Eastern Management Area Groundwater Sustainability Agency

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

January 2022

EMA
Santa Ynez River Valley Groundwater Basin
Eastern Management Area
Groundwater Sustainability Agency

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Prepared for:
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GSI Water Solutions, Inc., is pleased to submit this Groundwater Sustainability Plan (GSP) prepared in accordance with California Code of Regulations, Title 23. Water, Division 2. Department of Water Resources, Chapter 1.5. Groundwater Management, Subchapter 2. Groundwater Sustainability Plans.

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Abbreviations and Acronyms

µg/L	microgram per liter
ADF	average daily flow
Administrative Agreement	Intra-Basin Administrative Agreement for Implementation
AEM	airborne electromagnetic
AF	acre-feet
AFY	acre-feet per year
ANA	Above Narrows Account
AMI	automated meter infrastructure
ASR	aquifer storage and recovery
AW	applied water
Basin	Santa Ynez River Valley Groundwater Basin
BCM	Basin Characterization Model
bgs	below ground surface
BMP	best management practice
BNA	Below Narrows Account
BPA	base pumping allocation
CAG	Citizens Advisory Group
CASGEM	California Statewide Groundwater Elevation Monitoring
Casino	Chumash Casino Resort
CCR	California Code of Regulations
CCWA	Central Coast Water Authority
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CGPS	Continuous Global Positioning System
City	City of Solvang
CMA	Santa Ynez River Valley Groundwater Basin – Central Management Area
COGG	California Oil, Gas, and Groundwater
Committee	EMA GSA Committee
County	Santa Barbara County
DCR	Delivery Capability Report
DDW	Division of Drinking Water
DMS	data management system
DPS	Distinct Population Segment
DRINC	Drinking Water Information Clearinghouse
DSW-MAR	distributed storm water managed aquifer recharge
DWR	California Department of Water Resources
EMA	Santa Ynez River Valley Groundwater Basin – Eastern Management Area

Ep	pan evaporation
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ET	evapotranspiration
ETAW	evapotranspiration of applied water
ETc	crop evapotranspiration
ETo	reference evapotranspiration
EVT	Existing Vegetation Type
GAMA	Groundwater Ambient Monitoring and Assessment
GCP	(Santa Ynez) Groundwater Communication Portal
GDE	groundwater dependent ecosystem
GEC	groundwater extraction credit
gpcd	gallons per capita per day
gpm	gallons per minute
Groundwater Report	2019 Santa Barbara County Groundwater Basins Status Report
GSA	Groundwater Sustainability Agency
GSI	GSI Water Solutions, Inc.
GSP	Groundwater Sustainability Plan
GWMP	Groundwater Management Plan
HCM	hydrogeologic conceptual model
HTO	Heal the Ocean
HUC	Hydrologic Unit Codes
ID No. 1	Santa Ynez River Water Conservation District, Improvement District No. 1
ILRP	Irrigated Lands Regulatory Program
InSAR	Interferometric Synthetic Aperture Radar
IRWM	Integrated Regional Water Management
JPL	Jet Propulsion Laboratory
LOCSD	Los Olivos Community Service District
LUST	leaking underground storage tank
M&I	municipal and industrial
MA	management area
MAR	managed aquifer recharge
MBAS	methylene blue active substances
MCL	maximum contaminant level
mg/L	milligrams per liter
MGD	million gallons per day
mm	milliliter
MO	measurable objective
MOA	memorandum of agreement
MOU	memorandum of understanding

MT	minimum threshold
MTBE	methyl tert-butyl ether
NASA	National Aeronautics and Space Administration
NAVD 88	North American Vertical Datum of 1988
NCCAG	Natural Communities Commonly Associated with Groundwater
NHD	National Hydrography Dataset
NMFS	National Marine Fisheries Service
NWIS	National Water Information System
OWTS	onsite wastewater treatment system
PCE	tetrachloroethylene
pCi/L	picocuries per liter
Plan	Groundwater Sustainability Plan
PMA	project or management action
QA/QC	quality assurance and quality control
RMS	representative monitoring site
RP	reference point
RWQCB	Regional Water Quality Control Board
SACV	San Antonio Creek Valley Groundwater Basin
SCH	State Clearinghouse
SGMA	Sustainable Groundwater Management Act
SMC	sustainable management criterion
SMCL	secondary maximum contaminant level
Stetson	Stetson Engineers
SWP	State Water Project
SWRCB	Stare Water Resources Control Board
SYCSD	Santa Ynez Community Services District
SYR	Santa Ynez River
SYRHM	Santa Ynez River Hydrologic Model
SYRWCD	Santa Ynez River Water Conservation District
TDS	total dissolved solids
TEM	transient electromagnetic
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
tTEM	towed transient electromagnetic
UC	University of California
UNAVCO	University NAVSTAR Consortium
USBR	U.S. Bureau of Reclamation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UWCD	United Water Conservation District

UWMP	Urban Water Management Plan
VIC	variable infiltration capacity
Water Agency	Santa Barbara County Water Agency
WMA	Santa Ynez River Valley Groundwater Basin – Western Management Area
WQ Basin Plan	Water Quality Control Plan for the Central Coastal Basin
WQO	water quality objective
WRP	water reclamation plant
WWTF	wastewater treatment facility
WWTP	wastewater treatment plant
WY	water year

Definitions

California Water Code

Sec. 10721

Unless the context otherwise requires, the following definitions govern the construction of this part:

(a) Adjudication action means an action filed in the superior or federal district court to determine the rights to extract groundwater from a basin or store water within a basin, including, but not limited to, actions to quiet title respecting rights to extract or store groundwater or an action brought to impose a physical solution on a basin.

(b) Basin means a groundwater basin or subbasin identified and defined in Bulletin 118 or as modified pursuant to Chapter 3 (commencing with Section 10722).

(c) Bulletin 118 means the department's report entitled California's Groundwater: Bulletin 118 updated in 2003, as it may be subsequently updated or revised in accordance with Section 12924.

(d) Coordination agreement means a legal agreement adopted between two or more groundwater sustainability agencies that provides the basis for coordinating multiple agencies or groundwater sustainability plans within a basin pursuant to this part.

(e) De minimis extractor means a person who extracts, for domestic purposes, two acre- feet or less per year.

(f) Governing body means the legislative body of a groundwater sustainability agency.

(g) Groundwater means water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water, but does not include water that flows in known and definite channels.

(h) Groundwater extraction facility means a device or method for extracting groundwater from within a basin.

(i) Groundwater recharge or recharge means the augmentation of groundwater, by natural or artificial means.

(j) Groundwater sustainability agency means one or more local agencies that implement the provisions of this part. For purposes of imposing fees pursuant to Chapter 8 (commencing with Section 10730) or taking action to enforce a groundwater sustainability plan, groundwater sustainability agency also means each local agency comprising the groundwater sustainability agency if the plan authorizes separate agency action.

(k) Groundwater sustainability plan or plan means a plan of a groundwater sustainability agency proposed or adopted pursuant to this part.

(l) Groundwater sustainability program means a coordinated and ongoing activity undertaken to benefit a basin, pursuant to a groundwater sustainability plan.

(m) In-lieu use means the use of surface water by persons that could otherwise extract groundwater in order to leave groundwater in the basin.

(n) Local agency means a local public agency that has water supply, water management, or land use responsibilities within a groundwater basin.

(o) Operator means a person operating a groundwater extraction facility. The owner of a groundwater extraction facility shall be conclusively presumed to be the operator unless a satisfactory showing is made to the governing body of the groundwater sustainability agency that the groundwater extraction facility actually is operated by some other person.

(p) Owner means a person owning a groundwater extraction facility or an interest in a groundwater extraction facility other than a lien to secure the payment of a debt or other obligation.

(q) Personal information has the same meaning as defined in Section 1798.3 of the Civil Code.

(r) Planning and implementation horizon means a 50-year time period over which a groundwater sustainability agency determines that plans and measures will be implemented in a basin to ensure that the basin is operated within its sustainable yield.

(s) Public water system has the same meaning as defined in Section 116275 of the Health and Safety Code.

(t) Recharge area means the area that supplies water to an aquifer in a groundwater basin.

(u) Sustainability goal means the existence and implementation of one or more groundwater sustainability plans that achieve sustainable groundwater management by identifying and causing the implementation of measures targeted to ensure that the applicable basin is operated within its sustainable yield.

(v) Sustainable groundwater management means the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.

(w) Sustainable yield means the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing an undesirable result.

(x) Undesirable result means one or more of the following effects caused by groundwater conditions occurring throughout the basin:

(1) Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.

(2) Significant and unreasonable reduction of groundwater storage.

(3) Significant and unreasonable seawater intrusion.

(4) Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.

(5) Significant and unreasonable land subsidence that substantially interferes with surface land uses.

(6) Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

(y) Water budget means an accounting of the total groundwater and surface water entering and leaving a basin including the changes in the amount of water stored.

(z) Watermaster means a watermaster appointed by a court or pursuant to other law.

(aa) Water year means the period from October 1 through the following September 30, inclusive.

(ab) Wellhead protection area means the surface and subsurface area surrounding a water well or well field that supplies a public water system through which contaminants are reasonably likely to migrate toward the water well or well field.

Official California Code of Regulations (CCR)

Title 23. Waters

Division 2. Department of Water Resources

Chapter 1.5. Groundwater Management

Subchapter 2. Groundwater Sustainability Plans

Article 2. Definitions

23 CCR § 351

§ 351. Definitions.

The definitions in the Sustainable Groundwater Management Act, Bulletin 118, and Subchapter 1 of this Chapter, shall apply to these regulations. In the event of conflicting definitions, the definitions in the Act govern the meanings in this Subchapter. In addition, the following terms used in this Subchapter have the following meanings:

(a) “Agency” refers to a groundwater sustainability agency as defined in the Act.

(b) “Agricultural water management plan” refers to a plan adopted pursuant to the Agricultural Water Management Planning Act as described in Part 2.8 of Division 6 of the Water Code, commencing with Section 10800 et seq.

(c) “Alternative” refers to an alternative to a Plan described in Water Code Section 10733.6.

(d) “Annual report” refers to the report required by Water Code Section 10728.

(e) “Baseline” or “baseline conditions” refer to 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.

(f) “Basin” means a groundwater basin or subbasin identified and defined in Bulletin 118 or as modified pursuant to Water Code 10722 et seq.

(g) “Basin setting” refers to the information about the physical setting, characteristics, and current conditions of the basin as described by the Agency in the hydrogeologic conceptual model, the groundwater conditions, and the water budget, pursuant to Subarticle 2 of Article 5.

(h) “Best available science” refers to the use of sufficient and credible information and data, specific to the decision being made and the time frame available for making that decision, that is consistent with scientific and engineering professional standards of practice.

(i) “Best management practice” refers to a practice, or combination of practices, that are designed to achieve sustainable groundwater management and have been determined to be technologically and economically effective, practicable, and based on best available science.

(j) “Board” refers to the State Water Resources Control Board.

(k) “CASGEM” refers to the California Statewide Groundwater Elevation Monitoring Program developed by the Department pursuant to Water Code Section 10920 et seq., or as amended.

(l) “Data gap” refers to a lack of information that significantly affects the understanding of the basin setting or evaluation of the efficacy of Plan implementation, and could limit the ability to assess whether a basin is being sustainably managed.

(m) “Groundwater dependent ecosystem” refers to ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface.

(n) “Groundwater flow” refers to the volume and direction of groundwater movement into, out of, or throughout a basin.

(o) “Interconnected surface water” refers to 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.

(p) “Interested parties” refers to persons and entities on the list of interested persons established by the Agency pursuant to Water Code Section 10723.4.

(q) “Interim milestone” refers to a target value representing measurable groundwater conditions, in increments of five years, set by an Agency as part of a Plan.

(r) “Management area” refers to an area within a basin for which the Plan may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors.

(s) “Measurable objectives” refer to specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin.

(t) “Minimum threshold” refers to a numeric value for each sustainability indicator used to define undesirable results.

(u) “NAD83” refers to the North American Datum of 1983 computed by the National Geodetic Survey, or as modified.

(v) “NAVD88” refers to the North American Vertical Datum of 1988 computed by the National Geodetic Survey, or as modified.

(w) “Plain language” means language that the intended audience can readily understand and use because that language is concise, well-organized, uses simple vocabulary, avoids excessive acronyms and technical language, and follows other best practices of plain language writing.

(x) “Plan” refers to a groundwater sustainability plan as defined in the Act.

(y) “Plan implementation” refers to an Agency's exercise of the powers and authorities described in the Act, which commences after an Agency adopts and submits a Plan or Alternative to the Department and begins exercising such powers and authorities.

(z) “Plan manager” is an employee or authorized representative of an Agency, or Agencies, appointed through a coordination agreement or other agreement, who has been delegated management authority for submitting the Plan and serving as the point of contact between the Agency and the Department.

(aa) “Principal aquifers” refer to aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems.

(ab) “Reference point” refers to a permanent, stationary and readily identifiable mark or point on a well, such as the top of casing, from which groundwater level measurements are taken, or other monitoring site.

(ac) “Representative monitoring” refers to a monitoring site within a broader network of sites that typifies one or more conditions within the basin or an area of the basin.

(ad) “Seasonal high” refers to the highest annual static groundwater elevation that is typically measured in the Spring and associated with stable aquifer conditions following a period of lowest annual groundwater demand.

(ae) “Seasonal low” refers to the lowest annual static groundwater elevation that is typically measured in the Summer or Fall, and associated with a period of stable aquifer conditions following a period of highest annual groundwater demand.

(af) “Seawater intrusion” refers to the advancement of seawater into a groundwater supply that results in degradation of water quality in the basin, and includes seawater from any source.

(ag) “Statutory deadline” refers to the date by which an Agency must be managing a basin pursuant to an adopted Plan, as described in Water Code Sections 10720.7 or 10722.4.

(ah) “Sustainability indicator” refers to any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results, as described in Water Code Section 10721(x).

(ai) “Uncertainty” refers to a lack of understanding of the basin setting that significantly affects an Agency's ability to develop sustainable management criteria and appropriate projects and management actions in a Plan, or to evaluate the efficacy of Plan implementation, and therefore may limit the ability to assess whether a basin is being sustainably managed.

(aj) “Urban water management plan” refers to a plan adopted pursuant to the Urban Water Management Planning Act as described in Part 2.6 of Division 6 of the Water Code, commencing with Section 10610 et seq.

(ak) “Water source type” represents the source from which water is derived to meet the applied beneficial uses, including groundwater, recycled water, reused water, and surface water sources identified as Central Valley Project, the State Water Project, the Colorado River Project, local supplies, and local imported supplies.

(al) “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.

(am) “Water year” refers to the period from October 1 through the following September 30, inclusive, as defined in the Act.

(an) “Water year type” refers to the classification provided by the Department to assess the amount of annual precipitation in a basin.

Executive Summary

ES-1 Introduction

The Sustainable Groundwater Management Act (SGMA), effective as of January of 2015, created a new statewide framework for managing California's groundwater at the local level. SGMA empowers local agencies to form groundwater sustainability agencies (GSAs) tasked with developing groundwater sustainability plans (GSPs), such as this document. A GSP is a detailed road map for maintaining or bringing a designated groundwater basin into a sustainable condition within the next 20 years. When a basin is managed sustainably, groundwater conditions are maintained in a manner that avoids undesirable results caused by groundwater conditions occurring throughout the basin, such as chronic lowering of groundwater levels, or significant and unreasonable depletion of supply, reduction of groundwater storage, degraded water quality, land subsidence, or depletions of interconnected surface waters.

In his signing statement, Governor Brown emphasized that "groundwater management in California is best accomplished locally." The Santa Ynez River Valley Groundwater Basin (Basin) is divided into three management areas: the Western Management Area (WMA), the Central Management Area (CMA), and the Eastern Management Area (EMA), each with its own GSA and GSP. In 2017, the Santa Ynez River Water Conservation District (SYRWCD), Santa Barbara County Water Agency, the City of Solvang, and the SYRWCD, Improvement District No. 1 (ID No. 1) signed a Memorandum of Agreement (MOA) to form the EMA GSA. This GSP describes the pathway to groundwater sustainability for the EMA.

This GSP describes the EMA physical setting; presents historical, present, and future water budgets; develops quantifiable management objectives that account for the interests of the EMA's beneficial groundwater uses and users; and identifies a group of projects and management actions that will allow the EMA to maintain or achieve sustainability within 20 years of plan adoption. This document also includes the list of references and technical studies, documentation of the stakeholder engagement process used in the development of this plan, and several supporting appendices. The EMA GSA has taken many steps, starting with stakeholder engagement, to complete the GSP in accordance with the requirements of SGMA and related SGMA regulations.

The EMA GSA has provided multiple venues for stakeholder engagement to encourage interested parties and the public to provide input based on their perspectives and priorities and to enable the GSA to provide updates to the public in a timely manner. The GSA created a Citizen Advisory Group (CAG) representing a variety of water user groups in the EMA to capture perspectives of all stakeholders throughout the development of the GSP. Numerous presentations and workshops were given to inform EMA groundwater users and the public about the plan and plan elements, and to solicit input. In addition, many of the key GSP sections were posted on the EMA website for public review. Numerous other meetings, educational flyers, mailers, and postings to social media were done to provide outreach in accordance with the *Communication and Engagement Plan* (see Appendix B). Comments were received through email, letters, and posts to the EMA groundwater communications portal. Each of these comments have been responded to and the locations where the comments are addressed in the GSP (if changes were warranted) are recorded in the response to comment log in Appendix J.

This plan considers the sources and uses of water in the EMA and the changes that might occur due to population growth, potential expansion of irrigated agriculture, and changes in rainfall, streamflow, and evapotranspiration due to climate change. This plan also considers groundwater dependent ecosystems (GDEs), which are ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface.

The EMA GSA establishes sustainable management criteria (SMCs) to avoid significant and unreasonable conditions caused by groundwater use that could lead to undesirable results for five sustainability indicators listed in SGMA. As indicated above, the sustainability indicators include (1) chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply, (2) significant and unreasonable reduction of groundwater storage, (3) degraded water quality, (4) land subsidence, and (5) depletion of interconnected surface water. Basin stakeholders helped to define the sustainability goal, what constitutes undesirable results, and appropriate SMCs for each sustainability indicator. SGMA also requires that GSAs identify GDEs and assess the effects of changing groundwater levels on GDEs. The GSP includes a robust groundwater monitoring program and defines projects and management actions that have been developed to maintain long-term groundwater sustainability.

The organization of this plan is as follows:

- **Section 1 – Introduction to Plan Contents:** An introduction to the GSP, including a description of its purpose and a brief description of the EMA.
- **Section 2 – Administrative Information:** Includes the following:
  - Information on the EMA GSA as an organization and a brief description of the agencies participating in the GSA, including information on the legal authority of the GSA to plan and coordinate groundwater sustainability for the EMA.
  - An overview description of the EMA, including land use and agencies with jurisdiction, a description of the existing groundwater management plans and regulatory programs, any programs for conjunctive use, and urban land use programs that might have an effect on, or be affected by, this GSP.
  - The EMA GSA's communication and engagement planning and implementation, public feedback and stakeholder comments on the plan, how feedback was incorporated into the GSP, and responses to comments received
- **Section 3 – Basin Setting:** Includes the following:
  - An explanation of the hydrogeologic conceptual model developed for the EMA that includes descriptions of the regional hydrology and geology, principal aquifers and aquitards, and a description of the data gaps in the current model.
  - A detailed description of the groundwater conditions, including groundwater elevations and changes in storage, groundwater quality for drinking water and agricultural irrigation and trends over time, an evaluation of land subsidence, locations where surface water and groundwater are interconnected, and the identification and distribution of groundwater-dependent ecosystems.
  - A presentation of the historical, current, and projected future water budgets for the EMA; how the water budgets were developed; an estimate of sustainable yield for the EMA; and the effects of climate change using the California Department of Water Resources (DWR) climate change assumptions.
- **Section 4 – Monitoring Networks:** A detailed description of the monitoring objectives and monitoring in the EMA for groundwater levels, storage, water quality, land subsidence, interconnected surface water, representative monitoring sites, and a description of the data management and reporting system.
- **Section 5 – Sustainable Management Criteria:** Defines the sustainability goal for the EMA; describes the process through which the SMCs were established; describes significant and unreasonable effects that could lead to undesirable results as a result of groundwater conditions occurring throughout the EMA describes and defines SMCs regarding chronic lowering of groundwater levels, significant and unreasonable reduction in groundwater storage, degraded groundwater quality, land subsidence, and

depletion of interconnected surface water (including quantity and timing of surface water depletion); and describes the minimum thresholds, measurable objectives, and interim milestones to avoid undesirable results.

- **Section 6 – Projects and Management Actions:** Provides a grouping and description of each project and management action that may be developed and implemented by the EMA GSA to avoid undesirable results and ensure sustainability within 20 years of GSP adoption.
- **Section 7 – Groundwater Sustainability Plan Implementation:** Describes the implementation sequence for projects and management actions, overall schedule, estimated implementation costs, and sources of funding.

Summaries of the key technical sections of this GSP are presented below.

ES-2 Basin Setting (GSP Section 3)

Section 3 of the GSP describes the physical setting and characteristics of the EMA, including the basin boundaries, geologic formations and structures, and principal aquifer units. The hydrogeologic conceptual model describes how the groundwater system works and is based on the available body of data and prior studies of the Basin's geology, hydrology, and water quality. In this GSP, the hydrogeologic conceptual model provides a framework for subsequent sections of the basin setting, including groundwater conditions and water budgets. Together these sections provide the basis for understanding the groundwater resources in the EMA and support the GSA's efforts to achieve groundwater sustainability in the EMA and the Basin by 2042. This plan will be updated as required to maintain this goal.

ES-2.1 Hydrogeologic Conceptual Model and Principal Aquifers

Figure ES-1 is a diagram generally depicting the hydrogeologic system of the EMA, including its topographic setting, underlying geologic system, principal aquifers, generalized recharge and discharge areas for the aquifers, and water inflows and outflows. Two principal aquifers have been identified in the EMA: the Paso Robles Formation and the Careaga Sand. Water present within the Santa Ynez River Alluvium is considered surface water under the regulatory jurisdiction of the State Water Resources Control Board (SWRCB) and is not managed under SGMA. Therefore, and according to definitions set forth by SGMA and the SGMA regulations, the Santa Ynez River Alluvium is not classified in this GSP as a principal aquifer (see Appendix K).

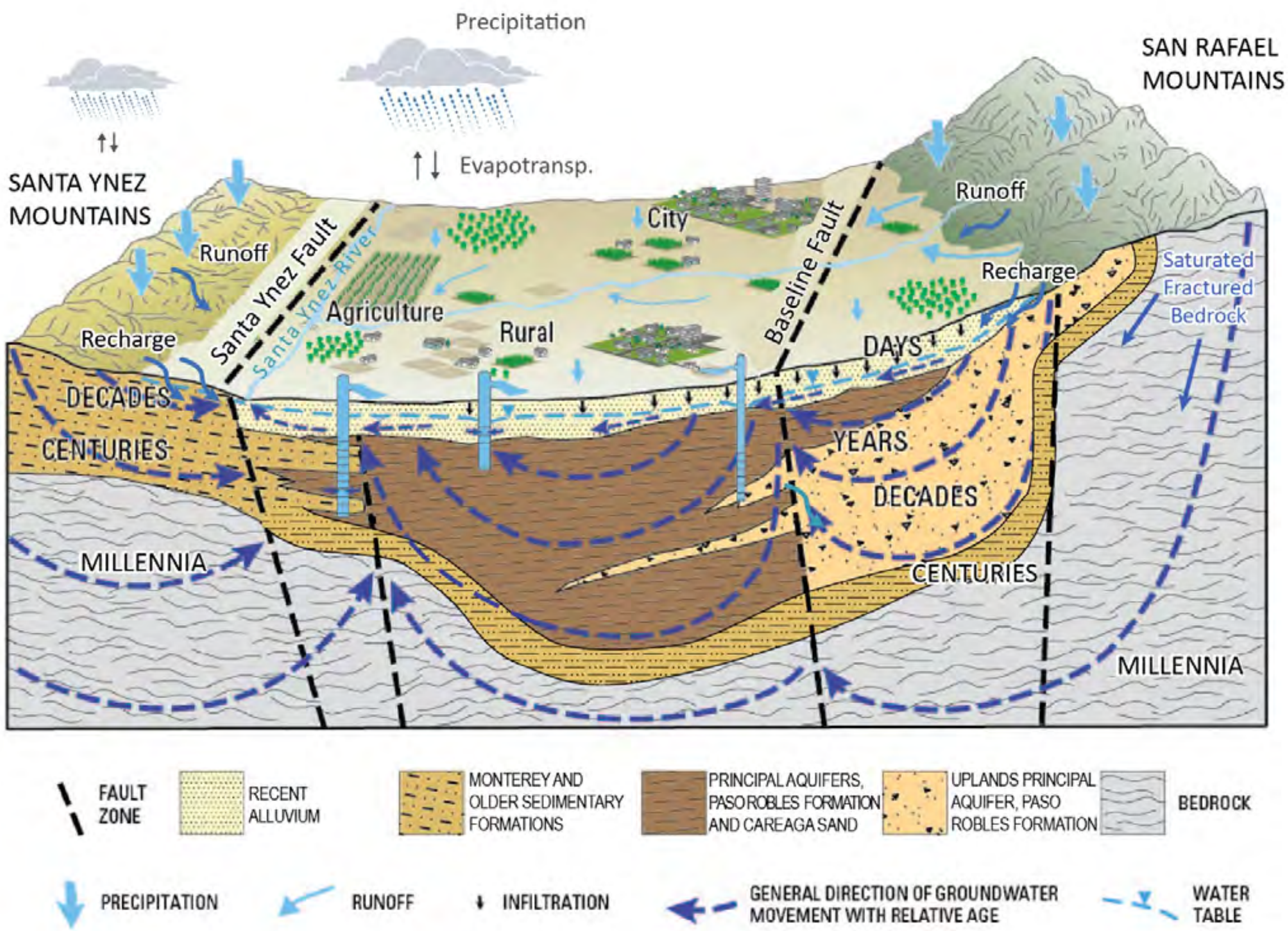

Figure ES-1. Hydrogeologic Conceptual Model and Principal Aquifers

The Paso Robles Formation contains the majority of the groundwater in storage in the EMA. This aquifer is present in the Santa Ynez Uplands area of the EMA, extending from the ground surface to approximately 3,500 feet below ground surface, with an average thickness of about 1,500 feet. Deeper portions of the Paso Robles Formation are thought to contain poor quality groundwater. The Paso Robles Formation is made of relatively thin sand and gravel layers interbedded with thicker layers of silt and clay. The upper portion of the Paso Robles formation tends to contain more coarse-grained materials and produces groundwater at higher flow rates than the more fine-grained lower portion.

The Careaga Sand lies below the Paso Robles Formation in the Santa Ynez Uplands and below the Santa Ynez River gravels near the City of Solvang. In the Santa Ynez Uplands, the Careaga Sand is typically about 800 feet thick on average and varies between 200 and 900 feet. Generally, the Careaga Sand is less permeable than the Paso Robles Formation. Wells drawing water from the Careaga Sand typically provide less water than wells screened in the Paso Robles Formation. Because the material in this aquifer is relatively uniform and fine, wells completed in the Careaga Sand often have sanding problems.

ES-2.2 Recharge and Discharge in the EMA

Within the Santa Ynez Uplands area of the EMA, sources of groundwater recharge include percolation of precipitation, infiltration into and through streambeds, urban and agricultural return flows, septic system return flows (leachate), and water system distribution losses. Within the shallow alluvial sand and gravel beds of tributaries in the Santa Ynez Uplands, portions of the ephemeral streams contribute to groundwater recharge into the underlying Paso Robles Formation. Where the Careaga Sand is exposed at ground surface in the Purisima Hills and along Alamo Pintado Creek, water from precipitation and streamflow can recharge this aquifer. Groundwater recharge to principal aquifers also occurs from mountain front recharge. Mountain front recharge includes (1) direct recharge from the underlying bedrock along the San Rafael Mountains to the north and east and from the Santa Ynez Mountains to the south and (2) runoff from the mountains that subsequently percolates into the ground.

Natural groundwater discharge areas in the EMA include springs and seeps, groundwater discharge to surface water, and evapotranspiration by plants whose roots tap into groundwater in the alluvium along creeks and streams. Groundwater discharge as subsurface outflow from the Santa Ynez Uplands portion of the EMA to the adjoining Central Management Area (CMA) is relatively small. Much of the groundwater flow exits the uplands as surface water flow leaving the tributaries just upstream of the confluence with the Santa Ynez River. Very small quantities of groundwater flow may occur through fractures in the bedrock in the Ballard Canyon area. Surface water also discharges from the EMA as underflow from the Santa Ynez River Alluvium that crosses into the CMA.

ES-2.3 Groundwater Conditions

Groundwater wells completed in the Paso Robles Formation have water levels that have been relatively stable over long periods except during drought periods. Water levels in the Paso Robles Formation show a strong correlation with climatic conditions. Some wells show water elevation decreases of more than 100 feet during prolonged drought cycles, but most wells appear to fully recover within a few years when the drought conditions end. Changes in water levels are also related to groundwater pumping. The Paso Robles Formation is the most productive and most widely pumped aquifer in the EMA. During periods of drought, water levels decline in response to a combination of increased pumping and decreased recharge. Seasonal fluctuations in water levels in the Paso Robles Formation appear to be relatively small (less than 30 feet).

Wells completed in the Careaga Sand also show long-term stability of water levels since the mid-1960s, with minimal change in water level elevation. Water levels in some wells show muted correlation with climatic conditions, exhibiting minor decreases during drought conditions and rising water levels during wet periods. One reason for the stable water levels in the Careaga Sand is that there is much less groundwater pumping compared to the Paso Robles Formation. Wells completed in the Careaga Sand typically have relatively low yields compared to the yields of the Paso Robles Formation. The volume of water extracted from the Careaga Sand is likely a small portion of the total available storage, which may explain why water levels do not show significant decline due to drought conditions.

Groundwater in the EMA is generally suitable for use as potable water and for agriculture. While there are some wells that currently have constituent concentrations that exceed Basin Water Quality Objectives set by the Regional Water Quality Control Board, it is possible that some of these exceedances are a result of natural conditions and not caused by land use or other anthropogenic activities. Elevated boron concentrations are naturally occurring in many central coast basins, and elevated total dissolved solids (TDS), chloride, and sodium are often associated with rocks of marine origin that are present in the EMA. EMA agricultural stakeholders have not indicated that these concentrations are impacting agricultural production or drinking water quality.

ES-2.4 Interconnected Groundwater and Surface Water

The Santa Ynez River is the primary surface water drainage feature in the EMA, flowing from east to west. The EMA also includes both perennial and intermittent creeks that flow into the Santa Ynez River or into Cachuma Reservoir (Lake Cachuma). The surface water system of the Santa Ynez River, including underflow within the Santa Ynez Alluvium, is subject to the regulatory jurisdiction of the SWRCB and is not managed by the EMA GSA under SGMA (refer to Appendix K for additional discussion of the distinction between groundwater and the surface water system in accordance with SGMA).

Tributaries to the Santa Ynez River on the north side of the EMA cut through the uplands and provide recharge to the Paso Robles Formation. This percolating groundwater is not interconnected with surface water and is completely disconnected from the underlying regional groundwater table within the principal aquifers. Within these portions of the tributaries, the regional groundwater table is significantly lower than the elevation of the tributaries and there is no continuous saturated zone between the surface and water table, except in the lower ends of Alamo Pintado and Zanja de Cota Creeks. At the southern ends of these tributaries, groundwater present in the tributary alluvium encounters relatively impermeable bedrock adjacent to and beneath the Santa Ynez River, which forces the groundwater to discharge to surface water at these locations. This is most evident on the far southern ends of Alamo Pintado and Zanja de Cota Creeks at the confluence with the Santa Ynez River.

ES-2.5 Groundwater Dependent Ecosystems (GDEs)

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." GDE types include terrestrial vegetation that is supported by groundwater that discharges to seeps, springs, wetlands, streams, and estuaries. Figure ES-2 shows the locations of potential GDEs in the EMA, as identified through screening methods developed by The Nature Conservancy and from local data on the spatial and temporal variations in the water table depth below ground surface. Biological surveys have not been completed in preparation of this GSP, but the presence of these potential GDEs will be verified during GSP implementation.

Several palustrine and riverine wetland features, three mapped springs, and five types of vegetation communities are present within the EMA. The five vegetation types are the following:

- Coast Live Oak
- Valley Oak
- Riparian Mixed Hardwoods
- Riversidean Alluvial Scrub
- Willow

The potential GDEs are further categorized based on their proximity to, and association with, the regional confined principal aquifers in the EMA. Category A GDEs are associated with the principal aquifers and may be affected by groundwater management activities, while Category B GDEs show a hydrogeologic separation from the principal aquifers and are unlikely to be affected by groundwater management activities. Category A GDEs are concentrated in the southwestern portion of the EMA in the areas surrounding the lower, generally perennial reaches of Alamo Pintado and Zanja de Cota Creeks. Category B GDEs are located in the northern and eastern portion of the EMA. The Category A potential GDEs are considered in the development of sustainable management criteria (Section 5) and in projects and management actions (Section 6).

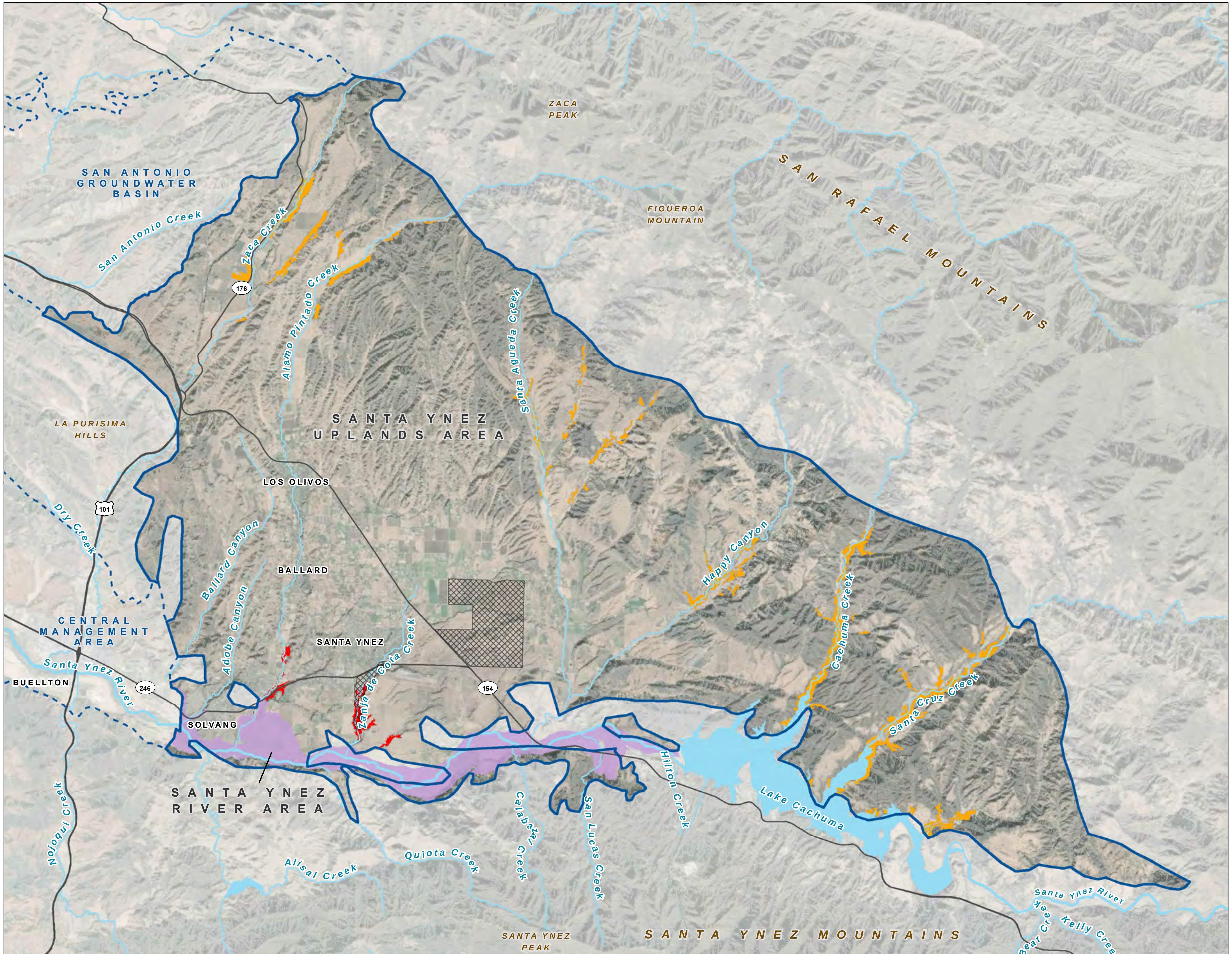

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FIGURE ES-2

Categorized Potential Groundwater Dependent Ecosystems

Santa Ynez River Valley Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan

LEGEND

Santa Ynez River Area

Native Communities Commonly Associated with Groundwater (NCCAG)

Category A – Potential GDE Associated with a Principal Aquifer (184 acres[2])

Category B – Potential GDE Unlikely to be Affected by Groundwater Management Activities (1,546 acres[2])

All Other Features

Eastern Management Area Bulletin 118 Boundary

Other Bulletin 118 Groundwater Basin Boundary

Chumash Reservation Boundary

Major Road

Watercourse

Waterbody

NOTE

1. GDE: Groundwater Dependent Ecosystem
2. Includes both NCCAG Wetland and Vegetation acreage

N

0 5,000 10,000 15,000
Feet

Date: September 2, 2021
Data Sources: ESRI, USGS, Maxar 2019, USFWS

GSI Water Solutions, Inc.

The EMA GSA is fully supportive of the comprehensive and ongoing efforts, dating back to the 1990s, to develop and implement surface flow and non-flow measures in the mainstem lower Santa Ynez River and certain tributaries for the protection of public trust resources, including but not limited to steelhead and its critical habitat within the Santa Ynez River. The member agencies of the EMA GSA remain actively involved with numerous federal, state, and local entities in proceedings before the SWRCB and in the current re-consultation process under the federal Endangered Species Act to protect steelhead and its critical habitat in the lower Santa Ynez River. Notably, however, steelhead and other species residing in the Santa Ynez River depend on surface and underflow components of the surface water system and are not groundwater dependent based on the analyses set forth in this GSP.

ES-2.6 Water Budget Development

A water budget defines the sources and uses of water in a groundwater basin and how they have changed over time. The water budget in this GSP is an inventory and accounting of total surface water and groundwater inflows (recharge) and outflows (discharge) from the EMA, including the following:

Surface Water Inflows (Santa Ynez River):

- Streamflow and subsurface inflow into the Santa Ynez River Alluvium from both the upstream Santa Ynez River and Santa Ynez Uplands tributaries
- Runoff of precipitation into streams and rivers or diversion structures that enter the EMA from the surrounding watershed
- Irrigation return flow to the Santa Ynez River Alluvium
- Return flows from septic systems
- Imported surface water (e.g., from the State Water Project)

Surface Water Outflows (Santa Ynez River):

- Streamflow exiting the EMA through the Santa Ynez River and Zaca Creek
- Subsurface flow through the Santa Ynez River Alluvium downstream towards the Central Management Area
- Pumping from river wells completed in the Santa Ynez River Alluvium
- Evapotranspiration by plants

Groundwater Inflows:

- Recharge from precipitation
- Percolation of tributary flows to groundwater
- Subsurface groundwater inflow, including mountain front recharge
- Agricultural irrigation return flow (water not consumed by crops/landscaping)
- Percolation of treated wastewater
- Septic tank return flows
- Urban irrigation return flow (including water distribution system leakage and water from imported sources)

Groundwater Outflows:

- Groundwater pumping

- Evapotranspiration by crops and phreatophyte plants
- Subsurface groundwater outflows to adjoining groundwater systems
- Groundwater discharge to surface water

The historical and current water budget analysis was developed in a tabular accounting format by water year using various publicly available data sets. The projected water budget analysis was developed in part using the EMA numerical groundwater flow model. The groundwater inflow and outflow components of the water budget are related to the principal aquifers (the Paso Robles Formation and the Careaga Sand) in the Santa Ynez Uplands portion of the EMA. The difference between inflows to and outflows from the groundwater system in the Santa Ynez Uplands is equal to the change of groundwater in storage.

The estimated inflow and outflow components as well as the estimated sustainable yield are presented in this GSP. SGMA requires that, within 20 years, basins avoid significant and unreasonable effects that could lead to undesirable results as a result of groundwater conditions occurring throughout the EMA. Undesirable results include chronic lowering of groundwater levels over time indicating a significant and unreasonable depletion of supply. This can occur when the average annual amount of groundwater extraction exceeds the long-term average annual supply of water to the basin. It is normal for groundwater basins to experience increases and decreases in storage in response to the normal dry and wet hydrologic cycles.

The water budget for the historical period of 1982 through 2018 indicates that total groundwater outflow exceeded the total inflow in the EMA by an average of 1,830 AFY, as shown in Figure ES-3.

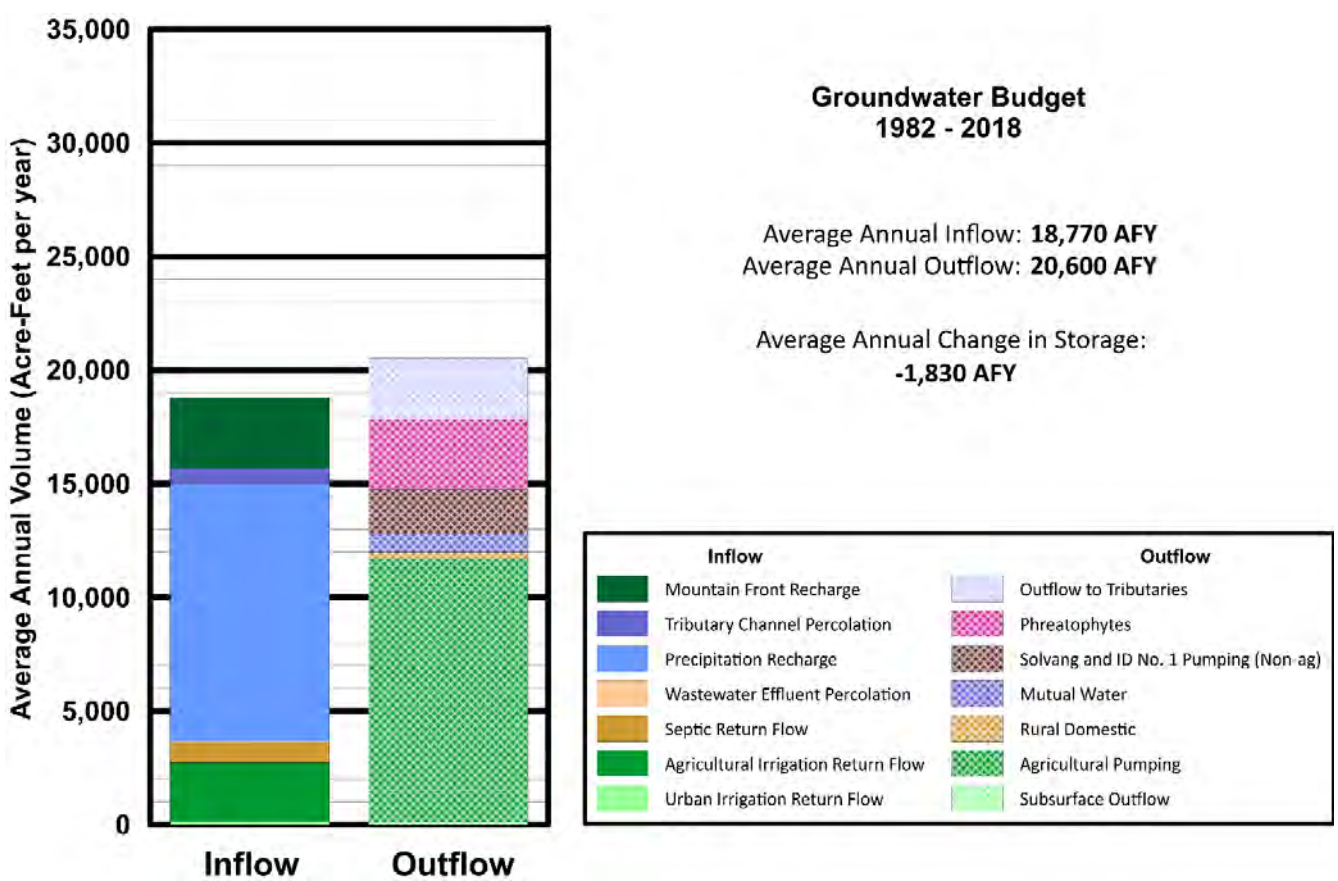


Figure ES-3. Average Groundwater Budget Volumes, Historical Period (1982 through 2018)

The sustainable yield in the EMA was estimated by adding the average change of groundwater in storage (negative 1,830 AFY) to the estimated total average amount of groundwater pumping (14,700 AFY) for the historical period. This results in a sustainable yield of about 12,870 AFY. This estimated value reflects historical climatic and hydrologic conditions and provides insight into the average amount of groundwater pumping that can be sustained in the EMA without causing undesirable results as defined by SGMA. The sustainable yield is not a fixed constant value but can fluctuate over time as the groundwater inflows and outflows change; thus, the calculated sustainable yield within the EMA can be estimated and likely modified during a future update of the GSP, depending on the representativeness of the long-term hydrologic conditions present at that time or availability of improved estimates of the water budget components.

ES-2.7 Projected Water Budget

The projected water budget is used to assess how future land use, pumping, and climate conditions affect the EMA. Based on the conditions documented in the historical water budget, the inflow and outflow from the EMA were estimated throughout the GSP implementation period through 2042 as well as for 50 total years after this GSP is submitted, through 2072. Historical climate values were projected forward into the future, and modified by projected climate change impacts on streamflow, recharge, evapotranspiration, and precipitation. The subsurface groundwater inflow and outflow components were projected using anticipated future land uses, population growth, and related pumping volumes.

The DWR-provided climate change data are based on the California Water Commission's Water Storage Investment Program climate change analysis results, which used global climate models and radiative forcing scenarios recommended for hydrologic studies in California by the Climate Change Technical Advisory Group. Climate data from the recommended General Circulation Model models and scenarios have also been downscaled and aggregated to generate an ensemble time series of change factors that describe the projected average change in precipitation and evapotranspiration (ET) values for climate conditions that are expected to prevail at midcentury and late century, centered around 2030 and 2070, respectively.

Within the entire Basin, and therefore the EMA, streamflow is projected to increase slightly on average, by 0.5 percent in 2030 and 3.8 percent in 2070, based on the average DWR climate change factors and other factors in the variable infiltration capacity analyses for the Basin. The projected changes to streamflow resulting from the climate change factors have been applied to the flow that will occur through the tributaries that flow through the Santa Ynez Uplands and ultimately into the Santa Ynez River. Crops require more water to sustain growth in a warmer climate, and this increased water requirement is characterized in climate models using the rate of ET. Under 2030 conditions, the EMA is projected to experience average annual ET increases of 3.8 percent relative to the historical period. Under 2070 conditions, annual ET is projected to increase by 8 percent relative to the historical period. The seasonal timing of precipitation in the EMA is projected to change. Sharp decreases in early fall and late spring precipitation accompanied by increases in winter and early summer precipitation are projected to occur. Under 2030 conditions, the largest monthly changes would occur in May with projected decreases of 14 percent, while increases of approximately 9 percent and 10 percent are projected in March and August, respectively. Under 2070 conditions, decreases of up to 31 percent are projected in May while the largest increases are projected to occur in September (25 percent) and January (17 percent). On average, the EMA is projected to experience minimal changes in total annual precipitation, although, the drought that has continued since before 2012 is concerning to Basin stakeholders.

Groundwater outflows from the Santa Ynez Uplands are projected to exceed inflows in the future in the absence of GSA management actions. During the historical period, production from wells in the Santa Ynez Uplands served increasing demands for areas that did not have access to surface water supply. In the future, it is assumed surface water supplies, including imported water sources, will not be sufficient to meet new demand from agricultural, municipal, and industrial uses, and therefore increased demand would be supplied by local groundwater.

The combined effects of these changes in supply and demand are that total groundwater pumping in the EMA may increase by approximately 1.1 percent, from 14,760 AFY under historical conditions to 14,920 AFY under 2042 conditions, and to 14,840 AFY by 2072, unless measures are implemented to increase supply or reduce demand. The water budget calculations indicate that the current deficit (outflows exceeding inflows) could increase to an average of 2,060 AFY in 2042 and further to 2,270 AFY in 2072. This analysis demonstrates that, if demand for groundwater increases in the future, projects and management actions may be needed to address the current and projected deficit (overdraft) anticipated to remain in 2042, the year that DWR requires the Basin to be balanced and sustainable without undesirable results.

The projected water budget for year 2042 conditions is presented in Figure ES-4, which breaks out the inflow and outflow components of the water budget.

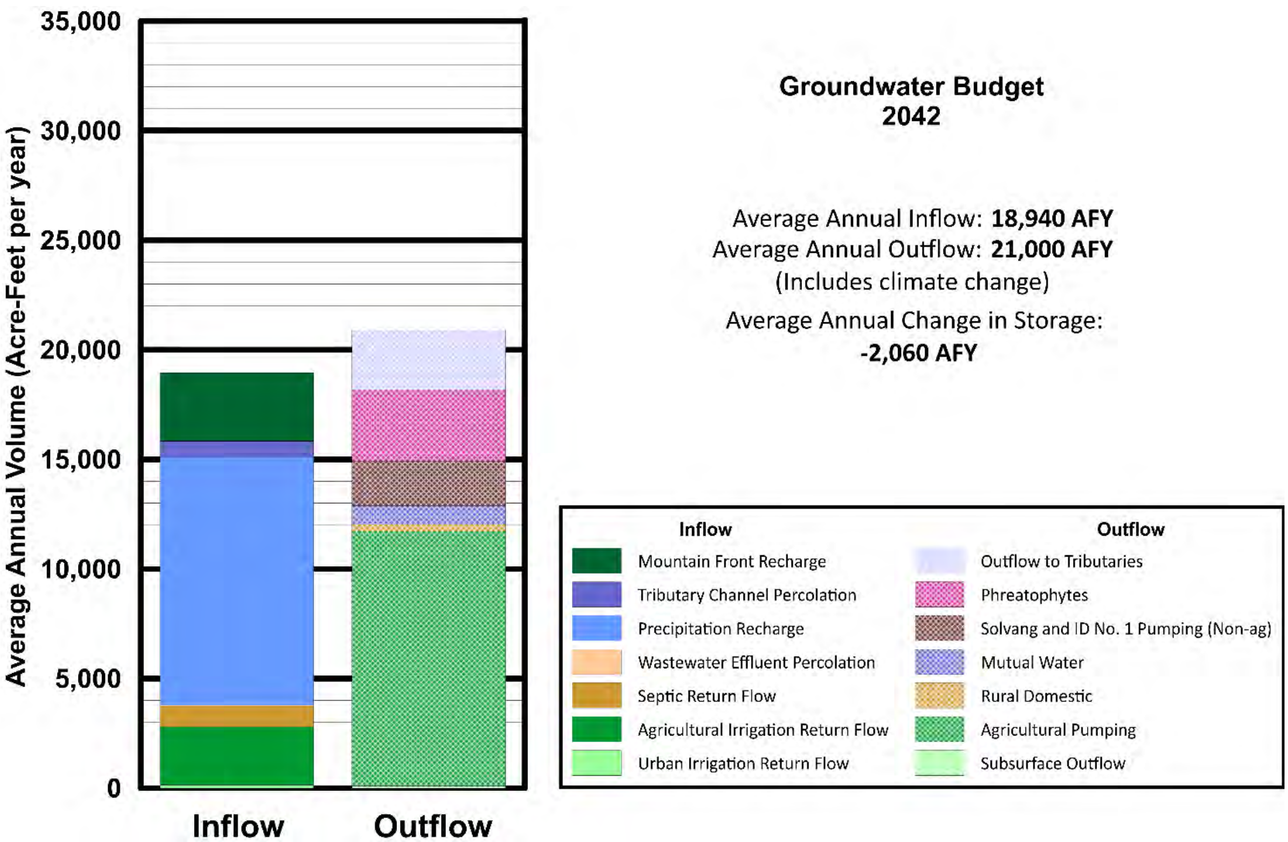


Figure ES-4. Projected Groundwater Budget, 2042

ES-3 Monitoring Networks (GSP Section 4)

This section of the GSP describes existing monitoring networks and improvements to the monitoring networks that are being developed for implementation of the EMA GSP. The monitoring networks presented in this section are largely based on existing monitoring sites. During the 20-year GSP implementation period, it will be necessary to expand the existing monitoring networks and, if existing wells are unavailable, identify or install more monitoring sites to fully demonstrate sustainability and improve the groundwater flow model.

The groundwater level monitoring network section of this GSP is largely based on historical groundwater data compiled by the U.S. Geological Survey National Water Information System program, the California Statewide Groundwater Elevation Monitoring program, and semi-annual groundwater monitoring conducted by Santa Barbara County. The groundwater quality monitoring network section of this GSP is largely based on historical groundwater data compiled by the USGS Groundwater Ambient Monitoring and Assessment Program. The subsidence monitoring program will rely on existing Interferometric Synthetic Aperture Radar (InSAR) and University NAVSTAR Consortium (UNAVCO) satellite monitoring information, which may be supplemented with surveyed benchmarks if the satellite data suggest that subsidence is occurring as a result of groundwater pumping. Depletion of interconnected surface water and potential significant and unreasonable adverse impacts to GDEs will be monitored in new piezometers that will be installed in two tributaries where groundwater is interconnected with surface water. Data gaps have been identified in the monitoring programs that will be addressed during GSP implementation.

ES-3.1 Monitoring Plan for Water Levels, Change in Storage, Water Quality

The GSP monitoring network is composed of aquifer-specific wells that are screened in one of the two principal aquifers in the EMA (the Paso Robles Formation or the Careaga Sand). A total of 24 representative wells—defined in the SGMA regulations as monitoring sites that are representative of groundwater conditions in each of the principal aquifers—make up the groundwater level monitoring network in the EMA. Representative wells are spatially distributed to provide information across most of the EMA, have a reasonably long record of data so that trends can be determined, and have hydrograph signatures that are representative of groundwater levels in wells in the surrounding area. Additionally, there are 13 wells in the EMA that are monitored by Santa Barbara County that do not meet the criteria of representative wells, totaling 37 wells that are currently monitored in the EMA. The monitoring network will enable the collection of data to assess sustainability indicators, evaluate the effectiveness of management actions and projects that are designed to achieve sustainability, and evaluate adherence to minimum thresholds and measurable objectives for each applicable sustainability indicator.

The representative wells network consists of 24 wells (15 wells in the Paso Robles Formation and 9 wells in the Careaga Sand) that will be used to monitor groundwater levels and storage. Ten wells are production wells used for agricultural irrigation, seven wells are domestic drinking water wells, and seven wells are municipal drinking water wells. While not ideal for use as monitoring wells because they are production wells, these wells are currently included as representative wells because of their locations in the EMA, available well construction information, and long periods of record. The groundwater level monitoring network will be used to create groundwater elevation contour maps and calculate change of groundwater in storage for each principal aquifer.

The geographic distribution of this selection of representative wells allows for the collection of data to evaluate groundwater gradients and flow directions over time as well as the annual change in storage. Furthermore, the monitoring frequency of the wells will allow for the monitoring of seasonal highs and lows. Because wells were chosen with the existing lengths of historical data records in mind, future groundwater data will be comparable to the historical data. This coverage accounts for the ability to use each site for monitoring multiple sustainability indicators.

The groundwater quality monitoring network includes a total of 61 wells. This includes 26 municipal and public water system wells that were identified by reviewing data available from the SWRCB Division of Drinking Water, 25 agricultural supply wells, and 10 domestic supply wells included in the groundwater quality monitoring network. These wells were identified by reviewing data available from the SWRCB Irrigated Lands Regulatory Program (ILRP). In the future, wells that are sampled as part of the ILRP will be used to assess groundwater quality at agricultural and domestic wells.

ES-3.2 Monitoring Plan for Land Subsidence

Locally defined significant and unreasonable conditions for land subsidence are (1) land subsidence rates exceeding rates estimated by using InSAR (satellite-based land surface elevation monitoring) data processed by TRE ALTAMIRA, Inc. for the period from June 13, 2015, through September 19, 2019, and by the National Aeronautics and Space Administration for the period between spring of 2015 and summer of 2017; and (2) land subsidence that causes significant and unreasonable damage to or substantially interferes with groundwater supply, land uses, infrastructure, and property interests. Total measured negative change in land surface elevation in the EMA based on these sources has been less than 0.06 foot (ft), or 0.015 ft per year. Recorded subsidence could be due to tectonic activity, groundwater extraction, oil and gas extraction, or a combination of the three. This is considered a minor rate of land surface elevation change and is relatively insignificant and not a major concern for the EMA GSA. The EMA GSA will continue to monitor annual land surface elevation change using InSAR and UNAVCO satellite systems.

ES-3.3 Monitoring Plan for Interconnected Surface Water and GDEs

Avoiding significant and unreasonable adverse impacts on beneficial uses of interconnected surface water present in the EMA is the focus of the depletion of interconnected surface sustainability indicator. To avoid significant and unreasonable adverse impacts to GDEs, groundwater levels will be used as a proxy for monitoring interconnected surface water because installation of surface water gauging stations is not considered feasible due to access and channel configuration limitations. Shallow monitoring wells, or piezometers, are planned to be installed and monitored within the areas identified near the confluence of both Alamo Pintado and Zanja de Cota Creeks with the Santa Ynez River (see Figure 4-4). Monitoring of groundwater levels will be conducted to assess whether there is potential for a long-term depletion of interconnected surface water and undesirable results caused by groundwater extraction. Groundwater levels measured below the maximum rooting depth of GDEs—along with observed significant and unreasonable loss of habitat relative to conditions existing when SGMA was enacted—would be considered an undesirable result.

ES-4 Sustainable Management Criteria (SMCs) (GSP Section 5)

Section 5 defines the criteria by which sustainability will be evaluated, defines conditions that constitute sustainable groundwater management, and discusses the process by which the EMA GSA will characterize undesirable results and establish minimum thresholds and measurable objectives for each sustainability indicator in the EMA. Section 5 presents the data and methods used to develop SMCs and demonstrates how these criteria influence beneficial uses and users. The SMCs are considered initial criteria and will be reevaluated and potentially modified in the future as new data become available.

Sustainability indicators are the effects caused by groundwater conditions occurring throughout the EMA that, when significant, unreasonable, and caused by groundwater conditions occurring throughout the EMA, become undesirable results. Undesirable results are one or more of the following effects:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon

- Significant and unreasonable reduction in groundwater storage
- Significant and unreasonable degraded groundwater quality
- Significant and unreasonable land subsidence that substantially interferes with surface land uses
- Depletion of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

A wide variety of information was used to define minimum thresholds and measurable objectives for each sustainability indicator, which are measured at representative wells. Minimum thresholds and measurable objectives are generally defined as follows:

- **Minimum Threshold** – A minimum threshold is the numeric value for each sustainability indicator that is used to define undesirable results. For example, a particular groundwater level might be a minimum threshold if lower groundwater levels would result in a significant and unreasonable reduction of groundwater in storage or depletion of supply.
- **Measurable Objective** – Measurable objectives are specific, quantifiable goals or targets that reflect the EMA's desired groundwater conditions and allow the EMA GSA to achieve the sustainability goal within 20 years.

