty associated with the effects of groundwater replenishment and fluctuations in groundwater elevations. The GSA will take this into account when evaluating the benefit to the Subbasin, through monitoring of the groundwater.

6.3 Management Actions

Management actions, such as education and outreach, as well as initiating the development of rules and regulations and metering requirements may be initiated during the first year of implementation or may also be added to this GSP prior to adoption. Discussed herein is a suite of management actions the GSAs may consider during implementation of the GSP to achieve sustainability. Management actions identified below should be implemented before others can be achieved. The GSAs could implement some management actions Subbasin-wide, while the policies and programs for other management actions may be developed by a single GSA and be implemented by individual landowners. It is expected the GSAs will further develop and craft management actions in response to stakeholder input on parallel timelines and adapt to the estimated schedules according to the best available information and best available science at any given time used to support the management actions.

The legal authority and basis for the management actions described in this GSP are outlined in the SGMA and related provisions. GSA authorities include but are not limited to adopting policies, regulating groundwater extractions, imposing fees, monitoring, enforcing programs, and more. Though SGMA grants the GSAs these powers, the pursuit and implementation of the projects and management actions are the GSAs' responsibility. The GSAs must enforce their legal authority to the extent necessary to achieve sustainable groundwater management for all beneficial users within the Subbasin. In the development of the management actions, the GSAs intend to embody the lessons learned from other groundwater managed basins and strive to accomplish the following:

- Be transparent.
- Use a portfolio of approaches to achieve sustainability.
- Continued data collection.
- Devise a groundwater pumping limitation.
- Address concerns of funding GSP projects, programs, and management actions.
- Assure performance by penalties and enforcement.

The Management Actions that may be considered by the GSA are discussed below and grouped into the following general topics. These categories are referenced in the Management Action IDs.

A summary of conceptual potential management actions is included as **Table 6-3.**

Table 6-3 Conceptual Potential Management Actions

Management Action (b)(1)	Description (b)(1)	Measurable Objective (b)(1)	Circumstances of Implementation (b)(1)(A)	Quantification of Demand Reduction (b)(2)	Permitting & Regulatory Process (b)(3)	Status, Start, End, & Accrual of Benefits (b)(4)	Explanation of Benefits & Method of Evaluation (b)(5)	Explanation of Water Source & Reliability (b)(6)	Cost & Funding Options (b)(8)	Management of Groundwater Extraction & Recharge (b)(9)	Level of Uncertainty, 1=certain 5=uncertain (d)
Education of groundwater use per acre	The GSA may adopt a policy which provides groundwater extractors their approximate groundwater extraction on a per acre basis for multiple years as an education tool prior to any enforcement action.	The goal is to provide education and promote awareness of the GSA overdraft condition particularly for those groundwater extractors who do not have meters. The measurable objective is annual statements of groundwater extraction in acre-feet.	The GSA may consider multiple quantification methods for determination of groundwater extraction per acre. The policy may be implemented shortly after the adoption of the GSP and remain until GSA overdraft has ended or other programs are enacted.	This management action alone may not generate a quantifiable demand reduction. However, it is an educational tool which may change individual practices.	No permits or regulatory process is required for the GSA to adopt the policy.	The policy has not been drafted. It is expected to commence shortly after the adoption of the GSP and be completed within 1 year.	The expected benefits may mitigate overdraft by educating the public about the use of groundwater supplies. The method of evaluation may be achieved through multiple approaches.	The management action may be accomplished by GSA policy adoption. No external water source is used.	Estimated $_____ cost to draft and adopt policy.	Not applicable.	2
Pumping fees for groundwater allocation exceedances	The GSA may adopt a policy to levy tiered fees for pumping beyond the current groundwater pumping limits. The GSA may consider cease and desist orders for excessive abuse.	The goal is incentivize groundwater extractors to pump only up to their groundwater pumping limit per year. The measurable objective is the volume of groundwater extraction in acre-feet.	Prerequisites of levying fees may include the installation of a flowmeter or other quantification method for groundwater extractors (excluding de minimis extractors). The policy may be implemented within 5 years of GSP adoption and remain indefinitely. The policy fees and penalties may be reviewed by the GSA annually.	Estimated 0 - ? acre-feet per year. It may vary significantly depending upon levied fees, water year, and available transfers/banked credits.	No permits or regulatory process is required for the GSA to adopt the policy. The GSA has the power as outlined in the SGMA, and related provisions to adopt ordinances, levy financial penalties, and enforce policies.	The policy has not been drafted. It is expected to commence after the adoption of quantification method and be completed within 3 years. Refer to the (b)(2) for accrual of expected benefits.	The expected benefits may mitigate local overdraft by incentivizing groundwater extractors to pump groundwater supplies in a sustainable fashion. The ancillary benefits include additional funds for the GSA to invest in other projects and management actions. The method of evaluation may be reviewing the effective fee structures and number of fees levied.	The management action may be accomplished by GSA policy adoption and enforcement. No external water source is used.	Estimated $_____ cost to draft and adopt policy. Once adopted, the levied fees may fund other projects and management actions.	Chronic lowering of groundwater levels in cones of depression or depletion of supply during periods of drought may be offset by temporary increases in fee structure or groundwater pumping restrictions.	3
Agricultural land fallowing subsidies	The GSA may adopt a policy to incentive farmers to permanently fallow land.	The goal is to reduce irrigated acreage. The measurable objective is the acreage of fallowed land.	The policy could be considered at anytime, but recommended within 5 years of GSP adoption. The policy would remain indefinitely.	Estimated 0 - ? acre-feet per year.	No permits or regulatory process is required for the GSA to adopt the policy. The GSA has the power as outlined in the SGMA, and related provisions to adopt ordinances.	The policy has not been drafted. It is expected to commence shortly after the adoption of the GSP and be completed within 2 years. Refer to the (b)(2) for accrual of expected benefits.	The expected benefits of on-farm water conservation may reduce the overall groundwater pumping. The method of evaluation may consider the type of subsidy and number of participants.	The management action may be accomplished by GSA policy adoption. No external water source is used.	Estimated $_____ cost to draft and adopt policy. Ongoing subsidies may range from $_____ - _____annually.	Chronic lowering of groundwater levels or depletion of supply during periods of drought may be offset by a temporary increase in subsidies.	3
Require new developments (non-de minimis extractors) to prove sustainable water supplies.	The GSA may adopt a policy to require new developments or land development (non-de minimis extractors) to prove sustainable water supplies based upon the current GSA groundwater allocation. The GSA may review and comment on all new development environmental documents to ensure water balance and corresponding mitigation measures are implemented. Requires County support.	The goal is to ensure all new developments (non-de minimis extractors) do not exceed the current GSA groundwater allocation and groundwater supplies are consumed or retained within the GSA boundary. The measurable objective is proven new development water balance with the goal of 0.0 acre-feet groundwater overdraft /year.	The policy may be implemented shortly after the adoption of the GSP and remain until GSA overdraft has ended or indefinitely. The County must also support the policy.	Estimated 0 - ? acre-feet per year may be retained within the GSA boundary.	The regulatory process may require cooperation from the County/City to ensure the GSA reviewed and commented on the environmental documents prior to County/City approval. The GSA has the power as outlined in the SGMA, and related provisions to adopt ordinances.	The policy has not been drafted. It is expected to commence shortly after the adoption of the GSP and be completed within 3 years. Refer to the (b)(2) for accrual of expected benefits.	The expected benefits may mitigate overdraft by ensuring new developments utilize groundwater supplies in accordance with current GSA groundwater allocations and groundwater supplies are consumed or retained within the GSA boundary. The method of evaluation may be quantifying the number of new developments that are approved without GSA comment/approval.	The management action may be accomplished by GSA policy adoption and coordination with the County/City. The GSA may request County/City development procedures to include the circulation of environmental documents and approval from GSA prior to County/City approval. No external water source is used.	Estimated $_____ cost to draft and adopt policy, plus an estimated $_____ cost to coordinate development approval changes at the County/City.	Not applicable.	2

Note: The following sections were noted below because they apply to all management actions with very little variance.

Public Notice (b)(1)(B): The GSA may provide public notice in multiple formats and platforms. Adopted policies may reside in GSA Board Meeting minutes and GSA Policy Manual available on the GSA website. Electronic notice may be provided to any person who requests email notifications. The GSA Board may hold regular monthly meetings and annual education workshops.

Legal Authority (b)(7): The GSA has the power as outlined in the SGMA, and related provisions to adopt ordinances, levy financial penalties, and enforce programs.

Cost & Funding Options (b)(8): GSA administrative and operating costs may be funded through various financial avenues discussed further in GSP Chapter 7.2.

Table 6-4 List of Potential Management Actions

Project	Title	Est Recharge (af)	Est Reduction (af)	Estimated Cost ($)	Estimated Cost ($/af)[1]
Priority 1					
5	Install Flowmeters		-	$350,000[3]	NA
6	Rules and Regulations		-	$20,000	NA
7	Water Recharge and Banking Policy		-	$20,000	NA
8	Transfer Policy		-	$20,000	NA
9	Pumping limits Policy		20,000	$50,000	NA
10	Fill Data Gaps			$100,000	NA
	SubTotal				
Priority 2					

Notes – 1 – costs capitalized at 6% for 30 years. Cost does not include water supply.
2 – Costs are 2016 based dollars
3- Assumes 35 wells at $10,000 per well

From discussions with local landowners the following management actions are being considered:

1. Flow measurement
    a. Surface water diversions
    b. Groundwater production wells
2. Rules and Regulations
3. Establishment of pumping limits by year
4. Surface water Recharge and Banking
5. Water transfers
6. Groundwater Transfers outside of basin
7. Limitation on future development without supply.

These policy or management actions are listed as **Table 6-4**. Other management actions that could be considered are:

8. Registration of Extraction Facilities
9. Installation of Sounding Tubes and Water Quality Sample Ports
10. Groundwater Carryover Structure
11. Incentives
12. Pumping Restrictions During Droughts

7 Plan Implementation

Plan implementation will officially commence with the adoption of this GSP and will continue until January 2042. The GSAs within the Subbasin will continue to build upon existing efforts regarding public engagement and securing additional funding to support actions necessary for sustainably managing groundwater in the Plan Area. During a five-year period between the inaugural GSP submission and the next interim milestone, and while DWR has up to two years to review the GSP, the GSAs anticipate a focus on project implementation, data collection, and coordinating with stakeholders and other beneficial users. Since most of the groundwater pumping occurs within the PVGSA, it is expected that most of the actions will be taken by this GSA. With this understanding, the following sections relate specifically to the PVGSA.

7.1 Estimate of GSP Implementation Costs

PVGSA and the Pleasant Valley Water District will experience two types of implementation costs – ongoing administrative expenses and project costs. Ongoing administrative expenses are anticipated to initially include fiscal agent and legal counsel expenses, audits, annual data collection and reporting, outreach, consultant expenses for preparing funding reports and updating the GSP. Although project implementation costs are likely to be excluded from PVGSA-related expenses to landowners and possibly negligible during the first interim GSP milestone period, a future scenario may require PVGSA to support capital costs for improvement of the monitoring network or another type of project with a collective benefit to local landowners. Total costs for this initial interim five-year period are estimated to vary from $150,000 to $373,000 per annum and will be presented to PVGSA's Board of Directors for consideration and approval annually. Costs associated with implementing the GSP will require PVGSA to pursue funding mechanisms such as Proposition 26 or Proposition 218 as well as water use charges, in order to provide a steady stream of revenue for a specific period. PVGSA has not determined which funding mechanism will be utilized to provide future revenue, at a minimum for the first interim milestone period (five years).

Regulation Requirements:
§ 354.6. Agency Information
When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:
(e) An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.

7.2 Identify Funding Alternatives

Administrative Expenses. PVGSA must consider other funding mechanisms, such as through Propositions 26 or Proposition 218, to secure funds for the next five years leading up to the first interim milestone. Projected costs and expenses include such items as administrative support, GSP update and implementation, annual SGMA reporting, stakeholder outreach and engagement, consulting firms and legal counsel for SGMA compliance, etc., and estimated costs can be found in **Table 7-1** below. Given that project costs are not the current responsibility of PVGSA, the proposed budget included herein will be the basis for anticipated costs incurred during this first five-year interim milestone period. Annually, PVGSA Board of Directors will consider budget needs to ensure fiscal solvency with the understanding that adjustments may be required if budget assumptions do not hold true.

Table 7-1 Administrative Expenses

Item	2022	2023	2024	2025	2026
Administration	$5,000	$10,000	$10,000	$10,000	$10,000
Groundwater Monitoring and Measurement	$10,000	$25,000	$25,000	$25,000	$25,000
Legal	$2,000	$10,000	$10,000	$10,000	$10,000
Annual Reporting	$75,000	$75,000	$75,000	$75,000	$75,000
Coordination with adjacent Basins	$2,000	$4,000	$4,000	$3,000	$3,000
Plan Update				$250,000	$250,000
Totals	$94,000	$124,000	$124,000	$373,000	$373,000

Project Costs. At this time, project costs are not the responsibility of PVGSA and will be borne solely by a project proponent. Such projects may be funded by existing capital improvement budgets, grant funding, propositions (26 or 218), low interest loans, or other methods. Each project will be required to develop and secure funding needed to ensure their sustainability by 2042. In total, projects described in **Section 6** have an estimated cost of over $35 million. Member agencies will re-evaluate their respective SGMA efforts periodically to determine whether an adjustment is necessary in their project implementation plan.

Table 7-2 Project Costs

Item	2022	2023	2024	2025	2026
North Canal Pipeline	$14,000,000				
South Canal Pipeline Exp			$2,500,000		
Los Gatos Gravel Pits		$2,100,000		$400,000	
Meter Policy	$350,000				
Rules and Regulations	$20,000				
Transfer Policy	$20,000				
Pumping limits Policy	$50,000				
Monitor Well Installation	$100,000				
Surface water Purchase		$1,500,000	$1,500,000	$1,500,000	$3,000,000
Totals	$14,540,000	$3,600,000	$4,000,000	$1,900,000	$3,000,000

[1]Assumes a rate of $250-500/AF

Grant Funding. PVGSA recognizes that grants provide a key source of funding that can be utilized to offset fiscal burdens to stakeholders and beneficial users. While the foregoing is true, PVGSA also knows that such funds should not be factored into any budget projections because of the time lag between reimbursement and date expense is incurred. PVGSA also recognizes that grant funding is not guaranteed and will perform long-term financial planning accordingly.

Regulation Requirements:
§ 354.6. Agency Information
When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:
(e) An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.

7.3 Schedule for Implementation

Projects were identified in **Section 6** and summarized in **Table 6-1**. The Priority 1 projects and management actions are planned to be completed during the first five-year period and there are hopes to complete a number of the management actions and the north pipeline within the first year of adoption of the plan as shown in table 7.2.

Regulation Requirements:
§ 350.4. General Principles
Consistent with the State's interest in groundwater sustainability through local management, the following general principles shall guide the Department in the implementation of these regulations.
(f) A Plan will be evaluated, and its implementation assessed, consistent with the objective that a basin be sustainably managed within 20 years of Plan implementation without adversely affecting the ability of an adjacent basin to implement its Plan or achieve and maintain its sustainability goal over the planning and implementation horizon.

7.3.1 Pleasant Valley GSA –

This GSA is expected to implement many of the projects and management actions of the plan. The GSA may take the initiative, work in coordination with the Pleasant Valley Water District and/or the other GSAs in the Subbasin, or work with individual landowners.

7.3.2 City of Coalinga GSA –

The City imports surface water for its customers as well as the prisons located in the Subbasin. Additionally, the City and prisons both treat wastewater. Through cooperative agreements some of this wastewater is reused for agricultural production and some is recharged back to the aquifer. There may be opportunity to increase the infiltration of the existing WWTP basins as well as use of storm basins within the City for intentional recharge activities when not in use to control storm water. These projects will be implemented, as needed, for groundwater sustainability.

7.3.3 County of Fresno GSA - Pleasant Valley –

The County GSA properties consist of a rural residential enclave in the southern margins of the Subbasin as well as the current oil production lands in the western most portion of the basin. There is little existing groundwater demand in these areas, and it is expected that the actions for this GSA will be minimal.

7.4 Data Management System

Regulation Requirements:
§ 352.6. Data Management System
Each Agency shall develop and maintain a data management system that is capable of storing and reporting information relevant to the development or implementation of the Plan and monitoring of the basin.

The GSAs in the Subbasin are coordinating with respect to development of a data management system (DMS) capable of storing and aggregating information necessary for annual reporting to DWR through this effort of developing the GSP. Since the basin is relatively small, the DMS is planning to use a combination of spreadsheets as well as data logger data summarized in spreadsheets that will facilitate standardization of collection of basin-wide data and allow for data entry by PVGSA. Below is a list of basic elements included in the DMS:

- Well location and construction information (where applicable)
- Water level readings and hydrographs, including water year type
- Groundwater level elevation contours and direction of groundwater flow map
- Estimated groundwater extraction by category
- Total water use by source
- Estimate of groundwater storage change, including map and tables of estimation
- Graph showing annual groundwater use and cumulative storage change with each water year type

This DMS will also utilize GIS information with basic data layers for referencing typical information such as GSA boundaries, topography, land use, streets, aerial imagery, subsurface geology, etc.

Figure 7-1 Data Management System Screenshot

To be included upon system completion.

7.5 Annual Reporting

Regulation Requirements:

§ 356.2. Annual Reports

Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:

(a) General information, including an executive summary and a location map depicting the basin covered by the report.

(b) A detailed description and graphical representation of the following conditions of the basin managed in the Plan:

(1) Groundwater elevation data from monitoring wells identified in the monitoring network shall be analyzed and displayed as follows:

(a) Groundwater elevation contour maps for each principal aquifer in the basin illustrating, at a minimum, the seasonal high and seasonal low groundwater conditions.

(b) Hydrographs of groundwater elevations and water year type using historical data to the greatest extent available, including from January 1, 2015, to current reporting year.

(2) Groundwater extraction for the preceding water year. Data shall be collected using the best available measurement methods and shall be presented in a table that summarizes groundwater extractions by water use sector, and identifies the method of measurement (direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.

(3) Surface water supply used or available for use, for groundwater recharge or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water year.

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

(5) Change in groundwater in storage shall include the following:

(a) Change in groundwater in storage maps for each principal aquifer in the basin. **(b)** A graph depicting water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the basin based on historical data to the greatest extent available, including from January 1, 2015, to the current reporting year.

(c) A description of progress towards implementing the Plan, including achieving interim milestones, and implementation of projects or management actions since the previous annual report.

PVGSA will be the Basin Coordinator and comply with required information pursuant to SGMA regulation 356.2. The type of information that will be included in these annual reports, due April 1st each year, is i) groundwater levels, ii) estimated extraction volumes, iii) surface and total water use, iv) groundwater storage change, and v) progress of GSP implementation within the Subbasin. **Table 7-3** presents an outline the Subbasin will follow for its inaugural annual report. The anticipated schedule for these annual reports is as follows:

- December 31 GSAs provide required GSA specific information.
- February 28 Draft annual report completed.
- March GSAs review and approve annual report.
- April 1 Basin Coordinator completes submittal of annual report to DWR.

Table 7-3 Potential Outline for Pleasant Valley Subbasin Annual Reports

Chapter/Subchapter	Title
Chapter 1	Introduction
Chapter 2	Land Use and Surface Water Supplies
Chapter 3	Groundwater Pumping
Chapter 4	Sustainable Management Criteria
4.1	Sustainability Goal
4.2	Groundwater Levels
4.3	Groundwater Storage
4.4	Groundwater Quality
4.5	Land Subsidence
4.6	Surface to Groundwater Interconnection
Chapter 5	Monitoring Network Changes
Chapter 6	Groundwater Projects and Management Action Status

7.6 Periodic Evaluations

Regulation Requirements:

§ 356.4. Periodic Evaluation by Agency

Each Agency shall evaluate its Plan at least every five years and whenever the Plan is amended, and provide a written assessment to the Department. The assessment shall describe whether the Plan implementation, including implementation of projects and management actions, are meeting the sustainability goal in the basin, and shall include the following:

(a) A description of current groundwater conditions for each applicable sustainability indicator relative to measurable objectives, interim milestones and minimum thresholds.

(b) A description of the implementation of any projects or management actions, and the effect on groundwater conditions resulting from those projects or management actions.

(c) Elements of the Plan, including the basin setting, management areas, or the identification of undesirable results and the setting of minimum thresholds and measurable objectives, shall be reconsidered and revisions proposed, if necessary.

(d) An evaluation of the basin setting in light of significant new information or changes in water use, and an explanation of any significant changes. If the Agency's evaluation shows that the basin is experiencing overdraft conditions, the Agency shall include an assessment of measures to mitigate that overdraft.

(e) 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 does not satisfy the requirements of Sections 352.4 and 354.34**(c)**. The description shall include the following:

(1) An assessment of monitoring network function with an analysis of data collected to date, identification of data gaps, and the actions necessary to improve the monitoring network, consistent with the requirements of Section 354.38.

(2) If the Agency identifies data gaps, the Plan shall describe a program for the acquisition of additional data sources, including an estimate of the timing of that acquisition, and for incorporation of newly obtained information into the Plan.

(3) The Plan shall prioritize the installation of new data collection facilities and analysis of new data based on the needs of the basin.

(f) A description of significant new information that has been made available since Plan adoption or amendment, or the last five-year assessment. The description shall also include whether new information warrants changes to any aspect of the Plan, including the evaluation of the basin setting, measurable objectives, minimum thresholds, or the criteria defining undesirable results.

(g) A description of relevant actions taken by the Agency, including a summary of regulations or ordinances related to the Plan.

(h) Information describing any enforcement or legal actions taken by the Agency in furtherance of the sustainability goal for the basin.

(i) A description of completed or proposed Plan amendments.

(j) Where appropriate, a summary of coordination that occurred between multiple Agencies in a single basin, Agencies in hydrologically connected basins, and land use agencies.

(k) Other information the Agency deems appropriate, along with any information required by the Department to conduct a periodic review as required by Water Code Section 10733.

Sustainable management of groundwater, by its very nature, is a dynamic effort resulting in new information and data that requires periodic evaluations of actions relative to sustainability goals. PVGSA will periodically evaluate this GSP pursuant to SGMA §356.4. Results of these evaluations will be documented in assessments to DWR and are anticipated to occur concurrently with the five-year updates to the GSP. Assessments may be issued more frequently if PVGSA determines an action is necessary, because failure to modify the current course of action would result in not achieving a sustainability goal.

8 References and Technical Studies (Reg. § 354.4)

Regulation Requirements:
§ 354.4. General Information
Each Plan shall include the following general information:
(a) An executive summary written in plain language that provides an overview of the Plan and description of groundwater conditions in the basin.
(b) A list of references and technical studies relied upon by the Agency in developing the Plan. Each Agency shall provide to the Department electronic copies of reports and other documents and materials cited as references that are not generally available to the public. Note: Authority cited: Section 10733.2, Water Code.
Reference: Sections 10733.2 and 10733.4, Water Code.

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Appendices

Appendix A – Memorandums of Understanding Between GSAs

Appendix B – Stakeholder Communication and Engagement Plan

Appendix C – Stakeholder Comments and Responses

Appendix D – GSP Checklist—Elements of the Plan

Appendix E – KDSA Report 2020

Appendix F – Hydrographs Depicting Long-Term Groundwater Elevations

Appendix G – Hydrographs Based on Transducer Measurements

Appendix H – Reporting Standards Section 352.4

Appendix I – Public Comments and Response Summary

Appendix J – PVWD Contract for Water Supplies 2021

Appendix A – Memorandums of Understanding Between GSAs

MEMORANDUM OF UNDERSTANDING BETWEEN THE CITY OF COALINGA GROUNDWATER SUSTAINABILITY AGENCY AND THE PLEASANT VALLEY GROUNDWATER SUSTAINABILITY AGENCY WITH RESPECT TO IMPLEMENTATION OF THE SUSTAINABLE GROUNDWATER MANAGEMENT ACT

THIS MEMORANDUM OF UNDERSTANDING ("MOU") is made and effective as of January 2, 2020, by and between the CITY OF COALINGA GROUNDWATER SUSTAINABILITY AGENCY ("City") and PLEASANT VALLEY GROUNDWATER SUSTAINABILITY AGENCY ("PVGSA"). The City and PVGSA may be collectively referred to herein as the "Parties," or singularly as a "Party."

RECITALS

A. On September 16, 2014, the Governor of the State of California signed into law Senate Bills 1168 and 1319, and Assembly Bill 1739 collectively, the Sustainable Groundwater Management Act ("SGMA"), which is codified at Water Code Sections 10720 *et seq.*; and

B. SGMA requires that California groundwater basins and subbasins be managed by a Groundwater Sustainability Agency ("GSA") or multiple GSAs, and that such management be implemented pursuant to an approved Groundwater Sustainability Plan ("GSP") or multiple coordinated GSPs; and

C. California Water Code Section 10723.8, subdivision (c), prohibits the recognition of any entity as an exclusive GSA if the entity's proposed GSA management area overlaps the proposed GSA management area of another entity, subject to certain procedural requirements; and

D. PVGSA and the City have elected to serve as exclusive GSAs for their respective areas within the Pleasant Valley Subbasin of the San Joaquin Valley Basin (Basin No. 5-022.10 in the Department of Water Resources' Bulletin No. 118).

The Parties therefore agree as follows:

1. **Objectives.** The objectives of the Parties in entering into this MOU are as follows:

(a) To achieve sustainable groundwater management pursuant to SGMA in the Pleasant Valley Subbasin that is identified in the attached **Exhibit "A"**.

(b) To work cooperatively with each other and with adjacent GSAs in the Pleasant Valley Subbasin to prepare a single GSP that covers the Pleasant Valley Subbasin.

(c) To work cooperatively with each other and with adjacent GSAs in the Pleasant Valley Subbasin and in adjacent subbasins to achieve sustainable groundwater management in the Pleasant Valley Subbasin.

2. **Precedence of City's Land Use Planning Authority.** PVGSA agrees that its operations as the PVGSA, and the GSP adopted by the PVGSA, the City and the other GSAs in the subbasin, will not abrogate the City's general plan or conflict with the City's exercise of its land use planning authority; provided, that the City's general plan and the City's exercise of its land use planning authority comply with all applicable laws, statutes, and regulations.

3. **Coordination Framework.** Each Party to this MOU agrees, in developing the GSP, and in its respective implementation of the GSP, to consider the interests of the other Party, including but not limited to the City's general plan. In order to prevent conflicts between the GSP and the City's general plan and between PVGSA's operations as the PVGSA and the City's exercise of its land use planning authority, the City shall have opportunities to provide, and PVGSA shall consider, advisory input in the development and implementation of the GSP. The Director of the City's Department of Public Works and Planning shall designate a contact person (Designated Contact Person) to whom PVGSA shall provide written notices of opportunities to participate in SGMA implementation.

No fewer than 90 days before adopting or modifying the GSP or policies or procedures for the exercise of GSA powers, PVGSA shall provide written notice to the Designated Contact Person. Within 30 days of receiving such notice, the Designated Contact Person may request consultation with PVGSA's representative. Prior to the adoption or modification of the GSP or policies or procedures for the exercise of GSA powers, PVGSA shall consider any comments or recommendations provided by the Designated Contact Person for the City, to achieve the goals of this MOU.

No fewer than 90 days prior to issuing, adopting, modifying, or approving any ordinance, policy, plan, or permit, or taking any other action related to groundwater resources within the Pleasant Valley basin, the City shall provide written notice to PVGSA. Within 30 days of receiving such notice, PVGSA may request a mandatory consultation with the City. Prior to taking any groundwater-related action, the City shall consider any comments or recommendations provided by PVGSA.

4. **Finances.** Each of the Parties to this MOU shall bear its own costs of implementing SGMA, except as follows:

(a) The City shall provide such assistance and support as it is able to provide at current staffing levels in applying for grant funding related to SGMA implementation when so requested by the PVGSA. The ability of the City to provide such assistance and support shall be determined exclusively by the City.

5. **Notices.** All notices required or permitted by this MOU or applicable law shall be in writing and may be delivered in person (by hand or by courier) or may be sent by regular, certified, or registered mail or U.S. Postal Service Express Mail, with postage prepaid, or by facsimile transmission, or by electronic transmission (email) and shall be deemed sufficiently given if served in a manner specified in this Section 5. The addresses and addressees noted below are that Party's designated address and addressee for delivery or mailing of notices.

To Pleasant Valley Water District:	Pleasant Valley Water District c/o District President Post Office Box 468 Coalinga, CA 93210-0468
To City of Coalinga GSA:	City of Coalinga Department of Public Works and Planning c/o Marissa Tejo, City Manager 155 W. Durian Ave. Coalinga, CA 93210 Telephone: (559) 935-1533

Either Party may, by written notice to the other, specify a different address for notice. Any notice sent by registered or certified mail, return receipt requested, shall be deemed given on the date of delivery shown on the receipt card, or if no delivery date is shown, three (3) days after the postmark date. If sent by regular mail, the notice shall be deemed given forty-eight (48) hours after it is addressed as required in this section and mailed with postage prepaid. Notices delivered by United States Express Mail or overnight courier that guarantee next day delivery shall be deemed given twenty-four (24) hours after delivery to the Postal Service or courier. Notices transmitted by facsimile transmission or similar means (including email) shall be deemed delivered upon telephone or similar confirmation of delivery (conformation report from fax machine is sufficient), provided a copy is also delivered via personal delivery or mail. If notice is received after 4:00 p.m. or on a Saturday, Sunday or legal holiday, it shall be deemed received on the next business day.

6. **Indemnification.** As the City does not vote on the actions of the PVGSA, PVGSA shall hold harmless and indemnify the City from and against any liability, claims, actions, costs, damages or losses of any kind, including but not limited to death or injury to any person and/or damage to property, arising out of the implementation of the GSP by PVGSA. PVGSA shall not be obligated to indemnify the City where any loss, damage, injury, liability, or claim is a result of the sole negligence or willful misconduct of the City. Additionally, the City shall hold harmless and indemnify the PVGSA from and against any liability, claims, actions, costs, damages or losses of any kind, including but not limited to death or injury to any person and/or damage to property, arising out of the implementation of the GSP by the City. The City shall not be obligated to indemnify PVGSA where any loss, damage, injury, liability, or claim is a result of the sole negligence or willful misconduct of PVGSA.

The foregoing indemnification obligation shall continue beyond the term of this MOU as to any acts or omissions occurring before or under this MOU or any extension of this MOU.

7. **Compliance with Laws.** In any action taken pursuant to this MOU, PVGSA and the City shall comply with all applicable statutes, laws, and regulations, specifically including, but not limited to, SGMA and its implementing regulations, as they now exist or as they may be amended or promulgated from time to time.

To the extent that this MOU conflicts with or does not accurately reflect any applicable statutes, laws, or regulations now existing or as amended or promulgated from time to time, the laws, statutes, and regulations shall govern.

To the extent that any applicable statutes, laws, or regulations are amended or newly promulgated in such a manner that causes this MOU to conflict with or no longer accurately reflect such statutes, laws, or regulations, this MOU shall be modified, in writing, by all Parties, in order to comport with the newly amended or promulgated statutes, laws, or regulations.

8. **Entire Agreement.** This MOU and items incorporated herein contain all of the agreements of the Parties with respect to the matters contained herein, and no prior agreement or understanding pertaining to any such matter shall be effective for any purpose.

9. **Amendments.** No provisions of this MOU may be amended or modified in any manner whatsoever except by an agreement in writing duly authorized by representatives of all Parties.

10. **No Assignment.** The rights and obligations of the Parties to this MOU may not be assigned or delegated, and any attempt to assign or delegate such rights or duties in contravention of this section shall be null and void.

11. **Binding Effect.** This MOU shall apply to and bind successors, assignees, contractors, subcontractors, transferees, agents, employees, and representatives of the respective Parties hereto.

12. **Governing Law.** This MOU and all documents provided for herein and the rights and obligations of the Parties hereto shall be governed in all respects, including validity, interpretation and effect, by the laws of the State of California (without giving effect to any choice of law principles).

13. **Waiver.** The failure of any Party to insist on strict compliance with any provision of this MOU shall not be considered a waiver of any right to do so, whether for that breach or any subsequent breach. The acceptance by any Party of either performance or payment shall not be considered to be a waiver of any preceding breach of the MOU by any other Party.

14. **Severability.** If any term or provision of this MOU is, to any extent, held invalid or unenforceable, the remainder of this MOU shall not be affected.

15. **Headings.** The subject headings of the sections of this MOU are included for purposes of convenience only and shall not affect the construction or interpretation of any of the provisions herein.

16. **Counterparts.** This MOU may be executed in any number of counterparts, each of which shall be an original, but all of which shall constitute one and the same instrument.

IN WITNESS WHEREOF, the Parties have executed this MOU as of the day and year first above written.

PLEASANT VALLEY GROUNDWATER SUSTAINABILITY AGENCY

By: _____

Name: Bradford E. Gleason

Title: Board President

CITY OF COALINGA GROUNDWATER SUSTAINABILITY AGENCY

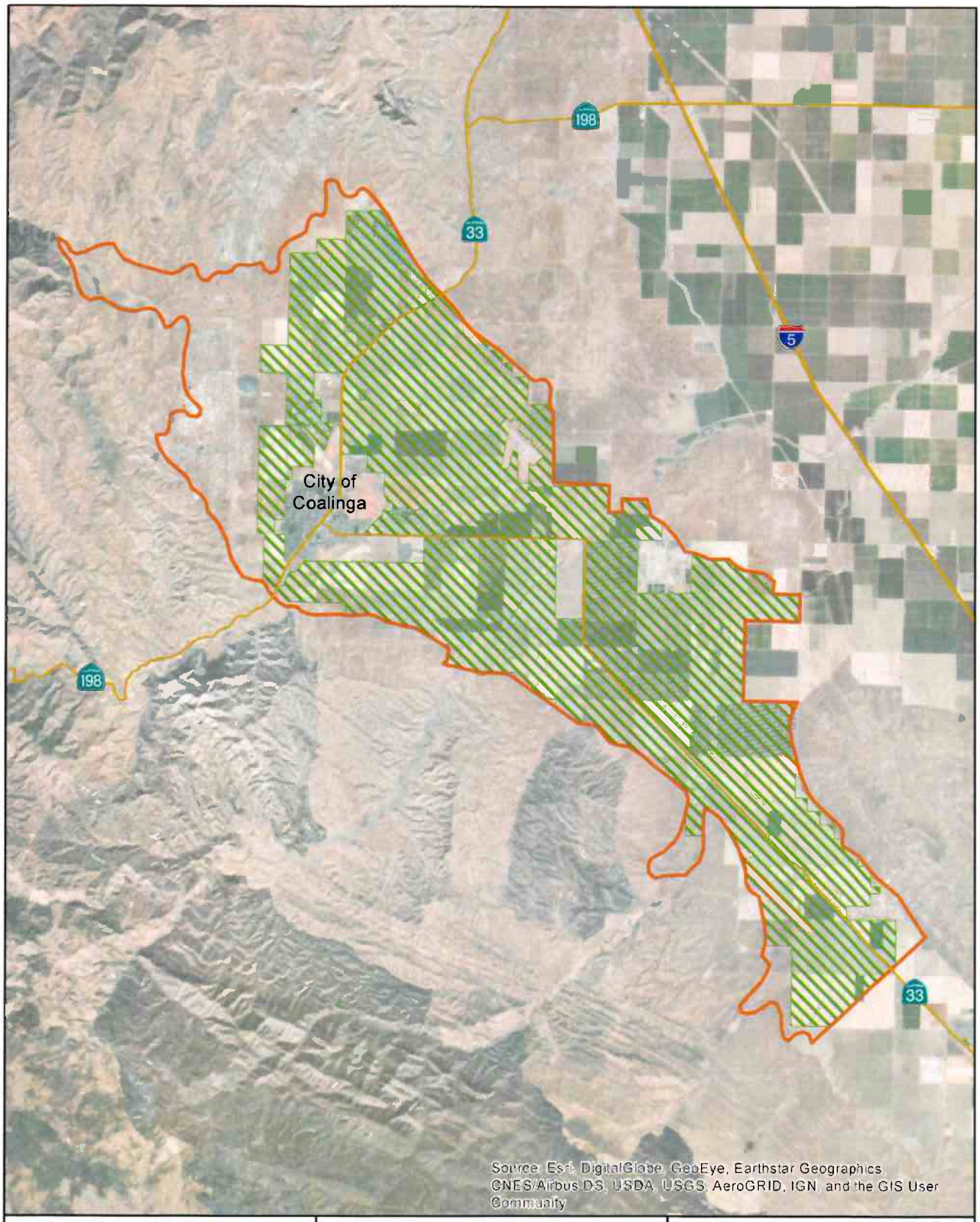
By: _____

Ron Lander, Mayor and Chairman, City of Coalinga Groundwater Sustainability Agency

ATTEST:
Shannon Jensen, City Clerk
City of Coalinga, State of California

By: _____

City Clerk



EST 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company

N

0 1 2
Miles

Major Road

Pleasant Valley Water District GSA - 34,640 ac

Pleasant Valley Subbasin - 48,216 ac

Pleasant Valley Water District Groundwater Sustainability Agency

7/15/2019 : G:\Pleasant Valley WD - 1103\110319001-2019 On Going\GIS\Map\Pleasant Valley WD GSA.mxd

County of Fresno

Board of Supervisors

Minute Order

Hall of Records, Room 301
2281 Tulare Street
Fresno, California
93721-2198
Telephone: (559) 600-3529
Toll Free: 1-800-742-1011
www.co.fresno.ca.us

February 25, 2020

Present: 5 - Chairman Buddy Mendes, Vice Chairman Steve Brandau, Supervisor Nathan Magsig, Supervisor Brian Pacheco, and Supervisor Sal Quintero

Agenda No. 50. **Public Works & Planning** File ID: 19-1622

Re: Authorize the Chairman to execute a Memorandum of Understanding with the Pleasant Valley Groundwater Sustainability Agency for implementation of the Sustainable Groundwater Management Act in the Pleasant Valley Groundwater Subbasin

APPROVED AS RECOMMENDED

Ayes: 5 - Mendes, Brandau, Magsig, Pacheco, and Quintero

Agreement No. 20-081

MEMORANDUM OF UNDERSTANDING BETWEEN THE COUNTY OF FRESNO AND PLEASANT VALLEY GROUNDWATER SUSTAINABILITY AGENCY WITH RESPECT TO IMPLEMENTATION OF THE SUSTAINABLE GROUNDWATER MANAGEMENT ACT

THIS MEMORANDUM OF UNDERSTANDING ("MOU") is made and effective as of February 25, 2020, by and between the COUNTY OF FRESNO ("County") and PLEASANT VALLEY WATER DISTRICT (also known, for purposes of the Sustainable Groundwater Management Act, as PLEASANT VALLEY GROUNDWATER SUSTAINABILITY AGENCY) ("PVWD" or "PVGSA"). The County and PVGSA may be collectively referred to herein as the "Parties," or singularly as a "Party."

RECITALS

A. On September 16, 2014, the Governor of the State of California signed into law Senate Bills 1168 and 1319, and Assembly Bill 1739 collectively, the Sustainable Groundwater Management Act ("SGMA"), which is codified at Water Code Sections 10720 *et seq.*; and

B. SGMA requires that California groundwater basins and subbasins be managed by a Groundwater Sustainability Agency ("GSA") or multiple GSAs, and that such management be implemented pursuant to an approved Groundwater Sustainability Plan ("GSP") or multiple coordinated GSPs; and

C. California Water Code Section 10723.8, subdivision (c), prohibits the recognition of any entity as an exclusive GSA if the entity's proposed GSA management area overlaps the proposed GSA management area of another entity, subject to certain procedural requirements; and

D. PVGSA and the County have elected to serve as exclusive GSAs for their respective areas within the Pleasant Valley Subbasin of the San Joaquin Valley Basin (Basin No. 5-022.10 in the Department of Water Resources' Bulletin 118.

The Parties therefore agree as follows:

1. **Objectives.** The objectives of the Parties in entering into this MOU are as follows:

(a) To achieve sustainable groundwater management pursuant to SGMA in the Pleasant Valley Subbasin that is identified in the attached **Exhibit "A"**.

(b) To work cooperatively with each other and with adjacent GSAs in the Pleasant Valley Subbasin to prepare a single GSP that covers the Pleasant Valley Subbasin.

(c) To work cooperatively with each other and with adjacent GSAs in the Pleasant Valley Subbasin and in adjacent subbasins to achieve sustainable groundwater management in the Pleasant Valley Subbasin.

2. **Precedence of County's Land Use Planning Authority.** PVGSA agrees that its operations as the PVGSA, and the GSP adopted by the PVGSA, the County and the other GSAs in the subbasin, will not abrogate the County's general plan or conflict with the County's exercise of its land use planning authority; provided, that the County's general plan and the County's exercise of its land use planning authority comply with all applicable laws, statutes, and regulations.

3. **Coordination Framework.** Each Party to this MOU agree, in developing the GSP, and in its respective implementation of the GSP, to consider the interests of the other Party, including but not limited to the County's general plan. In order to prevent conflicts between the GSP and the County's general plan and between PVGSA's operations as the PVGSA and the County's exercise of its land use planning authority, the County shall have opportunities to provide, and PVGSA shall consider, advisory input in the development and implementation of the GSP. The Director of the County's Department of Public Works and Planning shall designate a contact person (Designated Contact Person) to whom PVGSA shall provide written notices of opportunities to participate in SGMA implementation.

No fewer than 90 days before adopting or modifying the GSP or policies or procedures for the exercise of GSA powers, PVGSA shall provide written notice to the Designated Contact Person. Within 30 days of receiving such notice, the Designated Contact Person may request consultation with PVGSA's representative. Prior to the adoption or modification of the GSP or policies or procedures for the exercise of GSA powers, PVGSA shall consider any comments or recommendations provided by the Designated Contact Person for the County, to achieve the goals of this MOU.

No fewer than 90 days prior to issuing, adopting, modifying, or approving any ordinance, policy, plan, or permit, or taking any other action related to groundwater resources within the Pleasant Valley basin, the County shall provide written notice to PVGSA. Within 30 days of receiving such notice, PVGSA may request a mandatory consultation with the County. Prior to taking any groundwater-related action, the County shall consider any comments or recommendations provided by PVGSA.

4. **Finances.** Each of the Parties to this MOU shall bear its own costs of implementing SGMA, except as follows:

(a) The County shall provide such assistance and support as it is able to provide at current staffing levels in applying for grant funding related to SGMA implementation when so requested by the PVGSA. The ability of the County to provide such assistance and support shall be determined exclusively by the County.

5. **Notices.** All notices required or permitted by this MOU or applicable law shall be in writing and may be delivered in person (by hand or by courier) or may be sent by regular, certified, or registered mail or U.S. Postal Service Express Mail, with postage prepaid, or by facsimile transmission, or by electronic transmission (email) and shall be deemed sufficiently given if served in a manner specified in this Section 6. The addresses and addressees noted below are that Party's designated address and addressee for delivery or mailing of notices.

To Pleasant Valley Water District:	Pleasant Valley Water District c/o District President Post Office Box 468 Coalinga, CA 93210-0468
To County of Fresno:	County of Fresno Department of Public Works and Planning c/o Glenn Allen, Water and Natural Resources Division 2220 Tulare St. 6th Floor Fresno, CA 93721 Telephone: (559) 600-4500

Either Party may, by written notice to the other, specify a different address for notice. Any notice sent by registered or certified mail, return receipt requested, shall be deemed given on the date of delivery shown on the receipt card, or if no delivery date is shown, three (3) days after the postmark date. If sent by regular mail, the notice shall be deemed given forty-eight (48) hours after it is addressed as required in this section and mailed with postage prepaid. Notices delivered by United States Express Mail or overnight courier that guarantee next day delivery shall be deemed given twenty-four (24) hours after delivery to the Postal Service or courier. Notices transmitted by facsimile transmission or similar means (including email) shall be deemed delivered upon telephone or similar confirmation of delivery (conformation report from fax machine is sufficient), provided a copy is also delivered via personal delivery or mail. If notice is received after 4:00 p.m. or on a Saturday, Sunday or legal holiday, it shall be deemed received on the next business day.

6. **Indemnification.** As the County does not vote on the actions of the PVGSA, PVGSA shall hold harmless and indemnify the County from and against any liability, claims, actions, costs, damages or losses of any kind, including but not limited to death or injury to any person and/or damage to property, arising out of the implementation of the GSP by PVGSA. PVGSA shall not be obligated to indemnify the County where any loss, damage, injury, liability, or claim is a result of the sole negligence or willful misconduct of the County. Additionally, the County shall hold harmless and indemnify the PVGSA from and against any liability, claims, actions, costs, damages or losses of any kind, including but not limited to death or injury to any person and/or damage to property, arising out of the implementation of the GSP by the County. The County shall not be obligated to indemnify PVGSA where any loss, damage, injury, liability, or claim is a result of the sole negligence or willful misconduct of PVGSA.

The foregoing indemnification obligation shall continue beyond the term of this MOU as to any acts or omissions occurring before or under this MOU or any extension of this MOU.

7. **Compliance with Laws.** In any action taken pursuant to this MOU, PVGSA and the County shall comply with all applicable statutes, laws, and regulations, specifically including, but not limited to, SGMA and its implementing regulations, as they now exist or as they may be amended or promulgated from time to time.

To the extent that this MOU conflicts with or does not accurately reflect any applicable statutes, laws, or regulations now existing or as amended or promulgated from time to time, the laws, statutes, and regulations shall govern.

To the extent that any applicable statutes, laws, or regulations are amended or newly promulgated in such a manner that causes this MOU to conflict with or no longer accurately reflect such statutes, laws, or regulations, this MOU shall be modified, in writing, by all Parties, in order to comport with the newly amended or promulgated statutes, laws, or regulations.

8. **Entire Agreement.** This MOU and items incorporated herein contain all of the agreements of the Parties with respect to the matters contained herein, and no prior agreement or understanding pertaining to any such matter shall be effective for any purpose.

9. **Amendments.** No provisions of this MOU may be amended or modified in any manner whatsoever except by an agreement in writing duly authorized by representatives of all Parties.

10. **No Assignment.** The rights and obligations of the Parties to this MOU may not be assigned or delegated, and any attempt to assign or delegate such rights or duties in contravention of this section shall be null and void.

11. **Binding Effect.** This MOU shall apply to and bind successors, assignees, contractors, subcontractors, transferees, agents, employees, and representatives of the respective Parties hereto.

12. **Governing Law.** This MOU and all documents provided for herein and the rights and obligations of the Parties hereto shall be governed in all respects, including validity, interpretation and effect, by the laws of the State of California (without giving effect to any choice of law principles).

13. **Waiver.** The failure of any Party to insist on strict compliance with any provision of this MOU shall not be considered a waiver of any right to do so, whether for that breach or any subsequent breach. The acceptance by any Party of either performance or payment shall not be considered to be a waiver of any preceding breach of the MOU by any other Party.

14. **Severability.** If any term or provision of this MOU is, to any extent, held invalid or unenforceable, the remainder of this MOU shall not be affected.

15. **Headings.** The subject headings of the sections of this MOU are included for purposes of convenience only and shall not affect the construction or interpretation of any of the provisions herein.

16. **Counterparts.** This MOU may be executed in any number of counterparts, each of which shall be an original, but all of which shall constitute one and the same instrument.

IN WITNESS WHEREOF, the Parties have executed this MOU as of the day and year first above written.