ES-4.1 Sustainability Goal

Because each of the groundwater management areas together encompass the entire Basin, a single sustainability goal has been adopted for the entire Santa Ynez River Valley Groundwater Basin as follows:

> In accordance with the Sustainable Groundwater Management Act (SGMA), the sustainability goal for the Santa Ynez River Valley Groundwater Basin (Basin) is to sustainably manage the groundwater resources in the Western, Central, and Eastern Management Areas to ensure that the Basin is operated within its sustainable yield for the protection of reasonable and beneficial uses and users of groundwater. The absence of undesirable results, as defined by SGMA and the Groundwater Sustainability Plans (GSPs), will indicate that the sustainability goal has been achieved. Sustainable groundwater management as implemented through the GSPs is designed to ensure that:
>
> 1. Long-term groundwater elevations are adequate to support existing and future reasonable and beneficial uses throughout the Basin,
> 2. A sufficient volume of groundwater storage remains available during drought conditions and recovers during wet conditions,
> 3. Groundwater production, and projects and management actions undertaken through SGMA, do not degrade water quality conditions in order to support ongoing reasonable and beneficial uses of groundwater for agricultural, municipal, domestic, industrial, and environmental purposes.
>
> Groundwater resources will be managed through projects and management actions implemented under the GSPs by the respective Groundwater Sustainability Agencies (GSAs). Management of the Basin will be supported by monitoring groundwater levels, groundwater in storage, groundwater quality, land surface elevations, and interconnected surface water. The GSAs will adaptively manage any projects and management actions to ensure that the GSPs are effective and undesirable results are avoided.
>
> The EMA GSP includes a monitoring program (see Section 4) that addresses each of the applicable sustainability indicators. If, based on the results of the monitoring program, minimum thresholds are exceeded such that undesirable effects are present or imminent, the GSA will identify management actions and projects that will be implemented to avoid an undesirable result (see Section 6). Other

projects and management actions may be implemented immediately upon GSP adoption, without a specific nexus to undesirable results, to achieve the sustainability goal, address data gaps, and collect important data regarding basin conditions that are necessary for effective management of the EMA.

ES-4.2 Qualitative Objectives for Meeting Sustainability Goals

Qualitative objectives are designed to help stakeholders understand the overall purpose for sustainably managing groundwater resources (e.g., avoid chronic lowering of groundwater levels) and reflect the local economic, social, and environmental values within the EMA. A qualitative objective is often compared to a mission statement. The qualitative objectives for the EMA are the following:

- **Avoid Chronic Lowering of Groundwater Levels**
  - Maintain groundwater levels that continue to support current and ongoing beneficial uses and users of groundwater use in the EMA.
- **Avoid Significant and Unreasonable Reduction of Groundwater Storage**
  - Maintain sufficient groundwater volumes in storage to sustain current and ongoing beneficial uses and users of groundwater which maintains access to groundwater supplies, including during prolonged drought conditions while avoiding permanent degradation of GDEs resulting from groundwater conditions occurring throughout the EMA.
- **Avoid Significant and Unreasonable Degraded Groundwater Quality**
  - Maintain groundwater access to suitable water quality for all beneficial uses to ensure sustainability of groundwater drinking water supplies for all beneficial uses.
  - Evaluate changes in groundwater quality resulting from groundwater conditions occurring throughout the EMA.
- **Avoid Significant and Unreasonable Land Subsidence that Substantially Interferes with Surface Land Uses**
  - Reduce or prevent land subsidence that causes significant and unreasonable effects to groundwater supply, current land uses, and water supply infrastructure, and property interests.
- **Avoid Significant and Unreasonable Depletion of Interconnected Surface Water**
  - Avoid depletions of interconnected surface water that have significant and unreasonable adverse impacts to beneficial uses of the surface water, including GDEs, caused by groundwater conditions occurring throughout the EMA.
  - Maintain sufficient groundwater levels to maintain areas of interconnected surface water existing as of January 2015 when SGMA became effective.

ES-4.3 General Process for Establishing Sustainable Management Criteria

This section presents the process that was used to develop the SMCs for the EMA, including input obtained from EMA stakeholders, the criteria used to define undesirable results, and the information used to establish minimum thresholds and measurable objectives.

ES-4.3.1 Obtain Public Input

The public input process was developed in conjunction with the GSA member agencies and included engagement with local stakeholders, the public at large, and interested parties on GSP issues. This included the formation of the Citizen's Advisory Group (CAG), whose members were selected by the GSA Committee because they represent the various beneficial uses and users of groundwater in the EMA. The SMCs and beneficial uses presented in this section were developed using a combination of information from public input, public meetings, written comments submitted to the GSA, hydrogeologic analysis, and meetings with CAG members.

ES-4.3.2 Define Undesirable Results

Defining what is considered undesirable is one of the first steps in the SMC development process. The qualitative objectives for meeting sustainability goals are presented as ways of avoiding undesirable results for each of the sustainability indicators. The absence of undesirable results defines sustainability. The following are the general criteria used to define undesirable results in the EMA:

- There must be significant and unreasonable effects caused by groundwater conditions occurring throughout the EMA.
- A minimum threshold is exceeded in a specified number of representative wells over a prescribed period such that there is a depletion of supply.
- Impacts to beneficial uses, including to GDEs, are likely to occur.

These criteria may be refined periodically during the 20-year GSP implementation period based on monitoring data and analysis.

ES-4.4 Summary of Sustainable Management Criteria

Table ES-1 summarizes the SMCs for the six groundwater sustainability indicators. The table describes the type(s) of potential undesirable results associated with each sustainability indicator, the minimum thresholds, and measurable objectives for each indicator. Detailed discussions of the SMCs for each groundwater sustainability indicator are provided in Sections 5.5 through 5.10 of this GSP.

Table ES-1. Summary of Sustainable Management Criteria

Potential Undesirable Results	Minimum Threshold	Measurable Objective	Other Notes
Chronic Lowering of Groundwater Levels			
Groundwater levels in the Paso Robles Formation or Careaga Sand aquifers remain below minimum thresholds after 2 consecutive years of average and above-average precipitation in 50 percent of representative wells. Existing agricultural, municipal, and domestic wells are unable to produce the estimated sustainable yield of the EMA due to chronic decline in groundwater levels caused by groundwater conditions occurring throughout the EMA.	Paso Robles Formation wells: 15 feet below spring 2018 levels. Careaga Sand wells: 12 feet below spring 2018 levels.	Average groundwater levels measured at each representative monitoring site prior to the recent drought beginning in Water Year 2012.	Extended drought or high rates of pumping (exceeding the long-term rate of recharge) could lead to significant and unreasonable effects on groundwater levels.
Significant and Unreasonable Reduction of Groundwater in Storage			
Same as for chronic lowering of groundwater levels.	Same as for chronic lowering of groundwater levels.	Same as for chronic lowering of groundwater levels.	Same as for chronic lowering of groundwater levels.
Seawater Intrusion			
Not applicable (EMA is an inland basin)	N/A	N/A	N/A
Significant and Unreasonable Degraded Groundwater Quality			
Concentrations of regulated contaminants in untreated groundwater pumped from private domestic wells, agricultural wells, or municipal wells exceed regulatory thresholds as a result of groundwater conditions occurring throughout the EMA or GSA activities. Groundwater conditions occurring throughout the EMA or GSA activities cause concentrations of total dissolved solids (TDS), chloride, sulfate, boron, sodium, or nitrate to increase and exceed Basin Water Quality Objectives (WQOs) and is greater than concentrations in January 2015.	Concentrations of TDS, chloride, sulfate, boron, sodium, and nitrate are equal to or greater than WQOs in 50 percent of representative wells or are equal to concentrations in January 2015.	Do not make contamination issues worse; maintain groundwater quality equal to or below regulatory standards for contaminants, or equal to or below concentrations in January 2015. Maintain groundwater quality related to salts and nutrients equal to or below WQOs, or equal to or below concentrations in January 2015.	Minimum thresholds are not established for contaminants because state regulatory agencies have the responsibility and authority to regulate and direct actions that address contamination.
Significant and Unreasonable Land Subsidence that Substantially Interferes with Surface Land Uses			
Significant and unreasonable subsidence caused by groundwater conditions occurring throughout the EMA exceeds the minimum threshold *and* causes damage to structures and infrastructure and substantially interferes with surface land uses.	The rate of subsidence does not exceed 0.08 ft (1 inch) per year for 3 consecutive years.	Maintenance of current conditions as measured at the 95 percent confidence range of InSAR data, 0.053 ft per year.	Based on InSAR-measured subsidence and UNAVCO CGPS stations.
Depletion of Interconnected Surface Water that has Significant and Unreasonable Adverse Impacts to Beneficial Uses of Surface Water			
Permanent loss or significant and unreasonable adverse impacts to existing native riparian or aquatic habitat in the Category A (high-priority) GDE area due to lowered groundwater levels caused by groundwater use.	Groundwater levels measured at the piezometers proposed to be installed in the GDE areas of Alamo Pintado and Zanja de Cota Creeks are 15 ft below the streambed.	Groundwater levels measured at 5 ft below the streambed (using the same piezometers as for the minimum threshold).	Avoiding impacts to GDEs will also avoid depletion of surface water that discharges to the Santa Ynez River. The areas near the confluence of Alamo Pintado and Zanja de Cota Creeks with the Santa Ynez River are the only locations identified in the EMA where groundwater from a principal aquifer is interconnected with surface water.

Notes

CGPS = Continuous Global Positioning System

GDE = groundwater-dependent ecosystem

TDS = total dissolved solids

UNAVCO = University NAVSTAR Consortium

WQO = Water Quality Objective

Appendix I of this GSP presents a well location map and hydrographs showing the minimum threshold levels for each representative well that will be used to monitor for chronic lowering of groundwater levels and depletion of storage. The locations of GDEs near the confluence of Alamo Pintado and Zanja de Cota Creeks with the Santa Ynez River and the proposed interconnected surface water monitoring network are shown in Figure 4-4.

Interim milestones show how the GSA would move from current conditions to meeting the measurable objectives in the 20-year GSP implementation horizon. While no significant and unreasonable effect has been observed in the EMA as a result of lowering of groundwater levels to date, interim milestones are being proposed for lowering of groundwater levels and change in groundwater storage to ensure that the GSA is on track for eliminating the storage deficit going forward. The GSA intends to move forward with selected projects and management actions (see GSP Section 6) very early after GSP submittal to ensure that groundwater levels recover when normal or above normal rainfall conditions return. No interim milestones are proposed for degraded groundwater quality, land subsidence, or depletion of interconnected surface water, because no significant or unreasonable effects have been observed in the EMA associated with these sustainability indicators.

ES-5 Management Actions and Projects (GSP Section 6)

Section 6 of the GSP describes the management actions that will be developed and implemented in the EMA to attain and maintain sustainability in accordance with SGMA regulations. Management actions are activities that support groundwater sustainability through policy and regulations without infrastructure. These actions are intended to optimize groundwater use to avoid undesirable results, consistent with SGMA regulations. Many are also intended to help improve the understanding of the EMA, enhance the monitoring program, enhance improved water use practices, and improve information upon which the GSA may make decisions. Projects are defined as activities supporting groundwater sustainability that require infrastructure.

The potential management actions described in this section include the following:

- Address data gaps
- Groundwater pumping fee program
- Well registration and well meter installation programs
- Water use efficiency programs
- Groundwater Base Pumping Allocation program
- Groundwater Extraction Credit marketing and trading program
- Voluntary agricultural crop fallowing and crop conversion programs

The identified management actions and potential future projects are categorized into three groups, with the management actions in Group 1 to be initiated within 1 year of GSP adoption by the GSA. The Group 2 management actions and Group 3 projects may be considered for implementation in the future as conditions dictate and the effectiveness of the other management actions are assessed. Group 1 management actions are focused primarily on filling identified data gaps, developing funding for GSA operations and future EMA monitoring, registering and metering wells, and developing new and expanding existing water use efficiency programs for implementation within the EMA. The Group 2 management actions and Group 3 projects may not be necessary if the implementation of Group 1 management actions results in conditions in the EMA that are trending toward meeting the EMA GSA sustainability goals and measurable objectives.

The projects and management actions included in this section should be considered a list of options that will be refined during GSP implementation. Stakeholders will be provided an opportunity to participate in the public process before projects and actions are undertaken. The effect of the management actions will be reviewed periodically, and additional Group 2 management actions and Group 3 projects may be considered and implemented as necessary to avoid undesirable results. A graphical depiction of the implementation sequence is presented in Figure ES-5.

Management actions included in the GSP are summarized below and are described in more detail in Sections 6.3 through 6.10.

ES-5.1 Group 1 Management Action 1 – Address Data Gaps

Data gaps have been identified that require additional information because they are important for management of the EMA in the future. The following management actions will help fill these data gaps:

- Expanding Monitoring Well Network in the EMA to Increase Spatial Coverage and Well Density
- Performing Video Surveys in Representative Wells That Do Not Have Adequate Well Construction Records
- Installing Shallow Piezometers in Alamo Pintado Creek and Zanja de Cota Creek Identified GDE Areas
- Reviewing/Updating Water Usage Factors and Crop Acreages and Update Water Budget
- Surveying and Investigating Additional Potential GDEs in the EMA

ES-5.1.1 Expand Monitoring Well Network in the EMA to Increase Spatial Coverage and Well Density

The areas where additional monitoring well data is needed are depicted in Figure 4-2. The data gap areas in both the Paso Robles Formation and the Careaga Sand units (the northwestern and north central portions of the uplands from Los Olivos to the northern boundary of the EMA, including the northern reaches of Zaca Creek and Alamo Pintado Creek) are locations where additional monitoring wells would improve the understanding of basin conditions. The proposed strategy for adding monitoring wells to the monitoring network will be to first incorporate existing wells to the extent possible. If an existing well in a particular area cannot be identified or permission to use data from an existing well cannot be secured to fill a data gap, then a new monitoring well may be considered.

ES-5.1.2 Perform Video Surveys in Representative Wells That Currently Do Not Have Adequate Construction Records to Confirm Well Construction

Several of the representative wells that are planned to be included in the GSP monitoring well network do not have adequate documentation about their depths, geologic formations intersected, casing characteristics, screened intervals, pump settings, and/or well construction details. To address this data gap, the EMA GSA will perform video logging to ascertain well construction details, and the location of well production zones. Concurrent with the video surveys, EMA GSA representatives will interview each well owner regarding the well maintenance history, operational issues or events, surface issues that may affect the well, and water quality within the well.

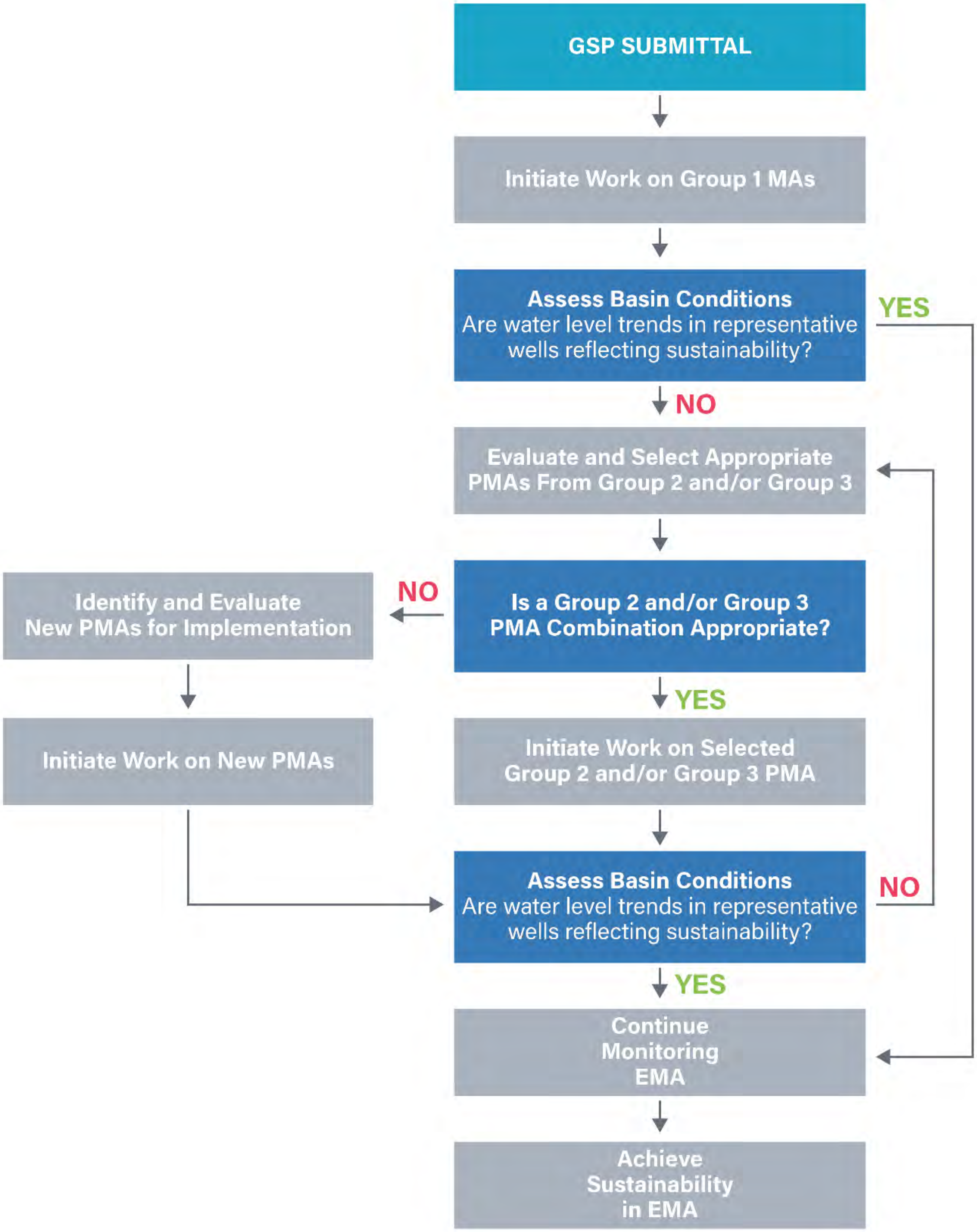


Figure ES-5. Adaptive Implementation Strategy for Projects and Management Actions

ES-5.1.3 Install Shallow Piezometers in Alamo Pintado Creek and Zanja de Cota Creek Identified GDE Areas

To avoid undesirable results to GDEs and interconnected surface water discharging to the Santa Ynez River from the tributaries, construction of two shallow piezometers, are proposed within the GDE areas identified near the confluence of Alamo Pintado and Zanja de Cota Creeks with the Santa Ynez River (see Figure 4-4). The two proposed shallow piezometers will provide valuable data that will allow an enhanced understanding of the interconnected surface water system in high priority GDE areas and provide the basis for future refinements in the EMA hydrogeologic conceptual model.

ES-5.1.4 Review/Update Water Usage Factors and Crop Acreages and Update Water Budget

While the accuracy of the DWR and SYRWCD data for irrigated crops for the recent years is relatively high, uncertainty remains regarding the estimates of water use on the irrigated lands within the EMA. To address this uncertainty, the EMA GSA plans to review and update water usage factors and crop acreages, which will be incorporated into future refinements in the EMA water budget.

ES-5.1.5 Survey and Investigate Potential GDEs in the EMA

No biological or habitat surveys have been completed to verify the existence of potential GDEs in preparation of this GSP. A preliminary evaluation indicates there is insufficient data available to confirm the existence of the full nature and extent of Category A (high-priority) potential GDEs. To address this uncertainty, the recommended next step is to conduct field surveys to document and characterize the Category A potential GDEs. The findings from the proposed field surveys could be incorporated into future refinements in the EMA hydrogeologic conceptual model and SMCs.

ES-5.2 Group 1 Management Action 2 – Groundwater Pumping Fee Program

As part of the GSP implementation process, the EMA GSA will explore various financing options to cover its operational costs and to generate funding for the ongoing EMA monitoring program and the implementation of Group 1 management actions and potential future Group 2 management actions and Group 3 projects. Based on the results of these efforts, the EMA GSA may adopt a management action to levy groundwater pumping fees to generate funding for the EMA GSA. The initial financing evaluation will be focused on program design, policy and regulatory development, compliance with the California Environmental Quality Act, and stakeholder outreach. The EMA GSA will identify and evaluate the most effective and equitable fee structure for the EMA.

ES-5.3 Group 1 Management Action 3 – Well Registration and Well Meter Installation Programs

Well registration is intended to establish an accurate count of all the active wells in the EMA. Well metering is intended to improve estimates of the amount of groundwater extracted from the EMA. The EMA GSA will require that all groundwater production wells, including wells used by de minimis pumpers, be registered with the EMA GSA. The GSA may also develop and implement reporting protocols applicable to de minimis pumpers to ensure their production is reflected in the total amount of pumping in the EMA and to address circumstances where de minimis pumpers are or may be exceeding the de minimum thresholds. The EMA GSA will require all non-de minimis groundwater pumpers to report extractions at an interval to be determined by the EMA GSA using an approved method to estimate production. Guidelines and a regulatory framework will be developed to implement this program, which may also include a system for reporting and accounting for water conservation initiatives, voluntary irrigated land fallowing (temporary and permanent), stormwater capture projects, or other activities that individual pumpers may elect to implement.

ES-5.4 Group 1 Management Action 4 – Water Use Efficiency Programs

Urban, rural, and agricultural water use efficiency has been practiced in the EMA for more than two decades and has been effective in significantly reducing water use within the region outside of the EMA. Existing programs promote responsible design of landscapes and appropriate choices of appliances, irrigation equipment, and other water-using devices to enhance the efficient use of water. The water use efficiency management actions—to be developed for implementation by municipal, agricultural, and rural domestic pumpers—will promote expansion and supplementation of the water use efficiency programs that currently exist. These programs will also be aligned with the requirements of water conservation mandates that been put in place by the State of California. Two types of water use efficiency programs are proposed:

- **Urban and Domestic Water Use Efficiency Programs:** Initiatives that promote increasing water use efficiency by achieving reductions in the amount of water used for municipal, commercial, industrial, landscape irrigation, rural domestic, and aesthetic purposes. These programs can include incentives, public education, technical support, and other efficiency-enhancing programs.
- **Agricultural Water Use Efficiency Programs:** Initiatives that promote increasing water use and irrigation efficiency and achieving reductions in the amount of water used for agricultural irrigation. These programs can include incentives, public education, technical support, training, implementation of BMPs, and other efficiency-enhancing programs.

ES-5.5 Group 2 Management Action 5 – Groundwater Base Pumping Allocation

If Group 1 management actions do not avoid chronic groundwater level declines and reduction of groundwater in storage over the next 20-year period and beyond, the EMA GSA may seek to develop and implement a regulatory program to allocate a volume of groundwater to be pumped by users annually from the EMA. This program is referred to herein as the base pumping allocation (BPA) program. The amount of pumping reduction (if needed in the future) is uncertain and will depend on several factors including climate conditions, the effectiveness and timeliness of voluntary actions by pumpers, and the success of other planned and potential projects and management actions. The groundwater BPA Program would require various analyses and steps, including but not limited to:

- Establishing a methodology for determining baseline pumping considering:
  - Sustainable yield of the EMA
  - Groundwater level trends
  - Historical groundwater production
  - Land uses and corresponding water use requirements
  - Compliance with the California Environmental Quality Act
- Establishing a methodology to consider, among other factors determine groundwater, water rights and evaluation of anticipated benefits from other relevant actions individual pumpers take
- An implementation timeline
- Approving a formal regulation to enact the program

A baseline pumping allocation schedule could be implemented and adjusted over time, as needed, and according to relevant factors, to meet groundwater extraction targets in the EMA (consistent with the sustainable yield). Analyses would be updated periodically as new data are developed.

ES-5.6 Group 2 Management Action 6 – Groundwater Extraction Credit (GEC) Marketing and Trading Program

As previously described, the EMA GSA may, as needed, develop and implement a Groundwater BPA Program that would assign pumping allocations in the EMA annually and, if necessary, impose a schedule on the pumping allocations over time to bring total pumping in the EMA within its sustainable yield within 20 years of GSP adoption. In conjunction with a Groundwater BPA Program, the EMA GSA may also pursue the development and implementation of a Groundwater Extraction Credit (GEC) Marketing and Trading Program to provide increased flexibility to groundwater producers in using their pumping allocations. The program could enable voluntary transfers of allocations between parties, on a temporary or permanent basis, through an exchange of GECs. Among other potential benefits, a GEC Marketing and Trading Program could assist existing groundwater users or new groundwater users in acquiring needed groundwater supplies from other pumpers, in the form of GECs, to support economic activities in the EMA, encourage and incentivize water conservation, enable temporary and permanent fallowing of agricultural lands, and facilitate a control of pumping allocations as needed during the 20-year GSP implementation period. As part of a GEC Marketing and Trading Program, the EMA GSA may consider a policy to define groundwater extraction carryover provisions from year to year and/or to allow multi-year pumping averages.

ES-5.7 Group 2 Management Action 7 – Voluntary Agricultural Crop Fallowing and Crop Conversion Programs

The EMA GSA has identified voluntary agricultural crop fallowing and crop conversion as a potential management action that may be considered if Group 1 management actions are not proving effective in achieving sustainability in the EMA within 20 years of GSP adoption. As deemed necessary during the GSP implementation period, the EMA GSA may develop programs that would permit voluntary fallowing and land use conversions on a temporary or permanent basis as a means of reducing total water production in the EMA. As with the Groundwater BPA and GEC Marketing and Trading Programs discussed above, an important consideration in developing a voluntary fallowing and crop conversion program would be to include protections of water rights for producers who choose to fallow or carry out their land use conversions. As part of this management action, the EMA GSA would develop an EMA-wide accounting system that tracks landowners who decide to voluntarily fallow or convert their land and reduce groundwater pumping or otherwise refrain from using groundwater.

ES-5.8 Group 3 Projects

Although the EMA GSA has no near-term plans to initiate construction of any specific projects for the purposes of achieving groundwater sustainability, the EMA GSA and/or other local agencies may be interested in proceeding with the study, planning, preliminary design/engineering, and permitting phases for several projects that were identified for potential future consideration. A description of the projects that the EMA GSA identified for future consideration and associated summary information are presented in Sections 6.10.1 through 6.10.10.

The projects that the EMA GSA identified for future consideration include:

- Distributed Storm Water Managed Aquifer Recharge (DSW-MAR) Basins (In-Channel and Off-Stream Basins)
- City of Solvang / Santa Ynez Community Services District WWTF Recycled Water and Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse
- Los Olivos Community Services District WWTF Recycled Water and Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse

- Santa Ynez Band of Chumash Indians WWTF Recycled Water and Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse
- GSA to become a Funding Partner to the Santa Barbara County Precipitation Enhancement Program
- Conjunctive Use – Managed Aquifer Recharge (MAR) Projects Using Imported (State Water Project [SWP] and Santa Ynez River [SYR]) Water
- In Lieu Recharge Projects to Deliver Unused and Surplus Imported Water to Offset Groundwater Extractions
- Aquifer Storage and Recovery Projects

ES-6 Groundwater Sustainability Plan Implementation (GSP Section 7)

Section 7 provides a conceptual road map for efforts to implement the GSP after adoption and discusses implementation effects in accordance with SGMA regulations. This implementation plan is based on the current understanding of the EMA's conditions and anticipated administrative considerations that affect the management actions described in Section 6. Projects and management actions will address data gaps and reduce uncertainty, improve understanding of basin conditions and how they may change over time, and create opportunities to promote conservation and optimize water use in the EMA.

The EMA GSA plans to continually monitor and assess groundwater levels relative to SMCs, and under conditions where minimum thresholds are projected to be reached, the EMA GSA will perform assessments to determine whether the trends are related to groundwater pumping, drought conditions, or other factors. If groundwater level data are trending toward reaching minimum thresholds as a direct consequence of groundwater pumping in the EMA, then the EMA GSA may consider the implementation of Group 2 management actions and Group 3 projects. Conceptual planning-level cost estimates for implementing each management action are presented in Table 7-1, and potential funding sources are described in Section 7.7.

SECTION 1: Introduction to Plan Contents

§ 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.

This section describes the purpose of this Groundwater Sustainability Plan (GSP), the Santa Ynez River Valley Groundwater Basin (Basin) – Eastern Management Area (EMA), and how this GSP is organized.

1.1 Purpose of the Groundwater Sustainability Plan

In 2014, the State of California enacted the Sustainable Groundwater Management Act (SGMA). This law requires groundwater basins in California that are designated as medium or high priority be managed sustainably. Satisfying the requirements of SGMA generally requires four basic activities:

1. Forming one or multiple Groundwater Sustainability Agency(s) (GSAs) to fully cover a basin
2. Developing one or multiple GSPs that fully cover the basin
3. Implementing the GSP and managing to achieve quantifiable objectives
4. Regular reporting to the California Department of Water Resources (DWR)

This document fulfills the GSP requirement for the EMA GSA. This GSP describes the EMA, develops quantifiable management objectives that account for the interests of the EMA's beneficial groundwater uses and users, and identifies a group of projects and management actions that will allow the EMA to achieve sustainability within 20 years of plan adoption.

This GSP was developed specifically to comply with SGMA's statutory and regulatory requirements. As such, the GSP uses the terminology set forth in these requirements (see California Water Code § 10721 and 23 California Code of Regulations § 351), which may be different from the terminology used in other contexts (e.g., past reports or studies, past analyses, judicial rules, or findings).

1.2 Description of the Santa Ynez River Valley Groundwater Basin – Eastern Management Area

The Basin is identified by DWR in Bulletin 118 as Basin No. 3-015 (DWR, 2016). The Basin is located in central Santa Barbara County in the Central Coastal region of California. For the purposes of groundwater management and SGMA compliance, the Notice of Decision to Become a GSA, dated May 1, 2017, describes the organization of SGMA compliance for the Basin with the creation of three management areas: the Western Management Area, the Central Management Area, and the EMA (see Appendix A).

The EMA is within the Basin, as presented on Figure 1-1. The total area of the EMA is about 130 square miles. The land surface elevation ranges from 480 feet at the mouth of Alamo Pintado Creek south of Solvang to about 2,390 feet in the foothills of the San Rafael Mountains on the northeast side of the EMA. The San Rafael Range continues beyond the boundaries of the EMA, reaching elevations of 4,000 to 6,000 feet above mean sea level (LaFreniere and French, 1968). The EMA boundary delineates the northeast portion of the groundwater basin; however, the watershed includes a larger area that contributes surface water to the EMA.

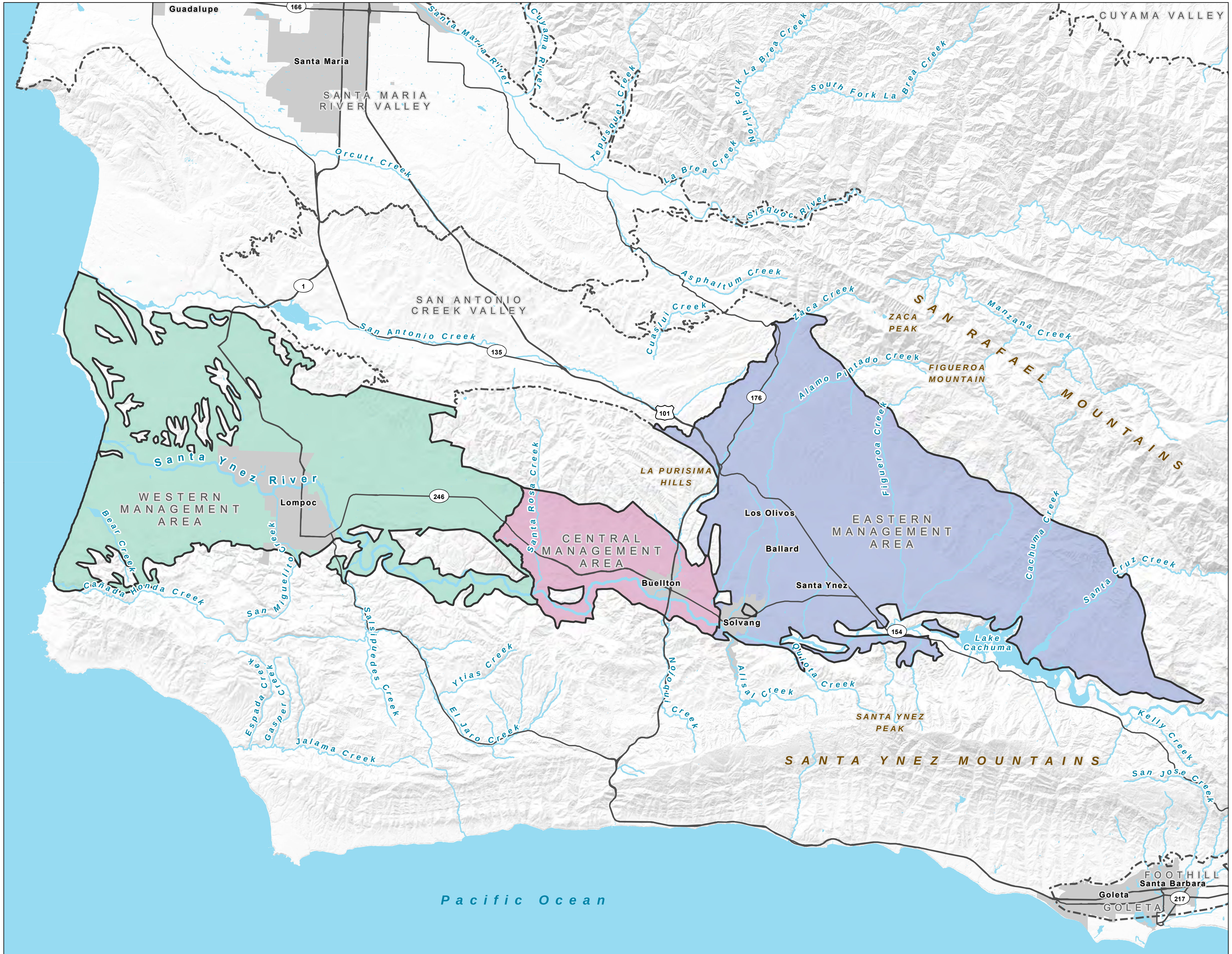


FIGURE 1-1

Santa Ynez River Valley Groundwater Basin

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

Bulletin 118 Santa Ynez River Valley Groundwater Basin

Santa Ynez River Valley Subbasins

- Central Management Area
- Eastern Management Area
- Western Management Area

All Other Features

- Other Bulletin 118 Groundwater Basin Boundary
- City Boundary
- Major Road
- Watercourse
- Waterbody

N

0 10,000 20,000 30,000
Feet

GSI Water Solutions, Inc.

Date: July 27, 2021
Data Sources: ESRI, USGS

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section1\Figure1_1_EMA_Adjacent_Mngt_Areas_Basins.mxd, abarry

1.3 How this GSP is Organized

This GSP has been planned and developed collaboratively by the member agencies making up the EMA GSA. The organization of this plan is as follows:

- **Section 1 – Introduction to Plan Contents**: An introduction to the GSP, including a description of its purpose and a brief description of the EMA.
- **Section 2 – Administrative Information:** Includes the following:
  - Information on the EMA GSA as an organization and a brief description of the agencies participating in the GSA, including information on the legal authority of the GSA to plan and coordinate groundwater sustainability for the EMA.
  - An overview description of the EMA, including land use and agencies with jurisdiction, a description of the existing groundwater management plans and regulatory programs, any programs for conjunctive use, and urban land use programs that might have an effect on, or be affected by, this GSP.
  - The EMA GSA's communication and engagement planning and implementation, public feedback and stakeholder comments on the plan, how feedback was incorporated into the GSP, and responses to comments received
- **Section 3 – Basin Setting:** Includes the following:
  - An explanation of the hydrogeologic conceptual model developed for the EMA that includes descriptions of the regional hydrology and geology, principal aquifers and aquitards, and a description of the data gaps in the current model.
  - A detailed description of the groundwater conditions, including groundwater elevations and changes in storage, groundwater quality for drinking water and agricultural irrigation and trends over time, an evaluation of land subsidence, locations where surface water and groundwater are interconnected, and the identification and distribution of groundwater-dependent ecosystems.
  - A presentation of the historical, current, and projected future water budgets for the EMA; how the water budgets were developed; an estimate of sustainable yield for the EMA; and the effects of climate change using the California Department of Water Resources (DWR) climate change assumptions.
- **Section 4 – Monitoring Networks:** A detailed description of the monitoring objectives and monitoring in the EMA for groundwater levels, storage, water quality, land subsidence, interconnected surface water, representative monitoring sites, and a description of the data management and reporting system.
- **Section 5 – Sustainable Management Criteria:** Defines the sustainability goal for the EMA; describes the process through which the SMCs were established; describes significant and unreasonable effects that could lead to undesirable results as a result of groundwater conditions occurring throughout the EMA describes and defines SMCs regarding chronic lowering of groundwater levels, significant and unreasonable reduction in groundwater storage, degraded groundwater quality, land subsidence, and depletion of interconnected surface water (including quantity and timing of surface water depletion); and describes the minimum thresholds, measurable objectives, and interim milestones to avoid undesirable results.
- **Section 6 – Projects and Management Actions:** Provides a grouping and description of each project and management action that may be developed and implemented by the EMA GSA to avoid undesirable results and ensure sustainability within 20 years of GSP adoption.

- **Section 7 – Groundwater Sustainability Plan Implementation:** Describes the implementation sequence for projects and management actions, overall schedule, estimated implementation costs, and sources of funding.

1.4 References

DWR. 2018. Bulletin 118 Basin Boundary Description 3-015, Santa Ynez River Valley. Prepared by the California Department of Water Resources (DWR). Available at https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/2016-Basin-Boundary-Descriptions/3_015_SantaYnezRiverValley.pdf. (Accessed July 26, 2021.)

LaFreniere, G.F., and J.J. French. 1968. Ground-Water Resources of the Santa Ynez Upland Ground-Water Basin, Santa Barbara County, California. Prepared by G.F. LaFreniere and J.J. French in cooperation with the Santa Barbara County Water Agency for the U. S. Geological Survey.

SECTION 2: 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.

2.1 Agency Information [§ 354.6]

On May 23, 2016, eight agencies, including the Santa Ynez River Water Conservation District (SYRWCD); Santa Barbara County Water Agency (Water Agency); the City of Solvang; and the SYRWCD, Improvement District No. 1 (ID No. 1); along with the Cities of Buellton and Lompoc and the Vandenberg Village and Mission Hills Community Services Districts, entered into a memorandum of understanding (2016 MOU).[1] The 2016 MOU outlined a structure for implementing Sustainable Groundwater Management Act (SGMA) in the Santa Ynez River Valley Groundwater Basin (Basin); the formation of three Groundwater Sustainability Agencies (GSAs) for the Western Management Area (WMA), Central Management Area (CMA), and Eastern Management Area (EMA); and the development of a separate Groundwater Sustainability Plan (GSP) for each GSA.

On April 27, 2017, the SYRWCD, the Water Agency, the City of Solvang, and ID No. 1 entered into a memorandum of agreement (2017 MOA)[2] providing for the formation of the EMA GSA, the development of this GSP, the implementation of a hydrogeologic study, and the establishment of a GSA Committee for the EMA. The 2017 MOA also outlines the powers of the GSA and establishes how each signing party bears the costs of the outlined efforts. The 2017 MOA is described in further detail in Section 2.1.2.3 and is presented in Appendix A.

On February 26, 2020, the eight parties to the 2016 MOU entered into an Intra-Basin Administrative Agreement (Administrative Agreement)[3] to coordinate implementation of the SGMA among the three GSAs in the Basin (see Appendix A). This agreement provides a framework for ongoing cooperation to ensure that the three GSPs are developed and implemented using the same data and methodologies for key assumptions (e.g., groundwater elevation data, water budget, etc.) and that components of the three GSPs needed to achieve the sustainability goal for the Basin are based on a consistent understanding of the Basin setting. The agreement further outlines how the GSAs will coordinate distribution of California Department of Water Resources (DWR) grant funds, as well as cost sharing for joint services.

Additionally, a Coordination Agreement has been prepared and entered into between the GSAs in accordance with SGMA requirements. A copy of the Agreement is included with the GSP submitted to DWR.

[1] Memorandum of Understanding for Implementation of the Sustainable Groundwater Management Act in the Santa Ynez Valley Groundwater Basin (see Appendix A).
[2] Memorandum of Agreement for Formation of a Groundwater Sustainability Agency for the Eastern Management Area in the Santa Ynez River Valley Groundwater Basin Under the Sustainable Groundwater Management Act (see Appendix A).
[3] Intra-Basin Administrative Agreement for Implementation of the Sustainable Groundwater Management Act in the Santa Ynez River Valley Groundwater Basin (see Appendix A).

2.1.1 Name and Mailing Address

§ 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.

The following contact information is provided for the EMA GSA pursuant to California Water Code § 10723.8:

Santa Ynez River Valley Groundwater Basin Eastern Management Area GSA
Mailing Address: P.O. Box 719
Physical Address (no mail delivery): 3669 Sagunto Street, Suite 101 Santa Ynez, CA 93460

2.1.2 Organization and Management Structure

§ 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:

(b) The organization and management structure of the Agency, identifying persons with management authority for implementation of the Plan.

2.1.2.1 Agencies Participating in the GSA

The organization and management structures of each of the four member agencies in the EMA are described below.

Santa Ynez River Water Conservation District

The SYRWCD was formed in 1939 for the primary purpose of protecting water rights on the lower Santa Ynez River. The SYRWCD extends over approximately 180,000 acres in central Santa Barbara County (County). Water production within the SYRWCD is used for domestic, municipal, industrial, and agricultural purposes.

Under the Water Conservation District Law of 1931, the SYRWCD has collected a groundwater charge since 1979 to supplement ad valorem property taxes (on land only) to fund its operations. The groundwater charge is based on self-reported production from owners' wells in the SYRWCD. There are currently six groundwater charge zones in the SYRWCD. There is a differential charge for agricultural water, special irrigation water (such as parks, golf courses), and other (non-agricultural, non-special) water uses. Water code dictates that other water rates may be no less than three times the agricultural rates.

The principal enabling act for formation of SYRWCD is California Water Code § 74000 et seq. SYRWCD is governed by a five-member board of directors. Directors are elected by the registered voters in SYRWCD boundaries to staggered 4-year terms; there is no limit to how many terms a board member may serve. The board meets quarterly to discuss regular business, and as needed to discuss special agenda items. The board is the legislative body of the district that determines the policies by which SYRWCD operates. SYRWCD's staff include a general manager, a groundwater program manager, and a district administrator. Staff also fill the roles of board secretary and treasurer. The board is also supported and advised by its own legal counsel. SYRWCD is the point of contact with DWR for the EMA GSA, according to California Code of Regulations (CCR) Title 23, § 357.4.

Santa Barbara County Water Agency

The Water Agency was established by the state legislature in 1945 to control and conserve storm, flood, and other surface waters for beneficial use and to enter into contracts for water supply. The Water Agency was originally empowered under California Water Code § 30000 et seq. The Water Agency is part of the Santa Barbara County Public Works Department and is responsible for the following:

- Preparing investigations and reports on the County's water requirements, groundwater conditions, efficient use of water, and other water supply related technical studies.
- Managing County-wide programs, including the Integrated Regional Water Management (IRWM) Program, Regional Water Efficiency Program, and winter cloud seeding program.
- Providing technical assistance to other County departments, water districts, and the public concerning water availability.
- Administering certain provisions of the Cachuma Project and the Twitchell Dam Project contracts with the U.S. Bureau of Reclamation (USBR).
- Participating in GSAs.

City of Solvang

The City of Solvang was incorporated on May 1, 1985. Its City Council includes a mayor, mayor pro tempore, and three council members. The mayor and one council member each serve a 2-year term and all other council members serve 4-year terms. The City Council meets the second and fourth Mondays of each month. The City of Solvang Municipal Code[4] includes regulations on Water and Sewer, Zoning, Subdivisions, and Stormwater.

Santa Ynez River Water Conservation District, Improvement District No. 1

ID No. 1 was formed on July 7, 1959, under the Water Conservation Law of 1931, Division 21, § 74000 et seq. of the California Water Code as an Improvement District within the SYRWCD, for the purposes of furnishing water to its customers within its boundaries. ID No. 1's operations are governed by rules and regulations for water service for ID No. 1. The most recent version of the Rules and Regulations was adopted by the Board on March 20, 2018.

2.1.2.2 Memorandum of Agreement for GSP Development

The four member agencies participating in the EMA GSA entered into an MOA in April 2017. The 2017 MOA forms a GSA for the EMA and facilitates a cooperative and ongoing working relationship between the parties to develop a GSP for the EMA. The GSP developed under this MOA will be considered for adoption by the EMA GSA and the adopted GSP subsequently will be submitted to DWR for approval. The GSA may decide to enter into a new agreement to coordinate GSP implementation at that time. A copy of the 2017 MOA is included in Appendix A.

[4] The City of Solvang Municipal Code is available here: http://qcode.us/codes/solvang/. (Accessed March 22, 2021.)

The 2017 MOA establishes the EMA GSA Committee (Committee), consisting of one representative and one alternate from each of the four member agencies. The representative is an elected official while the alternate is either an elected official or staff, as appointed by the governing body of the member agency. The 2017 MOA outlines voting within the Committee and the Committee's powers and responsibilities. The Committee conducts activities related to GSP development and SGMA implementation, including but not limited to the following:

- Developing a SGMA-compliant GSP.
- Reviewing and participating in the selection of consultants related to GSA efforts.
- Developing annual budgets and additional funding needs.
- Developing a stakeholder engagement plan.
- Coordinating with the other two GSAs in the Basin.

The full list of activities the Committee is authorized to undertake is included in the 2017 MOA (see Appendix A).

2.1.2.3 Administrative Agreement and Coordination Agreement

As described in Section 2.1, eight parties in the Basin entered into the Administrative Agreement in 2020, which provides context for the three GSAs in the Basin to work together to prepare three GSPs for the Basin (see Appendix A). The Administrative Agreement describes the division of DWR grant funding for GSP development among the three GSAs and cost sharing, when appropriate, for basin-wide activities. Importantly, the Administrative Agreement also requires the three GSAs to prepare a Coordination Agreement in accordance with SGMA and the SGMA regulations to ensure that the three GSPs are developed and implemented using the same data and methodologies for key assumptions (e.g., groundwater elevation and extraction data, surface water supply, total water use, change in groundwater storage, water budget, and sustainable yield). A Coordination Agreement has been prepared and entered into among the three GSAs and has been submitted with the three GSPs for the Basin to DWR.

2.1.3 Plan Manager and Contact Information

§ 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:

(c) The name and contact information, including the phone number, mailing address and electronic mail address, of the plan manager.

The address and telephone number for the EMA GSP plan manager is listed below:

Bill Buelow, GSA Coordinator
Santa Ynez River Valley Groundwater Basin
Eastern Management Area GSA
P.O. Box 719
3669 Sagunto Street, Suite 101
Santa Ynez, CA 93460
Phone: 805-693-1156
e-mail: bbuelow@syrwcd.com

2.1.4 Legal Authority

§ 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:

(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.

As part of its creation, the 2017 MOA for the GSA Committee granted it authority to have all powers that a GSA is authorized to exercise as provided by SGMA, including, but not limited to, developing a GSP and imposing fees to fund GSA and GSP activities.

In accordance with California Water Code § 10720.5 (b) "Nothing in this part, or in any groundwater management plan adopted pursuant to this, part determines or alters surface water rights or groundwater rights under common law or any provision of law that determines or grants surface water rights." Accordingly, this GSP does not determine or alter such surface water or groundwater rights.

Figure 2-1 shows the extent of the GSP plan area for the EMA, which is the Santa Ynez Uplands Area, along with the jurisdictional boundary of each of the four member agencies of the EMA GSA. The entire plan area is covered by the four agencies; no portion of the EMA is covered by an exclusive agency.[5] No authority is needed from any other GSA or agency to implement this GSP.

2.1.5 Cost and Funding of Plan Implementation

§ 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.

Costs and options for funding the EMA GSP are presented in Section 7.

[5] The Santa Ynez Band of Chumash Indians has sovereignty over the Santa Ynez Reservation but is not a member agency of the GSA implementing this GSP.

2.2 Description of Plan Area [§ 354.8]

This GSP covers the entire EMA, which lies in the eastern portion of the Basin, in north Santa Barbara County. As presented on Figure 2-1, the EMA portion of the Basin is bounded on the north and east by the San Rafael Mountains and on the northwest by the adjacent San Antonio Creek Valley Groundwater Basin. The southern boundary of the EMA to the south is adjacent to the Santa Ynez Mountains. The southwest portion of the EMA is adjacent to the CMA and beyond to the rest of the Basin (DWR, 2018). Average precipitation within the EMA varies from a maximum of about 24 inches per year in the higher elevations to a minimum of about 15 inches per year in the southern and central areas (Santa Barbara County, 2012).

The EMA includes the City of Solvang; the unincorporated townships of Santa Ynez, Los Olivos, and Ballard; properties of the Santa Ynez Band of Mission Indians; and remaining unincorporated areas extending throughout the EMA (see Figure 2-2). The unincorporated areas consist of ranchettes (occupying parcels that are 5 to 20 acres in size) and larger agricultural parcels. The City of Solvang and ID No.1 provide retail water service to their respective service areas. Additionally, water is produced from private wells for domestic and agricultural uses both inside and outside of the retail water service areas. The SYRWCD covers approximately 33 percent of the EMA area in two non-contiguous areas, one in the southwestern portion of the EMA and the other around Cachuma Reservoir (Lake Cachuma). The City of Solvang and ID No. 1 are entirely within the SYRWCD boundary. The remainder of the EMA outside of the SYRWCD, the City of Solvang, and ID No.1 boundaries is under the jurisdiction of the Water Agency, as described by SGMA. Estimates of pumping within the EMA vary widely over time and are largely unknown outside of the SYRWCD boundary. Estimates of pumping in these areas have been made using crop type, acreage, and crop water use factors. Changes in pumping volumes are attributed to changes in agricultural practices and residential development.

The Santa Ynez River drains the entire Santa Ynez watershed as it flows through its southern end. From its origins in the Los Padres National Forest to the east near Divide Peak and the Ventura County border, the river enters three man-made reservoirs, including Jameson Lake, Gibraltar Reservoir, and Lake Cachuma. Two tributaries from the Santa Ynez Uplands Area, Santa Cruz Creek and Cachuma Creek, feed Lake Cachuma, the largest of the three reservoirs. The Bradbury Dam impounds Lake Cachuma; downstream, the Santa Ynez River flows west through the EMA. Within the EMA, the Santa Ynez River is joined by several tributaries, including Santa Agueda Creek, Zanja de Cota Creek, and Alamo Pintado Creek. Highway 154 is the most significant east-west highway in the EMA; Highway 246 also runs east-west across western third of the EMA.

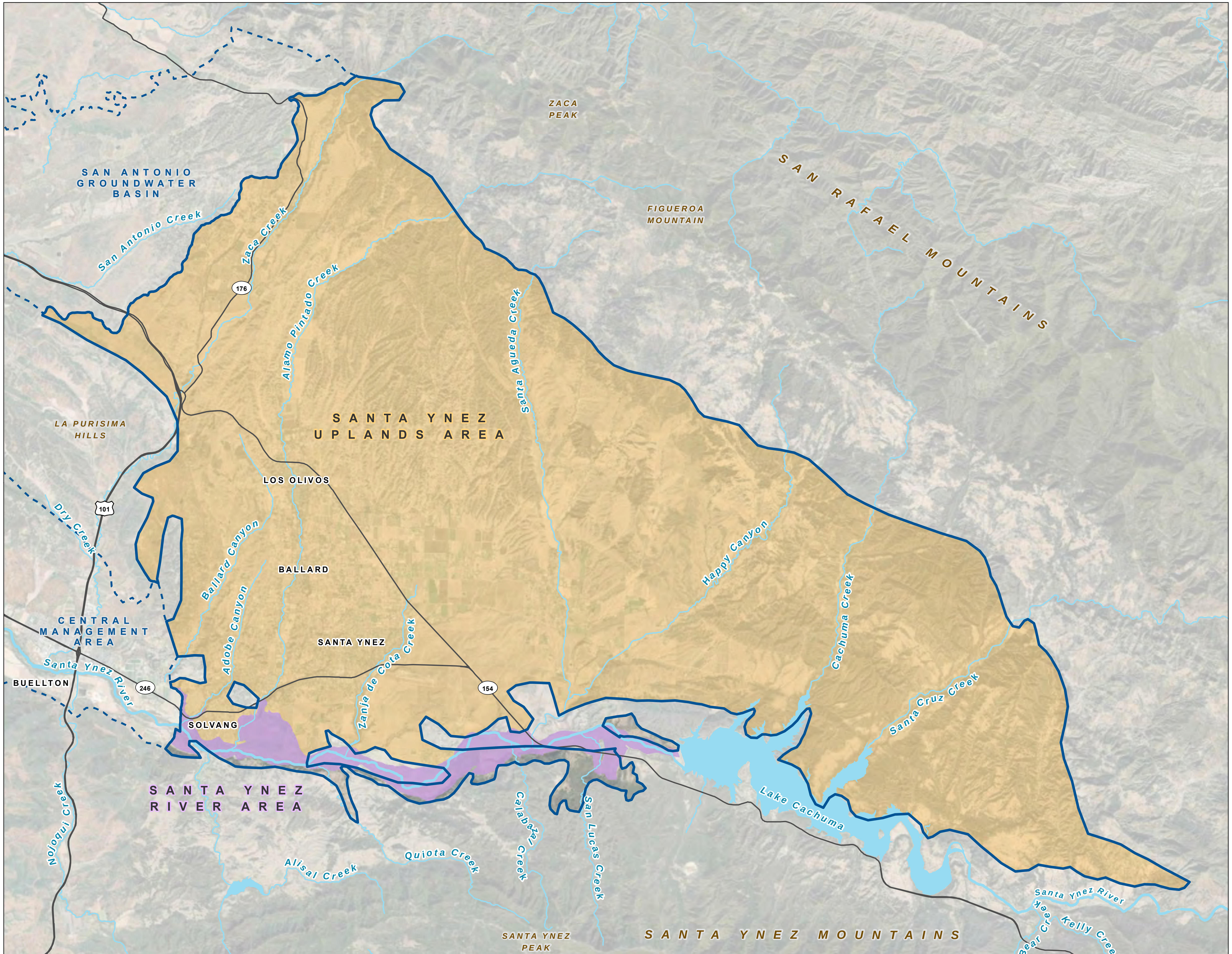


FIGURE 2-1

Area Covered by GSP

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

- Santa Ynez Uplands Area (area covered by GSP)
- Santa Ynez River

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

NOTE

GSP: Groundwater Sustainability Plan

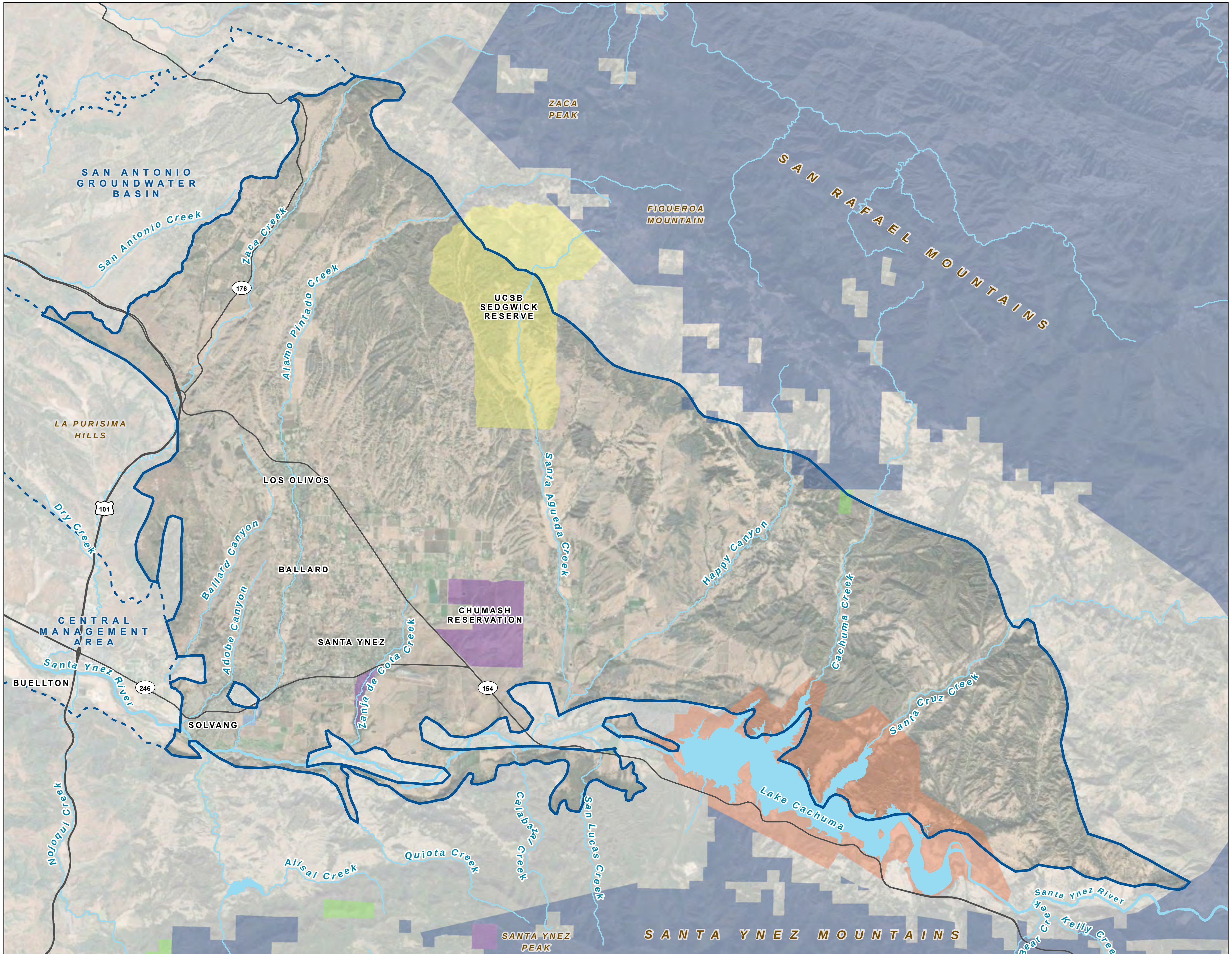
Date: June 3, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

FIGURE 2-2

Federal, State, and Tribal Jurisdictional Areas

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan



LEGEND

Land Ownership

- Bureau of Indian Affairs
- Bureau of Land Management
- Bureau of Reclamation
- CA Dept. of Parks and Recreation
- UCSB Sedgwick Reserve
- USDA Forest Service

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

NOTES

UCSB: University of California Santa Barbara
USDA: U.S. Department of Agriculture

N

0 5,000 10,000 15,000
Feet

Date: July 27, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section2\Figure2_2_Fed_State_Tribal_Jurisdictions.mxd, abarry

2.2.1 Summary of Jurisdictional Areas and Other Features

2.2.1.1 Adjudicated Areas, Other GSA, And Alternative Plans

§ 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.

(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 the best available information.

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

As of the date that this GSP was completed and submitted to DWR for evaluation, no part of the Basin nor any surrounding basin has been identified in SGMA (California Water Code § 10720.8) as an adjudicated area and no part of the Basin nor any surrounding basin has been the subject of a comprehensive adjudication as described in Code of Civil Procedure § 830 et seq. Two other GSAs exist within the Basin (i.e., WMA and CMA). No alternative plans have been submitted for any part of the Basin nor for any surrounding basin. Consequently, no map is included in the GSP for adjudicated areas or alternative plans.

2.2.1.2 Other Jurisdictional Areas

In addition to the four member agencies of the EMA GSA, there are several federal, state, tribal, and local agencies that have some degree of water management authority in the EMA. Each agency or organization is discussed below. A map of the jurisdictional extent of the federal, state, and tribal agencies within the EMA is shown on Figure 2-2. A map showing the jurisdictional extent of city and local jurisdictions within the EMA is shown on Figure 2-3.