PLEASANT VALLEY WATER DISTRICT, a California Water District

By: _____

Name: Bradford E. Gleason

Title: Board President

COUNTY OF FRESNO

By: _____

Ernest "Buddy" Mendes, Chairman of the Board of Supervisors of the County of Fresno

ATTEST:
Bernice E. Seidel, Clerk of the Board of Supervisors
County of Fresno, State of California

By: _____
Deputy

Appendix B – Stakeholder Communication and Engagement Plan

List of Public Meetings *(Reg. § 354.10)*

Regulation Requirements:

§ 354.10. Notice and Communication

Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:

(a) A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties.

(b) A list of public meetings at which the Plan was discussed or considered by the Agency.

(c) Comments regarding the Plan received by the Agency and a summary of any responses by the Agency.

(d) A communication section of the Plan that includes the following:

- **(1)** An explanation of the Agency's decision-making process.
- **(2)** Identification of opportunities for public engagement and a discussion of how public input and response will be used.
- **(3)** A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin.
- **(4)** The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.

Note: Authority cited: Section 10733.2, Water Code.

Reference: Sections 10723.2, 10727.8, 10728.4, and 10733.2, Water Code

Pleasant Valley Subbasin

Communication & Engagement Plan

Fresno County, California
September 2020
Updated February 2022

Prepared for:
Pleasant Valley Subbasin Groundwater Sustainability Agencies
Pleasant Valley GSA • City of Coalinga GSA • Fresno County Pleasant Valley GSA Area

Prepared by:
Provost & Pritchard Consulting Group
286 W. Cromwell Avenue, Fresno, CA 93711

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Report Prepared for:

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Note: This Communication & Engagement Plan will be updated as necessary throughout the GSP development, public review, and implementation phases.

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Abbreviations

AB ..... Assembly Bill
BLM ..... U.S. Bureau of Land Management
CASGEM ..... California Statewide Groundwater Elevation Monitoring
C&E ..... Communication & Engagement
CDCR ..... California Department of Corrections & Rehabilitation
CDFW ..... California Department of Fish and Wildlife
City ..... City of Coalinga
CVP ..... Central Valley Project
DA ..... Disadvantaged Areas
DAC ..... Disadvantaged Community
DWR ..... Department of Water Resources
EDA ..... Economically Distressed Areas
EIA ..... U.S. Energy Information Administration
GSA ..... Groundwater Sustainability Agency
GSP ..... Groundwater Sustainability Plan
ILRP ..... Irrigated Lands Regulatory Program
MOU ..... Memorandum of Understanding
PSA ..... Public service announcement
PVGSA ..... Pleasant Valley GSA
PVWD ..... Pleasant Valley Water District
SB ..... Senate Bill
SDAC ..... Severely Disadvantaged Community
SGMA ..... Sustainable Groundwater Management Act
USBR ..... U.S. Bureau of Reclamation

Introduction

SGMA Overview

The Sustainable Groundwater Management Act (**SGMA**) is a combination of three bills signed by California Governor Jerry Brown in 2014: Assembly Bill (**AB**) 1739, Senate Bill (**SB**) 1168, and SB 1319. SGMA provides local agencies with the authority to manage groundwater basins in a sustainable manner. The legislation recognizes that groundwater is most effectively managed at the local level, and local agencies will need to achieve groundwater sustainability within 20 years of submitting groundwater sustainability plans.

In SGMA, sustainable groundwater management is defined as management of groundwater supplies in a manner that can be maintained in planning and implementation phases without causing undesirable results. Undesirable results include the following significant and unreasonable indicators:

- Chronic lowering of groundwater levels
- Reduction of groundwater storage
- Seawater intrusion
- Degraded water quality
- Land subsidence
- Depletion of interconnected surface waters

Implementation of SGMA and outreach requirements (**Figure 0-1**) are broken down into four phases:

- **Phase 1: GSA Formation and Coordination –** Phase 1 ranged from 2015 to 2019, and during this phase, local agencies created groundwater sustainability agencies (**GSA**). The responsibility of a GSA is to develop and implement a groundwater sustainability plan (**GSP**) that will consider all beneficial uses and groundwater users within the basin. GSAs were required to be formed by June 30, 2017.
- **Phase 2: GSP Preparation and Submission –** Phase 2 ranges from 2017 to 2022, and during this phase, the GSAs must develop a subbasin-wide GSP with measurable objectives and milestones that ensure basin sustainability. A basin may be managed by a single GSP or multiple-coordinated GSPs. The California Department of Water Resources (**DWR**) developed regulations for evaluating GSPs and alternatives to GSPs by June 1, 2016. When Pleasant Valley Water District (**PVWD**) formed the Pleasant Valley GSA (**PVGSA**), the boundary originally included all of the subbasin, but DWR indicated the district could not serve as the GSA for areas outside of its jurisdictional boundary. Following notification from the DWR, the City of Coalinga and County of Fresno formed their respective GSAs in 2019. The priority for this subbasin was finalized during Phase 1 of the SGMA 2019 Basin Prioritization, the GSP is due for the basin on January 4, 2024. However, since PVGSA received Sustainable Groundwater Management funding for GSP preparation, the GSP is due earlier as discussed below.
- **Phase 3: GSP Review and Evaluation –** Phase 3 will be held in 2021 and consists of a public review period. The public review period will be held 90 days prior to the subbasin-wide public hearing and subsequent adoption of the GSP. Once the GSP has been submitted to the DWR by February 28, 2022, DWR will hold another 60-day review and comment period for stakeholders.

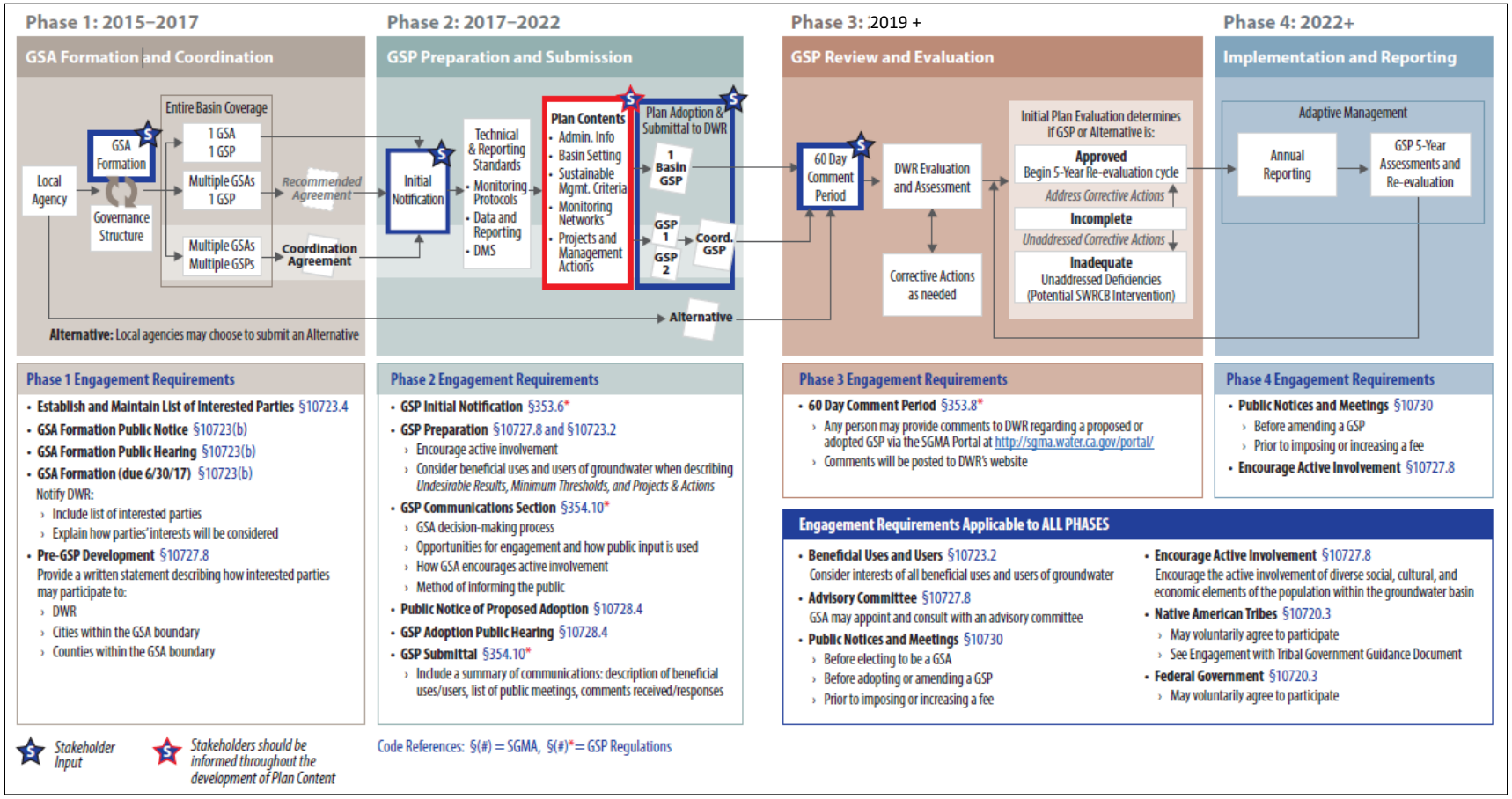
- **Phase 4: Implementation and Reporting –** Following the submission of the GSP in 2022, the Pleasant Valley Subbasin GSAs will immediately begin the implementation of efforts described in the GSP to reach sustainability within the basin. This will be an ongoing phase, as the goal of SGMA is to reach sustainability as described in the GSP by 2042.

Communication & Engagement Plan

As required by SGMA, GSAs must consider the interests of all beneficial uses and users of groundwater and include them in the GSP development process. The GSAs within the Pleasant Valley Subbasin have developed a joint Communication & Engagement (**C&E**) Plan to address how stakeholders within the individual GSA boundaries (and when collaboration is plausible at the subbasin-level) will be engaged through stakeholder education and opportunities for input and public review during the development and implementation of the GSP. This plan provides an overview of the Pleasant Valley Subbasin GSAs, their stakeholders, and decision-making process; identifies opportunities for public engagement and discussion of how public input and responses will be used; describes how the Pleasant Valley Subbasin GSAs encourage the active involvement of diverse, social, cultural, and economic elements of the population within their individual boundaries and subbasin boundary; and the methods to be used to inform the public stakeholders about the progress of GSP development, public review and implementation.

As outlined by the DWR in the GSP Stakeholder Communication and Engagement Guidance Document, this Communication & Engagement Plan defines the Pleasant Valley Subbasin GSAs' process for accomplishing the seven general steps in stakeholder communication and engagement:

- **Set Goals and Desired Outcomes –** Description of the situation at a high level with clear goals and objectives, identifying overriding concerns
- **Identify Stakeholders –** Development of a broad list of individuals, groups and organizations who need to be engaged in the process
- **Stakeholder Survey and Mapping –** Conducting a stakeholder survey to develop a "Lay of the Land" overview
- **Messages and Talking Points –** Definition of the key messages needed to effectively convey to the various subbasin stakeholders
- **Venues for Engaging –** Identification of opportunities (venues and methods) to engage stakeholders
- **Implementation Timeline –** Creation of a timeline to inform the process and highlight when to engage with stakeholders
- **Evaluation and Assessment –** Definition of a process to evaluate if communication and engagement goals are being met at the individual GSA level and through collaborative subbasin efforts



Source: GSP Stakeholder Communication and Engagement Guidance Document, California Department of Water Resources, January 2018

Figure 0-1. Stakeholder Engagement Requirements by Phase

I. Goals and Desired Outcomes

This section of the Communication & Engagement Plan provides a description of the Pleasant Valley Subbasin and the individual GSAs, defines the goals of how to address the challenges, regulatory requirements and opportunities, and how to reach the desired outcomes of communication efforts.

A. Description and Background of the Pleasant Valley Subbasin

SGMA requires all high- and medium-priority groundwater basins, as designated by the DWR Bulletin 118, to be managed by a GSA or multiple GSAs. In November 2018, DWR reclassified the Pleasant Valley Subbasin's groundwater overdraft conditions (part of the San Joaquin Valley Groundwater Basin 5-022.10) from a low-priority basin to a medium-priority basin. The Pleasant Valley Subbasin consists of three GSAs (listed in **Table I-1**), and is located entirely within the County of Fresno (**Figure I-1**).

Table I-1. GSAs in the Pleasant Valley Subbasin

GSA	GSA Member Agencies
Pleasant Valley GSA	Pleasant Valley Water District
City of Coalinga GSA	City of Coalinga
Fresno County Pleasant Valley GSA Area	County of Fresno

Under SGMA, the Pleasant Valley Subbasin GSAs are responsible for submitting a GSP to the DWR by January 4, 2024. However, with the Sustainable Groundwater Management Planning Grant, the funding requirements require submittal of the GSP by January 31, 2022. The three GSAs are committed to working collaboratively to jointly manage groundwater and develop a single GSP for the Pleasant Valley Subbasin. Representatives from these agencies communicate routinely for the purpose of developing a cooperative, comprehensive basin-wide plan that meets the requirements of SGMA and reaches the overall goal of groundwater sustainability by 2040.

Throughout the SGMA phases, the Pleasant Valley Subbasin GSAs' Boards of Directors and technical teams will be responsible for collecting and organizing data, engaging and retaining experts and consultants, and soliciting feedback from beneficial users of groundwater and interested parties within the subbasin boundary. The specific roles of the Boards of Directors and any GSA committees are described in **Section II.A**.

I.A.1 Subbasin Industries and DACs

I.A.1.1 Industries

Collaboration meetings may be held with the companies and organizations within the following industries to make sure their organizational visions and groundwater needs for facility operations are taken into consideration during GSP development and implementation phases. While an overview of the main industries within the Pleasant Valley Subbasin are described below, the industries specific to each GSA are indicated in **Section I.B**.

I.A.1.1.1 Agriculture

Agriculture is one of the top industries within the Pleasant Valley area of Fresno County. Pistachios, beef cattle, and a variety of vegetables, including carrots, garlic and tomatoes, are among the primary crops grown and processed within the Pleasant Valley subbasin.

As one of the primary industries, agriculture is the largest private employer in the county. Harris Farms is one of the largest agricultural producers within the San Joaquin Valley and has a significant presence in the area near Interstate 5 in the Coalinga area, though they are not located within the subbasin. Another major agricultural producer, The Wonderful Company, owns or manages over 3,000 acres of pistachios, and operates one of their packing facilities within the Coalinga area. Sequoia Packing Company has the largest garlic packing capacity in the world, processing, packaging, and shipping thousands of tons of garlic worldwide from their Coalinga facility.

Because of the significant presence of agriculture production within the Pleasant Valley Subbasin, agriculture industry stakeholders need to be involved and informed during the development and public review phases of the GSP. Implementation will have a significant direct impact on the industry, and ultimately the local, state, and national economies. The Pleasant Valley Subbasin GSAs will engage with agriculture stakeholders primarily at a subbasin level, as many growers may have land within multiple GSA boundaries.

I.A.1.1.2 Oil Production

Oil production is a main industry in certain areas of Fresno County and the Pleasant Valley Subbasin, primarily within the Fresno County Pleasant Valley GSA Area. First discovered in 1887, Coalinga oilfield is the single largest oilfield in Fresno County and has been ranked 76th among the top 100 producing oil fields in the United States having produced more than 5.6 million barrels of oil in 2013, according to the U.S. Energy Information Administration's (**EIA**) Top 100 U.S. Oil and Gas Fields March 2015 Report.

The oil industry is considered a beneficial user of groundwater, though the majority of groundwater is from oil extraction and not from the usable aquifer. Pleasant Valley Subbasin GSAs will include oil companies within the subbasin boundary in the stakeholder education/outreach process, notifying them of outreach meetings, meeting with them on an individual basis, and including them on the Interested Parties List. This will give representatives of the industry opportunities to provide direct input and feedback during the GSP development, public review and implementation phases.

I.A.1.2 DACs

Communication and educational outreach efforts with disadvantaged communities (**DAC**) and severely disadvantaged communities (**SDAC**) are needed for the development and implementation of the Pleasant Valley Subbasin's GSP according to the Department of Water Resources' Best Management Practices. Pleasant Valley Subbasin also consists of economically distressed areas (**EDA**), which will be covered in communications with landowners in the areas.

Information will be used to communicate to and engage the disadvantaged areas in the GSP process, will include an explanation of SGMA and soliciting feedback. A composite listing of the disadvantaged communities, along with their populations (according to the US Census American Community Survey (ACS) 5-Year Data: 2012 – 2016 accessed from the DWR website https://water.ca.gov/Work-With-Us/Grants-And-Loans/Mapping-Tools), within the subbasin boundary are listed in **Table I-2** and shown by subbasin and GSA in **Figure I-2**. There are several economically distressed areas that are not included in **Table I-2**, as they each have a population of "zero."

By including disadvantaged areas in communication efforts during the development, public review and implementation phases of the GSP, residents will be more likely to participate and provide feedback that could be crucial to long-term solutions for groundwater sustainability within their communities. Any feedback received from residents of disadvantaged areas will be reviewed and evaluated by the Pleasant Valley Subbasin GSAs during the GSP development phase.

Table I-2. Disadvantaged Communities within the Pleasant Valley Subbasin

Disadvantaged Community/Area	Population	DAC/EDA	GSA
Coalinga	16,609	DAC	City of Coalinga GSA

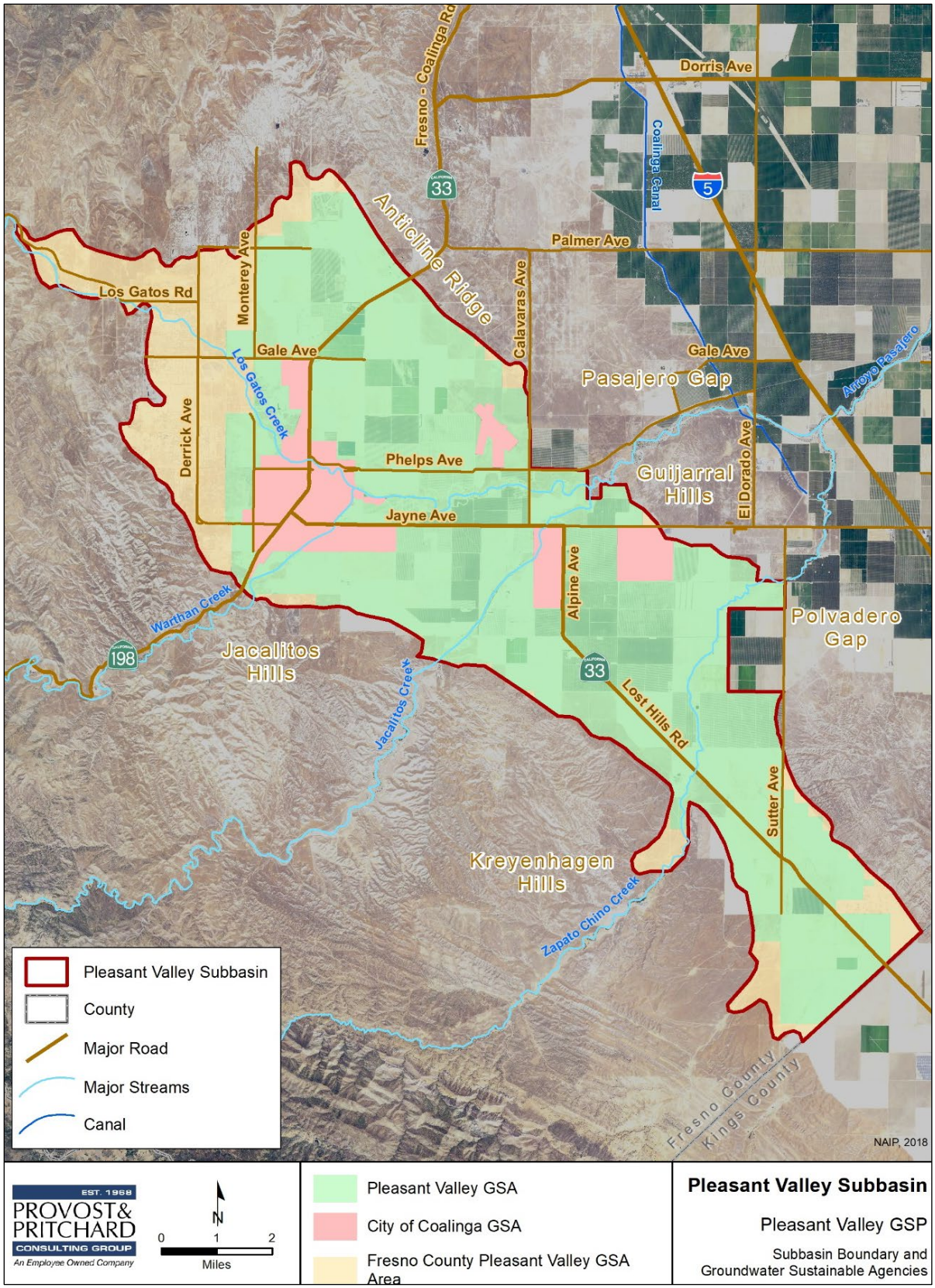


Figure I-1. Pleasant Valley Subbasin Boundary & Groundwater Sustainability Agencies

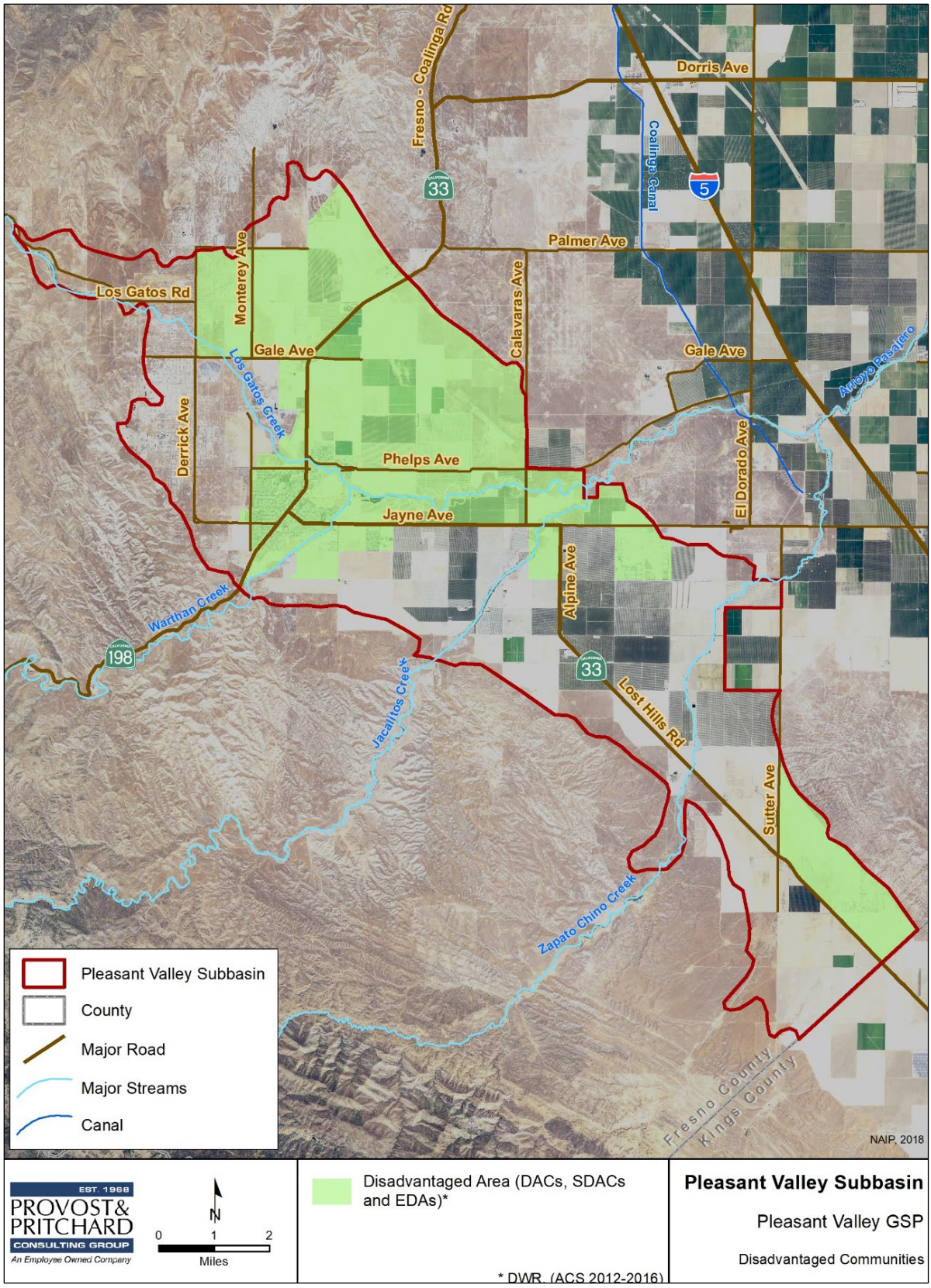


Figure I-2. Disadvantaged Communities within Pleasant Valley Subbasin

B. Description of the GSAs & Their Boundaries

I.B.1 Pleasant Valley GSA

The Pleasant Valley GSA was officially formed by the Pleasant Valley Water District (PVWD) on January 24, 2017 to meet the compliance requirements of California's SGMA legislation. The GSA's boundaries overlays the boundaries of the PVWD (**Figure I-3**).

PVWD was formed in 1963 to provide agricultural surface water to landowners, though a contracted supply was not obtained, and includes approximately 38,000 total acres, of which around 30,000 are in agriculture production, with nearly 10,000 of those acres of pistachios. With over 80 active landowner-owned water wells, many of which are monitored electronically, studies conducted by the district indicate a potential water storage capacity of 1 million acre-feet. Landowners within the district's GSA have already begun importing surface supplies to help offset the overdraft of groundwater supplies.

Pleasant Valley GSA has a Memorandum of Understanding (**MOU**) with City of Coalinga GSA and Fresno County Pleasant Valley GSA Area to take the lead in preparing the subbasin-wide GSP, while communicating and collaborating with management of the other two GSAs throughout the development, public review and implementation phases.

I.B.1.1 GSA Industry

The primary industry within the Pleasant Valley GSA is agriculture, with nearly one/third of the producing acreage in pistachios.

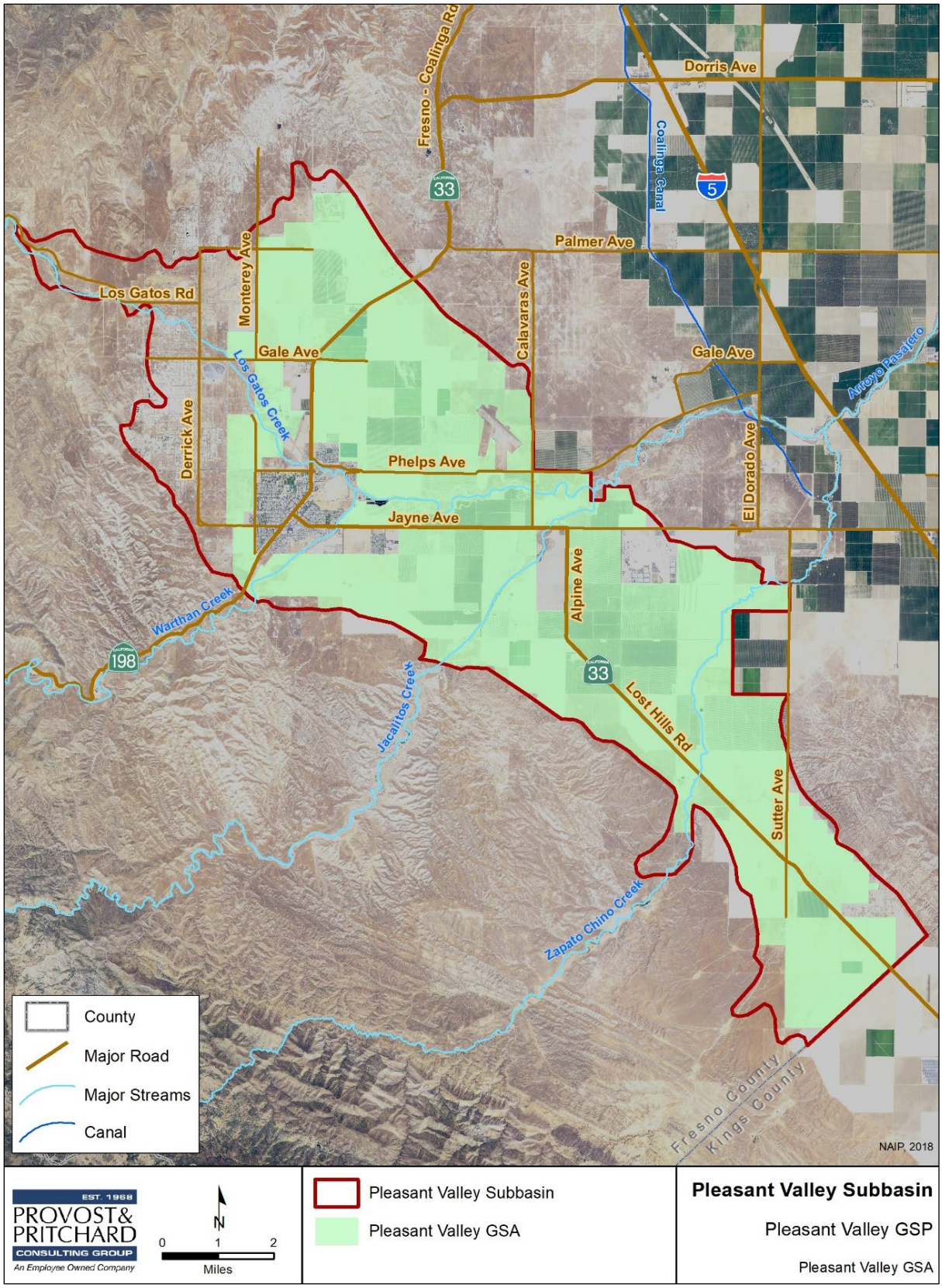


Figure I-3. Pleasant Valley GSA Boundary

I.B.2 City of Coalinga GSA

The City of Coalinga (**City**) is one of three GSAs within the Pleasant Valley Subbasin, representing the groundwater interests within the City's boundary (**Figure I-4**). The City Council officially voted to form the GSA on April 25, 2019, citing in an MOU with Pleasant Valley GSA that will provide advisory input to the Pleasant Valley GSA to prepare and implement a GSP for the subbasin.

The City's water supply is imported from Central Valley Project (**CVP**) water, which they receive under a water service contract with the U.S. Bureau of Reclamation (**USBR**), and ultimately the City does not rely on groundwater supplies. However, within the City limits, there are some agricultural entities that do pump groundwater. The City also manages the treatment and distribution of the surface water for municipal use, and for the Pleasant Valley State Prison and Coalinga State Hospital.

I.B.2.1 GSA Industry

Industry within the City of Coalinga is diverse, with the economy being driven by surrounding agricultural interests; small businesses; schools, including West Hills Community College; Coalinga State Hospital; Pleasant Valley State Prison, and a library, museum, airport and other recreational facilities.

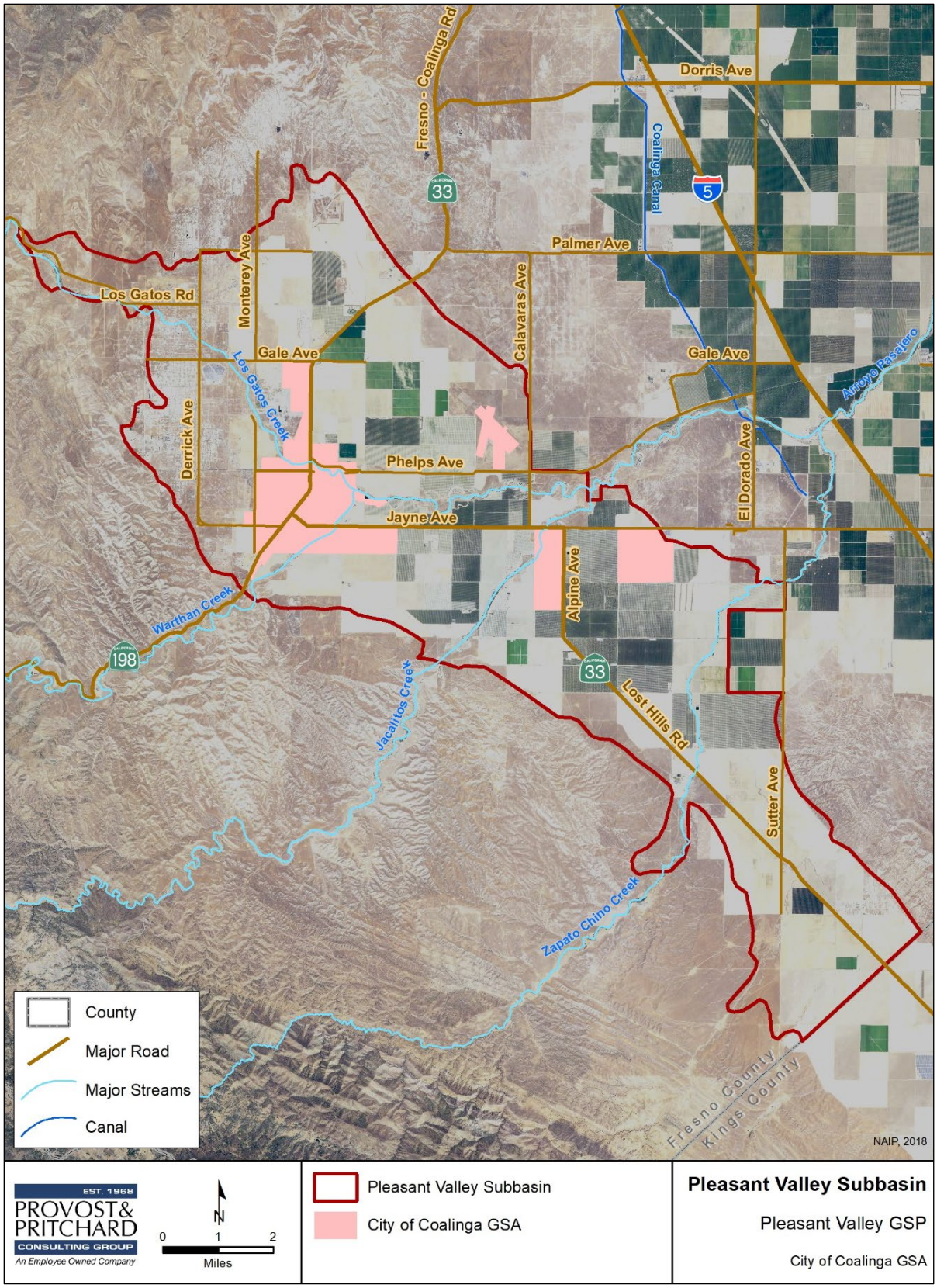


Figure I-4. City of Coalinga GSA Boundary

I.B.3 Fresno County Pleasant Valley GSA Area

When the Pleasant Valley GSA was formed, the agency originally included all the areas in the subbasin outside of the City of Coalinga, including those areas in Fresno County not within another agency (i.e. "white areas") and the area within PVWD. However, the Department of Water Resources indicated the PVGSA may not serve as the GSA for areas outside of the jurisdictional boundary of the forming agency (PVWD). The Fresno County Board of Supervisors determined it to be in the best interest of the County to serve as a GSA for the areas within the Pleasant Valley Subbasin not included within the boundaries of the Pleasant Valley GSA or City of Coalinga GSA. On May 7, 2019, the County of Fresno Board of Supervisors made it official by signing a resolution to form a GSA to represent the white area of the Pleasant Valley Subbasin (**Figure I-5**). Fresno County also has an MOU with Pleasant Valley GSA and will provide advisory input to the Pleasant Valley GSA to prepare and implement a GSP for the subbasin.

A small rural residential community, called the "Lost Hills Community" by Fresno County staff, is located toward the southern end of the GSA area that relies exclusively on groundwater.

I.B.3.1 GSA Industry

The primary industries within the Fresno County Pleasant Valley GSA Area is oil production and agriculture.

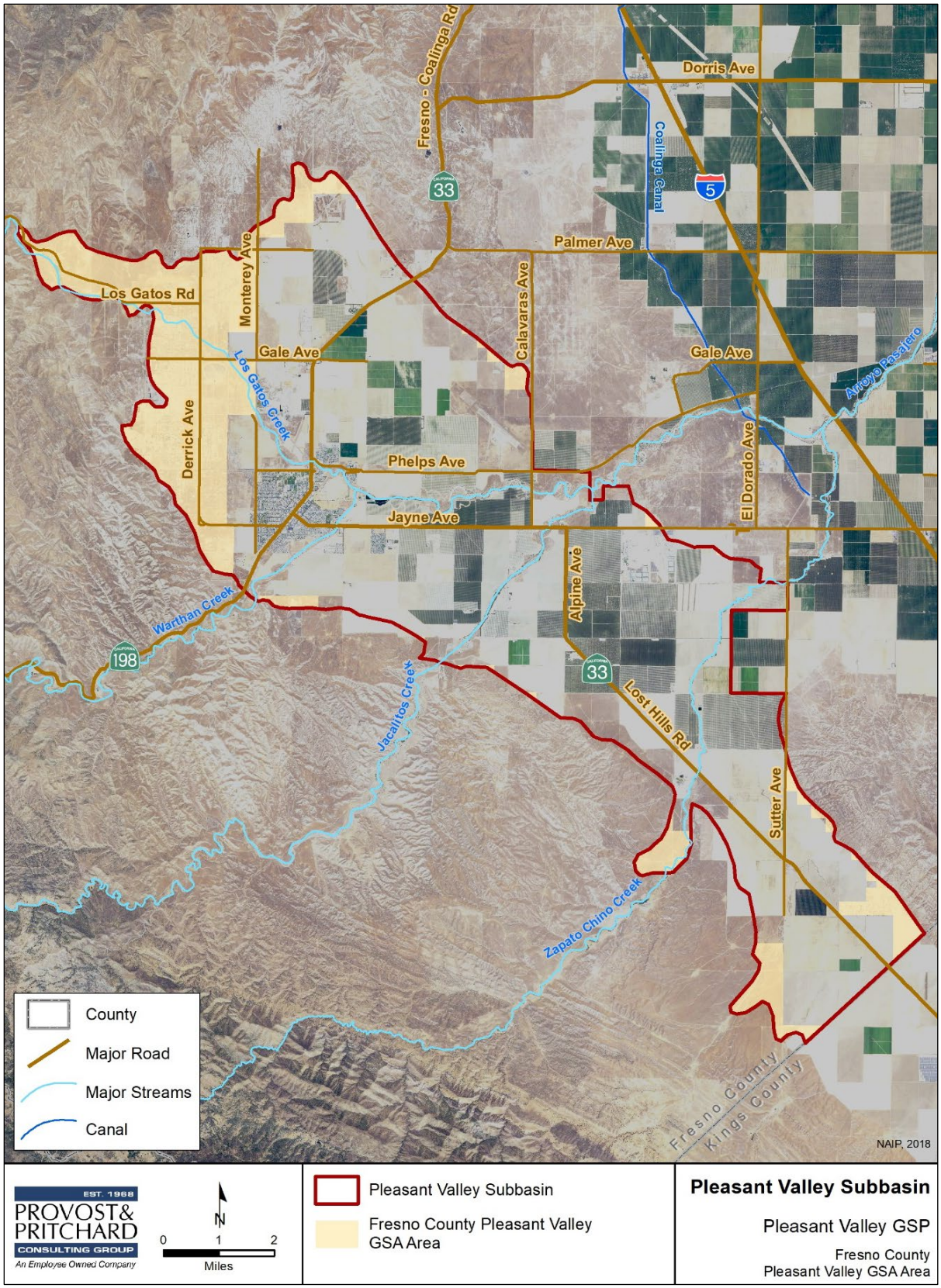


Figure I-5. Fresno County Pleasant Valley GSA Area Boundary

C. Pleasant Valley Subbasin GSAs' Decision-Making Process

The Pleasant Valley Subbasin GSAs' decision-making process are broken down by the roles of the subbasin management team, Board of Directors and potential ad-hoc committees. The roles of these subbasin and GSA entities and their responsibilities are outlined below and described in more detail in **Section II.A**.

- **Subbasin Management Team –** Comprised of designated representatives from the GSAs and technical consultants working collaboratively to jointly manage groundwater within the Pleasant Valley Subbasin and to develop a GSP, with PVGSA as the lead
- **Boards of Directors –** Adopts general policies regarding development and implementation of the GSAs and the GSP
- **Stakeholder/Advisory Committees –** Representing all beneficial uses and users of groundwater within the individual GSA boundaries, makes recommendations to the Boards of Directors and technical consultants regarding feedback from stakeholders and adoption of a GSP that accounts for local interests. The Pleasant Valley GSA formed a technical advisory committee consisting of PVGSA Directors and representatives from the other GSAs. While allowed within SGMA, these committees are not required. Each GSA has the option to form a Stakeholder/Advisory Committee.

D. Goals/Desired Outcomes of GSP Development

The overall, main goal of the Pleasant Valley Subbasin GSAs is to establish and execute a GSP that will achieve sustainable groundwater management within the Pleasant Valley Subbasin by 2042, with minimal impacts on the industries and the beneficial uses and users of groundwater (**Table II-2**, **Table II-3**, and **Table II-4**).

E. Communication Objectives to Support the GSP

The ultimate goal of communication objectives during the formation/coordination, GSP development, public review and implementation phases of the SGMA compliance, is to encourage active involvement of diverse, social, cultural, and economic elements of the population within the subbasin's boundary. The Pleasant Valley Subbasin GSAs will give beneficial users and users of groundwater opportunities to engage in the GSP process, provide educational outreach opportunities for stakeholders while reaching out through specific communication avenues (**Section V**). As active stakeholders, members of the Boards of Directors and ad-hoc committees are direct representatives of their districts, communities and industries, and it is important for them to continually gather feedback/input, and concerns/needs of their constituents and report back to their respective meetings. Any stakeholder input received will be reviewed by the Subbasin Management Team and taken into consideration during GSP development.

I.E.1 Phase 1: GSA Formation and Coordination

Phase 1: GSA Formation and Coordination has been completed. This phase stretched from 2015 through 2020, and consisted of forming the individual GSAs, development of Memorandums of Understanding between the GSAs, establishing the List of Interested Parties (**Section II.C.1**), and creating the Communication & Engagement Plan to outline communication efforts for the GSP development, public review and implementation phases. Stakeholder input was utilized during the GSA formation phase, as beneficial users and stakeholders with interests in groundwater usage within the GSAs' boundaries were notified via public meeting notices as soon as the process began (**Table I-3**).

Table I-3. GSA Formation Public Hearing Notices

GSA	Publication	Date Published	Date Public Hearing Held
Pleasant Valley GSA	The Fresno Bee	January 16, 2017; January 23, 2017	January 24, 2017
City of Coalinga GSA	The Fresno Bee	April 15, 2019; April 22, 2019	April 25, 2019
Fresno County Pleasant Valley GSA Area	The Business Journal	April 22, 2019; April 26, 2019	May 7, 2019

I.E.2 Phase 2: GSP Preparation and Submission

Phase 2: GSP Preparation and Submission will span from Spring of 2020 through January 31, 2022. With the goal of having the draft GSP by summer of 2021, 2020 will primarily be the technical development of the plan, while working with the Subbasin Management Team, GSAs' Boards of Directors, any ad-hoc committees, and stakeholders (**Section II.A**), for feedback and input. During the spring and summer of 2020, the first round of public outreach meetings and interaction with stakeholder groups (**Section II.B**) and other community organizations and entities (**Section II.C**) will be held by PVGSA with the purpose of educating and informing stakeholders about SGMA and the GSP process, while also soliciting feedback and input from these groups (**Section III.A**) to consider and include feedback and input into the GSP. Public outreach for this phase will be completed primarily through collaborative subbasin-wide efforts, with progress reports given at City of Coalinga's council meetings and County of Fresno's Board of Supervisors meetings.

I.E.3 Phase 3: GSP Review and Evaluation

During 2021, Phase 3: GSP Review and Evaluation, the communication and engagement efforts will continue. Once the draft of the GSP is completed in summer of 2021, the public review process will begin. A 90-day public comment period will be held, with the GSP draft posted on the Pleasant Valley Subbasin GSAs' websites for all stakeholders to conveniently download, review and provide comments. Outreach meetings will be held during this phase, likely at the same locations meetings during Phase 2 were held. These meetings will focus on an overview of the GSP content, while giving stakeholders a public forum to provide their feedback and comments.

At the conclusion of the 90-day public comment period, a joint subbasin-wide public hearing will be held to receive any final comments, oral and/or written, from stakeholders with groundwater interests within the three Pleasant Valley Subbasin GSAs.

Once the public review period is completed, public comments will be taken into consideration and, as appropriate, incorporated into the final version of the Pleasant Valley Subbasin GSP. Once finalized, each GSA's Board of Directors will adopt the plan before it is submitted to the DWR no later than January 31, 2022. Following submittal, stakeholders will be given a second 60-day comment period through the DWR's SGMA portal at http://sgma.water.ca.gov/portal/. Comments will be posted to the DWR's website prior to the state agency's evaluation, assessment, and approval.

I.E.4 Phase 4: Implementation and Reporting

Phase 4: Implementation and Reporting will begin once the plan is submitted by January 31, 2022. Even while the DWR is reviewing the GSP, SGMA-implementation at the GSA-level must begin. During the implementation phase, communication and engagement efforts will be shifted to educational and informational awareness of the requirements and processes for reaching groundwater sustainability as set

forth in the submitted GSP. Active involvement of all stakeholders is encouraged during this phase, and public notices are required for any public meetings and prior to imposing, and later increasing, any fees. Public outreach for this phase will also be completed by the through collaborative subbasin-wide efforts, particularly when target audiences span more than one GSA boundary.

F. Overriding Concerns, Major Concerns or Challenges

Through preliminary discussions with Pleasant Valley Subbasin GSAs' management, the priority for the subbasin is to comply with SGMA and avoid state intervention. Overriding concerns, major concerns or challenges are centralized around economic impacts to the oil and agricultural industry, which will also have a direct impact on DACs. Economic impacts could include loss of jobs and loss of tax revenue due to the decreased land values of fallowed ground. Many DAC residents are employed by the agricultural industries and oil industries. The agricultural and oil industries, domestic well owners, and DACs will be the main target audiences for direct outreach meetings because of the significant impact SGMA implementation will have on these beneficial users of groundwater.

A summary of additional top concerning issues affecting groundwater, and the effect of SGMA on agriculture, oil production, and rural communities/EDAs/DACs is listed in **Table III-1**.

II. Stakeholder Identification

A. Active Stakeholder Groups

The active stakeholder groups of the Pleasant Valley Subbasin GSAs are members of the Boards of Directors of each GSA and ad-hoc committees. Their specific roles in the communication and engagement process are discussed in this section.

II.A.1 Role of Boards of Directors

The Pleasant Valley Subbasin GSAs' Boards of Directors all consistently function as the governing body of the specific GSA, formed to adopt general policies regarding development and implementation of the GSP. Governance of each GSA is described below, and meeting dates, times and locations for each board are noted. All meetings are open to the public.