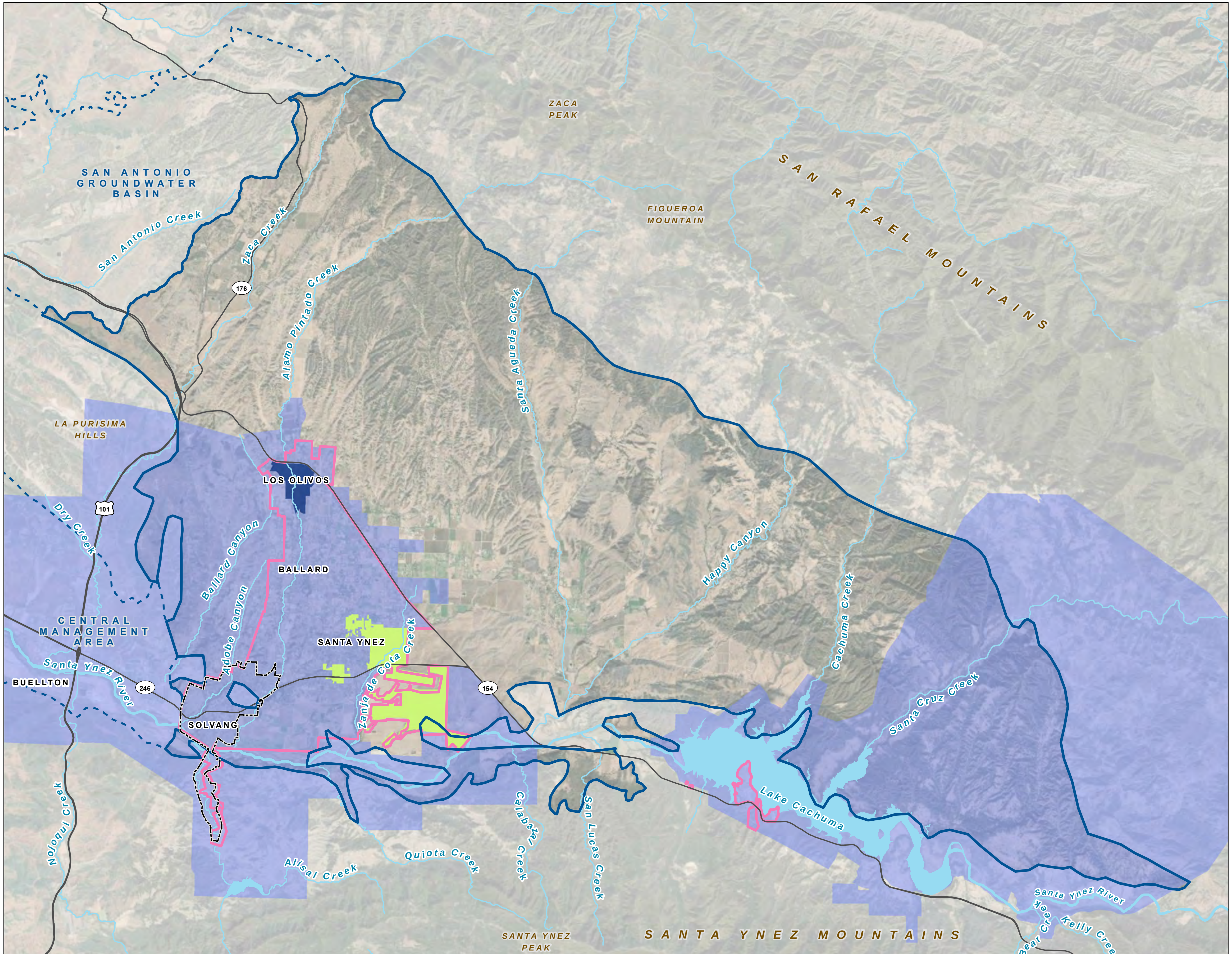


FIGURE 2-3

City and Local Jurisdictional Areas

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

- Santa Ynez Community Services District
- Los Olivos Community Services District
- City of Solvang
- Santa Ynez River Water Conservation District (SYRWCD)
- SYRWCD Improvement District No. 1

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

Date: June 3, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section2\Figure2_3_City_and_Local_Jurisdictions.mxd, abarry

2.2.1.3 Federal Agencies

Federal agencies with land holdings in the EMA include the National Forest Service, the Bureau of Land Management, and the USBR. A portion of the Los Padres National Forest covers a small area near the northern boundary of the EMA. The Bureau of Land Management manages one small parcel near Happy Canyon Road that partially overlies the EMA. The USBR manages the area in and around Lake Cachuma.

2.2.1.4 Tribal Land

The one Native American tribe in Santa Barbara County is the Santa Ynez Band of Chumash Indians. The Tribe has three recognized tribal land areas in the EMA. The Santa Ynez Reservation of the Santa Ynez Band of Chumash Indians' boundaries are within the boundary of the EMA, and the Tribal Chairman indicated early in the SGMA process that the Tribe looks forward to collaborating with the GSA.[6] Currently, the Chumash tribal government is participating in the SGMA process for the EMA GSA through its representative on the Citizens Advisory Group (CAG).

2.2.1.5 State Agencies

The Santa Ynez Mission State Park is the only state-owned parcel within the EMA, as shown on Figure 2-2. The State Water Resources Control Board has jurisdiction over the Santa Ynez River and the associated river underflow.

2.2.1.6 County Agencies

The County of Santa Barbara is responsible for comprehensive long-term planning in the county through a County of Santa Barbara Comprehensive Plan.[7] Details on the Comprehensive Plan are available in Section 2.2.3. In addition, the Water Agency overlies the EMA and is a local agency as defined in California Water Code § 10721(n). The Water Agency represents the areas outside of the SYRWCD, City of Solvang, and ID No. 1 jurisdictional areas within the EMA (see Figure 2-1).

2.2.1.7 City and Local Agencies

The City of Solvang (City) lies on the west side of the EMA. The City has water management authority over its incorporated area and manages a number of parks and recreational sites. The City water and sewer regulations include a conservation program that sets forth conservation benchmarks and penalties. The City operates a wastewater treatment plant (WWTP) that can treat up to 1.5 million gallons per day. The WWTP receives and treats wastewater from the City as well as the Santa Ynez Community Services District (SYCSD). The City's stormwater code outlines the provisions for protecting water quality.

In addition to collecting and treating wastewater from the City, the SYCSD serves the eastern portion of the town of Santa Ynez and maintains the Chumash wastewater treatment and collection system. The SYCSD is responsible for sewer collections and streetlights. The SYCSD also does contract operations for wastewater collection and treatment.

The Los Olivos Community Service District was formed in 2018 for the purpose of developing the facilities necessary to collect, treat, and dispose of sewage, wastewater, recycled water, and stormwater in the unincorporated community of Los Olivos.

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[6] See Appendix E of the *Communication and Engagement Plan for Santa Ynez EMA GSP Development* (Appendix B of this GSP).

[7] Available at https://www.countyofsb.org/plndev/policy/comprehensiveplan/comprehensiveplan.sbc. (Accessed March 24, 2021.)

SYRWCD was established as a special district by the Santa Barbara County Board of Supervisors in 1939. Its mission is to protect water rights and conserve and augment water supplies within the district. Its six groundwater charge zones are presented in Figure 2-4.

ID No. 1 was formed on July 7, 1959, under the Water Conservation Law of 1931, Division 21, § 74000 et seq. of the California Water Code as an Improvement District within the SYRWCD, for the purposes of furnishing water to its customers within its boundaries (see Figure 2-4). ID No. 1's operations are governed by rules and regulations for water service for ID No. 1. The most recent version of the Rules and Regulations was adopted by the Board on March 20, 2018.

2.2.1.8 Land Use

Land uses in the Santa Barbara County Comprehensive Plan are designated by the Santa Barbara County Board of Supervisors. Land uses throughout the County include the following:

- Agriculture
- Mineral Resource Industry
- Oil/Petroleum Resource Industry
- Mineral Resource Area
- Utility-Scale Solar Photovoltaic Facility
- Waste Disposal Facility
- Incorporated City
- Unincorporated Urban Area
- Vandenberg Space Force Base[8]
- Los Padres National Forest

According to land use data prepared by Land IQ, LLC, and provided to DWR, the primary land uses in the EMA are agriculture, urban areas, and undeveloped land. Current EMA land uses in the EMA are summarized by category in Table 2-1 and shown on Figure 2-5. They do not include the Vandenberg Space Force Base and Utility-Scale Solar Photovoltaic Facility noted above. The urban land use category is provided by DWR based on data compiled by Land IQ, LLC, from 2018 (DWR, 2021). The balance of the approximately 84,400 acres in the EMA is classified as native vegetation and could include dry farmed land. In 2019 the Santa Barbara County Board of Supervisors limited outdoor cannabis cultivation in the unincorporated areas of the County outside the Carpinteria Agricultural Overlay District to no more than 1,575 acres (Santa Barbara County Code § 50-7) and added a required special land use permit.

[8] Vandenberg Space Force Base was formerly called the Vandenberg Air Force Base until a renaming ceremony in May 2021 (Associated Press, 2021). The Base is not included in the EMA.

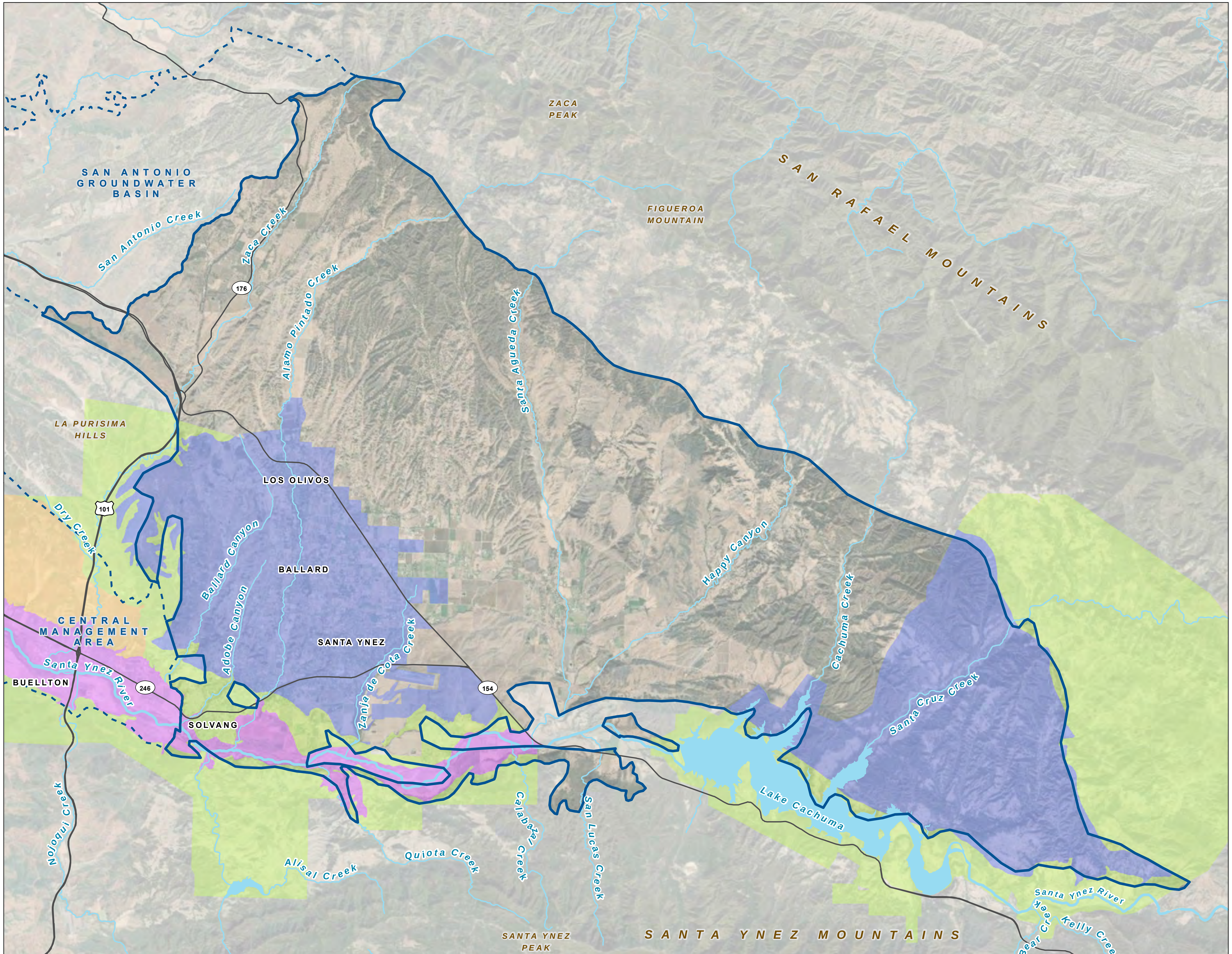


FIGURE 2-4

Santa Ynez River Water Conservation District Zones

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

Santa Ynez River Water Conservation District Zones

- Zone A – Santa Ynez River
- Zone C
- Zone D – Buellton Upland
- Zone E – Santa Ynez Upland

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

Date: June 3, 2021
Data Sources: ESRI, USGS, Maxar 2019

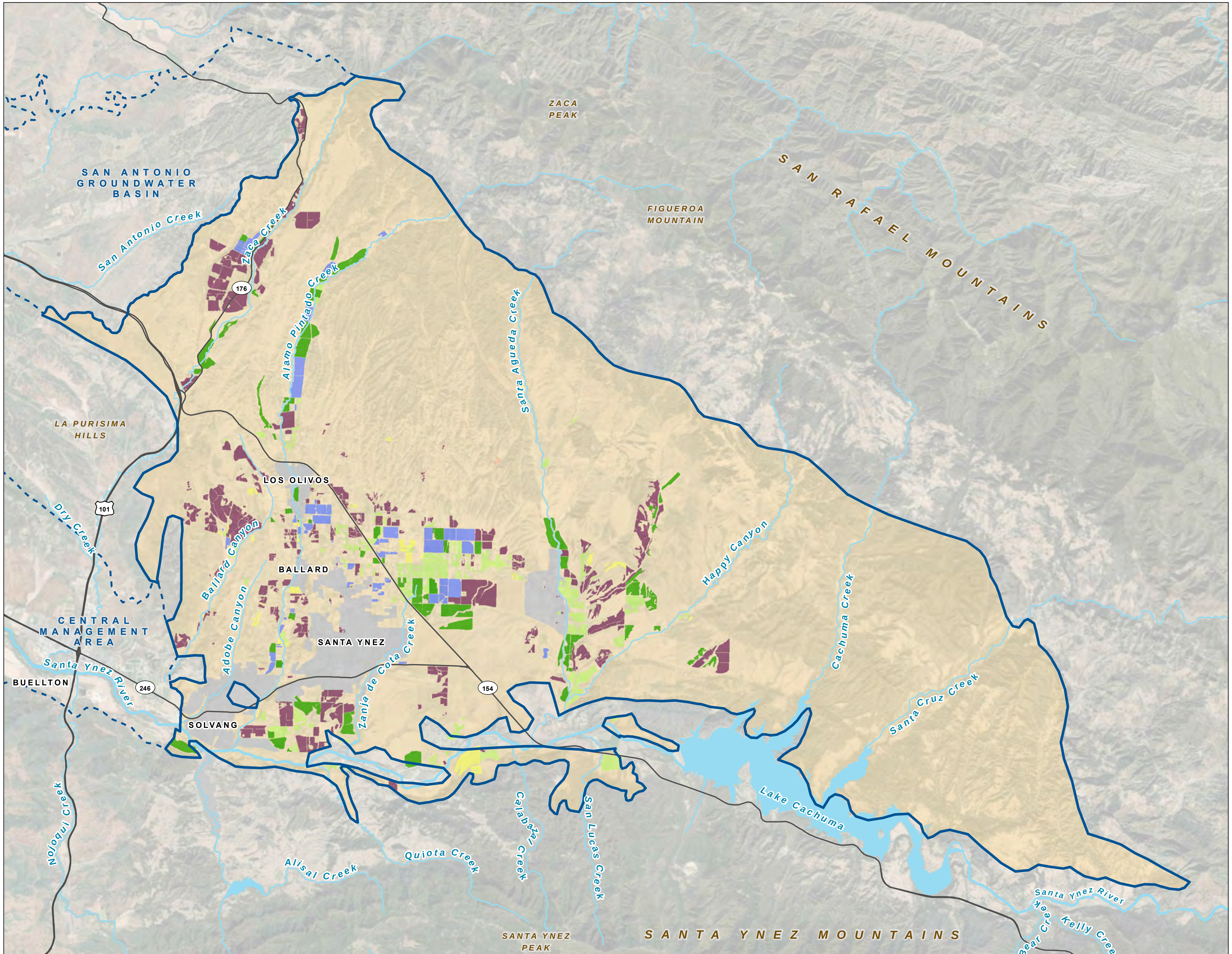
GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section2\Figure2_4_SYRWCD_GW_Charge_Zones.mxd, abarry

FIGURE 2-5

Existing Land Use Designations

Santa Ynez River Valley Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan



LEGEND

Land Use

- Field Crops
- Pasture
- Deciduous Fruit and Nuts
- Ornamentals
- Truck, Nursery, and Berry Crops
- Vineyards
- Urban/Industrial
- Native Vegetation and Rural Domestic

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

Date: June 3, 2021
Data Sources: ESRI, USGS,Maxar 2019, LandIQ 2018

GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section2\Figure2_5_Land_Use_Designations.mxd, abarry

Table 2-1. Land Use Summary in 2018

Land Use Category	Acres
Agriculture by Crop Type	
Deciduous Fruit and Nuts	317
Field Crops	1,590
Ornamentals	3
Pasture	1,294
Truck, Nursery, and Berry Crops	872
Vineyards	3,253
Total Agriculture	**7,330**
Urban	**4,359**
Native Vegetation / Idle	**84,711**
Total	**96,400**

The City of Solvang, which occupies 2.2 square miles in the EMA, includes the following zoning designations within its boundaries (City of Solvang, 2016):

- Eight Residential Categories, including Mobile Home Park
- Commercial Retail / General /Tourist Related
- Light Industry
- Professional – Offices
- Recreational
- Agricultural
- Resource Management

2.2.1.9 Water Use Sector

Water demands in the EMA are organized into the six water use sectors identified in the GSP emergency regulations.[9] These are:

- **Urban.** Urban water use is assigned to non-agricultural water uses in the City and other census-designated places. Domestic use outside of census-designated places is not considered urban use.
- **Industrial.** There is limited industrial use in the EMA. DWR does not have any records of wells in the EMA that are categorized as being for industrial use. Most industrial use is associated with agriculture and is accounted for in the agricultural water use sector.
- **Agricultural.** This is the largest water use sector in the EMA.
- **Managed wetlands.** There are no managed wetlands in the EMA.
- **Managed recharge.** There is no managed recharge in the EMA.

[9] Section 3, Basin Setting, includes water budgets that categorize water uses with different categories, primarily (1) agricultural; (2) "other" water, which includes municipal, industrial, small public water systems, and domestic use; and (3) "special" irrigation water, which refers to urban landscape and golf course irrigation.

- **Native vegetation.** This is the largest water use sector in the EMA by land area. This sector, required by the regulations, includes rural residential areas. Native vegetation is the term used in the regulations for all other unmanaged and non-irrigated land use sectors.

Figure 2-6 shows the distribution of the water use sectors in the EMA.

2.2.1.10 Water Source Type

Water source types in the EMA include groundwater, surface water, and water imported from outside the EMA. Groundwater supplies about 85 percent of the water demand within the EMA, and communities dependent on groundwater are presented in Figure 2-7 (refer to the water budget presented in Section 3.3). Water is imported into the EMA from the Cachuma Project and from the State Water Project (SWP).

Groundwater pumped by the City and ID No. 1 is delivered to their customers within their respective boundaries in the southwestern portion of the EMA. Private agricultural and domestic users also pump groundwater from the Santa Ynez Uplands. The bulk of water used to irrigate crops in the EMA is sourced by pumping groundwater from the Santa Ynez Uplands and surface water from the Santa Ynez River underflow.

ID No. 1 imports water into the EMA via the Cachuma Project and the SWP. ID No. 1 does not receive its Cachuma Project water directly; instead, in addition to its own entitlement of SWP supplies, it also receives an amount of SWP water through an Exchange Agreement with the South Coast members of the Cachuma Project, whereby ID No.1 provides its Cachuma Project water to the South Coast in exchange for an equivalent amount of SWP water from the South Coast agencies. ID No.1 also produces water from the Santa Ynez River underflow pursuant to licenses issued by the State Water Resources Control Board for use in the Santa Ynez Uplands.

As a member agency of the Central Coast Water Authority (CCWA), ID No. 1 has a Table A allocation of 2,000 acre-feet per year (AFY) and a 200-acre-foot drought buffer of imported SWP water. Of that amount, 1,500 AFY are contractually committed for use by the City of Solvang. The drought buffer effectively increases the amount of water to be delivered in the event that overall deliveries are reduced by a given percentage.

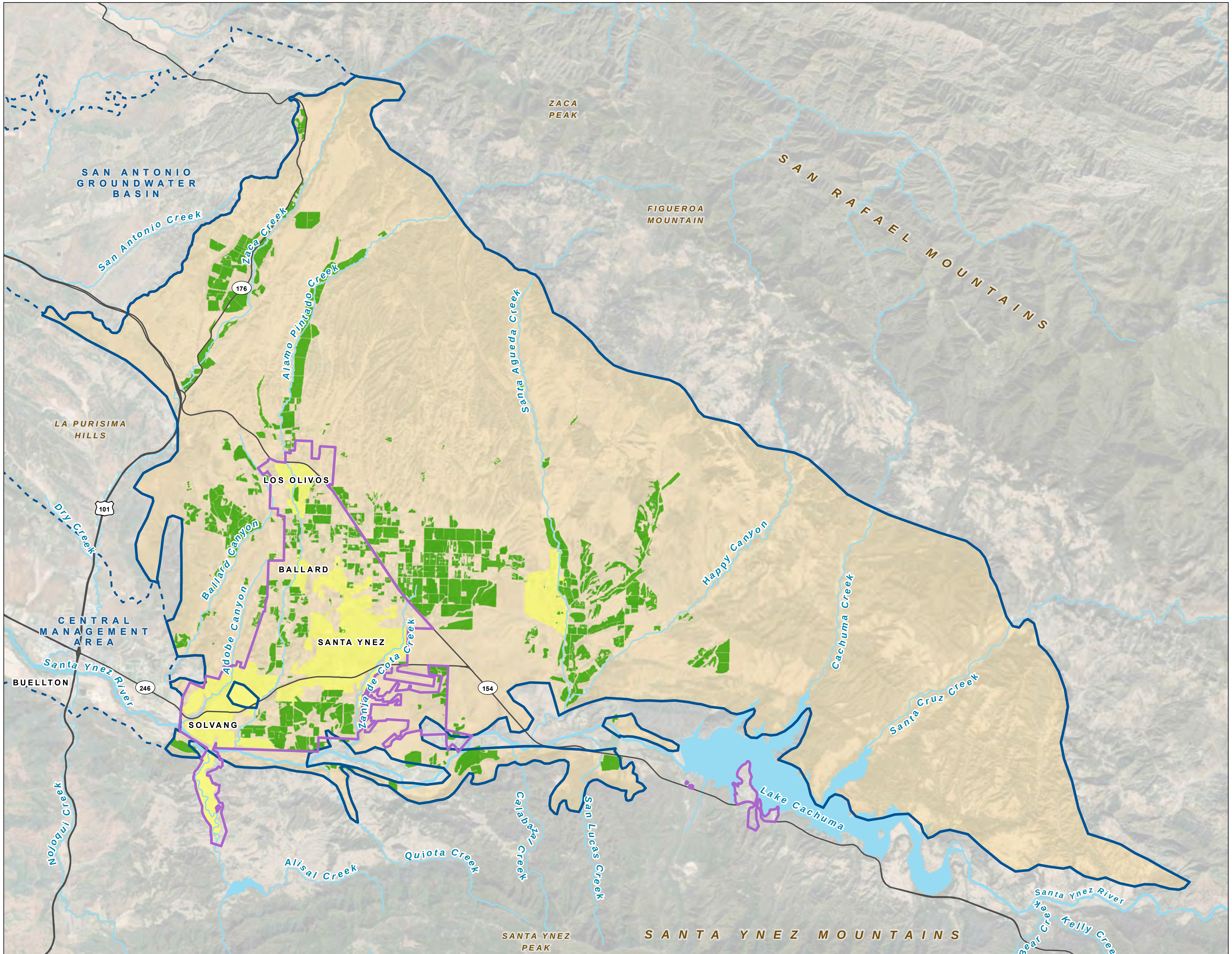


FIGURE 2-6

Water Use Sector and Water Source Type

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

Area with Access to Surface Water via State Water Project and/or Cachuma Project

Water Use Sector

- Agricultural
- Urban/Industrial
- Native Vegetation and Rural Domestic

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

Date: June 3, 2021
Data Sources: ESRI, USGS, Maxar 2019, LandIQ 2018

GSI Water Solutions, Inc.

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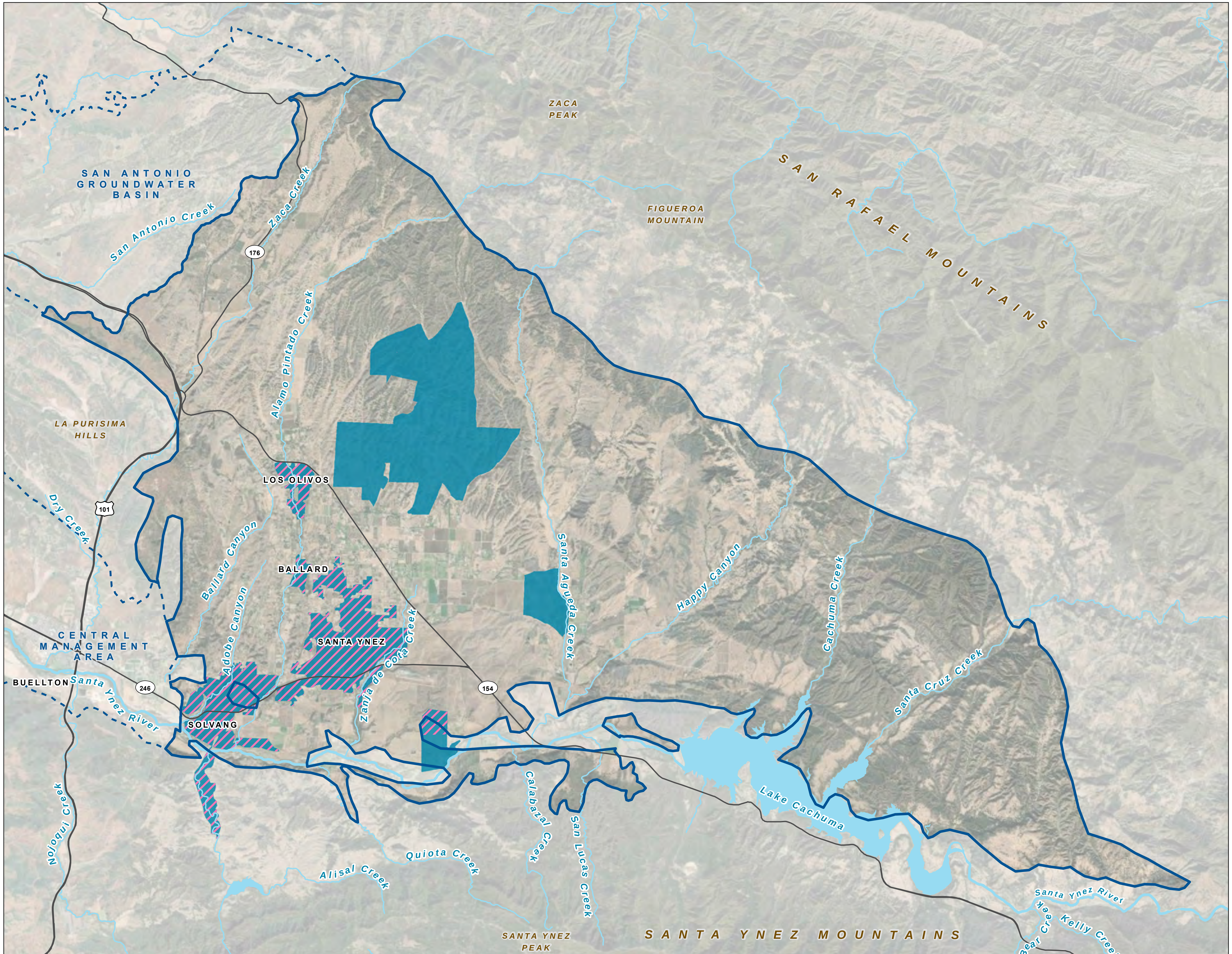

FIGURE 2-7

Communities Dependent on Groundwater

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

- Community Dependent Soley on Groundwater
- Community Served by Groundwater and Surface Water (State Water Project and Cachuma Project)

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

Date: December 2, 2021
Data Sources: ESRI, USGS, LandIQ 2018, CNRA 2018.

GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section2\Figure2_7_Groundwater_Dependent_Communities.mxd, abarry

2.2.1.11 Existing Well Types, Numbers, and Density

An exact total count of existing and active wells in the EMA is not yet known. Preliminary data on well types, well depth data, and well distribution data were retrieved from DWR's Well Completion Report Map Application.[10] Well information is also available from SYRWCD and public databases, which supplement the DWR well data. Wells in the public databases may have been long since destroyed or abandoned and some well records are located in more than one database. Due to multiple well-naming conventions, it is possible that some wells exist in multiple sources. The databases, and number of wells in each, include the following:

- DWR Well Completion Reports: 583 wells within and surrounding EMA
- ID No. 1: 14 groundwater wells in the EMA
- USBR: 13 monitoring wells within Santa Ynez River
- City of Solvang: 10 wells
- Mutual water companies: various groundwater wells in Santa Ynez Uplands

DWR categorizes wells in its mapping application as either domestic, production, or public supply. These categories are based on the well use information submitted with well logs to DWR. Many of the wells categorized on well logs as production wells are used for agriculture. Most of the wells in the EMA are also used in part for domestic purposes.

The density of wells in the EMA by their types of use are presented on Figure 2-8 through Figure 2-10. The data used to develop these maps are from DWR-provided data and well locations for the City of Solvang and ID No. 1. These maps should be considered representative, but not definitive, of well distributions.

2.2.2 Water Resources Monitoring and Management Programs [§ 354.8(c) and (d)]

§ 354.8 Description of Plan Area. Each Plan shall include a description of the geographic areas covered, including the following information:

(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.

(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.

2.2.2.1 Groundwater Level Monitoring

In 2009, the California legislature passed Senate Bill X7-6, the California Statewide Groundwater Elevation Monitoring (CASGEM) Program, mandating that local agencies track seasonal and long-term trends in groundwater elevations in all state-designated groundwater basins. The Water Agency is the designated monitoring entity for the Basin.

[10] Available at https://www.arcgis.com/apps/webappviewer/index.html?id=181078580a214c0986e2da28f8623b37. (Accessed March 24, 2021.)

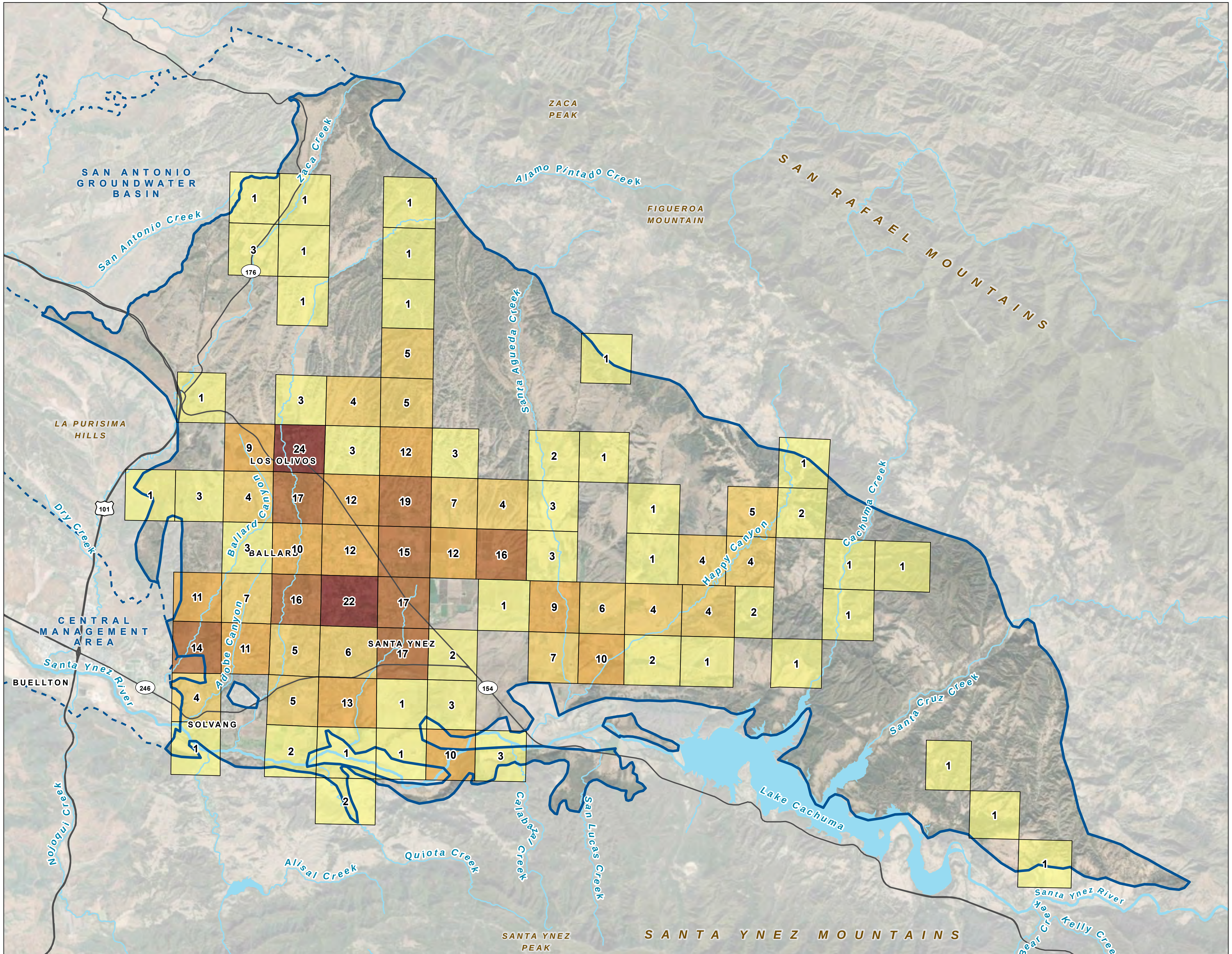

FIGURE 2-8

Well Density By Section (Domestic Wells)

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

Domestic Well Count by Section

- 1 - 3
- 4 - 7
- 8 - 13
- 14 - 19
- 20 - 24

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

Date: June 3, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section2\Figure2_8_Well_Density_By_Section_Domestic_Wells.mxd, abarry

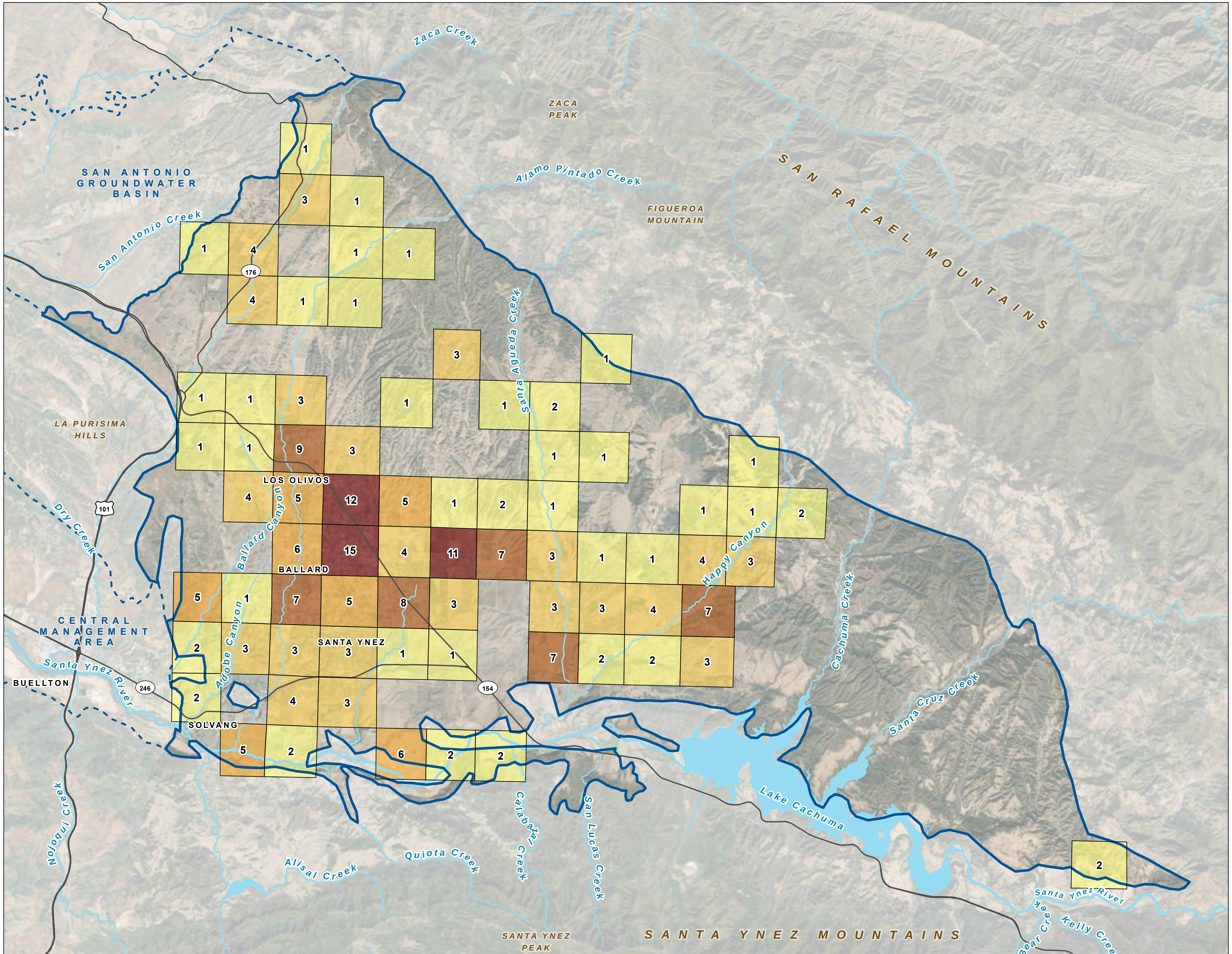

FIGURE 2-9

Well Density By Section (Irrigation Wells)

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

Irrigation Well Count by Section

- 1 - 2
- 3 - 4
- 5 - 6
- 7 - 9
- 10 - 15

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

Date: June 3, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section2\Figure2_9_Well_Density_By_Section_Irrigation_Wells.mxd, abarry

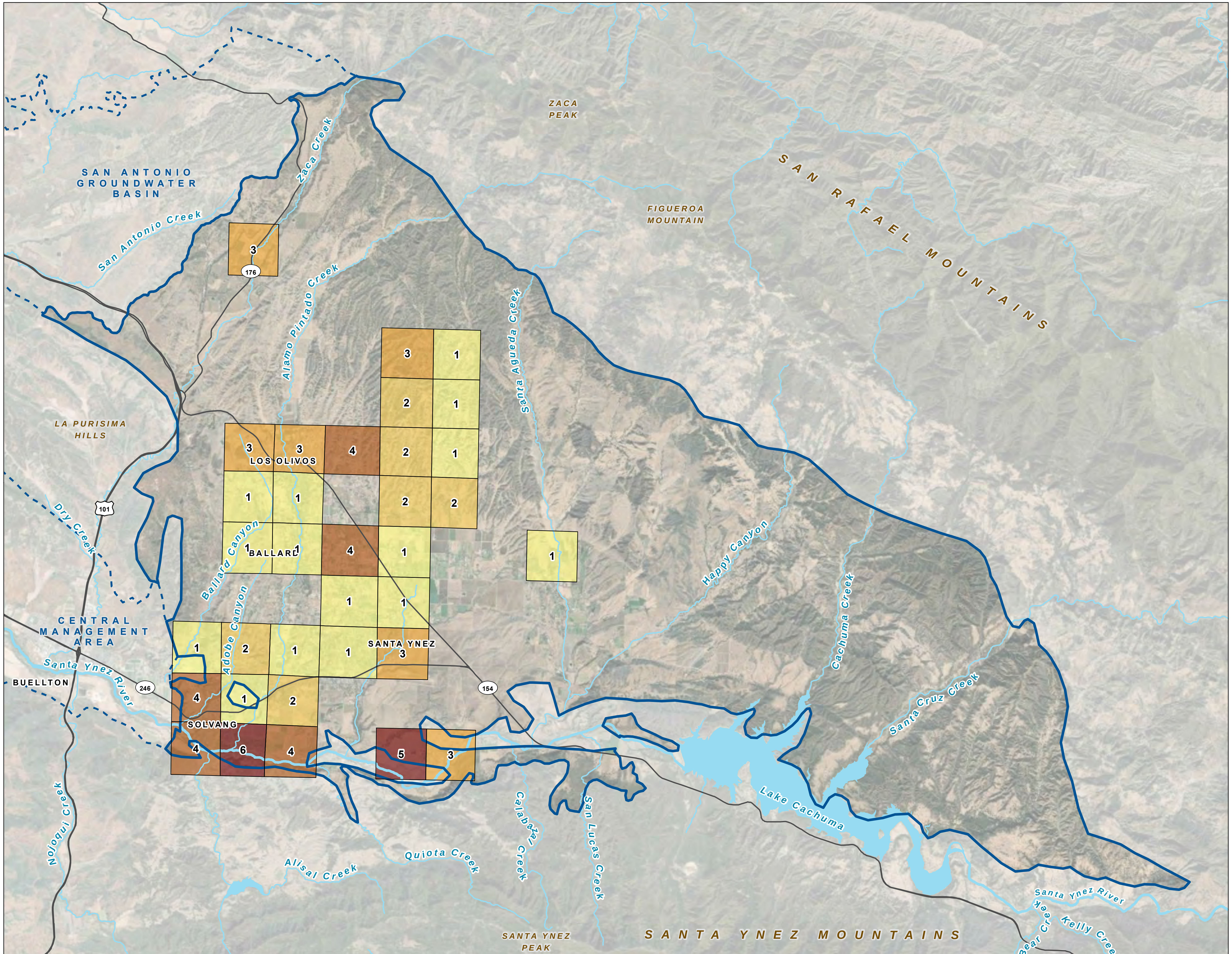

FIGURE 2-10

Well Density By Section (Public Wells)

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

Public Well Count by Section (includes industrial use)

- 1
- 2
- 3
- 4
- 5 - 6

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

Date: June 9, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section2\Figure2_10_Well_Density_By_Section_Public_Wells.mxd, abarry

In a cooperative program with the U.S. Geological Survey (USGS) National Water Information System (NWIS), the Water Agency monitors more than 300 groundwater wells annually throughout the County, including in the EMA. Figure 2-11 shows wells with publicly available groundwater elevation data in the EMA. Currently, groundwater level measurements are taken once in the spring and sometimes also in the fall. The monitoring is performed in a network of wells that have been volunteered for this purpose. The network has changed over time as access to wells has been lost or new wells have been added. The cooperative program, in place for several decades, provides vital data for tracking groundwater trends and conducting groundwater studies. The data are published in a triennial report prepared by the Water Agency. Many of the functions of the CASGEM Program will be replaced or subsumed under the GSAs.

The City of Solvang, ID No.1, USBR, and several mutual water companies also provide groundwater well elevation data. A summary of the groundwater level data compiled for use in this GSP is presented in Table 3-5.

2.2.2.2 Groundwater Quality Monitoring

Groundwater quality is monitored under several different programs and by different agencies, including the following:

- The City of Solvang and ID No. 1 use data from sampled supply wells for their annual water quality reports to comply with their water supply permits and California Safe Drinking Water Act requirements and reports to DWR and their customers.
- The USGS collects water quality data on a routine basis under the Groundwater Ambient Monitoring and Assessment (GAMA) program and the NWIS. These data are stored in Stare Water Resources Control Board's (SWRCB's) GeoTracker GAMA Program database.
- Multiple sites monitor groundwater quality as part of investigation or compliance monitoring programs through the Central Coast Regional Water Quality Control Board (RWQCB).[11]
- Water Agency monitors water quality in conjunction with water level measurements collected for the CASGEM Program.

Section 3.2 provides a summary of groundwater quality for drinking water and agricultural purposes.

Figure 2-12 shows the location of wells in the GAMA GeoTracker database.

[11] In 2016, the Central Coast RWQCB adopted Resolution No. R3-2017-0004, Adopting the Human Right to Water as a Core Value and Directing Its Implementation in Central Coast Water Board Programs and Activities. The Resolution and the Workplan for Implementing the Human Right to Water (Central Coast RWQCB, 2017a) includes development of region-wide geographic information system maps to identify areas where public and domestic drinking water wells are impacted by common pollutants and the identification of areas where domestic wells users are vulnerable to contamination.

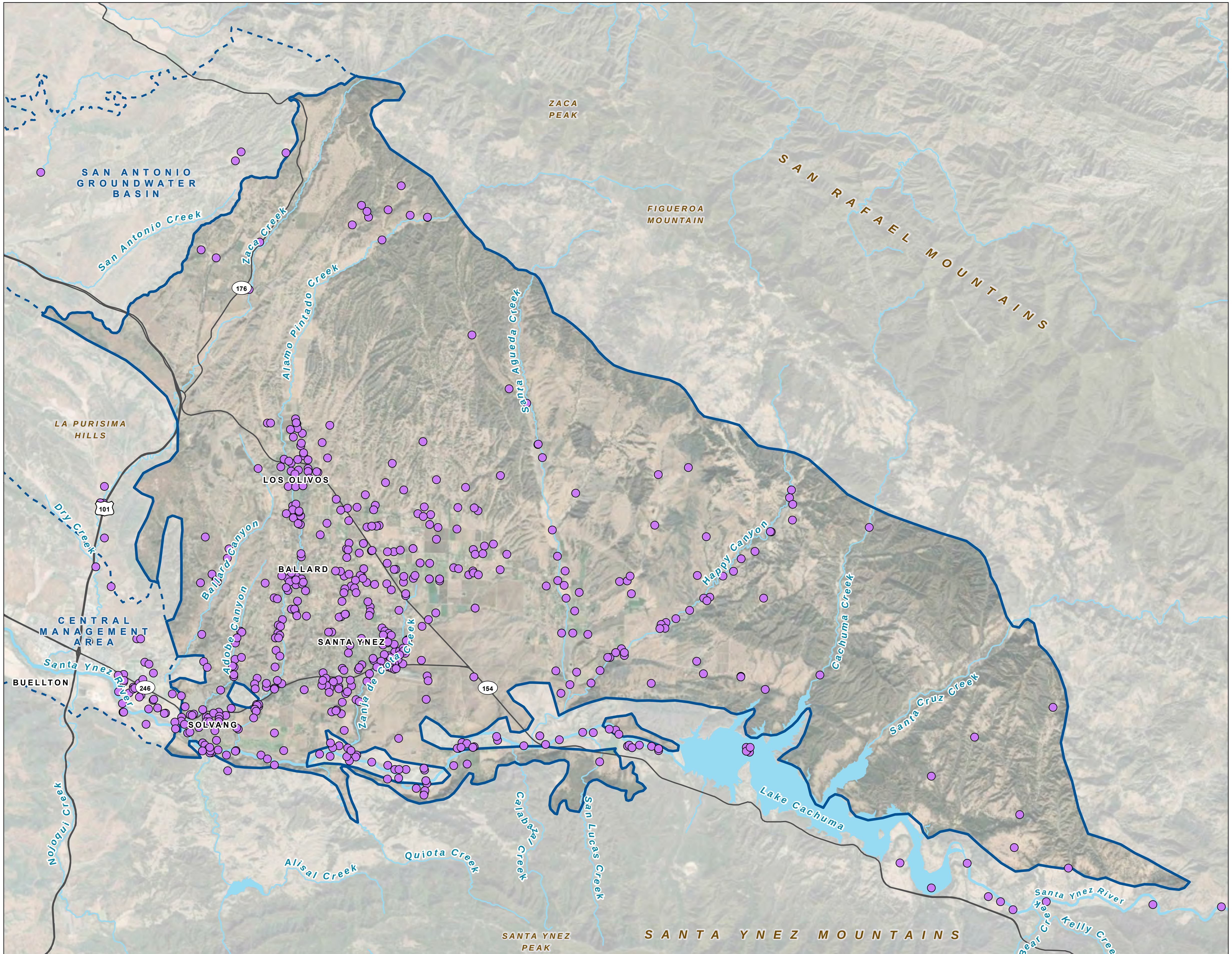

FIGURE 2-11

Wells with Publicly Available Groundwater Elevation Data

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

Well

All Other Features

Eastern Management Area Bulletin 118 Boundary

Other Bulletin 118 Groundwater Basin Boundary

Major Road

Watercourse

Waterbody

N

0 5,000 10,000 15,000
Feet

Date: June 3, 2021
Data Sources: ESRI, USGS, LandIQ 2018

GSI Water Solutions, Inc.

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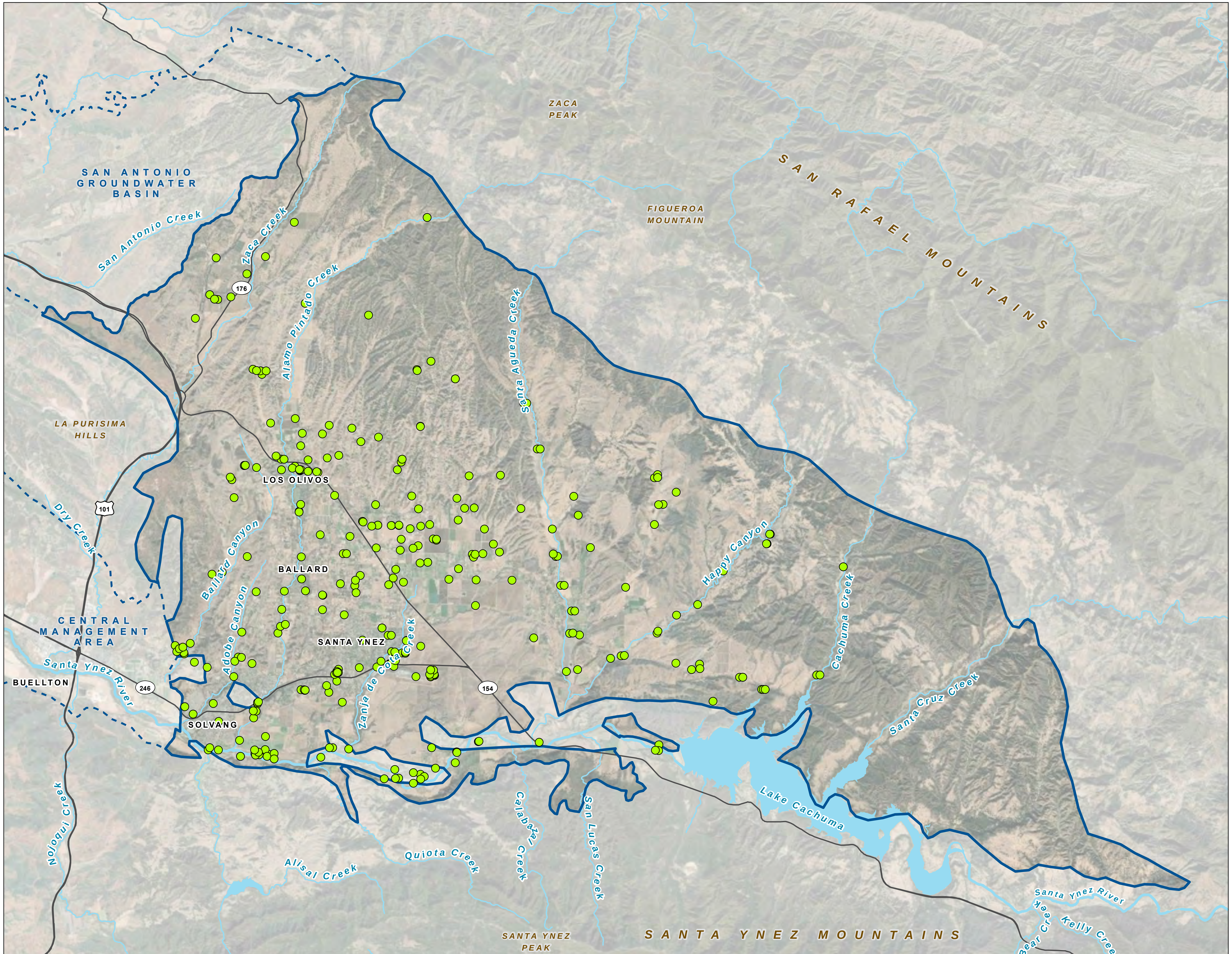
FIGURE 2-12

Wells with Publicly Available Groundwater Quality Data

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan



LEGEND

- Well

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000

Feet

Date: June 3, 2021
Data Sources: ESRI, USGS, LandIQ 2018

GSI Water Solutions, Inc.

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2.2.2.3 Surface Water Monitoring

Stream gauges have historically been maintained and monitored by the USGS. Data are stored electronically in NWIS files and are retrievable from the USGS Water Resources site. USBR maintains data on water releases from Bradbury Dam. The periods with monthly streamflow data sets from stream gauging stations within and surrounding the EMA are presented on Table 3-1. The locations of these gauging stations, with the exception of the upstream stations along the Santa Ynez River, are presented on Figure 2-13. The locations of the point of delivery of imported water from northern California through the SWP via the CCWA pipeline is also presented on Figure 2-13.

2.2.2.4 Climate Monitoring

Climate data are measured at two meteorological monitoring stations in the EMA portion of the Basin as well as six additional stations surrounding the EMA. Data from these stations were obtained from Santa Barbara County. Station information is provided in Table 2-2 and station locations are shown on Figure 2-14. Figure 2-14 displays the long-term precipitation record at the Santa Ynez Fire Station #32.

Table 2-2. Meteorological Monitoring Stations Used for Historical Period Selection

Station No.	Station Name	Beginning of Record	Location	Elevation (feet)	Period Average Precipitation (inches)
218	Santa Ynez Fire Station	1951	Within EMA	600	15.7
393	Solvang	1965	Within EMA	485	18.3
196	Los Olivos - Foxen Canyon	1995	Within EMA	1,040	16.0
419	Midland School	1958 [1]	Within EMA	1,180	16.4
290	Happy Canyon	1994 [2]	Within EMA	1,690	15.6
233	Buellton Fire Station	1955	Surrounding	360	17.2
421	Figueroa Mountain	1961	Surrounding	3,200	21.3
332	Cachuma	1953	Adjacent EMA	800	19.7
204	Los Alamos Fire Station	1910	San Antonio Basin	580	15.3
230	Gibraltar Reservoir	1920	Upstream	1,500	26.2
232	Jameson Dam	1926	Upstream	2,230	28.7

Notes

[1] Data from the Midland School is discontinuous, missing entire water years: 1964, 1969, 1977 through 1993, and 2002 through 2011. This data includes 34 of the 61 years between water years 1958 and 2018.

[2] Data from Happy Canyon is discontinuous, missing water years 1998 through 2001.

EMA = Eastern Management Area

California Irrigation Management Information Center Station 64 measures several climatic factors that allow a calculation of daily reference evapotranspiration (ET) for the area. This site is located in an alfalfa field and is significantly affected by the changing conditions mandated by alfalfa agriculture. A summary of average monthly precipitation, temperature, and reference evapotranspiration (ETo) for the EMA is presented on Table 2-3.

Table 2-3. Average Monthly Climate Summary, Station 64 in EMA

Month	Average Precipitation (inches)[1]	Average ETo (inches)[2]	Average Daily Temperature (°F)[3]
January	3.3	1.9	49
February	3.4	2.4	50
March	2.9	3.8	53
April	1.0	5.0	56
May	0.9	6.0	59
June	0.4	6.4	63
July	0.3	6.6	66
August	0.3	6.2	66
September	0.1	4.8	54
October	0.7	3.7	59
November	0.7	2.3	52
December	2.4	1.7	47
Monthly Average	**1.4**	**4.2**	**57**
Average Calendar Year[4]	**16.6**	**50.6**	**57**

Notes

Data sources: DWR CIMIS https://cimis.water.ca.gov/Stations.aspx

[1] Average of monthly precipitation at CIMIS Station 64 for water years 1988 through 2020.

[2] Average of monthly evapotranspiration at CIMIS Santa Ynez Station 64 for water years 1988 through 2020.

[3] Average daily temperature at CIMIS Santa Ynez Station 64 for water years 1988 through 2020.

[4] Average Calendar Year is not the sum of monthly averages, but rather a historical annual average over the period of record.

°F = degrees Fahrenheit

CIMIS = California Irrigation Management Information Center

EMA = Eastern Management Area

ETo = reference evapotranspiration

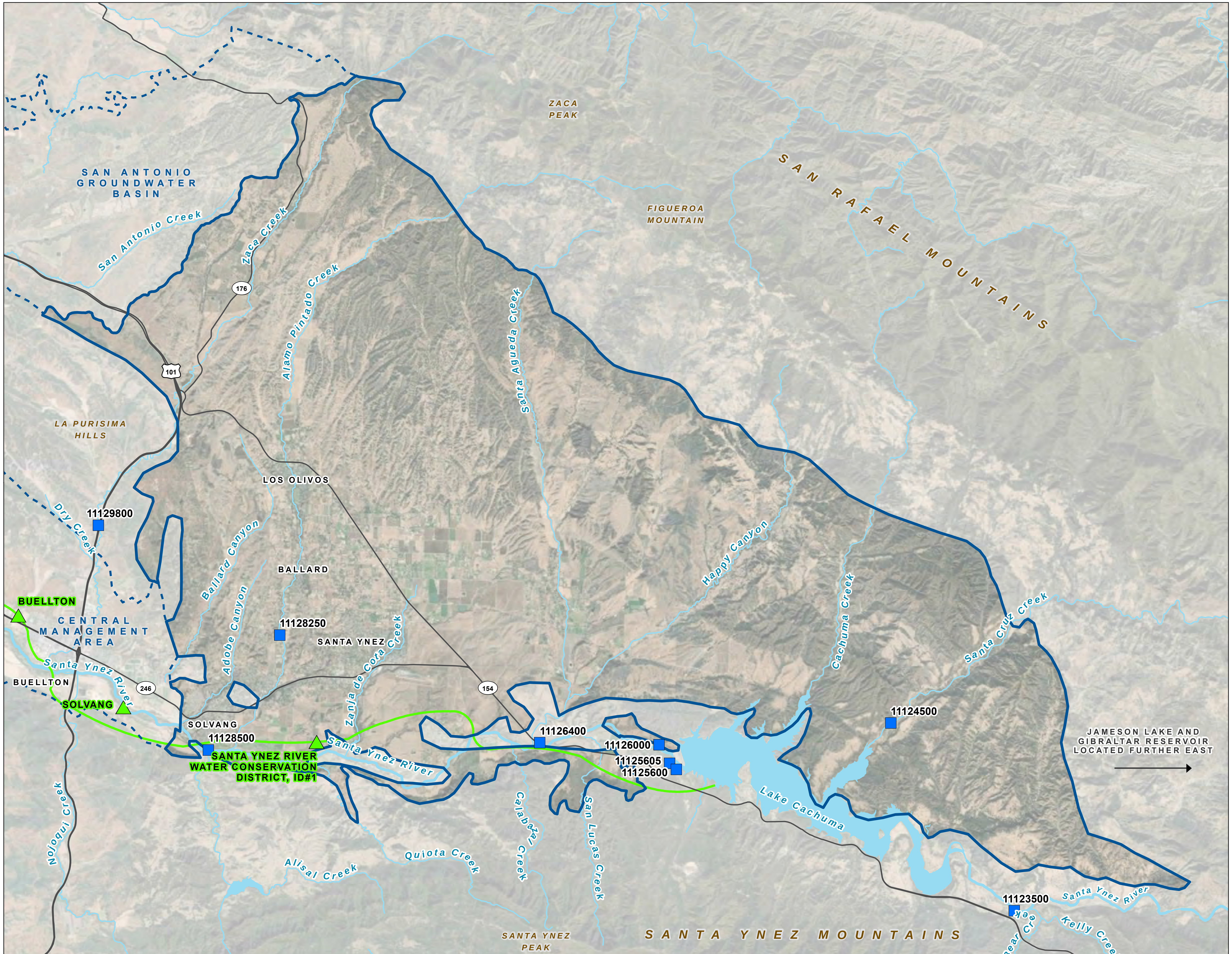

FIGURE 2-13

Surface Water Features

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

- Surface Water Gauge
- SWP Turnout
- SWP Pipeline

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

NOTE

SWP: State Water Project

N

0 5,000 10,000 15,000
Feet

Date: June 12, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

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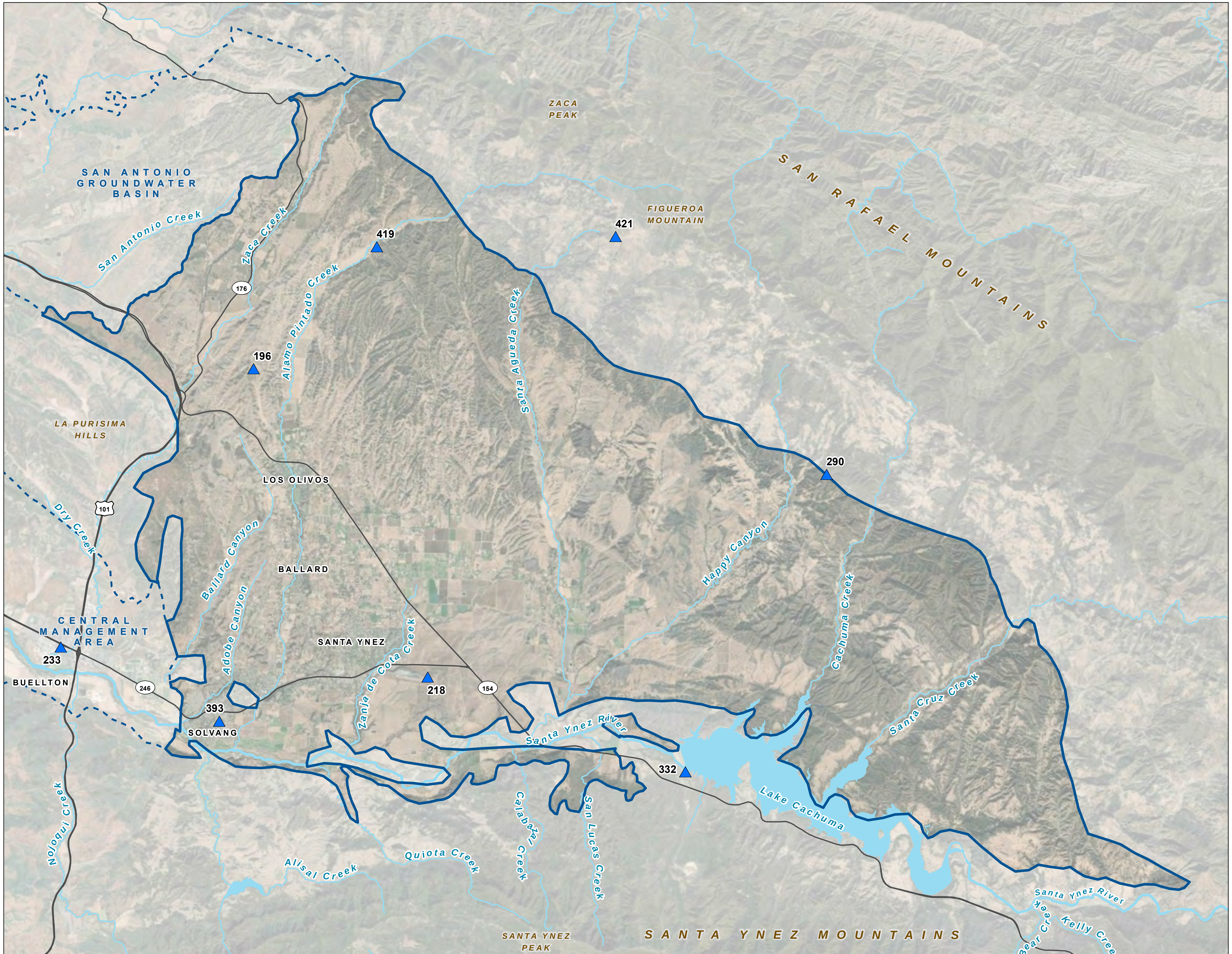
FIGURE 2-14

Meteorological Monitoring Stations

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan



LEGEND

- Meteorological Monitoring Station

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000

Feet

GSI Water Solutions, Inc.

Date: June 3, 2021

Data Sources: ESRI, USGS, LandIQ 2018

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section2\Figure2_14_Meteorological_Monitoring_Stations.mxd, abarry

2.2.2.5 Existing Water Management Plans

Existing water management plans within the EMA area include the Central Coast Water Authority's Urban Water Management Plan (UWMP), the Water Quality Control Plan for the Central Coast Basin, and the Santa Barbara County IRWM Plan. In addition, the Santa Barbara County Groundwater Basins Status Report provides monitoring data and further information about groundwater resources in the region. These water management plans were developed prior to SGMA and while they have goals that differ from the sustainability goal provided in this GSP, they will not limit operational flexibility in the EMA with regard to sustainable groundwater management. The sustainability goal presented in Section 5 was developed collaboratively for the Basin and adopted by all three GSAs in the context of both SGMA and the existing water management plan framework. The GSP and implementation plan presented in Section 7 will adapt to conditions based on the results of the monitoring program to avoid undesirable results (see Section 4). This approach is consistent with the CCWA UWMP and IRWM Plan.

Central Coast Water Authority Urban Water Management Plan

The UWMP Act requires urban water suppliers to compare the total projected demand for water supply with the amount of water supply that is available over the next 20 years, in 5-year increments. The CCWA [12] was formed for the sole purpose of designing, constructing, and operating the facilities needed to bring SWP water to the agencies that contract to receive that water. CCWA is considered an urban water supplier because SWRCB Division of Drinking Water (DDW) classifies it as a public water system. Both ID No. 1 and the City of Solvang provide retail water service within the EMA, but they are not large enough to be required to prepare an UWMP.

The CCWA's 2020 Update to its UWMP (CCWA, 2021) describes the roles and responsibilities of CCWA, available water supplies, water demands, water reliability, and mitigation programs performed in droughts to secure additional water. The UWMP 2020 Update provides the following:

- A projection of future SWP water demand and assesses SWP supply reliability through 2040 for CCWA participants.
- An update on the negotiations to extend the termination dates of SWP contracts for participating CCWA agencies beyond the 2040 termination date into 2085.
- A discussion of future possible water sources.

The discussion of future water sources includes water transfers (such as the Cachuma Project in the EMA), groundwater banking, desalination, and recycled water and local groundwater. Future water projects include the following:

- **Delta Conveyance Project**—An infrastructure project that would allow for greater flexibility in balancing the needs of the Delta estuary with the reliability of water supplies and help in reducing the risk of long outages from Delta levee failures.
- **Suspended Table A Reacquisition**—In the 1980s, 12,214 square feet of SWP Table A water was suspended by DWR and the Santa Barbara County Flood Control and Water Conservation District. CCWA and the Santa Barbara County Flood Control and Water Conservation District have the option of reacquiring this suspended water through payment of past costs plus interest.

[12] The CCWA member agencies are the Cities of Buellton, Guadalupe, Santa Barbara, and Santa Maria; Carpinteria Valley Water District; Goleta Water District; Montecito Water District; and ID No. 1 in which the City of Solvang is located. Participating entities with no voting rights include Golden State Water Company, Vandenberg Space Force Base, La Cumbre Mutual Water Company, Morehart Land Company, and the Raytheon Systems Company.

- **Long-Term Exchange between San Luis Obispo Flood Control Water Conservation District and CCWA**—An exchange of SWP Table A water for water treated at the CCWA Coastal Branch that could benefit CCWA participants. CCWA and the San Luis Obispo Flood Control Water Conservation District are exploring potential exchange concepts for mutual benefit.
- **CCWA Water Management Strategies Study**—CCWA is developing a management strategies study for maximizing the utility of State Water Project water supplies and integrating it with local supplies. Potential water management measures may include transfers, exchanges, and banking.

Water Quality Control Plan for the Central Coastal Basin – Planning Elements

The *Water Quality Control Plan for the Central Coastal Basin* (WQ Basin Plan) (RWQCB et al., 2017) provides management strategies to ensure that surface water and groundwater in the Central Coast Region are managed to provide the highest possible quality. The WQ Basin Plan includes the following elements:

- The water quality standards that must be maintained for all the water uses in the region
- An implementation plan that describes the programs, projections, and other actions necessary to achieve the water quality standards
- The existing plans and policies of the SWRCB and the RWQCB that protect water quality
- A description of the monitoring and surveillance programs to support ensuring management of surface and groundwater

The WQ Basin Plan includes recommended actions, requirements, and management principles, including salt source control, to ensure high-quality surface water and groundwater for all beneficial uses. The present and potential future beneficial uses for inland waters listed in the WQ Basin Plan include surface water and groundwater as municipal supply (water for community, military, or individual water supplies); agricultural purposes; groundwater recharge; recreational water contact and non-contact; sport fishing; warm freshwater habitat; wildlife habitat; rare, threatened or endangered species; and spawning, reproduction, and/or early development of fish.

The WQ Basin Plan also describes the existing regulatory monitoring and assessment of point sources of pollution and a program to control nonpoint sources of pollution; the GAMA program to assess groundwater quality; the Central Coast Ambient Monitoring Program; and the available state, federal, and regional assessments of water quality (see Section 2.2.2.6 for more on the water quality measures outlined in the WQ Basin Plan).

Santa Barbara County Integrated Regional Water Management Plan

The Santa Barbara County IRWM Plan (Dudek, 2019), updated in 2019, provides guidance for integrating water management across the region. The IRWM Plan was updated through a 2-year process that included a broad array of stakeholders and objectives, priorities, and resource management strategies which were revisited to respond to the changing conditions in the region, including increasing vulnerabilities from climate change, and in response to new state-mandated requirements, including SGMA regulations.

The IRWM Plan integrated 34 selected water management strategies and considered and included an additional eight strategies for the region. The strategies included in the IRWM Plan have or will have a role in protecting the region's water supply reliability, water quality, ecosystems, groundwater, and flood management objectives. The integration of these strategies resulted in a list of action items (projects, programs, and studies) needed to implement the IRWM Plan over the 25-year planning horizon.

Based on several datasets, no disadvantaged communities were identified within the EMA (refer to the IRWM Plan [Dudek, 2019]; 2020 California Air Resources Board and 2018 California Climate Investments

Priority Populations online maps[13]; and DWR's DAC mapping data from 2018 at the places and tract scales[14]).

Santa Barbara County Groundwater Basins Status Report

The 2019 Santa Barbara County Groundwater Basins Status Report (Groundwater Report) (Santa Barbara County, 2019) describes the conditions of groundwater and status of groundwater basins in Santa Barbara County since the publication of the 2011 Santa Barbara County Groundwater Report. The 2019 Groundwater Report provides data and information from state and federal monitoring for water quantity and quality in the wake of the local drought emergency that lasted from 2014 to 2019. Specifically, for each basin in the county, the report discusses basin characteristics and status, provides groundwater levels and hydrographs for selected wells, and describes developments in supplemental supplies and basin management plans.

2.2.2.6 Existing Groundwater Regulatory Programs

Well owners located within the service area of SYRWCD are required to register their wells and report the quantity of water pumped on a semi-annual basis. Groundwater production in the EMA that occurs outside of the SYRWCD boundaries is not reported. Groundwater use within the EMA is also subject to the Agricultural Order, Title 22 Drinking Water Program, and Water Quality Control Plan described below.

Agricultural Order

In 2017 the Central Coast RWQCB issued Agricultural Order No. R3-2017-0002, a Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Agricultural Order) (RWQCB, 2017). The permit requires that growers implement practices to reduce nitrate leaching into groundwater and improve surface receiving water quality. Specific requirements for individual growers are structured into three tiers based on the relative risk their operations pose to water quality. Growers must enroll, pay fees, and meet various monitoring and reporting requirements according to the tier to which they are assigned. All growers are required to implement groundwater monitoring, either individually or as part of a cooperative regional monitoring program. Growers electing to implement individual monitoring (i.e., not participating in the regional monitoring program) are required to test all on-farm domestic wells and the primary irrigation supply well for nitrate or nitrate plus nitrite, and general minerals, including, but not limited to, total dissolved solids, sodium, chloride, and sulfate.

The Central Coast RWQCB is currently developing Agricultural Order No. R3-2021-0040 (RWQCB, 2021). The updated Agricultural Order has more frequent groundwater monitoring requirements than Agricultural Order No. R3-2017-0002. Beginning in 2022, all growers must conduct annual sampling of all on-farm domestic drinking water supply wells and the primary irrigation well between March 1 and May 31. Growers must report monitoring results by July 31 each year. Additionally, groundwater trend monitoring is required under the updated Agricultural Order. All growers are required to implement groundwater trend monitoring work plans either individually or as part of a cooperative regional monitoring program. Work plans for groundwater trend monitoring must be submitted by a date dependent on the phase area. The work plan due date is September 1, 2027, in the EMA.

[13] Available at https://webmaps.arb.ca.gov/PriorityPopulations/. (Accessed December 6, 2021.)
[14] Available at https://gis.water.ca.gov/app/dacs/. Mapped DACs data included Places (2018) and Tracts (2018). (Accessed December 6, 2021.)

Title 22 Drinking Water Program

The DDW regulates public water systems in the state to ensure the delivery of safe drinking water to the public. A public water system is defined as a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year. Private domestic wells, wells associated with drinking water systems with less than 15 residential service connections, and industrial and irrigation wells are not regulated by the DDW.

The County of Santa Barbara has primacy and regulates state small water systems as defined in Chapter 34B Domestic Water Systems (Ordinance No. 12-4843) (Santa Barbara County, 2012). The DDW enforces the monitoring requirements established in Title 22 of the CCR for public water system wells, and all the data collected must be reported to the DDW. Title 22 also designates the regulatory limits (known as maximum contaminant levels) for various waterborne contaminants, including volatile organic compounds, non-volatile synthetic organic compounds, inorganic chemicals, radionuclides, disinfection byproducts, general physical constituents, and other parameters.

Water Rights Releases

Surface water releases from Lake Cachuma to the lower Santa Ynez River are made in accordance with water rights orders and decisions issued by the SWRCB to replenish the downstream alluvial areas within the EMA and other downstream reaches, and to protect public trust resources. Water rights releases for users downstream of Lake Cachuma are set forth in SWRCB Decision D886, and SWRCB Orders WR 73-37, WR 89-18, and WR 2019-0148. These releases are based on the establishment of two accounts, and accrual of credits (storing water) in Lake Cachuma for the areas above and below the Lompoc Narrows. Releases from the Above Narrows Account (ANA) are made at Bradbury Dam at the direction of SYRWCD for the benefit of downstream water users between the dam and the Lompoc Narrows. Releases from the Below Narrows Account (BNA) are conveyed to the Narrows for the benefit of water users in the Lompoc Plain subarea at the direction of SYRWCD. ANA releases are made to replenish the alluvial areas above the Lompoc Narrows and combined releases of ANA and BNA are made to replenish the various downstream areas of the Santa Ynez River Alluvium and Lompoc Plain, respectively.

Water Quality Control Plan for the Central Coastal Basin – Water Quality Requirements

The pollution control actions required by, and best management practices recommended by, the SWRCB, the RWQCB, and other agencies with authority over water quality are described in the WQ Basin Plan (RWQCB et al., 2017). The WQ Basin Plan includes all the EMA and also extends beyond its boundaries. The plans and policies of the SWRCB for managing water quality are listed in Section 5 and included as appendices to the WQ Basin Plan. Key policies in the WQ Basin Plan that affect the management of surface water and groundwater in the EMA include the State Policy for Water Quality Control, Sources of Drinking Water Policy, and the Nonpoint Source Management Plan. Discharge prohibitions outlined in the WQ Basin Plan include regulations for groundwater, salt discharge, and other discharge requirements. Best management practices recommended in the WQ Basin Plan include source controls that prevent a discharge or threatened discharge and treatment controls that remove pollutants from a discharge before it reaches surface water or groundwater. The WQ Basin Plan also lists the thresholds for Total Maximum Daily Loads (TMDLs) for waterbodies covered by the plan; none of the waterbodies with concentrations exceeding TMDLs are in the EMA.

2.2.2.7 Conjunctive Use Programs

§ 354.8 Description of Plan Area. Each Plan shall include a description of the geographic areas covered, including the following information:

(e) A description of conjunctive use programs in the basin.

Some water users within the EMA use surface water and underflow from the Santa Ynez River conjunctively with groundwater. Native surface water flows enter the EMA from precipitation runoff within the watershed and Santa Ynez River inflow to the EMA, regulated as releases from Lake Cachuma at the Bradbury Dam, operated by the USBR (see Section 2.2.2.6). Additional surface water is available as SWP water imported by ID No.1 pursuant to its entitlement as a CCWA member agency and via an Exchange Agreement with the South Coast members of the Cachuma Project. Details on water sources and historical, current, and projected water budgets are available in Section 3.

2.2.3 Land Use and General Plans

§ 354.8 Description of Plan Area. Each Plan shall include a description of the geographic areas covered, including the following information:

(f) A plain language description of the land use elements or topic categories of applicable general plans that includes the following:

(1) A summary of general plans and other land use plans governing the basin.

(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.

(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.

2.2.3.1 Land Use and General Plans Summary [§ 354.8(f)(1),(f)(2), and (f)(3)]

Land use planning authority in the EMA is the responsibility of the Santa Barbara County and the City of Solvang. The Santa Barbara County Comprehensive Plan includes the following elements that have a bearing on water quantity or quality:

- A land use element that outlines the distribution of real estate, open space and agricultural land, mineral resources, recreational facilities, schools, and waste facilities

- A conservation element[15] that addresses the conservation, development, and use of natural resources including water, forests, soils, rivers, and mineral deposits
- Community and specific plans for municipalities and more urban areas to provide goals, policies, and standards to guide community development
- An open space element that details plans and measures for preserving open space for natural resources, outdoor recreation, public health and safety, and agriculture.

2.2.3.2 Santa Barbara County Integrated Regional Water Management Plan and Plan Update

The Santa Barbara County IRWM Program began in 2005 following the passage of Proposition 50, The Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002. Chapter 8 of Proposition 50 authorized the legislature to appropriate funding for IRWM planning, the intent of which was to encourage agencies to develop plans using regional water management strategies for water resources and to develop projects using these IRWM strategies to protect communities from drought, protect and improve water quality, and improve local water security by reducing dependence on imported water. The first Santa Barbara County IRWM Plan was adopted in 2007. The region updated the IRWM Plan in 2019 to address adaptation to climate change, provide incentives for collaboration in managing water resources and setting regional priorities for water infrastructure, and improving regional water self-reliance.

2.2.3.3 How Land Use Plans May Change Water Demands and Sustainable Groundwater Management

The Santa Barbara County Comprehensive Plan includes goals, principles, and policies aligned with sustainable groundwater management. In particular, the Groundwater Resources Section of the plan's Conservation Element outlines four major goals that are compatible with sustainable management objectives under SGMA. These goals are:

- Goal 1: To ensure adequate quality and quantity of groundwater for present and future County residents, and to eliminate prolonged overdraft of any groundwater basins.
- Goal 2: To improve existing groundwater quality, where feasible, and to preclude further permanent or long-term degradation in groundwater quality.
- Goal 3: To coordinate County land use planning decisions and water resources planning and supply availability.
- Goal 4: To maintain accurate and current information on groundwater conditions throughout the County.

As a county-wide document, the Comprehensive Plan does not make specific policy recommendations for the EMA. Nonetheless, the overarching policies and strategies in the plan promote water conservation, coordinated decision making around land use and water resources, groundwater recharge, and prevention of prolonged overdraft, all of which are consistent with the sustainable groundwater management objectives of this GSP. Future land use patterns described in the Comprehensive Plan's Land Use Element were considered in the projected water budget forecast in Section 3.3 of the GSP.

The City of Solvang's General Plan is being updated and includes a Conservation/Open Space Element that identifies current water supply resources, including groundwater, as well as projected future demands and options for meeting those demands. The Conservation/Open Space Element promotes the protection of groundwater resources and lays out policies and actions supporting sustainability, such as protecting

[15] Various studies indicate slight to moderate levels of overdraft in several groundwater basins within the County and substantial overdraft in one basin (Santa Barbara County, 2012). The goals and policies in the Santa Barbara County Comprehensive Plan, Conservation Element, Groundwater Resources Section were developed to protect local groundwater.

important groundwater recharge areas through open space designation and prohibiting land uses in recharge areas that could adversely affect groundwater. Information from the Conservation/Open Space Element and the plan's Land Use Element was considered in the projected water budget forecast in Section 3.3 of the GSP.

2.2.3.4 How Sustainable Groundwater Management May Affect Water Supply Assumptions

As described above, the sustainable groundwater management focus of the GSP is well-aligned with the Santa Barbara County Comprehensive Plan's goals and policies in support of prudent management of groundwater resources and protection from overdraft. The Comprehensive Plan's policies regarding coordination of land use planning with water resources planning may present opportunities to include groundwater sustainability data in decision making. The Groundwater Resources Section of the Conservation Element includes estimates of safe yield, overdraft, storage, and other parameters related to water supply, and it notes that additional studies and updates are anticipated to refine the estimates. The data collected during the development and implementation of the GSP may therefore be used to refine water supply assumptions and support sustainability. While the City of Solvang's General Plan does not provide an in-depth discussion of sustainable groundwater management, the plan is undergoing a comprehensive update that may provide opportunities to incorporate new data and sustainability objectives as part of its water supply assumptions. The update to the General Plan is anticipated to be completed by May 2022.

2.2.3.5 Impact of Land Use Plans Outside of Basin on Sustainable Groundwater Management

The Santa Barbara County Comprehensive Plan described previously applies throughout the County and is not specific to the EMA. Implementation of the Comprehensive Plan is anticipated to be complementary to implementation of the GSP and achievement of a sustainable groundwater management. The EMA GSA is not aware of any other land use plans outside the EMA that would limit progress toward sustainability or prevent sustainable management.

2.2.4 Process for Well Permitting

§ 354.8 Description of Plan Area. Each Plan shall include a description of the geographic areas covered, including the following information:

(f) A plain language description of the land use elements or topic categories of applicable general plans that includes the following:

(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 Santa Barbara County Public Health Department's Environmental Health Services Division requires a Water Well Permit for all new and replacement wells and for modifications to wells such as deepening, replacement or repairs. A permit application and map must be submitted describing the proposed location, construction, and intended use of the well. An Environmental Health Services representative reviews the application and conducts a site inspection before issuance of a permit can occur. Standards for well construction are set forth in Santa Barbara County Code § 34A-12. Once the well construction or replacement is completed, the property owner or well driller must provide a copy of the completed well log to Environmental Health Services. In addition, new wells drilled inside the service area boundaries of SYRWCD are required to be registered with and report groundwater pumping to the SYRWCD.

2.2.5 Additional Plan Elements

§ 354.8 Description of Plan Area. Each Plan shall include a description of the geographic areas covered, including the following information:

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

Additional Plan elements from California Water Code § 10727.4 are shown in Table 2-4 below along with a description of how they are addressed in the GSP, coordinated with other entities, or are not applicable to the EMA.

Table 2-4. Plan Elements from California Water Code Section 10727.4

Element	Location
(a) Control of saline water intrusion	Not applicable
(b) Wellhead protection areas and recharge areas	To be coordinated with Santa Barbara County
(c) Migration of contaminated groundwater	Section 3, Basin Setting and Section 4, Monitoring Plan
(d) A well abandonment and well destruction program	To be coordinated with Santa Barbara County
(e) Replenishment of groundwater extractions	Section 6, Projects and Management Actions
(f) Activities implementing, opportunities for, and removing impediments to, conjunctive use or underground storage	Section 6, Projects and Management Actions
(g) Well construction policies	To be coordinated with Santa Barbara County
(h) Measures addressing groundwater contamination cleanup, groundwater recharge, in-lieu use, diversions to storage, conservation, water recycling, conveyance, and extraction projects	Section 6, Projects and Management Actions
(i) Efficient water management practices, as defined in Section 10902, for the delivery of water and water conservation methods to improve the efficiency of water use	To be coordinated with SYRWCD and other entities as applicable
(j) Efforts to develop relationships with state and federal regulatory agencies	Section 6, Projects and Management Actions
(k) Processes to review land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity	To be coordinated with Santa Barbara County and City of Solvang
(l) Impacts on groundwater dependent ecosystems	Section 3, Basin Setting and Section 3.2.6, Groundwater Dependent Ecosystems

2.3 Notice and Communication [§ 354.10]

2.3.1 Beneficial Uses and Users

§ 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.

In accordance with § 10723.2 of SGMA, the following parties were contacted to determine how best to consider and protect their interests during the formation of the GSA and throughout implementation of the GSP. Land uses and property interests potentially affected by the use of groundwater in the EMA, and the parties representing those interests, include but are not limited to the following:

- **Holders of overlying groundwater rights, including agricultural users and domestic water well owners:** Domestic water well owners and agricultural users are members of the EMA CAG.
- **Municipal well operators:** The City of Solvang and ID No. 1 are municipal well operators and members of the GSA. Residents living in the service areas of the City of Solvang and ID No. 1 are members of the CAG.
- **Santa Ynez River Water Conservation District ID No. 1:** ID No. 1 is a member of the GSA and pumps groundwater for municipal, agricultural, commercial, and domestic uses.
- **Public water systems:** Representatives from several mutual water companies in the EMA are members of the EMA CAG.
- **Local land use planning agencies:** The City of Solvang and Santa Barbara County are members of the EMA GSA. Both entities have planning authority in the EMA. Both agencies were provided notice of the intention to adopt the GSP on August 6, 2021, by the EMA GSA.
- **Environmental users of groundwater:** The California Department of Fish and Wildlife (CDFW) and the National Marine Fisheries Service (NMFS) have been involved in the EMA SGMA process regarding environmental uses of groundwater. Environmental users of groundwater were invited to apply to participate on the EMA CAG.
- **Surface water users:** The City of Solvang and ID No. 1 divert water from the alluvial underflow of the Santa Ynez River. The City of Solvang discharges wastewater to the alluvial underflow of the Santa Ynez River. CDFW and NMFS have been involved regarding environmental uses of the Santa Ynez River. The SYRWCD manages water rights releases for the benefit of downstream users of surface water. Surface water users are members of the EMA CAG.
- **California Native American Tribes:** The Santa Ynez Band of Chumash Indians is a federally recognized tribe that maintains a reservation within the EMA and will work with the EMA GSA. A representative of the Chumash Tribe is a member of the EMA CAG.
- **Disadvantaged communities:** No disadvantaged communities have been identified within the EMA. Focused efforts have been made to ensure that all users within the EMA are informed of the GSP development process and are invited to participate.

- **Entities listed in SGMA § 10927 that are monitoring groundwater elevations in all or part of the EMA managed by the GSA:** The City of Solvang and ID No. 1 monitor their respective wells, and the Water Agency is the CASGEM agency within the EMA. All three entities are members of the EMA GSA.

The EMA GSA developed a *Communication and Engagement Plan for Santa Ynez EMA GSP Development* (see Appendix B) to guide stakeholder engagement and ensure that all beneficial uses and users of groundwater remained informed about the GSP development process and had opportunities to participate and represent their interests. Participation from a variety of stakeholders helps the EMA GSA make decisions that consider varying needs and interests in the EMA.

The EMA GSA created the EMA CAG, which is comprised of a variety of the stakeholders and water user groups. Members of this group provide meaningful insight, support, and expertise from a variety of viewpoints for the EMA GSA to consider. Although strictly advisory and not a voting participant of the EMA GSA, the EMA CAG represents a number of social, business, agricultural, domestic, cultural, and economic backgrounds to bring the widest possible perspective. Potential EMA CAG members were identified through outreach to the interested party list and a press release to local newspapers. The group is comprised of seven members representing interests of the following stakeholder groups:

- Domestic well owners
- Agricultural well owners
- Vineyard and wine industry
- Riparian water diverters
- Mutual water companies
- Santa Ynez Band of Chumash Indians
- At large citizens

EMA CAG applicants were screened by an Ad-Hoc committee of the EMA GSA consisting of elected representatives and member agency staff. The selected representatives must reflect the interests of their group and be able to effectively communicate the group's opinions and feedback. The qualifications of all candidates were reviewed prior to the EMA GSA selection of the EMA CAG.

The members of the EMA CAG were responsible for reviewing drafts of the various sections of the GSP, providing feedback on those drafts, reviewing and providing feedback on draft newsletters created for stakeholder outreach, reviewing presentations that were delivered during workshops and Committee meetings, and soliciting input from their respective stakeholders as the GSP was being developed. Staff members from the EMA GSA member agencies facilitated the CAG meetings; prepared agendas for the meetings; compiled questions, comments, and responses to comments made in the meetings; prepared supporting materials; prepared press releases; and maintained the Basin's SGMA website with dedicated GSA pages.

2.3.2 Public Meetings

§ 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:

(b) A list of public meetings at which the Plan was discussed or considered by the Agency.

The EMA GSA Committee first met in January 2019 and has held quarterly regular meetings thereafter, with additional special meetings, as needed. Regular and special meetings are open to the public and involve discussions of the GSP. Opportunities for public comment are provided at all meetings, and meetings are also an opportunity for stakeholders to stay informed about what is happening with the GSA and the GSP process. Meetings were held remotely via teleconference call and video feed due to COVID-19 protocols. In-person meetings, when conducted, took place in the Solvang City Council Chambers after the first initial meetings held in the Santa Ynez Community Services District Conference Room. Advance notice of meetings has been, and will continue to be, posted on the Basin's SGMA website (santaynezwater.org). All agendas and meeting minutes from past meetings are available on the Basin's SGMA website. The EMA CAG consists of appointed members representing a variety of groundwater uses and users in the EMA. The EMA CAG provides input to the GSA related to elements of the GSP, and its meetings are open to the public and noticed in accordance with the Brown Act.[16] Below is a list of public meetings of the EMA GSA Committee and the CAG where the GSP was discussed.

EMA GSA Committee meetings:

- 2019: January 24, April 25, July 25, and October 24
- 2020: February 27, May 21, August 27, November 19, and December 10
- 2021: January 21, February 25, March 25, April 15, April 29, May 13, May 27, July 22, August 26, October 21, October 28, November 18, and December 9

EMA CAG meetings:

- 2019: September 5 and September 30
- 2020: January 9 and June 2
- 2021: February 17, May 11, July 7, Sept. 30, and October 11

[16] The Ralph M. Brown Act (Government Code §§ 54950-54963) is intended to provide public access to meetings of California local government agencies. Agencies subject to the requirements of the Brown Act must provide public notice of their meetings, post agendas of the subjects to be discussed, and provide public access to those meetings. More information is available at https://firstamendmentcoalition.org/facs-brown-act-primer/

2.3.3 Public Comments

§ 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:

(c) Comments regarding the Plan received by the Agency and a summary of any responses by the Agency.

Public comments received and a summary of responses to public comments are provided in Appendix J. In addition to the response to comments, many revisions were made to the GSP incorporating responses to the comments received "that raise credible technical or policy issues with the Plan." (§ 355.4(b)(10))

2.3.4 Communication

2.3.4.1 Decision-Making Process

§ 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:

(d) A communication section of the Plan that includes the following:

(1) An explanation of the Agency's decision-making process.

The GSA's decision-making process is described in the 2017 MOA for the formation of the GSA which became effective April 27, 2017. The GSA Committee is comprised of one elected official representative and an alternate from each of the four member agencies that make up the GSA: SYRWCD, City of Solvang, Water Agency, and ID No. 1. Voting in the EMA GSA Committee is weighted. The Water Agency has five votes, SYRWCD has three votes, ID No. 1 has two votes, and the City of Solvang has one vote. A quorum to hold a meeting requires a simple majority (three of the four GSA member agencies), and meetings are subject to the Brown Act, which includes public notice and comment requirements. All proposed actions or resolutions must be passed by a simple majority of the voting membership. Actions to enter into a Joint Powers Agency agreement and to adopt or approve the GSP must pass by a 70 percent vote (at least eight votes) with the concurrence of each GSA member's governing body.

2.3.4.2 Public Engagement

§ 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:

(d) A communication section of the Plan that includes the following:

(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.

The *Communication and Engagement Plan* describes multiple venues and tools for stakeholder engagement to support interested parties in providing input on their priorities and values and to provide updates to the public in a timely manner. The EMA GSA is committed to conducting an open process that includes active discussions with all interested parties throughout the development of the GSP.

A list of interested parties has been compiled and is updated and revised regularly. The EMA's interested parties list is maintained on the online Santa Ynez Groundwater Communication Portal (GCP), which is also used by the two other GSAs in the Basin. The GCP notifies interested parties electronically of upcoming meetings related to development of the GSP and sends e-mails about upcoming surveys and public comment periods. More than 35 notification e-mails were sent through this source over the course of GSP preparation. The GCP contains a database showing meeting dates, times, and locations, along with related documents, such as meeting agendas, minutes, and matters considered by the GSA. During public comment periods, interested parties can review documents and submit comments using a form on the GCP. Public comments are reviewed and addressed in revisions to GSP elements and sections.

In addition to the online GCP, EMA GSA Committee meetings are held regularly to provide updates and information about the GSP and to receive public feedback. As described above, all EMA GSA Committee meetings are subject to Brown Act requirements. The EMA CAG provides an additional level of public input on various issues related to the development of the GSP. As requested by the EMA GSA Committee, the EMA CAG provided feedback on elements or sections of the GSP (and on the final draft of the GSP) to ensure the inclusion of perspectives representing different categories of groundwater uses and users in the EMA. Public input gathered at these meetings has helped shape development of the GSP and fostered discussion of stakeholder concerns and ideas for collaborative involvement in future GSP implementation activities.

More than 23 public workshops were held during the development of the GSP to inform stakeholders of key elements of the GSP and to solicit input on how sustainability criteria should be set, what constitutes undesirable results, and what projects and management actions should be employed as needed or desired to maintain sustainability in the EMA. Media outreach included preparation of three press releases in the Santa Barbara News Press, Santa Ynez Valley Star, and Noozhawk, a digital news source.

Substantial effort was put into maintaining the Basin's SGMA website (santaynezwater.org) with GSA-specific webpages that provided a calendar of events and public comment periods for each GSA, GSA and CAG meeting agendas, minutes, supporting materials presented at each meeting, and workshop slides. The Basin's SGMA website has recorded over 5,000 webpage views per month.

The EMA GSA used focused methods to enhance the accessibility of the GSP development process to a diverse range of social, cultural, and economic elements of the population within the EMA. Section 10723.2(h) of SGMA provides that California Native American tribes are among the beneficial users of groundwater that must be considered by the EMA GSA in preparing the GSP. The Santa Ynez Band of Chumash Indians have a reservation within the EMA, and the Tribal Chairman indicated early in the process of developing the GSP that the Tribe looks forward to collaborating with the GSA. The EMA GSA remains in contact with and welcomes participation from the Santa Ynez Band of Chumash Indians in GSP development, and the Tribal Government has a representative on the EMA CAG.

Specific efforts were also made to reach out to disadvantaged communities during GSP development, including the use of culturally appropriate language, education, and framing of sustainable groundwater management issues. However, recent data indicates that there are no disadvantaged communities present within the EMA, although there are disadvantaged communities within other management areas in the Basin. The GSA created quarterly newsletters in English and Spanish for the general public for the entire Basin, which were distributed by member agencies in utility bills and through newsletters from the County's District Supervisors. These newsletters are included in Appendix B. Translation services were offered for different languages as needed in compliance with the Dymally-Alatorre Bilingual Services Act. Interested parties were notified of each meeting through the GCP and through the newsletters from the County's District Supervisors.

2.3.4.3 Progress Updates

§ 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:

(d) A communication section of the Plan that includes the following:

(4) The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.

The EMA GSA has kept the public informed throughout the development of the GSP using the GCP and other means discussed herein and will continue to use this web-based tool during GSP implementation along with the Basin's SGMA website that has GSA-specific pages. E-mails will be sent to interested parties to report on the progress made in implementing projects and actions. Direct mailings will also be sent to stakeholders who have requested direct mailings and provided a mailing address. EMA GSA Committee meetings will continue to be held to present information and invite the public to comment. Materials presented in EMA GSA Committee meetings to update the public on progress will also be made available to local agencies to use in communications with their own constituents, and they will be encouraged to share these materials. Annual reports will be prepared describing monitoring results and progress toward implementing the GSP and meeting sustainability goals. GSP updates must be submitted to DWR every 5 years, and stakeholders will be asked to review and comment on the updates.

The *Communication and Engagement Plan* for the GSP is presented in Appendix B. A description of the public process that was used to establish the SMCs is presented in Section 5.3.1. The methods the EMA GSA will follow to inform the public about progress towards implementing the GSP is included in Section 7. The annual report will also provide an update that informs the public about progress toward implementing the plan.

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SECTION 3: **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.

This section describes the physical setting and characteristics of the Santa Ynez River Valley Groundwater Basin (Basin) Eastern Management Area (EMA), including the basin boundaries, geologic formations and structures, and principal aquifer units. An accurate understanding of the Basin is central to sustainable management of the groundwater resource for all the beneficial uses within the EMA, including agricultural, municipal, domestic, and environmental uses.

This section is principally based upon a body of published literature, consisting primarily of the following:

- Geologic and hydrogeologic investigations
- Annual groundwater planning reports, which have been prepared for a large portion of the EMA for more than 40 years
- Basin-specific geologic and hydrogeologic data

The compiled literature, reports, and data that contribute to this report constitute the best available information relevant to the EMA. This Basin Setting section of the Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan (GSP) provides a foundation for sustainable groundwater management, and, to that end, will be updated as warranted to maintain this goal.

3.1 Hydrogeologic Conceptual Model [§ 354.14]

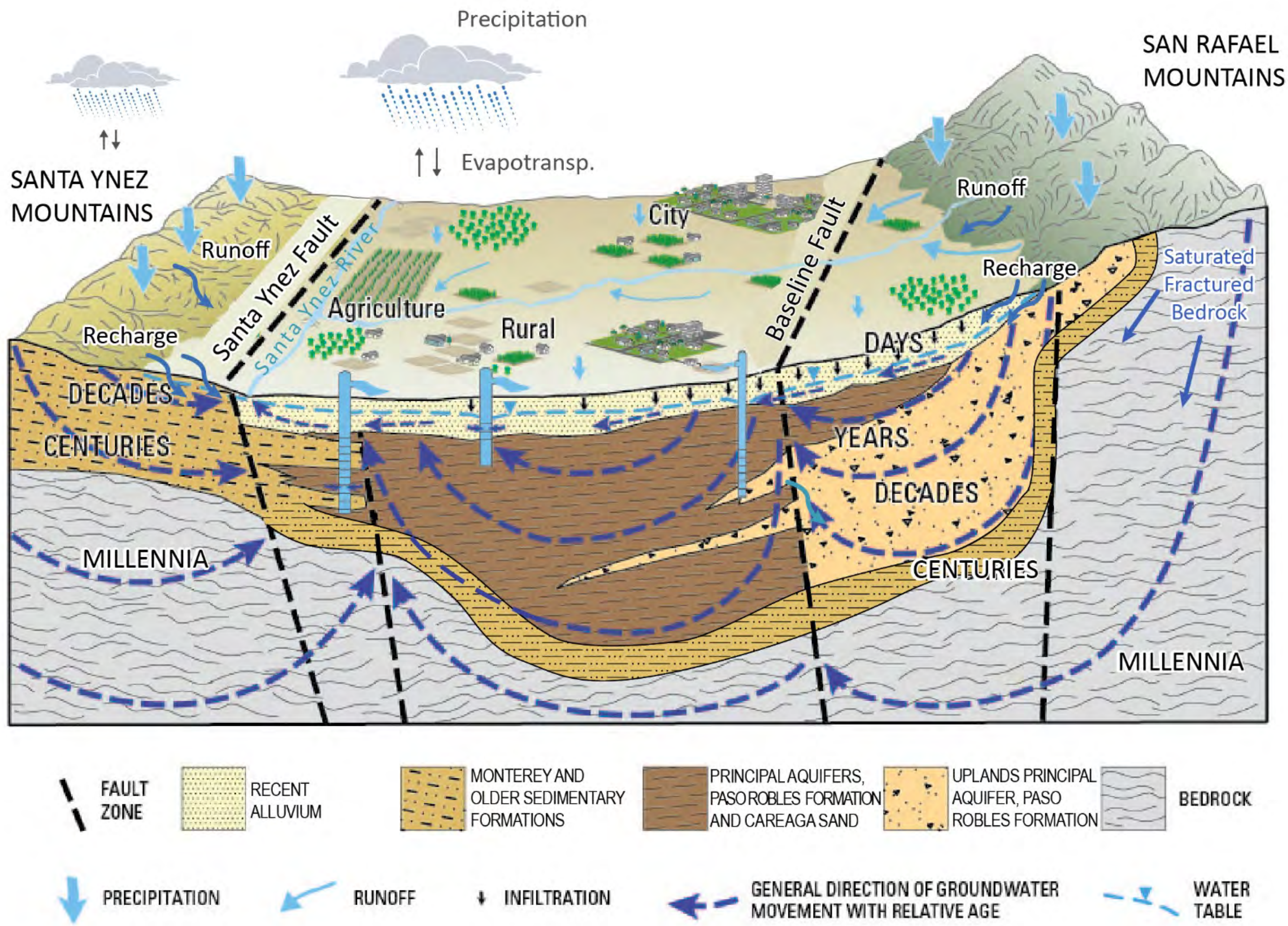
§ 354.14 Hydrogeological Conceptual Model

(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.

This section describes the hydrogeologic conceptual model (HCM) for the EMA and, to some degree, the entire Basin. The HCM is a simple narrative description with diagrams of the hydrogeologic system of the EMA. As depicted in Figure 3-1, the EMA HCM area encompasses the entire landscape and underlying geology from the mountains rimming the Basin (the San Rafael Mountains to the north and east and the Santa Ynez Mountains to the south) down to the Santa Ynez River that drains water from the valley. The HCM and its various components are presented below, including the following:

- Topographic setting
- Surface hydrology and its interactions with groundwater

- Underlying geologic system and principal aquifers
- Generalized recharge and discharge areas for the aquifers
- Principal flow directions
- Water inflows and outflows



Source: Nishikawa, 2013, Hydrologic and Geochemical Characterization of the Santa Rosa Plain Watershed, Sonoma County, California

Important details related to each of these components of the HCM, relevant groundwater water quality and primary beneficial uses of the groundwater, and a discussion of identified data gaps and aspects of uncertainty associated with these elements are presented in the following subsections.

This HCM provides a framework for subsequent sections of the basin setting, including groundwater conditions (Section 3.2) and water budgets (Section 3.3). Together these sections provide the basis for a solid understanding of the groundwater resources in the EMA and support water managers' efforts to achieve groundwater sustainability in the EMA and the Basin by 2042.

3.1.1 Regional Hydrology

3.1.1.1 Topography and Watershed Boundary

§ 354.14 Hydrogeological Conceptual Model.

(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.

The Basin is located within the Santa Ynez River watershed in Santa Barbara County on California's central coast. The entire Basin is about 50 miles long and varies in width from about 4 to 7 miles, as presented on Figure 1-1. The Basin covers 319 square miles (204,000 acres) within the entire Bulletin 118 Basin Boundary, of which the easternmost 150 square miles make up the EMA, including the Santa Ynez Uplands and Santa Ynez River areas. The Santa Ynez Uplands area includes the groundwater system that is under the jurisdiction of the Sustainable Groundwater Management Act (SGMA). The Santa Ynez River area, including the river and associated underflow constitutes a surface water system, is managed under the jurisdiction of the California State Water Resources Control Board (SWRCB) and is not within the purview of SGMA.

The Basin is divided into three management areas (MAs): the Western Management Area (WMA), the EMA, and the Central Management Area (CMA). Due to the unique geology and hydrogeology in each area, these three areas are managed as individual management areas with respect to SGMA.

Extending north of the Santa Ynez Uplands and rising to 4,000 to 6,000 feet above sea level, the EMA watershed includes Figueroa Mountain (LaFreniere and French, 1968) and the Santa Ynez Mountains. The EMA is bounded on the north and east by impermeable rocks of the San Rafael Mountains and on the northwest by the adjacent San Antonio Creek Valley Groundwater Basin (San Antonio Groundwater Basin). The entire Basin is bounded on the south by the Santa Ynez Mountains (DWR, 2016; Figures 1-1 and 3-1).

As is discussed throughout this section, the EMA portion of the California Department of Water Resources (DWR) Bulletin 118 boundary comprises two main areas: the Santa Ynez Uplands and the Santa Ynez River areas. To the north and east, the Santa Ynez Uplands are surrounded by the San Rafael Mountains, which contribute surface water flow and groundwater recharge to the Santa Ynez Uplands. Several tributaries and their sub-watersheds flow from the San Rafael Mountains to the Santa Ynez River. They include Santa Cruz Creek and Cachuma Creek, which flow into Lake Cachuma (Cachuma Reservoir). Several other creeks that flow into the Santa Ynez River directly downstream of Lake Cachuma's Bradbury Dam include Happy Canyon, Santa Agueda Creek, Zanja de Cota Creek, Alamo Pintado Creek, Adobe Canyon and Ballard Canyon. Zaca Creek exits the EMA and flows through the CMA into the Santa Ynez River.

The southern portion of the DWR's Bulletin 118 basin boundary along the Santa Ynez River is bounded by the Santa Ynez Mountains to the south. Surface water flows into this area are principally from the upstream Santa Ynez River, which drains approximately 900 square miles, and include flow from the Santa Ynez

Mountains through the following tributaries into the Santa Ynez River: Hilton, San Lucas, Calabazal, Quiota and Alisal Creeks. The locations of the contributing creeks are shown on Figure 3-1.[17]

The Santa Ynez Uplands covers a majority of the EMA, including the northern 130 square miles (87 percent) of the 150 square miles of the EMA. The Santa Ynez Uplands is characterized by the following:

- It is wholly within the EMA.
- It includes the towns of Santa Ynez, Ballard, and Los Olivos.
- It includes areas both within the Santa Ynez River Water Conservation District (SYRWCD) referred to as Zone E; shown on Figure 2-4 and extending to the north to the San Rafael Mountains and to the east to areas north of Lake Cachuma (Stetson, 2021).
- Its principal aquifers are separated from the topographically lower Santa Ynez River and associated Alluvium to the south by a ridge of low permeability rocks (e.g., Monterey Formation), except in areas where tributaries to the Santa Ynez River (e.g., Alamo Pintado Creek) cut through. These low permeability rocks underlie the river and Santa Ynez River Alluvium.
- Its land-surface elevation ranges from a low of 480 feet above sea level in the southern portion along Alamo Pintado Creek near the City of Solvang to a high of about 2,390 feet above sea level in the foothills in the north and northeast of the area.

The Santa Ynez River Alluvium—managed as surface water by the SWRCB and not subject to management by the Groundwater Sustainability Agencies (GSAs) under SGMA—underlies the Santa Ynez River. The Santa Ynez Alluvium extends outside of the EMA, both upstream and downstream, for a total length of 36 miles between the upstream Bradbury Dam (to the east) through the CMA and WMA to the Lompoc Plain to the west, passing the Cities of Solvang, Buellton, and Lompoc (Santa Barbara County, 2012). In the EMA, the land-surface elevation within the Santa Ynez River Alluvium ranges from a low of 350 feet near the City of Solvang, to a high of 600 feet near the base of Bradbury Dam (Santa Barbara County, 2012).

Between the Santa Ynez Uplands and Santa Ynez River areas lies an area of relatively limited groundwater production (referred to in SYRWCD annual reports as Zone C [see Figure 2-4]) that serves as a catch-all area for all other portions of SYRWCD (Stetson, 2021). Groundwater production in this area is limited due to the relatively shallow and discontinuous aquifers and bedrock.

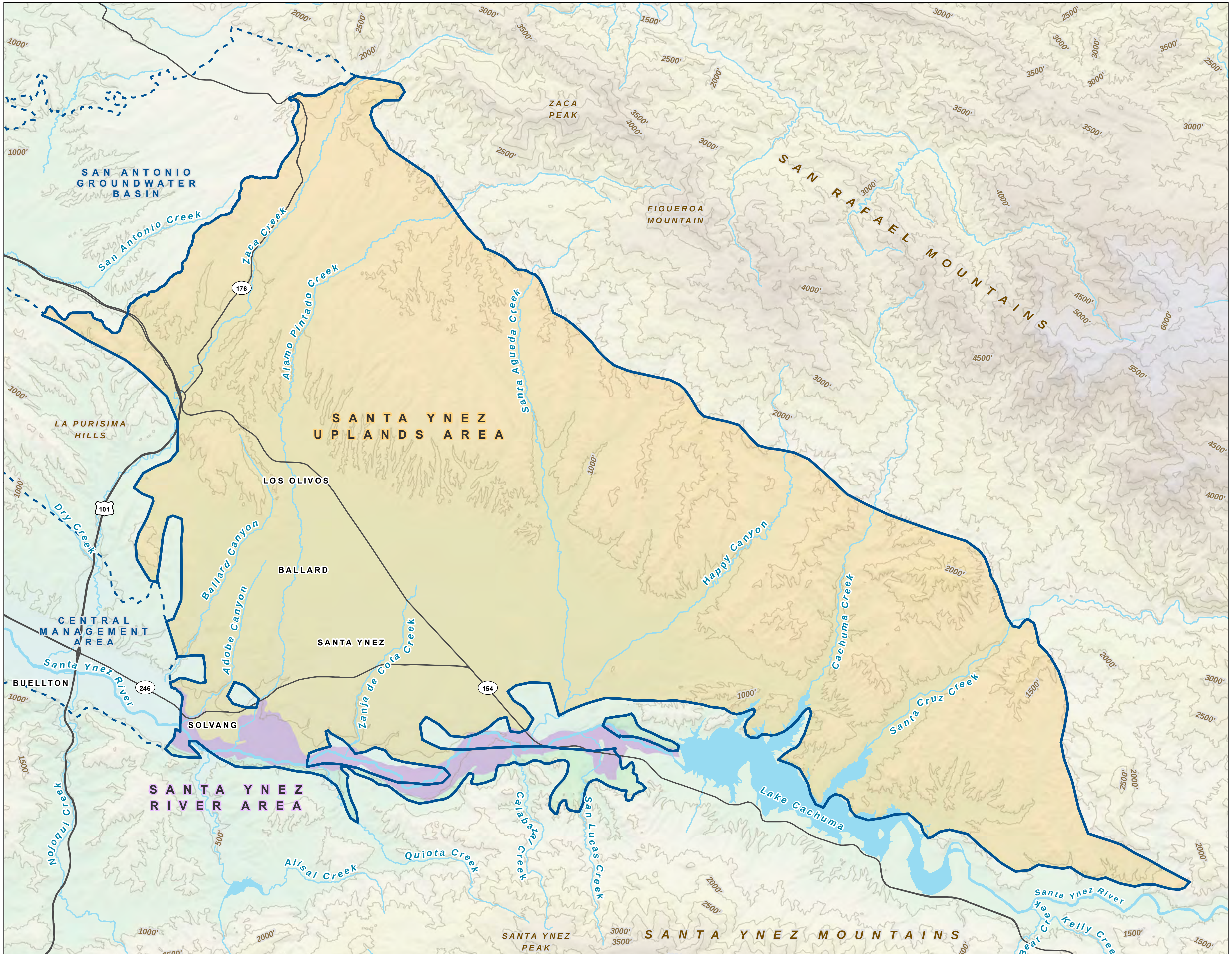
As is discussed more thoroughly in Section 3.3, Water Budgets, both surface water flow and groundwater recharge derive from water that enters the Basin around the edges from the underlying bedrock on the mountain slopes. This is commonly referred to as mountain front recharge. This recharge component occurs both from the north from the San Rafael Mountains, which contribute groundwater recharge to the Santa Ynez Uplands, and from the south from the Santa Ynez Mountains, which contribute recharge to the Santa Ynez River area both above and belowground. Mountain front recharge from the Santa Ynez Mountains flows directly into streams and then into the Santa Ynez River.

[17] The subareas referred to in this GSP generally follow the conventions used for management by SYRWCD, such that the Santa Ynez River area includes most of SYRWCD's Zone A, as well as other areas within the Santa Ynez River Alluvium upstream to the Bradbury Dam. The Santa Ynez River area constitutes a surface water system, which is managed under the jurisdiction of the SWRCB and is not within the purview of SGMA. These general areas are summarized in annual reports prepared by SYRWCD.

FIGURE 3-1

Topographic Map

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan



LEGEND

- Santa Ynez Uplands Area (area covered by GSP)
- Santa Ynez River Area

Elevation

- 6,500'
- 150'
- Elevation Contour, 500'

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

Date: June 9, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

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3.1.1.2 Soil Types

§ 354.14 Hydrogeological Conceptual Model.

(d) Physical characteristics of the basin shall be represented on one or more maps that depict the following:

(3) Soil characteristics as described by the appropriate Natural Resources Conservation Service soil survey or other applicable studies.

Soil types have been mapped and presented by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service Soil Survey Geographic Database (USDA, 2020; Figure 3-2). The saturated hydraulic conductivity of the surficial soils is a good indicator of surficial soil infiltration potential, and thus potential for recharging underlying groundwater resources. The soil hydrologic grouping is an assessment of soil infiltration rates that are determined by the water transmitting properties of the soil, which includes hydraulic conductivity and percentage of clays in the soil relative to sands. These groups are defined as the following:

- **Group A – High Infiltration Rate:** Water is transmitted freely through the soil; soils typically have less than 10 percent clay and more than 90 percent sand or gravel.
- **Group B – Moderate Infiltration Rate:** Water transmission through the soil is unimpeded; soils typically have between 10 and 20 percent clay and between 50 and 90 percent sand.
- **Group C – Slow Infiltration Rate:** Water transmission through the soil is somewhat restricted; soils typically have between 20 and 40 percent clay and less than 50 percent sand.
- **Group D – Very Slow Infiltration Rate:** Water movement through the soil is restricted or very restricted; soils typically have greater than 40 percent clay, less than 50 percent sand.

The hydrologic groups generally correlate with the hydraulic conductivity of underlying geologic units, with lower soil hydraulic conductivity zones correlating to areas underlain by clayey portions of the Paso Robles Formation. The higher soil hydraulic conductivity zones generally correspond to areas underlain by Alluvium underlying the Santa Ynez River, unsaturated Older Alluvium, and areas of coarser sediments within the Paso Robles Formation.

Soils with the highest infiltration rate in Group A mainly consist of deep, well-drained to excessively drained sands or gravelly sands, characterized by low runoff potential even when thoroughly wet. These high infiltration soils are present in three general areas:

- **Vicinity of Los Olivos and Solvang**
- **Along Santa Agueda and Alamo Pintado Creeks**, as well as along the **Tributary Alluvium of Santa Cruz Creek** north of Lake Cachuma
- **Along the Santa Ynez River**

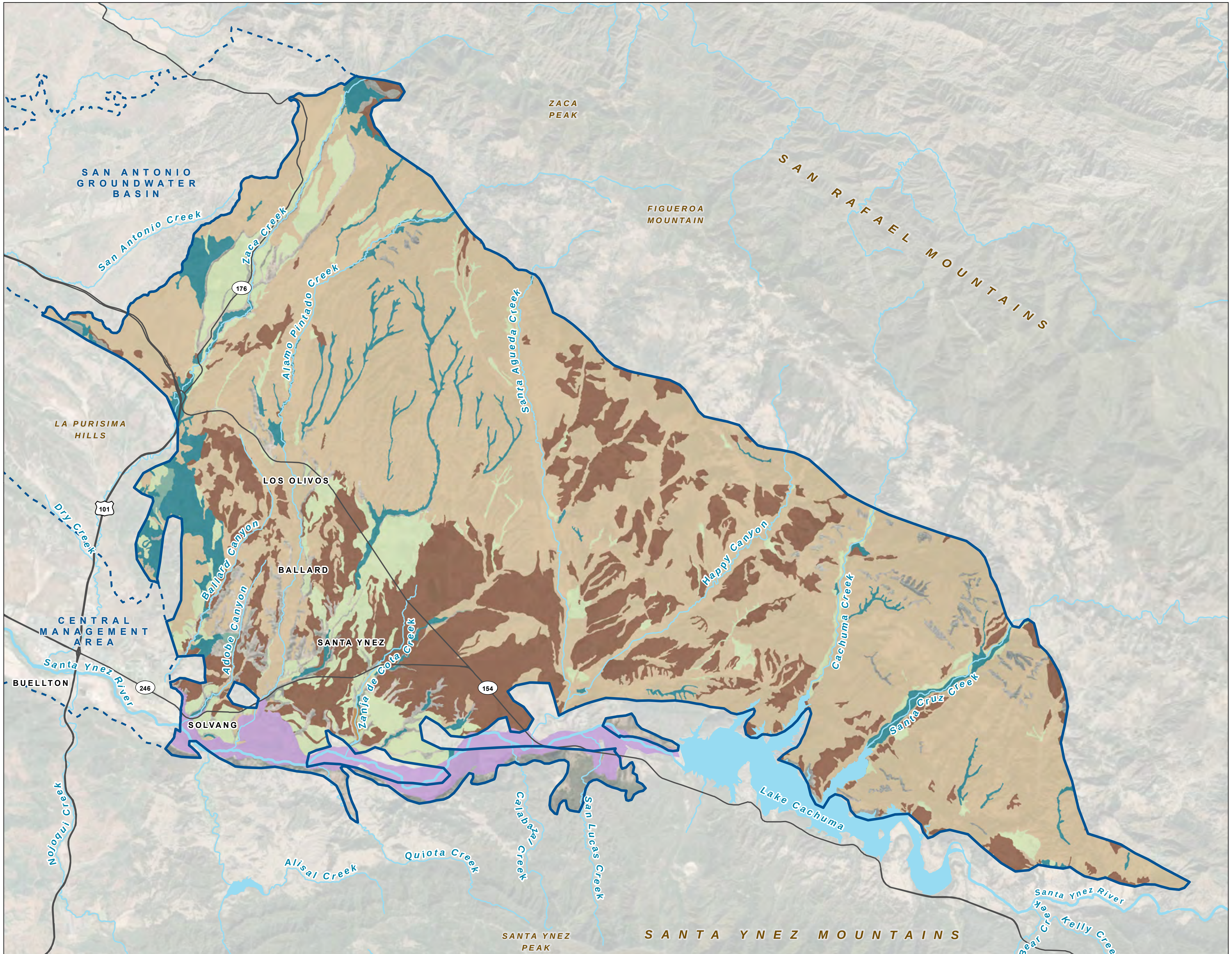

FIGURE 3-2

Hydrologic Soil Groups

Santa Ynez River Valley
Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan

LEGEND

Santa Ynez River Area

Soil Hydrologic Group

- A High Infiltration Rate
- A/D High Infiltration Rate when Drained
- B Moderate Infiltration Rate
- C Slow Infiltration Rate
- C/D Slow Infiltration Rate when Drained
- D Very Slow Infiltration Rate

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

Hydrologic Soil Groups

Group A: Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B: Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C: Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D: Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

N

0 5,000 10,000 15,000
Feet

Date: June 9, 2021
Data Sources: ESRI, USGS, Maxar 2019

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The soils in Group B have a moderate infiltration rate when thoroughly wet and are moderately deep and well-drained. These have moderately fine to moderately coarse texture. These soils are located within the following:

- **Tributary Alluvium of Zaca Creek** north of Highway 101
- **Santa Ynez Uplands** north of Santa Ynez
- **Zanja de Cota Creek and a majority of SYRWCD's Zone C area**, adjacent to the Santa Ynez River area

The slow and very slow infiltration rate soils in Groups C and D, respectively, make up the remainder of the EMA, occurring primarily in the Older Alluvium that blankets the area and found in areas of the Santa Ynez Uplands. These soils have slow to very slow infiltration rates when thoroughly saturated. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture.

3.1.1.3 Surface Water Bodies

§ 354.14 Hydrogeological Conceptual Model

(d) Physical characteristics of the basin shall be represented on one or more maps that depict the following:

(5) Surface water bodies that are significant to the management of the basin.

The most significant natural surface water feature in the Basin, the Santa Ynez River, flows west over approximately 90 miles, from its headwaters in the San Rafael and Santa Ynez Mountains, to the Pacific Ocean, draining approximately 900 square miles (Figure 2-13). The headwaters originate at an elevation of about 4,000 feet above sea level near the eastern boundary of Santa Barbara County, where there is an average annual precipitation of up to 49 inches per year.[18]

The Santa Ynez River enters three human-made reservoirs upstream of the WMA and the CMA: Jameson Reservoir is the farthest upstream, then Gibraltar Reservoir, and finally Lake Cachuma (Figure 2-13). The reservoirs were built for municipal water supply. Both Jameson and Gibraltar Reservoirs have storage capacities of approximately 5,000 acre-feet each. Lake Cachuma is much larger with a total storage capacity of as much as 195,578 acre-feet (at an elevation of 753 feet above sea level). Although reservoir releases flow into the Santa Ynez River, the reservoirs are also managed to divert water out of the Santa Ynez River watershed through a system of tunnels through the Santa Ynez Mountains for use by the cities located on the Santa Barbara County south coast (i.e., City of Goleta and Cities of Santa Barbara, Montecito and Carpinteria).

The largest of the three reservoirs is Lake Cachuma, which is approximately 5 miles long and up to 1 mile wide, which is fed by the upper Santa Ynez River and two major tributaries from the Santa Ynez Uplands to the north, which are Santa Cruz Creek and Cachuma Creek. Below the Bradbury Dam, which impounds Lake Cachuma, the Santa Ynez River flows west into and through the EMA. In the EMA downstream of Bradbury Dam, the Santa Ynez River is joined by several tributaries—including Santa Agueda Creek, Zanja de Cota Creek, and Alamo Pintado Creek—as the river flows past the communities of Solvang and Santa Ynez, as shown on Figure 3-1.

[18] PRISM Climate Group. 2014. *Average Annual Precipitation 1981–2010*.