II.A.1.1 Pleasant Valley GSA

Pleasant Valley GSA's Board of Directors consists of seven directors, who also serve on the PVWD Board of Directors. Directors are landowners or landowner representatives from the Pleasant Valley area. The GSA regularly meets on the fourth Tuesday of January, March, May, July, September and November, following the PVWD Board of Directors meeting, which begins at 10 a.m. and is held at 24505 West Dorris Avenue in Coalinga, unless otherwise posted on https://sgma.pleasantvalleywaterdistrict.com.

II.A.1.2 City of Coalinga GSA

The City of Coalinga's council members serve as the governing board for the City of Coalinga GSA. The Council is comprised of five elected officials, each representing one of five districts within the City's boundaries. City Council meetings are held on the first and third Wednesday of each month at 6 p.m. at City Hall, located at 155 West Durian in Coalinga, California, unless otherwise posted on https://www.coalinga.com/AgendaCenter/City-Council-5.

II.A.1.3 Fresno County Pleasant Valley GSA Area

The governing board of the Fresno County Pleasant Valley GSA Area is composed of the County's Board of Supervisors. Fresno County Board of Supervisors meetings are held the first and third Tuesdays of each month (unless otherwise posted by County officials) at 9 a.m. at the Board Chambers, located in the Hall of Records, on the third floor of 2281 Tulare Street in Fresno, California, unless otherwise posted on https://www.co.fresno.ca.us/departments/board-of-supervisors.

II.A.2 Role of Stakeholder/Advisory Committees

In Section 10727.8 "Public Notification and Participation; Advisory Committee" of the Sustainable Groundwater Management Act, GSAs may appoint and consult with an advisory committee for the purpose of developing and implementing a GSP. Through a stakeholder/advisory committee, a GSA is able to encourage the active involvement of diverse social, cultural, and economic elements of the population within the groundwater basin prior to and during the development and implementation of the GSP. The formation of a stakeholder or advisory committee is not a requirement but may be formed at any time during the phases of the GSP preparation and implementation.

II.A.2.1 Pleasant Valley GSA

Pleasant Valley GSA has a technical advisory committee that consists of three of Pleasant Valley Water District Board members and one representative from the City of Coalinga GSA and one representative from the Fresno County Pleasant Valley GSA Area.

II.A.2.2 City of Coalinga GSA

City of Coalinga GSA does not have a stakeholder or advisory committee but has a member on the PVGSA technical advisory committee.

II.A.2.3 Fresno County Pleasant Valley GSA Area

The Fresno County Pleasant Valley GSA Area does not have a stakeholder or advisory committee but has a member on the PVGSA technical advisory committee. However, in March 2015, the Fresno County Board of Supervisors formed a SGMA Workgroup to advise the Board of Supervisors on items related to SGMA. This has included developing recommendations for a governance structure to form GSAs, conduct research on what other local agencies are doing to implement SGMA, monitor legislation, set policies, and potential funding opportunities. The SGMA Workgroup meets periodically.

B. Specific Stakeholder Groups

Based on the applicable interests identified in SGMA, Section 10723.2 "Consideration of All Interests of All Beneficial Uses and Users of Groundwater" (**Table II-1**), the three Pleasant Valley Subbasin GSAs have identified the stakeholder groups with interests within their respective boundaries. These specific stakeholder groups have financial, political, business or personal stakes in the management of groundwater within the jurisdiction of the Pleasant Valley Subbasin and will be the focus of communication and engagement efforts during the GSP development, public review and implementation phases. These stakeholders are listed by GSA in **Table II-2**, **Table II-3**, and **Table II-4**.

Table II-1. Consideration of All Interests of All Beneficial Uses and Users of Groundwater

SGMA, Section 10723.2. Consideration of All Interests of All Beneficial Uses and Users of Groundwater		
Agricultural Users	Domestic Well Owners	Municipal Well Operators
Public Water Systems	Local Land Use Planning Agencies	Environmental Users of Groundwater
Surface Water Users	Federal Government	California Native American Tribes
Disadvantaged Communities	Entities monitoring and reporting groundwater elevations in all or part of a groundwater basin	

II.B.1.1 Environmental Users of Groundwater

It should be noted that environmental users of groundwater within the Pleasant Valley Subbasin were investigated by the Pleasant Valley GSA, City of Coalinga GSA, and Fresno County Pleasant Valley GSA Area, but none were identified to have specific groundwater interests within the subbasin. If there are environmental groups with groundwater interests, they can seek participation in the GSP development and public review process at their request within their specific GSA.

II.B.1.2 Federal Government

The City of Coalinga has a surface water contract with the USBR for the City's municipal and public water supply, which is delivered to the City's water treatment plant via the Coalinga Canal located northeast of the City. The City pays a delivery fee to the USBR for the surface water. The Pleasant Valley GSAs will

coordinate efforts with USBR personnel directly as necessary throughout the GSP development, public review and implementation phases.

In addition, there are portions of land owned by the Bureau of Land Management (**BLM**) around the subbasin, but not within the subbasin. To the west of the subbasin is the Coalinga Mineral Springs National Recreation Trail. The trail is located on the southern tip of the Diablo Mountains and is a mixed chaparral-foothill vegetation community with grey pine, chamise, Manzanita, yucca, and other shrubs and annual wildflowers. There is no longer any running water or facilities at the trail entrance.

II.B.1.3 State Government

The Pleasant Valley State Prison, operated by the California Department of Corrections and Rehabilitation (**CDCR**), as well as the Coalinga State Hospital, operated by the Department of State Hospitals, are located within the Pleasant Valley Subbasin. Both facilities receive their water from the City of Coalinga. The Pleasant Valley State Prison's treated wastewater is purchased by a nearby landowner and used for agricultural purposes. Appropriate prison and hospital personnel will be invited to provide input on their needs during development of the GSP and invited to review and provide public comment on the plan.

The approximately 1,200-acre Pleasant Valley Ecological Reserve has three units in the Pleasant Valley area: Phelps Avenue, Jayne Avenue, and Southern. It has a mixture of annual grassland and saltbush scrub habitats. It also contains some seasonal riparian areas. Animals include foxes, squirrels, and lizards. The approximately 160-acre Southern Unit is primarily located within the PVGSA portion of the subbasin, just north of Zapato Chino Creek and west of Sutter Avenue and has abandoned wells that are not proposed to be rehabilitated or re-drilled. Management is by the California Department of Fish and Wildlife (**CDFW**). See https://wildlife.ca.gov/Lands/Places-to-Visit/Pleasant-Valley-ER) for more information. CDFW staff are on the interested parties list and engaged in the stakeholder process.

II.B.1.4 Native American Tribes

There are no known California Native American Tribes within the Pleasant Valley Subbasin. However, the GSAs will continue to investigate any possible Native American Tribal interests and will include their participation if any interests are identified.

II.B.2 Pleasant Valley GSA Stakeholders

The interests of the parties identified in **Table II-2** will be considered in the operation of the Pleasant Valley GSA, and the development and implementation of the GSP. These stakeholders will have opportunities to provide input through written public comments, and opportunities to participate in regular and special board meetings, and public workshops.

Table II-2. Stakeholder Groups with Interests in the Pleasant Valley GSA

Stakeholder Group	Description
Agricultural Users	Agriculture landowners rely on groundwater or import surface water for irrigation and are represented through members of the PVWD Board of Directors. Relationships with agricultural water users are already established.
Domestic Well Owners	Represented by landowners within the GSA boundary who own residences located on their rural properties.
Local Land Use Planning Agencies	County of Fresno
Surface Water Users	While there is no known hydrologic connection between surface and groundwater flows within the PVGSA, the subbasin has several creeks within the boundary including Los Gatos Creek, Warthan Creek, Zapato Chino Creek, and Jacalitos Creek.
Federal Government	The Bureau of Land Management has land nearby but located outside of the Pleasant Valley Subbasin.
Disadvantaged Communities	There are disadvantaged areas within the GSA.
State Government	The Department of Fish and Wildlife manages the Pleasant Valley Ecological Preserve, a portion of which is located with the PVGSA.
Entities monitoring and reporting groundwater elevations in all or part of a groundwater basin	Represented by PVWD as the California Statewide Groundwater Elevation Monitoring (CASGEM) Program's monitoring entity for the Pleasant Valley Subbasin.

II.B.3 City of Coalinga GSA Stakeholders

The interests of all beneficial uses and users of groundwater within the City of Coalinga GSA are identified in **Table II-3**:

Table II-3. Stakeholder Groups with Interests in the City of Coalinga GSA

Stakeholder Group	Description
Agricultural Users	Agriculture users within the GSA rely on groundwater.
Public Water Systems	The City operates a public water system, using surface water to provide municipal and drinking water to residents located within the GSA boundary. All domestic and municipal use in the City is supplied by the City from imported water under the City's contract with the USBR. The Pleasant Valley State Prison and Coalinga State Hospital receives their water treated and delivered, from the City.
Municipal Water Systems	The Coalinga-Huron Recreation and Parks District operates one or more wells in the GSA to irrigate parks located within the City.
Local Land Use Planning Agencies	City of Coalinga, County of Fresno
Surface Water Users	While there is no hydrologic connection between surface and groundwater flows within the PVGSA, the subbasin has several creeks within the boundary including Los Gatos Creek and Warthan Creek. The City has a surface water contract with the USBR for City's public water system, which is delivered to the City's water treatment plant via the Coalinga Canal located east of the City.
Disadvantaged Communities	City of Coalinga
Entities monitoring and reporting groundwater elevations in all or part of a groundwater basin	Represented by PVWD as the California Statewide Groundwater Elevation Monitoring (CASGEM) Program's monitoring entity for the Pleasant Valley Subbasin

II.B.4 Fresno County Pleasant Valley GSA Area Stakeholders

An initial list of stakeholders within the Fresno County Pleasant Valley GSA Area is described in **Table II-4**.

Table II-4. Stakeholder Groups with Interests in the Fresno County Pleasant Valley GSA Area

Stakeholder Group	Description
Agricultural Users	Agricultural users within the GSA rely on groundwater or import surface water for irrigation.
Domestic Well Owners	Domestic wells within the GSA boundary are located at residences of landowners and landowner employees.
Local Land Use Planning Agencies	County of Fresno
Disadvantaged Communities	There are disadvantaged areas within the GSA.
Entities monitoring and reporting groundwater elevations in all or part of a groundwater basin	Represented by PVWD as the California Statewide Groundwater Elevation Monitoring (CASGEM) Program's monitoring entity for the Pleasant Valley Subbasin

C. Community Organizations, Public Agencies and Other Entities

There are many community organizations, public agencies and other entities throughout the Pleasant Valley Subbasin's boundary that will be utilized to reach out to stakeholders. These resources identified as avenues for outreach opportunities are listed in **Table II-5**, and organized by subbasin-wide and individual GSA efforts. Additional community organizations, public agencies and entities may be added to the list as GSP development and implementation phases move forward, and as additional connections are made between the Pleasant Valley Subbasin GSAs and the communities within their boundaries.

The Pleasant Valley Subbasin GSAs can communicate with these resources as an avenue to reach stakeholders. Opportunities to give presentations at their respective meetings may be scheduled, and the Pleasant Valley Subbasin GSAs will work with these organizations and agencies to distribute stakeholder surveys, public outreach meeting notices and educational information via email distribution, social media posts and other printed materials (handouts).

If a GSA Board of Director or ad-hoc committee member is currently involved with or has contacts within a community organization, public agency, or other entity, they may present on behalf of the GSA and Pleasant Valley Subbasin to further outreach efforts. A universal presentation may be developed for a consistent message, and may include an overview on SGMA and why it is important to the audience, explanation and updates of the GSP development process including an awareness of the public review period, and education of GSP requirements during the implementation phase. Talking points and key messages for GSP development, public review and implementation phases are discussed further in **Section IV**.

Table II-5. Community Organizations and Public Agencies

Organization/ Public Agency	Responsible GSA			Contact Information
	Pleasant Valley	City of Coalinga	Fresno Co. – PV	
Water/Other Districts				
Pleasant Valley Water District	X			Contact: Brad Gleason, President Address: Post Office Box 468, Coalinga, CA 93210 Email: bgleason@westhillsfinancial.com
Coalinga-Huron Cemetery District	X			Contact: Virginia Lopez Address: PO Box 447, Coalinga, CA 93210 Telephone: (559) 630-5447; Email: lopezvirginia1191@yahoo.com; coalingahuroncemetery@yahoo.com
Coalinga-Huron Library District		X		Contact: Mary Leal, Library Director Address: 305 N. 4th Street, Coalinga, CA 93210 Telephone: (559) 935-1676
Coalinga-Huron Mosquito Abatement District	X	X	X	Contact: Ralph Baiza, General Manager Address: PO Box 478, Coalinga, CA 93210 Telephone: (559) 935-3198
Coalinga-Huron Recreation and Parks District		X		Contact: Lisa Gonzalez, General Manager Address: Post Office Box 386, Coalinga, CA 93210 Telephone: (559) 935-0727; Email: jroderick@chrpd.org

Organization/ Public Agency	Responsible GSA			Contact Information
	Pleasant Valley	City of Coalinga	Fresno Co. – PV	
Municipal Agencies				
City of Coalinga		X		Contact: Sean Brewer, Assistant City Manager Address: 155 West Durian, Coalinga, CA 93210 Telephone: (559) 935-1533; Email: sbrewer@coalinga.com
County of Fresno			X	Contact: Glenn Allen, Public Works & Planning Address: 2220 Tulare Street, 6th Floor, Fresno, CA 93721 Telephone: (559) 600-9672; Email: glallen@fresnocountyca.gov
Agriculture/Oil Industry/Commercial Organizations				
Aera Energy, LLC *(oil company)*			X	Address: 29010 Shell Road, Coalinga, CA 93210 Telephone: (559) 935-7400; Website: www.aeraenergy.com
Almond Board of California	X		X	Address: 1150 Ninth Street, Suite 1500, Modesto, CA 95354 Telephone: (209) 549-8262; Email: staff@almondboard.com
California Fresh Fruit Association *(formerly California Grape & Tree Fruit League)*	X		X	Address: 7647 N. Fresno St., Suite 103, Fresno, CA 93720 Telephone: (559) 226-6330; Email: gradonovich@cafreshfruit.com
California Independent Petroleum Association (CIPA)	X	X	X	Contact: Willie Rivera, Director of Regulatory Affairs Telephone: (661) 395-5287; Email: willie@cipa.org
California Pistachio Research Board	X		X	Address: 4938 E. Yale Avenue, Suite 102, Fresno, CA 93727 Telephone: (559) 255-6480; Email: admin@acpistachios.org; bobk@acpistachios.org
Central Valley Meat Co. (Harris Ranch Beef)	X		X	Contact: Brian Coelho, President & CEO Corporate Address: 10431 8-3/4 Avenue, Hanford, CA 93230 Address: 29475 Fresno-Coalinga Road, Coalinga, CA 93210 Telephone: (559) 583-9624; Email: brian@centralvalleymeat.com
Chevron Corporation	X	X	X	Contact: Cody Tolbert Address: Post Office Box 1392, Bakersfield, CA 93311 Local Address: 39405 S. Derrick Avenue, Coalinga, CA 93210 Telephone: (661) 654-7296 Email: CodyTolbert@chevron.com
Coalinga Feed Yard	X		X	Contact: Jim Anderson, Craig Finster Address: 35244 Oil City Road, Coalinga, CA 93210 Telephone: (559) 935-0836; Email: jsafarms@lightspeed.net; craigfinster@yahoo.com
Fresno County Farm Bureau	X		X	Contact: Kayleena Speakman, Communications & Operations Manager Address: 1274 W. Hedges Avenue, Fresno, CA 93728 Telephone: (559) 237-0263; Email: info@fcfb.org

Organization/ Public Agency	Responsible GSA			Contact Information
	Pleasant Valley	City of Coalinga	Fresno Co. – PV	
Granite Construction		X	X	Contact: Courtney DePorto, Environmental Coordinator, Valley Region Address: 4001 Bradshaw Road, Sacramento, CA 95827 Telephone: (916) 855-4514; Email: courtney.deporto@gcinc.com
Harris Farms	X		X	Contact: John Harris, Company Chairman Address: 21011 E. Trimmer Springs Road, Sanger, CA 93657 Telephone: (800) 742-1955; Email: JohnHarris@HarrisFarms.com
Harris Ranch Inn & Restaurant				Contact: Brad Reynolds, General Manager Address: 24505 West Dorris Avenue, Coalinga, CA 93210 Telephone: (559) 935-0717; Email: Brad.Reynolds@HarrisFarms.com
Phillips 66 *(oil company)*			X	Address: 256 E. Polk Street, Coalinga, CA 93210 Telephone: 559) 935-0388
Sequoia Packing Company		X		Contact: David Grimes, General Manager Address: 500 Enterprise Parkway, Coalinga, CA 93210 Mailing Address: Post Office Box 1015, Coalinga, CA 93210 Telephone: (559) 934-1763; Email: david@degrimes.com
University of California Cooperative Extension, Fresno County	X		X	Contact: Karmjot Randhawa, County Director Address: 550 E. Shaw Avenue, Suite 210-B, Fresno, CA 93710 Telephone: (559) 241-7515; Email: kgrandhawa@ucanr.edu
West Hills Oil, Inc.	X		X	Contact: Scott Cain, President Address: 485 W. Elm Avenue, Coalinga, CA 93210 Telephone: (559) 935-1687; Email: amy@westhillsoil.com
Wonderful Farms	X		X	Contact: Address: Telephone: Email:
Environmental Justice Organizations				
Self-Help Enterprises		X		Contact: Paul Boyer, Program Director Address: Post Office Box 6520, Visalia, CA 93290 Telephone: (559) 802-1681; Email: paulb@selfhelpenterprises.com
Service Organizations				
Coalinga Area Chamber of Commerce		X		Contact: Benjamin Kahikina III, Executive Director Address: 265 W. Elm Avenue, Coalinga, CA 93210 Telephone: (559) 935-2948; Email: exec@coalingachamber.com
Coalinga Elks Lodge #1613		X		Mailing Address: Post Office Box 1013, Coalinga, CA 93210 Physical Address: 200 Cambridge Avenue, Coalinga, CA 93210 Telephone: (559) 935-1613; Email: tamaranebelung@gmail.com
Coalinga Fraternal Order of Eagles #1872		X		Address: 156 W. Durian Avenue, Coalinga, CA, 93210 Telephone: (559) 934-1827

Organization/ Public Agency	Responsible GSA			Contact Information
	Pleasant Valley	City of Coalinga	Fresno Co. – PV	
Coalinga Lions Club		X		Address: Post Office Box 201, Coalinga, CA 93210 Telephone: (559) 935-1954
Kiwanis Club of Coalinga		X		Address: Post Office Box 404, Coalinga, CA 93210 Telephone: (559) 935-2941
State and Federal Facilities				
Bureau of Land Management – Coalinga Mineral Springs				Contact: Central Coast Field Office Address: 940 Second Avenue, Marina, CA 93933 Telephone: (831) 582-2200; Email: BLM_CA_Web_CC@blm.gov
California Department of Fish and Wildlife	X			Contact: Andrew G. Gordus, Ph. D., Staff Toxicologist/Region 4 SGMA Physical Address: 1234 East Shaw Ave., Fresno, CA 93710 Telephone: (559) 243-4014 x 239; Email: Andy.Gordus@wildlife.ca.gov
Department of State Hospitals – Coalinga		X		Contact: Brandon Price, Executive Director Physical Address: 24511 W. Jayne Ave, Coalinga, CA 93210 Mailing Address: Post Office Box 5000, Coalinga, CA 93210 Telephone: (559) 935-4300
Pleasant Valley State Prison (CDCR)		X		Contact: Scott Frauenheim, Warden Physical Address: 24863 W. Jayne Ave, Coalinga, CA 93210 Mailing Address: Post Office Box 8500, Coalinga, CA 93210 Telephone: (559) 935-4900

II.C.1 School Districts

School districts within the Pleasant Valley Subbasin boundary are listed in **Table II-6** and reflected in **Figure II-1.** The schools receive their water from the City of Coalinga and should be included in the stakeholder outreach process. In addition, schools are an avenue for communicating with other stakeholders whose students attend the schools, particularly families within the rural areas who are agricultural users and domestic well owners or reside in a disadvantaged area.

Table II-6. School Districts within the Pleasant Valley Subbasin

School Districts	Responsible GSA			Contact Information
	Pleasant Valley GSA	City of Coalinga GSA	Fresno Co. - PV	
Coalinga-Huron Unified School District	X	X	X	Contact: Lori Villanueva, Superintendent Address: 657 Sunset Street, Coalinga, CA 93210 Telephone: (559) 935-7500; Email: lvillanueva@chusd.org Website: www.chusd.org
West Hills College, Coalinga	X	X		Contact: Brenda Thames, President Address: 300 Cherry Lane, Coalinga, CA 93210 Telephone: (559) 934-2200; Email: brendathames@whccd.edu Website: www.westhillscollege.com

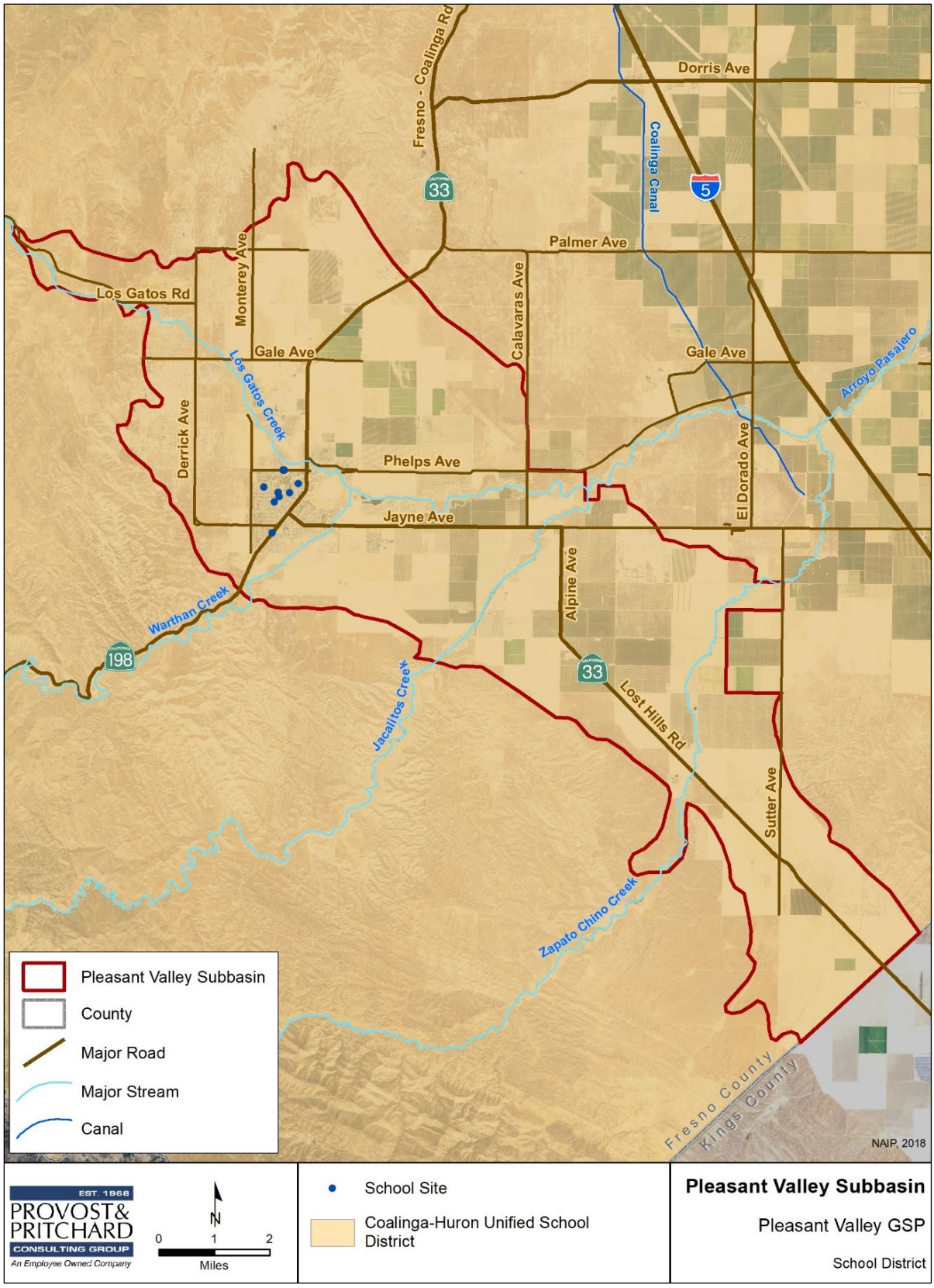


Figure II-1. School Districts within the Pleasant Valley Subbasin

D. Interested Persons List

SGMA Section 10723.4 "Maintenance of Interested Persons List" states:

> *"The groundwater sustainability agency shall establish and maintain a list of persons interested in receiving notices regarding plan preparation, meeting announcements, and availability of draft plans, maps, and other relevant documents. Any person may request, in writing, to be placed on the list of interested persons."*

In compliance with the SGMA requirement, the Pleasant Valley GSA established and maintains a list of interested persons on behalf of all three GSAs in the subbasin, and routinely distributes meeting notices and relevant information to the stakeholders who have requested to be included. Interested parties may join the interested parties list at http://sgma.pleasantvalleywaterdistrict.com/. The PVGSA will continue to grow their contact list through the process discussed in **Section V.A.4**.

III. Stakeholder Survey and Mapping

Through ongoing communications and public education and outreach efforts described in **Section V**, stakeholders will have the opportunity to have a voice in the GSP development process. This section discusses in detail the preliminary discussion with primary stakeholders, and conducting verbal Stakeholder Surveys, which will be a valuable source in collecting feedback from target audiences who have vested interests in how the implementation of the GSP will affect their interests.

A. Stakeholder Survey

III.A.1 Identification of Stakeholder Issues, Interests and Challenges

Stakeholder issues, interests and anticipated challenges are routinely discussed in Subbasin Management Team, Board of Directors, and ad-hoc committee meetings. Board members represent the interests of the stakeholders identified for the Pleasant Valley Subbasin GSAs (**Table II-2**, **Table II-3**, and **Table II-4**). Stakeholder surveys may be conducted through stakeholder meetings to solicit input to identify issues, interests and challenges stakeholders are facing and concerned about. **Table III-1** outlines preliminary concerns, which will be taken into consideration during the GSP development process and used as a basis for the development of fact sheets and public meeting presentations for public outreach opportunities.

Table III-1. Stakeholder Issues, Interests & Challenges

Stakeholder Issues, Interests & Challenges	
Top Concerning Issues Regarding Groundwater Usage and SGMA:	• Economic impacts (loss of jobs, loss of complete industries, loss of tax revenue due to decrease in land values of fallowed ground) • Government regulations and involvement (i.e. SGMA and ILRP), and the impacts on investments and livelihoods • Over pumping and the subsequent legislation (over-regulation) • Long-term water quantity and quality • Fallowing of farmland (loss of production) • Negative impacts on oil production within the subbasin • Water allocations for domestic use vs. agriculture production with SGMA implementation • Dry wells • Legal rights to groundwater (concerns of unequal representation amongst landowners) • Water usage (surface water vs. groundwater) • Decreased quality of food for California and the United States as a whole • Concerns that the cost for SGMA implementation will not be shared equitably between beneficial users of groundwater

III.A.2 Survey Questions

Stakeholders need to have an opportunity to be heard during the GSP development process, in addition to the involvement of the active stakeholders who represent their interests. The verbal Stakeholder Survey is a way to gather information from these individuals. As previously mentioned, the process for conducting the Stakeholder Survey will be conducted as one-on-one discussions with stakeholders.

Survey questions recommended by the DWR are listed below:

1. Are you familiar with Sustainable Groundwater Management Act (SGMA) regulations?
2. Are you currently engaged in activity of discussions regarding groundwater management in this region?
3. Do you own or manage/operate land in this region?
4. Do you manage water resources? If yes, what is your role?
5. What is your primary interest in land or water resources management?
6. Do you have concerns about groundwater management? If so, what are they?
7. Do you have recommendations regarding groundwater management? If so, what are they?

Subbasin management may add questions during discussions that specifically pertain to information and feedback needed from stakeholders and industries the GSAs' boundaries.

B. "Lay of the Land" Overview

Results from Stakeholder Surveys will be compiled into an informal "Lay of the Land Overview" to categorize the feedback received so the technical team can utilize the information during the GSP development phase. This information will be noted by:

- Type of stakeholder
- Key interests related to groundwater
- Key issues (documented or specific issues of past events)
- Responses to survey questions

Results may also be used as a basis for the development of fact sheets and key messages and talking points (**Section IV**), as necessary to educate and inform stakeholders effectively.

III.B.1 Types of Stakeholders

Types of stakeholders with the greatest interests in the GSP development and resulting implementation efforts to reach groundwater sustainability include agricultural users, domestic well owners, municipal well operators, public water systems, surface water users, and disadvantaged communities.

One-on-one conversations and collaborative discussions will include agricultural users, domestic well owners, surface water users, municipal well operators, public water system operators, local land use agencies, groundwater monitoring entities, state and federal representatives, and residents of disadvantaged communities.

III.B.2 Stakeholder Key Interests Related to Groundwater

The key interests of stakeholders related to groundwater within the Pleasant Valley Subbasin boundary include:

- Drinking water
- Domestic, everyday usage
- Agriculture – Farming, livestock
- Oil production and other industrial uses

IV. Messages and Talking Points

Key messages and talking points will be broken down by phases and stakeholder groups, as different factors and issues will affect different groundwater interests. These messages and talking points are also prone to evolve as the GSP is developed, leaving this section open to being amended and finetuned as communication and engagement efforts move forward.

Fact sheets reflecting key messages will be developed, as needed, and tailored for the specific GSP development, public review and implementation phases, and made available for public education efforts described in **Section V.A.3.2**.

IV.A.1 Key Messages & Talking Points

IV.A.1.1 Universal Key Messages

Universal key messages will be a consistent part of information provided throughout all phases of GSP development, public review, and implementation.

- What is SGMA
- Common Uses of Groundwater
- What is the Role of a GSA
- Pleasant Valley Subbasin's Overall Goal – Work collaboratively at the subbasin level to meet groundwater sustainability requirements with minimal impacts to the beneficial users of groundwater within the subbasin boundary
- GSA Purpose Statements
  - **Pleasant Valley GSA:** To serve as the lead GSA in the preparation of the GSP, working cooperatively with the City of Coalinga GSA and Fresno County – Pleasant Valley GSA Area, to develop and implement a GSP that will sustainably manage groundwater with the Pleasant Valley Subbasin
  - **City of Coalinga GSA:** To serve as the GSA for the land within the city limits, and coordinate efforts with the Pleasant Valley GSA and the Fresno County Pleasant Valley GSA Area to prepare and implement a GSP for the Pleasant Valley Subbasin
  - **Fresno County Pleasant Valley GSA Area:** To represent the groundwater interests of "white area" landowners (areas within Fresno County not represented by another agency) within the Pleasant Valley GSA, while coordinating efforts with the Pleasant Valley GSA and City of Coalinga GSA in the development and implementation of a GSP

IV.A.1.2 Phase 1: GSA Formation and Coordination

The Phase 1: GSA Formation and Coordination has been completed. During this phase, key messages centered around developing the Boards of Directors, official formation of the GSAs, and soliciting individuals who represent the interests of all beneficial usages and users of groundwater within the Pleasant Valley Subbasin boundary, filling the leadership seats, selecting technical consultants, and forming the Subbasin Management Team.

IV.A.1.3 Phase 2: GSP Preparation and Submission

The Pleasant Valley Subbasin may develop a presentation to be used at various community meetings, along with a corresponding fact sheet as a take-home. The fact sheet will be made available on PVGSAs' website, as well as distributed at public outreach meetings and community organization presentations, and with stakeholder surveys. In addition to the universal key messages, the presentation and fact sheet for the GSP development and submission phase may include:

- Timeline of the GSP process
- Industry-related water usage and economic impacts – Common practices and conservation efforts
- Top concerns – Everyday usage/lifestyle impacts, economic impacts, land fallowing
- Direction on providing input/voicing concerns (outreach meetings, stakeholder surveys)

IV.A.1.4 Phase 3: GSP Review and Evaluation

Once the draft of the Pleasant Valley Subbasin's GSP is completed, GSAs may develop a second presentation and corresponding fact sheet, which may consist of a recap of universal key messages, and the following:

- Timeline of the public review phase, and date of public hearing
- Main points/overview of the GSP
- Process for public review of GSP draft and providing comments to the Pleasant Valley Subbasin Management Team
- What to expect next
- Additional key messages may be added for this phase

IV.A.1.5 Phase 4: Implementation and Reporting

Once the Pleasant Valley Subbasin's GSP has been submitted to the DWR, the implementation phase will begin, and key messages will be developed with a focus on implementation efforts that affect stakeholder groups, which may result in tailored presentations and corresponding fact sheets (i.e. oil industry and agriculture industry presentations may have different talking points). As with the previous phases, universal key messages will be included.

IV.A.2 Likely Questions or Issues and Responses

The "Likely Questions or Issues" list in **Table IV-1** will evolve through the GSP development, public review and implementation phases. This table may expand as additional questions surface throughout the phases, and responses will be updated as the Pleasant Valley Subbasin's GSP is developed and answers are more clearly defined.

Table IV-1. Likely Questions or Issues

Likely Question or Issue	Response	Phase
"Will I have to fallow my land?"	That information has not been determined yet, as we are in the preliminary stages of GSP development.	All
"How will the Pleasant Valley Subbasin GSP address rural residential well owners?"	That information has not been determined yet, as we are in the preliminary stages of GSP development.	Phase 1, 2 & 3
"How can I voice my concerns about how SGMA is going to affect me?"	The public is invited to attend GSA Board of Directors meetings to be informed about the progress of GSA and GSP development. Public outreach meetings will be held in 2020 and 2021, and the public can participate in the development of the GSP through the public meetings.	Phase 1, 2 & 3
"When will I have to cut back groundwater pumping?"	Once the GSP has been submitted to the DWR in January 2022, the Pleasant Valley Subbasin GSAs will begin the implementation phase. The parameters around the amount of groundwater pumping will be determined in the GSP.	All
"How much water are we going to be able to pump?"	That information has not been determined yet, as we are in the preliminary stages of GSP development.	All
"Are our ag pumps going to be metered? If so, who is going to pay for it?"	That information has not been determined yet, as we are in the preliminary stages of GSP development.	All
"Can groundwater management activities improve water challenges in DACs?"	That information has not been determined yet, as we are in the preliminary stages of GSP development.	All
"Does SGMA require that groundwater levels always remain the same, or will they be able to rise and fall somewhat in wet and dry years?"	No, SGMA does not require that groundwater levels always remain the same. SGMA only requires that groundwater supplies be managed in a manner that can be maintained without causing undesirable results.	All
"What will happen if the Pleasant Valley Subbasin GSP doesn't get submitted to DWR by January 2022, as required?"	If the Pleasant Valley Subbasin GSP isn't submitted by the deadline, the State Water Resources Control Board will intervene and take control and regulate groundwater usage within the subbasin.	Phase 1, 2 & 3
"DWR has described GSPs as adaptive. Does that mean they will be modified as new monitoring data becomes available to GSAs?"	The initial GSP must identify any data gaps. The GSP will also have a monitoring program, and as new monitoring data becomes available, the plan will be updated every five years.	All
"How will future city and community development be handled in relation to their allowed groundwater pumping?"	While SGMA requires coordination with land use planning agencies, future development areas must have proven water sources outside of SGMA. The GSAs will work with the land use planning agencies to evaluate future development needs and determine how it will be incorporated into the GSP.	All

V. Venues for Engaging

There are a variety of opportunities, venues and methods for the Pleasant Valley GSAs to connect with and engage stakeholders throughout GSA formation, GSP development, GSP review, and GSP implementation phases. Stakeholder groups identified in **Section II** will be engaged in communication efforts as detailed in this section.

A. Direct Stakeholder Outreach

V.A.1 Collaboration Meetings – Active Stakeholders

As detailed in **Section II.A**, regular meetings with active stakeholder groups will be held during their regularly scheduled times. Members of the public and partners from other local agencies are encouraged to attend Pleasant Valley Subbasin GSAs' Boards of Directors meetings to voice their thoughts and concerns throughout the GSP development, public review and implementation phases. Meeting notices and agendas are routinely distributed to the Interested Parties List and are posted on the individual GSAs' websites, though the PVGSA website will be the primary website for the entire subbasin (**Table V-2**).

Active stakeholder meeting days, times and locations are listed in the following subsection.

V.A.1.1 Boards of Directors Meetings

- **Pleasant Valley GSA:** GSA Board of Directors meets the fourth Tuesday of every other month in January, March, May, July, September and November, following the PVWD Board of Directors' meeting at 10 a.m. at Harris Ranch Inn & Restaurant, located at 24505 W. Dorris Avenue in Coalinga, California.
- **City of Coalinga GSA:** City Council meetings are held the first and third Wednesday of each month at 6 p.m. at City Hall, located at 155 West Durian in Coalinga, California.
- **Fresno County Pleasant Valley GSA Area:** Board of Supervisor meetings are held the first and third Tuesdays of each month (unless otherwise posted) at 9 a.m. at the Board Chambers, located in the Hall of Records, 2281 Tulare Street on the third floor in Fresno, California.

V.A.2 Educational/Outreach Public Meetings

V.A.2.1 Stakeholders

Educational/outreach public meetings will be scheduled for Phase 2: GSP Preparation and Submission, Phase 3: GSP Review and Evaluation, and Phase 4: Implementation and Reporting (see **Section VI** for the meeting schedules). These meetings will be important as the GSP will affect all groundwater users within the Pleasant Valley Subbasin GSAs' jurisdictions, and the impact of the SGMA implementation is significant. Stakeholders are already inquiring about the impacts of implementation, while many stakeholders are unaware of the SGMA. Spanish translation services will be available at educational/outreach public meetings, if needed.

- **Phase 2: GSP Preparation and Submission –** Public meetings held during Phase 2 will be geared towards an overview of SGMA, overview of the GSP development process, public review and implementation (what stakeholders can expect), distribution of stakeholder surveys and solicitation of stakeholder input, and question/answer sessions. This segment of public meetings will give

stakeholders an opportunity to be involved in GSP development and share their thoughts and concerns. Possible venues within the Pleasant Valley Subbasin are listed in **Table V-1**. Presentations will be given at GSAs' board and council meetings, and a maximum of two subbasin-wide outreach meetings will be held for stakeholders identified in **Table II-2**, **Table II-3**, and **Table II-4**.

- **Phase 3: GSP Review and Evaluation –** During Phase 3, the draft of the Pleasant Valley Subbasin GSP will be distributed for public review. During the public review period, public meetings will be held at the same venues as during Phase 2 (**Table V-1**). The presentation will include an overview of the GSP and will give stakeholders the opportunity to comment on the draft in a public forum. Presentations will be given at government agency meetings, and at maximum of two subbasin-wide outreach meetings will be held for stakeholders.

  At the conclusion of the 90-day public review period, a subbasin-wide public hearing will be held for stakeholders to provide oral and/or written comments before the GSP is finalized. The public hearing will be noticed in local newspapers 90 days and 45 days prior.

- **Phase 4: Implementation & Reporting –** Public meetings will be crucial during Phase 4 and will likely be ongoing to educate stakeholders on implementation requirements and guide them through the steps to compliance and groundwater sustainability.

V.A.2.2 Industry Organizations, Community Organizations & Other Entities

Industry and community organizations, public agencies and other entities are listed in **Table II-5**, and will be contacted to invite representatives of the respective organizations to attend and participate in the scheduled GSA meetings throughout the GSP development phase. If possible, one-on-one meetings may be scheduled to gather input from these stakeholders. Discussions will likely include an overview on SGMA and why it is important to them, an explanation of the GSP development process, including an awareness of the public review period. In addition, the Pleasant Valley Subbasin GSAs will work with these organizations throughout the GSP development and public review process to distribute public outreach meeting notices, and educational information via email distribution, social media posts, and printed materials.

V.A.2.3 Meeting Notification Process

Stakeholders will be invited to public meetings through distribution of meeting notices to Pleasant Valley Subbasin GSAs' member agency distribution list maintained by the PVGSA. In addition, community organizations' contact lists, and press releases and public service announcements may also be used. Press releases will be distributed to local media outlets announcing the meeting dates, times, and locations. Local community organizations, such as the Fresno County Farm Bureau, may be asked to distribute meeting notices via email blasts to their membership/contact lists.

V.A.2.4 Ideal Venues

Venue locations will need to have a capacity to hold large audiences. The location list in **Table V-1** will be updated with additional information and other venue possibilities as meetings are scheduled, and venue availability and rental price is confirmed. Pleasant Valley Subbasin outreach meetings will be held in central locations for all stakeholder types.

Due to the COVID-19 pandemic, outreach meetings will be planned in accordance with restrictions in place at the time of the meetings. If in-person meetings are prohibited, outreach will be scheduled via video conference/teleconference. When in-person meetings are allowed but with social distancing requirements in effect, precautions will be taken in the meeting room set-up, while also allowing for stakeholders to join the meeting via video conference/teleconference.

Table V-1. Potential Public Meeting Venues & Locations

Venue	Location	Contact Information
Best Western Conference Room	Coalinga	Address: 1785 Jayne Avenue, Coalinga, CA 93210 Telephone: (559) 934-0101 Website: www.bestwestern.com
City of Coalinga	Coalinga	Address: City Hall, 155 West Durian, Coalinga, CA 93210 Telephone: (559) 935-1533 Website: www.coalinga.com
Coalinga Elks Lodge #1613	Coalinga	Address: 200 Cambridge Avenue, Coalinga, CA 93210 Contact: Tamara Nebelung, Secretary Telephone: (559) 935-1613; Email: tabaranebelung@gmail.com Website: www.elks.org/lodges/home.cfm?LodgeNumber=1613
Harris Ranch Restaurant & Inn	Coalinga and surrounding areas	Address: 24505 W. Dorris Avenue, Coalinga, CA 93210 Telephone: (559) 935-0717; Email: service@harrisranch.com Website: www.harrisranch.com
Keck Park Community Center	Coalinga	Address: 555 Monroe-Coalinga Street, Coalinga, CA 93210 Contact: Jean Roderick or Ana Ibarra, Coalinga-Huron Recreation & Park District Telephone: (559) 935-0727; Email: jroderick@chrpd.org Website: https://chrpd.org
West Hills Community College	Coalinga	Address: Theater, 300 W. Cherry Lane, Coalinga, CA 93210 Telephone: (559) 943-2000 Website: www.westhillscollege.com

V.A.3 Printed Communication

V.A.3.1 Branding

Branding is defined as the process of creating distinctive and durable perceptions in the minds of a target audience. A brand is a specific look – a persistent, consistent, unique identity for an organization, making it easy for an audience to identify an organization through its consistent and frequent use of branding. The Pleasant Valley Subbasin GSAs have individual brands that will be incorporated in all forms of communication and engagement with the public, which includes consistent usage of official logos, fonts, and colors. When subbasin-wide visual and printed materials are developed, all three logos will be utilized. The Pleasant Valley Subbasin GSAs' Branding Summary are included in their respective appendices.

V.A.3.2 Printed Materials

Printed materials will incorporate the visual imagery established through branding efforts and will be tailored for specific means of communication throughout the phases of GSP development, public review, and implementation. Printed materials will be translated into Spanish, if necessary, for a specific target audience.

- **Fliers –** Fliers may be designed and tailored for secondary stakeholder audiences and will encompass infographics and text with key messages that are pertinent for that phase of GSP development. Distribution may be via website posting, direct mail, email, and direct distribution as handouts at schools, community organization meetings, GSA and subbasin outreach meetings.
- **Fact Sheets –** Fact sheets may be developed and updated for each of the GSP phases and will include a section with an overview of SGMA facts, and development, public review, and implementation timelines. Fact sheets will be available for download on the Pleasant Valley Subbasin GSAs' individual websites, distributed at public meetings and industry/community organization meetings, and emailed to the Interested Parties Lists and other community organizations' email distribution lists.
- **Letter Correspondence –** When letter correspondence is necessary, particularly during the public review and implementation phases, letters will be distributed via email and/or direct mail. Letters will include pertinent facts and explanations that need to be communicated to specific stakeholder groups. Notification letters will be sent to public agencies and government entities when the GSP is released for the 90-day public review.
- **Presentation Materials –** Power Point presentations will be utilized at educational/outreach public meetings. If a Power Point isn't possible to display for a meeting, display boards printed at 24-inch x 36-inch or larger in size will be used and set up on easels. Handouts of presentations and smaller versions of display boards can be distributed to stakeholders in attendance, emailed to the Interested Parties list, and posted on individual GSAs' websites for stakeholders to access, particularly if they were unable to attend.
- **Newsletter –** Annual or bi-annual newsletters may be created during the GSP implementation phase to inform stakeholders of compliance requirements and groundwater sustainability updates, opportunities, and programs within the Pleasant Valley Subbasin. If developed, the newsletter will be distributed to stakeholders within the subbasin boundary and to those on the Interested Parties Lists, posted on individual GSAs' websites, and to others who have specific roles during the GSP development, public review and implementation phases. The ideal timeframe to develop and distribute the annual newsletter is following the submittal of the Annual Report each year.
- **Other Printed Materials –** Other printed materials may be developed during the GSP development, public review and implementation phases.

V.A.4 Digital Communication

Digital communication outlets will also be designed to incorporate Pleasant Valley Subbasin GSAs' branding and will be a significant mode of communication through the GSP development, public review and implementation phases.

- **Websites –** Public meeting notices, agendas and minutes of the Board of Directors and ad-hoc committee meetings will be posted on the individual GSAs' websites, with the PVGSA website serving as the integral resource for all stakeholders within the Pleasant Valley Subbasin. The City's website and Fresno County's website will include a link to the PVGSA site. These websites will serve as integral resources for stakeholders within the Pleasant Valley Subbasin boundary. Electronic files

of printed materials, presentations and other educational resources will be accessible via the websites. This will serve as a way for stakeholders to easily educate themselves on the GSP process and phases.

Table V-2. Pleasant Valley Subbasin GSAs' Websites

GSA	Website
Pleasant Valley GSA	https://sgma.pleasantvalleywaterdistrict.com
City of Coalinga GSA	https://www.coalinga.com/442/Sustainable-Groundwater-Management-Act
Fresno County Pleasant Valley GSA Area	https://www.co.fresno.ca.us/departments/public-works-and-planning/divisions-of-public-works-and-planning/water-and-natural-resources-division/pleasant-valley-sub-basin

- **Email Distribution –** As required by SGMA 10723.4 "Maintenance of Interested Persons List," the Pleasant Valley GSA maintains a subbasin-wide contact list and regularly distributes emails to those who have expressed interest in the GSPs' progress. These emails consist of meeting notices and other documents that are pertinent to the Pleasant Valley Subbasin GSAs and their communication efforts. This process will continue.

  Email blasts for meeting notices, stakeholder surveys, public review notices, and other crucial information will be coordinated with community organizations and stakeholder groups by utilizing their distribution lists. Examples of these organizations are Fresno County Farm Bureau, Self-Help Enterprises, Coalinga Chamber of Commerce, and irrigation and special districts within the subbasin boundaries. A complete working list of organizations are listed in **Table II-5**.

V.A.5 Media Coverage

Press releases and public service announcements (**PSA**) may be written and distributed to the media list of local newspaper publications, and other media outlets. These press releases and PSAs will focus on notification of public engagement opportunities such as targeted stakeholder meetings, stakeholder survey circulation, public review/comment processes and opportunities, and GSP implementation.