Downstream of Bradbury Dam, the Santa Ynez River continues flowing west and is primarily intermittent throughout the Basin, carrying mainly flood flows from tributary watershed land downstream of Bradbury Dam with occasional spills and releases of water from Lake Cachuma. During summer months, water is released from Lake Cachuma to meet downstream water rights.

Downstream Water Rights Releases

The EMA is recharged in part by downstream water rights releases from Lake Cachuma, as ordered by SYRWCD. Rules governing water rights releases for users downstream of Lake Cachuma are set forth in the SWRCB Order of 1973 (WR 73-37), as amended in 1989 (WR 89-18) and most recently in 2019 (WR 2019-0148) (SWRCB, 2019). These releases are based on the establishment of two accounts and accrual of credits (storing water) in Lake Cachuma for the Above and Below Narrows areas. Releases from the Above Narrows Account are made at Bradbury Dam for the benefit of downstream water users between the dam and the Lompoc Narrows. Releases from the Below Narrows Account are conveyed to Lompoc Narrows for the benefit of water users in the Lompoc Plain subarea. The SYRWCD designates the riparian flow subarea as Zone A, which is referred to as the Santa Ynez River Area on Figure 3-1.

Historically, the primary uses of Lake Cachuma water have been for people and agriculture. Water rights releases from Bradbury Dam are made for the benefit of downstream users of water along the Santa Ynez River in a manner that balances the flood flow capture capacity within the reservoir and the reliable downstream supply of water for aquatic and riparian needs and human demands along the river. The 2019 water rights decision includes provisions to protect endangered Southern California steelhead in the Santa Ynez River. Within the EMA, the Santa Ynez River flows west of Highway 154, past the communities of Solvang and Santa Ynez, as presented on Figure 3-1.

3.1.2 Streamflow Monitoring

Within the EMA, the Santa Ynez River is currently gauged and recorded just upstream of the EMA where it flows under Highway 154 at the San Lucas Bridge. Flow of the Santa Ynez River within the EMA has been actively gauged near Solvang from 1928 until the present. Streamflow is also measured along Alamo Pintado Creek, at a location approximately 2.5 miles upstream of its confluence with the Santa Ynez River.

Streamflow data from the historical and existing streamflow gauges, along with Lake Cachuma storage data, have been obtained from the U.S. Geological Survey (USGS). Data documenting water releases from Bradbury Dam were compiled from the U.S. Bureau of Reclamation (USBR) sources.

The periods with monthly streamflow data sets from stream gauging stations within and surrounding the EMA are presented on Table 3-1. The locations of these gauging stations, with the exception of the upstream stations along the Santa Ynez River, are presented on Figure 2-13.

Table 3-1. Summary of Streamflow Gauging Stations

Station Name	Elevation (feet)	Location	Beginning of Record	End of Record	Station No.
Jameson Reservoir	2,240	Upstream	1970	2013	11121010
Santa Ynez River Below Gibraltar Reservoir	1,229	Upstream	1988	Active	11123000
Gibraltar Dam Release Weir	1,229	Upstream	2007	Active	11122010
Santa Ynez River Above Gibraltar Dam Storage	1,399 (varies)	Upstream	1988	Active	11122000
Santa Ynez River Below Los Laurels Canyon	788	Upstream	1947	Active	11123500
Santa Cruz Creek	783	Upstream	1941	Active	11124500
Hilton Canyon Below Bradbury Dam	653	Upstream	2002	2016	11125605
Hilton Canyon Creek	740	Upstream	2016	Active	11125600
Santa Ynez River near Santa Ynez (stage)	558	Upstream	1928	2009 (Currently stage only)	11126000
Santa Ynez River at Highway 154 (Water Quality)	520	Upstream	2007	Active	11126400
Alamo Pintado Creek	540	Within EMA	1970	Active	11128250
Zaca Creek Near Buellton	471	Downstream	1963	Active	11129800
Santa Ynez River at Solvang	350	Within EMA[1]	1928	Active	11128500

Note

[1] This is within the DWR Bulletin 118 boundaries for the Basin in the Santa Ynez River area, not managed under the purview of SGMA.

3.1.2.1 Sources and Point of Delivery of Imported Water

§ 354.14 Hydrogeological Conceptual Model.

(d) Physical characteristics of the basin shall be represented on one or more maps that depict the following:

(6) The source and point of delivery for imported water supplies.

In addition to local surface water and groundwater sources, supplemental water is imported into the EMA. While groundwater supplies a majority of the water demand within the EMA, surface water is available to the EMA via local sources (the Cachuma Project and Cachuma releases that convey water through the Santa Ynez River Alluvium), and from an imported source: California State Water Project (SWP) water through the Coastal Branch of the SWP (Santa Barbara County, 2012).[19] Pumping from the Santa Ynez River Alluvium is managed as surface water by the SWRCB and is not subject to management by the GSAs under SGMA.

State Water Project

Imported SWP water is delivered to portions of the EMA through the Central Coast Water Authority (CCWA) pipeline, which has been operating since 1997. Water is delivered at turnouts to specific water distribution systems, as well as to Lake Cachuma. Within the Basin, the receiving entities are Vandenberg Space Force Base,[20] the City of Buellton, the City of Solvang, and the Santa Ynez River Water Conservation District, Improvement District No. 1 (ID No. 1). CCWA water can also be mixed in with the water from water rights releases at Lake Cachuma.

In 1997 and 1998, CCWA was formed to finance, construct, manage, and operate Santa Barbara County's 42-mile extension of the SWP water pipeline, the State-owned water facilities in Santa Barbara and San Luis Obispo Counties, and a regional water treatment plant (Santa Barbara County, 2012). Beginning in 1998, ID No. 1 began receiving water from the SWP through the new pipeline. The location of the pipeline and turnouts in the City of Solvang and ID No. 1 are presented on Figure 2-13.

ID No. 1 holds an SWP allocation of 2,000 acre-feet per year (AFY) and a 200-AFY as a drought buffer. A total of 1,500 AFY are contractually committed for use by the City of Solvang. The drought buffer effectively increases the amount of water that can be delivered in the event that the agency's full allocation of SWP water is not delivered in a given year.

The imported water, both within ID No. 1 and the City of Solvang, is used by agricultural, municipal, domestic, and industrial customers. Approximately 95 percent of these water uses occur on land overlying the Santa Ynez Upland area; however, it is not possible at this time to determine exactly where the imported water is used in the ID No. 1 system. This is because, in the ID No. 1 water distribution system, the imported water is mixed with other native water in the Basin, including upland groundwater and river alluvium well water.

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[19] Both the Cachuma Project and the SWP water source provisions are described in detail in Section 3.3.2.1.3.
[20] Vandenberg Space Force Base was formerly called the Vandenberg Air Force Base until a renaming ceremony in May 2021 (Associated Press, 2021).

3.1.3 Regional Geology

§ 354.14 Hydrogeological Conceptual Model.

(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.

(d) Physical characteristics of the basin shall be represented on one or more maps that depict the following:

(2) Surficial geology derived from a qualified map including the locations of cross-sections required by this Section.

This section describes the geologic formations and structure in the EMA portion of the Basin. These descriptions are summarized from published reports from the USGS (Upson and Thomasson,1951 and LaFreniere and French, 1968) and reports by consultants and federal, state, and local agencies. The surficial geology and geologic structures are mapped and described by Dibblee (1950, 1980, 1987a, 1987b, 1988a, 1988b, 1991, 1993a, and 1993b), as presented on Figure 3-3.

3.1.3.1 Regional Geologic and Structural Setting

The Basin is located at the extreme southern end of the Coast Ranges geomorphic province, as defined by the California Geological Survey (2002). The Santa Ynez Fault Zone, which is located near the southern boundary of the Basin, is the southern boundary of the Coast Ranges, which extend more than 500 miles to the north up the California Coast to the Oregon border. The Coast Ranges are northwest-trending mountain ranges and valleys that follow the trend of the San Andreas Fault. The Coast Ranges are composed of thick Mesozoic and Cenozoic sedimentary rocks. The northern and southern extents of the Coast Ranges are separated by a depression in which the San Francisco Bay lies.

The Transverse Ranges south of the Basin is an east-west trending series of steep mountain ranges and valleys. Contrary to the north-south trending in the Coast Ranges, the structure of the Transverse Ranges is oblique to the normal northwest trend of coastal California, hence the name "Transverse." This province extends offshore to include the San Miguel, Santa Rosa, and Santa Cruz islands. Intense north-south compression is squeezing the Transverse Ranges, causing this to be one of the most rapidly rising regions on Earth (California Geological Survey, 2002).

Within the Coast Ranges, the Basin consists of a westward-trending, linear, structural depression between rugged mountain ranges and hills. The Basin is open to the Pacific Ocean on its west end. The main structural features of the Basin are a series of related synclines and anticlines (i.e., folding of the rocks), which represent folded formations in the lowland between the Santa Ynez Mountains on the south and the faulted San Rafael Mountains on the north (Figure 3-3).

Within the EMA, several faults bound the EMA and cross it, as shown on Figure 3-3. The San Rafael Mountains to the north of the EMA were uplifted along the Little Pine Fault Zone, which trends northwest and has a displacement of several thousand feet (Upson and Thomasson, 1951).

Several additional faults exist within the EMA. The Santa Ynez River Fault Zone crosses below the Santa Ynez River area. Likewise, the Baseline Fault and the associated Los Alamos Fault and Casmalia Fault Zone cross the Santa Ynez Uplands area of the Basin in a southeast to northwest trend (Figure 3-3). These faults do not exhibit vertical offset of adjacent materials and are not believed to be barriers to groundwater flow but are likely semi-permeable because of the interbedded (and layered) nature of the underlying Paso Robles Formation (Hoffman, 1996).

The Tertiary-age older consolidated sedimentary formations surrounding and underlying the EMA include the Monterey Formation and the Vaqueros Formation. These units outcrop at the surface on the southern and northern edges of the EMA and underlie the water-bearing formations or aquifers. The water-bearing formations (aquifers) are discussed further below.

Monterey Formation (Bedrock below Principal Aquifers)

The Miocene-age Monterey Formation (Tm on Figure 3-3) consists of interbedded argillaceous and siliceous shale, sandstone, siltstone, and diatomite. The Monterey Formation outcrops in the highlands surrounding the EMA, defines the base of the Basin, and lies stratigraphically below the Paso Robles Formation at the western edge of the EMA. Regionally, the unit thickness of the Monterey Formation is up to as much as 3,500 feet and is often highly deformed. The Monterey Formation is a source for oil in the Zaca Oil Field northwest of Los Olivos.

Groundwater produced from the Monterey Formation often has high concentrations of hydrogen sulfide, total organic carbon, and manganese. The locations of oil and gas exploration wells drilled in the EMA are presented on Figure 3-4. Oil and gas exploration has been important to the understanding of the geology of the region, including the EMA. The oil and gas wells identified on Figure 3-4 help identify the depth and extent of the geologic formations that surround and underlie the EMA. Water wells completed in the Monterey Formation are occasionally productive if a sufficient thickness of highly deformed and brittle siliceous shale is encountered. More often, however, the Monterey shale produces groundwater to wells in very low quantities.

Other Bedrock Formations (Bedrock below Principal Aquifers)

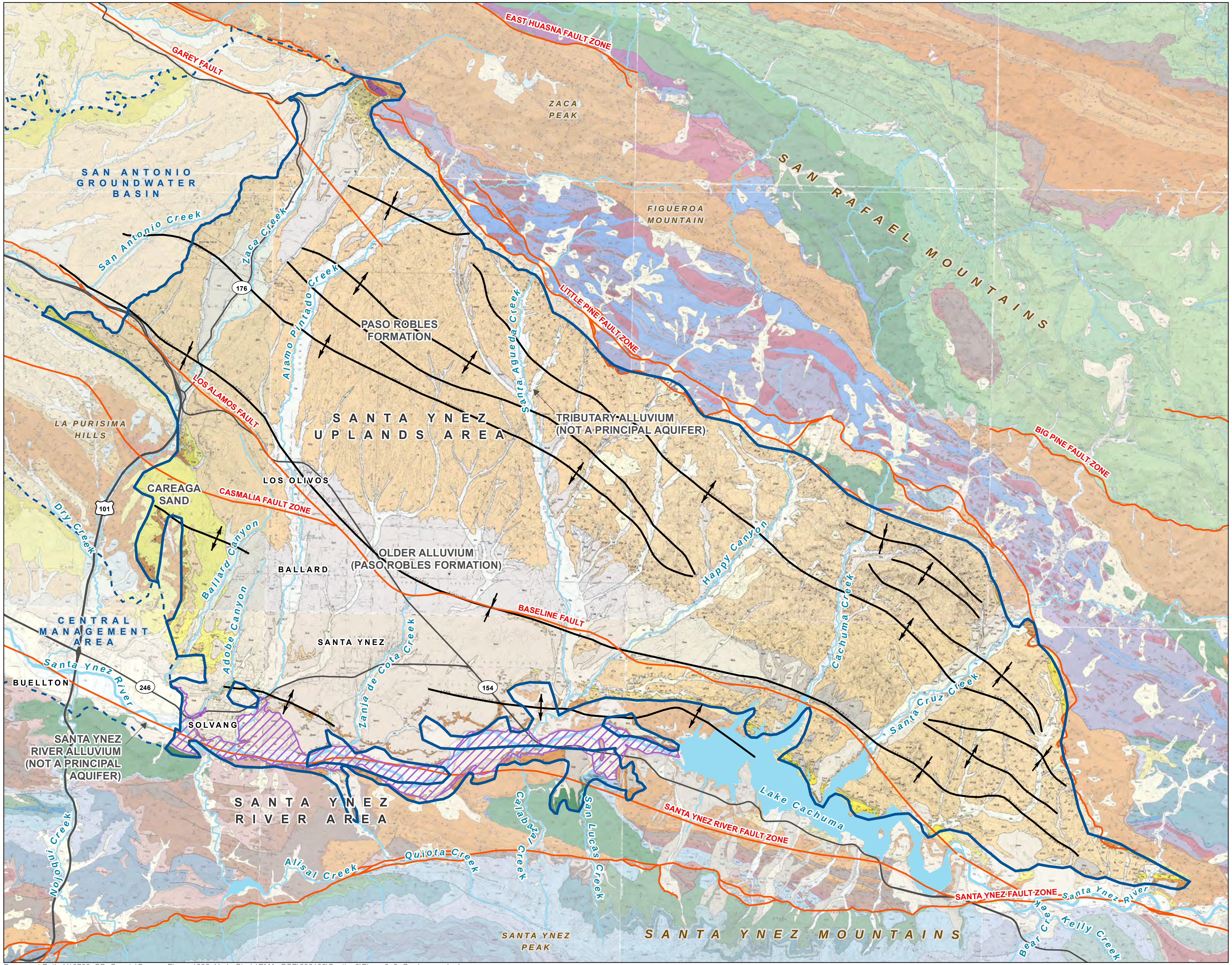
The bedrock below and surrounding the Basin consists of a variety of non-water-bearing rocks of Tertiary, Cretaceous, and Jurassic ages. These are older impermeable rocks below and surrounding the Basin, separated by and faults including the Little Pine Fault Zone to the north and Santa Ynez River Fault Zone to the south. These rocks include the Monterey Formation; Sisquoc Formation; Sandstone of Hurricane Deck (also known as the Temblor Sandstone); Vaqueros Sandstone; Sespe Formation; Espada Formation; and the Diabase, Serpentinite and the Franciscan Assemblage (Figure 3-3). Few water wells are completed within these formations, which are all outside of the Basin.

Characteristic of the Coast Range, the oldest of these rocks represent ophiolites, which consist of very old igneous and metamorphic rocks from the Jurassic and Cretaceous ages. These rocks formed at great depth and were scraped off the ocean floor when it subducted (dived below) rocks on the land.

FIGURE 3-3

Geologic Map

Santa Ynez River Valley
Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan



LEGEND

- Santa Ynez River Area

Geology

- Tributary Alluvium, Qa
- Santa Ynez River Alluvium, Qg
- Older Alluvium, Qoa
- Paso Robles Formation QTp
- Careaga Sand, Tcag
- Monterey Formation, Tm
- Fault

Fold Axes

- Anticline
- Syncline

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

Date: June 9, 2021
Data Sources: ESRI, USGS, Maxar 2019

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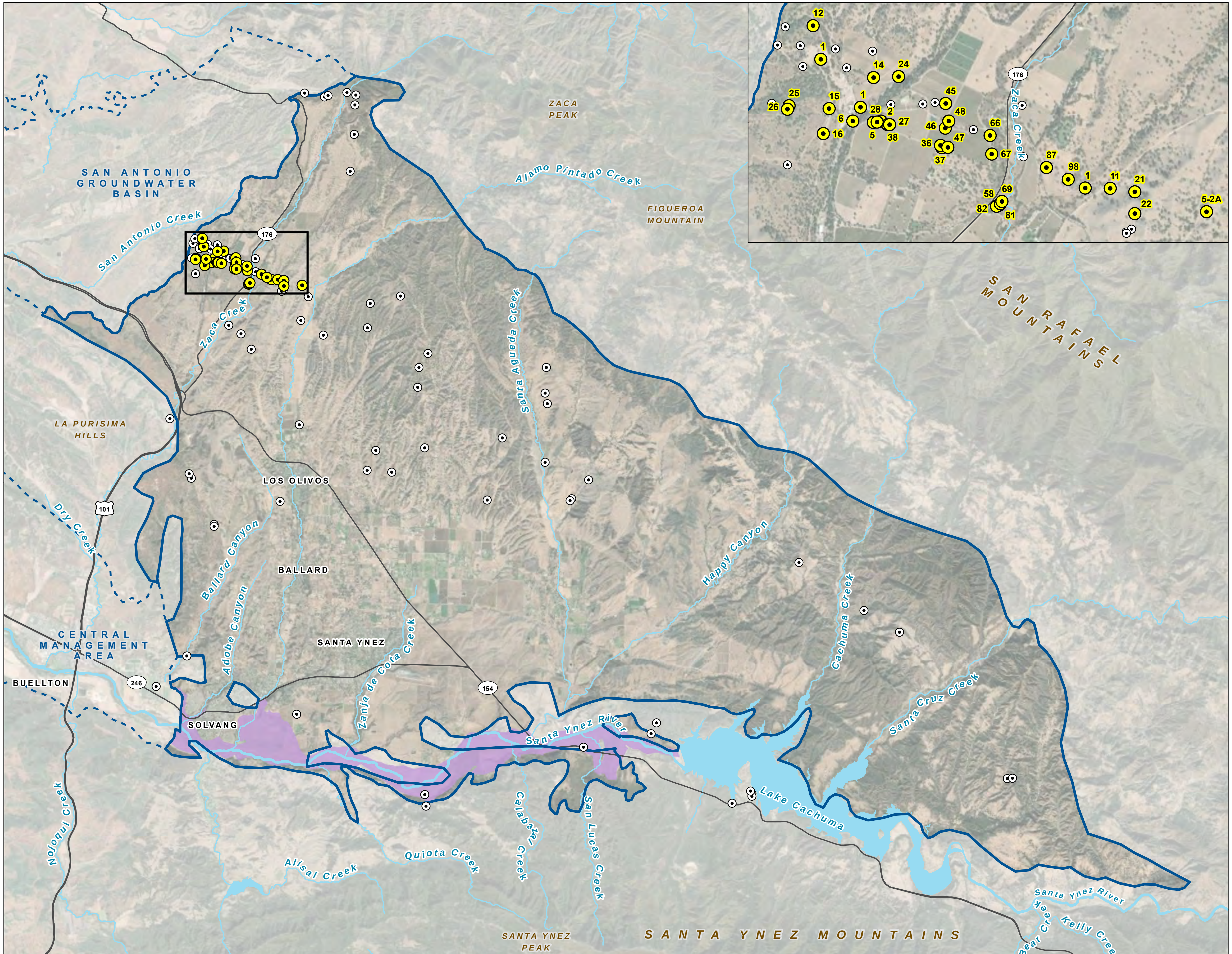

FIGURE 3-4

Oil and Gas Wells

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

- Active Well
- Inactive Well
- Santa Ynez River Area

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

GSI Water Solutions, Inc.

Date: June 3, 2021
Data Sources: ESRI, USGS, Maxar 2019

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3.1.3.2 Surficial Geology

The Basin is a wedge-shaped, northwest-trending trough filled with sediments that have been folded and faulted by dynamic regional tectonics. The Basin is bounded by faults on the north and east along the base of the San Rafael Mountains and to the south near the Santa Ynez River by older low-permeability rocks. The boundary to the northwest is defined as the shared border with the San Antonio Groundwater Basin, which is a topographic watershed divide west of Zaca Creek Canyon, but not necessarily a geologic barrier to groundwater flow. The understanding of flow in this area is discussed further in Section 3.2.

The surficial geology and major fault systems within and surrounding the Basin are presented as Figure 3-3. In the lowland between the Santa Ynez Mountains and the San Rafael Mountains, the non-water-bearing rocks that underlie the Basin are folded in response to regional tectonic forces. This folding determined the areas where the unconsolidated water-bearing sediments could accumulate to form the aquifers within the Basin. Several synclines and anticlines exist throughout the complexly folded bedrock units within the EMA. The Santa Ynez River flows on top of a relatively younger alluvium that overlies the much older Monterey Formation, which was uplifted closer to the surface, due to faulting and folding in this portion of the Basin.

As shown on Figure 3-3, the Basin is filled with an unconsolidated to weakly consolidated Tertiary-aged marine sandstone deposit, referred to as the Careaga Sand (Tcag) and non-marine Pliocene- and Pleistocene-aged sand, gravel, silt, and clay deposits that comprise the Paso Robles Formation (QTp). In this report, the authors have combined the use of the two members of the Careaga Sand (Cebada and Graciosa members) to reflect how this material is managed in the EMA. The water-bearing formations of the Careaga Sand and the Paso Robles Formation together extend to a depth of more than 1,500 feet below ground surface (bgs) in the EMA with a maximum thickness up to 3,500 feet in the deepest part of the EMA. Overlying these formations are the Quaternary-aged Older Alluvium (Qoa), which is considered a derivative of the Paso Robles Formation, and is therefore composed of materials that are very similar to the Paso Robles Formation to a depth of as thick as 150 feet in places. Because of this similarity, this Older Alluvium is managed as part of the Paso Robles Formation

The Tributary Alluvium (Qa) in the Santa Ynez Uplands is comprised of similar alluvial materials as those of the Santa Ynez River Alluvium (Qg) in the Santa Ynez River area. These two materials are together referred to as Younger Alluvium in the CMA and WMA.

3.1.3.3 Geologic Cross Sections

§ 354.14 Hydrogeological Conceptual Model

(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.

Several geologic cross sections were created to depict the complex geology throughout the EMA. The locations of the cross sections are shown on Figure 3-5 and the geologic cross sections are provided as Figures 3-6 through 3-14. Beneath the geology exposed on the land surface, are a series of sedimentary and bedrock geologic formations. The uppermost units below the surface are the recent and older alluvium and the Paso Robles Formation and Careaga Sand, which represent the principal aquifers. Underlying the principal aquifer, Tertiary-age and older consolidated sedimentary formations surrounding and underlying the EMA include the Monterey Formation and the Vaqueros Formation. These units outcrop at the surface on the southern and northern edges of the EMA and underlie the water-bearing formations or aquifers.

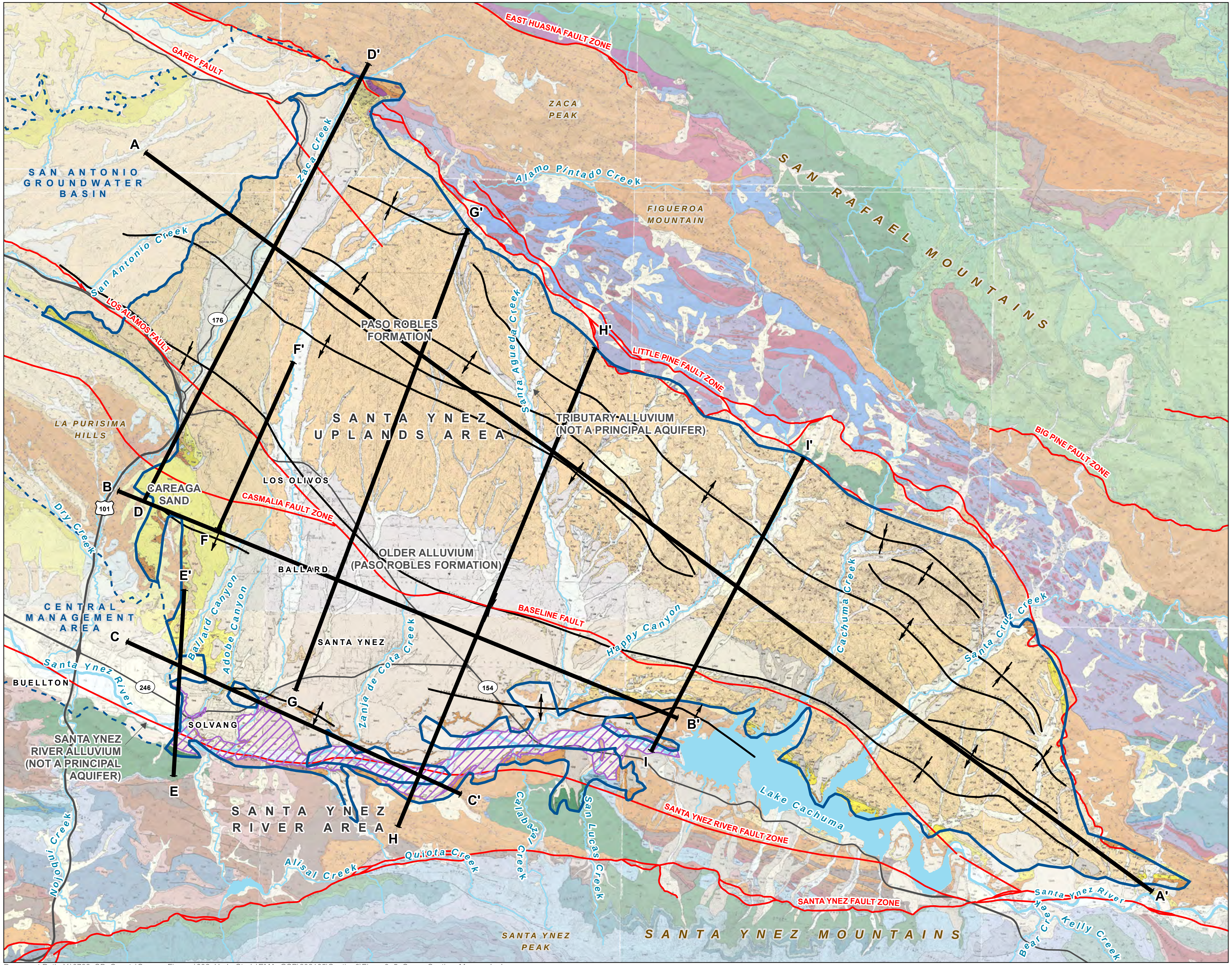

FIGURE 3-5

Geologic Cross Section Location Map

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

- Santa Ynez River Area
- Cross Section Line

Geology

- Tributary Alluvium, Qa
- Santa Ynez River Alluvium, Qg
- Older Alluvium, Qoa
- Paso Robles Formation QTp
- Careaga Sand, Tcag
- Monterey Formation, Tm
- Fault

Fold Axes

- Anticline
- Syncline

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

GSI Water Solutions, Inc.

Date: June 9, 2021
Data Sources: ESRI, USGS, Maxar 2019

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The geologic cross sections were created with the three-dimensional (3D) geologic modeling tool Leapfrog®. The 3D model has been used to characterize and illustrate the geologic and hydrogeologic setting that will be used to and support the decision-making process regarding sustainable groundwater management criteria. The 3D model was created for this GSP based on the best-available data from a variety of local, regional, and state-wide sources of geologic and hydrogeologic data, as presented on Table 3-2. Details of how the geologic framework model was prepared are presented in Appendix C.

Table 3-2. Summary of Data Used for Geologic Model

Data Type	Source	Coverage	Period of Record
Borehole Lithology (including oil and gas well geophysical logs)	DWR, ID No. 1, SYRWCD, Solvang, California Geologic Energy Management Division, USGS	131 boreholes within or adjacent to EMA	Current
Well Screen Intervals	DWR, ID No. 1, SYRWCD, Cities, USGS NWIS	279 wells within EMA	Current
Digital Elevation Model (DEM) 10-meter resolution	National Elevation Dataset (NED), USGS EROS Data Center	Entire model domain	Current
Surficial Geology	Dibblee (1950, 1980, 1987a, 1987b, 1988a, 1988b, 1991, 1993a, 1993b, and 1995)	Entire EMA	
Geologic Cross Sections	Dibblee (4 Sections: 1988a, 1993a, 1993b, 1995), Fugro (1 Section: 2007), Hopkins (4 Sections: 2003), USGS (3 Sections: Upson and Thomasson, 1951, LaFreniere and French, 1968)	Within and surrounding EMA	
Water Level Data[1]	USGS NWIS (includes CASGEM and Santa Barbara County data), USBR, City of Solvang, ID No. 1	Wells within and surrounding EMA	1905 to present

Notes

[1] Water level data and associated groundwater contour maps have not yet been incorporated into the model.

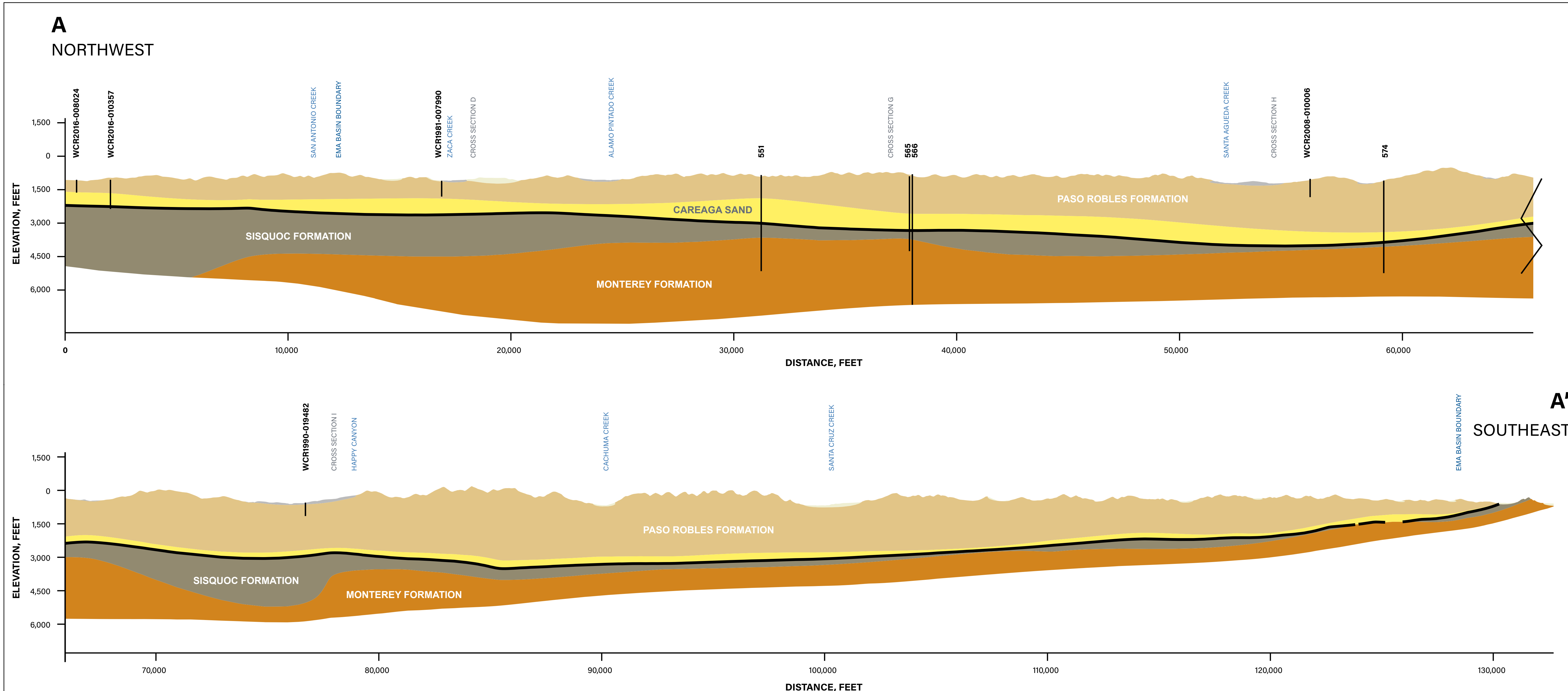
DWR = California Department of Water Resources
EMA = Eastern Management Area
EROS = Earth Resources Observation and Science
NWIS = National Water Information System
SYRWCD = Santa Ynez River Water Conservation District
USBR = U.S. Bureau of Reclamation
USGS = U.S. Geological Survey

The 3D geologic model represents the most complete understanding of the local geologic setting and distribution of principal aquifers and aquitards. The 3D geologic model also provided input data for the numerical groundwater flow model presented in Section 3.3 below. The 3D geological model will be updated as warranted as the understanding of the EMA changes. Geophysical characterization is underway within the EMA, the results of which will be used to update the 3D geologic model, numerical groundwater model, and geologic cross sections.

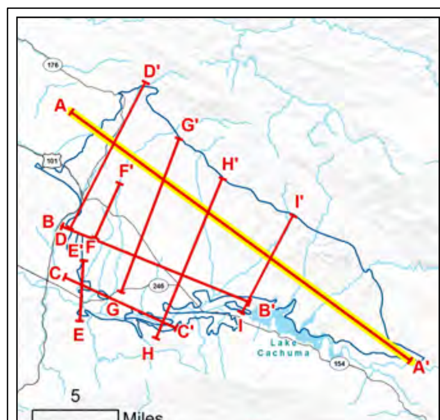
As shown in the cross sections, non-water-bearing rocks surround and underlie the EMA and include the Sisquoc and Monterey Formations. These formations are also evident at the surface in the southern portion of the EMA, north of the Santa Ynez River. These older bedrock units have generally low permeability, contain poor quality groundwater, and do not yield substantial quantities of water to wells.

Water-bearing geologic formations shown on Figure 3-3 and the geologic cross sections include the Paso Robles Formation, Careaga Sand, Santa Ynez River Alluvium, and Tributary Alluvium. The geologic cross sections show the relationships between the darker-colored non-water-bearing geologic units of the Sisquoc and Monterey Formations, and the lighter-colored water-bearing geologic formations.

The configurations of the geologic formations, aquifers, and aquitards are presented on the geologic cross sections. The lateral extent and physical properties of the principal aquifers and aquitards are presented in Section 3.1.4.



NOTE TO READER
These geologic cross sections are provided in draft format. The cross sections are derived from the geologic model, which will be updated following input from the geophysical surveys, which are in process. The final versions of these cross sections will comply with § 354.14(c).



LEGEND

- Qa – Tributary Alluvium
- Qoa – Older Alluvium
- QTp – Paso Robles Formation
- Tca – Careaga Sand
- Basin Bottom
- Tsq – Sisquoc Formation
- Tm – Monterey Formation

FIGURE 3-6
Cross Section A
Santa Ynez River Valley Groundwater Basin –
Eastern Management Area Groundwater Sustainability Plan

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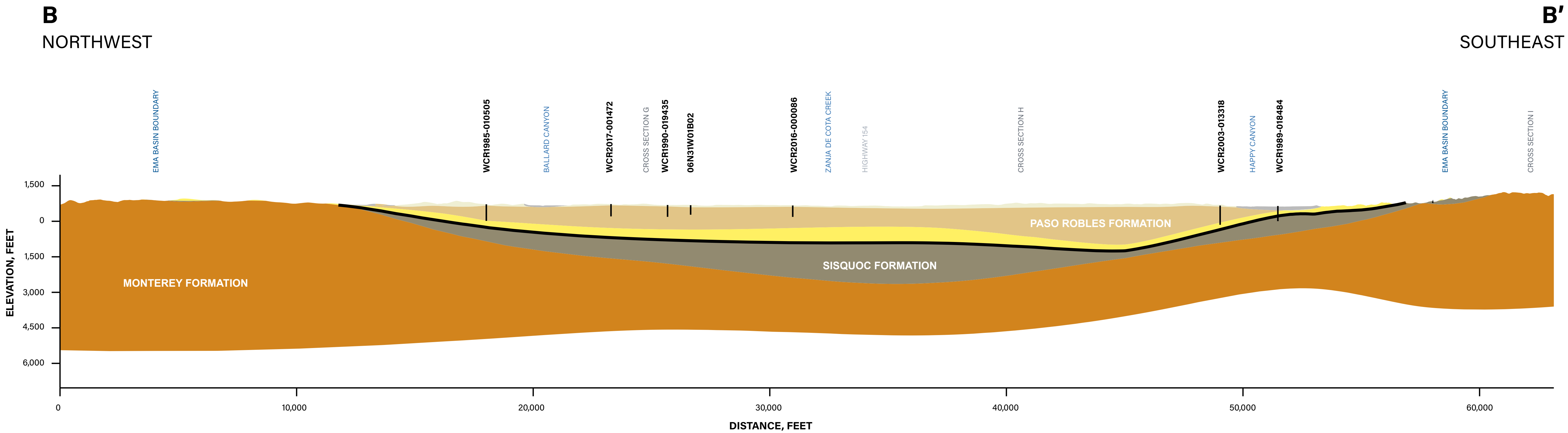
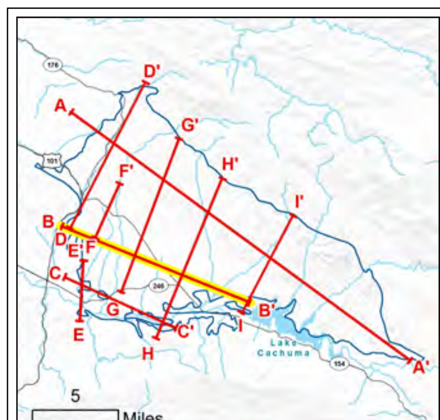


NOTE TO READER

These geologic cross sections are provided in draft format. The cross sections are derived from the geologic model, which will be updated following input from the geophysical surveys, which are in process. The final versions of these cross sections will comply with § 354.14(c).



LEGEND

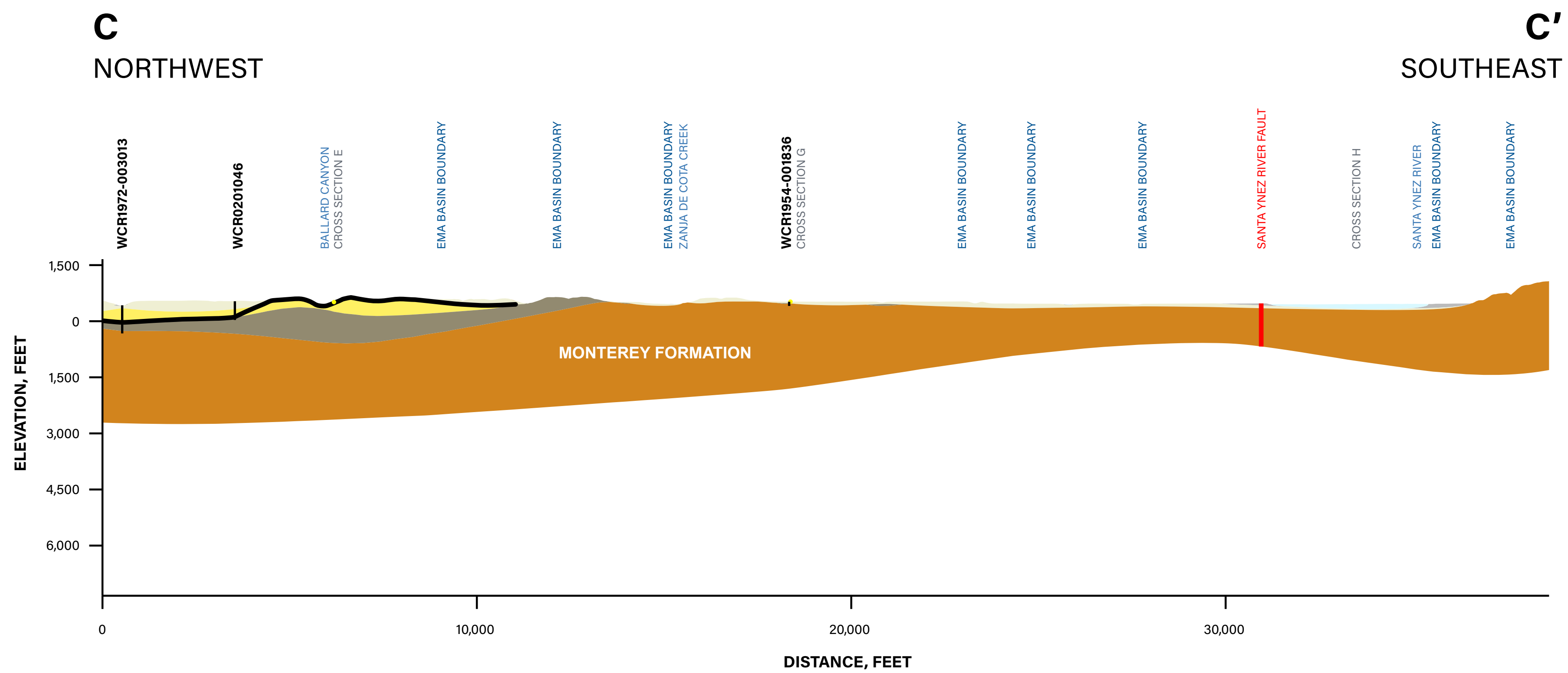
- Qa – Tributary Alluvium
- Qoa – Older Alluvium
- QTp – Paso Robles Formation
- Tca – Careaga Sand
- Basin Bottom
- Tsq – Sisquoc Formation
- Tm – Monterey Formation

FIGURE 3-7

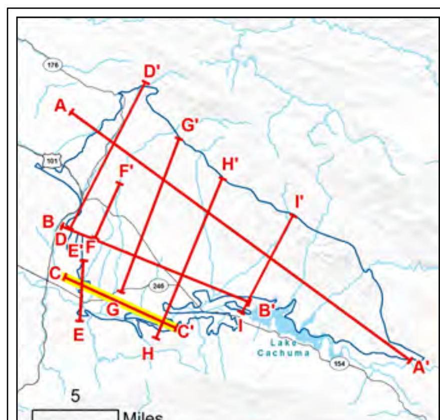
Cross Section B

Santa Ynez River Valley Groundwater Basin –
Eastern Management Area Groundwater Sustainability Plan

GSI Water Solutions, Inc.



NOTE TO READER
These geologic cross sections are provided in draft format. The cross sections are derived from the geologic model, which will be updated following input from the geophysical surveys, which are in process. The final versions of these cross sections will comply with § 354.14(c).



LEGEND

- Qa – Tributary Alluvium
- Qoa – Older Alluvium
- QTp – Paso Robles Formation
- Tca – Careaga Sand
- Basin Bottom
- Tsq – Sisquoc Formation
- Tm – Monterey Formation

FIGURE 3-8
Cross Section C
Santa Ynez River Valley Groundwater Basin –
Eastern Management Area Groundwater Sustainability Plan

GSI Water Solutions, Inc.

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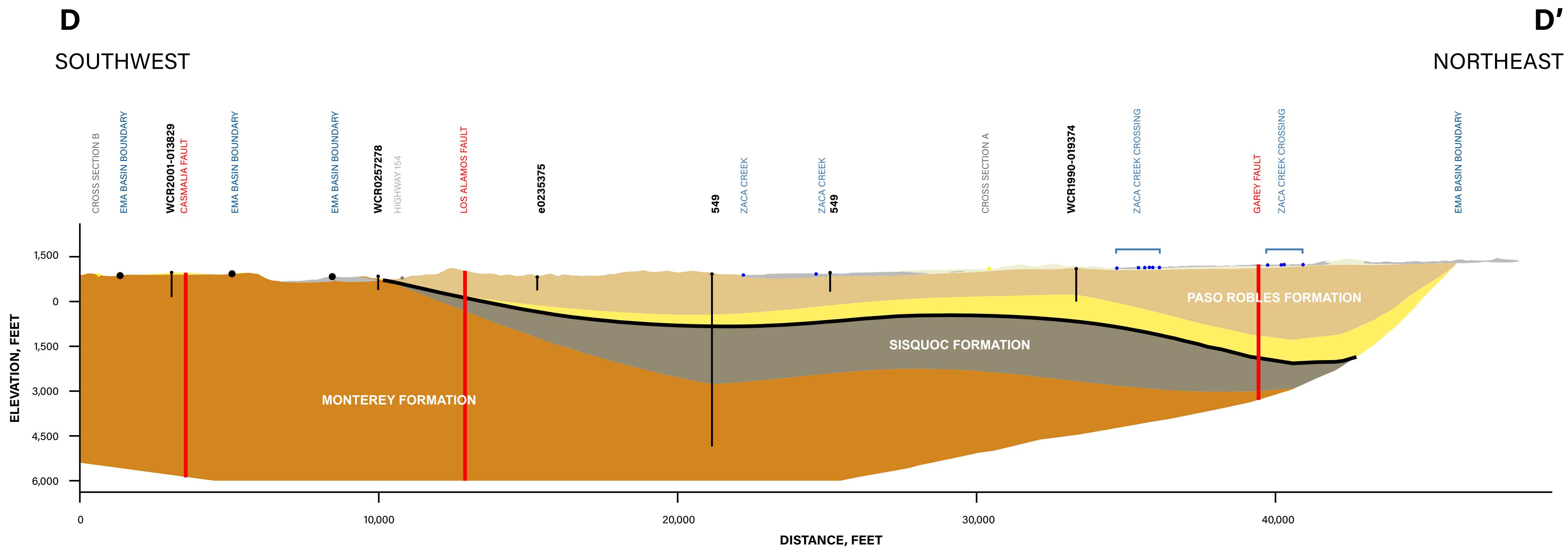
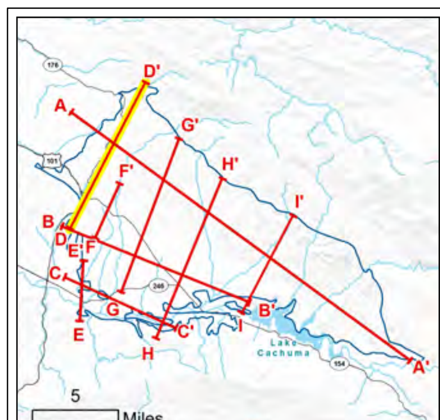


NOTE TO READER

These geologic cross sections are provided in draft format. The cross sections are derived from the geologic model, which will be updated following input from the geophysical surveys, which are in process. The final versions of these cross sections will comply with § 354.14(c).



LEGEND

- Qa – Tributary Alluvium
- Qoa – Older Alluvium
- QTp – Paso Robles Formation
- Tca – Careaga Sand
- Basin Bottom
- Tsq – Sisquoc Formation
- Tm – Monterey Formation

FIGURE 3-9

Cross Section D

Santa Ynez River Valley Groundwater Basin –
Eastern Management Area Groundwater Sustainability Plan

GSI Water Solutions, Inc.

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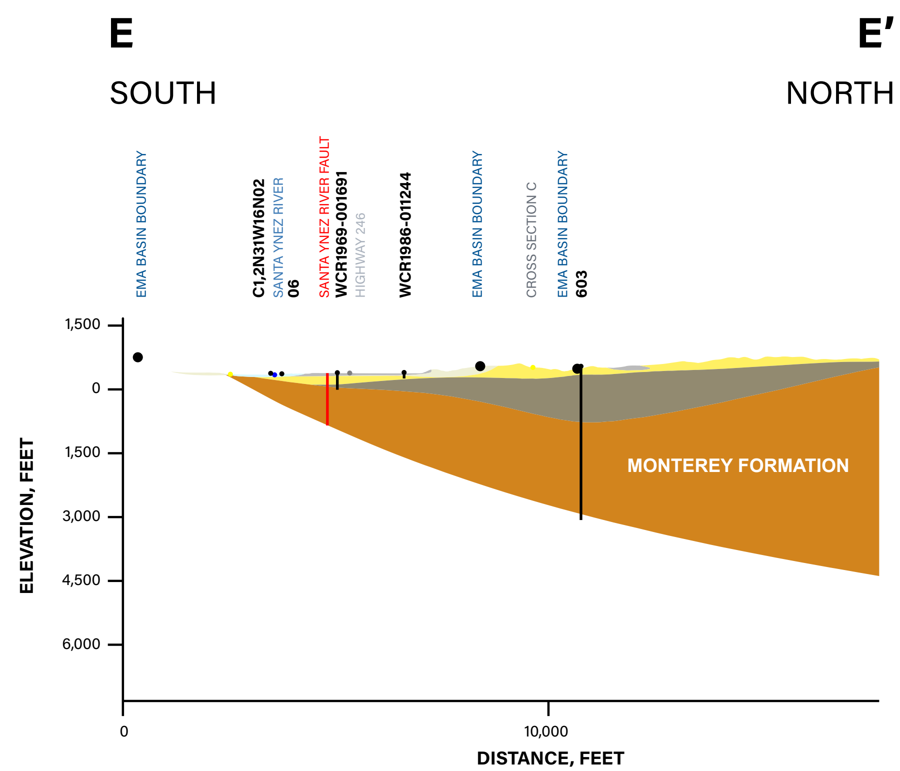

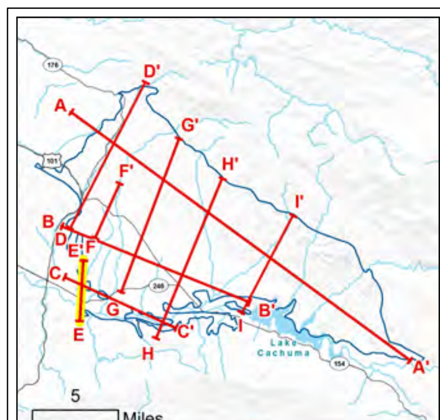

LEGEND

- Qa – Tributary Alluvium
- Qoa – Older Alluvium
- QTp – Paso Robles Formation
- Tca – Careaga Sand
- Basin Bottom
- Tsq – Sisquoc Formation
- Tm – Monterey Formation

FIGURE 3-10

Cross Section E

Santa Ynez River Valley Groundwater Basin –
Eastern Management Area Groundwater Sustainability Plan

GSI Water Solutions, Inc.

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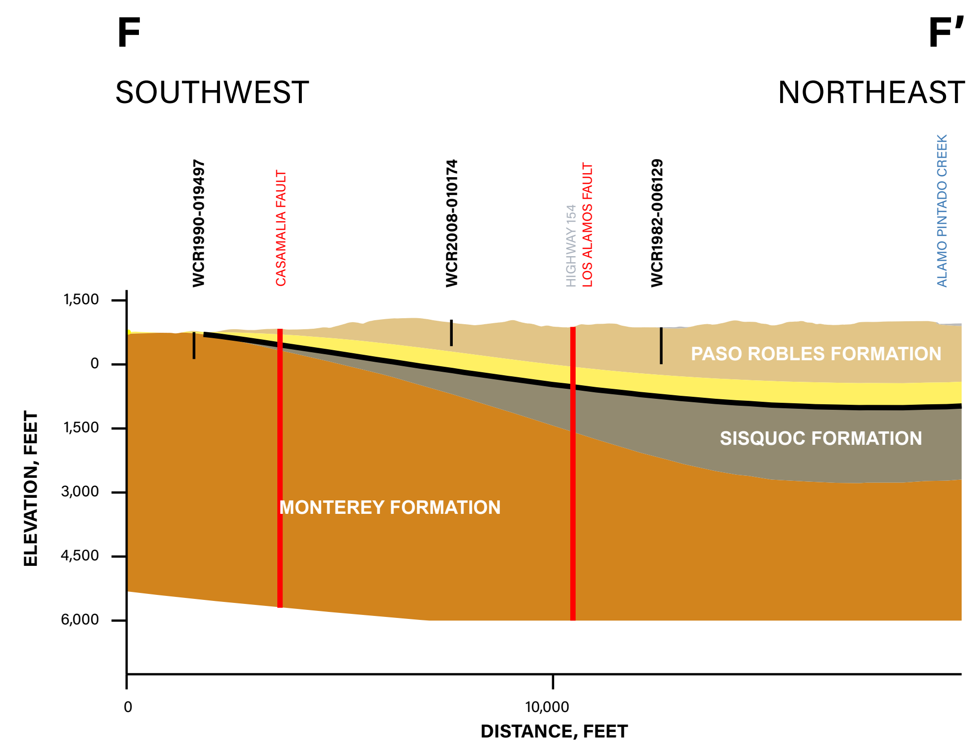
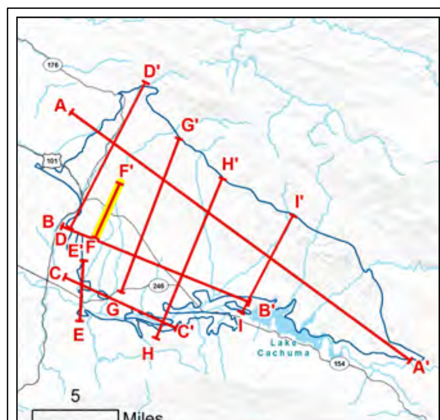




LEGEND

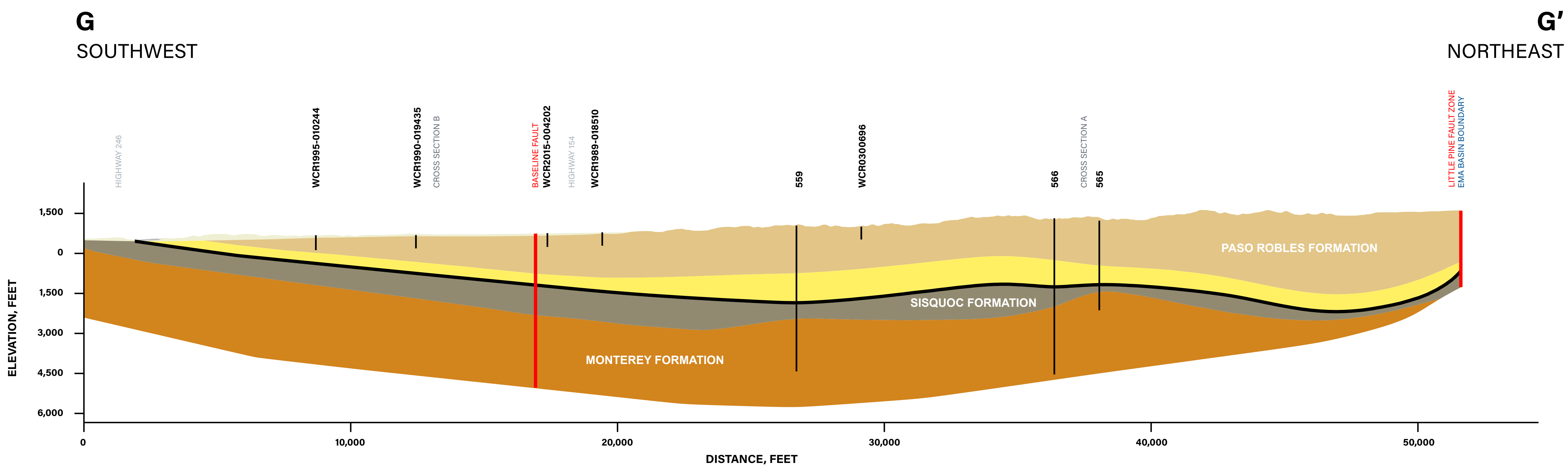
- Qa – Tributary Alluvium
- Qoa – Older Alluvium
- QTp – Paso Robles Formation
- Tca – Careaga Sand
- Basin Bottom
- Tsq – Sisquoc Formation
- Tm – Monterey Formation

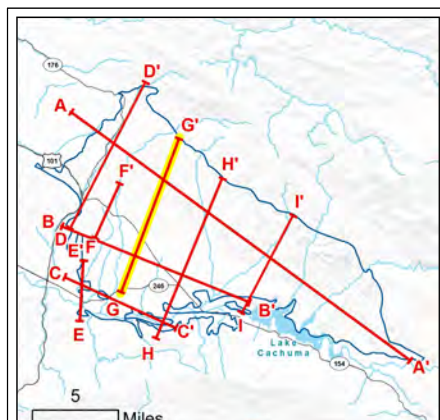
FIGURE 3-11

Cross Section F

Santa Ynez River Valley Groundwater Basin –
Eastern Management Area Groundwater Sustainability Plan

GSI Water Solutions, Inc.





LEGEND

- Qa – Tributary Alluvium
- Qoa – Older Alluvium
- QTp – Paso Robles Formation
- Tca – Careaga Sand
- Basin Bottom
- Tsq – Sisquoc Formation
- Tm – Monterey Formation

FIGURE 3-12

Cross Section G

Santa Ynez River Valley Groundwater Basin –
Eastern Management Area Groundwater Sustainability Plan

GSI Water Solutions, Inc.

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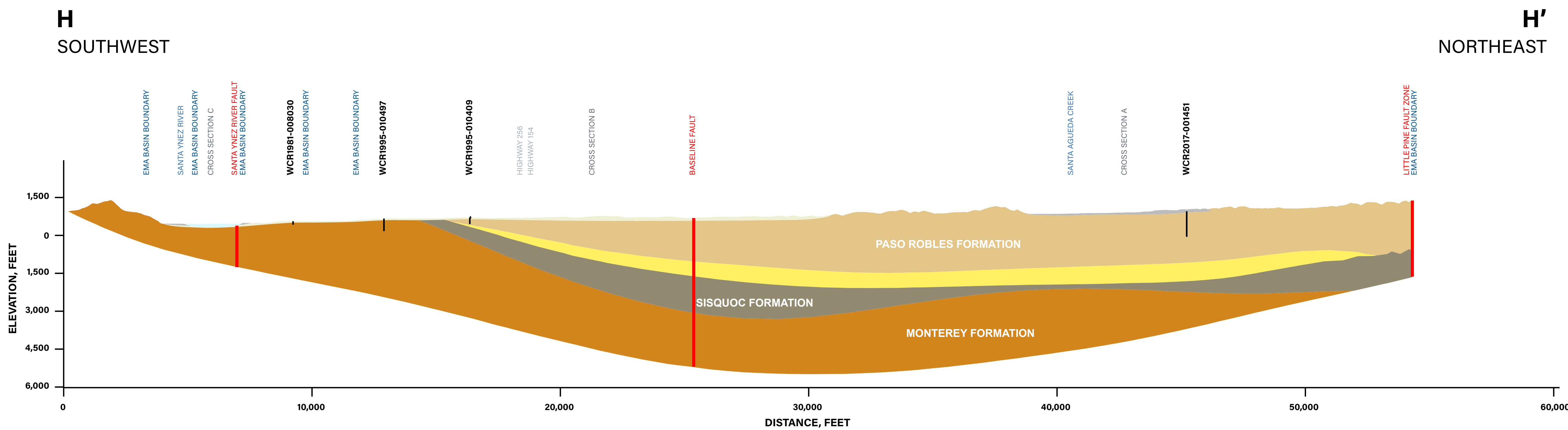

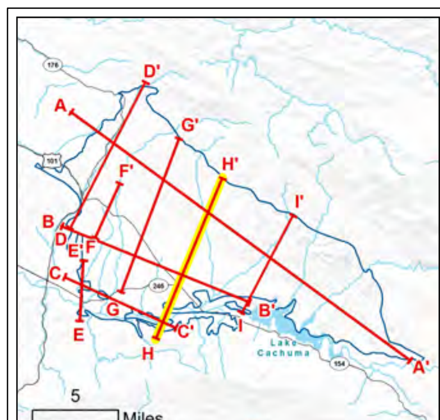

LEGEND

- Qa – Tributary Alluvium
- Qoa – Older Alluvium
- QTp – Paso Robles Formation
- Tca – Careaga Sand
- Basin Bottom
- Tsq – Sisquoc Formation
- Tm – Monterey Formation

FIGURE 3-13

Cross Section H

Santa Ynez River Valley Groundwater Basin –
Eastern Management Area Groundwater Sustainability Plan

GSI
Water Solutions, Inc.