Direct story pitches may be made when necessary via direct communication with news outlets throughout GSP development and implementation phases. These story pitches will focus on GSP development status updates, how public input is being used, and general overview of SGMA and how it will affect stakeholders (residents and industry) within the Pleasant Valley Subbasin boundary.

Table V-3. Pleasant Valley Subbasin Media Outlets

Media Outlet	Submission Information
Ag Wire *(weekly e-newsletter, Fresno County Farm Bureau)*	Submit: info@fcfb.org Website: www.fcfb.org; Telephone: (559) 237-0263
Agriculture Daily *(monthly publication, Fresno County Farm Bureau)*	Submit: info@fcfb.org Website: www.fcfb.org; Telephone: (559) 237-0263
Business Journal	Submit: Online Website: www.thebusinessjournal.com; Telephone: (559) 490-3400
Fresno Bee	Submit: Joe Kieta, Editor; jkieta@fresnobee.com Website: www.fresnobee.com; Telephone: (559) 441-6307
Hanford Sentinel	Submit: editor@HanfordSentinel.com Website: www.hanfordsentinel.com; Telephone: (559) 582-0471
KMJ News Talk Radio	Submit: ruth.michaels@cumulus.com Website: www.kmjnow.com; Telephone: (559) 490-5967
Water Wrights	Submit: Don Wright, Editor; don@waterwrights.net Website: www.waterwrights.net; Telephone: (559) 355-2389

VI. Implementation Timeline

The timeline for implementing the Pleasant Valley Subbasin's Communication & Engagement Plan will be broken down by phase:

- Phase 1: GSA Formation and Coordination – 2015 through 2020 (**Figure VI-1**)
- Phase 2: GSP Preparation and Submission – 2020 through 2022 (**Figure VI-2**)
- Phase 3: GSP Review and Evaluation – 2021 through 2022 (**Figure VI-3**)
- Phase 4: Implementation and Reporting – 2022 and ongoing (**Figure VI-4**)

The timeline is tentative and subject to change with the progression of the GSP development, public review, and implementation phases.

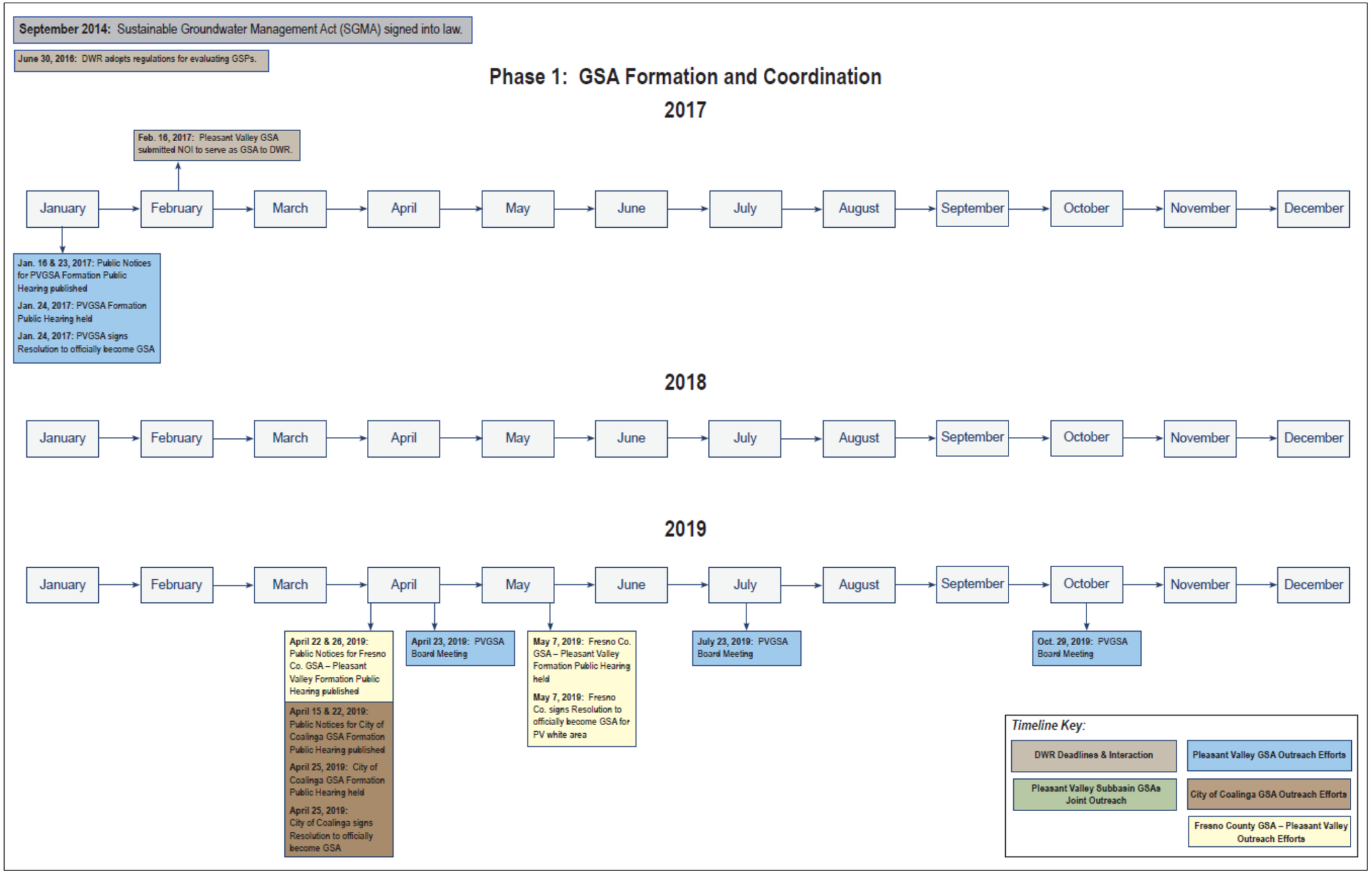


Figure VI-1. Pleasant Valley Subbasin Communication & Engagement Timeline – Phase 1: GSA Formation and Coordination

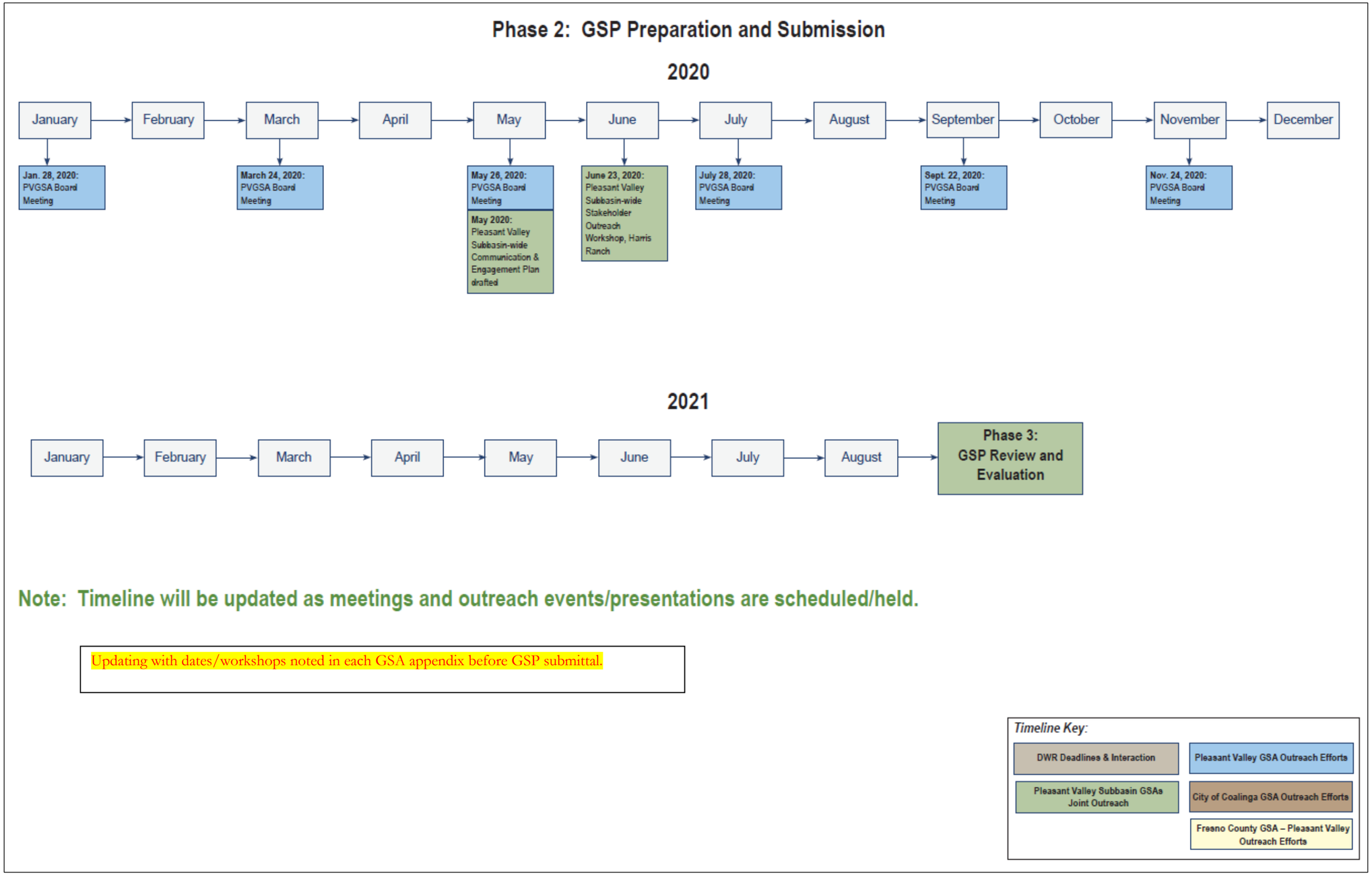


Figure VI-2. Pleasant Valley Subbasin Communication & Engagement Timeline – Phase 2: GSP Preparation and Submission

Placeholder for timeline: Updating with dates/workshops noted in each GSA appendix before GSP submittal.

Figure VI-3. Pleasant Valley Subbasin Communication & Engagement Timeline – Phase 3: GSP Review and Evaluation

Placeholder for timeline: Updating with dates/workshops noted in each GSA appendix before GSP submittal.

Figure VI-4. Pleasant Valley Subbasin Communication & Engagement Timeline – Phase 4: Implementation and Reporting

VII. Evaluation and Assessment

A. Evaluation and Assessment Process

Having an established "checks and balances" process is essential in keeping public outreach goals on target. SGMA and the resulting GSP will affect everyone within the sub-basin, and outreach efforts are meant to be all-encompassing. To evaluate and assess how outreach efforts are performing as compared to the goals and objectives detailed in the Communication & Engagement Plan, the Pleasant Valley Subbasin GSAs have established a process:

VII.A.1 Outreach Reports

GSA management will provide periodic updates to their respective GSAs' Board of Directors. These updates will include, but will not be limited to:

- Status of upcoming outreach events and recaps of past outreach events
- Milestone updates/revisions
- Review/input and approval of printed materials (fliers, fact sheets, talking points, etc.)
- Results and status updates of stakeholder surveys and/or discussions

VII.A.2 Milestone Review

Quarterly milestone reviews will be conducted for individual GSA and subbasin-level outreach efforts with the Subbasin Management Team.

These discussions may include:

- What has worked well?
- What hasn't worked as planned or could be finetuned for more effective results?
- Lessons learned
- Completed outreach efforts from the previous quarter
- Next steps

VII.A.3 Subbasin-Wide Outreach Tracking

The Pleasant Valley Subbasin GSAs will submit a summary of completed public outreach efforts to the Subbasin's Public Outreach Coordinator on a quarterly basis. The summaries will be added to the appendices in the Subbasin's Communication & Engagement Plan and will be included in the final GSP submitted to the DWR in February 2022.

Quarterly summaries should include:

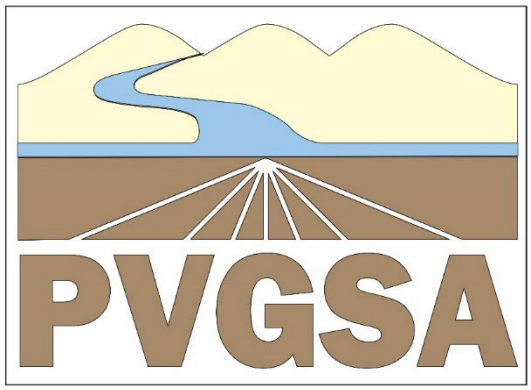
- Public outreach meetings and workshops (locations, times, target audience, number of people who attended). Public outreach meetings include board of director meetings, and City Council meetings when SGMA is an item on the agenda.
    - For each, include PDF copy of agenda, handouts, and presentation materials.
- PDFs of any distributed printed or digital materials distributed (public outreach workshop notices, informational materials posted within communities, email blasts, press releases, newsletters, etc.)
    - For each, include date distributed, methods of distribution, and number distributed to (if applicable).

Appendix A

Pleasant Valley GSA Public Outreach Tracking

GSA Branding Summary

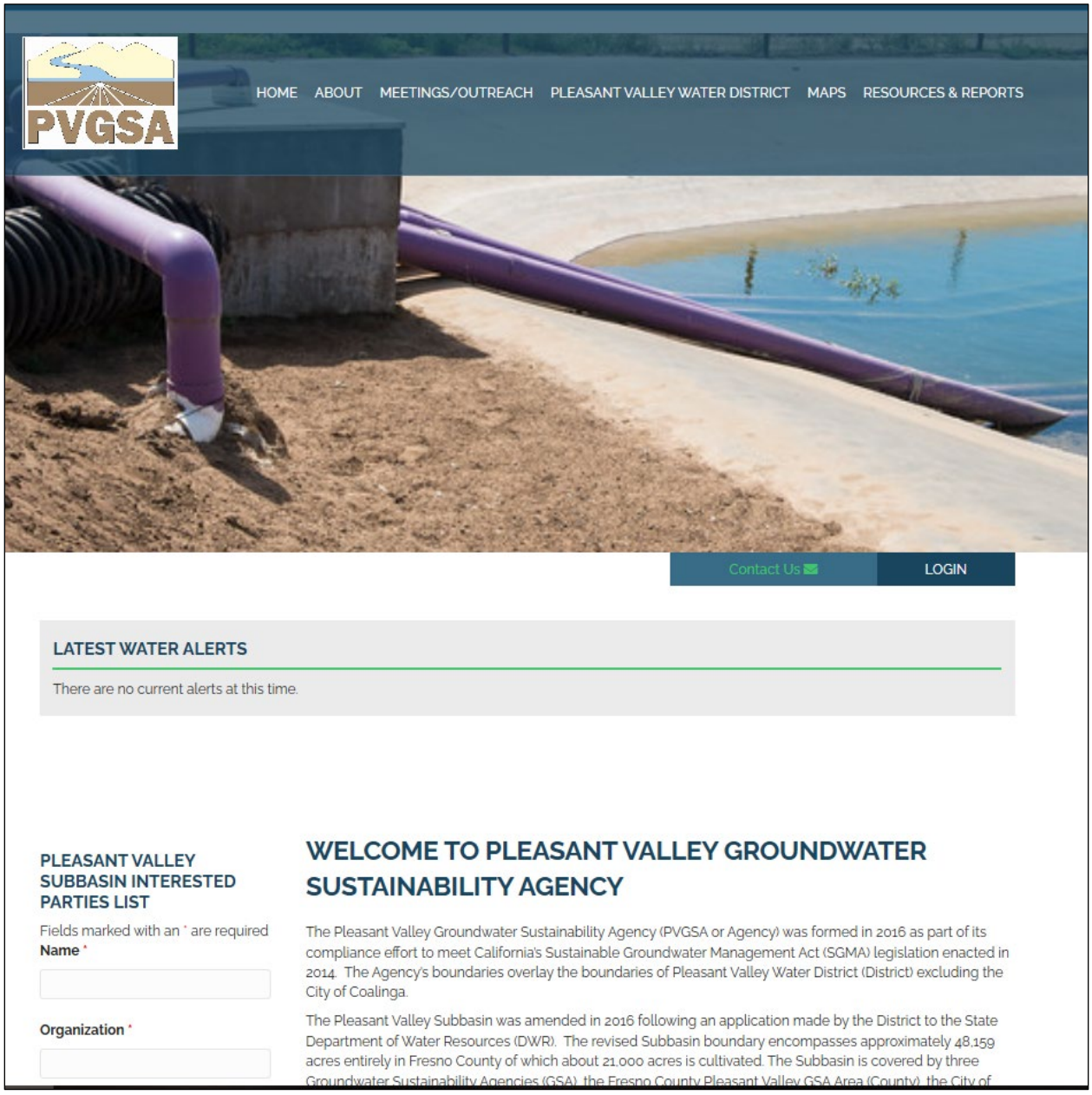
Logo



Website – http://sgma.pleasantvalleywaterdistrict.com/

The Pleasant Valley GSA's website serves as a hub for SGMA and GSP information for the Pleasant Valley GSA and the entire Pleasant Valley Subbasin, informing stakeholders about the GSA, subbasin-wide public outreach opportunities, and as a resource with SGMA-related information. With the PVGSA taking the lead in the development of the GSP for the entire subbasin, the City of Coalinga and Fresno County Pleasant Valley GSA Area will refer back to the PVGSA website and outreach materials. A site map for the PVGSA website is outlined below:

- **Homepage – sgma.pleasantvalleywaterdistrict.com**
  - Welcome/Introduction to the GSA
  - Interested Parties List
- **About – sgma.pleasantvalleywaterdistrict.com/about**
  - Quick Facts
  - Board of Directors
  - Organization/Staff
- **News & Reports – sgma.pleasantvalleywaterdistrict.com/news-and-reports**
  - Agenda
  - Minutes
  - Events
- **Pleasant Valley Water District -** http://pleasantvalleywaterdistrict.com/
- **Maps – sgma.pleasantvalleywaterdistrict.com/water-management**
- **Resources & Reports – sgma.pleasantvalleywaterdistrict.com/reports**



Picture 1. Screenshot of Pleasant Valley GSA Homepage

Completed Outreach Tracking

Pleasant Valley GSA – Presentations & Meetings		
Event	**Date**	**Location**
Pleasant Valley Water District Board of Directors Meeting	10 a.m., April 25, 2017	Harris Ranch Conference Center
Pleasant Valley Water District Board of Directors Meeting	9 a.m., October 24, 2017	Harris Ranch Conference Center
Pleasant Valley GSA Board of Directors Meeting	9 a.m., January 23, 2018	Harris Ranch Conference Center
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	Following board meeting, January 23, 2018	Harris Ranch Conference Center
Pleasant Valley GSA Board of Directors Meeting	10 a.m., March 13, 2018	Harris Ranch Conference Center
Pleasant Valley GSA Board of Directors Meeting	9:30 a.m., May 22, 2018	Harris Ranch Conference Center
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	10 a.m., May 22, 2018	Harris Ranch Conference Center
Pleasant Valley GSA Board of Directors Meeting	10 a.m., August 14, 2018	Harris Ranch Conference Center
Pleasant Valley GSA Board of Directors Meeting	10 a.m., October 30, 2018	Harris Ranch Conference Center
Pleasant Valley GSA Board of Directors Meeting	10 a.m., January 22, 2019	Harris Ranch Conference Center
Pleasant Valley GSA Board of Directors Meeting	10 a.m., April 23, 2019	Harris Ranch Conference Center
Pleasant Valley GSA Board of Directors Meeting	11:30 a.m., July 23, 2019	Harris Ranch Conference Center
Pleasant Valley GSA Board of Directors Meeting	10:30 a.m., October 29, 2019	Harris Ranch Conference Center
Pleasant Valley GSA Board of Directors Meeting	10 a.m., January 28, 2020	Harris Ranch Conference Center
Pleasant Valley GSA Board of Directors Meeting	10 a.m., March 24, 2020	Online via video conference and teleconference
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	10 a.m., June 23, 2020	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley GSA Board of Directors Meeting	10 a.m., July 28, 2020	Online via video conference and teleconference
Pleasant Valley GSA Board of Directors Meeting	10 a.m., October 6, 2020	Online via video conference and teleconference
Pleasant Valley GSA Board of Directors Meeting	10 a.m., November 17, 2020	Online via video conference and teleconference
Pleasant Valley GSA Board of Directors Meeting	10 a.m., January 26, 2021	Online via video conference and teleconference
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	11 a.m., January 26, 2021	Online via video conference and teleconference
Pleasant Valley GSA Board of Directors Meeting	10 a.m., May 25, 2021	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley GSA Board of Directors Meeting	10 a.m., July 27, 2021	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	11 a.m., July 27, 2021	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	10 a.m., August 24, 2021	Harris Ranch Conference Center; Online via video conference and teleconference

Pleasant Valley GSA – Presentations & Meetings		
Event	**Date**	**Location**
Pleasant Valley GSA Board of Directors Meeting	10 a.m., September 28, 2021	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	11 a.m., September 28, 2021	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley GSA Board of Directors Meeting	10 a.m., October 15, 2021	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley GSA Board of Directors Meeting	10 a.m., October 28, 2021	Online via video conference and teleconference
Pleasant Valley Water District & GSA Finance & Administrative Committee Meeting	1 p.m., December 8, 2021	Online via video conference and teleconference
Pleasant Valley Water District & GSA Water Policy Committee Meeting	9 a.m., December 9, 2021	Online via video conference and teleconference
Pleasant Valley GSA Board of Directors Meeting	10 a.m., December 14, 2021	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley Subbasin GSP Public Hearing	10 a.m., February 3, 2022	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley GSA Board of Directors Meeting (Adoption of Pleasant Valley Subbasin GSP)	10 a.m., February 10, 2022	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley Water District & GSA Finance & Administrative Committee Meeting	9 a.m., February 16, 2022	Online via video conference and teleconference
Pleasant Valley Water District & GSA Water Policy Committee Meeting	9 a.m., February 17, 2022	Online via video conference and teleconference

Pleasant Valley GSA – One-on-One Stakeholder Communication		
Date	**Organization**	**Notes**
May 19, 2020	Self-Help Enterprises	Email and phone call with SHE regarding DAC representation. Include on Interested Parties List to keep them informed of GSP progress and outreach events.
June 24, 2020	Granite	Request pumping data. Discuss projects.
June 24, 2020	Agriglobe	Discuss monitoring and getting water quality data
July 2, 2020	Coalinga-Huron Rec & Parks	Email inquiry on interest in SGMA and if they have any groundwater wells in their parks
August 2020	Granite	Email request for data
August 25, 2020	Hewitson Ag	Left phone message regarding SGMA and potential monitoring in south part of basin and Kings Co.
August 25, 2020	Chevron	Subbasin discussion and inquiry about Chevron operations. Send 6/23/20 workshop Power Point
August 26, 2020	Wood Ag/David Wood	Email correspondence re: SGMA and phone discussion re: monitoring in portion of basin

Pleasant Valley GSA – One-on-One Stakeholder Communication		
Date	**Organization**	**Notes**
August 27, 2020	West Hills Community College (WHCC) Farm of the Future	Email correspondence re: SGMA and farm well and potential monitoring at WHCC
August 31, 2020	Granite	Email follow-up request for data
September 2, 2020	WHCC Farm of the Future	Email follow-up discussion on continuous GPS station on farm, well locations and monitoring
September 8, 2020	Pleasant Valley State Prison	Referred to Miles Bettencourt as potential point of contact
September 10, 2020	Granite	Email request for data and well information
September 10, 2020	Coalinga Feed Yard	Phone message on well information and monitoring potential
September 10, 2020	DWR Fresno	Phone discussion on availability of well completion reports, groundwater level data and stream gage information
September 10, 2020	Wood Ag/David Wood	Email follow-up request for data
September 10, 2020	Chevron	Email follow-up request for data on water use, well locations
September 10, 2020	Leadership Council for Justice & Accountability	Email informing about PV Subbasin GSP
September 10, 2020	Hewitson Enterprise	Email message regarding SGMA and potential monitoring in south part of basin and Kings Co.
September 11, 2020	WHCC Farm of the Future	Phone discussion regarding monitoring of college wells
September 11, 2020	Leadership Council for Justice & Accountability	Amanda Monaco indicated that they are not working with organizations in the subbasin
September 14, 2020	DWR Fresno	Groundwater level monitoring that DWR is doing in Pleasant Valley
September 28, 2020	Granite	Received information on wells on Granite property
September 30, 2020	Coalinga-Huron Rec & Parks Consultant	Phone call from regarding abandoned well at Olsen Park and wanting information on groundwater quality in the subbasin. Considering well at Sports Complex. Add IP list.
October 28, 2020	Coalinga-Huron Cemetery District	Discuss water use and participation. Currently completely on imported city water. Well not keeping pressure.
November 5, 2020	Hewitson Enterprise	Letter regarding cooperation and monitoring.
December 2, 2020	Kings County Division of Water and Natural Resources Manager	Phone message regarding contact between subbasins
December 2, 2020	Worth Farms	Message regarding monitoring locations
February 18, 2021	Hewitson Enterprise	Phone call regarding monitoring.
February 19, 2021	Hewitson Enterprise	Email follow-up requesting monitoring.
February 24, 2021	Chevron	Review monitoring request and proposed RMS for levels.
March 9, 2021	Hewitson Enterprises	Reviewed proposed monitoring network and requested access to Hewitson wells. Permission denied.
March 9, 2021	Anderson & Mouren Farming	Reviewed proposed monitoring network and requested access to Anderson/Mouren wells.
March 10, 2021	Chevron	Discussed monitoring network. Permission denied to access Chevron wells.
March 2021	Nichols Farming	Discussed monitoring network and possibility of monitoring wells on their property or Kreyenhaugen lands.
March 18, 2021	Jacalitos Pistachio	Reviewed monitoring network. Verbal permission given to access their wells as RMS for quality and groundwater levels.

Pleasant Valley GSA – One-on-One Stakeholder Communication		
Date	**Organization**	**Notes**
March 25, 2021	West Hills CC Farm of the Future	Infrastructure Committee gives approval for SMC well for quality and monitoring on the college farm.
April 2021	Arnold (CA)	Agreement for monitoring discussed.
April 2, 2021	Lovelace & Sons Farming	Discussed monitoring network and possibility of monitoring wells on various Lovelace lands.
April 6, 2021	Valley Nut	Agreement for monitoring well sent.
April 6, 2021	Setton	Agreement for monitoring well sent.
April 7, 2021	Worth Farms	Agreement for monitoring discussed and sent.
April 8, 2021	Agriglobe	NVInv AF4 agreement for SMC wells sent for execution.
April 14, 2021	Gladstone	Discussed monitoring network and possibility of monitoring wells on various Gladstone lands.

It should be noted that representatives from many of the organizations, local businesses and landowners listed in the One-on-One Stakeholder Communication table attended board meetings and stakeholder workshops regularly. They also represented stakeholders with groundwater interests in not only the Pleasant Valley GSA, but the City of Coalinga GSA and Fresno County Pleasant Valley GSA. Engagement with these stakeholders was also inter-basin coordination.

Appendix B

City of Coalinga GSA Public Outreach Tracking

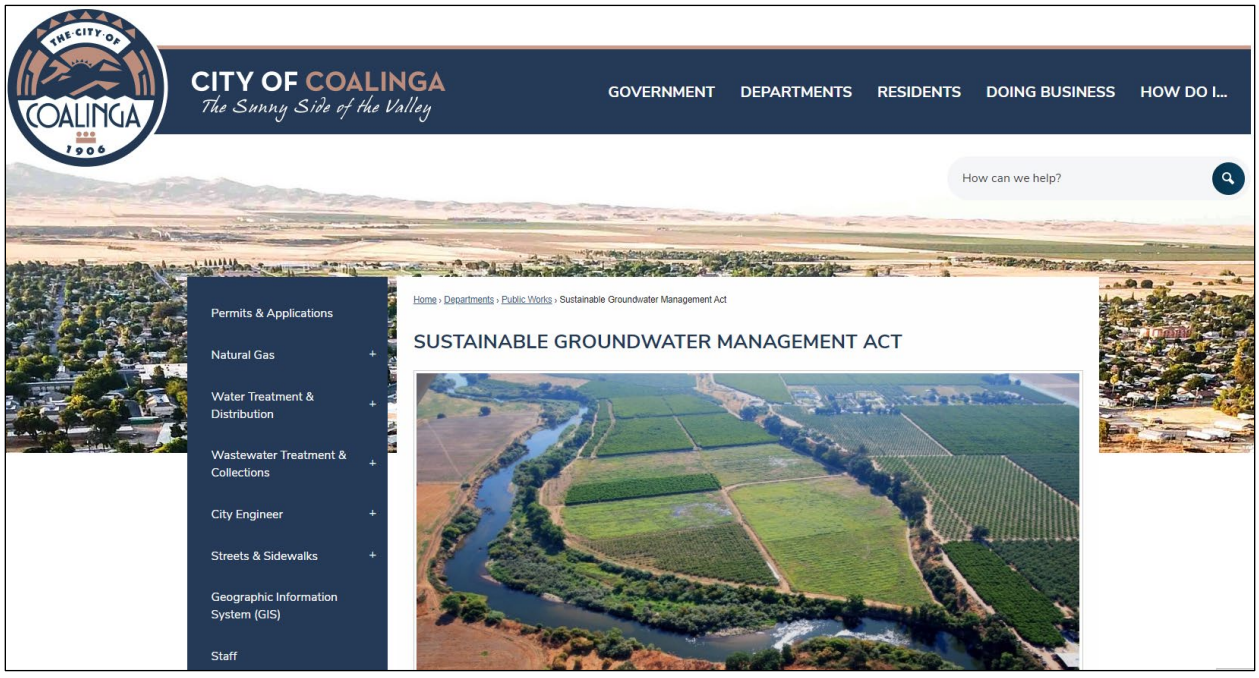
GSA Branding Summary

Logo

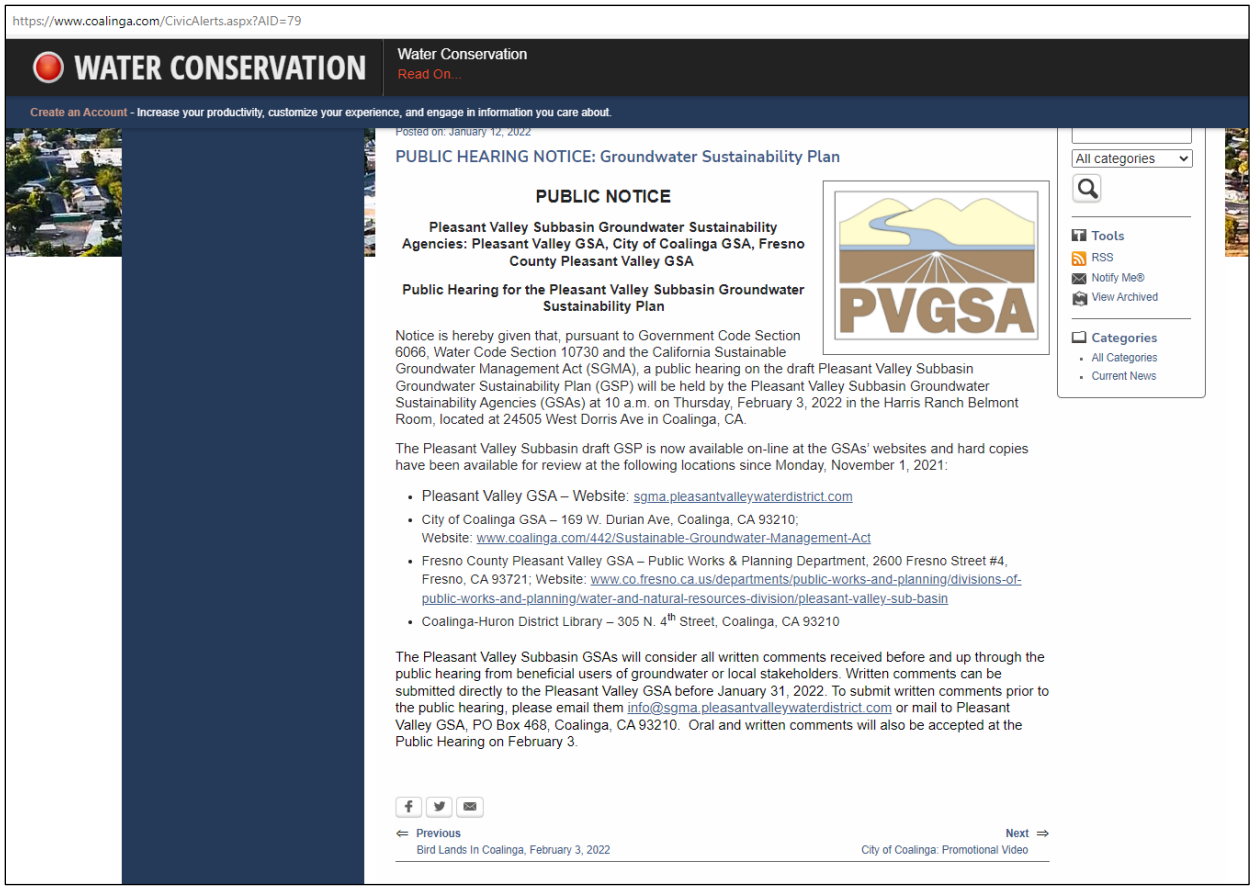
CITY OF COALINGA
The Sunny Side of the Valley

Website – https://www.coalinga.com/442/Sustainable-Groundwater-Management-Act

The City of Coalinga GSA's website serves as a hub for SGMA and GSP information for the City of Coalinga GSA, informing stakeholders about the GSA, subbasin-wide public outreach opportunities, and as a resource with SGMA-related information. With the PVGSA taking the lead in the development of the GSP for the entire subbasin, the City of Coalinga website refers back to the PVGSA website and outreach materials.



Picture 2. Screenshot of City of Coalinga GSA Homepage



Picture 3. Screenshot of Public Hearing Posting

Completed Outreach Tracking

City of Coalinga GSA – Presentations & Meetings		
Event	**Date**	**Location**
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	Following PVWD board meeting, January 23, 2018	Harris Ranch Conference Center
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	10 a.m., May 22, 2018	Harris Ranch Conference Center
City of Coalinga GSA officially formed at City Council Meeting	April 25, 2019	City Hall, City of Coalinga
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	10 a.m., June 23, 2020	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	11 a.m., January 26, 2021	Online via video conference and teleconference
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	11 a.m., July 27, 2021	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	10 a.m., August 24, 2021	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	11 a.m., September 28, 2021	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley Subbasin GSP Public Hearing	10 a.m., February 3, 2022	Harris Ranch Conference Center; Online via video conference and teleconference
City of Coalinga GSA Board of Directors Meeting (Adoption of Pleasant Valley Subbasin GSP)	6 p.m., February 17, 2022	Harris Ranch Conference Center; Online via video conference and teleconference

Appendix C

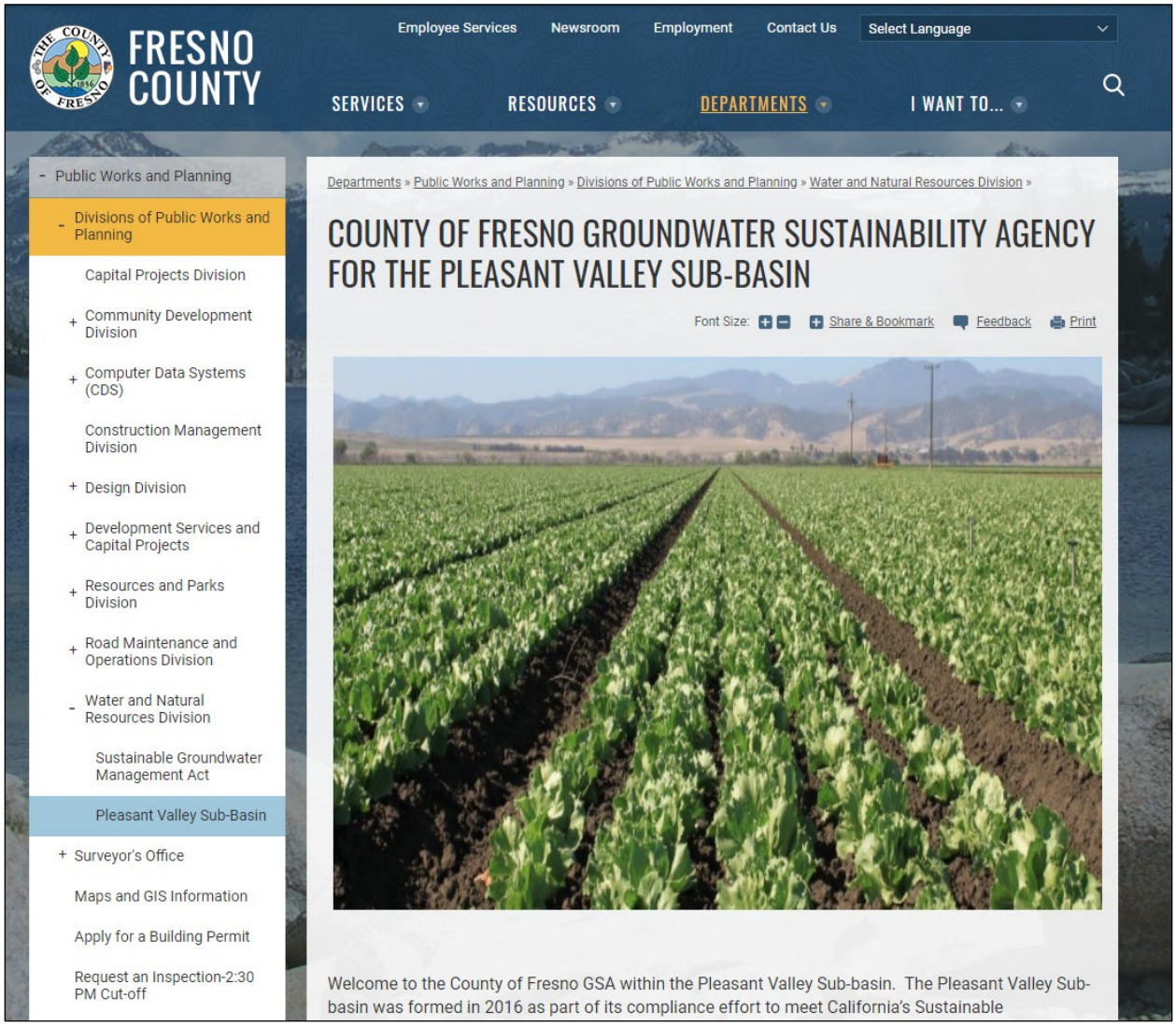
Fresno County Pleasant Valley GSA Area
Public Outreach Tracking

GSA Branding Summary

Logo

Website – https://www.co.fresno.ca.us/departments/public-works-and-planning/divisions-of-public-works-and-planning/water-and-natural-resources-division/pleasant-valley-sub-basin

The Fresno County Pleasant Valley GSA Area's website serves as a hub for SGMA and GSP information for Fresno County in the Pleasant Valley Subbasin, informing stakeholders about the GSA, subbasin-wide public outreach opportunities, and as a resource with SGMA-related information. With the PVGSA taking the lead in the development of the GSP for the entire subbasin, the Fresno County website refers back to the PVGSA website and outreach materials.



Picture 4. Screenshot of Fresno County Pleasant Valley GSA Area Homepage

Completed Outreach Tracking

Fresno County Pleasant Valley GSA – Presentations & Meetings		
Event	**Date**	**Location**
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	Following PVWD board meeting, January 23, 2018	Harris Ranch Conference Center
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	10 a.m., May 22, 2018	Harris Ranch Conference Center
Fresno County Pleasant Valley GSA officially formed by Board of Supervisors	May 7, 2019	County of Fresno Board of Supervisors
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	10 a.m., June 23, 2020	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	11 a.m., January 26, 2021	Online via video conference and teleconference
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	11 a.m., July 27, 2021	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	10 a.m., August 24, 2021	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley Subbasin Landowner/Stakeholder Workshop	11 a.m., September 28, 2021	Harris Ranch Conference Center; Online via video conference and teleconference
Pleasant Valley Subbasin GSP Public Hearing	10 a.m., February 3, 2022	Harris Ranch Conference Center; Online via video conference and teleconference
Fresno County Pleasant Valley GSA/County of Fresno Board of Supervisors Meeting (Adoption of Pleasant Valley Subbasin GSP)	9:30 a.m., February 22, 2022	County of Fresno Board of Supervisors

Appendix D

Pleasant Valley Subbasin-Wide Public Outreach Tracking

Subbasin Wide Outreach and GSA Coordination

Pleasant Valley Subbasin-Wide Outreach and GSA Coordination		
Date	**Organization**	**Notes**
January 23, 2018	Subbasin-wide Stakeholders	Pleasant Valley Subbasin Landowner/Stakeholder Workshop
May 22, 2018	Subbasin-wide Stakeholders	Pleasant Valley Subbasin Landowner/Stakeholder Workshop
June 23, 2020	Subbasin-wide Stakeholders	Pleasant Valley Subbasin Landowner/Stakeholder Workshop
July 1, 2020	City of Coalinga GSA	Email on water budget, website and coordination
July 1, 2020	Fresno County GSA	Email on website and coordination
August 17, 2020	City of Coalinga GSA	Request participation in TAC, city water supply questions and water budget needs
September 9, 2020	Subbasin GSAs Representatives	Technical Advisory Committee (TAC) Meeting: Review TAC structure, schedule, Chapter 2 Plan Area, Chapter 3 HCM; held online via video conference
October 27, 2020	Subbasin GSA Representatives	TAC Meeting: Review Chapter 3 Groundwater Conditions and Water Budget; held online via video conference
November 18, 2020	City of Coalinga GSA	Meeting regarding working together on sustainability.
December 15, 2020	Subbasin GSAs Representatives	TAC Meeting: Reviewed public workshop presentation for January 2021 including SMC concepts; held online via video conference
January 26, 2021	Subbasin-wide Stakeholders	Pleasant Valley Subbasin Landowner/Stakeholder Workshop
February 23, 2021	Subbasin GSAs Representatives	TAC Meeting: Reviewed decision task list for TAC recommendations to GSAs on water budget, SMCs, monitoring and implementation; held online via video conference
April 13, 2021	Subbasin GSA Representatives	TAC Meeting: Reviewed SMC recommendations and water budget natural recharge; held online via video conference
July 27, 2021	Subbasin-wide Stakeholders	Pleasant Valley Subbasin Landowner/Stakeholder Workshop
August 19, 2021	Subbasin GSA Representatives	TAC Meeting: Discussed GSP development and Sustainable Management Criteria; held online via video conference
August 24, 2021	Subbasin-wide Stakeholders	Pleasant Valley Subbasin Landowner/Stakeholder Workshop
September 28, 2021	Subbasin-wide Stakeholders	Pleasant Valley Subbasin Landowner/Stakeholder Workshop
October 26, 2021	Subbasin GSA Representatives	TAC Meeting: Review of GSP; held online via video conference
February 3, 2022	Subbasin-wide	Public Hearing on Pleasant Valley Subbasin GSP

Appendix C – Stakeholder Comments and Responses

No stakeholder comments were received.