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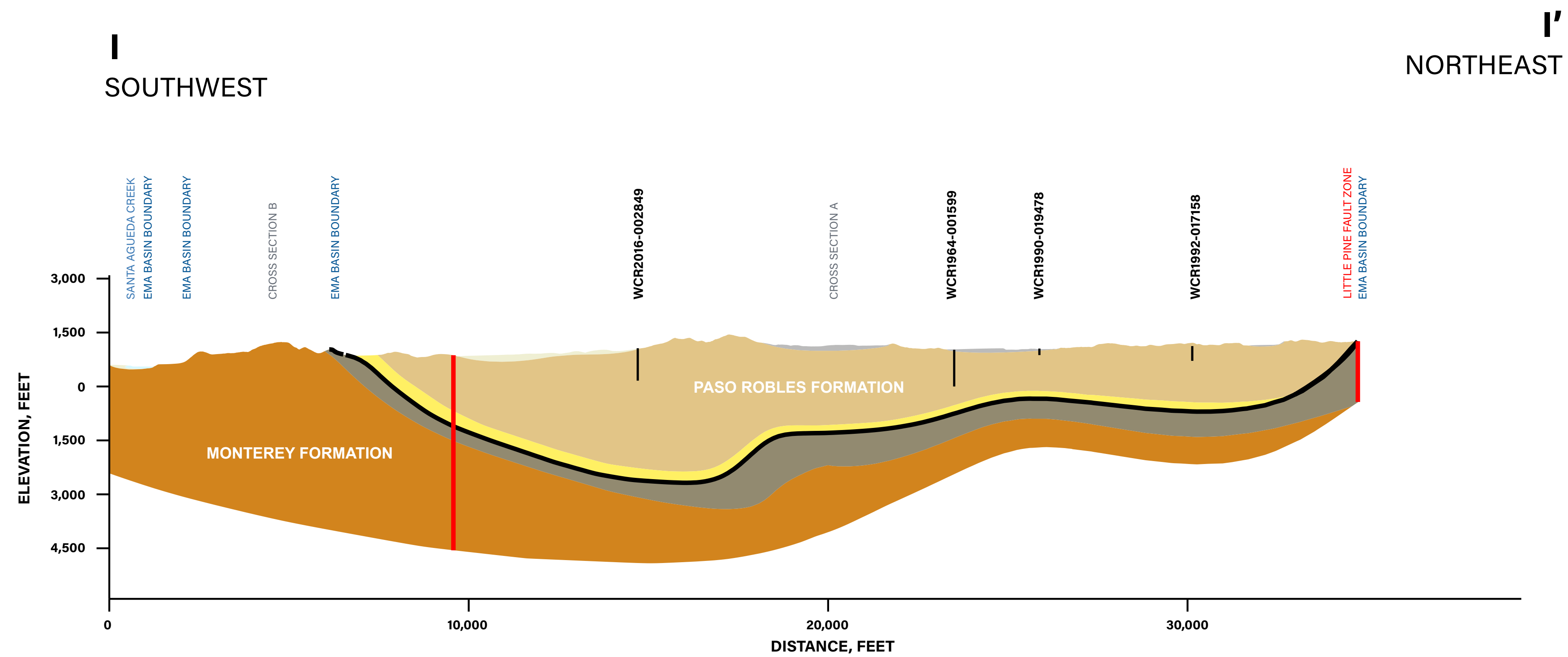
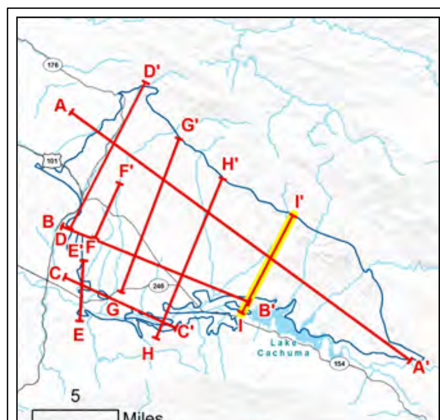




LEGEND

- Qa – Tributary Alluvium
- Qoa – Older Alluvium
- QTp – Paso Robles Formation
- Tca – Careaga Sand
- Basin Bottom
- Tsq – Sisquoc Formation
- Tm – Monterey Formation

FIGURE 3-14

Cross Section I

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

GSI Water Solutions, Inc.

3.1.4 Principal Aquifers and Aquitards

The following sections describe the principal aquifers in the EMA portion of the Basin,[21] including physical properties, hydrogeologic characteristics, structural features within and bounding the EMA, the water quality within the EMA, and the primary beneficial uses of groundwater.

§ 354.14 Hydrogeological Conceptual Model.

(b) The hydrogeologic conceptual model shall be summarized in a written description that includes the following:

(4) Principal aquifers and aquitards, including the following information:

(A) Formation names, if defined.

3.1.4.1 Principal Aquifers

Aquifers are commonly named based upon the presence of water-bearing sand and gravel deposits grouped together into similar zones. Aquifers can be vertically or horizontally separated by fine-grained layers (called aquitards) that can impede the movement of groundwater between aquifers. Two principal aquifers have been identified in the EMA, as presented in Table 3-3: the Paso Robles Formation and the Careaga Sand. The Paso Robles Formation and Older Alluvium have similar hydrogeologic characteristics, are managed as a single unit, and have been combined into a single principal aquifer for the purposes of this GSP.

Table 3-3. Principal Aquifers in the Basin

Principal Aquifer	Formation Names	Map Symbol
Paso Robles Formation	Paso Robles Formation	QTp
	Older Alluvium	Qoa
Careaga Sand	Careaga Sand	Tca and Tcag

Note

Pumping from the Santa Ynez River Alluvium is managed as surface water by the SWRCB and is not subject to management by the GSAs under SGMA.

Water present within the Santa Ynez River Alluvium is considered surface water subject to the jurisdiction of the SWRCB, and, thus, is not managed by the GSAs under SGMA. In accordance with definitions set forth by SGMA and the SGMA regulations, the Santa Ynez River Alluvium is not classified in this GSP as a principal groundwater aquifer. Appendix K contains a memorandum that presents additional hydrogeological, jurisdictional, and historical bases for defining water in the Santa Ynez River Alluvium as underflow of the Santa Ynez River and not "groundwater" for purposes of SGMA. The hydraulic continuity of this underflow with the surface flow of the Santa Ynez River is such that diversion from the underflow constitutes diversion

[21] The Basin boundary as defined by DWR Bulletin 118 (Bulletin 118 boundary) (DWR, 2018a) is shown on Figure 3-4. The Bulletin 118 boundary does not everywhere include the full lateral extent of basin sediments. The Bulletin 118 boundary also includes older, relatively impermeable non-basin geologic units in places. The discrepancies between the Bulletin 118 boundary and the surficial geology may be corrected in a future Basin Boundary Modification Request.

from the surface water system. This finding is also consistent with the practice of the SWRCB and numerous SWRCB decisions (refer to Appendix K for additional discussion).

The main criterion for defining the water-bearing geologic formations in the EMA as principal aquifers is based on the SGMA definition of a principal aquifer: "aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems." "Groundwater" is defined by SGMA as "water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water, but does not include water that flows in known and definite channels." Principal aquifers must exhibit both sufficient permeability and storage potential for the movement and storage of groundwater such that wells can reliably produce groundwater in sufficient quantities on a long-term basis. Another criterion is that the groundwater produced from the geologic formation must have generally acceptable quality. Groundwater of a conductivity of 3,000 micromhos/centimeter is considered as the maximum limit for basin groundwater quality that is suitable for serving beneficial uses in similar groundwater basins (DWR, 1979).

Application of these two criteria, along with the historical understanding and ongoing management of the aquifer system, supports the designation of the EMA sediments to the two principal aquifers, the Paso Robles Formation and the Careaga Sand. Descriptions of these two aquifers are presented below. Alluvium present within tributaries to the Santa Ynez River are not considered principal aquifers because they do not meet the above definitions; stakeholders living in these areas indicate that shallow wells frequently go dry in the summer and do not reliably supply water to meet beneficial uses.

3.1.4.2 Basin Boundary (Vertical and Lateral Extent of Basin) [§ 354.14(b)(2),(b)(3)]

§ 354.14 Hydrogeological Conceptual Model

(b) The hydrogeologic conceptual model shall be summarized in a written description that includes the following:

(2) Lateral basin boundaries, including major geologic features that significantly affect groundwater flow.

(3) The definable bottom of the basin.

While the watershed that drains surface water into the EMA encompasses a much larger area, DWR's Bulletin 118 defines the groundwater basin within the EMA as shown on Figure 3-1 (DWR Bulletin 118 Basin 3-015; DWR, 2018a).

The Santa Ynez Uplands is separated from the Santa Ynez River area to the south by a ridge of impermeable bedrock. The Santa Ynez River Alluvium extends outside of the EMA, both upstream and downstream of the City of Solvang and the EMA boundary, for a total length of 36 miles between the upstream Bradbury Dam (to the east) to the Lompoc Plain to the west, passing the cities of Buellton and Lompoc (Santa Barbara County, 2012).

The Basin's bottom elevation within the EMA is shown on Figure 3-15. In the Santa Ynez Uplands, the bottom of the Basin is the base of the water-bearing formations and includes the Paso Robles Formation and/or Careaga Sand. Together, the base of these water-bearing formations is an irregular surface formed as the result of folding, faulting, and erosion. The depth of these materials extends to a maximum depth of approximately 3,500 feet in some areas.

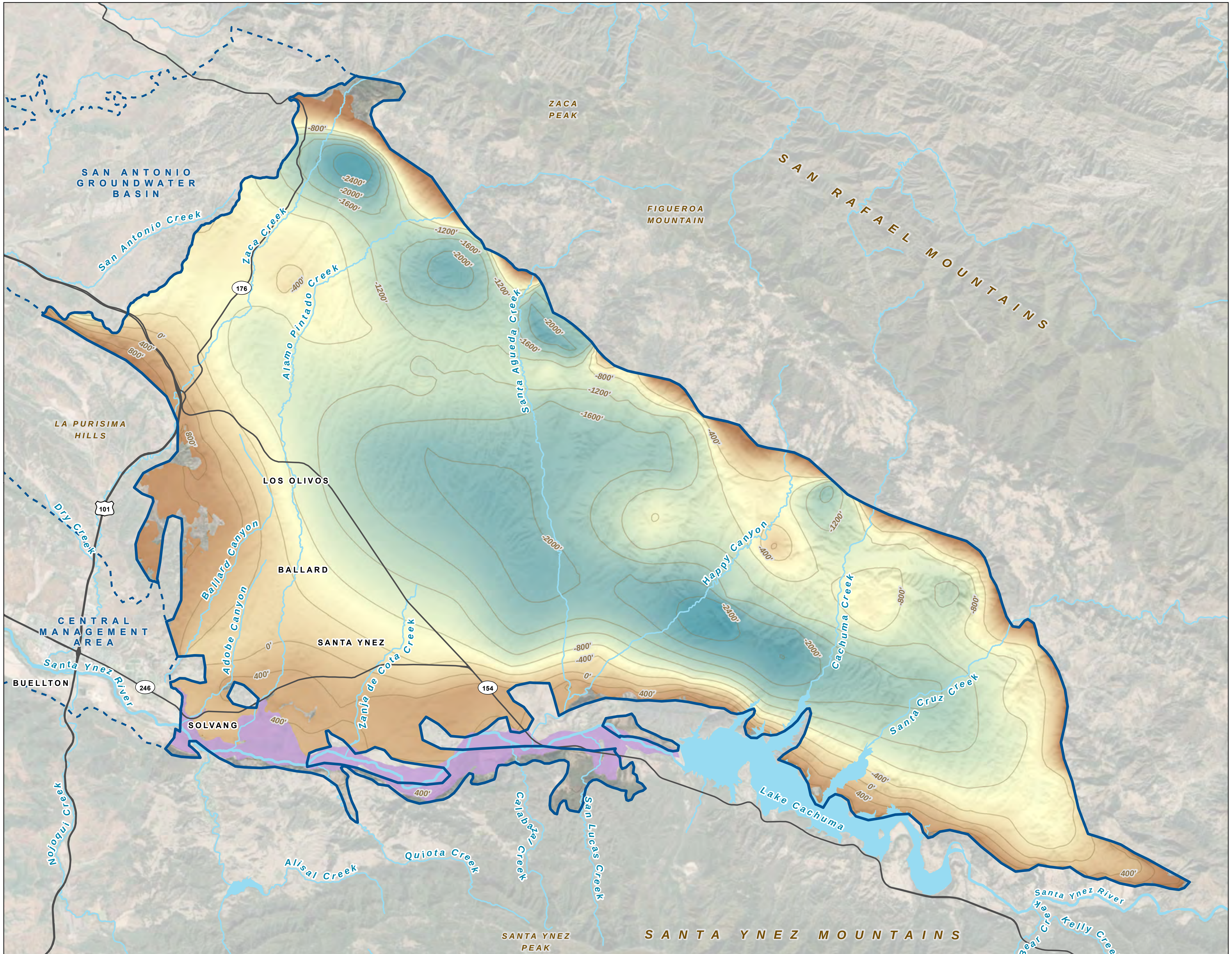


FIGURE 3-15

Basin Bottom

Santa Ynez River Valley Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan

LEGEND

Santa Ynez River Area

Base Elevation of Aquifers

1,830'

-2,750'

Elevation of Aquifer Contour, 400'

All Other Features

Eastern Management Area Bulletin 118 Boundary

Other Bulletin 118 Groundwater Basin Boundary

Major Road

Watercourse

Waterbody

NOTE

The elevation of the base of the groundwater basin is not well-understood in northern portion of the EMA, where the depth to this contact is greater than 3,000 feet.

N

0 5,000 10,000 15,000
Feet

Date: June 9, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section3\Figure3_15_BasinBottom.mxd, abarry

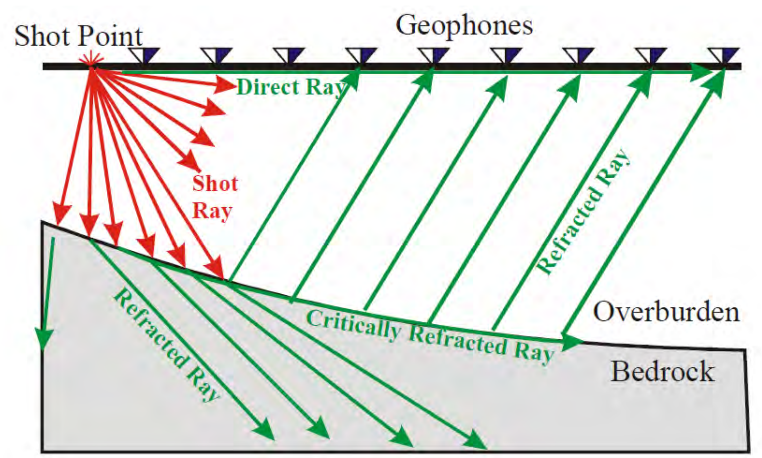
The top of the Monterey Shale bedrock is considered the base of the groundwater basin. While some of the bedrock units underlying the water-bearing materials may produce limited quantities of water, the water is generally of poor quality, especially within the Monterey Shale, and of limited volume and therefore, in accordance with SGMA, is not considered part of the Basin for the purposes of this GSP.

Basin Boundary Refinements - Geophysical Investigation

A series of geophysical surveys were conducted to provide additional information about water bearing deposits within the EMA including the nature of the boundary between the EMA and CMA, the nature of the connection between several of the north-south trending tributaries (e.g., Alamo Pintado Creek) within the Santa Ynez Uplands and the Santa Ynez River Alluvium, and to improve the understanding of the subsurface conditions in the Santa Ynez Uplands (Figure 3-16). These geophysical surveys included a variety of both land-based and aerial methods. The land-based methods included seismic refraction and transient electromagnetic (TEM) surveys that were conducted in September 2020. An airborne electromagnetic (AEM) survey using a tTEM called SkyTEM is an electromagnetic survey conducted using a helicopter in November 2020. The results of the TEM and SkyTEM surveys were not available at the time of this GSP preparation and will be presented in the 5-year update.

Seismic Refraction Survey

As discussed above, geologic maps of the EMA show a bedrock ridge in the southwestern portion of the Basin. The bedrock ridge is believed to constrain groundwater flow between the Santa Ynez Uplands to the north and the Santa Ynez River Alluvium to the south (Hoffman, 1996). Groundwater in portions of the Santa Ynez Uplands may contribute some quantity of recharge to the Tributary Alluvium, which subsequently contributes to recharge to the Santa Ynez River Alluvium underflow and the rest of the Basin downstream of the EMA. This is not well defined. The groundwater discharging from the Santa Ynez Uplands also may flow through notches in the bedrock, which have been scoured out by erosive flows within ancient tributaries of the Santa Ynez River. These notches associated with the major tributaries to the Santa Ynez River have been filled to a limited depth with alluvium, the depth and extent of which are the subject of geophysical exploration conducted in support of this GSP. The areas where the geophysical investigations were conducted are presented on Figure 3-16.



The diagram to the right presents an example of the seismic refraction method (HGI, 2020). Seismic energy provided by a source (shot) located on the surface radiates out from the shot point, either traveling directly through the upper layer (direct arrivals), or traveling down to, and then laterally along, higher-velocity layers (refracted arrivals) before returning to the surface. The refracted energy is detected on the surface using a linear array (or spread) of geophones spaced at regular intervals. Beyond a certain distance from the shot point, the refracted signal is observed as a first-arrival signal at the geophones (arriving before the direct arrival). Observation of the travel times of the direct and refracted signals provides information on the depth profile of the refractor for determining depth to bedrock and bedrock structure.

The results of the seismic refraction survey suggest that the depth to bedrock varies between approximately 35 and 200 feet bgs along the survey transects (Figure 3-16). A picture of one of these seismic refraction survey lines along Meadowlark Road is shown to the right. Generally, the depth to bedrock tends to decrease with proximity to the mapped bedrock highs—which helps confirm the presence of a flow-restricting bedrock ridge. The bedrock lows correspond to areas that are filled with alluvium and transmit groundwater through the notches. Some of the cross sections show significant undulations in the interpreted bedrock surface, which could indicate a degree of scouring by ancient tributaries, and thus a permeable conduit for groundwater to flow through. Although there are uncertainties concerning lithological interpretations, the cross sections provide important details about the geometries of permeable and impermeable sediments, which are essential to quantifying the amount of groundwater flowing out of the Santa Ynez Uplands.

tTEM Survey

The other ground-based geophysical survey consisted of a towed transient electromagnetic system (tTEM) system, employed to provide data that could refine the geometry, layering, and estimated hydraulic properties of the shallow subsurface materials (0 to 250 feet). The tTEM equipment is designed for detailed 3D geophysical and geological mapping of the shallow subsurface (0 to 250 feet) in a fast and cost-efficient way. The tTEM survey was conducted to characterize the geometry of the major tributaries where they join the Santa Ynez River and the interaction of groundwater and surface water in the Santa Ynez River channel. The results of the tTEM survey support the interpretation that there are no substantial subsurface channels in the underlying bedrock that convey subsurface outflow from the tributaries directly to the Santa Ynez River.

AEM Survey

The AEM (also referred to as SkyTEM) survey conducted within the EMA was designed to provide information about the geology, locations of faults and folds, thickness of principal aquifers, and geologic controls on groundwater movement in the Santa Ynez Uplands portions of the EMA. In addition, the AEM survey was designed to interpret the hydraulic connection between the EMA and CMA as well as between the shared border between the EMA and the San Antonio Groundwater Basin. The SkyTEM flight lines presented on Figure 3-16 were selected to maximize the understanding of the geologic materials to a depth of about 1,000 feet below ground in areas where well log data are not available. Generally, these areas included the western portion of the Basin adjacent to the border with the San Antonio Groundwater Basin, the northern portion of the Basin, and the eastern portion of the Basin, generally north of Lake Cachuma.

The flight lines avoided inhabited buildings and areas of possible interference with the geophysical methods, including large metallic structures, fences, power lines, and grape trellises. The AEM flight plans were spaced approximately 800 feet apart and totaled more than approximately 600 miles of total flight lines. The flights were flown in a northeast-to-southwest direction. Two individual flight lines extended from the northern portion of the EMA in the Santa Ynez Uplands to the southern end of the EMA near the Santa Ynez River, in a location that was also surveyed by tTEM methods.

The hydrologic conceptual model presented in this GSP was updated based on the tTEM and AEM survey results. The results of updated geometry of the groundwater basin were imported into the 3D geological model of the EMA (in Leapfrog) and informed the development of the geologic cross sections and, ultimately, the calibrated groundwater flow model. The results of the tTEM and AEM surveys were generally incorporated directly into the geologic model for the EMA, which:

- Verified the substantial degree of folding of the principal aquifers as presented in the HCM (which was based on geologic mapping as well as lithologic descriptions from water wells and downhole geophysical surveys from oil and gas wells).
- Verified the presence of a known fault in the surveyed area.
- Confirmed the interpretation included in the numerical modeling calibration that there are differences in characteristics between the upper and lower portions of the Paso Robles Formation.

A report presenting the results of the AEM survey will be available separately from this GSP.

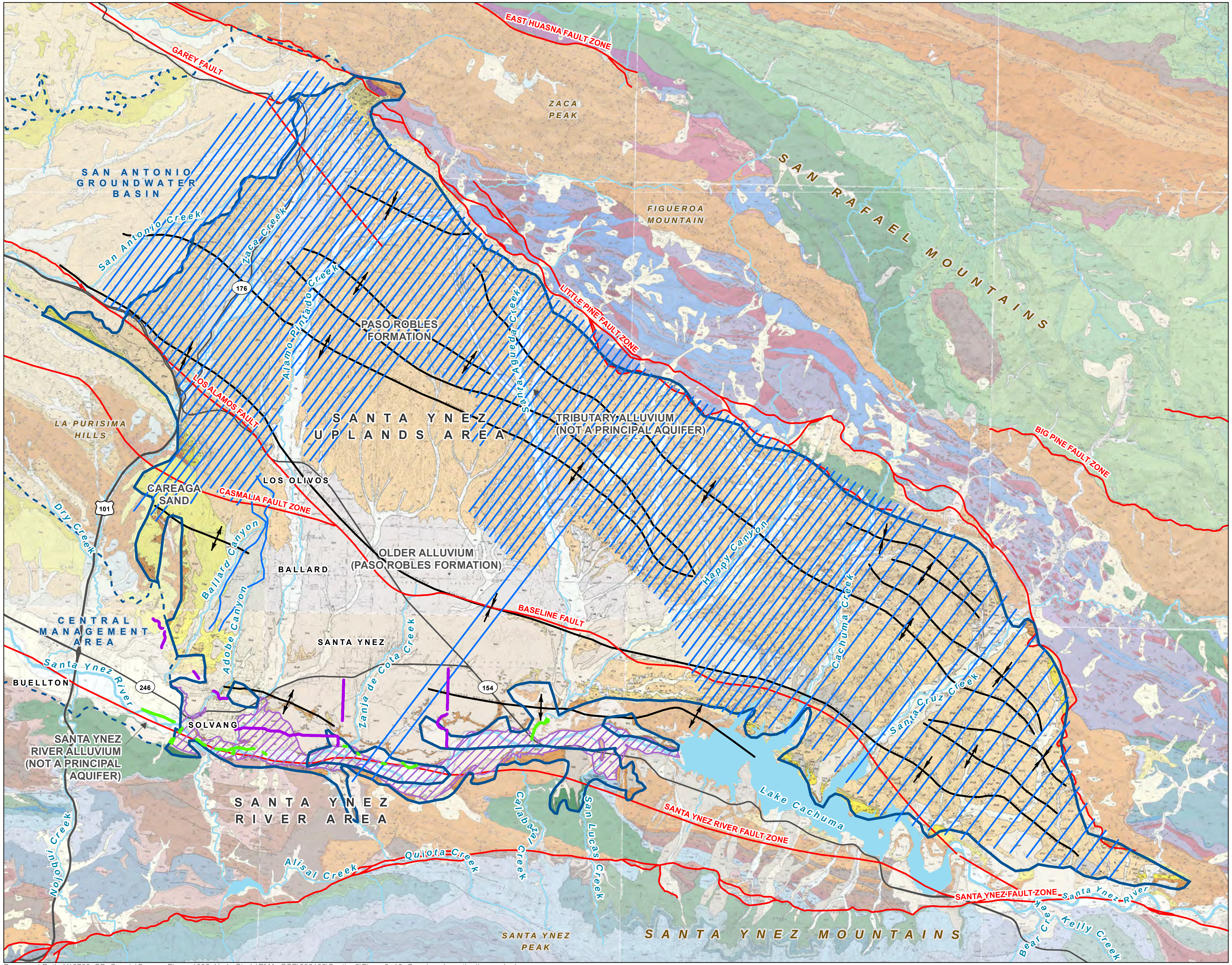


FIGURE 3-16

Areas of Geophysical Investigation

Santa Ynez River Valley
Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan

LEGEND

- SkyTEM (to be flown mid-November 2020)
- Towed Electromagnetic Survey (tTEM)
- Seismic Refraction Survey
- Santa Ynez River Area

Geology

- Tributary Alluvium, Qa
- Santa Ynez River Alluvium, Qg
- Older Alluvium, Qoa
- Paso Robles Formation QTp
- Careaga Sand, Tcag
- Monterey Formation, Tm
- Fault

Fold Axes

- Anticline
- Syncline

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

Date: June 9, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

3.1.4.3 Physical Properties of Aquifers and Aquitards

§ 354.14 Hydrogeological Conceptual Model

(b) The hydrogeologic conceptual model shall be summarized in a written description that includes the following:

(4) Principal aquifers and aquitards, including the following information:

(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.

The following section presents a description of the physical properties of each principal aquifer. These descriptions are based on technical studies and geologic interpretation compiled from the best available data. The locations of these aquifers are presented on Figure 3-3. The physical properties of each of the principal aquifers are summarized in Table 3-4.

No significant confining aquitard units are known to exist within the EMA, although locally confined conditions may be observed in wells completed in the Paso Robles Formation, due to the known heterogeneity in this aquifer, which includes clayey layers and gravel lenses of significant areal extent.

The hydraulic properties of wells completed in the principal aquifers were estimated based on published values (Upson and Thomasson, 1951; LaFreniere and French, 1968; Hoffman, 1996; Hopkins, 2003) and pumping test analyses for wells compiled for creation of this GSP. These data were supported by data included in well completion reports reviewed by GSI Water Solutions, Inc. (GSI). These best available data provide a basis for estimating aquifer properties for the principal aquifers. Aquifer testing data were compiled for wells completed within the Paso Robles Formation and Careaga Sand. These hydraulic properties are employed as inputs for the numerical groundwater flow model, whose development and results are presented in Section 3.3. The estimated aquifer properties presented in Table 3-4 and in the paragraphs below for the two principal aquifer and the Tributary Alluvium include usage of the following aquifer characteristics:

- **Hydraulic conductivity:** the rate of flow of water in gallons per day through a cross section of one square foot under a unit hydraulic gradient (feet per day).
- **Transmissivity:** the rate at which water is transmitted through a unit width of an aquifer under a unit hydraulic gradient (square feet per day).
- **Storativity:** the volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head. Also commonly referred to as the storage coefficient, storativity is the sum of the confined storage coefficient (specific storage times saturated thickness) and the specific yield (unitless).
- **Specific Capacity:** the rate of discharge of a water well per unit of water level drawdown (gallons per minute per foot of drawdown).
- **Flow:** the rate at which water is discharged from a water well during operation (gallons per minute).

Data sources include pumping tests compiled from the County of Santa Barbara Environmental Health Services for water purveyors and mutual water companies, including the following:

- Oak Trail Estates
- Midland School
- Santa Ynez Rancho Estates
- Rancho Ynecita
- Woodstock Ranch
- Walking M Ranches
- Alisal Ranch Golf Course
- Meadowlark Ranches
- City of Solvang
- ID No. 1

These data and reports (some of which include interpretation of the data) were reviewed to estimate hydraulic properties, principally, hydraulic conductivity and well production characteristics. The type of aquifer testing conducted varied between shorter-term step-rate tests and longer-term constant-rate tests conducted for up to 24 hours. The distribution of these wells in the Basin was generally sufficient to represent the variability of aquifer hydraulic properties throughout the EMA.

Table 3-4. Physical Properties of Each Principal Aquifer

Principal Aquifer	Principal Location (Lateral Extent)	Vertical Extent (feet)	Hydraulic Conductivity (feet / day)	Storativity (unitless)		Porosity
				Sc	Sy	(Vol/Vol)
Paso Robles Formation (includes Older Alluvium)	Santa Ynez Uplands, outcropping across approximately 70 percent of EMA, except for along the river, tributary channels, and older alluvial terraces within 1 to 2 miles of river	0 to 3,500 Av. Thickness: 1,500 bgs	0.2 to 96 Average:18	1.0 x 10-2	Paso Robles: 0.04	Paso Robles: 0.15
	Draped atop Paso Robles Formation from terraces near river up to 1 to 2 miles upslope from river	Surface to 150 Av. Thickness: 60 bgs	70 to 280 Average: 136	6.0 x 10-4	Older Alluvium: 0.1	Older Alluvium: 0.2
Careaga Sand	Deeply buried beneath Santa Ynez Uplands, rising to near-surface, near and beneath City of Solvang	Below Paso Robles Formation and Santa Ynez River Alluvium 200 to 900 Av. Thickness: 800 bgs	0.8 to 20 Average: 7.5	8.0 x 10-4	0.05	0.12

Notes

Av. = average

bgs = below ground surface

Sc = specific yield

Sy = storage coefficient

Vol = volume

The following sections provide information about both principal aquifers, including descriptions of the vertical and lateral extent of each, its hydraulic conductivity and storativity, as well as the general production capacity of wells completed in each aquifer.

Paso Robles Formation

The Paso Robles Formation (QTp on Figure 3-3) contains the majority of the groundwater in storage within the EMA. The Paso Robles Formation extends laterally throughout Santa Barbara and San Luis Obispo counties. Locally, this aquifer is present in the Santa Ynez Uplands area of the EMA, extending from the ground surface to a maximum depth of approximately 3,500 feet bgs and forms an extensive and heterogeneous aquifer where saturated.

The Paso Robles Formation is a Plio-Pleistocene-aged, predominantly non-marine terrestrial unit made of relatively thin, often discontinuous sand and gravel layers interbedded with thicker layers of silt and clay. These layers are often described on drillers logs as “shale gravel.” The formation was deposited in alluvial fan, floodplain, and lake depositional environments derived from materials from the surrounding the San Rafael and Santa Ynez Mountains. Seashells are reported in some well logs near the base of the Paso Robles Formation, suggesting a near-shore marine depositional environment. The formation is unconsolidated and poorly sorted. The sand and gravel beds within the unit have a high percentage of Monterey shale gravel fragments and generally have moderately lower permeability compared to the shallow, unconsolidated alluvial sand and gravel beds. Typically, the formation is sufficiently thick such that water wells completed in the Paso Robles Formation produce up to several hundreds of gallons per minute.

For the purpose of groundwater management, the Paso Robles Formation is considered a single unit. However, considerable variability is known to exist within the formation throughout the EMA and indeed the entire Basin. Whereas the upper part consists of relatively coarse-grained materials typical of alluvial fan deposits, the lower part of the complexly folded Paso Robles Formation is finer-grained. The coarser-grained upper portions of the Paso Robles Formation yield groundwater to wells at higher flow rates than the underlying portions. Deeper portions of the Paso Robles Formation are thought to contain poor quality groundwater.

Results of aquifer tests for 20 wells completed in the Paso Robles Formation throughout the EMA indicate that the hydraulic conductivity of the Paso Robles Formation varies between 1 foot and 100 feet per day. Based on these aquifer tests, as well as published reports, the upper part of the formation was assigned a hydraulic conductivity for use in this report and the numerical groundwater model of 10 feet per day and the lower part was assigned a value of 20 feet per day (Upson and Thomasson, 1951). The estimated range of hydraulic conductivity of between approximately 0.2 and 96 feet per day reflects the heterogeneity of the aquifer hydraulic properties of these materials in the EMA. The storativity ranges from 0.01 for confined storage with a specific yield of around 0.04. The pumping rates for wells completed in this formation can range between less than 100 gallons per minute (gpm) to as much as 1,500 gpm, depending largely on length of the aquifer perforated by individual wells.

Because of the similarity of the materials, the Older Alluvium is proposed to be managed in conjunction (as part of) the Paso Robles Formation. These Older Alluvium deposits (Qoa on Figure 3-3)—also referred to as Terrace Deposits—are located throughout the southern portion of the Santa Ynez Uplands (Figure 3-3). These deposits are terraces of dissected older alluvial sands and gravels overlying the Paso Robles Formation to a maximum depth of 150 feet. This formation is very similar to, and made up of the same materials as, the Paso Robles Formation it overlies, and therefore it is difficult to distinguish the Older Alluvium from the Paso Robles Formation. The Older Alluvium are not considered a reliable aquifer per se, because of their shallow depth and tendency to be dewatered during drought conditions (Hoffman, 1996). Several wells are completed in both the Older Alluvium and Paso Robles Formation materials. Because of the similarity of these materials, these will be managed together as one aquifer, referred to as the Paso Robles Formation.

Careaga Sand

The Careaga Sand (Tcag on Figure 3-3) is present at the surface in flanks of Purisima Hills and San Rafael Mountains. In the subsurface, this sand is present below the Paso Robles Formation in the Santa Ynez Uplands and below the Santa Ynez River gravels near the City of Solvang. In the Santa Ynez Uplands, the Careaga Sand is approximately 800 feet thick on average and varies between 200 and 900 feet (refer to the geologic cross sections in Section 3.1.2.3).

The Careaga Sand consists of fine-grained to medium-grained, uniform, massive, marine sand with some gravel and limestone. Some of the Careaga Sand contains fossils in areas west of the EMA. Where the Careaga Sand is exposed at ground surface in the Purisima Hills and along Alamo Pintado Creek, water from precipitation and streamflow can recharge this unit. Two members of the Careaga Sand include the upper Graciosa member (Tcag), which is relatively coarse, and the lower Cebada member (Tca), which is relatively fine-grained. These members are managed as a single aquifer within the EMA.

Generally, the Careaga Sand is less permeable than the overlying Paso Robles Formation; wells completed in the Careaga Sand typically provide relatively less water than wells in the Paso Robles Formation. Based on published values, the hydraulic conductivity of the Careaga Sand is approximately 10 feet per day (Upson and Thomasson, 1951), which is similar to the lower end of the range of hydraulic conductivities for the Paso Robles Formation. Pumping test data from a total of six wells completed in the Careaga Sand indicated that hydraulic conductivity ranges between approximately 2 feet and 20 feet per day. Aquifer tests for wells completed in the Careaga Sand ranged between 12 and 325 gpm. Because of the limited lateral extent of the aquifer relative the Paso Robles Formation within the Santa Ynez Uplands and the greater depth to this formation outside of the western portion of the Santa Ynez Uplands, fewer wells are completed in the Careaga Sand than in the overlying Paso Robles Formation. Wells completed within the Careaga Sand often have sanding problems, especially for wells completed in the lower Cebada member, because of the uniform fine nature of the material.

The storativity of the Careaga Sand is made up of a confined storage of approximately 0.008 and a specific yield of 0.05 (both of which are unitless).

3.1.4.4 Groundwater Flow Barriers

§ 354.14 Hydrogeological Conceptual Model.

(b) The hydrogeologic conceptual model shall be summarized in a written description that includes the following:

(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 EMA portion of the Basin is well-bounded by bedrock below the two principal aquifers, which contain and control the storage and movement of groundwater. Several faults are located within the water-bearing materials in the EMA. The Santa Ynez River Fault Zone crosses below the Santa Ynez River area. Likewise, the Baseline Fault and associated Los Alamos Fault and Casmalia Fault Zone, presented on Figure 3-3, cross the Santa Ynez Uplands area in a general southeast to northwest trend. While these faults may have vertical offset of as much as 120 feet (for the Baseline Fault just west of Santa Agueda Creek; USGS, 1981), these faults are not believed to be barriers to groundwater flow. Instead, they are likely semi-permeable because of the interbedded (layered) nature of the underlying Paso Robles Formation (Hoffman, 1996).

The total volume of groundwater that discharges as subsurface outflow from the higher-elevation Santa Ynez Uplands into the lower-lying Santa Ynez River along the southern border is relatively small (LaFreniere and French, 1968) due to the presence of impermeable bedrock. Limited groundwater flow appears to occur in gaps between bedrock outcrops, as confirmed by the results of the seismic refraction and tTEM geophysical surveys. Within the tributaries to the Santa Ynez River, the Tributary Alluvium has limited saturated thickness (e.g., 0 feet to 60 feet), thus restricting groundwater flow significantly (Hoffman, 1996), and see the summary of the recent geophysical survey (Section 3.1.3.2).

Fine-grained zones are present within the Paso Robles Formation; however, these zones are generally not laterally continuous and do not represent regional groundwater flow barriers.

The sediments of the Paso Robles Formation are heterogenous and have undergone a high degree of tectonic deformation. Consequently, the vertical heterogeneity in the water-bearing properties of the Paso Robles are the result of alternating coarse-grained beds and fine-grained beds. These fine-grained zones act as local confining beds and are likely the cause of the localized artesian conditions that were historically reported in some wells screened within the Paso Robles Formation in Happy Canyon and along Alamo Pintado Creek (LaFreniere and French, 1968).

The Careaga Sand consists of fine- to medium-grained sand with some silt and abundant pebbles. Driller logs from wells drilled into this unit do not indicate the presence of confining beds that may create barriers to flow in the Careaga Sand.

3.1.4.5 Groundwater Recharge and Discharge Areas

§ 354.14 Hydrogeological Conceptual Model.

(d) Physical characteristics of the basin shall be represented on one or more maps that depict the following:

(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.

This section describes areas of significant natural areal recharge and discharge within the EMA. Quantitative information about natural and anthropogenic recharge and discharge is provided in Section 3.3.

Groundwater Recharge Areas

Within the Santa Ynez Uplands area of the EMA, groundwater recharge occurs as distributed areal percolation of precipitation (particularly in areas where the units are exposed at ground surface), infiltration into and through streambeds, agricultural return flows, septic system return flows (leachate), and water system distribution losses. Within the Tributary Alluvium in the Santa Ynez Uplands, portions of the stream are “losing,” which means streamflow contributes to groundwater recharge into the underlying Paso Robles Formation. Percolation of precipitation is the principal component of groundwater recharge, as discussed in Section 3.3.

Groundwater recharge to principal aquifers also occurs from mountain front recharge. Mountain front recharge includes (1) direct recharge from the underlying bedrock along the San Rafael Mountains to the north and east and from the Santa Ynez Mountains to the south and (2) runoff from the mountains that subsequently percolates into the ground. The magnitude of this recharge is discussed in more detail in Section 3.3 along with the other processes of groundwater recharge.

Data provided by the California Soil Resource Lab at University of California (UC) Davis and the UC Agricultural and Natural Resources Department was used to develop a map presenting the areas of potential groundwater recharge. The hydrologic soil groupings are presented on Figure 3-2. The major factors that were considered for potential groundwater recharge areas include the following:

- Deep soil percolation
- Root zone residence time
- Topography
- Chemical limitations
- Soil surface condition (UC Davis and UC-ANR, 2020)

Areas with soils that have excellent recharge properties are shown in dark green, moderate recharge properties are shown in yellow, and areas with poor recharge properties are shown in orange and red (Figure 3-17). As shown on the map, the areas of excellent, good, and moderately good ratings are located along tributary valleys of the Alamo Pintado and Santa Agueda Creeks, as well within areas of Older Alluvium (above Paso Robles Formation) in the Santa Ynez Uplands. Notably, a few excellent areas are located south of the town of Santa Ynez along the northern bank of the Santa Ynez River.

Groundwater Discharge Areas

Natural groundwater discharge areas in the EMA include springs and seeps, groundwater discharge to surface water, and evapotranspiration (ET) by phreatophytes. Phreatophytes are plants with roots that tap into groundwater in the alluvium along creeks and streams. Springs and seeps in the EMA identified by the USGS based on the National Hydrography Dataset (NHD) are shown on Figure 3-18.

Springs are located in the San Rafael Mountain ranges north of the EMA and at three locations within the Santa Ynez Uplands: one in the Purisima Hills, one near Cachuma Creek, and another at the eastern portion of the EMA. Based on the elevation of mapped springs and seeps, it is likely that these discharge groundwater from bedrock outside of the EMA and from limited, perched water-bearing zones in the Santa Ynez Uplands. The single mapped spring within the EMA occurs within the Paso Robles Formation and likely indicates occasional perched groundwater conditions within steeply dipping strata of gravel and sand, which are exposed at higher elevations that are perched on less permeable beds of silt and clay (LaFreniere and French, 1968).

Groundwater discharge as subsurface outflow from the Santa Ynez Uplands portion of the EMA to the adjoining CMA is relatively small (LaFreniere and French, 1968). At the time that the USGS studied groundwater outflow (1946 to 1964), much of the groundwater flow was understood to exit the uplands as surface water flow in the tributaries to the Santa Ynez River, particularly on the lower end of Zanja de Cota Creek. The reported outflow was an average of 2,800 AFY for all tributaries. Groundwater discharge from the higher-elevation Santa Ynez Uplands into the lower-lying Santa Ynez River along the southern border of this area is limited because relatively impermeable bedrock along the southern boundary forms a barrier that forces groundwater to the surface along the Santa Ynez River (Hoffman, 1996). The tTEM geophysical survey supports the interpretation that there are no substantial buried channels that are cutting through the bedrock on the lower ends of these tributaries, where the subsurface outflow would occur. In these areas, discharge from the Paso Robles Formation occurs either as surface water or subsurface flow from the alluvium present in the tributaries to the Santa Ynez River. Very small quantities of groundwater flow may occur through fractures in the bedrock (which can occur as chert deposits) in consolidated rocks in the Ballard Canyon area (LaFreniere and French, 1968) and may be less than 100 AFY. Surface water also discharges from the EMA as underflow from the Santa Ynez River alluvium that crosses into the CMA (Stetson, 2004).

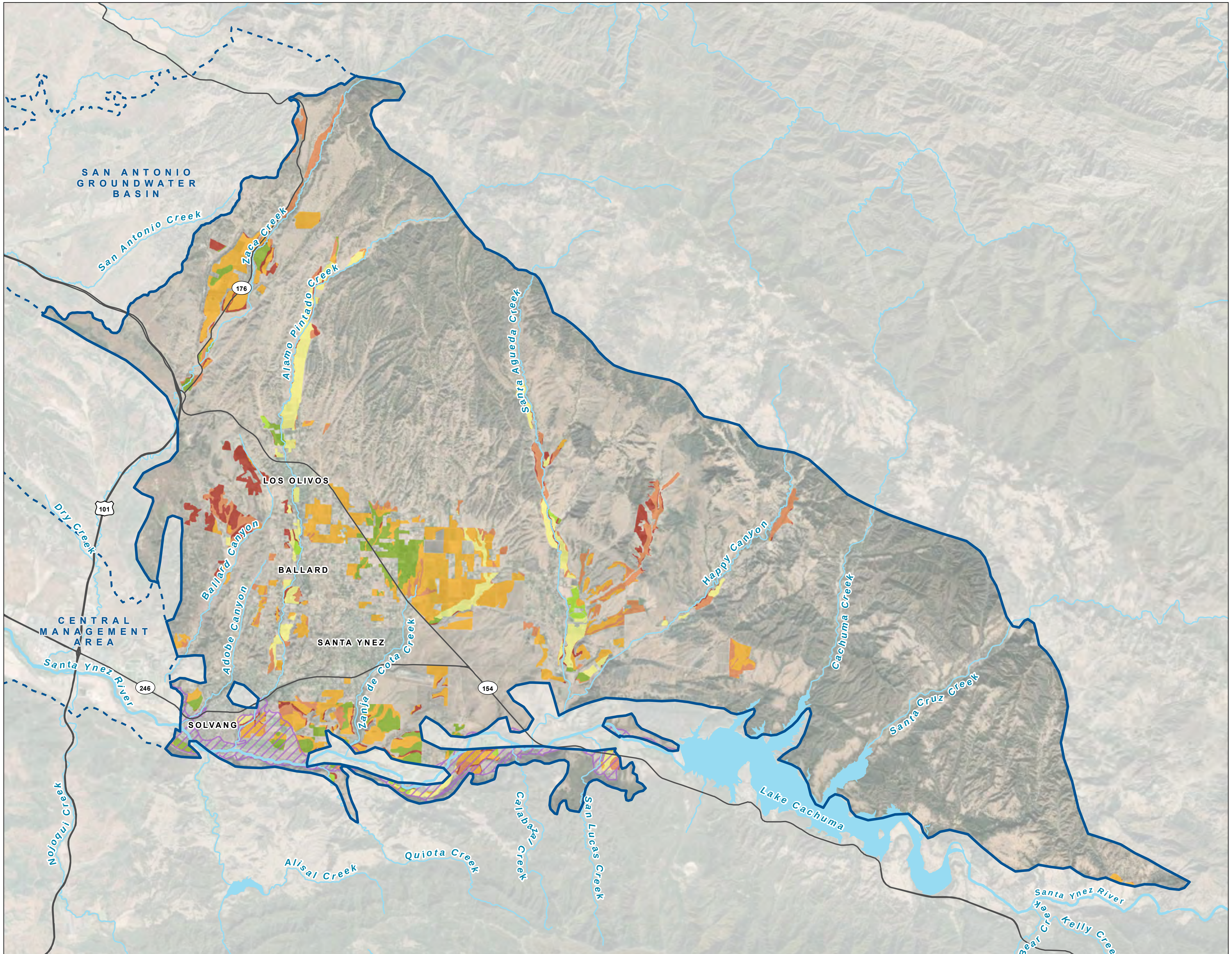


FIGURE 3-17

Recharge Potential on Agricultural Lands

Santa Ynez River Valley Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan

LEGEND

Santa Ynez River Area

Soil Agriculture Groundwater Banking Index (SAGBI) Rating

- Excellent (86 - 100)
- Good (70 - 85)
- Moderately Good (50 - 69)
- Moderately Poor (30 - 49)
- Poor (16 - 29)
- Very Poor (0 - 15)

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

NOTE

SAGBI is provided by California Soil Resource Lab at University of California (UC) Davis and the UC Agricultural and Natural Resources Department.

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Feet

Date: June 9, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

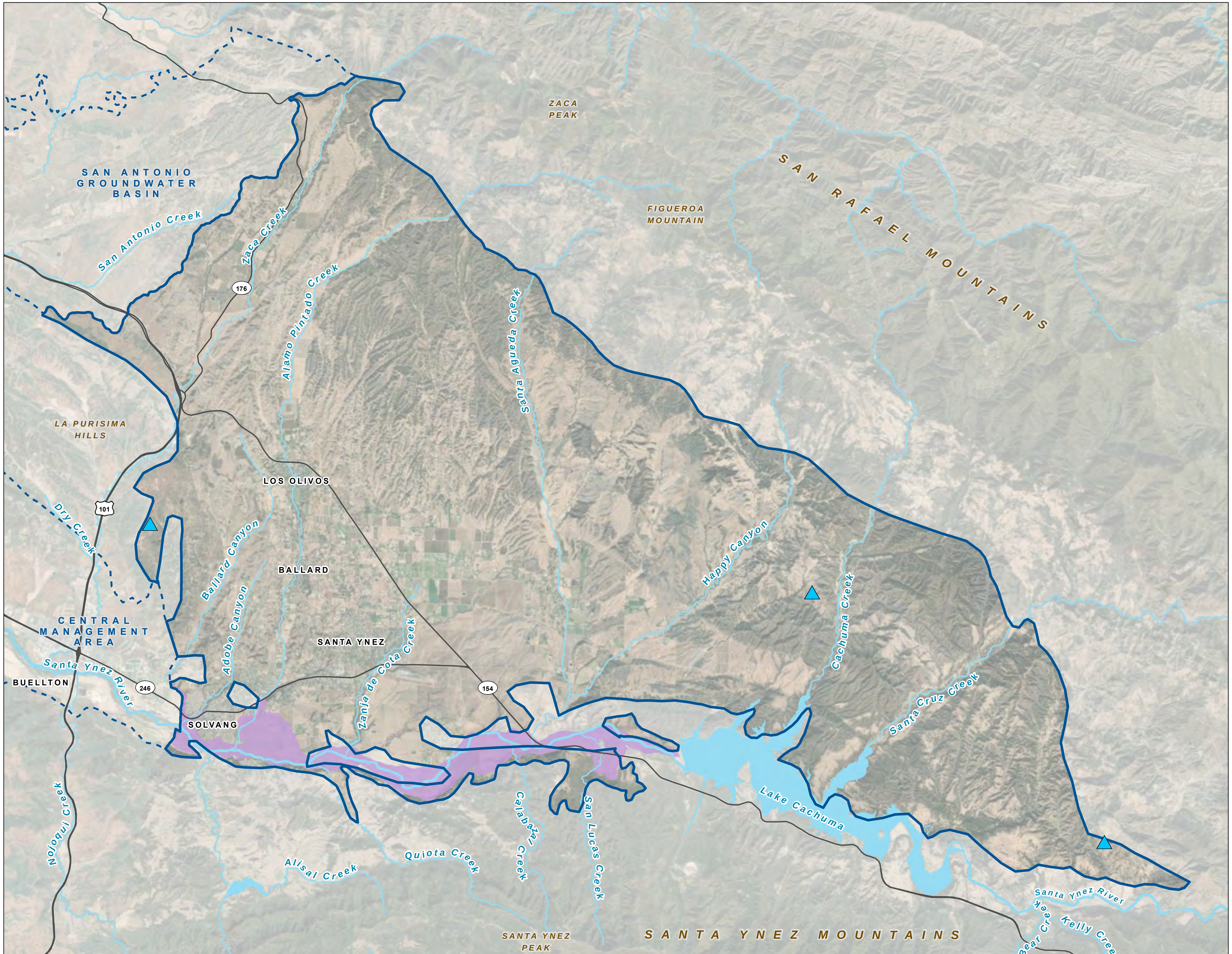

FIGURE 3-18

Seeps and Springs

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

- Seep/Spring
- Santa Ynez River Area

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

Date: June 11, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

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3.1.4.6 Water Quality

§ 354.14 Hydrogeological Conceptual Model.

(b) The hydrogeologic conceptual model shall be summarized in a written description that includes the following:

(4) Principal aquifers and aquitards, including the following information:

(D) General water quality of the principal aquifers, which may be based on information derived from existing technical studies or regulatory programs.

This section provides a general discussion of the natural groundwater quality in the EMA. A more complete discussion of the distribution and concentrations of specific constituents is presented in Section 3.2.3. This assessment of the general water quality of the EMA is based on the results from water quality samples collected and analyzed for various studies and programs for compliance with regulatory programs, sampling conducted by the USGS, data from the USGS National Water Information System (NWIS), and SWRCB's GeoTracker Groundwater Ambient Monitoring and Assessment (GAMA) Program database.

Groundwater quality in the EMA is suitable for potable and agricultural uses. Since implementation of SGMA, exceedances of maximum contaminant levels (MCLs) for gross alpha and trihalomethane were reported in three potable water supply wells. Wells classified as potable include both municipal and domestic wells. Exceedances of secondary MCLs (SMCLs) were reported in 11 potable water supply wells, and exceedances of water quality objectives (WQOs) set by the Regional Water Quality Control Board (RWQCB) were reported in 35 potable water supply wells. Summary tables of general groundwater quality are provided in Section 3.2.3.

3.1.4.7 Primary Beneficial Uses

§ 354.14 Hydrogeological Conceptual Model.

(b) The hydrogeologic conceptual model shall be summarized in a written description that includes the following:

(4) Principal aquifers and aquitards, including the following information:

(E) Identification of the primary use or uses of each aquifer, such as domestic, irrigation, or municipal water supply.

Groundwater from both principal aquifers has many beneficial uses within the EMA including agricultural use, municipal and industrial (M&I) use, domestic use, and environmental uses, particularly where groundwater is connected to surface water that supports groundwater dependent ecosystems (GDEs). This section summarizes the primary uses of water produced from each of the principal aquifers. Fourteen mutual water companies, along with many individual private well owners, rely on groundwater to satisfy water demands for agricultural and rural domestic uses from both principal aquifers (Figure 2-7).

Groundwater produced from the Paso Robles Formation and Careaga Sand is used for a variety of beneficial uses by municipal water purveyors, mutual water companies, and private pumpers. The municipal water purveyors that pump water from these principal aquifers include ID No. 1 and the City of Solvang, entities that provide water from these and other sources for M&I, agricultural, and domestic uses within their service areas. The water from these agencies is blended with water from other sources for distribution to customers. Mutual water companies and private pumpers provide water from the same wells for both agricultural and domestic potable uses. The volumes of water provided from each of these sources and beneficial uses are provided in Section 3.3.

3.1.5 Data Gaps and Uncertainty

§ 354.14 Hydrogeological Conceptual Model.

(b) The hydrogeologic conceptual model shall be summarized in a written description that includes the following:

(5) Identification of data gaps and uncertainty within the hydrogeologic conceptual model.

This section summarizes several portions of this HCM that constitute data gaps, focused primarily on the data gaps that that "could affect the ability of the Plan to achieve the sustainability goal" (§ 354.38 [a]) for the EMA. The adequacy of the monitoring networks to achieve this goal is discussed in Section 5.

Per the SGMA regulations, a data gap is defined as the following:

- A lack of information that significantly affects the understanding of the basin setting or evaluation of the efficacy of Plan implementation and could limit the ability to assess whether a basin is being sustainably managed.

This section also presents estimates of the levels of uncertainty with regard to the principal data relied upon for this HCM.

3.1.5.1 Groundwater Elevations

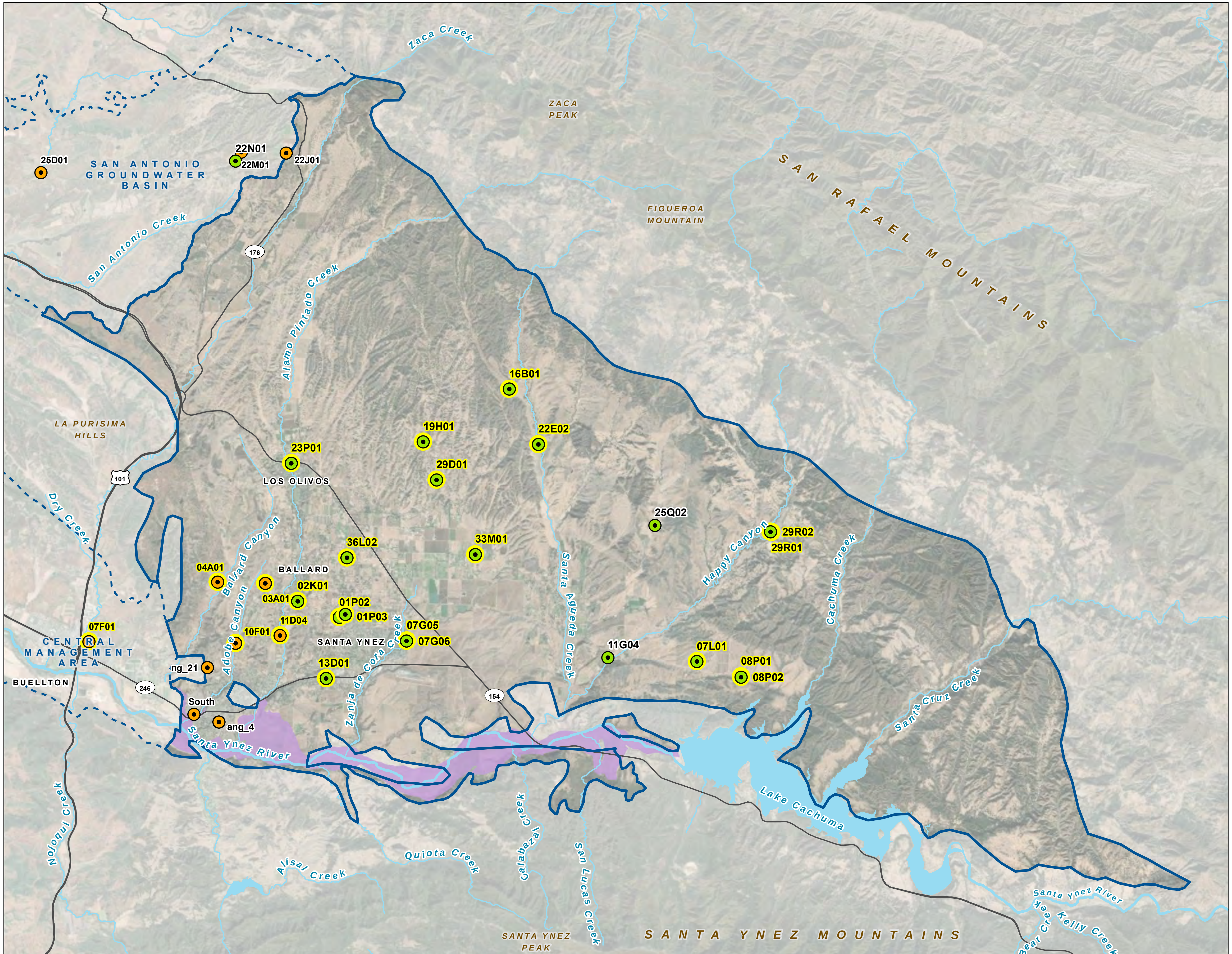
Central to the understanding of groundwater conditions within the EMA is a reliable, frequently sampled, and well-distributed water elevation data set for each of the principal aquifers. Groundwater elevation data are fundamental to assessing whether there are undesirable results for each sustainability indicator. Based on the importance of this parameter, regular monitoring of groundwater elevations throughout the Santa Ynez Uplands of the EMA in each the two principal aquifers must be conducted. As of 2019, approximately 45 wells were measured by Santa Barbara County staff in the spring months and 3 wells were monitored in the fall months. However, in the fall of 2020, the fall groundwater monitoring effort was expanded to include more complete groundwater monitoring such that in October 2020, Santa Barbara County staff measured groundwater levels in 20 wells within the EMA (Figure 3-19).

Even with the additional wells measured in October 2020, to measure water levels during the post-irrigation season, it is recommended that fall water level measurements be continued and the monitoring program expanded to include more wells completed within the Paso Robles Formation and the Careaga Sand in the northwest portion of the EMA near the shared border with the San Antonio Groundwater Basin and within the Paso Robles Formation in the general area of Happy Canyon.

FIGURE 3-19

Representative Wells with Spring 2018 Groundwater Elevation Data

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan



LEGEND

- Well
- County Monitoring Program Well (Spring 2018)

Aquifer Zone

- Paso Robles Formation
- Careaga Sand

All Other Features

- Santa Ynez River Area
- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

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0 5,000 10,000 15,000
Feet

Date: June 11, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

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3.1.5.2 Fault Influence on Groundwater Flow

Although Section 3.1.2 discusses many faults in the EMA, the Baseline Fault may constitute a barrier to groundwater flow. The current understanding of groundwater flow across the Baseline Fault is that the Baseline Fault is either permeable or semipermeable and does not constitute a barrier to groundwater flow. The addition of groundwater monitoring located on either side of the fault would clarify the relationship of water levels across the fault and, by extension, its potential role in controlling groundwater flow. Selection of wells for this purpose should be considered when expanding the groundwater monitoring network. This is discussed in more detail later in Section 4.

3.1.5.3 Well Completion Data

The construction details for many wells included in the monitoring network is unknown. An accurate understanding of the completion of each well construction is important to interpret and assign groundwater levels to the appropriate principal aquifer. To comply with the SGMA regulations, the water level within a well must represent a single aquifer, a condition that requires the accurate understanding of the completion of the well. As discussed further in Section 4, the well completion information in the monitoring network should be determined by the use of either video logs of wells and/or the provision of well completion information for wells included in the water level monitoring program as well as all of the wells within the EMA. Well completion information may require relationship building with well owners, encouraging them to provide the information.

3.1.5.4 Subsidence Monitoring

Subsidence monitoring has not been conducted on a routine basis to date and there is no indication that subsidence is occurring within the EMA. Section 4 includes a discussion of the proposed subsidence monitoring program.

3.2 Groundwater Conditions [§ 354.16]

§ 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:

This section describes the current and historical groundwater conditions in the principal aquifers within the Basin. In accordance with the SGMA regulations, current conditions are any conditions occurring after January 1, 2015. By implication, historical (or legacy) conditions are any conditions occurring prior to January 1, 2015. This section focuses on information required by the GSP regulations and information that is important for developing an effective plan to achieve sustainability. The organization of this section aligns with the five sustainability indicators specified in SGMA and the SGMA regulations as they apply to the EMA, including the following:

- **Chronic lowering of groundwater levels** indicating a significant and unreasonable depletion of supply
- Significant and unreasonable **reduction of groundwater in storage**
- Significant and unreasonable **degraded groundwater quality**
- Significant and unreasonable **land subsidence** that substantially interferes with surface land uses
- **Depletion of interconnected surface water** that has significant and unreasonable adverse impacts on beneficial uses of the surface water

The EMA is isolated from the Pacific Ocean and is not threatened by seawater intrusion; therefore, the sixth SMC, seawater intrusion, is not applicable in the EMA and is not further discussed in this section.