Appendix D – GSP Checklist—Elements of the Plan

Article 5.			Plan Contents for Pleasant Valley Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
§ 354.			**Introduction to Plan Contents**					
			This Article describes the required contents of Plans submitted to the Department for evaluation, including administrative information, a description of the basin setting, sustainable management criteria, description of the monitoring network, and projects and management actions.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
SubArticle 1.			**Administrative Information**					
§ 354.2.			**Introduction to Administrative Information**					
			This Subarticle describes information in the Plan relating to administrative and other general information about the Agency that has adopted the Plan and the area covered by the Plan.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.4.			**General Information**					
			Each Plan shall include the following general information:					
(a)			An executive summary written in plain language that provides an overview of the Plan and description of groundwater conditions in the basin.	14:22				
(b)			A list of references and technical studies relied upon by the Agency in developing the Plan. Each Agency shall provide to the Department electronic copies of reports and other documents and materials cited as references that are not generally available to the public.	284:287	8.1			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10733.2 and 10733.4, Water Code.					
§ 354.6.			**Agency Information**					
			When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:					
(a)			The name and mailing address of the Agency.	26	1.4			
(b)			The organization and management structure of the Agency, identifying persons with management authority for implementation of the Plan.	26:28	1.4.1			
(c)			The name and contact information, including the phone number, mailing address and electronic mail address, of the plan manager.	26:28	1.4.1			
(d)			The legal authority of the Agency, with specific reference to citations setting forth the duties, powers, and responsibilities of the Agency, demonstrating that the Agency has the legal authority to implement the Plan.	28:29	1.4.2			
(e)			An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.	29:31	1.4.3		1-4	
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.8, 10727.2, and 10733.2, Water Code.					
§ 354.8.			**Description of Plan Area**					
			Each Plan shall include a description of the geographic areas covered, including the following information:					
(a)			One or more maps of the basin that depict the following, as applicable:					
	(1)		The area covered by the Plan, delineating areas managed by the Agency as an exclusive Agency and any areas for which the Agency is not an exclusive Agency, and the name and location of any adjacent basins.	33:38	2	2-1:2-2		
	(2)		Adjudicated areas, other Agencies within the basin, and areas covered by an Alternative.	15,33				
	(3)		Jurisdictional boundaries of federal or state land (including the identity of the agency with jurisdiction over that land), tribal land, cities, counties, agencies with water management responsibilities, and areas covered by relevant general plans.	33:35,37:40	2.1.1,2.1.2, 2.1.3,2.1.4, 2.1.5	2-1,2-3,2-4	2-1,2-2	
	(4)		Existing land use designations and the identification of water use sector and water source type.	33,41:43,45:47	2.1.6,2.1.7	2-5,2-6,2-7	2-3,2-4,2-5	
	(5)		The density of wells per square mile, by dasymetric or similar mapping techniques, showing the general distribution of agricultural, industrial, and domestic water supply wells in the basin, including de minimis extractors, and the location and extent of communities dependent upon groundwater, utilizing data provided by the Department, as specified in Section 353.2, or the best available information.	33,43:44,48:49		2-8,2-9	2-6	
(b)			A written description of the Plan area, including a summary of the jurisdictional areas and other features depicted on the map.	33:44	2.1			
(c)			Identification of existing water resource monitoring and management programs, and description of any such programs the Agency plans to incorporate in its monitoring network or in development of its Plan. The Agency may coordinate with existing water resource monitoring and management programs to incorporate and adopt that program as part of the Plan.	54:55	2.3.1			
(d)			A description of how existing water resource monitoring or management programs may limit operational flexibility in the basin, and how the Plan has been developed to adapt to those limits.	55:56	2.3.2			
(e)			A description of conjunctive use programs in the basin.	56	2.3.3			
(f)			A plain language description of the land use elements or topic categories of applicable general plans that includes the following:					

Article 5.			Plan Contents for Pleasant Valley Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(1)		A summary of general plans and other land use plans governing the basin.	51	2.2.1			
	(2)		A general description of how implementation of existing land use plans may change water demands within the basin or affect the ability of the Agency to achieve sustainable groundwater management over the planning and implementation horizon, and how the Plan addresses those potential effects	51	2.2.2			
	(3)		A general description of how implementation of the Plan may affect the water supply assumptions of relevant land use plans over the planning and implementation horizon.	52	2.2.3			
	(4)		A summary of the process for permitting new or replacement wells in the basin, including adopted standards in local well ordinances, zoning codes, and policies contained in adopted land use plans.	53	2.2.4			
	(5)		To the extent known, the Agency may include information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management.	53	2.2.5			
(g)			A description of any of the additional Plan elements included in Water Code Section 10727.4 that the Agency determines to be appropriate.	57:62	2.4			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10720.3, 10727.2, 10727.4, 10733, and 10733.2, Water Code.					
§ 354.10.			**Notice and Communication**					
			Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:					
(a)			A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties.	62	2.5.1		2-7	See Appendix B
(b)			A list of public meetings at which the Plan was discussed or considered by the Agency.	62,361,364,368	2.5.1			See Appendix B
(c)			Comments regarding the Plan received by the Agency and a summary of any responses by the Agency.	452				See Appendix C
(d)			A communication section of the Plan that includes the following:					
	(1)		An explanation of the Agency's decision-making process.	62:63	2.5.2			
	(2)		Identification of opportunities for public engagement and a discussion of how public input and response will be used.	63,324,327:328	2.5.3			See Appendix B
	(3)		A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin.	64:65,345:350	2.5.4			See Appendix B
	(4)		The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.	64:65,311	2.5.4			See Appendix B
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.8, 10728.4, and 10733.2, Water Code					
SubArticle 2.			**Basin Setting**					
§ 354.12.			**Introduction to Basin Setting**					
			This Subarticle describes the information about the physical setting and characteristics of the basin and current conditions of the basin that shall be part of each Plan, including the identification of data gaps and levels of uncertainty, which comprise the basin setting that serves as the basis for defining and assessing reasonable sustainable management criteria and projects and management actions. Information provided pursuant to this Subarticle shall be prepared by or under the direction of a professional geologist or professional engineer.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.14.			**Hydrogeologic Conceptual Model**					
(a)			Each Plan shall include a descriptive hydrogeologic conceptual model of the basin based on technical studies and qualified maps that characterizes the physical components and interaction of the surface water and groundwater systems in the basin.	65	3.1.1			
(b)			The hydrogeologic conceptual model shall be summarized in a written description that includes the following:					
	(1)		The regional geologic and structural setting of the basin including the immediate surrounding area, as necessary for geologic consistency.	67:68	3.1.3	3-1		
	(2)		Lateral basin boundaries, including major geologic features that significantly affect groundwater flow.	65:67	3.1.2	3-1		
	(3)		The definable bottom of the basin.	68	3.1.3			
	(4)		Principal aquifers and aquitards, including the following information:					
		(A)	Formation names, if defined.	88	3.1.5.3			
		(B)	Physical properties of aquifers and aquitards, including the vertical and lateral extent, hydraulic conductivity, and storativity, which may be based on existing technical studies or other best available information.	83:87	3.1.5.1	3-12,3-13,3-14		See Appendix E
		(C)	Structural properties of the basin that restrict groundwater flow within the principal aquifers, including information regarding stratigraphic changes, truncation of units, or other features.	83	3.1.5	3-12,3-13		
		(D)	General water quality of the principal aquifers, which may be based on information derived from existing technical studies or regulatory programs.	88	3.1.6			

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		(E)	Identification of the primary use or uses of each aquifer, such as domestic, irrigation, or municipal water supply.	88	3.1.5.2	3-15		
	(5)		Identification of data gaps and uncertainty within the hydrogeologic conceptual model	94	3.1.10			
(c)			The hydrogeologic conceptual model shall be represented graphically by at least two scaled cross-sections that display the information required by this section and are sufficient to depict major stratigraphic and structural features in the basin.	76:82	3.1.4	3-6,3-7,3-8,3-9,3-10		See Appendix E
(d)			Physical characteristics of the basin shall be represented on one or more maps that depict the following:					
	(1)		Topographic information derived from the U.S. Geological Survey or another reliable source.	68:70	3.1.1	3-2		
	(2)		Surficial geology derived from a qualified map including the locations of cross-sections required by this Section.	71:72	3.1.2	3-3		
	(3)		Soil characteristics as described by the appropriate Natural Resources Conservation Service soil survey or other applicable studies.	73:75	3.1.3	3-4,3-5		
	(4)		Delineation of existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas, including significant active springs, seeps, and wetlands within or adjacent to the basin.	91:93	3.1.9	3-16,3-17		
	(5)		Surface water bodies that are significant to the management of the basin.	89:90	3.1.7	3-15		
	(6)		The source and point of delivery for imported water supplies.	91	3.1.8	3-15		
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2, 10733, and 10733.2, Water Code.					
§ 354.16.			**Groundwater Conditions**					
			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 that includes the following:					
(a)			Groundwater elevation data demonstrating flow directions, lateral and vertical gradients, and regional pumping patterns, including:					
	(1)		Groundwater elevation contour maps depicting the groundwater table or potentiometric surface associated with the current seasonal high and seasonal low for each principal aquifer within the basin.	95:101	3.2.1	3-1,3-17,3-18,3-19,3-20,3-21,3-22		
	(2)		Hydrographs depicting long-term groundwater elevations, historical highs and lows, and hydraulic gradients between principal aquifers.	96,101:103,376:445	3.2.1,3.2.2			See Appendices F and G
(b)			A graph depicting estimates of the change in groundwater in storage, based on data, demonstrating the annual and cumulative change in the volume of groundwater in storage between seasonal high groundwater conditions, including the annual groundwater use and water year type.	87,105,112:113,134	3.2.3	3-14,3-24	3-3	
(c)			Seawater intrusion conditions in the basin, including maps and cross-sections of the seawater intrusion front for each principal aquifer.	113	3.2.4			
(d)			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.	50,113:121	3.2.5	2-9,3-27,3-28,3-29,3-30		
(e)			The extent, cumulative total, and annual rate of land subsidence, including maps depicting total subsidence, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	122:123	3.2.6			
(f)			Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	128	3.2.7			
(g)			Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	128:130	3.2.8	3-35,3-36		
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10727.4, and 10733.2, Water Code.					
§ 354.18.			**Water Budget**					
(a)			Each Plan shall include a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored. Water budget information shall be reported in tabular and graphical form.	131:162	3.3	3-37,3-38,3-39,3-40,3-41,3-42	3-3,3-4,3-5,3-6,3-7,3-8,3-9,3-10,3-11	
(b)			The water budget shall quantify the following, either through direct measurements or estimates based on data:					
	(1)		Total surface water entering and leaving a basin by water source type.	139	3.3.4	3-15		
	(2)		Inflow to the groundwater system by water source type, including subsurface groundwater inflow and infiltration of precipitation, applied water, and surface water systems, such as lakes, streams, rivers, canals, springs and conveyance systems.	140:146	3.3.5	3-39		
	(3)		Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow.	147:150	3.3.6		3-6	
	(4)		The change in the annual volume of groundwater in storage between seasonal high conditions.	150	3.3.7		3-7	

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	(5)		If overdraft conditions occur, as defined in Bulletin 118, the water budget shall include a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions.	161	3.3.11			
	(6)		The water year type associated with the annual supply, demand, and change in groundwater stored.	162	3.3.12		3-4	
	(7)		An estimate of sustainable yield for the basin.	162	3.3.13		3-8	
(c)			Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:					
	(1)		Current water budget information shall quantify current inflows and outflows for the basin using the most recent hydrology, water supply, water demand, and land use information.	153:154	3.3.9		3-8	
	(2)		Historical water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type. The historical water budget shall include the following:					
		(A)	A quantitative evaluation of the availability or reliability of historical surface water supply deliveries as a function of the historical planned versus actual annual surface water deliveries, by surface water source and water year type, and based on the most recent ten years of surface water supply information.	151:153	3.3.8		3-7	
		(B)	A quantitative assessment of the historical water budget, starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to calibrate and reduce the uncertainty of the tools and methods used to estimate and project future water budget information and future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon.	151:153	3.3.8		3-7	
		(C)	A description of how historical conditions concerning hydrology, water demand, and surface water supply availability or reliability have impacted the ability of the Agency to operate the basin within sustainable yield. Basin hydrology may be characterized and evaluated using water year type.	151:153	3.3.8		3-7	
	(3)		Projected water budgets shall be used to estimate future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify the uncertainties of these projected water budget components. The projected water budget shall utilize the following methodologies and assumptions to estimate future baseline conditions concerning hydrology, water demand and surface water supply availability or reliability over the planning and implementation horizon:					
		(A)	Projected hydrology shall utilize 50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition for estimating future hydrology. The projected hydrology information shall also be applied as the baseline condition used to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change and sea level rise.	155:161	3.3.10	3-40,3-41,3-42	3-9,3-10,3-11	
		(B)	Projected water demand shall utilize the most recent land use, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demand. The projected water demand information shall also be applied as the baseline condition used to evaluate future scenarios of water demand uncertainty associated with projected changes in local land use planning, population growth, and climate.	155:161	3.3.10	3-40,3-41,3-42	3-9,3-10,3-11	
		(C)	Projected surface water supply shall utilize the most recent water supply information as the baseline condition for estimating future surface water supply. The projected surface water supply shall also be applied as the baseline condition used to evaluate future scenarios of surface water supply availability and reliability as a function of the historical surface water supply identified in Section 354.18(c)(2)(A), and the projected changes in local land use planning, population growth, and climate.	155:161	3.3.10	3-40,3-41,3-42	3-9,3-10,3-11	
(d)			The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget:					
	(1)		Historical water budget information for mean annual temperature, mean annual precipitation, water year type, and land use.	151:153	3.3.8		3-7	
	(2)		Current water budget information for temperature, water year type, evapotranspiration, and land use.	153:154	3.3.9		3-8	
	(3)		Projected water budget information for population, population growth, climate change, and sea level rise.	155:161	3.10	3-40,3-41,3-42	3-9,3-10,3-11	
(e)			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. If a numerical groundwater and surface water model is not used to quantify and evaluate the projected water budget conditions and the potential impacts to beneficial uses and users of groundwater, the Plan shall identify and describe an equally effective method, tool, or analytical model to evaluate projected water budget conditions.	137	3.3.2			

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(f)			The Department shall provide the California Central Valley Groundwater-Surface Water Simulation Model (C2VSIM) and the Integrated Water Flow Model (IWFM) for use by Agencies in developing the water budget. Each Agency may choose to use a different groundwater and surface water model, pursuant to Section 352.4.	137:138	3.3.3		3-2,3-3,3-4,3-5	
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10721, 10723.2, 10727.2, 10727.6, 10729, and 10733.2, Water Code.					
§ 354.20.			**Management Areas**					
(a)			Each Agency may define one or more management areas within a basin if the Agency has determined that creation of management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives than the basin at large, provided that undesirable results are defined consistently throughout the basin.	37,163:164	3.4	2-3		
(b)			A basin that includes one or more management areas shall describe the following in the Plan:					
	(1)		The reason for the creation of each management area.	163	3.4.1			
	(2)		The minimum thresholds and measurable objectives established for each management area, and an explanation of the rationale for selecting those values, if different from the basin at large.	163	3.4.2			
	(3)		The level of monitoring and analysis appropriate for each management area.	163	3.4.3			
	(4)		An explanation of how the management area can operate under different minimum thresholds and measurable objectives without causing undesirable results outside the management area, if applicable.	37,164	3.4.4	2-3		
(c)			If a Plan includes one or more management areas, the Plan shall include descriptions, maps, and other information required by this Subarticle sufficient to describe conditions in those areas.	37,164	3.4.4	2-3		
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10733.2 and 10733.4, Water Code.					
SubArticle 3.			**Sustainable Management Criteria**					
§ 354.22.			**Introduction to Sustainable Management Criteria**					
			This Subarticle describes criteria by which an Agency defines conditions in its Plan that constitute sustainable groundwater management for the basin, including the process by which the Agency shall characterize undesirable results, and establish minimum thresholds and measurable objectives for each applicable sustainability indicator.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.24.			**Sustainability Goal**					
			Each Agency shall establish in its Plan a sustainability goal for the basin that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline. The Plan shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield, and an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation and is likely to be maintained through the planning and implementation horizon.	167:169	4.1			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10721, 10727, 10727.2, 10733.2, and 10733.8, Water Code.					
§ 354.26.			**Undesirable Results**					
(a)			Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.	172,187,194,201,206	4.2.2.1,4.3.1.1,4.5.1.1,4.6.1.1,4.7.1.1			
(b)			The description of undesirable results shall include the following:					
	(1)		The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.	170,172:173,187,195,201,206	4.2.1,4.2.2.2,4.3.1.2,4.5.1.2,4.6.1.2,4.7.1.2			
	(2)		The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.	170,172:173,187,195,201,206	4.2.1,4.2.2.2,4.3.1.2,4.5.1.2,4.6.1.2,4.7.1.2			
	(3)		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.	170,172:173,187,195,201,206	4.2.1,4.2.2.2,4.3.1.2,4.5.1.2,4.6.1.2,4.7.1.2			
(c)			The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.	173,188,195,201,206	4.2.2.3,4.3.1.3,4.5.1.3,4.6.1.3,4.7.1.3			

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(d)			An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.	192,206:207	4.4,4.7			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10721, 10723.2, 10727.2, 10733.2, and 10733.8, Water Code.					
§ 354.28.			**Minimum Thresholds**					
(a)			Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.	174:182,188,195,202,207	4.2.3,4.3.2,4.5.2,4.6.2,4.7.2	4-3,4-4,4-5,4-6,4-7,4-8	4-2	
(b)			The description of minimum thresholds shall include the following:					
	(1)		The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by uncertainty in the understanding of the basin setting.	172,182,188,196,202,207	4.2.2.2,4.2.3.1,4.3.2.1,4.5.2.1,4.6.2.1,4.7.2.1			
	(2)		The relationship between the minimum thresholds for each sustainability indicator, including an explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.	182,189,196,202,207	4.2.3.2,4.3.2.2,4.5.2.2,4.6.2.2,4.7.2.2			
	(3)		How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.	183,189,196,203,207	4.2.3.3,4.3.2.3,4.5.2.3,4.6.2.2,4.7.2.3			
	(4)		How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.	183,189,197,203,208	4.2.3.4,4.3.2.4,4.5.2.4,4.6.2.3,4.7.2.4			
	(5)		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 basis for the difference.	183,189,197,203,208	4.2.3.5,4.3.2.5,4.5.2.5,4.6.2.4,4.7.2.5			
	(6)		How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.	184,190,197,203,208,217	4.2.3.6,4.3.2.6,4.5.2.6,4.6.2.5,4.7.2.6,5.2			
(c)			Minimum thresholds for each sustainability indicator shall be defined as follows:					
	(1)		Chronic Lowering of Groundwater Levels. The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results. Minimum thresholds for chronic lowering of groundwater levels shall be supported by the following:					
		(A)	The rate of groundwater elevation decline based on historical trends, water year type, and projected water use in the basin.	182	4.2.3.1			
		(B)	Potential effects on other sustainability indicators.	182:183	4.2.3.2			
	(2)		Reduction of Groundwater Storage. The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.	188:189	4.3.2.1			
	(3)		Seawater Intrusion. The minimum threshold for seawater intrusion shall be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results. Minimum thresholds for seawater intrusion shall be supported by the following:					
		(A)	Maps and cross-sections of the chloride concentration isocontour that defines the minimum threshold and measurable objective for each principal aquifer.	192	4.4			
		(B)	A description of how the seawater intrusion minimum threshold considers the effects of current and projected sea levels.	192	4.4			
	(4)		Degraded Water Quality. The minimum threshold for degraded water quality shall be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.	196	4.5.2.1			
	(5)		Land Subsidence. The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. Minimum thresholds for land subsidence shall be supported by the following:					

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		(A)	Identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency's rationale for establishing minimum thresholds in light of those effects.	202	4.6.2			
		(B)	Maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum threshold and measurable objectives.	202	4.6.2			
	(6)		Depletions of Interconnected Surface Water. 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. The minimum threshold established for depletions of interconnected surface water shall be supported by the following:					
		(A)	The location, quantity, and timing of depletions of interconnected surface water.	206:207	4.7			
		(B)	A description of the groundwater and surface water model used to quantify surface water depletion. If a numerical groundwater and surface water model is not used to quantify surface water depletion, the Plan shall identify and describe an equally effective method, tool, or analytical model to accomplish the requirements of this Paragraph.	206:207	4.7			
(d)			An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.	206:207	4.7			
(e)			An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators.	206	4.7			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10733, 10733.2, and 10733.8, Water Code.					
§ 354.30.			**Measurable Objectives**					
(a)			Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.	171,184:185,190,197,204,207:208	4.2.4.1,4.3.3.1,4.5.3.1,4.6.3.1,4.7	4-2	4-3,4-4	
(b)			Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.	171,184:185,190,197,204,207:208	4.2.4.1,4.3.3.1,4.5.3.1,4.6.3.1,4.7	4-2	4-3,4-4	
(c)			Measurable objectives shall 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.	185,190,198,204,207:208	4.2.4.2,4.3.3.2,4.5.3.2,4.6.3.2,4.7			
(d)			An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.	185,191,198,204,207:208	4.2.4.3,4.3.3.3,4.5.3.3,4.6.3.3,4.7			
(e)			Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.	186,190:191,198,205,207,209	4.2.4.4,4.3.3.4,4.5.3.4,4.6.3.4,4.7		4-4	
(f)			Each Plan may include measurable objectives and interim milestones for additional Plan elements described in Water Code Section 10727.4 where the Agency determines such measures are appropriate for sustainable groundwater management in the basin.	210	4.8			
(g)			An Agency may establish measurable objectives that exceed the reasonable margin of operational flexibility for the purpose of improving overall conditions in the basin, but failure to achieve those objectives shall not be grounds for a finding of inadequacy of the Plan.	210	4.8			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2, 10727.4, and 10733.2, Water Code.					
SubArticle 4.			**Monitoring Networks**					
§ 354.32.			**Introduction to Monitoring Networks**					
			This Subarticle describes the monitoring network that shall be developed for each basin, including monitoring objectives, monitoring protocols, and data reporting requirements. The monitoring network shall promote the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.34.			**Monitoring Network**					

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(a)			Each Agency shall develop a monitoring network capable of collecting sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate Plan implementation.	211:252	5.0	5-1,5-2,5-3,5-4,5-5,5-6,5-7,5-8,5-9	5-1	
(b)			Each Plan shall include a description of the monitoring network objectives for the basin, including an explanation of how the network will be developed and implemented to monitor groundwater and related surface conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of Plan implementation. The monitoring network objectives shall be implemented to accomplish the following:					
	(1)		Demonstrate progress toward achieving measurable objectives described in the Plan.	227	5.2.1			
	(2)		Monitor impacts to the beneficial uses or users of groundwater.	227	5.2.1			
	(3)		Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.	227	5.2.1			
	(4)		Quantify annual changes in water budget components.	227	5.2.1			
(c)			Each monitoring network shall be designed to accomplish the following for each sustainability indicator:					
	(1)		Chronic Lowering of Groundwater Levels. Demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods:					
		(A)	A sufficient density of monitoring wells to collect representative measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer.	213,216,228	5.3.1	5-2,5-5		
		(B)	Static groundwater elevation measurements shall be collected at least two times per year, to represent seasonal low and seasonal high groundwater conditions.	213,216,228	5.3.1	5-2,5-5		
	(2)		Reduction of Groundwater Storage. Provide an estimate of the change in annual groundwater in storage.	83,228:229	3.1.8,5.3.2			
	(3)		Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.	229	5.3.3			
	(4)		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.	229	5.3.3			
	(5)		Land Subsidence. Identify the rate and extent of land subsidence, which may be measured by extensometers, surveying, remote sensing technology, or other appropriate method.	122:123,215,230	3.2.6,5.3.5	5-4		
	(6)		Depletions of Interconnected Surface Water. Monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions. The monitoring network shall be able to characterize the following:					
		(A)	Flow conditions including surface water discharge, surface water head, and baseflow contribution.	230	5.3.6			
		(B)	Identifying the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable.	230	5.3.6			
		(C)	Temporal change in conditions due to variations in stream discharge and regional groundwater extraction.	230	5.3.6			
		(D)	Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.	230	5.3.6			
(d)			The monitoring network shall be designed to ensure adequate coverage of sustainability indicators. If management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the basin setting and sustainable management criteria specific to that area.	229,231:232	5.3.3,5.4			
(e)			A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.	229,231:232	5.3.3,5.4			
(f)			The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors:					
	(1)		Amount of current and projected groundwater use.	214,219:220,229,233:234	5.3.3,5.3.4,5.5	5-3,5-6,5-7		
	(2)		Aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow.	214,219:220,229,233:234	5.3.3,5.3.4,5.5	5-3,5-6,5-7		
	(3)		Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal.	214,219:220,229,233:234	5.3.3,5.3.4,5.5	5-3,5-6,5-7		

Article 5.			Plan Contents for Pleasant Valley Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(4)		Whether the Agency has adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response.	214,219:220,229,233:234	5.3.3,5.3.4,5.5	5-3,5-6,5-7		
(g)			Each Plan shall describe the following information about the monitoring network:					
	(1)		Scientific rationale for the monitoring site selection process.	215,235:238	5.6.1.1,5.6.2.1,5.6.4.1,5.6.5.1,5.6.6.1	5-4		
	(2)		Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.	235:238	5.6			See Appendix H
	(3)		For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.	182,184:186,188:191,193:198,204:205,208:209,235:238	4.2.3.1,4.2.4,4.3.2.1,4.3.3,4.5,4.6.3,4.7.3,5.6			
(h)			The 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.	213:215,229,239:240	5.3.3,5.3.4,5.7	5-2,5-3,5-4		
(i)			The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.	229:230,341:342	5.3.3,5.3.6,5.8			
(j)			An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.	229:230	5.3.3,5.3.6			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10727.4, 10728, 10733, 10733.2, and 10733.8, Water Code					
§ 354.36.			**Representative Monitoring**					
			Each Agency may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin, as follows:					
(a)			Representative monitoring sites may be designated by the Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined.	213,215:216,229,243:244	5.3.3,5.9	5-2,5-3,5-4		
(b)			(b) Groundwater elevations may be used as a proxy for monitoring other sustainability indicators if the Agency demonstrates the following:					
	(1)		Significant correlation exists between groundwater elevations and the sustainability indicators for which groundwater elevation measurements serve as a proxy.	229,243:244	5.3.3,5.9			
	(2)		Measurable objectives established for groundwater elevation shall include a reasonable margin of operational flexibility taking into consideration the basin setting to avoid undesirable results for the sustainability indicators for which groundwater elevation measurements serve as a proxy.	229,243:244	5.3.3,5.9			
(c)			The designation of a representative monitoring site shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area.	229,243:244	5.3.3,5.9			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2 and 10733.2, Water Code					
§ 354.38.			**Assessment and Improvement of Monitoring Network**					
(a)			Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.	245:250	5.10.1.1,5.10.2.1,5.10.4.1,5.10.5.1,5.10.6.1			
(b)			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.	217:218,245,247:249,251	5.2,5.10.1.2,5.10.2.2,5.10.4.2,5.10.5.2,5.10.6.2			
(c)			If the monitoring network contains data gaps, the Plan shall include a description of the following:					
	(1)		The location and reason for data gaps in the monitoring network.	217:218,246:248,250:251	5.2,5.10.1.3,5.10.2.3,5.10.4.3,5.10.5.3,5.10.6.3			

Article 5.			Plan Contents for Pleasant Valley Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(2)		Local issues and circumstances that limit or prevent monitoring.	217:218,246:248,250:251	5.2,5.10.1.3,5.10.2.3,5.10.4.3,5.10.5.3,5.10.6.3			
(d)			Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.	217:218,246:248,250:251	5.2,5.10.1.3,5.10.2.3,5.10.4.3,5.10.5.3,5.10.6.3			
(e)			Each Agency shall 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 that include the following:					
	(1)		Minimum threshold exceedances.	213,246:247,249:251	5.10.1.4,5.10.2.4,5.10.4.4,5.10.5.45.10.6.4	5-2		
	(2)		Highly variable spatial or temporal conditions.	213,246:247,249:251	5.10.1.4,5.10.2.4,5.10.4.4,5.10.5.45.10.6.4	5-2		
	(3)		Adverse impacts to beneficial uses and users of groundwater.	213,246:247,249:251	5.10.1.4,5.10.2.4,5.10.4.4,5.10.5.45.10.6.4	5-2		
	(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.	213,246:247,249:251	5.10.1.4,5.10.2.4,5.10.4.4,5.10.5.45.10.6.4	5-2		
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10728.2, 10733, 10733.2, and 10733.8, Water Code					
§ 354.40.			**Reporting Monitoring Data to the Department**					
			Monitoring data shall be stored in the data management system developed pursuant to Section 352.6. A copy of the monitoring data shall be included in the Annual Report and submitted electronically on forms provided by the Department.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10728, 10728.2, 10733.2, and 10733.8, Water Code.					
SubArticle 5.			**Projects and Management Actions**					
§ 354.42.			**Introduction to Projects and Management Actions**					
			This Subarticle describes the criteria for projects and management actions to be included in a Plan to meet the sustainability goal for the basin in a manner that can be maintained over the planning and implementation horizon.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.44.			**Projects and Management Actions**					
(a)			Each Plan shall include a description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.	253:276	6.0	6-1:6-2	6-1:6-4	
(b)			Each Plan shall include a description of the projects and management actions that include the following:					
	(1)		A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent. The Plan shall include the following:					
		(A)	A description of the circumstances under which projects or management actions shall be implemented, the criteria that would trigger implementation and termination of projects or management actions, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.	256	6.1			
		(B)	The process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken.	256	6.1			
	(2)		If overdraft conditions are identified through the analysis required by Section 354.18, the Plan shall describe projects or management actions, including a quantification of demand reduction or other methods, for the mitigation of overdraft.	256	6.1			
	(3)		A summary of the permitting and regulatory process required for each project and management action.	256	6.1			

Article 5.			Plan Contents for Pleasant Valley Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(4)		The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.	256	6.1			
	(5)		An explanation of the benefits that are expected to be realized from the project or management action, and how those benefits will be evaluated.	256	6.1			
	(6)		An explanation of 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.	256	6.1			
	(7)		A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.	256	6.1			
	(8)		A description of the estimated cost for each project and management action and a description of how the Agency plans to meet those costs.	256,278	6.1,7.2		7-2	
	(9)		A description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods.	257:258	6.1	6-1		
(c)			Projects and management actions shall be supported by best available information and best available science.	261,274	6.2,6.3			
(d)			An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.	253,265,267,269,271,273	6.2			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2, 10727.4, and 10733.2, Water Code.					

Appendix E – KDSA Report 2020

PLEASANT VALLEY WD
AQUIFER TRANSMISSIVITIES

Aquifer tests are available for ten wells in Pleasant Valley from which transmissivities could be determined (Table 1). Seven of these wells range in depth (lowest perforations) from 764 to 1,200 feet, and the other three range in depth (lowest perforations) from 1,760 to 2,070 feet. The tops of the perforations in the deeper wells range from 600 to 740 feet deep. For the shallower wells, specific capacities ranged from about 7 to 32 gpm per foot. There are specific capacities available for two other shallower wells, where transmissivity couldn't be determined. These specific capacities ranged from 66 to 73 gpm per foot. Transmissivities for the shallower wells ranged from 15,000 to 73,000 gpd per foot. Most values ranged from 30,000 to 57,000 gpd per foot.

For the three deep wells, specific capacities ranged from 11 to 26 gpm per foot, and transmissivities ranged from 18,000 to 39,000 gpd per foot. A specific capacity of 21 gpm per foot was available for another deep well, where the transmissivity couldn't be determined.

The relation between specific capacity and transmissivity was examined for these ten wells. Conversion factors (transmissivity divided by specific capacity) for eight of the tests ranged from 1,300 to 2,800 and averaged 2,000. This average value is the expected conversion factor for wells tapping confined groundwater. The highest specific capacities for shallower wells indicate that the highest transmissivities likely range from about 132,000 to 146,000 gpd per foot.

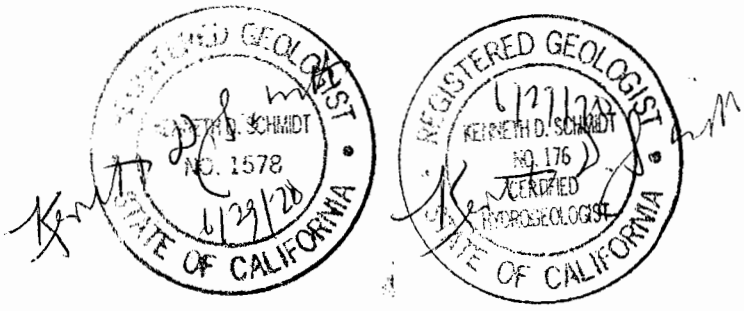


TABLE 1-SUMMARY OF PUMP TEST DATA
FOR WELLS IN PLEASANT VALLEY WD

Well Location	Well I.D.	Date	Perforated Interval (feet)	Pumping Rate (gpm)	Specific Capacity (gpm/ft)	Transmissivity (gpd/foot)
T20S/R15E-16C	Dust Bowl No. 2	12/14/11	740-1,760	2,500	25.9	39,000
T20S/R15E-22E	HTW Farms	10/20/16	686-2,070	1,500	14.3	18,000
T20S/R15E-32C	City Well No. 9	8/26/02	400-1,155	945	20.0	44,000
T20S/R16E-36N	Pleasant Valley Pist.	2/20/02	362-764	900	N.A.	112,000
T21S/R16E-8H	Devine Farms AS&R	11/00	500-1,000	2,000	29.0	73,000
T21S/R16E-8J	Double D 8-1 Well	11/22/00	500-1,000	3,000	31.7	41,000
T21S/R15E-12L	Jacalitos Creek Pist.	9/14/15	557-1,200	1,400	13.2	30,000
T21S/R15E-12L	Jacalitos Creek Pist. No. 3	6/6/19	435-952	1,500	12.4	65,000
T21S/R16E-15D	Kreyenhagen No. 1	12/20/14	600-1,960	2,017	11.0	31,000
T21S/R16E-16J	Stiefvater C-16 (flo-path)	12/8/08	460-750 & 810-1,030	900	6.5	15,000

Appendix F – Hydrographs Depicting Long-Term Groundwater Elevations



21S16E35A001M
360622N1202027W001

Water Surface Elevation (ft)

430
410
390
370
350
330
310
290

Depth to Groundwater (ft)

280
300
320
340
360
380
400

1960 1963 1966 1969 1972 1975 1978 1981 1984 1987 1990 1993 1996 1999 2002 2005 2008 2011 2014 2017 2020



21S16E27J001M
360700N1202221W001

Water Surface Elevation (ft)

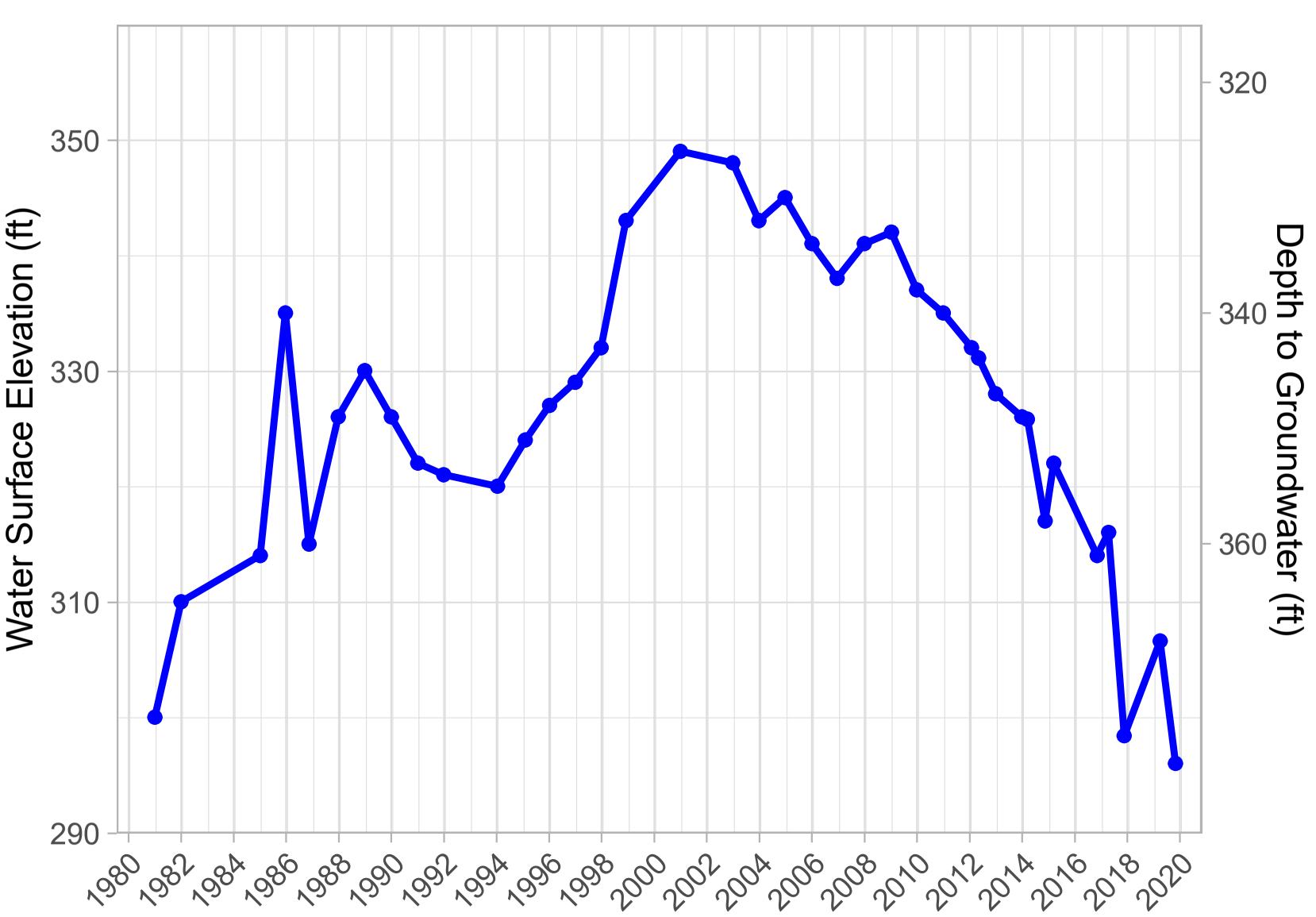
370
350
330
310
290

Depth to Groundwater (ft)

300
320
340
360

1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020




21S16E26M002M
360706N1202149W001
Water Surface Elevation (ft)
Depth to Groundwater (ft)
350
330
310
290
320
340
360
1980
1982
1984
1986
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1990
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1998
2000
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2004
2006
2008
2010
2012
2014
2016
2018
2020



21S16E26K001M
360708N1202085W001

Water Surface Elevation (ft)

400
380
360
340
320

Depth to Groundwater (ft)

300
320
340

1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020



21S16E26K002M
360714N1202096W001

Water Surface Elevation (ft)

400
380
360
340
320
300

Depth to Groundwater (ft)

300
320
340
360

1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017 2019



21S16E27J003M
360717N1202185W001

Water Surface Elevation (ft)

430
410
390
370
350
330
310

Depth to Groundwater (ft)

240
260
280
300
320
340

1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020



21S16E27H001M
360753N1202185W001

Water Surface Elevation (ft)

350
330
310
290
270

Depth to Groundwater (ft)

320
340
360
380

1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020



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360833N1202254W001

Water Surface Elevation (ft)

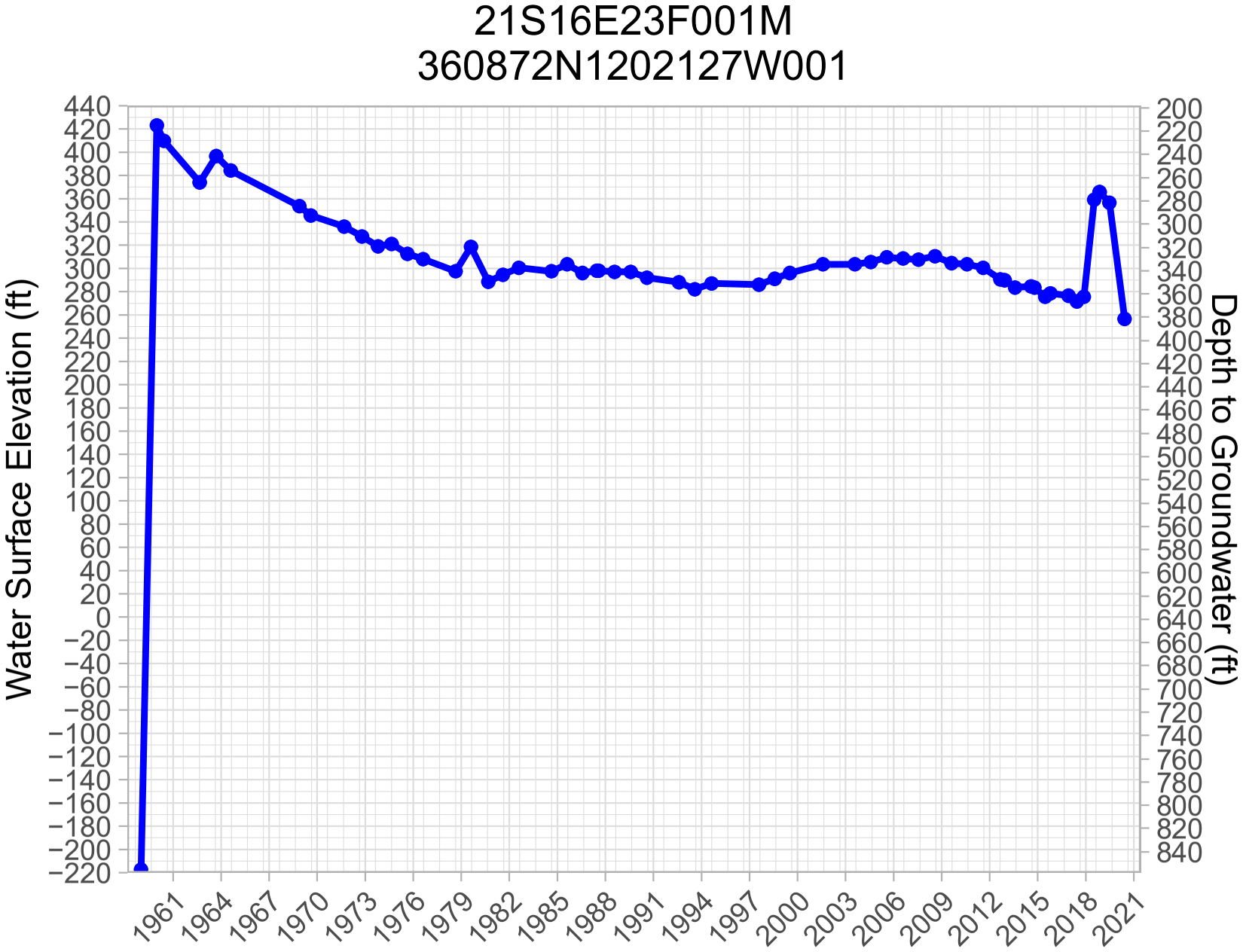
360
340
320
300
280
260
240
220
200

Depth to Groundwater (ft)

280
300
320
340
360
380
400
420

1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020




21S16E23F001M
360872N1202127W001
Water Surface Elevation (ft)
Depth to Groundwater (ft)
440
420
400
380
360
340
320
300
280
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240
220
200
180
160
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120
100
80
60
40
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0
−20
−40
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−140
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−180
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340
360
380
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21S16E22E001M
360903N1202354W001

Water Surface Elevation (ft)

450
430
410
390
370
350
330
310
290
270
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230
210
190
170
150
130
110

Depth to Groundwater (ft)

180
200
220
240
260
280
300
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360
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400
420
440
460
480
500

1960 1963 1966 1969 1972 1975 1978 1981 1984 1987 1990 1993 1996 1999 2002 2005 2008 2011 2014 2017 2020



21S16E22B001M
360939N1202271W001

Water Surface Elevation (ft)

290
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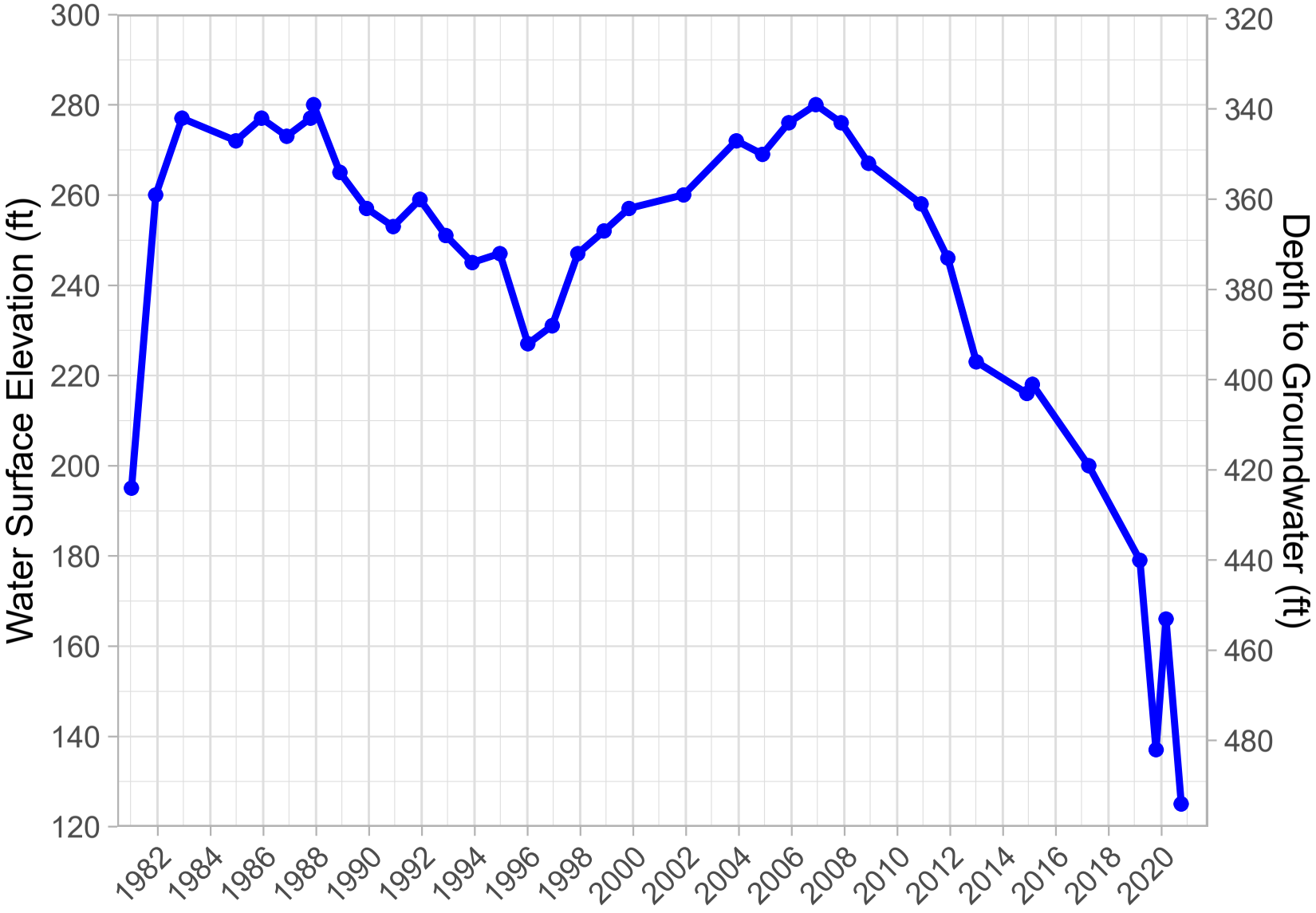
Depth to Groundwater (ft)

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1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020



21S16E15N002M
360939N1202321W001





21S16E21B001M
360939N1202452W001

Water Surface Elevation (ft)

310
290
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250
230
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190

Depth to Groundwater (ft)

320
340
360
380
400
420

1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017 2019



21S15E12Q002M
361078N1202988W001

Water Surface Elevation (ft)

380
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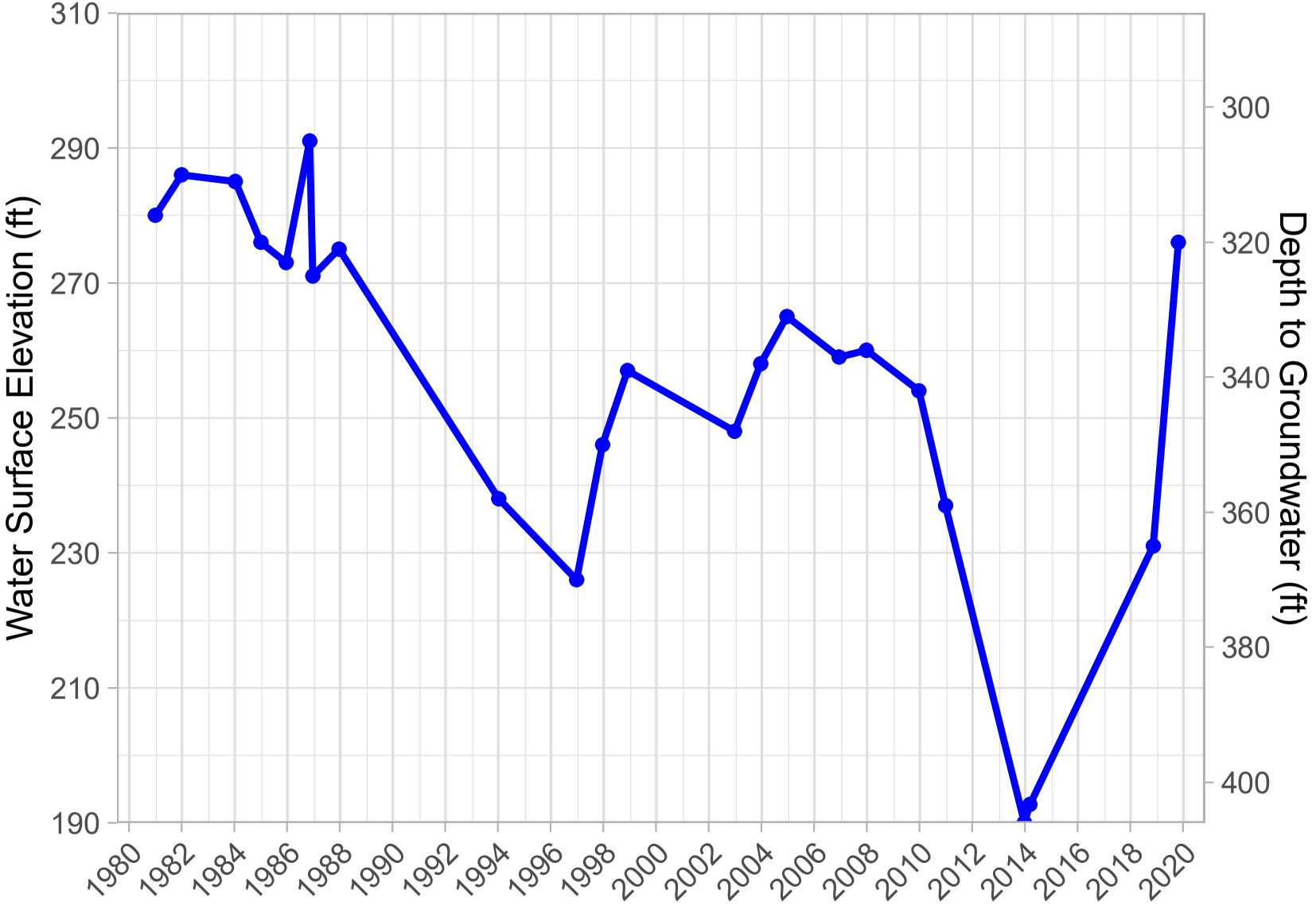
Depth to Groundwater (ft)