Variations in climatic conditions directly affect groundwater conditions. Climate affects both (1) recharge to the Basin, which rises significantly during wet periods in response to increase precipitation and (2) water use, which can increase in response to prolonged drought in the absence of rainfall and/or supplemental water supplies. This section includes a limited discussion of the variability of groundwater conditions in response to climatic variability. The discussion of the volumes of surface water and groundwater flowing into and out of the EMA portion of the Basin in the historical water budget discussion also includes a more thorough discussion of the variability of groundwater conditions in response to climatic variability (Section 3.3).

3.2.1 Chronic Lowering of Groundwater Levels

3.2.1.1 Groundwater Elevation Contours

§ 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.

Groundwater elevation conditions are largely based on water level data collected by the USGS through the NWIS database for the acquisition, processing, review, and storage of water data. The available water level data in the EMA were collected by the USGS and Santa Barbara County as part of the Water Data for the Nation program.[22] In the spring of 2019, Santa Barbara County took responsibility for annual groundwater level monitoring in the EMA after the USGS discontinued its monitoring efforts. Additional groundwater elevation data for wells were obtained from the City of Solvang and several mutual water companies. A summary of the groundwater water level data compiled for use in this GSP are presented on Table 3-5.

[22] Funded through a joint funding agreement with USGS and Santa Barbara County Water Agency.

Table 3-5. Summary of Available Groundwater Level Data

Source	Coverage	Period of Record
USGS (NWIS) includes California Statewide Groundwater Elevation Monitoring (CASGEM), local agencies and Santa Barbara County data	583 wells within and surrounding EMA	1905 to present
City of Solvang	10 wells	2008 to present
Mutual Water Companies	Several wells in Santa Ynez Uplands	Recent years only; varies by water company

From these wells, 78 were selected for incorporation into the groundwater elevation assessment (depending on the year and season) based on the quality of data and period of record for each well. Additional information about the monitoring network is provided in Section 5.3.

The set of wells used in the groundwater elevation assessment was selected based on the following criteria:

- The wells have groundwater elevation data for spring 2018
- Sufficient information exists to assign the well to either of the two principal aquifers
- Groundwater elevation data were deemed representative of static conditions

Based on these data, groundwater elevation contour maps were created for the two principal aquifers for the spring 2018 period. Prior to the late 1970s, the USGS and/or Santa Barbara County conducted water level monitoring throughout the EMA in the spring and fall, typically in April and October of each year. Since the late 1970s, very limited groundwater monitoring has conducted in the fall throughout the county. These fall monitoring events included three wells within the EMA; thus, there is limited understanding of groundwater levels following the summer irrigation season. The locations of the wells selected as representative of the principal aquifers with groundwater elevation data in spring of 2018 are shown on Figure 3-19. Reference elevations of these wells were surveyed by GSI in 2020 to satisfy the SGMA regulations, which require vertical elevations of reference points (wellheads) to be measured to an accuracy of 0.5 feet, or best available information, relative to the North American Vertical Datum of 1988 (NAVD88).

Groundwater elevation contour maps were created for the spring 2018 period to assess current groundwater conditions, including flow directions and groundwater gradients. The contours are based on groundwater elevation measurements from the selected wells, as presented on Figures 3-20 and 3-21. The groundwater elevation data that were deemed to be either unrepresentative of static conditions, obviously erroneous, or representative of more than a single aquifer were excluded from contouring. A summary of the gradients of each principal aquifer is presented as Table 3-6.

Table 3-6. Lateral Gradients of Each Principal Aquifer

Principal Aquifer	Location (Lateral Extent)	Horizontal Gradient (feet per foot)	Direction of Flow
Paso Robles Formation	Santa Ynez Uplands	0.02 to 0.03	South and southwest from the San Rafael Mountains
Careaga Sand	Santa Ynez Uplands	0.014 to 0.02	Southwest

Paso Robles Formation

The groundwater elevation contours for the Paso Robles Formation for the spring of 2018 show groundwater elevations ranging from approximately 1,200 feet above NAVD88 in the north to approximately 550 feet NAVD88 in the southern part of the Santa Ynez Uplands area.

Groundwater flow direction in the Paso Robles Formation is generally to the south-southwest with hydraulic gradients ranging from a high of approximately 0.03 feet per foot along the Santa Agueda Creek. Generally, throughout most of the Santa Ynez Uplands, the gradient is between 0.02 to 0.03 feet per foot.

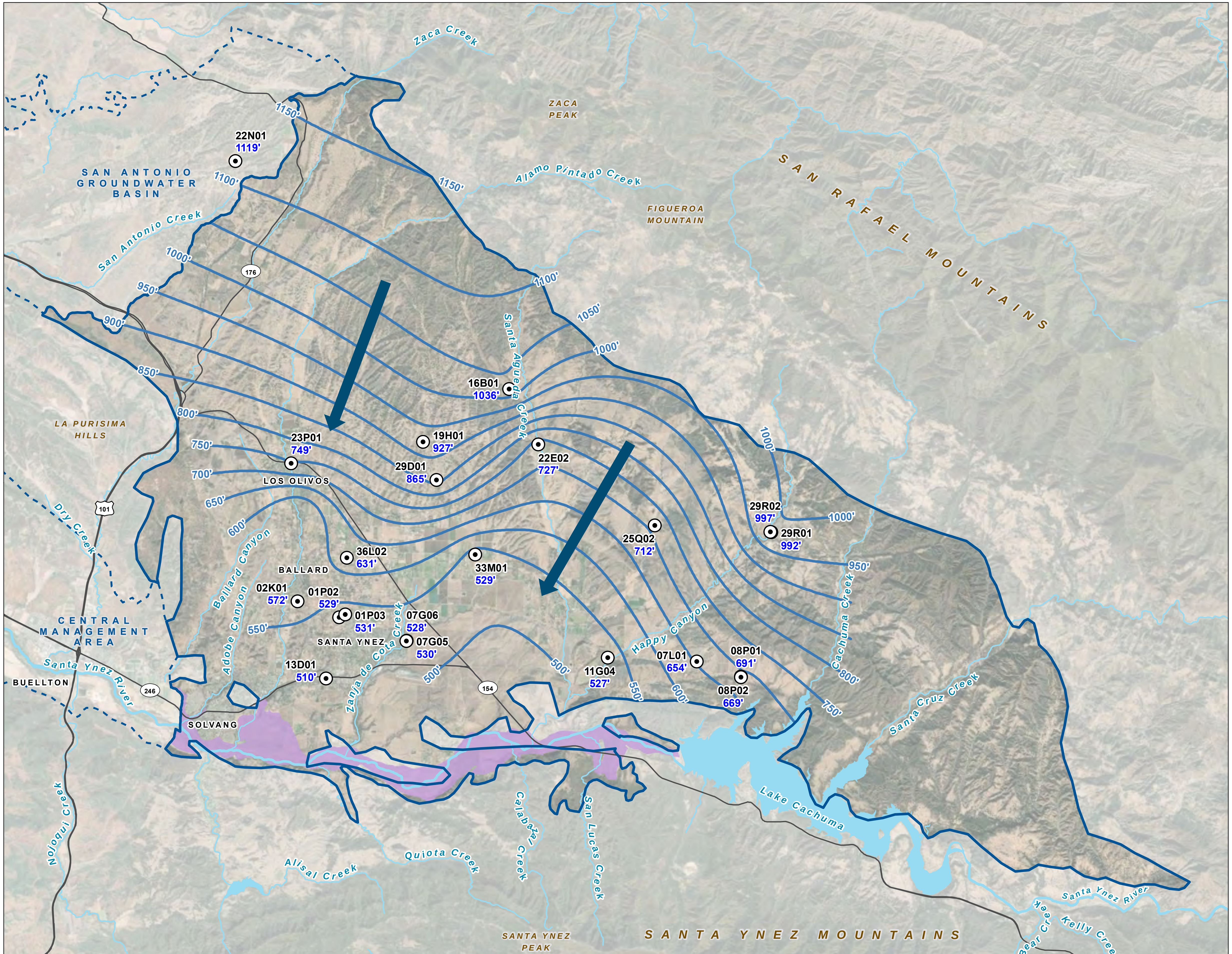
The conformity of the water-level contours indicates that, in general, the Paso Robles Formation may generally be considered as a single storage unit, as shown on Figure 3-20. Previous contouring of the Paso Robles Formation suggested that there were areas of partial confinement and local areas of perched groundwater within the formation (LaFreniere and French, 1968; Hoffman, 1996).

The Paso Robles Formation extends throughout the Santa Ynez Uplands, extending northwest without interruption into the adjacent San Antonio Groundwater Basin (refer to the geologic cross section of the area on Figures 3-6 and 3-20). The groundwater elevation contours in the area of the shared border with the San Antonio Groundwater Basin in the northwest corner of the EMA's Santa Ynez Uplands suggest that the flow direction is perpendicular to the shared border such that groundwater would neither flow into nor out of the EMA. This apparent direction of groundwater flow in this area is based on groundwater elevation measurements in only two wells near the 5-mile shared border and is therefore somewhat uncertain.

FIGURE 3-20

Paso Robles Formation Groundwater Elevation Contour Map, Spring 2018

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan



LEGEND

- Paso Robles Formation Well / Water Level Elevaton (feet)
- Paso Robles Formation Groundwater Elevation, Spring 2018
- Groundwater Flow Direction
- Santa Ynez River Area

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000 Feet

Date: June 11, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

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Careaga Sand

All of the known groundwater wells that are completed in the Careaga Sand are located in the western portion of the EMA. The Careaga Sand crops out west of the City of Solvang and dips towards the east, under the Paso Robles Formation at depths too deep for a typical production well. Consequently, groundwater contours for the Careaga Sand are restricted to the western portion of the EMA and based on wells that have been confirmed to be completed within the Careaga Sand.

In spring 2018, Careaga Sand groundwater elevations ranged from approximately 1,150 feet above NAVD88 in the north to approximately 320 feet NAVD88 in the southern part of the Basin.

Groundwater flow direction in the Careaga Sand is generally to the south-southwest with hydraulic gradients ranging from 0.014 feet per foot near the City of Solvang to approximately 0.02 feet per foot in the northwest portion of the Santa Ynez Uplands near the shared border with the San Antonio Groundwater Basin. Near the southwestern border with the CMA, the groundwater flow is towards the CMA. The magnitude of this flow is discussed further in Section 3.3. Groundwater flow through this area extends into the Careaga Sand, which is present below Adobe Canyon and into the CMA below the Santa Ynez River, as shown on Figure 3-21.

At the shared border with the San Antonio Groundwater Basin, however, the direction of flow is uncertain because very few wells exist in that area. The few wells that do exist suggest that the hydraulic gradient in the area is perpendicular to the groundwater basin boundary, which would indicate that no appreciable flow enters or leaves the EMA along that border. This uncertainty of the groundwater flow direction along the San Antonio Groundwater Basin boundary is identified as a data gap.

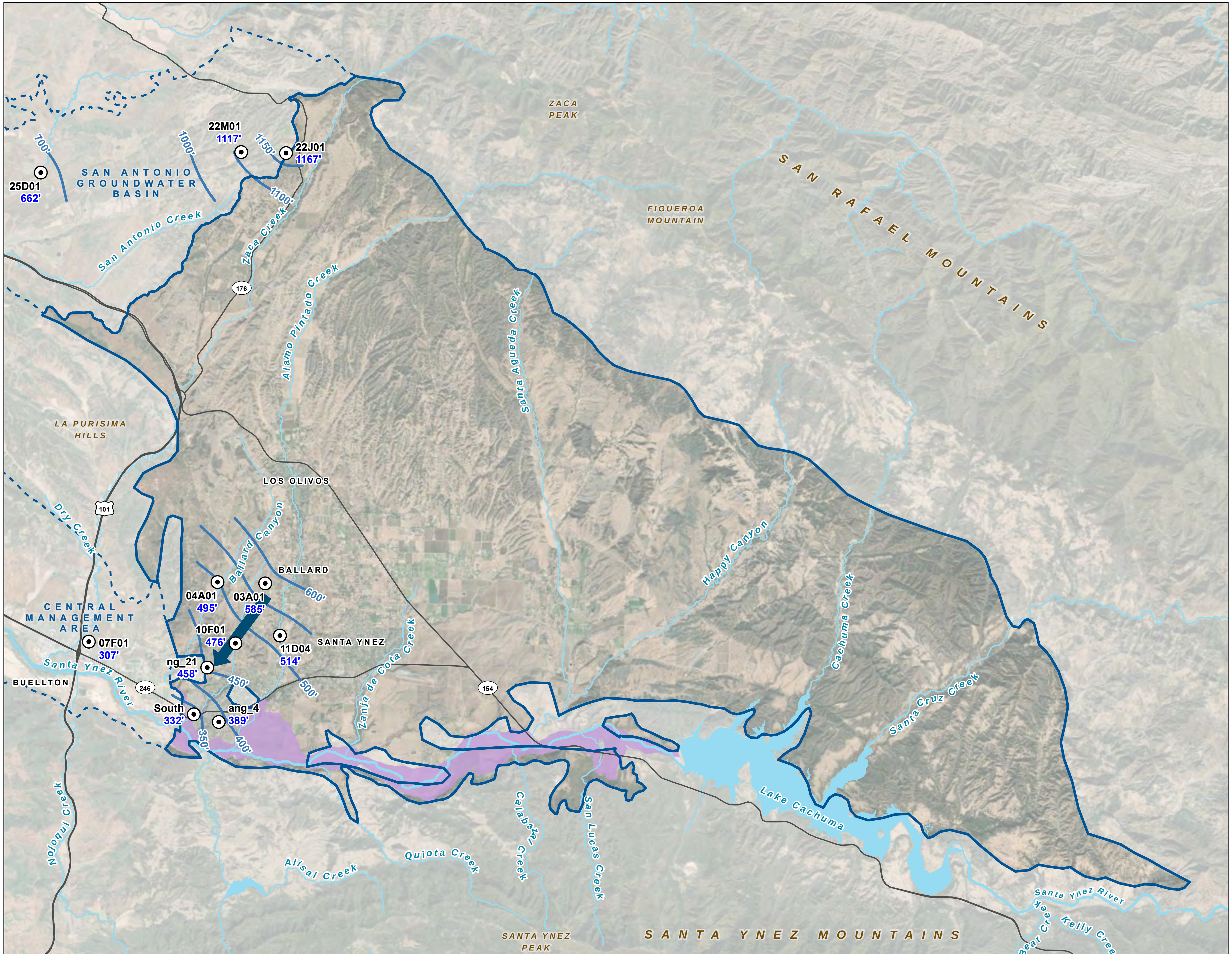

FIGURE 3-21

Careaga Sand Groundwater Elevation Contour Map, Spring 2018

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

- Careaga Sand Well
- Water Level Elevaton (feet)
- Careaga Sand Groundwater Elevation, Spring 2018
- Groundwater Flow Direction
- Santa Ynez River Area

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

Date: June 11, 2021
Data Sources: ESRI, USGS, Maxar 2019

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3.2.1.2 Groundwater Hydrographs

§ 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:

(2) Hydrographs depicting long-term groundwater elevations, historical highs and lows, and hydraulic gradients between principal aquifers.

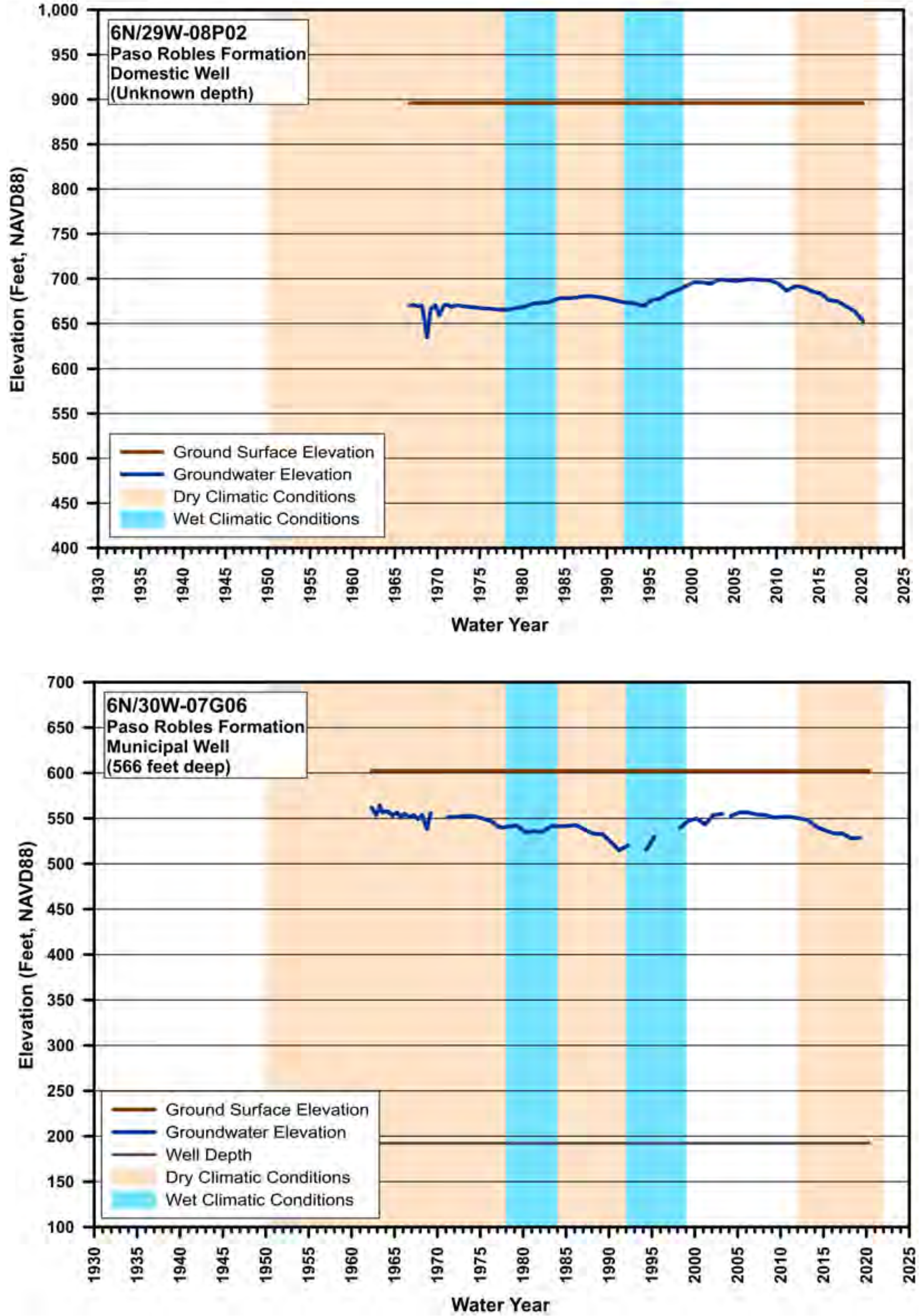
To demonstrate the long-term variability and trends of groundwater elevations in the EMA, hydrographs for wells in the two principal aquifers were created. Representative wells presented on Figure 3-19 were chosen because they have sufficient periods of record to identify trends and/or responses to climatic conditions, are geographically distributed, and represent a single aquifer system.

Paso Robles Formation

Representative hydrographs for four wells completed in the Paso Robles Formation are presented as Figure 3-22 and Figure 3-23. The complete set of hydrographs for the representative wells are included in Appendix D. As required, these hydrographs for the period of record present the water level elevation relative to NAVD88 and the ground surface elevation to illustrate the depth to water. The hydrographs also present the periods of climatic variation, which were based on precipitation data representative of conditions in the EMA.

Overall, the Paso Robles Formation well hydrographs illustrate the long-term stability of water levels over time except during drought periods. Water levels in the Paso Robles Formation show a strong correlation with climatic conditions. Some wells show water elevation decreases of more than 100 feet during prolonged drought cycles, but most wells appear to fully recover within a few years when the drought conditions end. Changes in water levels are likely also related to groundwater pumping as well. The Paso Robles Formation is the most productive and most widely pumped aquifer in the EMA. During periods of drought, water levels decline in response to a combination of increased pumping and decreased areal recharge.

Seasonal fluctuations in water levels in the Paso Robles Formation appear to be relatively small (less than 30 feet). This observation is based on hydrographs that have water level records predating 1980, when the USGS began monitoring water levels annually in the spring, instead of bi-annually in the spring and fall.



LEGEND

- Ground Surface Elevation
- Groundwater Elevation
- Dry Climatic Cycle
- Wet Climatic Cycle

FIGURE 3-22

Representative Paso Robles Formation Hydrographs: Wells -08P02 and -07G06

Groundwater Sustainability Plan
Eastern Management Area

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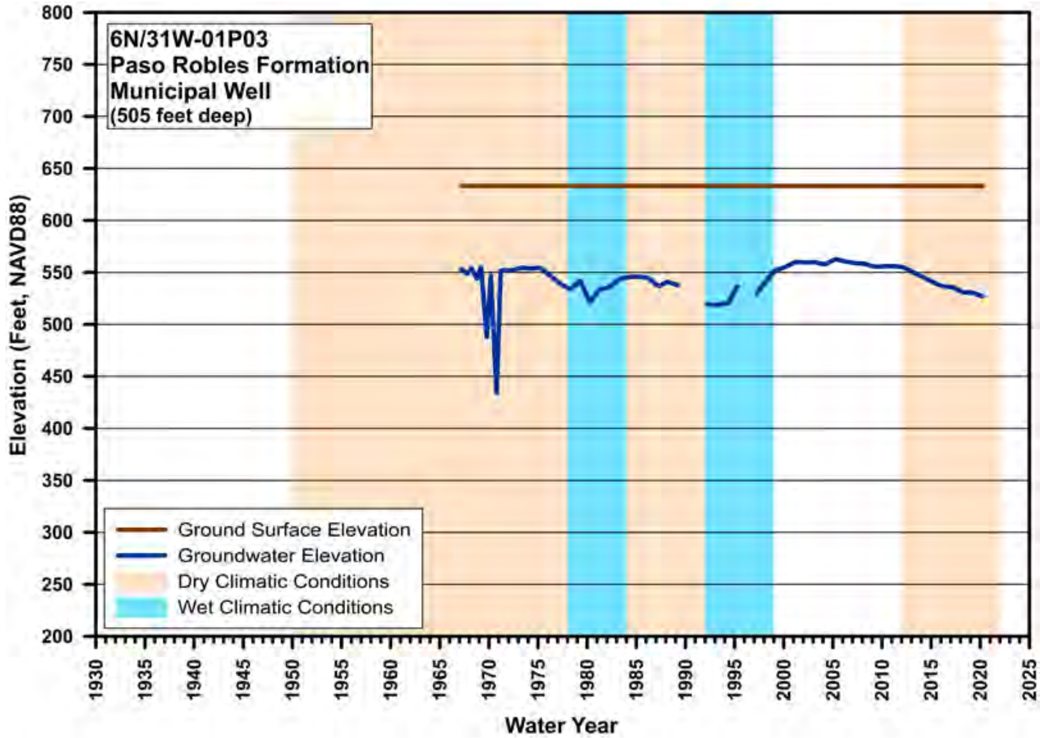

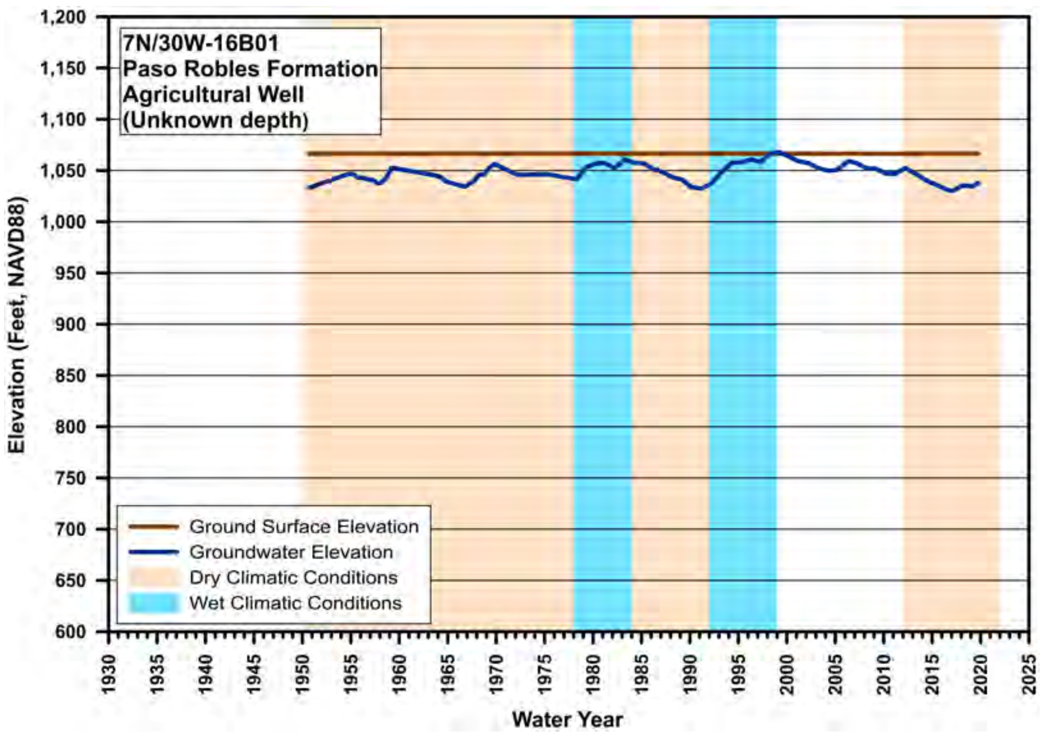

LEGEND

- Ground Surface Elevation
- Groundwater Elevation
- Dry Climatic Cycle
- Wet Climatic Cycle

FIGURE 3-23

Representative Paso Robles Formation Hydrographs: Wells -01P03 and -16B01

Groundwater Sustainability Plan
Eastern Management Area

GSI Water Solutions, Inc.

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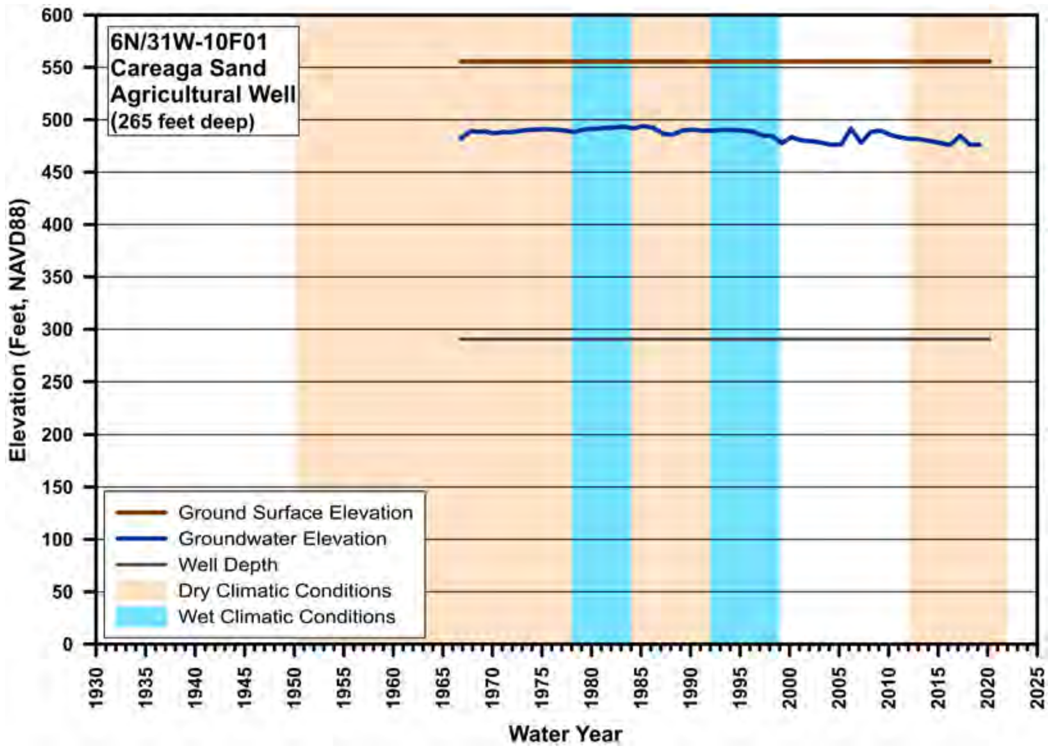
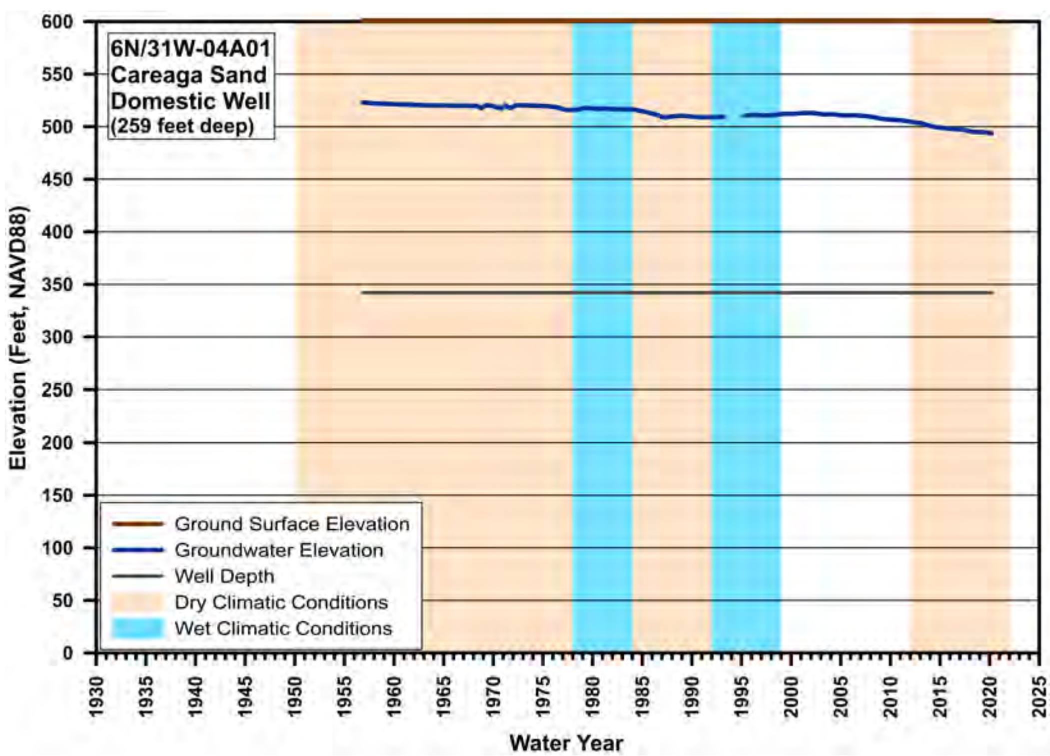
Careaga Sand

The Careaga Sand hydrographs presented on Figure 3-24 generally illustrate the long-term stability of water levels over the period of record for the two representative wells with continuous data since the mid-1960s. These wells show minimal change in water level elevation from the 1960s to present. Water levels in some wells show muted correlation with climatic conditions, exhibiting minor decreases during drought conditions and rising water levels during wet periods.

One reason for the stable water levels in the Careaga Sand is that the formation is not pumped significantly relative to the Paso Robles Formation. Wells completed in the Careaga Sand typically have relatively low yields compared to the yields of the Paso Robles Formation. The volume of water extracted from the Careaga Sand is likely a small portion of the total available storage, which may explain why water levels do not show significant decline due to drought conditions.





LEGEND

- Ground Surface Elevation
- Groundwater Elevation
- Dry Climatic Cycle
- Wet Climatic Cycle

FIGURE 3-24

Representative Careaga Sand Hydrographs: Wells -10F01 and -04A01

Groundwater Sustainability Plan
Eastern Management Area

GSI Water Solutions, Inc.

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3.2.2 Groundwater in Storage

§ 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:

(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 changes in groundwater in storage within the EMA are discussed in Section 3.3, Water Budget.

3.2.3 Degraded Groundwater Quality

§ 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:

(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.

This section provides a summary of the groundwater quality distribution and trends in the EMA. Water quality is presented in terms of beneficial use (potable water and agricultural irrigation), point sources of groundwater contamination, and naturally occurring salts and nutrient constituents in groundwater. Groundwater quality samples were collected and analyzed throughout the Basin for various studies and programs. Historical groundwater quality data was acquired from the SWRCB GeoTracker GAMA database.

This GSP focuses on constituents that relate to beneficial uses of groundwater that might be impacted by groundwater management activities. The constituents of concern are chosen for either or both of the following reasons:

1. The constituent has a drinking water standard (MCL or SMCL).
2. The constituent has a WQO set by the RWQCB in the Water Quality Control Plan for the Central Coast Basin (RWQCB et al., 2017).

While there are some wells that have constituent concentrations that exceed Basin Water Quality Objectives set by the RWQCB, it is possible that these exceedances are a result of natural conditions and not caused by land use or other anthropogenic activities. Elevated boron concentrations are naturally occurring in many central coast basins and elevated total dissolved solids (TDS), chloride, and sodium are often associated with rocks of marine origin that are present in the EMA. Any projects and management actions that are currently being considered, even if tentatively, are not anticipated to directly cause concentrations of any of these constituents in groundwater to increase.

Groundwater Quality Suitability for Potable Water

Water quality data from potable water supply wells were analyzed to identify exceedances of drinking water standards. For purposes of this assessment, potable water quality was analyzed for wells that serve water for potable purposes, including both municipal and domestic wells. The data reviewed include water quality analytical results from groundwater samples collected between January 1984 and January 2019 from 79 potable water supply wells in the EMA. Drinking water standards are established by federal and state agencies by setting concentration thresholds for certain groundwater constituents using MCLs and SMCLs. MCLs are regulatory thresholds and SMCLs are guidelines established for nonhazardous aesthetic considerations such as taste, odor, and color. WQOs are set by the RWQCB to protect all beneficial uses of groundwater.

Groundwater in the EMA is generally suitable for potable water purposes. Constituents with reported concentrations at or above their respective MCL or SMCL for samples collected from potable water supply wells are presented in Table 3-7.

Groundwater Quality Suitability for Agricultural Irrigation

Groundwater in the Basin is generally suitable for agricultural purposes based on comparison with basin WQOs as discussed in this section and based on feedback from agricultural stakeholders. The agricultural suitability of groundwater within the EMA was evaluated using the following two metrics:

1. Salinity as indicated by concentrations of dissolved solids
2. Specific ion toxicity as indicated by concentrations of sodium, chloride, and boron

Groundwater quality data from the GeoTracker GAMA data sets, excluding wells associated with cleanup sites, were evaluated. The data reviewed consists of 680 sampling events from 153 wells in the EMA collected between January 1984 and January 2021. Table 3-8 summarizes constituents with reported concentrations at or above their respective basin WQO.

Samples collected from 59 of 138 wells indicated TDS concentrations exceeding the WQO (600 milligrams per liter [mg/L]) in 127 of 437 samples (Table 3-8). The largest concentration of wells with reported concentrations of TDS at or above the WQO are located in the in the southwest and northwest regions of the EMA. Elevated TDS concentrations in the southwestern portion of the EMA may be a result of natural conditions as groundwater moves from recharge areas with low TDS to downgradient locations where TDS is higher. According to stakeholders, concentrations of TDS exceeding the WQO have not been a limiting factor for agricultural production.

Concentrations of boron, sodium, and chloride have also been reported at concentrations exceeding the WQO in the EMA. These constituents are generally associated with salt-containing minerals that are naturally present in the watershed. Samples analyzed for concentrations of sodium from 138 of 138 wells exceeded the WQO (20 mg/L) in 435 of 437 samples. According to stakeholders, concentrations of sodium exceeding the WQO have not been a limiting factor for agricultural production.

Samples analyzed for concentrations of chloride from 78 of 138 wells exceeded the WQO (50 mg/L) in 196 of 440 samples (Figure 3-27). The largest concentration of wells with reported concentrations of chloride exceeding the WQO are located in the southwest region of the EMA. According to stakeholders, concentrations of chloride exceeding the WQO have not been a limiting factor for agricultural production.

Analytical results for eight water samples indicate some caution should be used if irrigating crops, specifically fruit (including grapes) (Hanson, Grattan, and Fulton, 2006), due to potential boron ion toxicity (SWRCB, 2019).

Table 3-7. Potable Water Quality Results

Constituent	MCL (mg/L)	SMCL[1] (mg/L)	Number of Wells Sampled	Number of Wells with Constituent Concentrations at or above the WQ Standard	Number of Samples	Number of Samples with Constituent Concentrations Above the WQ Standard	Maximum Constituent Concentration Reported (mg/L)	Mean Constituent Concentration Reported (mg/L)
Chromium	0.05	--	34	1	181	1	0.059	0.02
Fluoride	2	--	41	1	158	1	15	0.35
Gross Alpha[2]	15	--	30	3	170	7	37.9	5.78
Nitrate[3]	10	--	68	6	604	40	16	4.3
Trihalomethanes	0.080	--	13	1	20	1	0.09	0.02
Carbon Tetrachloride	0.0005	--	18	1	24	1	0.0014	0.0002
Iron	--	0.3	29	13	117	34	15	1.32
Manganese	--	0.05	28	5	105	20	0.69	0.07
Foaming Agents (MBAS)	--	0.5	19	1	70	1	1.2	0.23
TDS	--	1,000	68	2	230	8	1,700	565

Notes

[1] Upper SMCL (SWRCB, 2018)
[2] Gross Alpha concentrations reported in picocuries per liter (pCi/L)
[3] Nitrate reported as nitrogen.

-- = No value
MBAS = methylene blue active substances
MCL = maximum contaminant level
mg/L = milligrams per liter
SMCL = secondary maximum contaminant level
WQ = water quality
TDS = total dissolved solids

Table 3-8. Summary of Agricultural Irrigation Water Quality

Constituent	WQO (mg/L)	Number of Wells Sampled	Number of Wells with Constituent Concentrations at or above the WQO	Number of Samples	Number of Samples with Constituent Concentrations above the WQO	Maximum Constituent Concentration Reported (mg/L)	Mean Constituent Concentration Reported (mg/L)
TDS	600	138	59	437	127	1700	550
Chloride	50	138	78	440	196	195	55
Boron	0.5	49	4	174	8	0.69	0.16
Sodium	20	138	138	437	435	228	49
Nitrate (as N)	1	104	88	694	634	16	4.1

Notes

mg/L = milligrams per liter

TDS = total dissolved solids

WQO = median groundwater quality objective for Santa Ynez sub-area (SWRCB, 2019)

Samples analyzed for concentrations of boron from 4 of 49 wells exceeded the WQO (0.5 mg/L) in 8 of 174 samples (Figure 3-29). Wells with reported concentrations of boron at or above the WQO are located to the west of Los Olivos.

Distribution and Concentrations of Point Sources of Groundwater Constituents

Potential point sources of groundwater quality degradation were identified, and waste discharge requirement permits were reviewed using the SWRCB GeoTracker data management system. Table 3-9 summarizes information from GeoTracker for open/active contaminated sites and Table 3-10 summarizes constituents historically found in exceedance of their respective drinking water quality standards in monitoring wells associated with point source contamination sites. Each of these exceedances occurred in a geographically isolated area and do not reflect typical groundwater quality within the EMA.

The locations of these potential groundwater contaminant point sources and the locations of completed/case closed sites is presented on Figure 3-25. The open/active cases include Jim's Service Center (Site ID T0608300118), two landfill sites, and one oil and gas site in the vicinity of the Zaca Oil Field and gas well fields shown on Figure 3-4.

The Jim's Service Center site was eligible for closure as of January 30, 2019, per the RWQCB Low Threat Closure Policy (Santa Barbara County Public Health Department, 2019). Site assessment reports indicate there are dissolved-phase benzene and methyl tert-butyl ether (MTBE) detections in groundwater beneath the site. Alamo Pintado Creek was determined to be the sensitive downgradient receptor. Due to the measured groundwater gradient in the area of the site, the classification of Alamo Pintado Creek as a losing stream by the USGS NHD, and the decreasing benzene and MTBE concentrations, a minimal threat to groundwater as a potable water source was determined (Flowline, 2018).

Other actively monitored sites include the closed landfills Foxen Canyon Class III Landfill, Ballard Canyon Landfill, and the Zaca Oil Field. Although groundwater contamination is associated with each of the landfill sites, the extent of contamination is well defined and contained on-site, the sites are continuously monitored, and they pose little threat to the beneficial use of groundwater in the EMA (Geosyntec, 2021a and 2021b). These sites are listed in Table 3-9 and their locations are shown on Figure 3-25.

Table 3-9. Potential Point Source of Groundwater Contamination

Site ID/Site Name	Site Type	Constituent(s) of Concern	Status
Jim's Service Center (T0608300118)	LUST Cleanup Site	Benzene and methyl tert-butyl ether (MTBE)	Open – Eligible for Closure as of 1/30/2019
Foxen Canyon Closed Class III Landfill (L10004697449)	Land Disposal Site	Tetrachloroethylene (PCE)	Open – Facility Closed/With Monitoring as of 9/28/2012
Ballard Canyon Closed Landfill (L10004435913)	Land Disposal Site	vinyl chloride, tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2 dichloroethylene (cis-1,2 DCE) and benzene	Open – Facility Closed/With Monitoring as of 9/28/2012
Zaca Oil Field - Produced Water Facilities (T10000011845)	Other Oil and Gas Projects	Petroleum hydrocarbons	Open - Inactive as of 7/27/2018

Notes

Source: MCLs, DLRs, and PHGs for Regulated Drinking Water Contaminants (SWRCB, 2020)

LUST = leaking underground storage site

Table 3-10. Constituents Associated with Point Source Contamination Sites Listed in Table 3-9

Constituent	Units	MCL	SMCL	Number of Wells Sampled	Number of Wells with Constituent Concentrations at or above the WQ Standard	Number of Samples	Number of Samples with Constituent Concentrations above the WQ Standard	Maximum Constituent Concentration Reported	Mean Constituent Concentration Reported
Aluminum	mg/L	1	--	1	1	3	3	13	6.6
Arsenic	mg/L	0.01	--	8	1	11	1	0.012	0.005
Cadmium	mg/L	0.005	--	23	1	349	1	0.025	0.005
Iron	mg/L	--	0.3	21	14	352	50	32.4	1.3
Manganese	mg/L	--	0.05	20	14	343	141	2.13	0.09
Selenium	mg/L	0.05	--	23	13	349	31	0.171	0.03
Thallium	mg/L	0.002	--	23	10	349	16	0.033	0.02
1,1-Dichloroethene	µg/L	6	--	39	1	565	2	50	3.2
1,2-Dichloroethane	µg/L	0.5	--	63	11	1,208	103	180	9.3
cis-1,2-Dichloroethene	µg/L	6	--	28	2	434	10	71	3.4
Benzene	µg/L	1	--	63	29	1,324	232	66,000	387
Ethylbenzene	µg/L	300	--	63	8	1,324	65	52,000	523
Methyl tert-butyl ether	µg/L	13	--	63	16	1,294	110	150,000	4,706
Toluene	µg/L	150	--	63	4	1,324	17	9,500	113
Trichloroethene	µg/L	5	--	39	1	565	2	50	1.6
Vinyl chloride	µg/L	0.5	--	28	2	434	23	21.6	7.2
Total Xylenes	µg/L	1,750	--	58	4	1,052	20	21,000	722

Notes

-- = No value

µg/L = micrograms per liter MCL = maximum contaminant level

mg/L = milligrams per liter

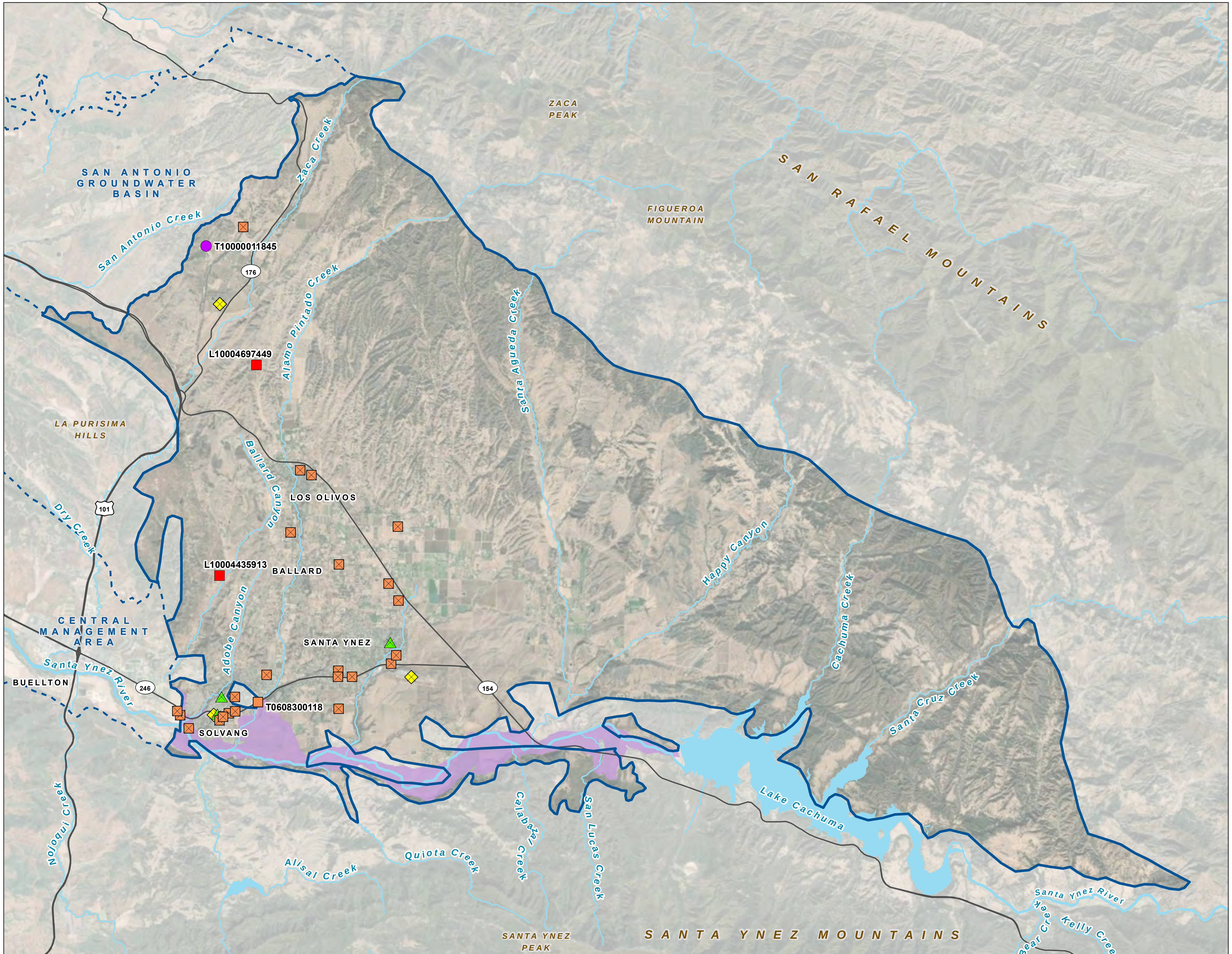
SMCL = secondary maximum contaminant level

WQ = water quality

FIGURE 3-25

Location of Potential Point Sources of Groundwater Contaminants

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan



LEGEND

Santa Ynez River Area

Site Type

- Active LUST Cleanup Site
- Active Landfill Site (Facility Closed)
- Active Oil and Gas Project Site
- Closed Cleanup Program Site
- Closed DTSC
- Closed LUST Cleanup Site

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

NOTES

DTSC: Department of toxic substances control
LUST: Leaky underground storage tank

N

0 5,000 10,000 15,000
Feet

GSI Water Solutions, Inc.

Date: June 11, 2021
Data Sources: ESRI, USGS, Maxar 2019

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Distribution and Concentrations of Diffuse or Natural Groundwater Constituents

The distribution and concentrations of several diffuse or naturally occurring constituents are discussed in the following subsections. Groundwater quality data were evaluated from the GeoTracker GAMA data set. The data reviewed consists of groundwater samples collected from 153 wells in the Basin between January 1984 and January 2021. Each of the constituents are compared to their drinking water standard, if applicable, or their WQO.

The available data show that wells with reported diffuse or naturally occurring constituent concentrations in groundwater at or above the respective WQO are distributed throughout the EMA with increasing concentrations in the direction of the groundwater flow towards the southwest.

While there are some wells that have constituent concentrations that exceed regulatory standards, it is possible that these exceedances are a result of natural conditions and not caused by land use activities. Elevated boron concentrations are naturally occurring in many Central Coast basins and elevated TDS, chloride, and sodium are often associated with rocks of marine origin that are present in the EMA. EMA agricultural stakeholders have not indicated that these are impacting agricultural production or drinking water quality.

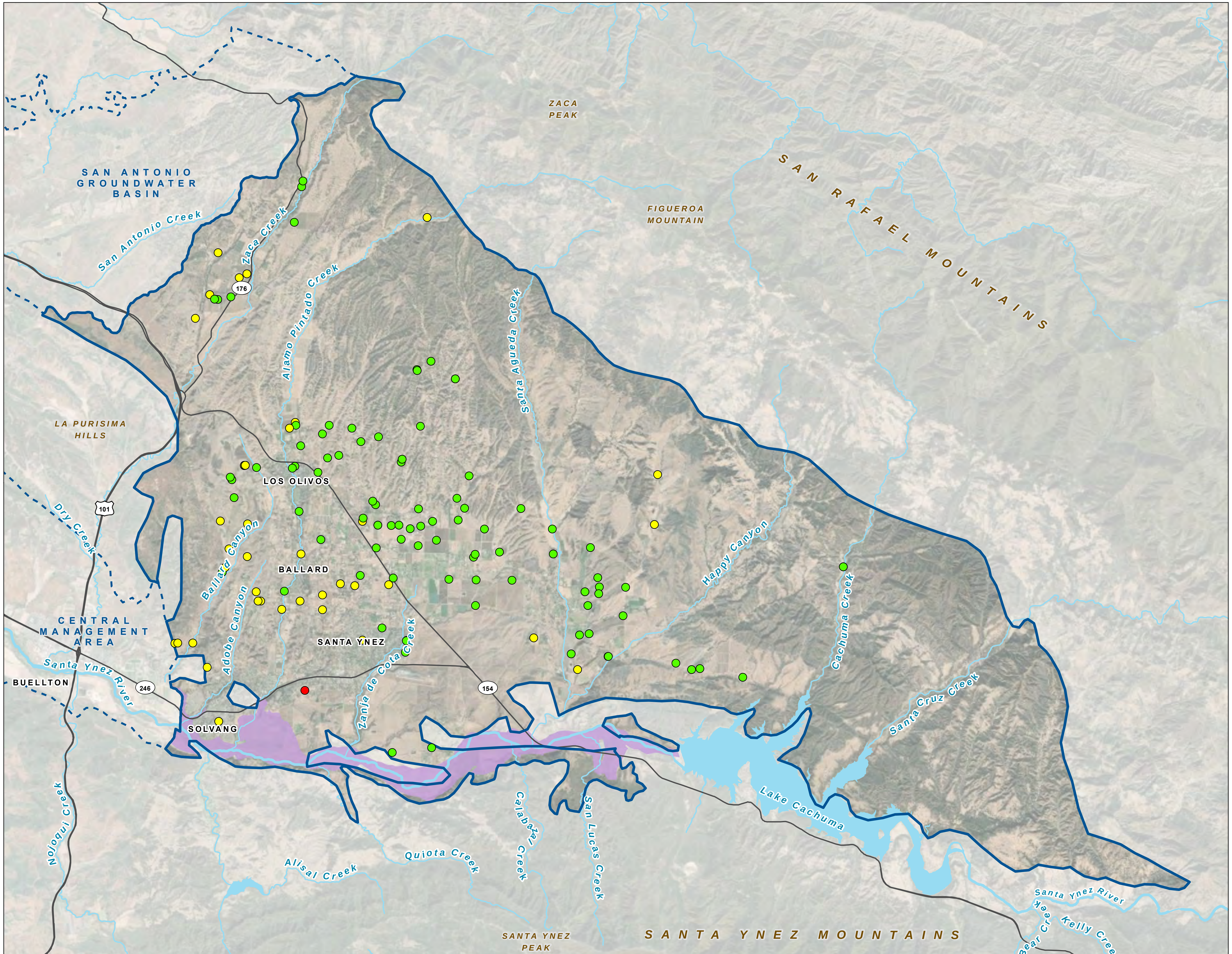
Total Dissolved Solids

TDS is defined as the total amount of dissolved minerals and salts in a given volume of water. TDS is a constituent of concern in groundwater because it has been detected at concentrations greater than its WQO of 600 mg/L in a total of 59 wells in the EMA. The SMCL for TDS has been established for aesthetic considerations (including color, odor, and taste) rather than health-related concerns. The SMCL includes a recommended standard of 500 mg/L, an upper limit of 1,000 mg/L and a short-term limit of 1,500 mg/L (SWRCB, 2018). TDS concentrations have ranged from 290 to 1,700 mg/L with an average of 551 mg/L in the EMA. Water quality data from wells with known zones of completion indicate that mean TDS concentrations reported from wells screened in the Careaga Sand are greater than those collected from wells screened in the Paso Robles Formation, which is not unexpected because the Careaga Sand is of marine origin. Based on a review of the publicly available groundwater quality data, the largest concentration of wells with mean TDS concentrations at or above the WQO are located in the southwest (downgradient) region of the EMA (Figure 3-26) and the northwest region of EMA.

FIGURE 3-26

Total Dissolved Solids 1984-2021 Average

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan



LEGEND

Santa Ynez River Area

Well Concentration

Total Dissolved Solids, mg/L

- <600
- 600-1,000
- >1,000

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

NOTES

1. The Water Quality Objective for Total Dissolved Solids is 600 mg/L.
2. The upper Secondary Maximum Contamination Level for Total Dissolved Solids is 1,000 mg/L.

mg/L: milligrams per Liter

N

0 5,000 10,000 15,000
Feet

Date: June 11, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

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Chloride

Chloride has been detected at concentrations greater than its WQO of 50 mg/L in a total of 78 wells located in the EMA. The SMCL for chloride has been established for color, odor, and taste, rather than human health effects. The SMCL includes a recommended standard of 250 mg/L, an upper limit of 500 mg/L and a short-term limit of 600 mg/L (SWRCB, 2018). Chloride concentrations have ranged from 16 to 195 mg/L with an average of 55 mg/L in the EMA. Water quality data from wells with known zones of completion indicate that mean chloride concentrations reported from wells screened in the Careaga Sand are greater than those collected from wells screened in the Paso Robles Formation, which is not unexpected because the Careaga Sand is of marine origin. Based on a review of the publicly available groundwater quality data, wells with mean chloride concentrations at or above the WQO are located throughout the EMA, with the largest concentrations of wells in the southwest region (Figure 3-27).

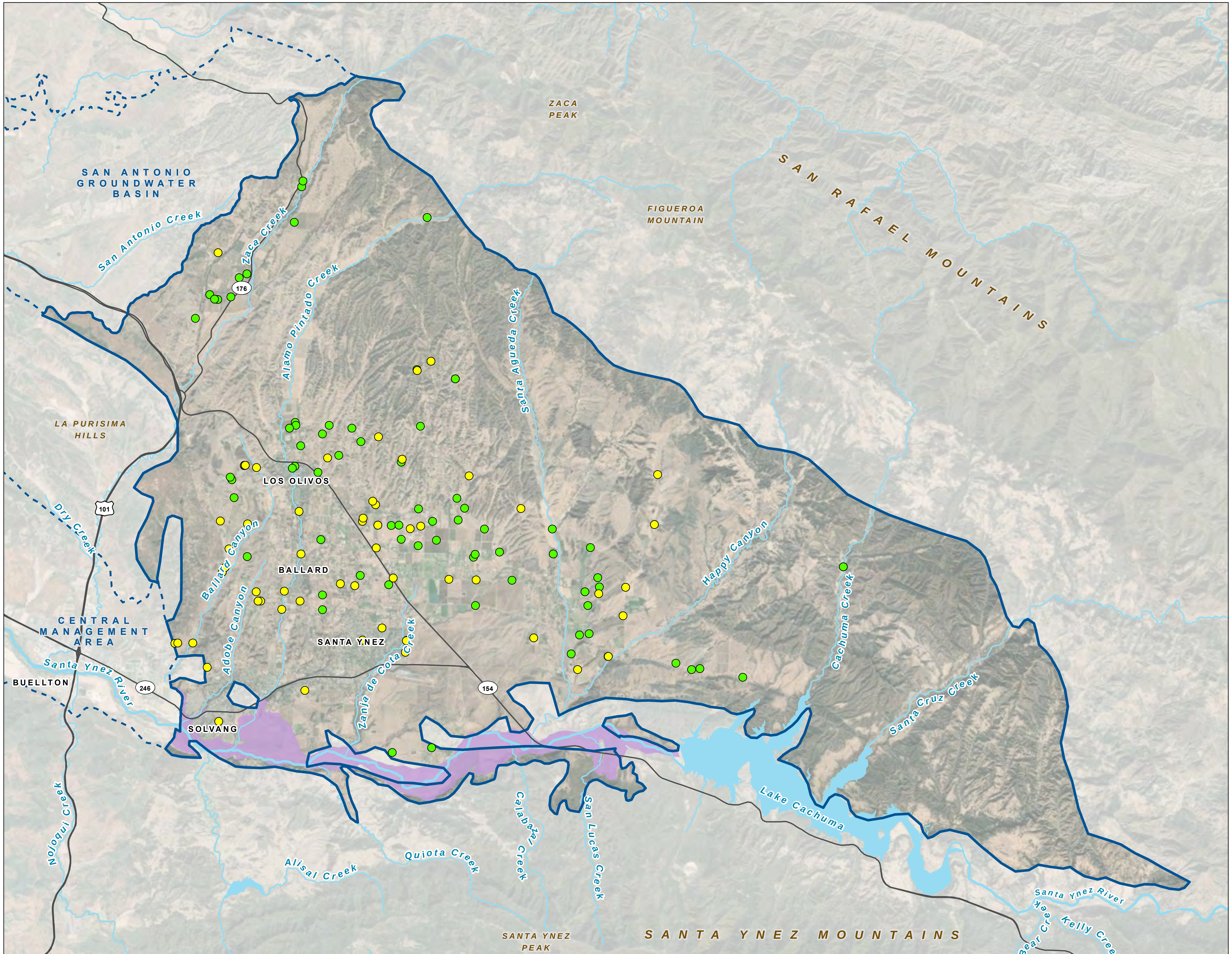

FIGURE 3-27

Chloride 1984-2021 Average

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

Santa Ynez River Area

Well Concentration

Chloride, mg/L

- 0 - 50
- 50 - 250
- > 250

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

NOTES

1. The Water Quality Objective for Chloride is 50 mg/L.
2. The upper Secondary Maximum Contamination Level for Chloride is 250 mg/L.

mg/L: milligrams per Liter

N

0 5,000 10,000 15,000
Feet

Date: June 11, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

Sulfate

Sulfate has been detected at concentrations greater than its WQO of 10 mg/L in 135 wells located in the EMA. The SMCL for sulfate was established to avoid causing digestive problems in humans. The SMCL includes a recommended standard of 250 mg/L, an upper limit of 500 mg/L, and a short-term limit of 600 mg/L (SWRCB, 2018). Sulfate concentrations have ranged from 3.1 to 366 mg/L with an average of 93 mg/L in the EMA. Water quality data from wells with known zones of completion indicate that mean sulfate concentrations reported from wells screened in the Careaga Sand are greater than those collected from wells screened in the Paso Robles Formation. Based on a review of the publicly available groundwater quality data, wells with mean sulfate concentrations at or above the WQO are located throughout the EMA and are likely naturally occurring (Figure 3-28).