260
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1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017 2019



21S16E10N003M
361089N1202363W001





21S16E08J001M
361119N1202585W001

Water Surface Elevation (ft)

490
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430
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Depth to Groundwater (ft)

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21S15E10K001M
361125N1203341W001

Water Surface Elevation (ft)

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Depth to Groundwater (ft)

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1975 1977 1979 1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017



21S15E12F002M
361156N1203004W001

Water Surface Elevation (ft)

310
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230
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190
170

Depth to Groundwater (ft)

340
360
380
400
420
440
460

1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020



21S16E09L001M
361158N1202452W001

Water Surface Elevation (ft)

310
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130

Depth to Groundwater (ft)

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1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017 2019



21S16E11E001M
361164N1202179W001

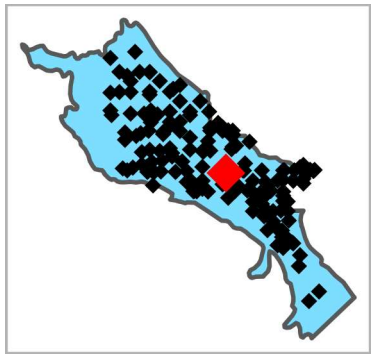
Water Surface Elevation (ft)

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Depth to Groundwater (ft)

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2016



21S16E08D003M
361214N1202693W001

Water Surface Elevation (ft)

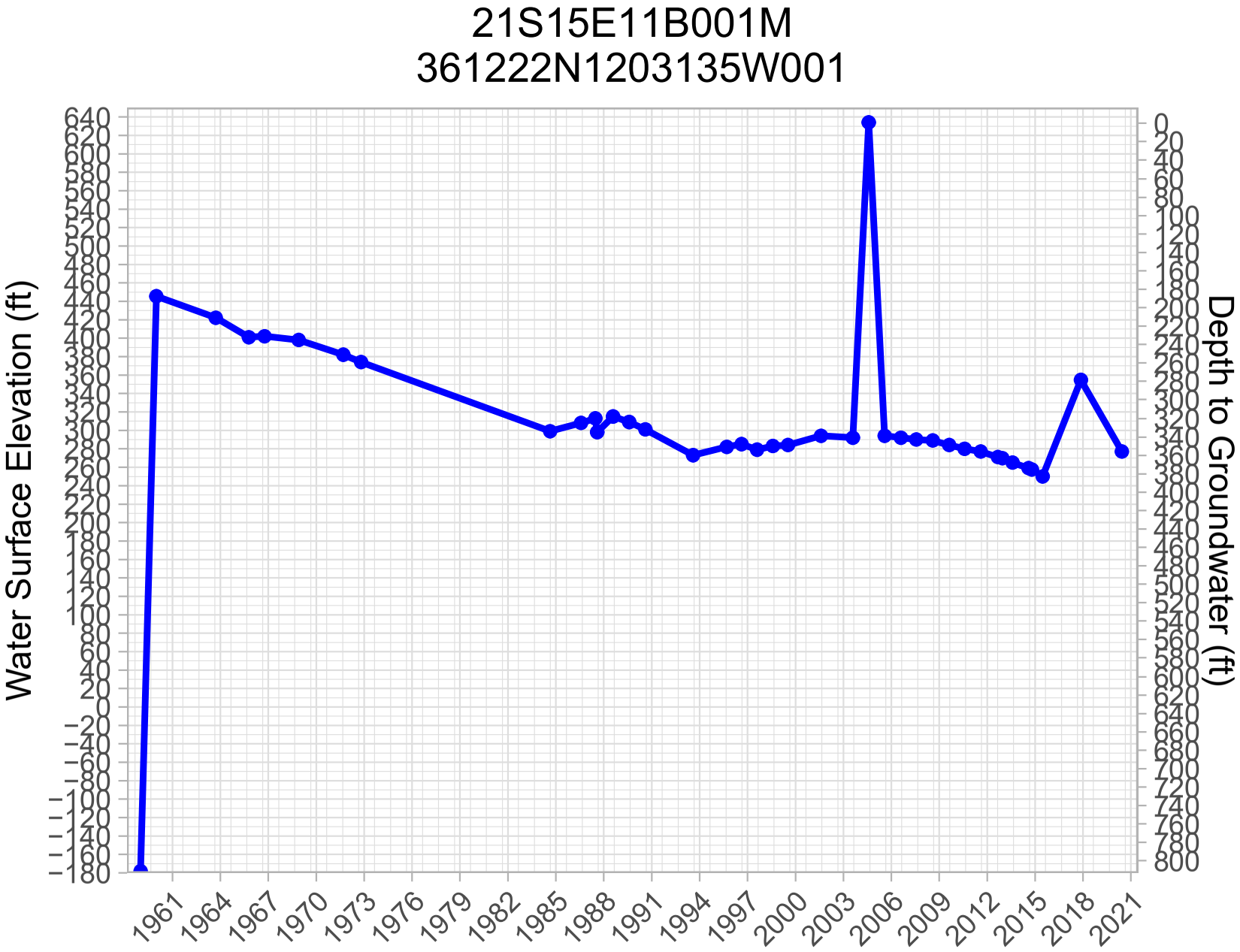
330
310
290
270
250
230
210
190

Depth to Groundwater (ft)

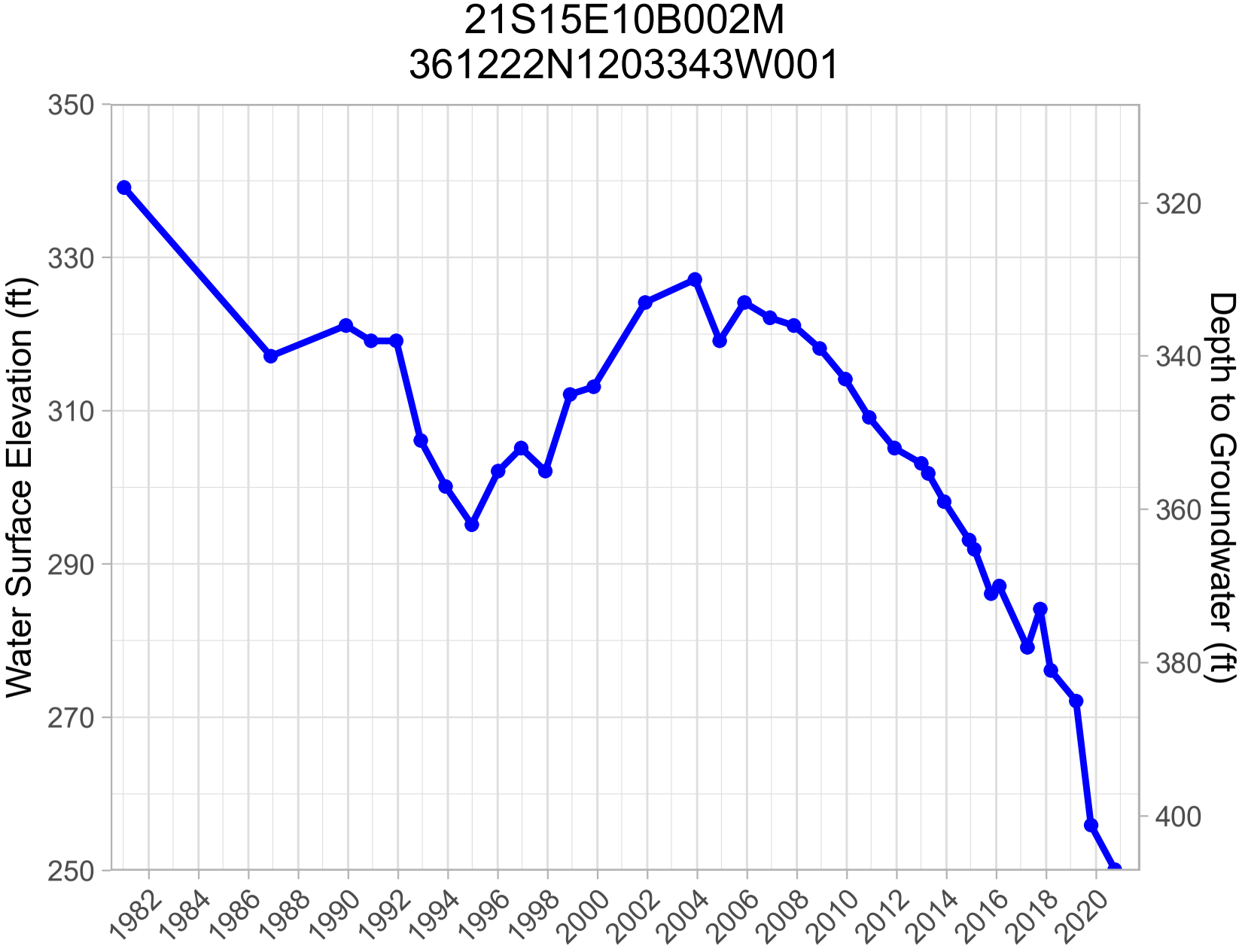
280
300
320
340
360
380
400

1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017 2019




21S15E11B001M
361222N1203135W001
Water Surface Elevation (ft)
Depth to Groundwater (ft)
640
620
600
580
560
540
520
500
480
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
440
460
480
500
520
540
560
580
600
620
640
660
680
700
720
740
760
780
800
1961
1964
1967
1970
1973
1976
1979
1982
1985
1988
1991
1994
1997
2000
2003
2006
2009
2012
2015
2018
2021




21S15E10B002M
361222N1203343W001
Water Surface Elevation (ft)
Depth to Groundwater (ft)
350
330
310
290
270
250
320
340
360
380
400
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020



21S16E04N003M
361231N1202532W001

Water Surface Elevation (ft)

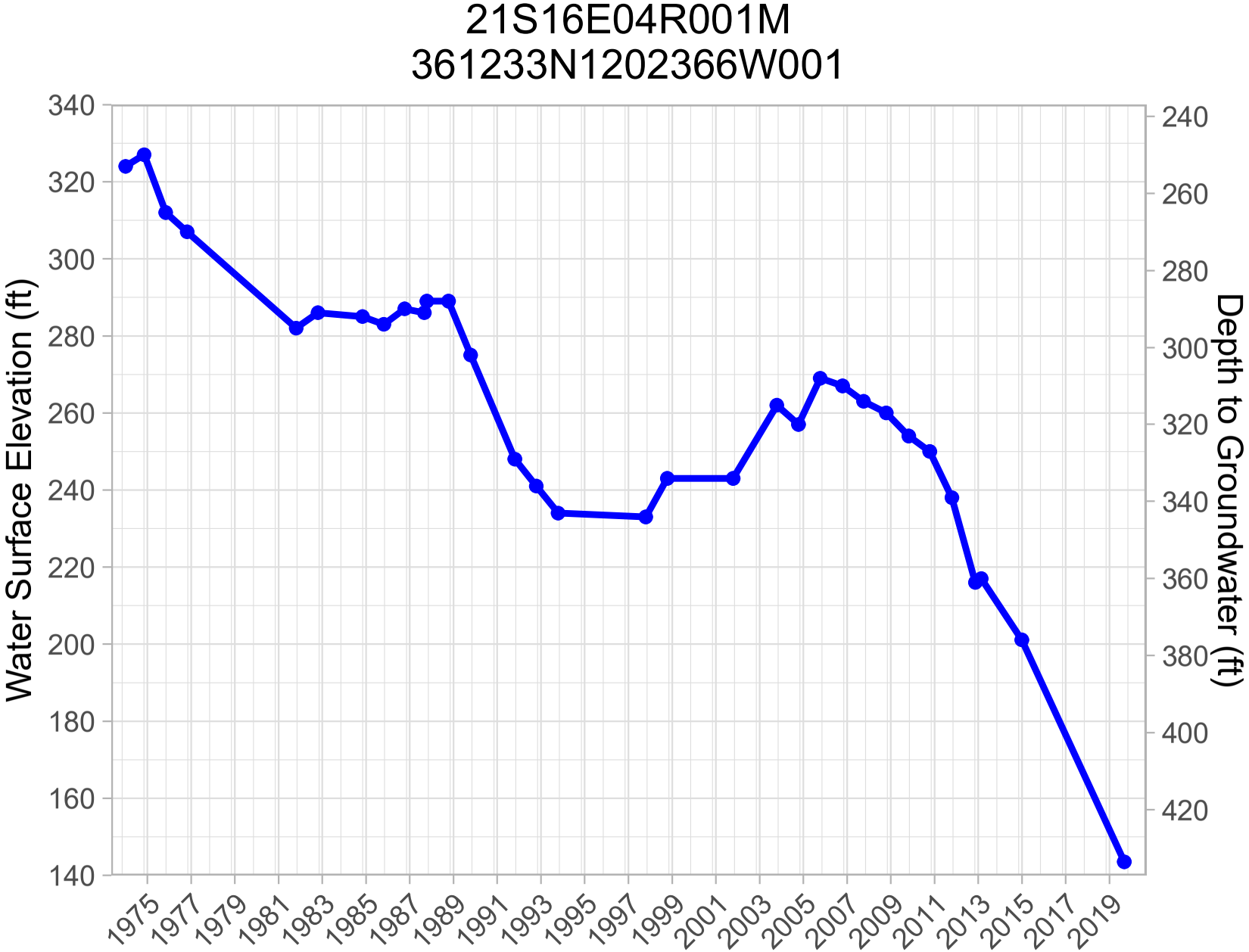
320
300
280
260
240
220

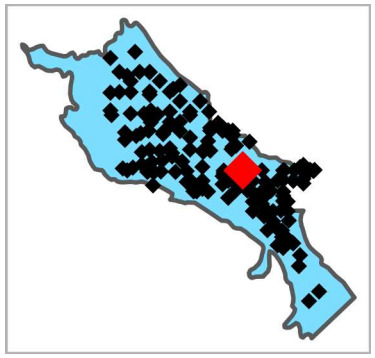
Depth to Groundwater (ft)

280
300
320
340

1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017 2019




21S16E04R001M
361233N1202366W001
Water Surface Elevation (ft)
Depth to Groundwater (ft)
340
320
300
280
260
240
220
200
180
160
140
240
260
280
300
320
340
360
380
400
420
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
2019



21S16E04N002M
361233N1202538W001

Water Surface Elevation (ft)

420
400
380
360
340
320
300
280
260
240
220

Depth to Groundwater (ft)

160
180
200
220
240
260
280
300
320
340
360

1964
1967
1970
1973
1976
1979
1982
1985
1988
1991
1994
1997
2000
2003
2006
2009
2012
2015
2018



21S15E04N004M
361233N1203571W001

Water Surface Elevation (ft)

450
430
410
390
370
350
330
310

Depth to Groundwater (ft)

260
280
300
320
340
360

1958 1961 1964 1967 1970 1973 1976 1979 1982 1985 1988 1991 1994 1997 2000 2003 2006 2009 2012 2015 2018 2021



21S15E04Q001M
361253N1203516W001

Water Surface Elevation (ft)

460
440
420
400
380
360
340
320

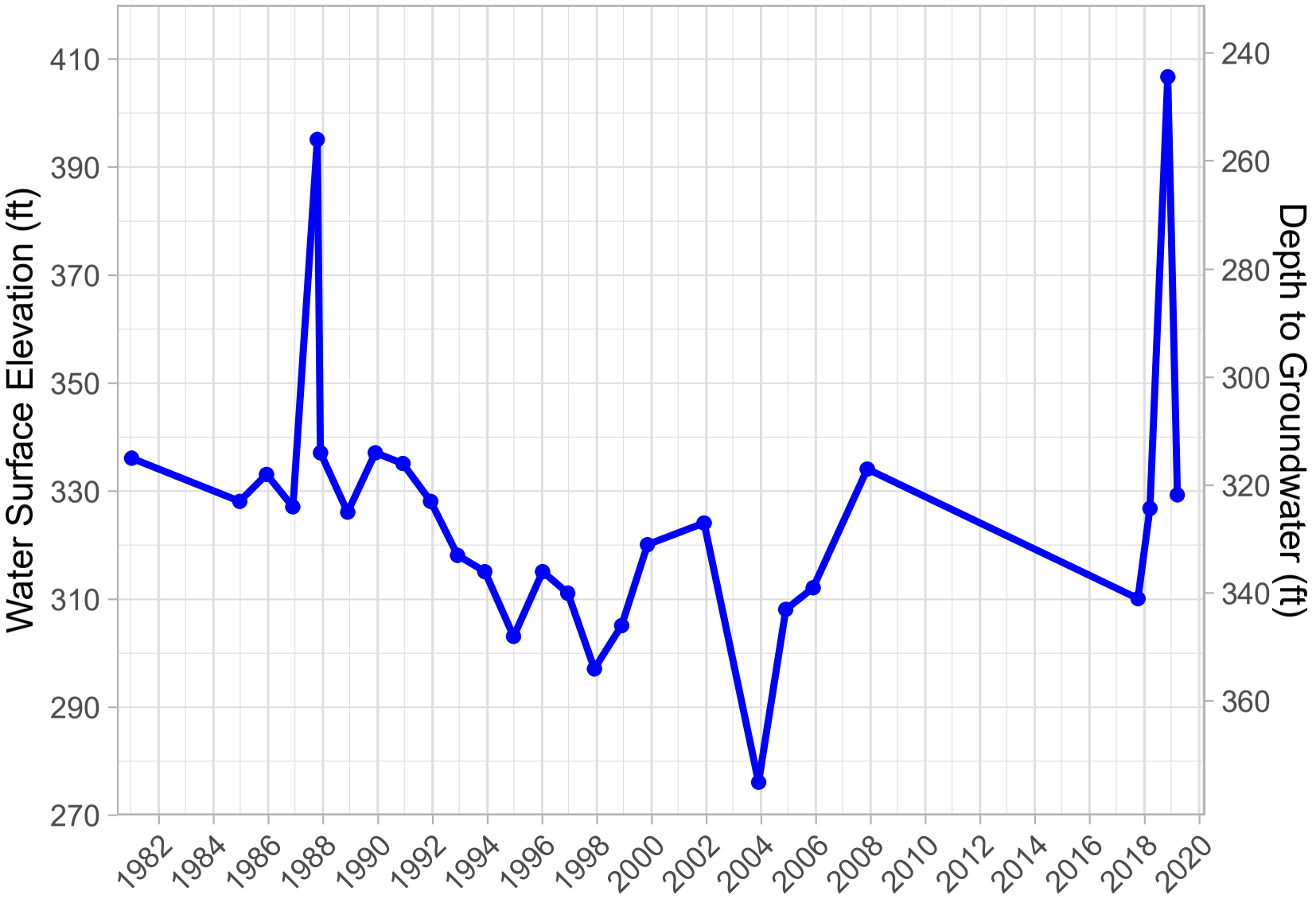
Depth to Groundwater (ft)

220
240
260
280
300
320
340

1963 1966 1969 1972 1975 1978 1981 1984 1987 1990 1993 1996 1999 2002 2005 2008 2011 2014 2017 2020



21S15E03F001M
361294N1203349W001





21S15E02E001M
361303N1203257W001

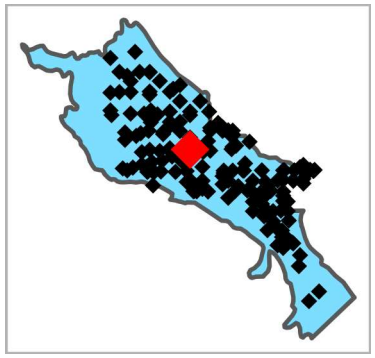
Water Surface Elevation (ft)

460 440 420 400 380 360 340 320 300 280 260 240 220 200 180 160 140 120 100 80 60 40 20 0 −20 −40 −60 −80 −100 −120 −140 −160 −180

Depth to Groundwater (ft)

180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580 600 620 640 660 680 700 720 740 760 780 800 820

1961 1964 1967 1970 1973 1976 1979 1982 1985 1988 1991 1994 1997 2000 2003 2006 2009 2012 2015 2018 2021



20S15E36N001M
361383N1203007W001

Water Surface Elevation (ft)

440
420
400
380
360
340
320
300
280
260
240
220
200

Depth to Groundwater (ft)

180
200
220
240
260
280
300
320
340
360
380
400

1964 1967 1970 1973 1976 1979 1982 1985 1988 1991 1994 1997 2000 2003 2006 2009 2012 2015 2018 2021



20S15E34R001M
361392N1203191W001

Water Surface Elevation (ft)

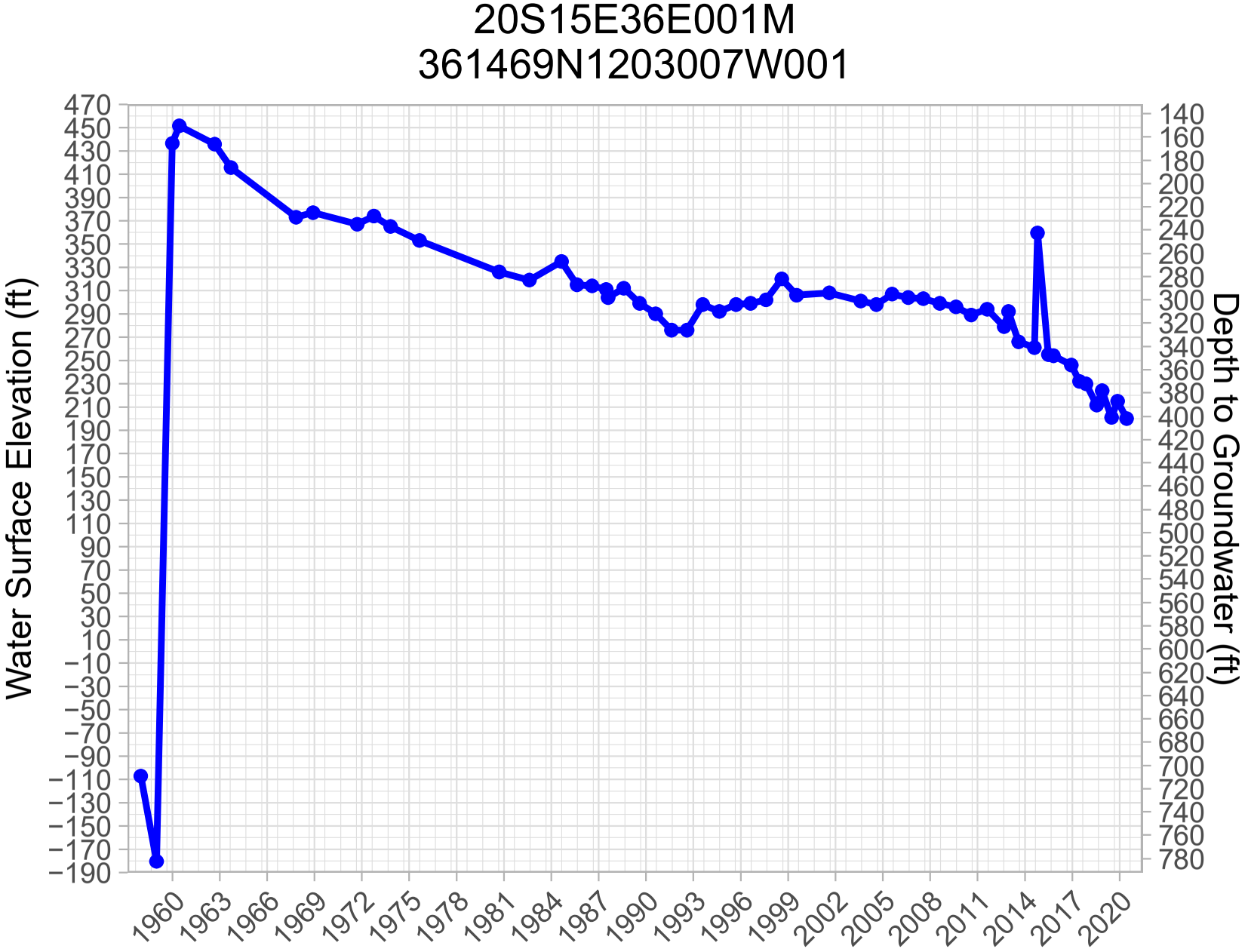
470
450
430
410
390
370
350
330
310
290
270
250
230
210
190
170

Depth to Groundwater (ft)

180
200
220
240
260
280
300
320
340
360
380
400
420
440

1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020




20S15E36E001M
361469N1203007W001
Water Surface Elevation (ft)
Depth to Groundwater (ft)
470
450
430
410
390
370
350
330
310
290
270
250
230
210
190
170
150
130
110
90
70
50
30
10
−10
−30
−50
−70
−90
−110
−130
−150
−170
−190
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
440
460
480
500
520
540
560
580
600
620
640
660
680
700
720
740
760
780
1960
1963
1966
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1981
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1996
1999
2002
2005
2008
2011
2014
2017
2020



20S15E33C002M
361481N1203488W001

Water Surface Elevation (ft)

480
460
440
420
400
380
360
340
320
300

Depth to Groundwater (ft)

200
220
240
260
280
300
320
340

1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018



20S15E34B002M
361508N1203252W001

Water Surface Elevation (ft)

370
350
330
310
290
270
250
230

Depth to Groundwater (ft)

280
300
320
340
360
380
400

1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020



20S15E26L001M
361583N1203099W001

Water Surface Elevation (ft)

340
320
300
280
260
240
220

Depth to Groundwater (ft)

300
320
340
360
380

1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017 2019



20S15E25D002M
361631N1203007W001

Water Surface Elevation (ft)

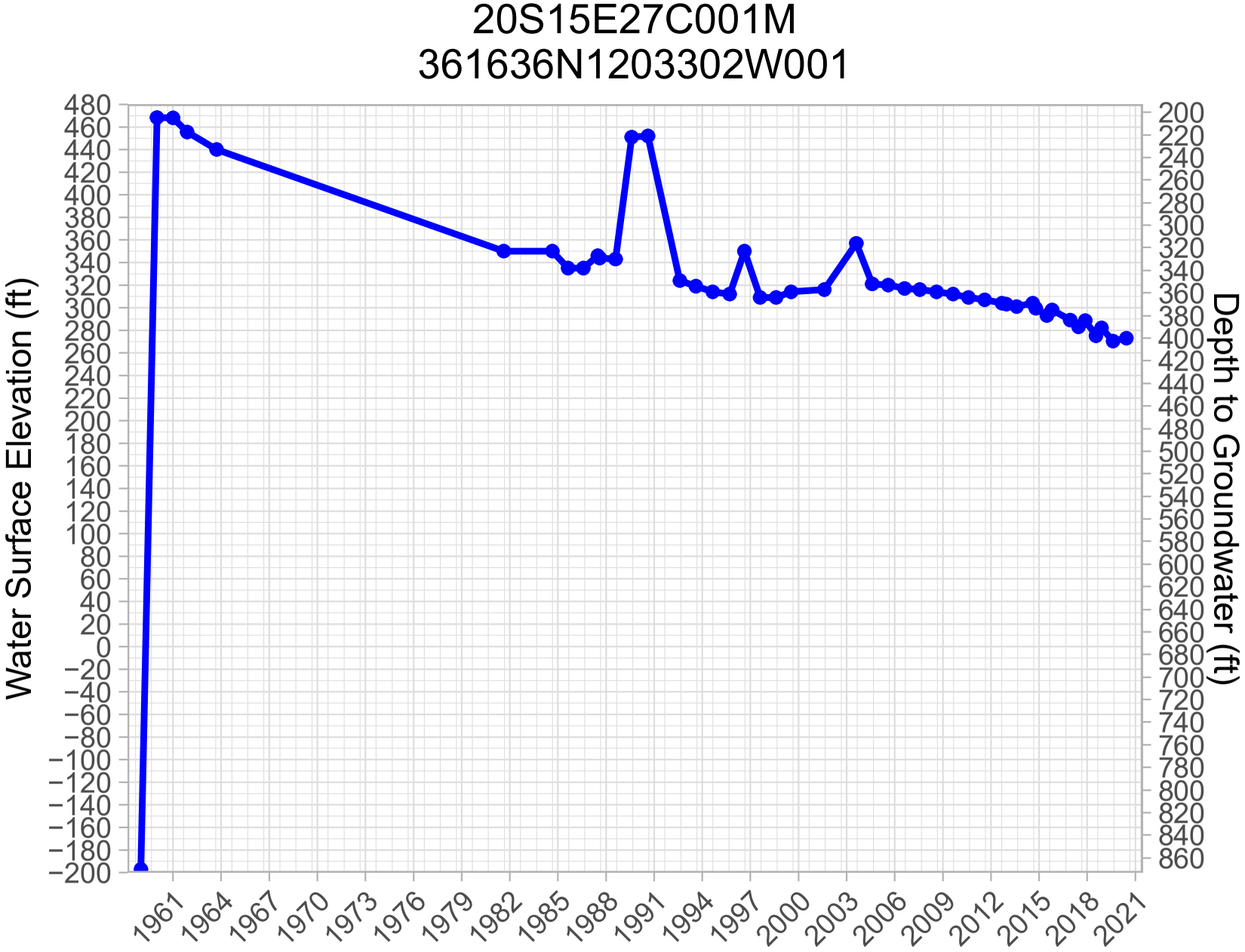
440
420
400
380
360
340
320
300
280

Depth to Groundwater (ft)

180
200
220
240
260
280
300
320

1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018




20S15E27C001M
361636N1203302W001
Water Surface Elevation (ft)
Depth to Groundwater (ft)
480
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
−20
−40
−60
−80
−100
−120
−140
−160
−180
−200
200
220
240
260
280
300
320
340
360
380
400
420
440
460
480
500
520
540
560
580
600
620
640
660
680
700
720
740
760
780
800
820
840
860
1961
1964
1967
1970
1973
1976
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2003
2006
2009
2012
2015
2018
2021



20S15E23L001M
361731N1203104W001

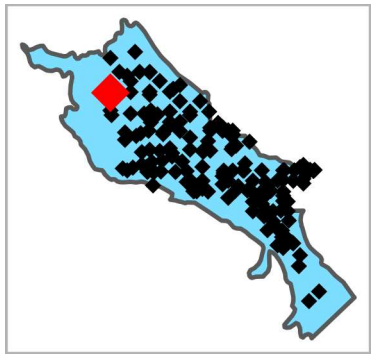
Water Surface Elevation (ft)

380
360
340
320
300
280
260
240

Depth to Groundwater (ft)

280
300
320
340
360
380
400

1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017 2019



20S15E20D001M
361792N1203718W001

Water Surface Elevation (ft)

460
440
420
400
380
360
340
320
300
280
260
240

Depth to Groundwater (ft)

300
320
340
360
380
400
420
440
460
480

1963 1966 1969 1972 1975 1978 1981 1984 1987 1990 1993 1996 1999 2002 2005 2008 2011 2014 2017 2020



20S15E23D001M
361800N1203188W001

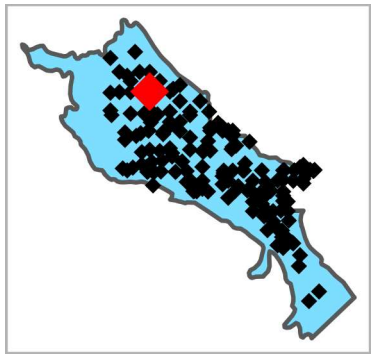
Water Surface Elevation (ft)

460
440
420
400
380
360
340
320
300
280

Depth to Groundwater (ft)

240
260
280
300
320
340
360
380
400

1960 1963 1966 1969 1972 1975 1978 1981 1984 1987 1990 1993 1996 1999 2002 2005 2008 2011 2014 2017 2020



20S15E22D002M
361800N1203366W001

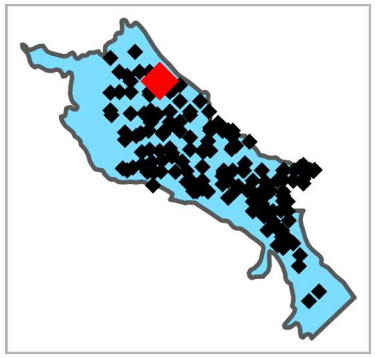
Water Surface Elevation (ft)

430
410
390
370
350
330
310
290
270
250

Depth to Groundwater (ft)

300
320
340
360
380
400
420
440
460
480

1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020



20S15E15L001M
361875N1203282W001

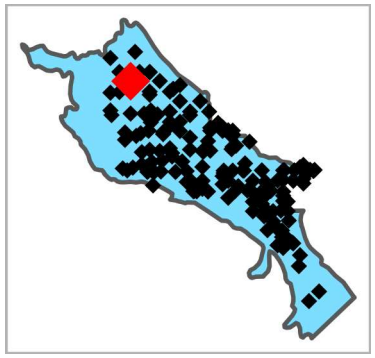
Water Surface Elevation (ft)

530
510
490
470
450
430
410
390
370
350
330
310
290
270
250

Depth to Groundwater (ft)

220
240
260
280
300
320
340
360
380
400
420
440
460
480

1962
1965
1968
1971
1974
1977
1980
1983
1986
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1995
1998
2001
2004
2007
2010
2013
2016
2019



20S15E16E001M
361875N1203543W001

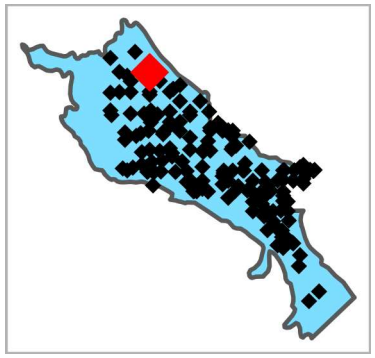
Water Surface Elevation (ft)

500
480
460
440
420
400
380
360
340
320
300
280
260

Depth to Groundwater (ft)

280
300
320
340
360
380
400
420
440
460
480
500

1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017 2019



20S15E16A002M
361939N1203374W001

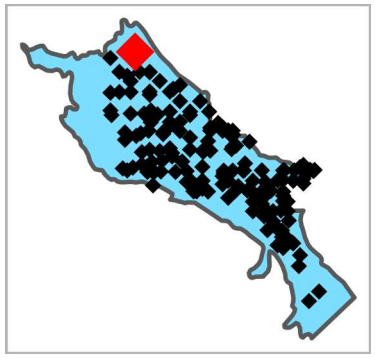
Water Surface Elevation (ft)

520
500
480
460
440
420
400
380
360
340
320
300
280
260

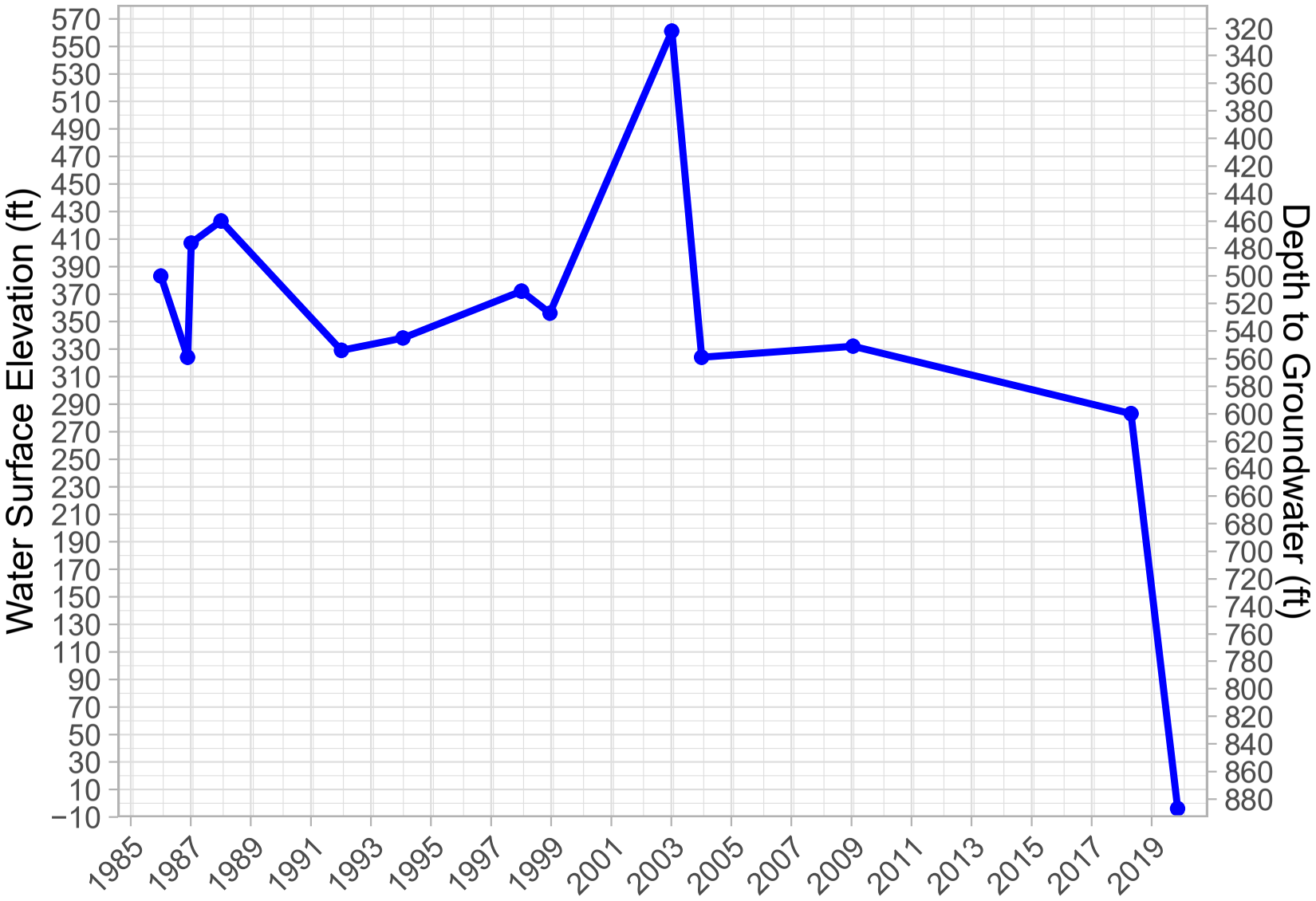
Depth to Groundwater (ft)

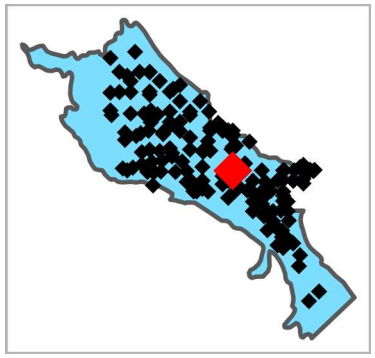
280
300
320
340
360
380
400
420
440
460
480
500

1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020



20S15E09C001M
362086N1203499W001





21S16E05P001M
361231N1202629W001

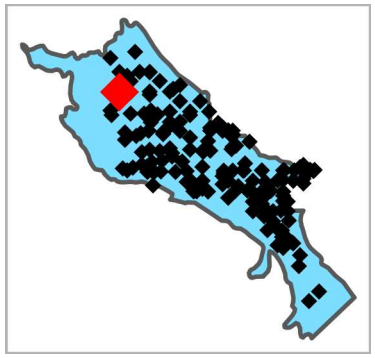
Water Surface Elevation (ft)

430
410
390
370
350
330
310
290
270
250

Depth to Groundwater (ft)

160
180
200
220
240
260
280
300
320
340

1963 1966 1969 1972 1975 1978 1981 1984 1987 1990 1993 1996 1999 2002 2005 2008 2011 2014 2017 2020



20S15E20B001M
361797N1203635W001

Water Surface Elevation (ft)

420
400
380
360
340
320
300
280

Depth to Groundwater (ft)

320
340
360
380
400
420
440
460

1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017 2019

Appendix G – Hydrographs Based on Transducer Measurements

20S15E16H001MX-CASGEM1-CASGEM1A-Worth



20S15E22M001MX-
CASGEM 2A-Worth



20S15E26L001MX



20S15E26Q001MX-VNG WF3-Valley Nut-CASGEM 3



20S15E35E001MX Klepper Ag



20S15E35H001MX-VNG
WF4-Valley Nut Growers



20S15E35J001MX-PVP
WF1-Arnold (CA)



20S16E28B001MX

4. TSP W4



20S16E28D001MX



20S16E30L001MX

2. TSP WF2 (All)



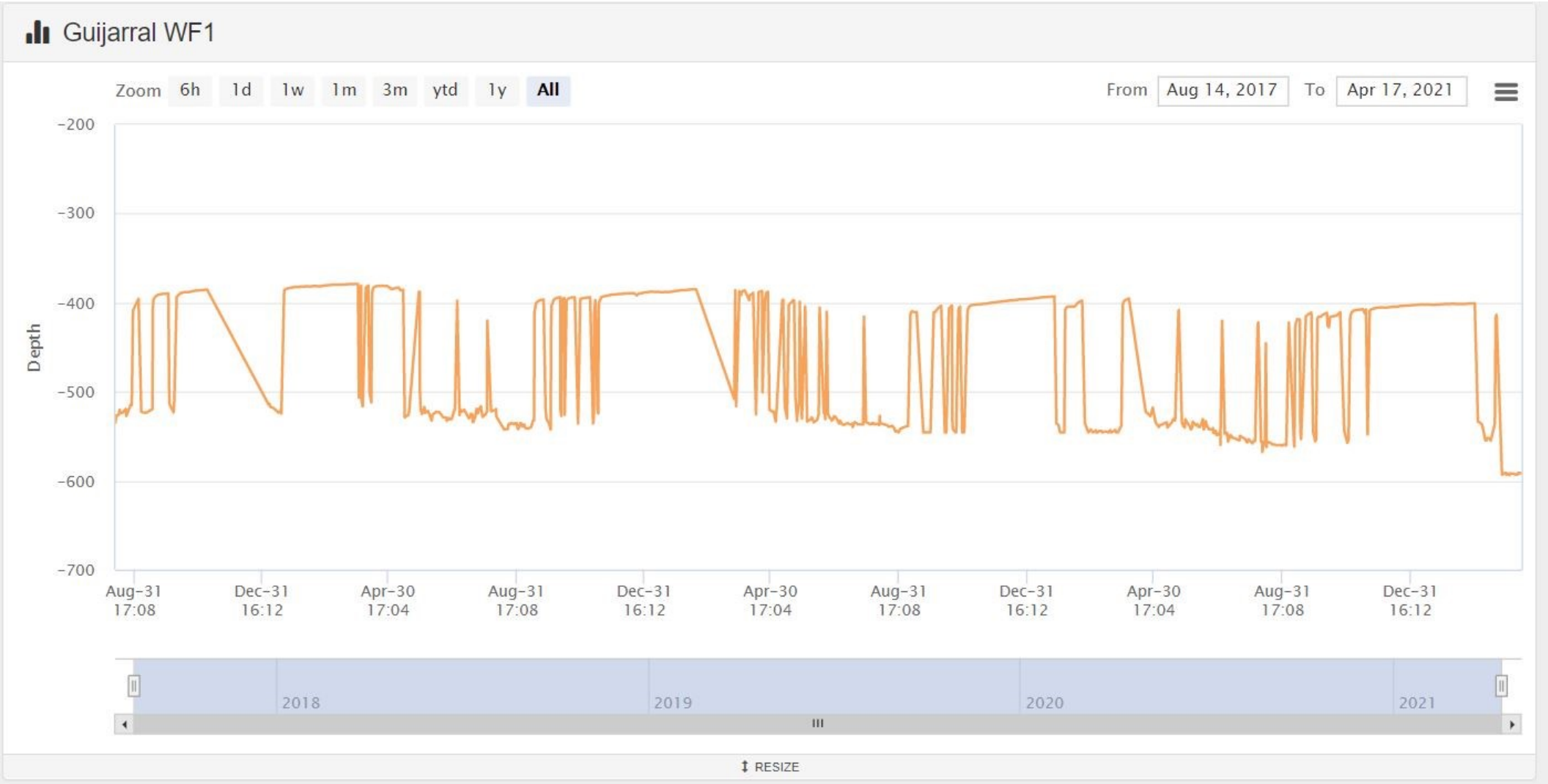
20S16E30N002MX



20S16E30Q002MX



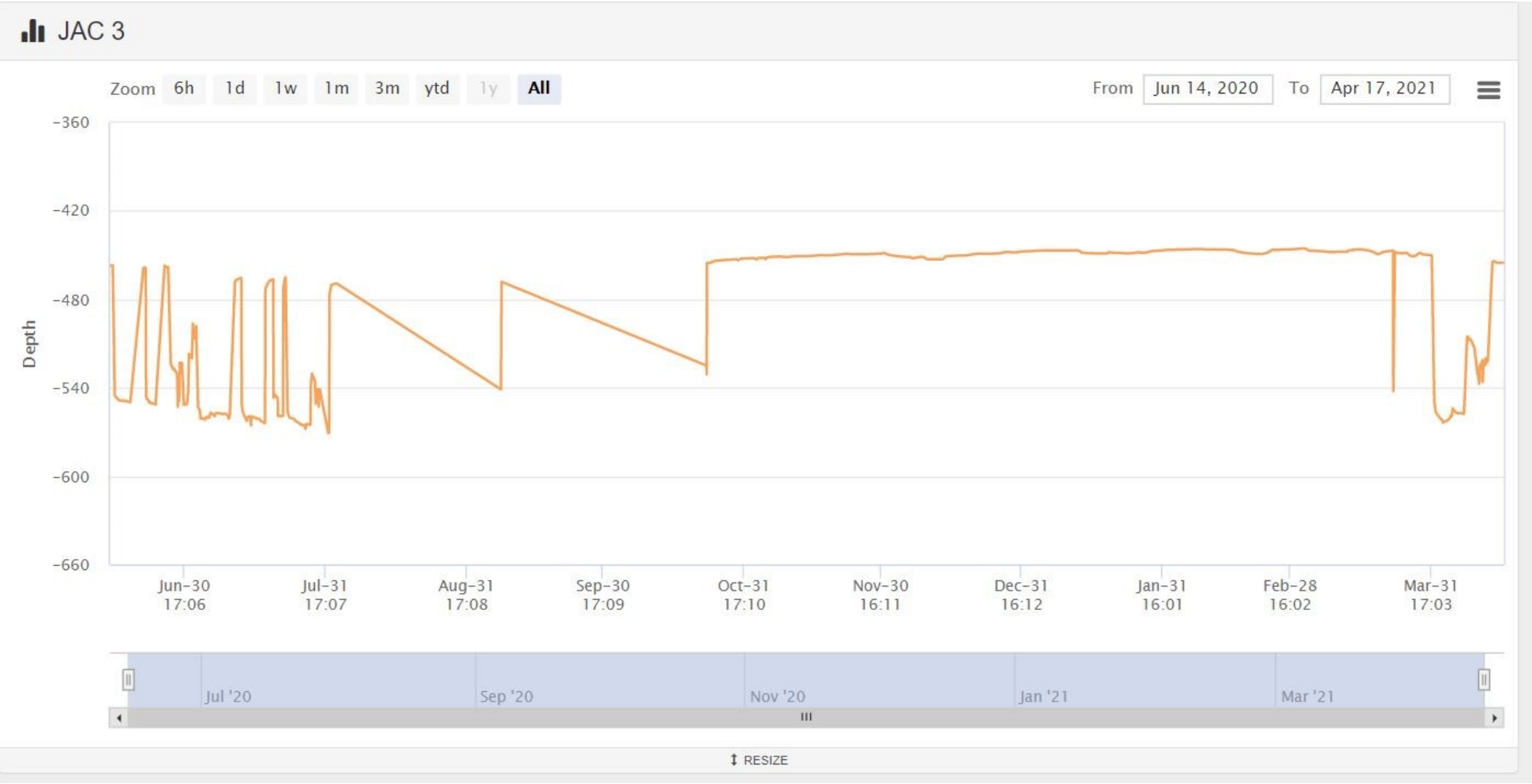
20S16E32L001MX-Guijarral WF1-Setton



21S15E12D001MX-JAC WF2-Jacalitos



21S15E12F002MX-JAC 3-Jacalitos



21S15E12Q003MX-
CASGEM 4-Lovelace



21S16E01L001MX



21S16E12M002MX



21S16E16Q001MX-
CASGEM 5A-Gladstone



21S16E22L002MX-CASGEM 6-Gladstone



Appendix H – Reporting Standards Section 352.4

CALIFORNIA

Water Boards

STATE WATER RESOURCES CONTROL BOARD

REGIONAL WATER QUALITY CONTROL BOARDS

California Code of Regulations, Title 23

(http://ccr.oal.ca.gov)

Excerpts of Divisions 2, 3, and 5 Applicable to the Administration of Water Rights and SGMA

(Current as of January 1, 2021)

JANUARY 2021

HISTORY

1. New article 2 (section 351) and section filed 8-15-2016 as an emergency exempt from review by OAL pursuant to Water Code section 10733.2(d); operative 8-15-2016. Pursuant to Water Code section 10733.2(d), these regulations shall remain in effect until revised by the Department of Water Resources (Register 2016, No. 34).

Article 3. Technical and Reporting Standards

§ 352. Introduction to Technical and Reporting Standards.

This Article describes the monitoring protocols, standards for monitoring sites, and other technical elements related to the development or implementation of a Plan.

NOTE: AUTHORITY CITED: SECTION 10733.2, WATER CODE
REFERENCE: SECTION 10733.2, WATER CODE.

HISTORY

1. New article 3 (sections 352-352.6) and section filed 8-15-2016 as an emergency exempt from review by OAL pursuant to Water Code section 10733.2(d); operative 8-15-2016. Pursuant to Water Code section 10733.2(d), these regulations shall remain in effect until revised by the Department of Water Resources (Register 2016, No. 34).

§ 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.

NOTE: AUTHORITY CITED: SECTION 10733.2, WATER CODE
REFERENCE: SECTIONS 10727.2, 10728.2, 10729 AND 10733.2, WATER CODE.

HISTORY

1. New section filed 8-15-2016 as an emergency exempt from review by OAL pursuant to Water Code section 10733.2(d); operative 8-15-2016. Pursuant to Water Code section 10733.2(d), these regulations shall remain in effect until revised by the Department of Water Resources (Register 2016, No. 34).

§ 352.4. Data and Reporting Standards.

(a) The following reporting standards apply to all categories of information required of a Plan, unless otherwise indicated:

(1) Water volumes shall be reported in acre-feet.

(2) Surface water flow shall be reported in cubic feet per second and groundwater flow shall be reported in acre-feet per year.

(3) Field measurements of elevations of groundwater, surface water, and land surface shall be measured and reported in feet to an accuracy of at least 0.1 feet relative to NAVD88, or another national standard that is convertible to NAVD88, and the method of measurement described.

(4) Reference point elevations shall be measured and reported in feet to an accuracy of at least 0.5 feet, or the best available information, relative to NAVD88, or another national standard that is convertible to NAVD88, and the method of measurement described.

(5) Geographic locations shall be reported in GPS coordinates by latitude and longitude in decimal degree to five decimal places, to a minimum accuracy of 30 feet, relative to NAD83, or another national standard that is convertible to NAD83.

(b) Monitoring sites shall include the following information:

(1) A unique site identification number and narrative description of the site location.

(2) A description of the type of monitoring, type of measurement taken, and monitoring frequency.

(3) Location, elevation of the ground surface, and identification and description of the reference point.

(4) A description of the standards used to install the monitoring site. Sites that do not conform to best management practices shall be identified and the nature of the divergence from best management practices described.

(c) The following standards apply to wells:

(1) Wells used to monitor groundwater conditions shall be constructed according to applicable construction standards, and shall provide the following information in both tabular and geodatabase-compatible shapefile form:

(A) CASGEM well identification number. If a CASGEM well identification number has not been issued, appropriate well information shall be entered on forms made available by the Department, as described in Section 353.2.

(B) Well location, elevation of the ground surface and reference point, including a description of the reference point.

(C) A description of the well use, such as public supply, irrigation, domestic, monitoring, or other type of well, whether the well is active or inactive, and whether the well is a single, clustered, nested, or other type of well.

(D) Casing perforations, borehole depth, and total well depth.

(E) Well completion reports, if available, from which the names of private owners have been redacted.

(F) Geophysical logs, well construction diagrams, or other relevant information, if available.

(G) Identification of principal aquifers monitored.

(H) Other relevant well construction information, such as well capacity, casing diameter, or casing modifications, as available.

(2) If an Agency relies on wells that lack casing perforations, borehole depth, or total well depth information to monitor groundwater conditions as part of a Plan, the Agency shall describe a schedule for acquiring monitoring wells with the necessary information, or demonstrate to the Department that such information is not necessary to understand and manage groundwater in the basin.

(3) Well information used to develop the basin setting shall be maintained in the Agency's data management system.

(d) Maps submitted to the Department shall meet the following requirements:

(1) Data layers, shapefiles, geodatabases, and other information provided with each map, shall be submitted electronically to the Department in accordance with the procedures described in Article 4.

(2) Maps shall be clearly labeled and contain a level of detail to ensure that the map is informative and useful.

(3) The datum shall be clearly identified on the maps or in an associated legend.

(e) Hydrographs submitted to the Department shall meet the following requirements:

(1) Hydrographs shall be submitted electronically to the Department in accordance with the procedures described in Article 4.

(2) Hydrographs shall include a unique site identification number and the ground surface elevation for each site.

(3) Hydrographs shall use the same datum and scaling to the greatest extent practical.

(f) Groundwater and surface water models used for a Plan shall meet the following standards:

(1) The model shall include publicly available supporting documentation.

(2) The model shall be based on field or laboratory measurements, or equivalent methods that justify the selected values, and calibrated against site-specific field data.

(3) Groundwater and surface water models developed in support of a Plan after the effective date of these regulations shall consist of public domain open-source software.

(g) The Department may request data input and output files used by the Agency, as necessary. The Department may independently evaluate the appropriateness of model results relied upon by the Agency, and use that evaluation in the Department's assessment of the Plan.

NOTE: AUTHORITY CITED: SECTION 10733.2, WATER CODE

REFERENCE: SECTIONS 10727.2, 10727.6 AND 10733.2, WATER CODE.

HISTORY

1. New section filed 8-15-2016 as an emergency exempt from review by OAL pursuant to Water Code section 10733.2(d); operative 8-15-2016. Pursuant to Water Code section 10733.2(d), these regulations shall remain in effect until revised by the Department of Water Resources (Register 2016, No. 34).

§ 352.6. Data Management System.

Each Agency shall develop and maintain a data management system that is capable of storing and reporting information relevant to the development or implementation of the Plan and monitoring of the basin.

NOTE: AUTHORITY CITED: SECTION 10733.2, WATER CODE
REFERENCE: SECTIONS 10727.2, 10728, 10728.2 AND 10733.2, WATER CODE.

HISTORY

1. New section filed 8-15-2016 as an emergency exempt from review by OAL pursuant to Water Code section 10733.2(d); operative 8-15-2016. Pursuant to Water Code section 10733.2(d), these regulations shall remain in effect until revised by the Department of Water Resources (Register 2016, No. 34).

Article 4. Procedures

§ 353. Introduction to Procedures.

This Article describes various procedural issues related to the submission of Plans and public comment to those Plans.

NOTE: AUTHORITY CITED: SECTION 10733.2, WATER CODE
REFERENCE: SECTION 10733.2, WATER CODE.

HISTORY

1. New article 4 (sections 353-353.10) and section filed 8-15-2016 as an emergency exempt from review by OAL pursuant to Water Code section 10733.2(d); operative 8-15-2016. Pursuant to Water Code section 10733.2(d), these regulations shall remain in effect until revised by the Department of Water Resources (Register 2016, No. 34).

§ 353.2. Information Provided by the Department.

(a) The Department shall make forms and instructions for submitting Plans, reports, and other information available on its website.

(b) The Department shall provide information, to the extent available, to assist Agencies in the preparation and implementation of Plans, which shall be posted on the Department's website.

NOTE: AUTHORITY CITED: SECTION 10733.2, WATER CODE
REFERENCE: SECTIONS 10729 AND 10733.2, WATER CODE

HISTORY

1. New section filed 8-15-2016 as an emergency exempt from review by OAL pursuant to Water Code section 10733.2(d); operative 8-15-2016. Pursuant to Water Code section 10733.2(d), these regulations shall remain in effect until revised by the Department of Water Resources (Register 2016, No. 34).

Appendix I – Public Comments and Response Summary

Comments and Responses *(Reg. § 354.10)*

Regulation Requirements:

§ 354.10. Notice and Communication

Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:

(a) A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties.

(b) A list of public meetings at which the Plan was discussed or considered by the Agency.

(c) Comments regarding the Plan received by the Agency and a summary of any responses by the Agency.

(d) A communication section of the Plan that includes the following:

- **(1)** An explanation of the Agency's decision-making process.
- **(2)** Identification of opportunities for public engagement and a discussion of how public input and response will be used.
- **(3)** A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin.
- **(4)** The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.

Note: Authority cited: Section 10733.2, Water Code.

Reference: Sections 10723.2, 10727.8, 10728.4, and 10733.2, Water Code

January 12, 2022

VIA EMAIL info@sgma.pleasantvalleywaterdistrict.com

Pleasant Valley GSA
PO Box 468,
Coalinga, CA 93210

Re: City of Coalinga Comments

The City of Coalinga has reviewed the Pleasant Valley Groundwater Sustainability Plan ("GSP") and appreciates the opportunity to review and comment on the GSP pursuant to the Sustainable Groundwater Management Act ("SGMA").

As a GSA serving in an advisory role to the Pleasant Valley Sub-Basin the City of Coalinga wanted to provide its comments on the final draft GSP which have been divided into general/administrative/policy comments and more detailed technical comments.

General/Administrative/Policy Comments

Groundwater recharge by the City of Coalinga via wastewater treatment plant

The City of Coalinga wants to ensure the groundwater being recharged out of the City of Coalinga's wastewater treatment plant is correctly accounted for which was subject to discussion during the technical meetings. The City of Coalinga estimates 1 million gallons a day are recharged into the basin via the wastewater treatment plant. The City found the recharge rates within the GSP to be vague with a range of 200-3000 acre feet time range. (Page 251-252). Also, the City found the recharge from the Prison and Hospital to be missing as these facilities are located in the City limits. Finally, the GSP was vague as to which entity would receive the groundwater credit for the wastewater treatment plant recharge when the City of Coalinga physically recharges the water. The GSP should clearly present the future projected water recharge from the City of Coalinga, State Hospital, and State Prison's wastewater treatment plants. Finally, the GSP should note that any groundwater recharged via the wastewater treatment plants are credited to the City of Coalinga GSA.

Technical Comments

- Number of hospitals and prisons is not correct. There are not "two nearby prisons and a hospital" (page 11). There is a prison and a state hospital both of which are located within the City of Coalinga. If you are referring to the Coalinga Regional Medical Center as the second hospital please clarify.

- The City of Coalinga's wastewater treatment plant is incorrectly labeled as a "lake" in the GSP. (Page 85). The City of Coalinga's wastewater treatment plant should be corrected and relabeled as a wastewater treatment plant.

- Produced water from the oil industry should not be considered under SGMA because this water is extracted from below the groundwater aquifer and produced water does not come from formations yielding usuable groundwater. (Page 109). Second, treated produced water that is extracted and recharged should be accounted for and this data should be provided by the oil companies.

- The City of Coalinga has accurate surface water information both from the Coalinga Canal and out of the surface water treatment plant. The City is willing to share this information. However, the City of Coalinga is requesting the surface water values related to streams flowing through the GSA. (Page 13). Also, the City of Coalinga is requesting this data be integrated within the GSP. Also, the GSP should clarify and distinguish naturally occurring surface water versus imported surface water and the return flow of this imported water.

- The City of Coalinga adopted an Urban Water Management Plan. (Page 107). Within the adopted Plan is a drought contingency plan which is intended to assist the City of Coalinga prepare and manage for a drought.

- The City of Coalinga is not responsible for any of the potential groundwater projects unless the City expressly agrees to join and pay for a project. The City of Coalinga agrees that project costs should be the responsibility of the proponent.

- There are some general concerns about the accuracy of the Land IQ land mapping program. The City of Coalinga wants to ensure Land IQ is in fact accurate and reliable. For example, certain land uses like “truck crops” are not defined and not correctly labeled within the City of Coalinga. Also, there appears to be a higher number of deciduous crop acreage than what is actually grown in the city limits of Coalinga.

We appreciate the opportunity to provide our general and technical comments related to the Pleasant Valley Groundwater Sustainability Plan. We hope these comments are welcomed and addressed a the public meeting and integrated into the Final Plan.

Please do not hesitate to contact me if you have any questions at sbrewer@coalniga.com or 559-935-1533.143.



Sean Brewer, Assistant City Manager

Cc: Sebastian Silveira, Griswold-Lasalle
Marissa Trejo, City Manager
Katie Durham, Provost & Pritchard
Eric Abrahamsen, Provost & Pritchard

PLEASANT VALLEY GROUNDWATER SUSTAINABILITY AGENCY

POST OFFICE BOX 468
COALINGA, CALIFORNIA 93210-0468

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LEGAL COUNSEL

JAMES S. ANDERSON
SECRETARY

February 15, 2022

City of Coalinga
Sean Brewer, Assistant City Manager
P.O. Box 468
Coalinga, CA 93210

RE: Pleasant Valley Groundwater Sustainability Plan

Dear Sean,
Thank you for your comments dated January 12, 2022. As you know there has been a lot of time, dedication, and hard work to develop the draft document that is presently out for review. We certainly want to thank you and all those involved at the City as well as the City GSA for the time and effort put forth to develop the draft document.

Again, thank you for your comments and the following is offered in response to your comments:

General/Administrative/Policy Comments

Groundwater recharge by the city of Coalinga via wastewater treatment plant
The City of Coalinga wants to ensure the groundwater being recharged out of the City of Colainga's watswater treatment plant is correctly accounted for which was subject to discussion during the technical meetings. The City of Coalinga estimates 1 million gallons a day are recharged into the basin via the wastewater treatment plant. The City found the recharge rates within the GSP to be vague with a range of 200-3000 acre feet time range. Also the City found the recharge from the Prison and Hospital to be missing as these facilities are located in the City limits. Finally, the GSP was vague as to which entity would receive the groundwater dredit fir the wastwter treatment plant recharge when the City of Coalinga physically recharges the water. The GSP should clearly present the future projected waterrechareg from the City o Coalinga, State Hospital, and State prison's wastewater tretamnet plants. Finally, the GSP should not that any groundwater recharged via the wastewater treatment plants are credited to the City of Coalinga GSA.

Response: This comment relates primarily to the amount of surface water imported into the basin and recharged to the underground. On page 3-80 the GSP identifies and estimates that approximately 1,800 af is recharged though the multiple wastewater treatment plants. While the



management actions have not been developed as yet there has been discussion amongst that parties concerning the importation of surface water for direct use and/or recharge and later recovery. While the management actions have not been adopted it has been the intent of the parties that the entity importing the surface supplies receive credit for the amount of import. As this policy has yet to be established it is hoped that this policy will get established in this next year as identified in chapter 7 implementation and we encourage you and your agency to continue to engage as the policies are developed.

Related to the 200-3000 acre-foot numbers shown above they can be referenced to Table 6-2 on page 6-8. These numbers relate to an estimate of additional surface supplies that could be purchased from the City by agricultural interest and imported into the basin for use by agriculture. These numbers are not reflective of the supplies currently imported to the subbasin.

Technical Comments
Number of Hospitals and prisons is not correct….

Response: Noted. The GSP has been updated on page ES -1.

The City of Coalinga wastewater treatment plant is incorrectly labeled as lake in the GSP

Response: Noted. The data in the figure comes from another source and this is how that agency identified the information. The figure has been altered to note that the lake is indeed the City of Coalinga wastewater treatment plant.

Produced water from the oil industry…..

Response: Noted. The GSP has been revised in section 3.2.5.3 to note that produced water from oil production is not covered under the GSP.

The City of Coalinga has accurate surface water information….

Response: the GSP recognizes the City of Coalinga imports significant surface water supplies into the basin. This is specifically identified on page 3-75 and is noted as approximately 5,500 af per year. It is thought that the information supplied by the City is sufficient and we are thankful for the information that has been supplied. Attached you will find the data that has been developed associated with streamflow in the streams that cross the valley. Of note, the past information documented by the Department of Water Resources has been focused on gaining peak flood event data whereas the district approach has been to identify all flows entering and leaving the valley.

The City of Coalinga adopted an urban water management plan.

Response: Noted. The GSP has been revised on page 2-19.

The City of Coalinga is not responsible for groundwater projects….

Response: Noted. The GSP has been revised on page 6-2.

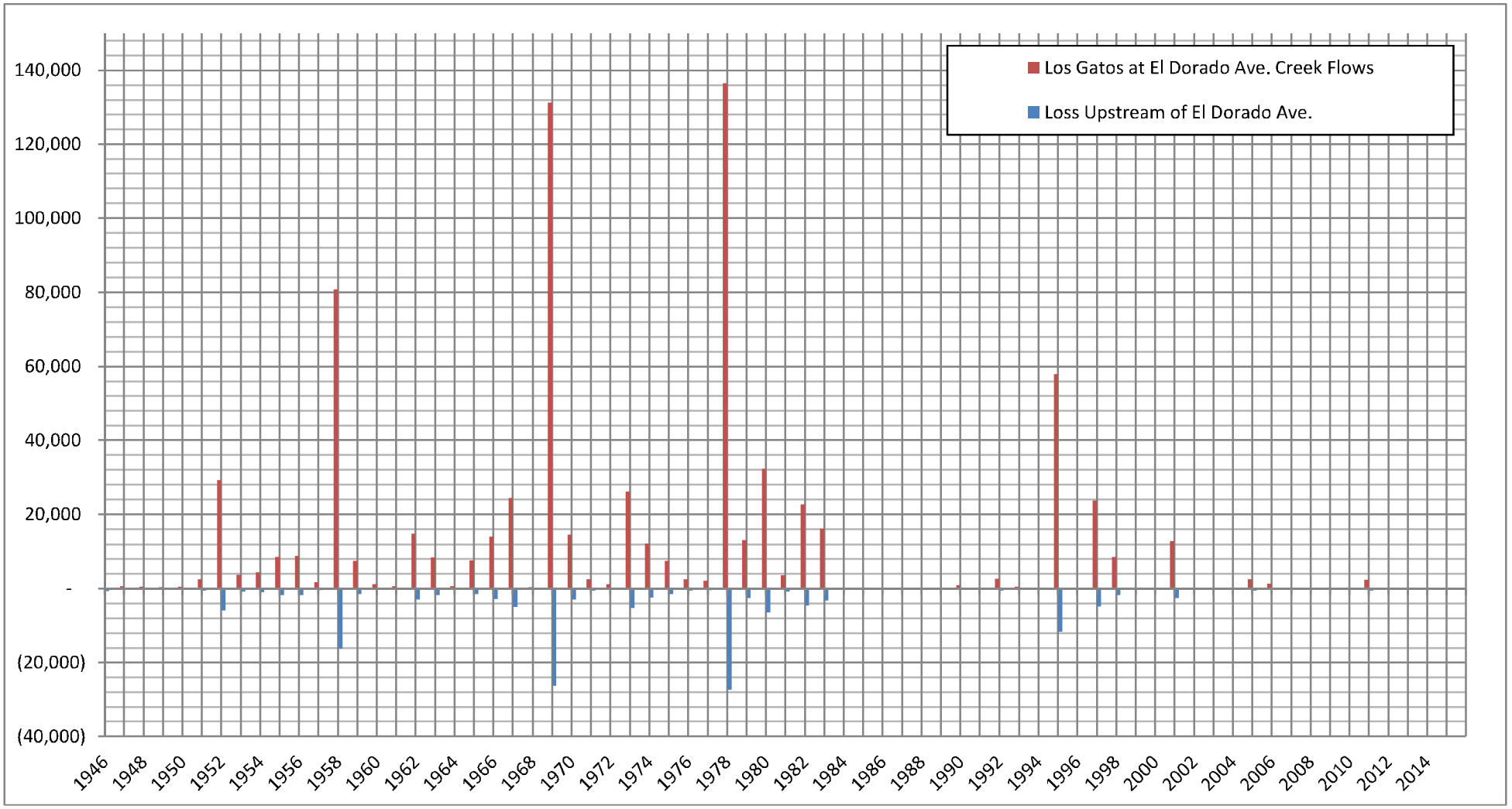
Accuracy of the Land IQ land mapping information……

Response: Noted. The acreage and type of crop are being checked through other sources.

Should you wish to discuss any of these items further or in more detail, feel free to call Brian Ehlers at 559-449-2700.

Sincerely,

Brad Gleason, Board President, Pleasant Valley GSA


Los Gatos at El Dorado Ave. Creek Flows
Loss Upstream of El Dorado Ave.
140,000
120,000
100,000
80,000
60,000
40,000
20,000
-
(20,000)
(40,000)
1946
1948
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
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1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014

Pleasant Valley Stream Gauge Yearly Summary Table:

Stream	2017 Upstream Volume (AF)	2017 Downstream Volume (AF)	2017 Total Losses (AF)	2018 Upstream Volume (AF)	2018 Downstream Volume (AF)	2018 Total Losses (AF)	2019 Upstream Volume (AF)	2019 Downstream Volume (AF)	2019 Total Losses (AF)	2020 Upstream Volume (AF)	2020 Downstream Volume (AF)	2020 Total Losses (AF)	2021 Upstream Volume (AF)	2021 Downstream Volume (AF)	2021 Total Losses (AF)	Notes:
Los Gatos Creek	6,326	2,214	4,112	1,533	1	1,532	1,936	274	1,663	74	27	47	703	675	28	Los Gatos is measuring from the DWR site (LGC) located in the mountains to W Gale Avenue.
Warthan Creek	1,190	417	773	1,245	23	1,222	1,759	5	1,754	0	0	0	419	84	334	Warthan is measuring from the DWR site (WRT) located in the mountains to HWY 33/E Polk St.
Jacalitos	N/A	N/A	0	468	0	468	2,666	534	2,132	84	78	6	165	144	20	Jacalitos is measuring from W Lost Hills Rd to HWY33/W Jayne Ave.
Zapato Chino	N/A	N/A	0	5,696	57	5,639	1,435	157	1,279	8,954	1,794	7,160	80	39	41	Zapato Chino is measuring from S Lost Hills Rd to Sutter Ave.
Totals:			4,886			8,861			6,827			7,213			423	

Additional Notes:

Downstream volumes do not account for other tributaires contributing to the stream.

Upstream and downstream volume values represent the maximum AF for that year and not specifically the value/s for the event/s.

No Pump sight stream guage data was available for 2017. The N/A's seen in 2017 for Jacalitos and Zapato Chino represent that there was no data available.

The Los Gatos Creek and Warthan Creek values for 2017 are estimated values since data was not available. These came from the "Stream Data" pdf dated 1/28/2020 that was put together for a Board Meeting.

The Warthan (WRT) data for 2020 was found to be bad data, so the AF values were zeroed out.

December 20, 2021

Pleasant Valley GSA
P.O. BOX 468,
Coalinga, CA 93210

Submitted via email: info@sgma.pleasantvalleywaterdistrict.com

Re: Public Comment Letter for Pleasant Valley Subbasin Draft GSP

Dear Calvin Monreal and Katie Durham,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Draft Groundwater Sustainability Plan (GSP) for the Pleasant Valley 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 Pleasant Valley 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"

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 Pleasant Valley 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 the identified DAC (City of Coalinga), including identification by name, location on a map (Figure I-2), and the size of the population. While the GSP identifies the water sources for the City of Coalinga in Table 2-5, it should clearly identify the City as an identified DAC in this table and thereby clearly indicate the water sources for DACs in the subbasin.

The GSP fails to provide a density map of domestic wells or information on the 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

- In Table 2-5, clearly identify the City of Coalinga as a DAC within the subbasin.
- Provide a domestic well density map and include 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 states (p. 3-64): *"Groundwater within the Subbasin is generally encountered at depths between 300 to 500 feet below ground.*

[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.

Due to the natural intermittent nature of surface water in the Subbasin and the depths to groundwater, the Subbasin does not have interconnected surface water and groundwater as defined in the SGMA regulations." The GSP presents depth to groundwater contours in FIgures 3-18 and 3-19, however there is no groundwater elevation data in the western portion of the subbasin. The GSP states (p. 5-20): "*There are no known interconnected surface water systems within the Subbasin, although there are areas where they may exist on the western border. No information is available to assess potential surface water-groundwater interconnection in these areas since there are no wells, and hence no groundwater pumping."* We recommend the GSP discuss the gaps in data needed to adequately characterize the interaction between groundwater and surface water within the subbasin. The GSP should consider any segments with data gaps as potential ISWs and clearly marked as such on maps provided in the GSP.

The GSP states that the groundwater system in the subbasin is comprised of an upper unconfined aquifer and a semi-confined aquifer at greater depths. We recommend that the GSP discuss the screening depths of wells used in developing the groundwater contours for the ISW analysis to ensure that depth to groundwater data used for the analysis represents the upper unconfined aquifer.

RECOMMENDATIONS

- Discuss the screening depths of wells in the subbasin. Ensure that groundwater data used in the ISW analysis represent the upper unconfined aquifer.
- Provide a map of streams in the subbasin. Clearly label reaches 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.
- 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.

Groundwater Dependent Ecosystems

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, insufficient groundwater data was used to characterize groundwater conditions underlying the subbasin's GDEs. The GSP uses depth-to-groundwater data from 2019 to characterize areas where the depth to groundwater was less than 200 feet to identify potential GDEs. We recommend using groundwater data from multiple seasons and water year types to determine the range of depth to groundwater around NC dataset polygons. Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying GDEs and is necessary to capture the variability in groundwater conditions inherent in California's Mediterranean climate.

The GSP does not provide an inventory of the flora or fauna species present in the subbasin's GDEs. Furthermore, the GSP does not acknowledge endangered, threatened, or special status species in the subbasin.

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. 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.
- 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 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.
- Include an inventory of the fauna and flora present within the subbasin's GDEs (see Attachment C of this letter for a list of freshwater species located in the Pleasant Valley Subbasin). Note any threatened or endangered species.

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.

[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]

- 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 Pleasant Valley Communication and Engagement Plan.[4]

We note the following deficiencies with the overall stakeholder engagement process:

- The GSP documents opportunities for public involvement and engagement in very general terms for listed stakeholders. Public notice and engagement activities include educational and outreach meetings with Spanish translation services, distribution of stakeholder surveys, question and answer sessions, solicitations for stakeholder input, opportunities for GSP comments, presentations to government agencies, outreach meetings for stakeholders, public hearings, and printed materials with Spanish translations including fliers, fact sheets, letters, newsletters, and presentation materials. The GSP does not state whether there was direct engagement with DACs, or whether DACs are represented on a GSP Advisory Committee or Board for the subbasin.

- The plan does not include documentation on how stakeholder input from the above-mentioned outreach and engagement was solicited, considered and incorporated into the GSP development process.

- The GSP fails to identify environmental stakeholders within the subbasin in order to consider and incorporate the interest of environmental users in the GSP development process. We recommend that the GSAs engage with environmental stakeholders such as the California Department of Fish and Wildlife or environmental non-profits.

- Page V-2 of Communication and Engagement Plan states: *"Printed materials will incorporate the visual imagery established through branding efforts and will be tailored for specific means of communication throughout the phases of GSP development, public review, and implementation,"* suggesting that plans for outreach to all identified stakeholders will continue during the implementation phase of the GSP. However, the GSP 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. The plan should also clarify whether a GSP Advisory Committee exists for the subbasin and if it will continue to meet and inform the GSP implementation for the subbasin after the GSP is adopted by the GSAs.

[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)]

RECOMMENDATIONS

- In the Communication and Engagement Plan, describe active and targeted outreach to engage DACs, drinking water users, and environmental 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]

Disadvantaged Communities and Drinking Water Users

For chronic lowering of groundwater levels, minimum thresholds are defined in terms of reducing the rate of the decline in water levels over time. Minimum threshold elevations are set to levels well below historical minimums. The GSP does not mention or discuss the impacts of groundwater levels on domestic wells in the subbasin. Therefore, the GSP does not sufficiently describe whether minimum thresholds will avoid significant and unreasonable loss of drinking water to domestic well users, especially given the absence of a domestic well mitigation plan in the GSP. 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 level minimum thresholds are consistent with Human Right to Water policy and will avoid significant and unreasonable impacts on these beneficial users.[9]

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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)]

[9] California Water Code §106.3. Available at: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=106.3

For degraded water quality, the GSP only establishes SMC for electric conductivity (EC). The minimum threshold for groundwater quality for the subbasin is set to an EC of 5,000 micromhos/cm, designed to be protective of pistachio crops. However, this value is well above the upper secondary maximum contaminant limit (MCL) for EC of 1,600 micromhos/cm. According to the state's anti-degradation policy,[10] water quality should be protected and is only allowed to worsen to the MCL if a finding is made that it is in the best interest of the people of the State of California. No analysis has been done and no such finding has been made. Furthermore, Section 3.2.5 of the GSP (Groundwater Quality Issues) discusses other constituents of concern (COCs) in the subbasin. Significantly, nitrate is an acute contaminant which, at levels above the maximum contaminant level, can affect public health. This is a particular concern for domestic wells, as nitrate exceedances do not affect the taste or smell of the water. All COCs in the sub basin that may be impacted or exacerbated by groundwater use and/or management should be included in the SMC, in addition to coordinating with water quality regulatory programs.

The GSP does not mention or discuss direct and indirect impacts on DACs or drinking water users when defining undesirable results for degraded water quality, nor does it evaluate the cumulative or indirect impacts of proposed minimum thresholds on DACs or drinking water users.

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

- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality.[11] For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[12]

- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.

[10] Anti-degradation Policy
https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/1968/rs68_016.pdf

[11] "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)]

[12] 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.

- 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.

- Set minimum thresholds that do not allow water quality to degrade to levels at or above the MCL trigger level.

Groundwater Dependent Ecosystems and Interconnected Surface Waters

Sustainable management criteria for chronic lowering of groundwater levels provided in the GSP do not consider potential impacts to environmental beneficial users. The GSP neither describes nor analyzes direct or indirect impacts on environmental users of groundwater when defining undesirable results. 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 SMC.

The GSP does not establish SMC for depletion of interconnected surface water. The GSP states (p. 4-42): *"As described in Chapter 3, groundwater levels are very deep compared to surface features. There are only small areas of land where groundwater levels may be in close proximity to the surface water feature. These may occur where the creek systems exit the more mountainous terrain in the western portion of the Subbasin. In general, these areas are not developed, are still within the canyon before opening into the Subbasin, have shallow alluvium, have steep slopes, are in areas where the land activity is devoted to cattle grazing, and are more than two miles from active wells used for agricultural production. It is for these reasons that this sustainability indicator is considered not likely to occur and sustainable management criteria are not established."* The GSP should further discuss data gaps for GDEs and ISWs, and provide specific plans to fill these data gaps in the monitoring network and projects and management actions sections of the GSP. While these data gaps are being filled, the GSP could be improved by including further discussion of significant and unreasonable effects for GDEs and ISWs in the subbasin, including surface water beneficial users (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). As SMC that consider GDEs and ISWs are established in the future, note our further recommendations below.

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."

- When defining undesirable results for chronic lowering of groundwater levels, 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]

- When defining undesirable results for depletion of interconnected surface water, 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 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 incorporates climate change into the projected water budget using DWR change factors for both 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 (only suggested) by DWR, their consequences could be significant and their inclusion can help identify important vulnerabilities in the subbasin's approach to groundwater management.

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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)]

[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

The GSP integrates climate change into key inputs (e.g., changes in precipitation and evapotranspiration) of the projected water budget. However, the plan fails to include surface water flow inputs (inclusive of imported water to the City of Coalinga) for the projected water budget and incorporate the effects of climate change on these flows. Additionally, the two sustainable yield estimates provided in the GSP are not calculated based on the projected water budget with climate change incorporated. If the water budgets are incomplete, including the omission of extremely wet and dry scenarios, omission of projected climate change effects on imported water inputs, and omission of 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.
- Include surface water flow inputs, inclusive of imported water, in the projected water budget and incorporate climate change effects on these flows.
- 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 adequate plans to increase the Representative Monitoring Sites (RMSs) in the monitoring network that represent water quality conditions and shallow groundwater elevations around DACs, domestic wells, and GDEs in the subbasin. These beneficial users may remain unprotected by the GSP without adequate 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 5-2 (Groundwater Level Representative Network) and Figure 5-3 (Water Quality Network) show insufficient representation of DACs and drinking water users for groundwater elevation and water quality monitoring. Furthermore, the GSP fails to provide discussion of data gaps for GDEs and ISWs. The GSP states in Section 5.10.6.2 (Identification of Interconnected Surface Water Data Gaps): *"The Subbasin does not recognize any data gaps at this time."* However, the GSP appears to acknowledge these data gaps with the following statement (p. 5-20): *"There are no known interconnected surface water systems within the Subbasin, although there are areas where they may exist on the western border. No information is available to assess potential surface water-groundwater interconnection in these areas since there are no wells, and hence no groundwater pumping."* We recommend that the GSP further discuss these data gaps and provide specific plans, such as locations and a timeline, to fill them.

[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)]

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 RMSs 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 RMSs.
- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, and GDEs.
- 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 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 includes recharge and habitat restoration projects with explicit benefits to the environment, such as the North Pipeline Project and Los Gatos Creek Gravel Pits Recharge Project. However, the GSP fails to describe this or other projects' explicit benefits or impacts to other beneficial users such as DACs or drinking water users.

We note that the plan does not include a domestic well mitigation program to avoid significant and unreasonable loss of drinking water. We recommend inclusion of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells for DACs and domestic users 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 GSAs plan 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]

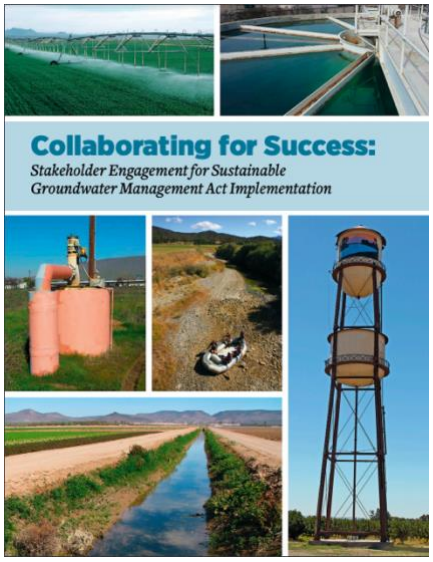
- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[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



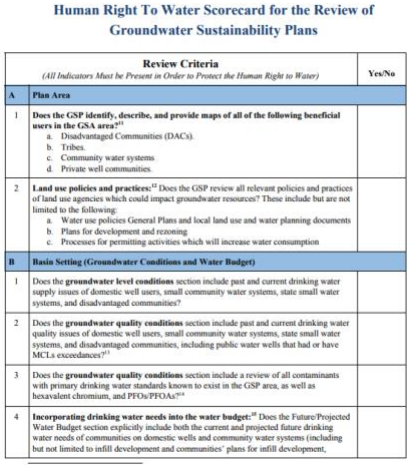
Clean Water Action, Community Water Center and Union of Concerned Scientists developed a guidance document called Collaborating for success: Stakeholder engagement for Sustainable Groundwater Management Act Implementation. It provides details on how to conduct targeted and broad outreach and engagement 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

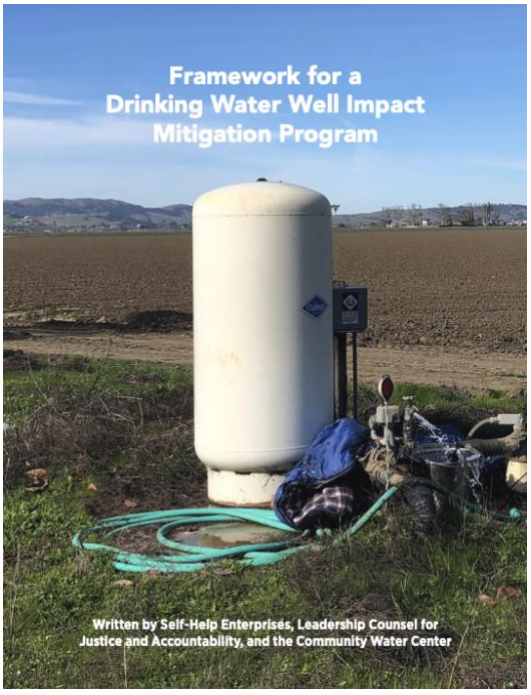


Human Right To Water Scorecard for the Review of Groundwater Sustainability Plans

	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?**[43] a. Disadvantaged Communities (DACs). b. Tribes. c. Community water systems. d. Private well communities.	
2	**Land use policies and practices:**[44] 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?[45]	
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?[46]	
4	**Incorporating drinking water needs into the water budget:**[48] 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,	

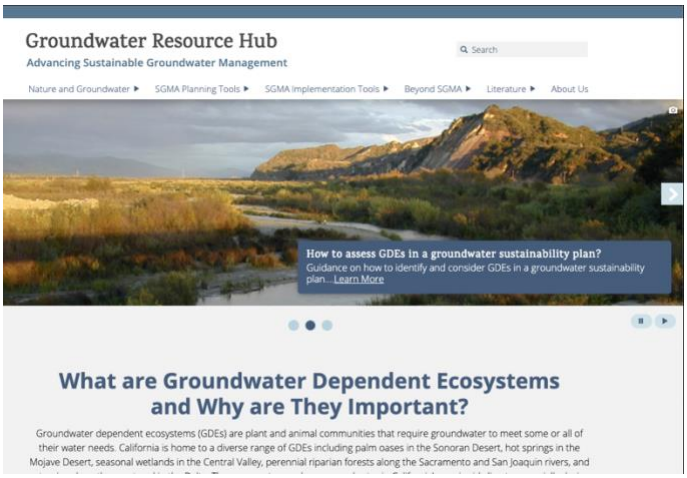
The Human Right to Water Scorecard was developed by Community Water Center, Leadership Counsel for Justice and Accountability and Self Help Enterprises to aid Groundwater Sustainability Agencies (GSAs) in prioritizing drinking water needs in SGMA. The scorecard identifies elements that must exist in 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

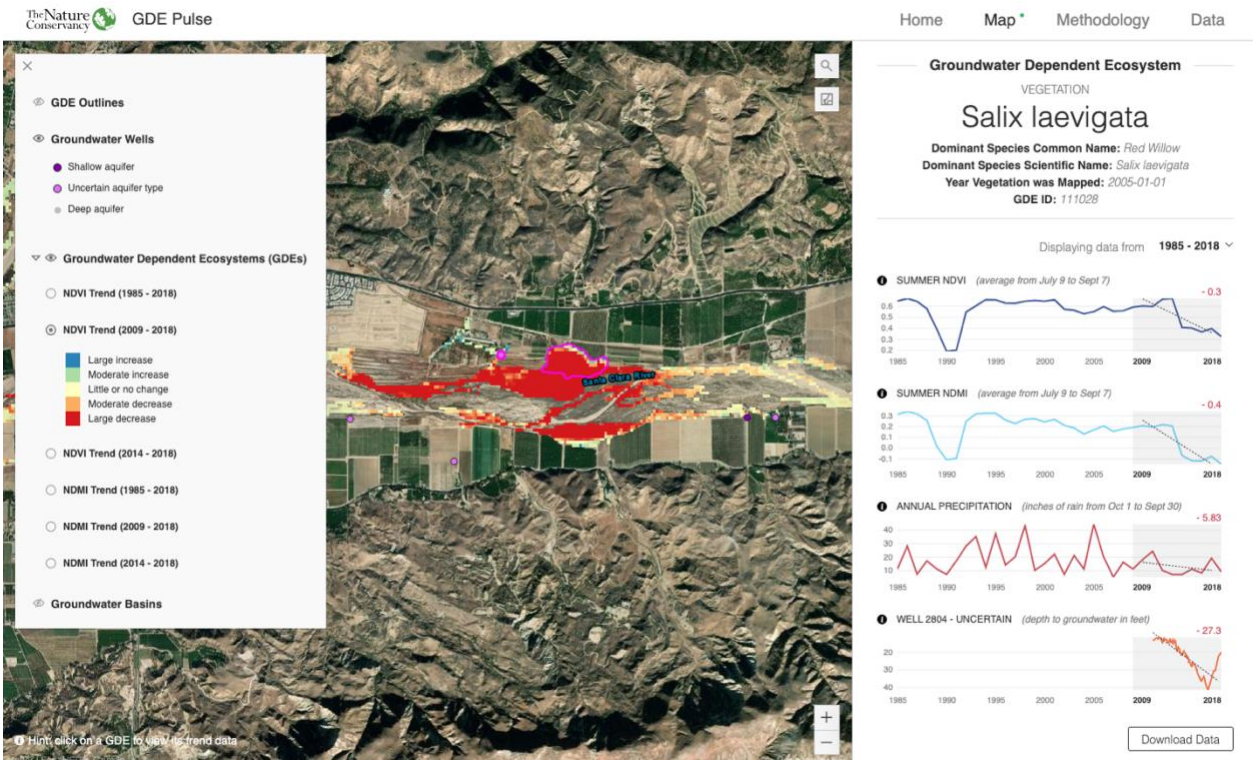
How the database was compiled

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.

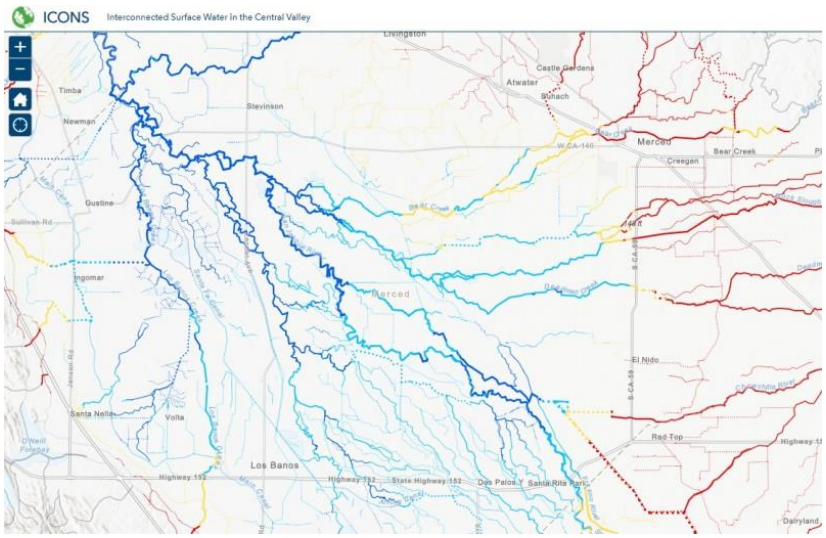
Normalized Difference Moisture Index (NDMI) is a satellite-derived index that represents water content in vegetation. NDMI is derived from the Near-Infrared (NIR) and Short-Wave Infrared (SWIR) channels. Vegetation with adequate access to water tends to have higher NDMI, while vegetation that is water 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 Pleasant Valley 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 Pleasant Valley 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				
Agelaius tricolor	Tricolored Blackbird	Bird of Conservation Concern	Special Concern	BSSC - First priority
HERPS				
Actinemys marmorata marmorata	Western Pond Turtle		Special Concern	ARSSC
Ambystoma californiense californiense	California Tiger Salamander	Threatened	Threatened	ARSSC
Anaxyrus boreas boreas	Boreal Toad			
Rana boylii	Foothill Yellow-legged Frog	Under Review in the Candidate or Petition Process	Special Concern	ARSSC
Rana draytonii	California Red-legged Frog	Threatened	Special Concern	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			

[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

Pseudacris regilla	Northern Pacific Chorus Frog			
PLANTS				
Baccharis salicina				Not on any status lists
Euthamia occidentalis	Western Fragrant Goldenrod			
Myosurus minimus	NA			

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.

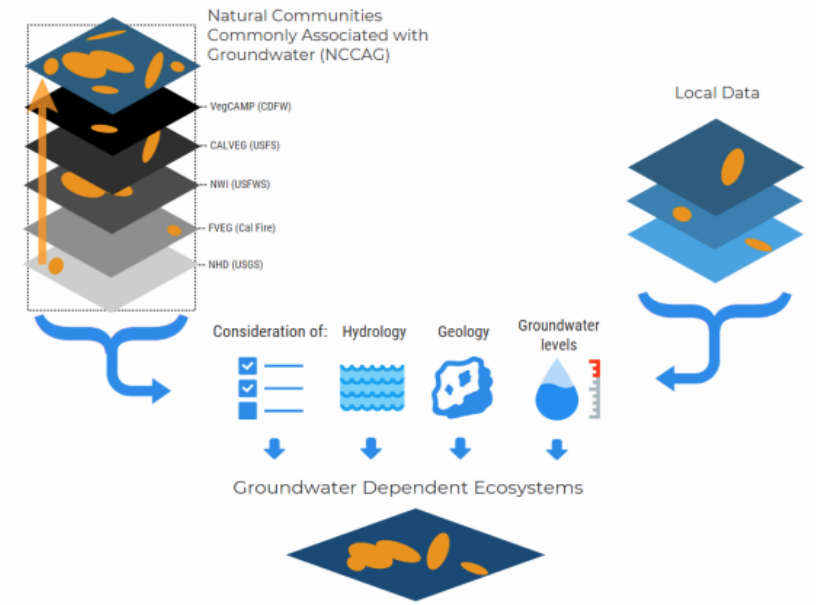


Figure 1. Considerations for GDE identification.
Source: DWR[2]

[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

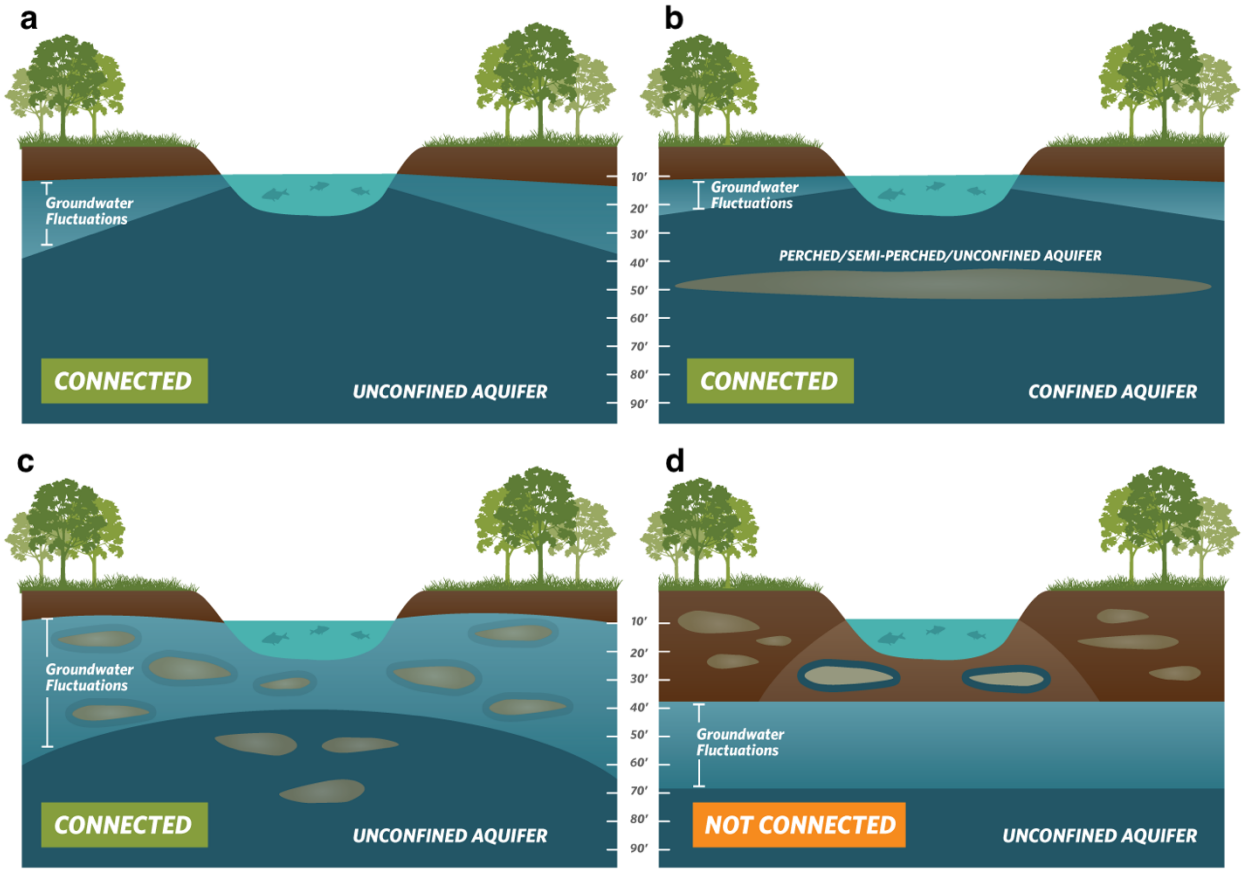


Figure 2. Confirming whether an ecosystem is connected to groundwater. Top: (a) Under the ecosystem is an unconfined aquifer with depth-to-groundwater fluctuating seasonally and interannually within 30 feet from land surface. **(b)** Depth-to-groundwater in the shallow aquifer is connected to overlying 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).

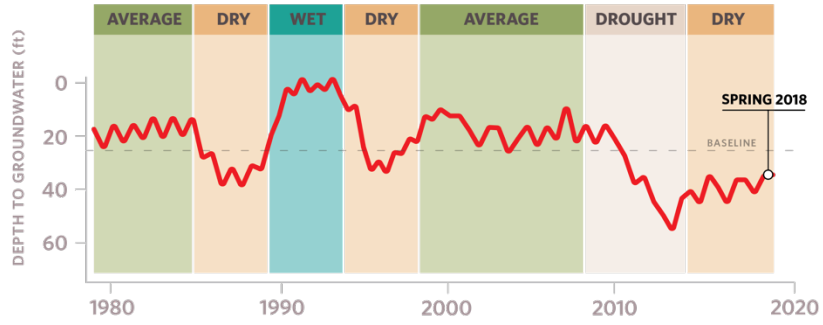


Figure 3. Example seasonality and interannual variability in depth-to-groundwater over time. Selecting one point in time, such as Spring 2018, to characterize groundwater conditions in GDEs fails to capture what groundwater conditions are necessary to maintain the ecosystem status into the future so adverse impacts are avoided.

[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).

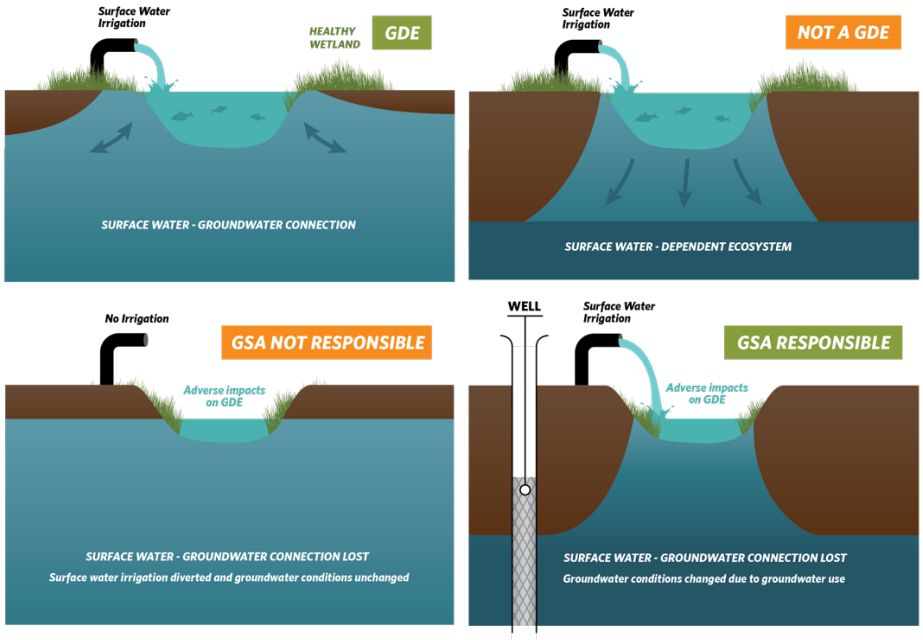


Figure 4. Ecosystems often depend on multiple sources of water. Top: (Left) Surface water and groundwater are interconnected, meaning that the GDE is supported by both groundwater and surface water. **(Right)** Ecosystems that are only reliant on non-groundwater sources are not groundwater-dependent. **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.

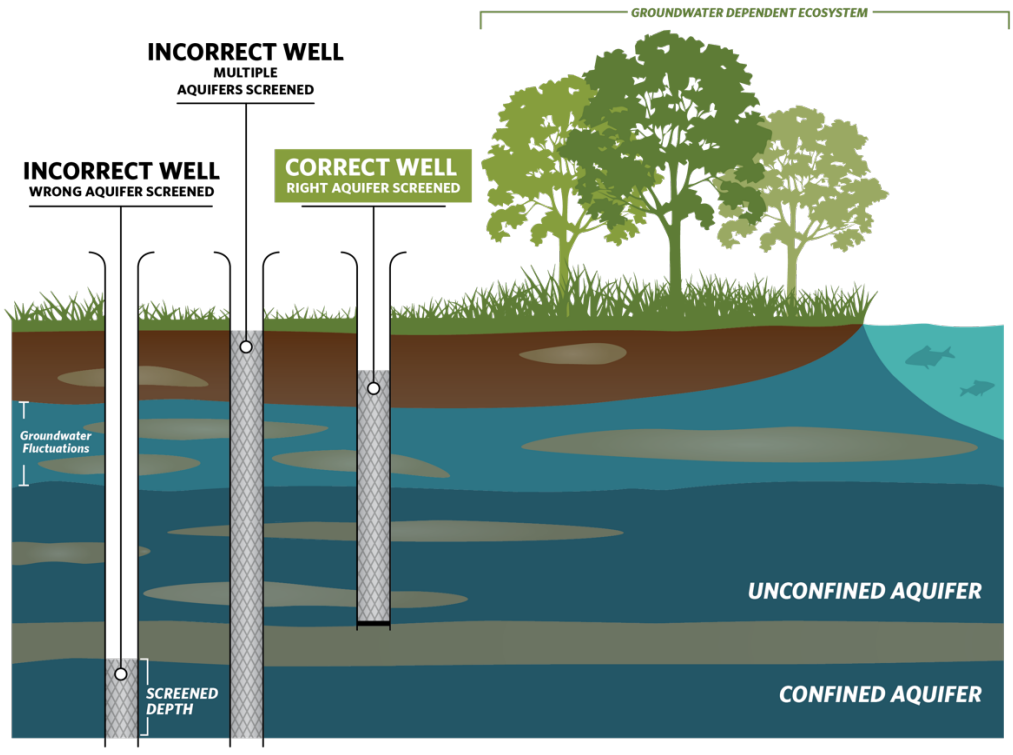


Figure 5. Selecting representative wells to characterize groundwater conditions near GDEs.

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.

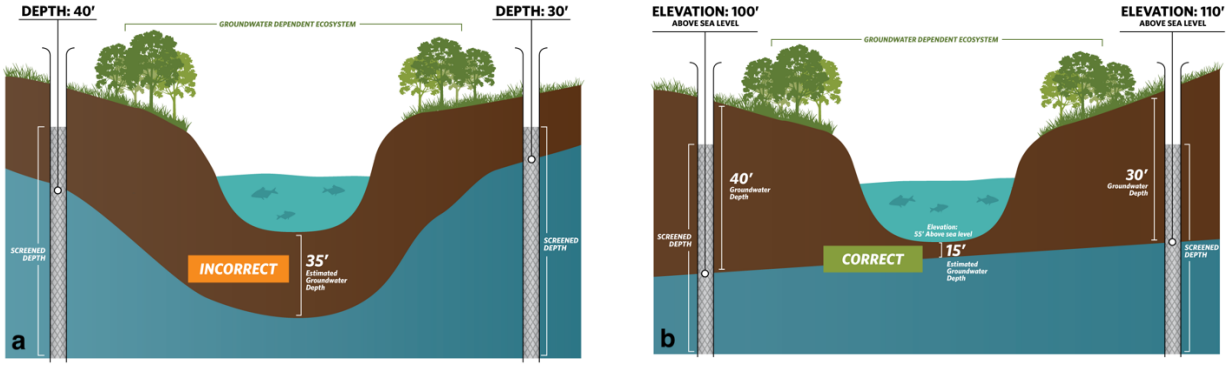


Figure 6. Contouring depth-to-groundwater around surface water features and GDEs. (a) Groundwater level interpolation using depth-to-groundwater data from monitoring wells. **(b)** Groundwater level interpolation using groundwater elevation data from monitoring wells and DEM data.

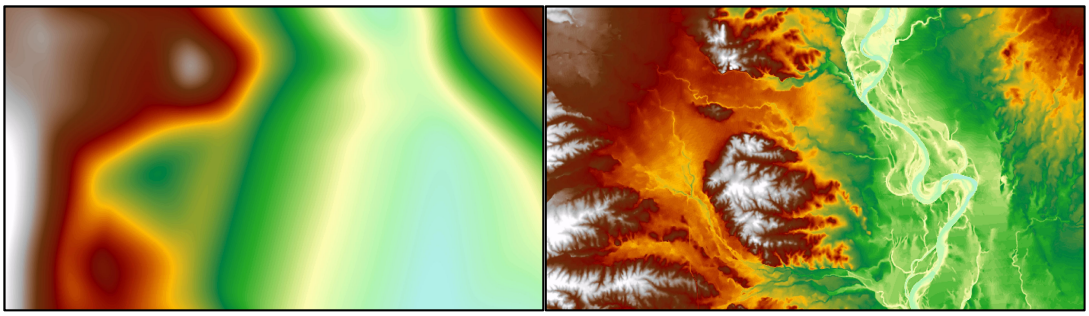


Figure 7. Depth-to-groundwater contours in Northern California. (Left) Contours were interpolated using depth-to-groundwater measurements determined at each well. **(Right)** Contours were determined by interpolating groundwater elevation measurements at each well and superimposing ground surface elevation 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.

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February 15, 2022

Nature Conservancy et al.

RE: Public Comment letter to Pleasant Valley Subbasin Draft GSP

Signatories to December 20, 2021 letter:

To all,

Thank you for your letter regarding the draft Groundwater Sustainability Plan (GSP). As you can expect there has been a lot of time dedication and hard work to develop the draft document that is presently out for review. We certainly want to thank you and all those involved in crafting the document and the time and effort gone into the review of the document.

Again, thank you for your comments and the following is offered in response to your comments and specifically a response to your Attachment A specific comments:

In Table 2-5 clearly identify the City of Coalinga as a DAC within the basin
Response: Done

Provide a domestic well density map and include average well depth across the subbasin.
Response: Included as Figure 2-9. Description of domestic wells and locations can be found on page 2-11 and in Table 2-6. Average domestic well depth is approximately 515 feet. Average irrigation well depth is approximately 1,000 feet.

Discuss the screening depth of wells in the subbasin. Ensure that groundwater data used in the ISW analysis represent the upper unconfined aquifer.
Response: The discussion on well depths and screen intervals has been updated on page 3-32. Screened depth for domestic wells with logs are provided in Table 2-6.

In terms of the ISW analysis, water levels used to evaluate this should not be for deep supply wells, perforated opposite large depth intervals. This is because no known water supply wells tap only the shallowest groundwater. Instead, water levels from shallow monitor wells should be used. There are several shallow monitor wells in the subbasin such as near the pilot recharge site along

Zapato Chino Creek. None of these wells indicate groundwater levels shallow enough to be connected to a stream. As part of proposed studies for the GSP, a number of new shallow monitor wells have been proposed to help evaluate irrigation return flow. These wells are planned to be installed in 2022, and water levels for them will provide more indication on the shallowest groundwater in specific areas.

Provide a map of streams in the subbasin. Clearly label reaches as interconnected or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
Response: This map can be found as Figure 5-8 on page 5-12.
There is a gravel extraction project near Los Gatos Creek, west of the Fresno-Coalinga Road. Pits have been dug more than 100 feet deep in this area adjacent to the creek and have not encountered groundwater.

For the other steams (Warthan Creek, Jacalitos Creek and Zapato Chino Creek), there could be interconnection of streamflow and shallow groundwater upslope from the subbasin. There has been a gravel extraction project along Zapato Chino Creek upstream of Highway 33 which in in the subbasin. No groundwater is known to have been encountered in this area. For the areas of potential shallow groundwater, all are located several miles or more from the nearest large capacity water well. As such, the drawdown due to irrigation well pumping would be minimal at these distances. Therefore, there appears to be no potential for groundwater pumping to influence streamflow.

For the depth to groundwater contour maps use the best practices presented in Attachment D.
Response: This methodology has been employed in developing the mapping.

Use depth to groundwater data from multiple seasons and water year types to determine the range of depth to groundwater.
Response: The maps included in the document identify different years that represent different hydrologic year types.

If insufficient data are available to describe groundwater conditions near to the NC data set include those areas as "Potential GDEs".
Response: Figure 3-35 and figure 3-36 have performed this review and Figure 3-36 found on page 3-66 has identified the potential GDEs.

Include an inventory of the fauna and flora present within the subbasin included as Attachment C of this letter.
Response: The San Joaquin Valley Kit Fox has been identified to occur in this area.

Quantify and present all water use sector demands in the historical current and projected water budgets.
Response: There are so many variables that are not measured and difficult to determine. Environmental demands associated with native vegetation were assumed to be met by

precipitation and stream loss and thus the quantities in these categories were reduced to account for the demand from these sources.

State whether or not there are managed wetlands in the subbasin.
Response: No there are not. Included as Figure 3-17 on page 3-29 is a map that identifies potential freshwater ponds from the United States Fish and Wildlife National Wetland inventory. It should be noted that these are irrigation regulating ponds and are kept clean of vegetation so as to not spread weeds and other unwanted growth into the producing agriculture operations.

In the Communication and Engagement Plan, describe active and targeted outreach to engage DACs, drinking water users and environmental stakeholders throughout the GSP development and implementation phases.
Response: The engagement plan has caused significant outreach efforts to a wide variety of potential interests. There have been over 30 meetings and workshops where input has been requested regarding development of the plan. Moreover, the City of Coalinga is engaged in development of the GSP and is adopting the same Plan.

Engage with environmental stakeholders in the subbasin, which could include California Department of Fish and Wildlife and environmental non-profits.
Response: The California Department of Fish and Wildlife (CAL F&W) has been included on the Interested Parties List, which receives notification of all upcoming meetings and workshops, and a representative attended at least one public workshop. Additionally, there have been a number of meetings with Cal F&W regarding the proposed North pipeline project which envisions intentional recharge activities that, among other things, benefit wildlife communities.

Provide documentation on how stakeholder input was incorporated into the GSP development process.
Response: Through meetings, workshops, involvement with board members, the City of Coalinga and the County of Fresno.

Utilize DWR's tribal engagement guidance to completely identify, involve, and address all tribes and tribal interests that may be present in the subbasin.
Response: The GSAs have followed the guidance documents from the DWR.

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.
Response: As shown on Figure ES-4 there are approximately 5 domestic wells and the Lost Hills community that have the potential to be impacted by lower water levels. From review of the RMS in T22S/R16 E wells in section 22 and 35, these hydrographs indicate measurable objectives that are higher than historical levels. Measurements will continue to be observed to identify groundwater depths and change in levels over time.

Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on drinking water users and DACs within the subbasin.

Response: See previous response

Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality.
Response: See previous response

Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.
Response: See previous response

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.
Response: Data will continue to be gathered to determine water quality and modified over time.

Set minimum thresholds that do not allow water quality to degrade to levels at or above the MCL trigger.
Response: Comment noted

When establishing SMC for the subbasin, consider that the SGMA statute specifically calls out that GSP's shall include "impacts on groundwater dependent ecosystems".
Response: Comment noted

When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses would best characterize a significant and unreasonable impact to GDEs.
Response: Comment noted

When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts in instream habitats within the ISWs when minimum thresholds in the subbasin are reached.
Response: Comment noted

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.
Response: See page 3-92 through 3-97.

Include surface water flow inputs, inclusive of imported water, in the projected water budget and incorporate climate change effects on these flows.
Response: See previous response

Calculate sustainable yield based on the projected water budget with climate change incorporated.
Response: See Table 3-11.

Incorporate climate change scenarios into projects and management actions
Response: See Chapter 6.

Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic well, and GDEs to clearly identify monitored areas.
Response: See Figure ES-4 and ES-5.

Increase the number of RMSs in the shallow aquifer across the subbasin as needed to map ISWs and adequately monitor all groundwater indicators across the subbasin and at appropriated depths for all beneficial users.
Response: Comment noted

Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at correct depth for all beneficial users.
Response: Comment noted

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.
Response: None proposed.

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.
Response: Comment noted

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 GSAs plan to mitigate such impacts.
Response: Comment noted.

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 foe wildlife and aquatic species.
Response: Comment noted

Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.
Response: Comment noted.

Sincerely,

Brad Gleason
Board President, Pleasant Valley GSA

Westlands Water District
3130 N. Fresno Street, P.O. Box 6056, Fresno, California 93703-6056, (559) 224-1523, FAX (559) 241-6277

February 2, 2022

Via Electronic Mail and Online Submission

Brad Gleason, President
Pleasant Valley Groundwater Sustainability Agency
P.O. Box 468
Coalinga, CA 93210
Email: info@pleasantvalleywaterdistrict.com
Online Submission: info@sgma.pleasantvalleywaterdistrict.com

Re: Pleasant Valley Subbasin Groundwater Sustainability Plan

Dear Mr. Gleason:

As you are aware, Westlands Water District ("Westlands") serves as the groundwater sustainability agency ("GSA") for the Westside Subbasin of the San Joaquin Valley Groundwater Basin ("Westside Subbasin"). Westlands adopted the Groundwater Sustainability Plan ("GSP") for the Westside Subbasin on January 8, 2020. Westlands respectfully submits this letter to ensure that Westlands' implementation of the Westside Subbasin GSP and sustainable management of the Westside Subbasin are not adversely impacted by implementation of the GSP prepared for the Pleasant Valley Subbasin of the San Joaquin Valley Groundwater Basin (Department of Water Resources ("DWR") Groundwater Subbasin Number 5-22.10) ("Pleasant Valley Subbasin" and "Pleasant Valley Subbasin GSP").

Comment 1: Analysis of Impacts on the Adjacent Westside Subbasin.

Westlands was not able to find in the Pleasant Valley Subbasin GSP a summary or evaluation of the cross-boundary impacts on the Westside Subbasin as required by Water Code section 10733(c) and DWR's GSP Regulations section 355.4(b)(7).[1] Notwithstanding, Westlands supports that the Pleasant Valley Subbasin GSP includes Minimum Thresholds and Measurable Objectives that protect 2015 groundwater levels. Those Minimum Thresholds and Measurable Objectives are sufficiently protective of cross-boundary flows and is consistent with the directive of the Sustainable Groundwater Management Act ("SGMA") for a GSP to avoid impairment to the sustainability goals of an adjacent GSP. However, consistent with GSP Regulations section 354.28(b)(3), the Pleasant Valley GSA should cite explicitly and explain that it will maintain the Minimum Thresholds and Measurable Objectives at 2015 levels during plan implementation.

[1] See Appendix A for the complete text of the provisions of SGMA and the "GSP Regulations" (Code Regs., tit. 23, § 350, *et seq*.) cited herein.

Comment 2: Potential Adverse Impacts of Pleasant Valley GSP Projects.

Westlands has more significant concerns with four potential projects identified in the Pleasant Valley GSP:

#PV 01	North Pipeline Project,
#PV 03	Los Gatos Creek Gravel Pits Recharge Project,
#PV 04	Zapato Chino Creek Instream Recharge Project, and
#PV 05	Water Banking Project–Section 31

(collectively referred to as the "Projects"). The Projects would be designed to divert water from naturally flowing creeks in order to recharge the Pleasant Valley Subbasin. (Pleasant Valley Subbasin GSP, pp. 6-12–6-15, 6-18–6-21.) Under current conditions, streamflow in these creeks flows into and replenishes the Westside Subbasin, which contributes to the safe and sustainable yield of the Westside Subbasin. (Westside Subbasin GSP, §§ 2.2.2.4.1, 2.3, Tab. 2-11, Fig. 2-66.) Although recharge projects can be an important tool for sustainable groundwater management, such projects must avoid adversely affecting the ability of Westlands to implement its Westside Subbasin GSP. (Wat. Code § 10733(c); GSP Regulations, § 355.4(b)(7).) Diverting water the out of creeks to replenish the Pleasant Valley Subbasin, as may be proposed by the Projects, could reduce the amount of water that naturally flows into and recharges the Westside Subbasin. If that were the case, contrary to the mandates of SGMA and the GSP Regulations, the Projects would impair the sustainability of the Westside Subbasin.

In addition, the #PV01 North Pipeline Project proposes to discharge water into the natural occurring stream, known as Los Gatos Creek (Arroyo Pasajero), that flows into Westlands boundaries and the Westside Subbasin. Again, if not designed properly, that project could introduce poor water quality into Westlands and negatively impact Westlands, including its ability to manage water quality conditions consistent with SGMA and the GSP Regulations. (Wat. Code § 10733(c); GSP Regulations, § 355.4(b)(7).)

Westlands requests that the Pleasant Valley GSP discuss that the Pleasant Valley GSA will coordinate with Westlands to design and develop the Projects in a manner that does not impair sustainable management of the Westside Subbasin.

Westlands further believes its concerns about the Projects can best be addressed through the improved coordination afforded by an interbasin agreement. (GSP Regulations, § 357.2.) An interbasin agreement will allow Westlands and the Pleasant Valley GSA to "establish compatible sustainability goals" that would support Westlands and the Pleasant Valley GSA each making "a finding that implementation of the Plan will not adversely affect an adjacent basin's ability to implement its Plan or impede the ability to achieve its sustainability goal." (GSP Regulations, § 357.2.) For this reason, Westlands requests that the Pleasant Valley GSA staff meet and confer with Westlands staff at the earliest opportunity to determine whether the agencies can reach an interbasin agreement that ensures implementation of both GSPs can proceed without risk of adverse impacts occurring in the basins.

Thank you for your careful consideration of these comments.

Sincerely,



Russ Freeman, P.E.
Deputy General Manager- Resources

Copy to:
Roy Jimenez, Jr
Fresno County GSA
2220 Tulare St. 6th Floor
Fresno, CA 93721
Email: RJJimenez@fresnocountyca.gov

Sean Brewer
City of Coalinga GSA
155 W. Durian
Coalinga, CA 93210
Email: sbrewer@coalinga.comm

PLEASANT VALLEY GROUNDWATER SUSTAINABILITY AGENCY

POST OFFICE BOX 468
COALINGA, CALIFORNIA 93210-0468

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JAMES S. ANDERSON
SECRETARY

February 15, 2022

Westlands Water District
Russ Feeman, Deputy General Manager – Resources
3130 N. Fresno Street
P.O. Box 6056
Fresno, CA 93703-6056

RE: Pleasant Valley Subbasin Groundwater Sustainability Plan

Dear Russ,
Thank you for your comments dated February 2, 2022. As you know there has been a lot of time dedication and hard work to develop the draft document that is presently out for review. In addition, we thank you for the staff time of your organization to meet, confer and exchange information. It was helpful in drafting the plan.

Again, thank you for your comments and the following is offered in response to your comments:

Comment 1: Analysis of impacts on the adjacent Westside Basin

… However, consistent with GSP regulations section 354.28(b)(3), the Pleasant Valley GSA should cite explicitly and explain that it will maintain the minimum thresholds and Measurable Objectives at 2015 levels during plan implementation.

Response: The Pleasant Valley Subbasin complies with section 354.28(b)(3) of DWR's GSP Regulations and includes a description of how The Minimum Thresholds will avoid causing undesirable results in the Westside Subbasin and avoid affecting the ability of the Westside Subbasin to achieve its sustainability goals. As noted in Section 4.2.3.3 ("Minimum Thresholds In Relation to Adjacent Basins"), the Minimum Thresholds in the Pleasant Valley GSP are higher than those set in the Westside Subbasin. The Minimum Thresholds and Measurable Objectives can be found in Section 4.2.3 and 4.2.4 of the plan. As is shown in Figures 4-3 through 4-8 the management objectives have been set to levels that are planned to be achievable. In some cases, these levels are higher than a historic low and in other cases they are lower than a record that has been documented.

Comment 2: Potential Adverse Impacts of Pleasant Valley GSP Projects

Paragraph 1

Westlands has more significant concerns with four potential projects identified in the Pleasant Valley GSP: …..

The projects would be designed to divert water from naturally flowing creeks in order to recharge the Pleasant Valley Subbasin. … Diverting water the out of creeks to replenish the Pleasant Valley Subbasin, as may be proposed by the Projects, could reduce the amount of water that naturally flows and recharges the Westside Subbasin. If that were the case, contrary to the mandates of SGMA and the GSP regulations, the Projects would impair the sustainability of the Westside Basi

Response: The Pleasant Valley GSA will implement its GSP in full compliance with SGMA. Most of the potential projects identified in your comment do not involve the diversion of water from the relevant creeks but instead natural infiltration of water from the creeks to the Pleasant Valley Subbasin. It is recognized that we share a watershed and the resources that are derived from this source. Part of the Pleasant Valley GSP is to evaluate the ability to generate additional surface flows from the watershed. With this understanding it doesn't necessarily correlate that Diversions of water within one basin, moreover, do not necessarily correlate with a loss of supply from the other. Additionally, if the Pleasant Valley Subbasin were able to recharge additional amounts, the result may be that there is increased groundwater outflow resulting in an increase into both basins. The Sustainable Groundwater Management Act, moreover, does not alter existing surface water or groundwater rights. Cal Water code Sec. 10720.5(b). Any diversion projects that need additional water rights will obtain them through appropriate legal procedures."

Paragraph 2

The North Pipeline Project proposes to discharge water into the natural occurring stream, known as Los Gatos Creek, that flows into Westlands boundaries and the Westside Subbasin. Again, if not designed properly, that project could introduce poor water quality into Westlands and negatively impact Westlands, including its ability to manage water quality conditions consistent with SGMA, and the GSP Regulations.

Response: Noted. The project is being properly designed to restore the function of the creek and reduce instability, thereby helping reduce sediment loading from erosion, which is one of the leading causes of poor water quality within the sub-basin. It should be noted the source of the surface water supply is from the Coalinga Canal which is under the control and operation of Westlands Water District.

Paragraph 3

Westlands further believes its concerns about Projects can best be addressed through the improved coordination afforded by an interbasin agreerment.

Response: The Pleasant Valley subbasin parties agree and accepts that the agencies should continue to foster good relationships and a closer working relationship to enhance water supplies in the respective subbasins. It is suggested that the Pleasant Valley Water District/PVGSA and staff continue to meet to finalize the negotiated Transportation Agreement as well as with the gathering and documenting of water level data in the vicinity of the Pasajero and Palvedero gaps so that better understanding of the connectivity of the subbasins is understood.

Sincerely,

Brad Gleason, Board President, Pleasant Valley GSA

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PROVOST& PRITCHARD
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Memorandum

To:	Board of Directors, Pleasant Valley Subbasin Groundwater Sustainability GSA
From:	Brian Ehlers
Subject:	GSP Comments
Date:	February 15, 2022

In addition to the three comment letters received on the Draft Groundwater Sustainability Plan there were comments received from the County of Fresno via e-mail and one verbal comment at the public hearing.

These comments are summarized below with PVGSA responses:

From the County of Fresno:

- *On page 1, near the top of the page, there's a reference to the report being "in general conformance with section 354.12 of the water code." That's incorrect. It should be a reference to Title 23, California Code of Regulations, section 354.12, not "the water code."*

- *On page 25, in section 1.5, it says that the County and the District entered into an MOU on May 7, 2019. That is incorrect. There was no MOU on that date. (And this is evident in Appendix A, which includes a February 25, 2020 MOU with the County, but not a May 7, 2019 MOU.) Those two paragraphs should be revised.*

Response: The GSP has been revised

From Craig Finster (landowner):

What I want to talk about probably has more to do with all of these things, not just the GSP, but all of it, and my concerns have always been at the end, when we figure out what a sustainable use is, if it's going to be a half-acre foot a year, whatever we come up with, how is that going to be divvied up with the landowners? I know that when we first decided that we could come up with some kind of an assessment, that assessment was levied on every landowner in the District. We even talked about should the larger water users pay more of an assessment, which would be the pistachio farmers. We decided at the time that everybody would pay the same assessment, because, as I remember, everyone would have a piece of the allocation. So there's the pistachio farmers, the row crops, I for a long time irrigated wheat and planted cotton, for years

that hasn't worked economically, but we decided that everybody would pay the same.

Historically, as far as water rights, if you owned the surface and wanted to drill a well you drilled a well. The water underneath your property was, I take it, your water. I hope that we're not trying to change that, that someone gets a bigger piece of the water. Now, even those that dry farm, I think that there's a large chunk of land that isn't farmed at all, I think it's grazing land, but they're within the District, and I think they should have some right to that water, whether they use their allotment to put on their ground or pistachios or whatever else they want to do with it, or for those that aren't pumping the water, and are in no way the cause of the overdraft that happened in the Valley, they should be able in some way to sell that half-acre foot for the people that are trying to find water."

Response: The GSP has been prepared to identify the condition of the Subbasin and develop a plan for sustainability. The plan has not developed Management actions and they are not included in the plan. According to the implementation chapter these are planned to be initiated in 2022 and the plan encourages your continued participation in crafting these policies and Management Actions. Additionally, it should be noted that the GSA will not modify existing water rights.

Appendix J – PVWD Contract for Water Supplies 2021

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State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

AGREEMENT AMONG THE DEPARTMENT OF WATER RESOURCES OF THE STATE OF CALIFORNIA, TULARE LAKE BASIN WATER STORAGE DISTRICT, WESTLANDS WATER DISTRICT, SAN LUIS WATER DISTRICT, AND PLEASANT VALLEY WATER DISTRICT FOR A CHANGE IN POINT OF DELIVERY OF TULARE LAKE BASIN WATER STORAGE DISTRICT'S 2021 STATE WATER PROJECT TABLE A WATER

SWPAO #21020

THIS AGREEMENT is made this 12th day of October, 2021, under the provisions of the California Water Resources Development Bond Act, and other applicable laws of the State of California among the Department of Water Resources of the State of California, herein referred to as "DWR," Tulare Lake Basin Water Storage District, herein referred to as "TLBWSD," Westlands Water District, herein referred to as "WWD," San Luis Water District, herein referred to as "SLWD", and Pleasant Valley Water District, herein referred to as "PVWD." DWR, TLBWSD, WWD, SLWD, and PVWD may be referred to individually as "Party" or collectively as "Parties."

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RECITALS

A. DWR and TLBWSD have entered into a water supply contract, dated December 20, 1963, and subsequently amended, providing that DWR shall supply certain quantities of water to TLBWSD, and providing that TLBWSD shall make certain payments to DWR, and setting forth the terms and conditions of such supply and payment (hereinafter "TLBWSD Water Supply Contract").

B. Growers with WWD, SLWD, and PVWD intend to purchase, and divide among themselves, up to 65,000 acre-feet of pre-1914 Kings River water from J.G. Boswell Company (Boswell), a landowner with TLBWSD. In order to facilitate the delivery of WWD's, SLWD's, and PVWD's acquired water from Boswell to their service areas, TLBWSD proposes to transfer a combined total of up to 65,000 acre-feet of TLBWSD's 2021 allocated State Water Project (SWP) Table A water (TLBWSD's Table A Water) to WWD, SLWD, and PVWD. In exchange, up to 65,000 acre-feet of Boswell's pre-1914 Kings River water will be delivered to TLBWSD for use in its service area.

C. TLBWSD hereby requests DWR's approval for a change in point of delivery of up to 65,000 acre-feet of TLBWSD's Table A Water to WWD, SLWD, and PVWD during the term of the Agreement.

D. In compliance with the California Environmental Quality Act (CEQA), TLBWSD, as the lead agency, filed a Notice of Exemption (NOE) with State Clearinghouse (SCH) on April 27, 2021. (SCH #2021040640).

E. The temporary change in point of delivery under this Agreement is statutorily exempt from CEQA under Section 1729 of the California Water Code. The State Water Resources Control Board (SWRCB), on July 16, 2021, approved a petition from DWR and the United States Bureau of Reclamation to temporarily consolidate the authorized place of use of SWP and Central Valley Project (CVP) water south of the Delta. SWRCB's approval is effective from July 16, 2021 to July 15, 2022.

F. DWR, as a responsible agency, has considered the SWRCB's determination prior to entering into this Agreement, and will file an NOE under CEQA upon execution of this Agreement.

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AGREEMENT

DWR approves a change in point of delivery of a combined total of up to 65,000 acre-feet of TLBWSD's Table A Water to WWD, SLWD, and PVWD during the term of the Agreement, subject to the following terms and conditions:

TERM

1. This Agreement shall become effective upon execution by all Parties, and shall terminate on July 15, 2022, or upon final payment to DWR by TLBWSD of all costs attributable to this Agreement, whichever occurs later. However, the liability, hold harmless and indemnification obligations in this Agreement shall remain in effect until the expiration of the applicable statute of limitations, or until any claim or litigation concerning this Agreement asserted to DWR, TLBWSD, WWD, SLWD, or PVWD within the applicable statute of limitations is finally resolved, whichever occurs later.

UNIQUENESS OF AGREEMENT

2. DWR's approval under this Agreement to convey up to 65,000 acre-feet of TLBWSD's Table A Water to WWD, SLWD, or PVWD is unique and shall not be considered a precedent for future agreements or DWR activities.

DELIVERY OF TLBWSD'S TABLE A WATER

3. Under Article 15(a) of TLBWSD's Water Supply Contract, DWR hereby consents to the delivery of up to 65,000 acre-feet of TLBWSD's Table A Water outside TLBWSD's service area under the terms and conditions of this Agreement and finds that such delivery will not materially impair TLBWSD's capacity to make payments to DWR.

NO SALE OF TLBWSD'S TABLE A WATER

4. TLBWSD attests that the delivery of up to 65,000 acre-feet of TLBWSD's Table A Water to WWD, SLWD, and PVWD under this Agreement does not constitute a sale of its Table A water. Rather, TLBWSD's Table A Water is used to facilitate the delivery of WWD's, SLWD's, and PVWD's acquired pre-1914 Kings River water from Boswell to WWD, SLWD, and PVWD.

USE OF CALIFORNIA AQUEDUCT CAPACITY

5. Delivery of water under this Agreement shall be in accordance with a schedule that has been reviewed and approved by DWR under applicable provisions of TLBWSD's Water Supply Contract. Article 12(f) of TLBWSD's Water Supply Contract shall govern the priority for delivery of such water.

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APPROVALS

6. The delivery of water under this Agreement shall be contingent upon, and subject to, the availability of Boswell's pre-1914 water, as well as the SWRCB's written approval, and any other necessary approvals and shall be governed by the terms and conditions of such approvals and any other applicable legal requirements. TLBWSD, WWD, SLWD, and PVWD shall be responsible for complying with all applicable laws and legal requirements and for securing any required consent, approvals, permits, or orders. TLBWSD shall furnish to DWR copies of all approvals and agreements required for the delivery of water under this Agreement.

WATER DELIVERY TO WWD, SLWD, and PVWD

7. DWR will deliver a total of up to 65,000 acre-feet of TLBWSD's Table A Water, normally scheduled for delivery to TLBWSD's service area, to WWD's turnout(s) in Reaches 4 through 7, to SLWD's turnout(s) in Reaches 3 and 4, and for PVWD at WWD's Coalinga Canal turnout in Reach 5 of the California Aqueduct by July 15, 2022. WWD, SLWD, and PVWD will decide the manner in which the 65,000 acre-feet will be divided among themselves. This decision is not the responsibility of DWR.

8. The delivery of TLBWSD's Table A Water to WWD, SLWD, and PVWD under this Agreement shall be in accordance with a schedule approved by DWR. DWR's approval is dependent upon the times and amounts of the delivery and the overall delivery capability of the SWP. DWR shall not be obligated to deliver the water at times when such delivery would adversely impact SWP operations or facilities, or other SWP contractors.

9. The sum of deliveries scheduled on behalf of TLBWSD to WWD, SLWD, and PVWD under this Agreement, plus scheduled TLBWSD SWP deliveries, plus deliveries to TLBWSD under any other agreements, shall not exceed the quantities on which the proportionate Use-of-Facilities factors are based under TLBWSD's Water Supply Contract, unless DWR determines that the deliveries will not adversely impact SWP operations or facilities, or other SWP contractors.

WATER DELIVERY SCHEDULES

10. All water delivery schedules and revisions under this Agreement shall be in accordance with Article 12 of TLBWSD's Water Supply Contract.

11. TLBWSD shall be responsible for coordinating and scheduling the water delivery with DWR as described in this Agreement. After all approvals have been obtained and before water is delivered under this Agreement, TLBWSD shall submit for DWR's approval a revised water delivery schedule showing the anticipated change to the monthly delivery pattern to accommodate the water delivery under this Agreement.

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12. In coordination with WWD, SLWD, and PVWD, TLBWSD shall submit monthly water delivery schedules, and revised delivery schedules, if any, for approval to the Project Water Management, Water Deliveries Section, indicating timing and point of delivery requested under this Agreement with reference to SWPAO #21020. Monthly schedules shall be sent by electronic mail to SWPDeliveries@water.ca.gov.

13. In coordination with WWD, SLWD, and PVWD, TLBWSD shall send weekly water schedules, indicating timing and point of delivery requests with reference to SWPAO #21020, by electronic mail by 10:00 am, Wednesday, for the following week, Monday through Sunday, to the following:

    a. State Water Project Operations Control Office
    Water Management Branch
    Water_deliv_sched@water.ca.gov
    Attention: Manager, Water Management Branch

    b. State Water Project Operations Control Office
    Power Management and Optimization Branch
    POCOptimization@water.ca.gov
    Attention: Manager, Power Management and Optimization Branch

    c. State Water Project Operations Control Office
    Pre-Scheduling Section
    Presched@water.ca.gov
    Attention: Manager, Pre-Scheduling Section

    d. State Water Project Operations Control Office
    Regulatory Compliance and Reporting Branch
    OCO_car_reprt@water.ca.gov
    PHONE (916) 574-2677
    Attention: Manager Reports Section

    e. San Luis Field Division
    Water Operations Section
    slwtrops@water.ca.gov

WATER DELIVERY RECORDS

14. DWR will maintain monthly records documenting the delivery of water under this Agreement.

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CHARGES

15. TLBWSD shall pay the following charges including all future adjustments, which shall be calculated in the same manner as charges are calculated for Table A deliveries and shall be in accordance with the provisions of TLBWSD's Water Supply Contract. Charges shall be determined for the year the water is delivered to WWD, SLWD, and PVWD.

    a. When a portion of TLBWSD's Table A Water is delivered by DWR to WWD, TLBWSD shall pay to DWR the charges associated with the delivery of the water from the Delta to WWD's turnout(s) in Reaches 4 to 7 of the California Aqueduct. TLBWD shall pay to DWR the Variable Operation, Maintenance, Power, and Replacement Component of the Transportation Charge and the Off-Aqueduct Power Facilities cost that is in effect for every acre-foot of water delivered from Delta to WWD's turnout(s).

    b. When a portion of TLBWSD's Table A Water is delivered by DWR to SLWD, TLBWSD shall pay to DWR the charges associated with the delivery of the water from the Delta to SLWD's turnout(s) in Reaches 3 and 4 of the California Aqueduct. TLBWD shall pay to DWR the Variable Operation, Maintenance, Power, and Replacement Component of the Transportation Charge and the Off-Aqueduct Power Facilities cost that is in effect for every acre-foot of water delivered from Delta to SLWD's turnout(s).

    c. When a portion of TLBWSD's Table A Water is delivered by DWR to PVWD, TLBWSD shall pay to DWR the charges associated with the delivery of the water from the Delta to WWD's Coalinga Canal turnout in Reach 5 of the California Aqueduct. TLBWD shall pay to DWR the Variable Operation, Maintenance, Power, and Replacement Component of the Transportation Charge and the Off-Aqueduct Power Facilities cost that is in effect for every acre-foot of water delivered from Delta to WWD's turnout(s).

16. In addition to the charges identified above, TLBWSD agrees to pay to DWR any additional identified demonstrable increase in costs that would otherwise be borne by DWR or by the SWP contractors not signatory to this Agreement as a result of DWR providing service under this Agreement.

17. Payment terms under this Agreement shall be in accordance with TLBWSD's Water Supply Contract.

NO IMPACT

18. This Agreement shall not be administered or interpreted in any way that would cause adverse impacts to SWP approved Table A water or to any other SWP approved water allocations, water deliveries, or SWP operations or facilities. TLBWSD, WWD,

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SLWD, and PVWD shall be responsible, jointly and severally, as determined by DWR, for any adverse impacts that may result from water deliveries under this Agreement.

LIABILITY

19. DWR is not responsible for the use, effects or disposal of water under this Agreement once the water is delivered to the designated turnout(s). Responsibility shifts from DWR to WWD, SLWD, or PVWD when DWR delivers the water to the designated turnout(s).

20. TLBWSD, WWD, SLWD, and PVWD agree to defend and hold DWR, its officers, employees, and agents harmless from any direct or indirect loss, liability, lawsuit, cause of action, judgment or claim, and shall indemnify DWR, its officers, employees, and agents from all lawsuits, costs, damages, judgments, attorneys' fees, and liabilities that DWR, its officers, employees, and agent incur as a result of DWR approving this Agreement or providing services under this Agreement, except to the extent resulting from the sole negligence or willful misconduct of DWR, its officers, employees and agents.

21. If uncontrollable forces preclude DWR from delivery of water under this Agreement, either partially or completely, then DWR is relieved from the obligation to deliver the water to the extent that DWR is reasonably unable to complete the obligation due to the uncontrollable forces. Uncontrollable forces shall include, but are not limited to earthquakes, fires, tornadoes, floods, and other natural or human caused disasters. TLBWSD, WWD, SLWD, and PVWD shall not be entitled to recover any administrative costs or costs associated with delivery of water under this Agreement if uncontrollable forces preclude DWR from delivering the water.

DISPUTE RESOLUTION

22. In the event of dispute regarding interpretation or implementation of this Agreement, the Director of DWR and general managers of TLBWSD, WWD, SLWD, and PVWD, or authorized representatives, shall endeavor to resolve the dispute by meeting within 30 days after the request of a Party. If the dispute remains unresolved, the Parties shall use the services of a mutually acceptable consultant in an effort to resolve the dispute. Parties involved in the dispute shall share the fees and expenses of the consultant equally. If a consultant cannot be agreed upon, or if the consultant's recommendations are not acceptable to the Parties, and unless the Parties otherwise agree, the matter may be resolved by litigation and any Party may, at its option, pursue any available legal remedy including, but not limited to, injunctive and other equitable relief.

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NO ASSIGNMENT OF AGREEMENT

23. Without the prior written consent of DWR, TLBWSD, WWD, SLWD, and PVWD, this Agreement is not assignable by TLBWSD, WWD, SLWD, or PVWD in whole or in part.

PARAGRAPH HEADINGS

24. The paragraph headings of this Agreement are for the convenience of the Parties and shall not be considered to limit, expand, or define the contents of the respective paragraphs.

OPINION AND DETERMINATION

25. Where the terms of this Agreement provide for actions to be based upon the opinion, judgment, approval, review, or determination of any party, such terms are to be construed as providing that such opinion, judgment, approval, review, or determination be reasonable.

MODIFICATION OF AGREEMENT

26. No modification of the terms and conditions of this Agreement shall be valid unless made in writing and signed by the Parties to this Agreement.

NO MODIFICATION OF WATER SUPPLY CONTRACT

27. This Agreement shall not be interpreted to modify the terms or conditions of TLBWSD's Water Supply Contract. Unless expressly provided herein, the terms and conditions of TLBWSD's Water Supply Contract and any future amendments apply to this Agreement.

SIGNATURE CLAUSE

28. The signatories represent that they have been appropriately authorized to enter into this Agreement on behalf of the Party for whom they sign. A copy of any resolution or other documentation authorizing TLBWSD, WWD, SLWD, and PVWD to enter into this Agreement, if such resolution or authorization is required, shall be provided to DWR before the execution of this Agreement.

EXECUTION

29. The Parties agree that this Agreement will be executed using DocuSign by electronic signature, which shall be considered an original signature for all purposes and shall have the same force and effect as an original signature. The Agreement shall take effect as soon as all Parties have signed.

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30. All Parties will receive an executed copy of this Agreement via DocuSign after all Parties have signed.

If the terms and conditions in this Agreement are acceptable, please sign and date using DocuSign.

IN WITNESS WHEREOF, the Parties hereto have entered into this Agreement.

Approved as to Legal Form
and Sufficiency

Ann K. B. Carroll KD
Acting General Counsel
Department of Water Resources

Date 10/11/2021

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

Ted Craddock
Ted Craddock
Deputy Director

Date 10/12/2021

TULARE LAKE BASIN WATER STORAGE DISTRICT

Jacob Westra
Name

General Manager
Title

10/8/2021
Date

WESTLANDS WATER DISTRICT

Name

Chief Operating Officer
Title

10/7/2021
Date

SAN LUIS WATER DISTRICT

Lon Martin
Name

General Manager
Title

10/7/2021
Date

PLEASANT VALLEY WATER DISTRICT

Brad Gleason
Name

Board President
Title

10/7/2021
Date