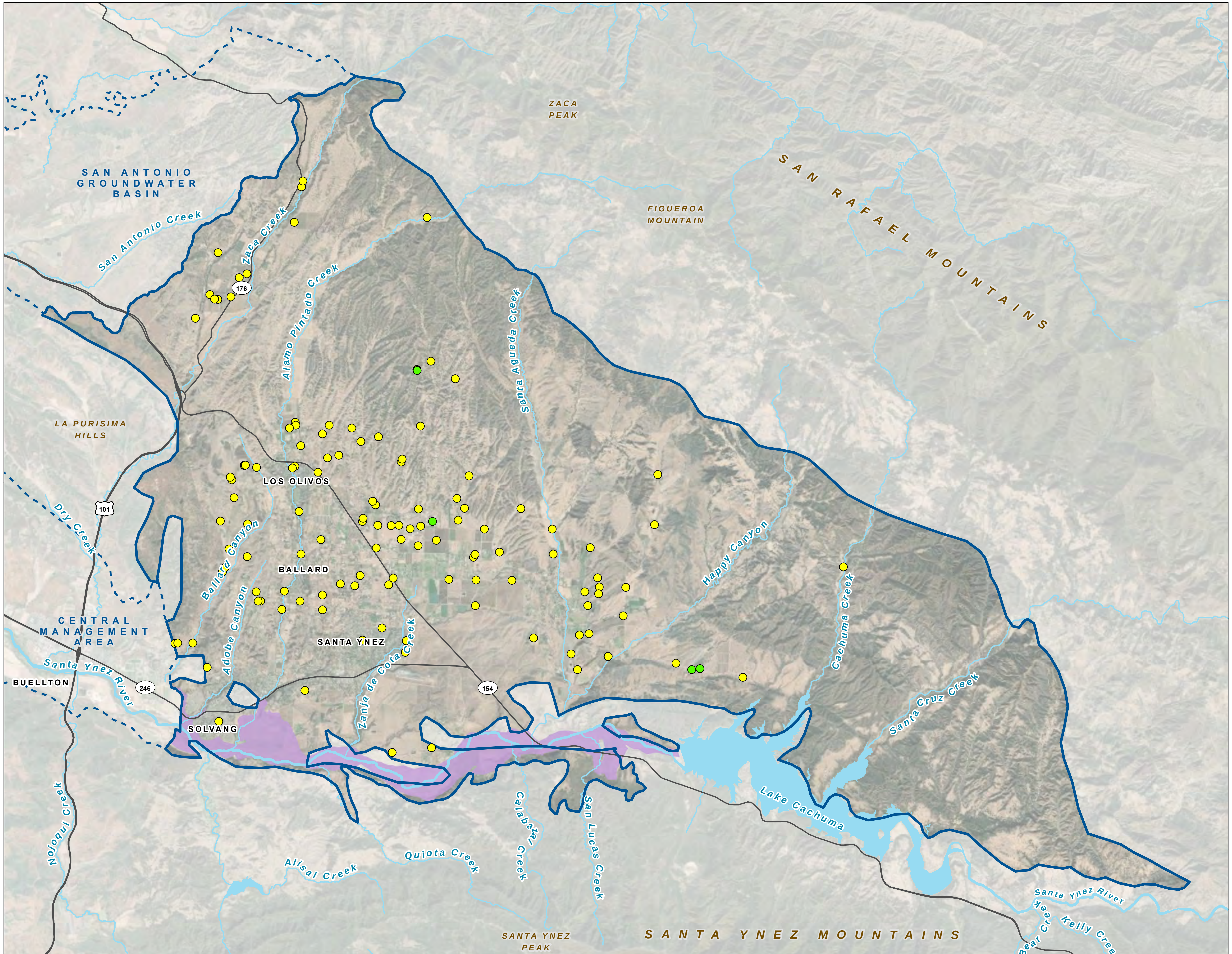

FIGURE 3-28

Sulfate
1984-2021 Average

Santa Ynez River Valley
Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan

LEGEND

Santa Ynez River Area

Well Concentration

Sulfate, mg/L

- <10
- 10-500
- >500

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

NOTES

1. The Water Quality Objective for Sulfate is 10 mg/L.
2. The upper Secondary Maximum Contamination Level for Sulfate is 500 mg/L.

mg/L: milligrams per Liter

N

0 5,000 10,000 15,000
Feet

Date: June 11, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

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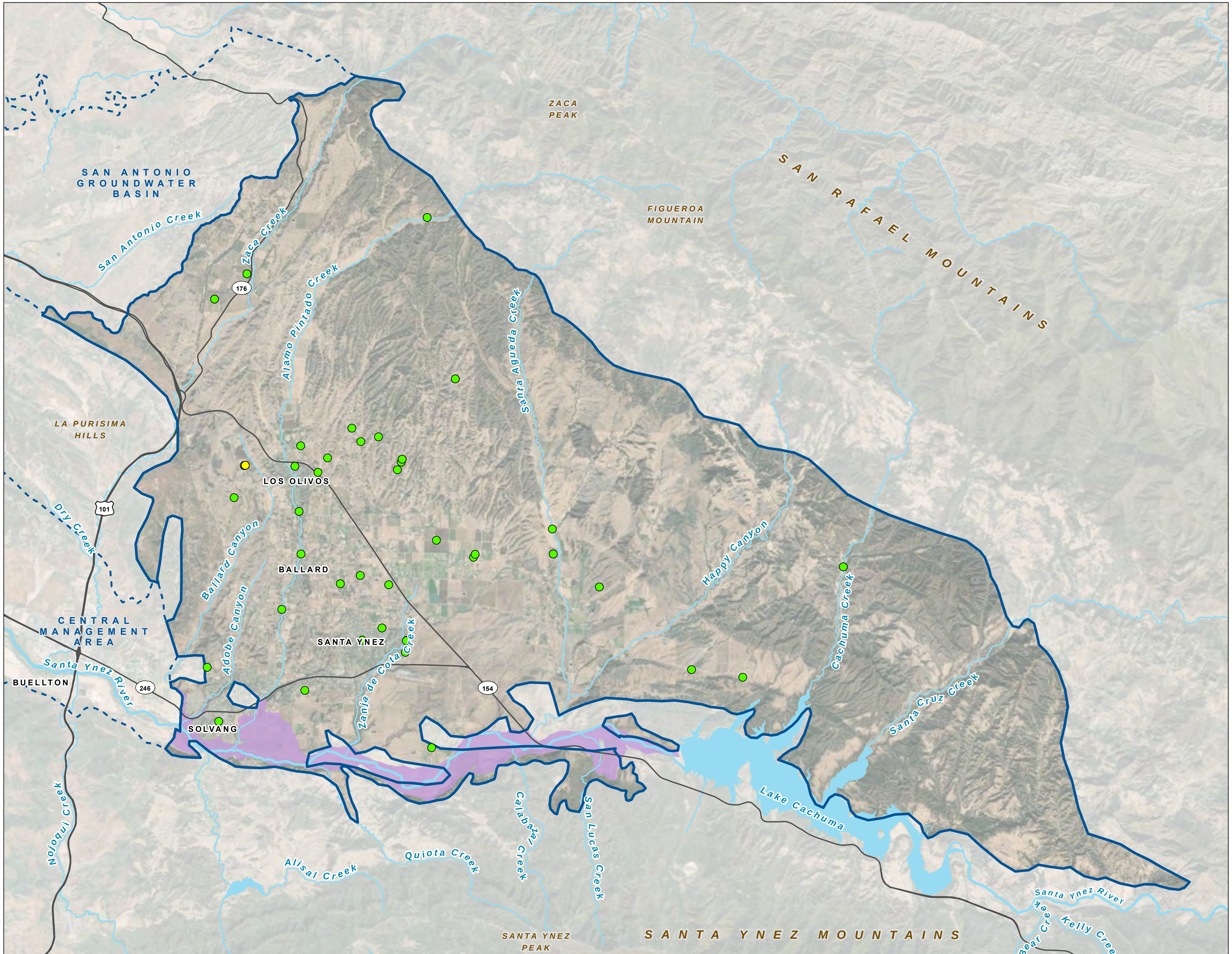
Boron

Boron is an unregulated constituent and therefore does not have a regulatory standard. However, boron is a constituent of concern because elevated boron concentrations have been found to impact the productivity of some agricultural crops, particularly vineyard grapes. Boron has been detected at concentrations greater than its WQO of 0.5 mg/L in four wells located in the EMA. Boron concentrations have ranged from 0.013 to 0.69 mg/L with an average of 0.17 mg/L in the EMA. Water quality data from wells with known zones of completion indicate that mean boron concentrations reported from wells screened in the Careaga Sand are greater than those collected from wells screened in the Paso Robles Formation. Based on a review of the publicly available groundwater quality data, wells with mean boron concentrations at or above the WQO are located to the west of Los Olivos.

FIGURE 3-29

Boron
1984-2021 Average

Santa Ynez River Valley
Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan



LEGEND

Santa Ynez River Area

Well Concentration

Boron, mg/L

- < 0.5
- 0.5 - 1
- > 1

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

NOTES

1. The Water Quality Objective for Boron is 0.5 mg/L.

mg/L: milligrams per Liter

N

0 5,000 10,000 15,000
Feet

GSI Water Solutions, Inc.

Date: June 11, 2021
Data Sources: ESRI, USGS, Maxar 2019

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section3\Figure3_29_Boron_Results.mxd, abarry

Sodium

Sodium is an unregulated constituent and therefore does not have a regulatory standard. However, sodium is a constituent of concern because elevated sodium concentrations in water can damage crops and affect plant growth. Sodium has been detected at concentrations greater than its WQO of 20 mg/L in the EMA in all wells sampled, and 435 of 437 samples analyzed. Sodium concentrations have ranged from 18.4 to 228 mg/L with an average of 49 mg/L in the EMA. Water quality data from wells with known zones of completion indicate mean sodium concentrations reported from wells screened in the Careaga Sand are greater than those collected from wells screened in the Paso Robles Formation. Based on a review of the publicly available groundwater quality data, wells with mean sodium concentrations at or above the WQO are located throughout the EMA (Figure 3-30). EMA agricultural stakeholders have not indicated that this naturally occurring constituent is impacting agricultural production.

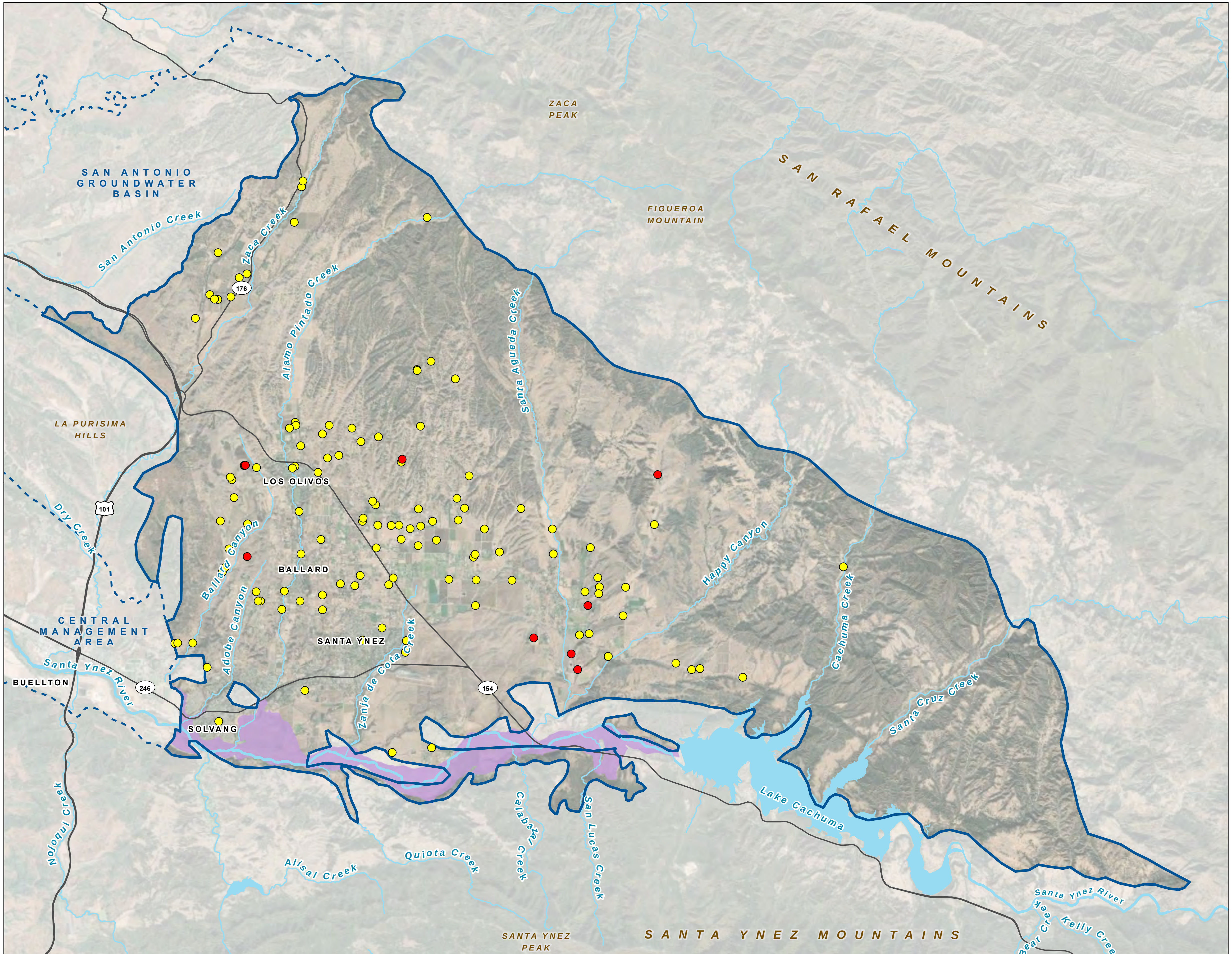


FIGURE 3-30

Sodium
1984-2021 Average

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

Santa Ynez River Area

Well Concentration

Sodium, mg/L

- < 20
- 20 - 100
- > 100

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

NOTES

1. The Water Quality Objective for Sodium is 20 mg/L.

mg/L: milligrams per Liter

Date: July 27, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section3\Figure3_30_Sodium_Results.mxd, abarry

Nitrate

Nitrate is a widespread constituent in California groundwater (California Department of Public Health, 2014). Elevated concentrations of nitrate in groundwater can be associated with agricultural activities, septic systems, confined animal facilities, landscape fertilizers, and wastewater treatment facilities. Nitrate is the primary form of nitrogen detected in groundwater. It is soluble in water and can easily pass through soil to the groundwater table. Nitrate can persist in groundwater for decades and accumulate to increased concentrations as more nitrogen is applied to the land surface each year (California Department of Public Health, 2014).

Nitrate has been detected at concentrations greater than its WQO of 1 mg/L (as N) in the EMA. Groundwater samples collected from 88 of 104 wells indicated nitrate concentrations exceeding the WQO in 634 of 694 samples. The MCL for nitrate has been established at 10 mg/L (SWRCB, 2020). Nitrate concentrations ranged from 0.1 to 16 mg/L (as N) with an average of 4 mg/L (as N). Wells with nitrate concentrations exceeding the MCL are located within three localized areas near the towns of Santa Ynez and Ballard (Heal the Ocean, 2019). Water quality data from wells with known zones of completion indicate mean nitrate concentrations reported from wells screened in the Careaga Sand are greater than those collected from wells screened int the Paso Robles Formation. Nitrate concentrations reported at or above the WQO are located throughout the EMA (Figure 3-31). Six of 68 wells sampled had nitrate concentrations exceeding drinking water standards (refer to Table 3-7). Concentrations of nitrate in groundwater will need to continue to be monitored to protect drinking water beneficial uses.

Other Constituents

Other diffuse or naturally occurring groundwater constituents reported at concentrations at or above their respective MCL or SMCL include iron, chromium, manganese, zinc, gross alpha, fluoride, and foaming agents (methylene blue active substances or MBAS). Each of these exceedances occurred in samples from a small number of wells, indicating isolated occurrences of these elevated constituent concentrations rather than widespread occurrences, affecting the entire EMA. Sustainability projects and management actions implemented as part of this GSP are not anticipated to directly cause concentrations of any of these constituents in groundwater to increase. The volatile organic water quality constituents reported above the MCLs were generally associated with cleanup sites that are now closed due to adequate mitigation, as presented in Figure 3-25. The constituents listed in this section are generally isolated detections and not widespread within the EMA.

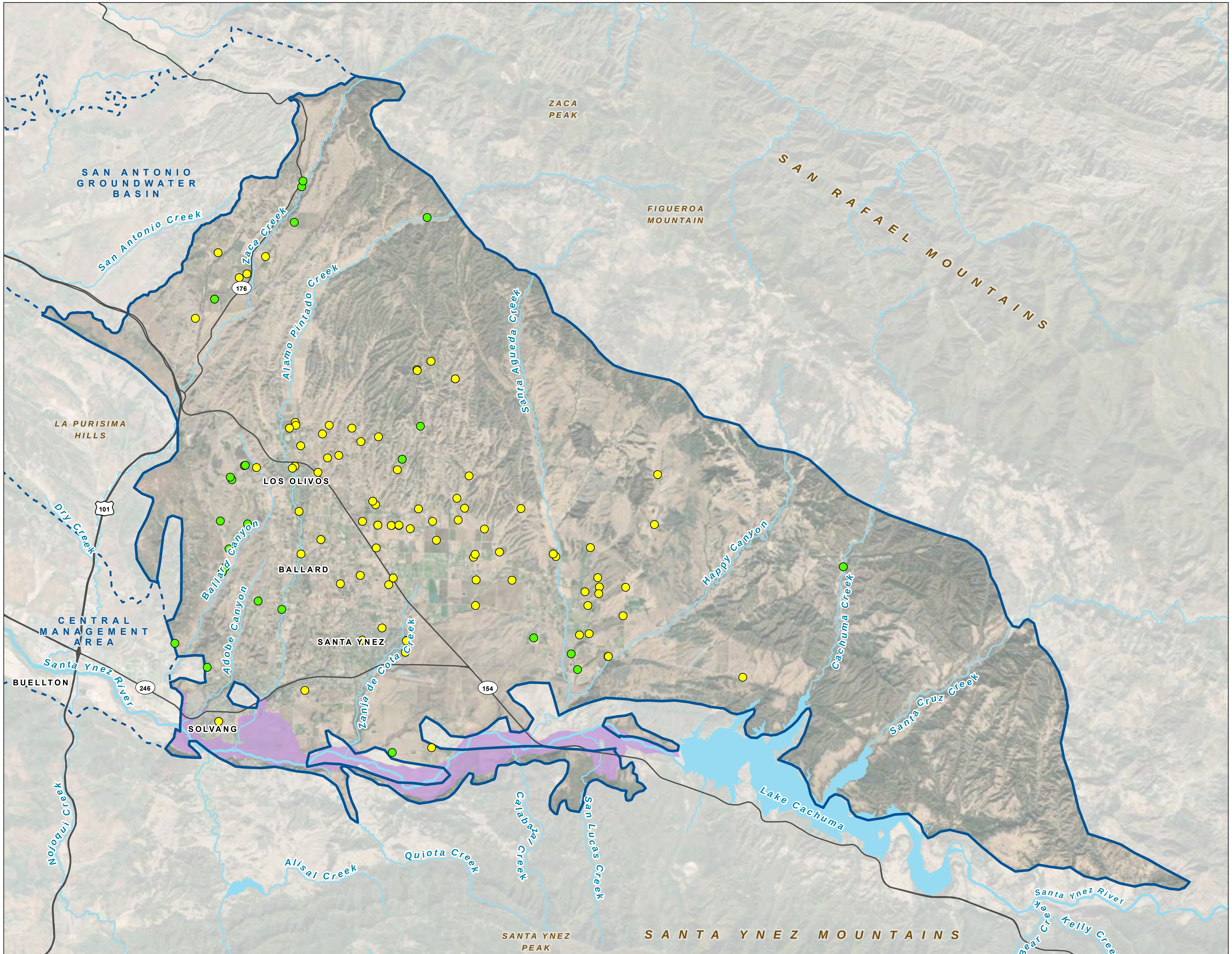
An MCL of 10 mg/L for hexavalent chromium recommended by the California Department of Public Health was adopted into the California Code of Regulations (CCR) in 2015. In 2017 the Superior Court of Sacramento County (Court) invalidated the MCL and ordered it removed from the CCR. The Court determined the MCL did not comply with all of the requirements in the Safe Drinking Water Act, including considering the economic feasibility of complying with an MCL (SWRCB, 2017). A revised MCL for hexavalent chromium is being evaluated by the SWRCB. Hexavalent chromium is currently regulated under the total chromium MCL of 0.05 mg/L. A report of a total chromium concentration at or above the respective MCL in a potable water supply well was reported once in 2002 and not since.

Some constituents are reported at elevated concentrations that do not have an established MCL or SMCL but do have an environmental screening level established for environmental cleanup sites. The screening levels are based on a human health risk assessment, the concentrations for which are published by the San Francisco Regional Water Quality Control Board, which publishes environmental screening levels pertinent to the entire state (SFRWQCB, 2019). Reported concentrations of constituents with environmental screening levels but no MCL or SMCL standard are either single detections or concentrations that were reported historically.

FIGURE 3-31

Nitrate
1984-2021 Average

Santa Ynez River Valley
Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan



LEGEND

Santa Ynez River Area

Well Concentration

Nitrate, mg/L

- < 1
- 1 - 10
- > 10

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

NOTES

1. The Water Quality Objective for Nitrogen is 1 mg/L.
2. The Maximum Contamination Level for Nitrogen is 10 mg/L.

mg/L: milligrams per Liter

N

0 5,000 10,000 15,000
Feet

Date: June 11, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section3\Figure3_31_Nitrate_Results.mxd, abarry

3.2.4 Land Subsidence

§ 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:

(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.

Land surface elevation data within the EMA were compiled from the DWR's SGMA Data Viewer Web-based geographic information system (GIS) viewer.[23] The data reviewed to assess the extent, cumulative total, and annual rate of land surface elevation changes include the following:

- Estimated land surface elevation using Interferometric Synthetic Aperture Radar (InSAR) data that are collected by the European Space Agency Sentinel-1A satellite and processed by TRE ALTAMIRA Inc. for the period from June 13, 2015, through September 19, 2019 (TRE ALTAMIRA, Inc., 2020). The InSAR data "accurately models change in ground elevation to an accuracy tested to be 18 millimeters (0.71 inches or 0.059 feet) vertical accuracy at 95% confidence level" (Towill, Inc., 2020 and 2021).
- Estimated land surface elevation using InSAR data collected by the European Space Agency Sentinel-1A satellite and processed by the National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory (JPL) for the period between spring of 2015 and summer of 2017 (NASA JPL, 2018).
- Measured land surface elevation data collected by a network of continuous global positioning system (CGPS) stations operated by University NAVSTAR Consortium (UNAVCO), including measured land surface elevation data collected by CGPSs for one location in the EMA and in in two locations immediately outside of the EMA (UNAVCO, 2020).
- No USGS or DWR extensometers are present within the Basin.

The land surface elevation data from InSAR includes point data that represent average vertical displacement values for points within 100-meter-by-100-meter areas, as well as coverage for the entire EMA interpolated from the point data. An example of the point data for total vertical displacement relative to June 13, 2015, is presented on Figure 3-32 in monthly time steps for the period between 2015 and 2019. The ground surface elevation at the location shown on Figure 3-32 east of Los Olivos shows vertical ground surface elevation changing monthly during over the 4-year period, with seasonal fluctuations and an overall net decline of 0.056 feet.

[23] The SGMA data viewer is available on the DWR SGMA website: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#landsub. (Accessed September 2020.)

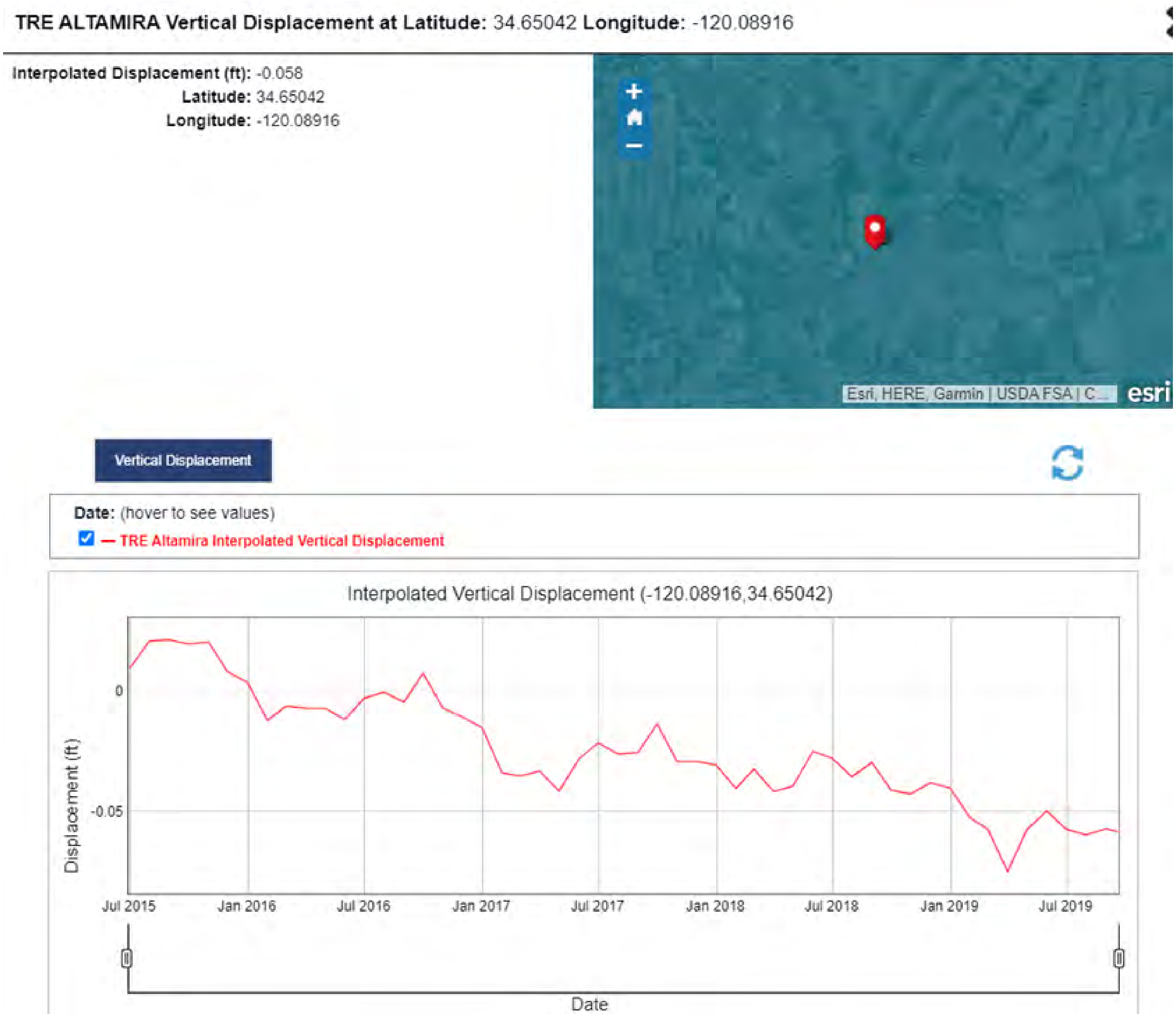


FIGURE 3-32

InSAR Vertical Displacement Point Data

Santa Ynez River Valley Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan

GSI Water Solutions, Inc.

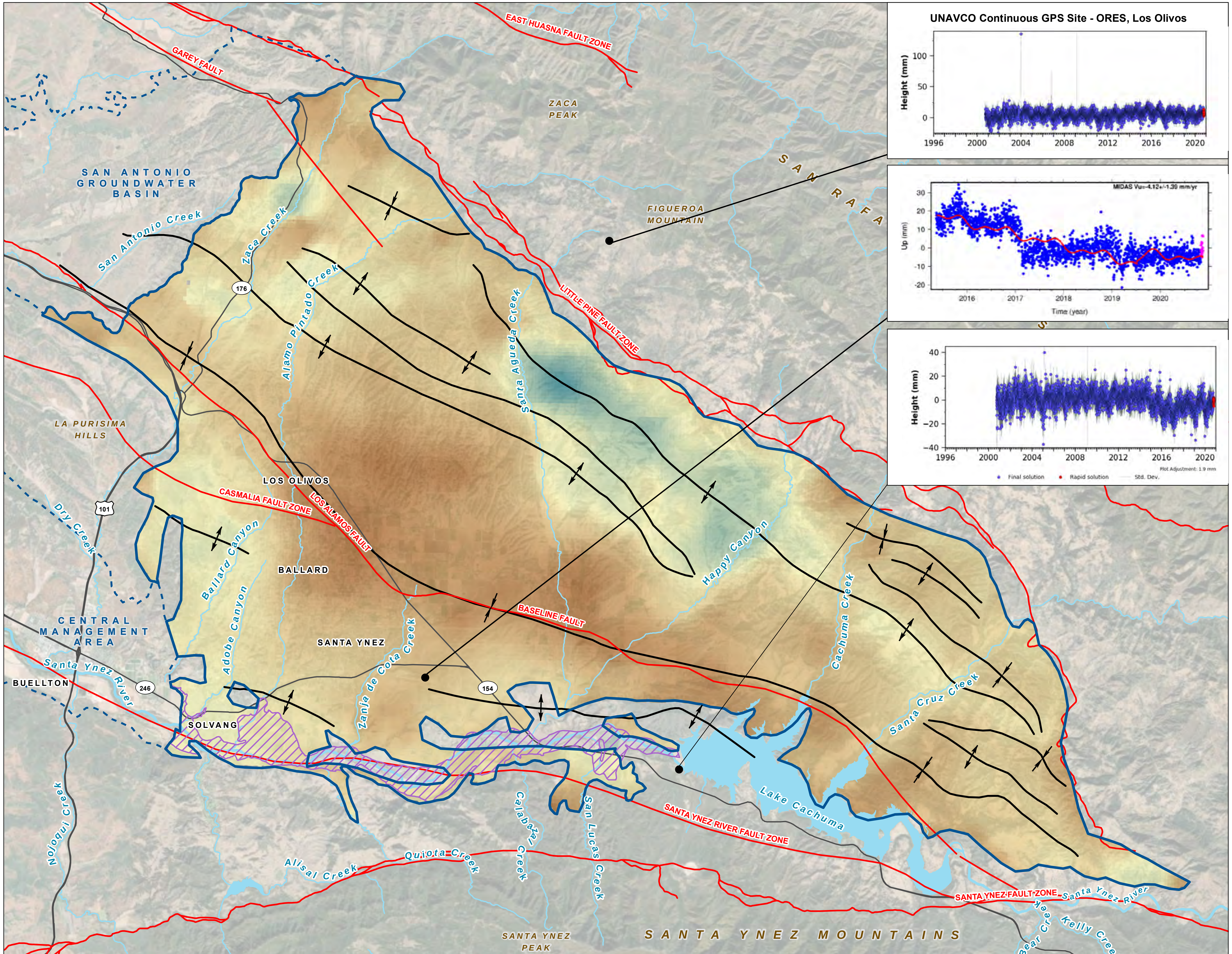


FIGURE 3-33

Total Subsidence, 2015 to 2019

Santa Ynez River Valley
Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan

LEGEND

Santa Ynez River Area

INSAR - Total Displacement June 2015 - September 2019

Displacement (feet)

High : 0.09

Low : -0.07

Fault

Fold Axes

Anticline

Syncline

All Other Features

Eastern Management Area Bulletin 118 Boundary

Other Bulletin 118 Groundwater Basin Boundary

Major Road

Watercourse

Waterbody

N

0 5,000 10,000 15,000

Feet

Date: June 14, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section3\Figure3_33_Total_Subsidence_2015_2019_InSAR.mxd, abarry

The lateral extent of the InSAR data covers the entire EMA, as presented on Figure 3-33. The dark tan areas on the figure have experienced a measured land surface elevation decrease of up to 0.07 feet, which is equal to a rate of 0.018 feet per year. The teal area represents a ground surface elevation increase of up to 0.09 feet over the 4-year period. Review of the data throughout the EMA indicates that the greatest amount of land surface elevation decrease in the EMA has occurred in the wedge-shaped area that is north of Ballard and the Baseline Fault within the Santa Ynez Uplands. Others have experienced 0.09 feet up uplift. The InSAR-based annual land surface elevation decrease rate of 0.018 feet per year (0.21 inches) is below the accuracy range of 0.059 feet per year (0.71 inches), and therefore the reported displacements are within the range of uncertainty of the InSAR data.

A review of water level hydrographs for wells in the areas of greatest land surface elevation decrease indicates that there does not appear to be a strong correlation between measured groundwater elevations and the observed land surface elevation changes. Furthermore, a review of the extent of the 2018 agricultural lands and urbanized areas relative to the land surface elevation changes presented on Figure 3-33 suggest that the developed, central portions of the EMA, which potentially have a higher rate of groundwater production, may not correlate with areas of the greatest land surface elevation changes. In addition, the measured land surface changes (elevation decrease or increase) may be dominantly controlled by folding and tectonics, where anticlinal structures may correlate with areas of uplift and synclinal structures may correlate with areas of subsidence.

Ground surface elevation data recorded from the UNAVCO CGPS Stations are presented on Figure 3-33, which includes time-series plots of land surface elevation for the three CGPS stations. One of these stations is located near the Santa Ynez Airport, while the other two stations are in the periphery of the EMA and indicate ground surface elevations regionally. Total land surface elevation increases or decreases recorded by the station in the EMA indicate that, since 2015, a total change in ground surface elevation decrease of 20 millimeters, or 0.065 feet, has occurred. The majority of the change occurred as an abrupt shift in early 2017, likely due to a downward abrupt shift toward the north that occurred in that year and not related to groundwater pumping. For context, the CPGS stations located immediately surrounding the EMA showed approximately plus or minus 10 millimeters, or 0.03 feet, of land surface elevation change during the approximately 19-year period of record (~2001 through 2020). This is a minor rate of land surface elevation change and is insignificant.

To supplement the InSAR and UNAVCO data, GEI Consultants conducted a preliminary subsidence evaluation to assess the general susceptibility of the EMA to experience subsidence as a result of lowering groundwater levels below historical levels, based on review of subsurface geologic information and groundwater level data for key wells. The preliminary evaluation included estimating ranges of possible long-term subsidence that might be expected in the future. The evaluation, which is included in Appendix E, included the following key conclusions:

- There have been no reports from landowners or public agencies of impacts resulting from subsidence.
- The analysis was completed at two representative well locations and showed an estimated total potential subsidence of on the order of 0.5 to 3 feet over the next 20 years. This estimate is considered speculative due to the lack of data on the material properties of geologic materials in the Basin.

The well logs used in the evaluations include relatively thick sections of clayey materials (which would be expected to drain slowly), which are not necessarily representative of the entire Basin. The Paso Robles Formation contains relatively thin, often discontinuous, sand and gravel layers interbedded with thicker layers of silt and clay; however, the fine-grained material that may be subject to subsidence are not laterally continuous, which tends to reduce the likelihood for significant subsidence. The Careaga Sand consists of fine-grained to medium-grained, uniform, massive, marine sand with some gravel and limestone; therefore, lacking laterally continuous fine-grained material susceptible to significant subsidence. It is unlikely that the full amount of estimated subsidence (of 0.5 to 3 feet) would be observed, unless groundwater elevations declined significantly below what has been observed historically and did not recover for an extended period.

There likely has been, some subsidence that occurred historically as a result of groundwater extraction, but there have been no reported or documented impacts to surface features.

The limited magnitude of the measured ground surface elevation changes and limited temporal extent (duration) of the data make determination of cause and effect difficult at the time of this writing. The available data show a minor amount of land surface elevation change that is relatively insignificant, likely a result of tectonic activity in the region, and not a major concern for the EMA. However, ongoing subsidence over many years could add up to a more significant decrease in ground surface elevation; thus, the GSAs will continue to monitor annual subsidence.

3.2.5 Interconnected Groundwater and Surface Water

§ 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:

(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.

Surface water bodies interact with groundwater in three basic ways, as follows (see also Figure 3-34). Note that one surface water body can interact in more than one of these three ways at different locations and at different times depending on groundwater and surface water conditions.

- Upward migration of groundwater through the stream bed (gaining stream condition). This requires the elevation of the water table in the vicinity of the surface water body to be higher than the elevation of the surface water body surface.
- Downward migration of surface water from the stream bed into groundwater (losing stream condition). This condition requires the elevation of the water table in the vicinity of the surface water body to be lower than the elevation of the surface water body surface.
- Downward migration of surface water from the streambed into groundwater, without direct connection to the underlying groundwater (disconnected).

Any connection of surface and groundwater systems can be affected by natural processes including prolonged wet periods or periods of drought, as well as anthropogenic processes, such land development, stream alteration, and pumping of surface water and/or groundwater. In addition to affecting the direction of water flow and volume of water exchanged between surface and groundwater systems, these processes can also affect water quality and GDEs where there is a prolonged interconnection between groundwater and surface water.

The classification of EMA streams, using acquired data and are defined by the USGS NHD (USGS, 2020), is presented in Figure 3-35. According to the NHD data set, the entire Santa Ynez River is defined as a perennial stream, as are several of its tributaries. The EMA includes many types of creeks, several which are perennial, some of which are intermittent, and others that are perennial in places and intermittent in other places. Upstream of Bradbury Dam, perennial creeks include both Santa Cruz Creek and Cachuma Creek, which flow into Lake Cachuma. Below Bradbury Dam, the other creeks classified as perennial include the following (in order from upstream to downstream): San Lucas Creek, Zanja de Cota Creek, Quiota Creek, and

Alisal Creek. Some of these creeks (e.g., Zanja de Cota) are perennial only in certain reaches. Three creeks are classified as intermittent over their full length: Happy Canyon Creek, Alamo Pintado Creek, and Ballard Canyon. The upstream portions of Santa Agueda Creek and Zaca Creek are perennial and become intermittent downstream.

The surface water system of the Santa Ynez River, including underflow within the Santa Ynez Alluvium, is subject to the regulatory jurisdiction of the SWRCB and is not managed by the EMA GSA under SGMA (refer to Appendix K for an additional discussion of the distinction between groundwater and the surface water system under in accordance with SGMA).

The following sections discuss the current understanding of the relationship between surface water and groundwater flow. Notably, the Santa Ynez River flow and connection to its baseflow is well documented and regulated. This surface water system is not discussed herein because groundwater within the EMA uplands does not interconnect with the river except where upland groundwater discharges to tributaries that then discharge into the river. The groundwater within the uplands does not directly interconnect with the Santa Ynez River due to the presence of low permeability bedrock that underlies the river and creates a barrier to flow (see Section 3.1.3). For the tributaries leading to the Santa Ynez River, however, the relationships between the streams and groundwater, though less well-documented, are discussed below.

3.2.5.1 Tributary Alluvium

A significant source of recharge to the Paso Robles Formation occurs within the shallow alluvial sand and gravel beds of tributaries where they are in direct contact with the Paso Robles Formation. Percolating groundwater moves readily through the tributary alluvium in the Santa Ynez Uplands (LaFreniere and French, 1968). In these areas, the tributaries are losing streams that recharge the groundwater in the underlying Paso Robles Formation (and Older Alluvium) and are completely disconnected from the underlying regional groundwater table and principal aquifer (see Section 3.2). Within these portions of the tributaries, the regional groundwater table is significantly lower than the elevation of the tributaries and there is no continuous saturated zone between the surface and water table, except in the lower ends of Alamo Pintado and Zanja de Cota Creeks.

Near the confluence of these tributaries with the Santa Ynez River, groundwater in the principal aquifers discharge to surface water in the distal ends of these tributaries because relatively impermeable bedrock to the north of and underlying the Santa Ynez River forces the groundwater to discharge to surface water (Upson and Thomasson, 1951).

As early as 1968, groundwater contours prepared by the USGS indicated that groundwater historically discharged into the alluvium of Alamo Pintado and Santa Cruz Creeks (LaFreniere and French, 1968) from the Paso Robles Formation. The only exception to this condition in the groundwater basin was in the lower part of Happy Canyon, where the water level contours were convex downstream and intermittent, indicating that underflow or surface flow in Happy Creek was discharging to the deeper the Paso Robles Formation (LaFreniere and French, 1968) (Figure 3-35).

Where the tributary valleys are narrow, the bedrock surface is relatively shallow and the cross-sectional area of tributary alluvium is decreased, groundwater may be forced to the surface and at times become surface water flow in the stream channels, particularly near the southern ends of the tributaries. Such narrowing and shallowing occurs where stream channels have cut through the consolidated rocks that form the south boundary of the Santa Ynez Uplands area. This causes the re-emergence of streamflow during spring and early summer months in Alamo Pintado, Santa Agueda, Zanja de Cota, and Zaca Creeks near the confluences with the Santa Ynez River (Figure 3-35). Groundwater modeling that was conducted of potential stream depletion in these areas resulting from groundwater conditions occurring throughout the EMA is discussed in Section 5.10, which presents the modeled results of the timing and magnitude of surface water depletions in these GDE areas.

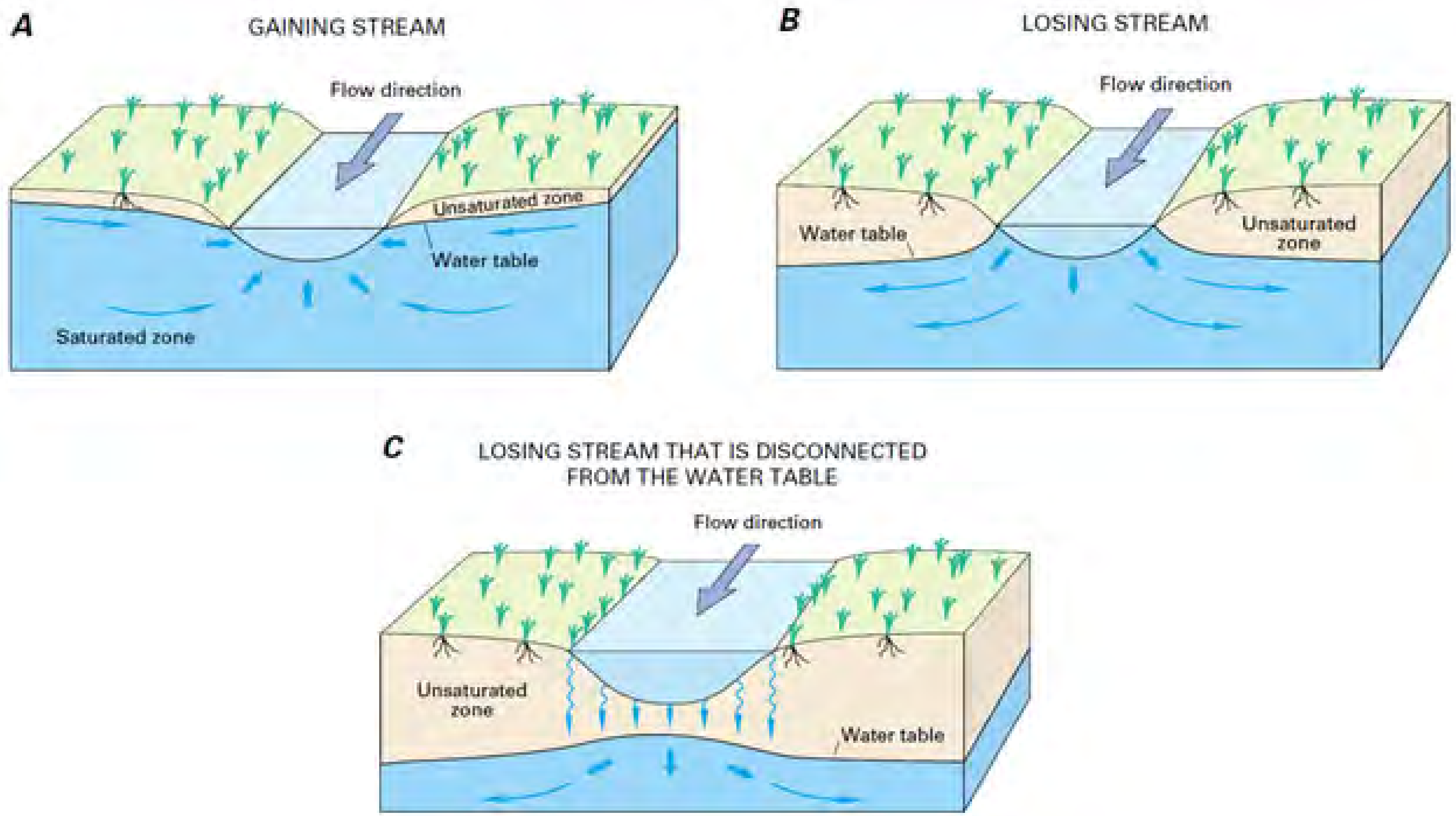
Review of the data presented on Figure 3-35 indicates that the entirety of Cachuma and Santa Cruz Creeks, as well as the lower end of Zanja De Cota Creek and the upper portion of Santa Agueda Creek, are perennial. All other groundwater that discharges naturally from the EMA is either transpired by plants, discharged as underflow through thin, narrow strands of alluvium that line the valleys tributary to the Santa Ynez River, or exists as surface water flowing into the Santa Ynez River that has resulted from discharge of groundwater from some tributaries, particularly near the confluence with the Santa Ynez River (e.g., Alamo Pintado and Zanja de Cota Creeks).

Santa Agueda and Alamo Pintado Creeks had streamflow gauging stations, which have been terminated. The only streamflow gauges that remain in the tributaries to the Santa Ynez River are within Alamo Pintado Creek and Santa Cruz Creek. Surface water flow has been estimated for Alisal, Santa Agueda, Zanja de Cota, Alamo Pintado, and Zaca Creeks for the period between 1941 and 2019 based on correlations with documented streamflow from old stream gauges that no longer exist (Stetson, 2008).

FIGURE 3-34

Gaining and Losing Streams

Santa Ynez River Valley
Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan



Adopted from USGS, 1999

GSI Water Solutions, Inc.

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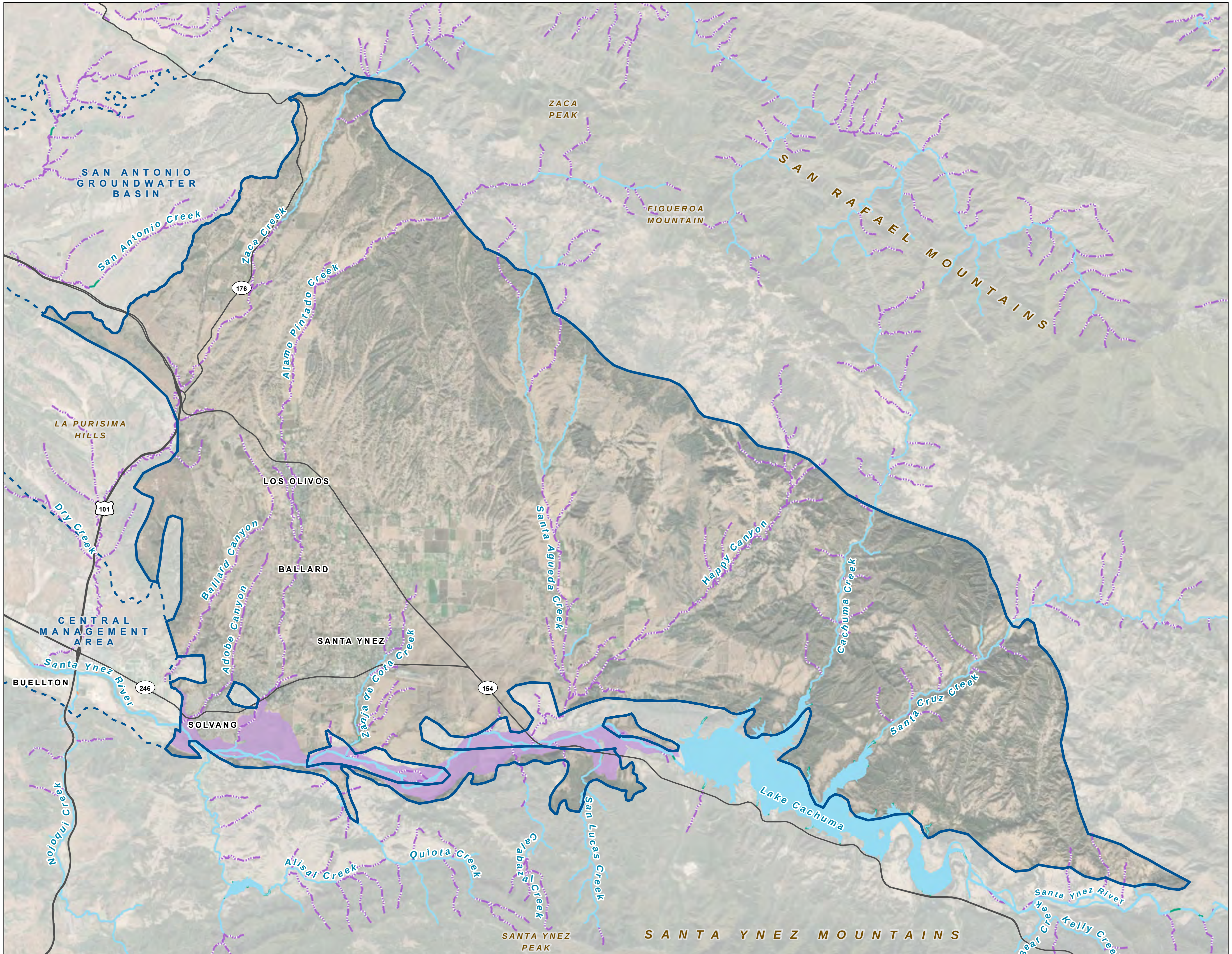


FIGURE 3-35

Stream Classifications

Santa Ynez River Valley Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan

LEGEND

Santa Ynez River Area

USGS NHD Stream Classification

Perennial

Intermittent

Artificial Path

Connector

All Other Features

Eastern Management Area Bulletin 118 Boundary

Other Bulletin 118 Groundwater Basin Boundary

Major Road

Waterbody

N

0 5,000 10,000 15,000
Feet

GSI Water Solutions, Inc.

Date: August 4, 2021
Data Sources: ESRI, USGS, Maxar 2019

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section3\Figure3_35_USGS_NHD_Stream_Classification.mxd, abarry

3.2.6 Groundwater Dependent Ecosystems

§ 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:

(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.

SGMA and the SGMA regulations establish requirements for the identification of GDEs, and, if present, identification of impacts on GDEs from management actions in the EMA or groundwater conditions occurring throughout the EMA. GDEs are defined in the SGMA regulations as "ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface." Determination of whether an area within a groundwater basin contains GDEs is the responsibility of the GSAs. DWR created the Natural Communities Commonly Associated with Groundwater data set (hereafter referred to as the Natural Communities data set), to assist GSAs with identification of potential GDEs, the data for which are presented on Figure 3-36.

The Natural Communities data set is a compilation of 48 publicly available state and federal agency data sets that map vegetation, wetlands, springs, and seeps in California. A working group that includes DWR, California Department of Fish and Wildlife (CDFW), and The Nature Conservancy (TNC) reviewed the compiled data set and conducted a screening process to (1) exclude vegetation and wetland types less likely to be associated with groundwater and (2) retain types commonly associated with groundwater as described in Klausmeyer et al. (2018). Two habitat classes are included in the Natural Communities data set statewide:

- Wetland features commonly associated with the surface expression of groundwater under natural, unmodified conditions
- Vegetation types commonly associated with the subsurface presence of groundwater (phreatophytes)

The data included in the Natural Communities data set do not represent the determination of a GDE by DWR, only the potential existence of a GDE. However, the Natural Communities data set can be used by GSAs as a starting point when approaching the task of identifying GDEs within a groundwater basin that are both classified as potential GDEs and are connected to groundwater.

The EMA GSA is fully supportive of the comprehensive and ongoing efforts, dating back to the 1990s, to develop and implement surface flow and non-flow measures in the mainstem lower Santa Ynez River and certain tributaries for the protection of public trust resources, including but not limited to steelhead and its critical habitat within the Santa Ynez River. The member agencies of the EMA GSA remain actively involved with numerous federal, state, and local entities in proceedings before the SWRCB and in the current re-consultation process under the federal Endangered Species Act to protect steelhead and its critical habitat in the lower Santa Ynez River. Notably, however, steelhead and other species residing in the Santa Ynez River depend on surface and underflow components of the surface water system and are not groundwater dependent based on the analyses set forth in this GSP.

3.2.6.1 Identification of Potential GDEs

TNC developed a guidance document based on best available science to assist agencies, consultants, and stakeholders to efficiently incorporate GDE analysis into GSPs. In the guidance, five steps were outlined to inform the GSP process (Rohde et al., 2018):

- **Step 1** – Identify potential GDEs
- **Step 1.1** - Map GDEs
- **Step 1.2** - Characterize GDE Condition
- **Step 2** – Determine Potential Effects of Groundwater Management on GDEs
- **Step 3** – Consider GDEs when Establishing Sustainable Management Criteria
- **Step 4** – Incorporate GDEs into the Monitoring Network
- **Step 5** – Identify Projects and Management Actions to Maintain or Improve GDEs

The two objectives within Step 1, to map (Step 1a) and characterize (Step 1b) GDEs in the EMA, are the focus of this section. The remaining steps are considered in later sections of the GSP, specifically in the Monitoring Network (Section 4), Sustainable Management Criteria (Section 5), and Projects and Management Actions (Section 6).

Based on review of the Natural Communities data set, several palustrine and riverine wetland features, three mapped springs, and five types of vegetation communities are present within the EMA. The five Natural Communities vegetation types are the following:

- Coast Live Oak
- Valley Oak
- Riparian Mixed Hardwoods
- Riversidean Alluvial Scrub
- Willow

The Natural Communities vegetation classifications are a collection of multiple vegetation species. The classifications named after a specific species (e.g., willow) are generally the predominant species in the classification (Klausmeyer et al., 2018). These five Natural Communities vegetation classifications are presented as polygons on Figure 3-36 as they occur throughout the EMA. Each of the vegetation classifications are described in detail below. The Natural Communities wetland classifications are also presented on Figure 3-36 (as one wetland area category). They are, however, difficult to discern, as they are composed of essentially linear features aligned along surface water courses. The three mapped springs are also shown on Figure 3-36.

Potential GDE Vegetation Classifications

The Natural Communities vegetation classifications in the EMA are summarized in this section.

The **Coast Live Oak** Natural Communities classification occurs throughout the EMA, covering an area of 5,830 acres as shown in orange on Figure 3-36. Coast live oak (*Quercus agrifolia*) dominates this type that occurs primarily on protected north-facing ravines within the river channel. Coast live oak is considered the most fire-resistant California tree oak, but the species does not tolerate extended flooding (USDA, 2009). It has evergreen leaves, thick bark, and an ability to sprout from the trunk and roots, given its food reserves stored in an extensive root system (USDA, 2009). Associated species include toyon (*Heteromeles arbutifolia*) and elderberry (*Sambucus mexicana*) (SWRCB, 2011). Reported maximum rooting depths for the coast live oak range from 24 to 35 feet (TNC, 2020).

The **Valley Oak** Natural Communities classification occurs throughout the EMA, covering an area of 1,265 acres as shown in red on Figure 3-36. Valley oak (*Q. lobata*) savanna and woodlands normally occur at elevations below 2,000 feet in valley bottoms on deep, well-drained soils (Meridian Consultants, 2012). Understory vegetation in relatively undisturbed areas may comprise native perennial bunchgrasses. This community may also contain scattered coast live oaks and blue oaks. Reported maximum rooting depth for valley oak is 80 feet (Lewis and Burgy, 1964).

The **Riparian Mixed Hardwoods** Natural Communities classification occurs in several isolated stands in the EMA, covering an area of 495 acres, as shown in purple on Figure 3-36. Riparian mixed hardwoods are found along perennial and intermittent streams in areas that are less frequently and less intensely disturbed by flood events than in areas dominated by riparian scrub. The dominant tree species include Fremont or black cottonwood (*Populus fremontii*, *P. balsamifera* ssp. *trichocarpa*), California sycamore (*Platanus racemosa*), willow (either arroyo, red or yellow), California walnut (*Juglans californica*), white alder (*Alnus rhombifolia*), and coast live oak (Meridian Consultants, 2012). Understory species, when present, include mugwort, wild rose, poison oak, blackberry, wild cucumber, and non-native plants such as periwinkle and nasturtium (Meridian Consultants, 2012). Apart from coast live oak, a few of this category's primary plant species (willow, Fremont cottonwood, and black cottonwood) have rooting depth information in the GDE Database (TNC, 2020), with ranges of from 1 to 7 feet.

The **Riversidean Alluvial Scrub** Natural Communities classification occurs in one 7-acre area located near the midpoint of the northern boundary of the EMA, as shown in light green on Figure 3-36. Scalebroom (*Lepidospartum squamatum*) is generally regarded as an indicator for this alliance (Hanes et al. 1988). Riversidean Alluvial Scrub habitats are found in alluvial fans and dry washes with flood patterns. The history of ground disturbance can play a significant contribution in the mixture of vegetation species. In addition to scalebroom, other species included in the Riversidian Alluvial Scrub CALVEG alliance are California buckwheat (*Eriogonum fasciculatum*), California sagebrush (*Artemisia californica*), white sage (*Salvia apiana*), and brittlebush (*Encelia* spp.), prickly pear (*Opuntia* spp.), chaparral yucca (*Yucca whipplei*), various sumac species (*Rhus* spp.), and California juniper (*Juniperus californica*) (USDA, 2009). No information about scalebroom rooting depth is provided in the GDE Rooting Depths Database. However, the other species associated with this Natural Communities classification (California buckwheat, chaparral yucca, and white sage) have reported rooting depths ranging from 2 to 5 feet (TNC, 2020).

The **Willow** Natural Communities classification occurs in two small areas within the EMA, totaling 7 acres. One willow classification area is in the Santa Ynez River Area and the other area is located near the midpoint of the northern boundary of the EMA, as shown in green on Figure 3-36. The Willow CALVEG alliance is defined by the dominance of a single or a combination of deciduous willow tree species including black (*Salix gooddingii*), red (*S. laevigata*), arroyo (*S. lasiolepis*), and/or shining (*S. lucida*) willows (USDA, 2009). While the presence of the Natural Communities willow classification is limited within the EMA, willow as individual species may also be found in the Riparian Mixed Hardwood CALVEG alliance (USDA, 2009). They are found on the edge of active channels and floodplain terraces where they have access to shallow groundwater. Other riparian species found within this CALVEG alliance include the Fremont cottonwood and California sycamore and a variety of perennial and annual forbs. No information about rooting depth of the specific willow species listed above is provided in the GDE Rooting Depths Database. However, other willow species in the same genus have reported maximum rooting depths ranging up to 8 feet (TNC, 2020).

Screening of Potential GDEs

To confirm whether the Natural Community vegetation and wetland polygons are connected to groundwater, local hydrologic information may be used to confirm a groundwater connection to the potential GDE. TNC guidance provides a list of questions to assess whether Natural Community polygons are connected to groundwater. These questions include the following from Worksheet 1 of the guidance:

1. Is the Natural Community polygon underlain by a shallow unconfined or perched aquifer that has been delineated as being part of a Bulletin 118 principal aquifer in the Basin?
2. Is the depth to groundwater under the Natural Community polygon less than 30 feet?

3. Is the Natural Community polygon located in an area known to discharge groundwater (e.g., springs/seeps)?

If the answer is yes to any of these three questions, per TNC guidance, it is likely a GDE. As a part of the process, some Natural Community polygons are removed and other GDE polygons may be added, where appropriate. TNC recommends that Natural Community polygons with insufficient hydrologic data also be considered GDEs but be flagged for further investigation.

Contoured groundwater elevation data for spring 2015 was used to determine areas where the Natural Communities polygons were within 30 feet depth to groundwater. Spring 2015 groundwater elevations were chosen for this analysis because this marked a period of the greatest recent data availability.[24] These data are considered representative of average spring-summer conditions within the last 5 years.[25] Areas with spring 2015 depth to groundwater of 30 feet or less are shown in purple on Figure 3-37 and the Natural Communities polygons that intersect with these areas are shown on Figure 3-38. Note that the Santa Ynez River Area has been excluded from the analysis, as this area is managed by the SWRCB and is therefore not under the purview of SGMA. The EMA GSA is not responsible for managing any aspect of the Santa Ynez River and related groundwater system (including assessment of impacts to GDEs).

The Natural Communities polygons associated with the spring 2015 depth to groundwater of 30 feet or less shown on Figure 3-38 are considered potential GDEs within the EMA. A brief aerial photo review indicates the potential GDEs identified in this step generally match areas of visible vegetation within the 30 foot or less depth-to-groundwater areas. An on-site biological survey is recommended by TNC (2019) as a final GDE verification step. Biological surveys have not been completed in preparation of this GSP. However, the presence of these potential GDEs will be verified during GSP implementation. The potential vegetation and wetland GDEs within the EMA are summarized in Tables 3-11 and 3-12.

Table 3-11. Potential Vegetation GDEs in the EMA (Excluding the Santa Ynez River Area)

Natural Communities Vegetation Classification	Acres
Coast Live Oak	1,250
Valley Oak	279
Riparian Mixed Hardwood	192
Riversidean Alluvial Scrub	5
Willow	4
Total	**1,731**

[24] The spatial distribution and density of spring 2015 groundwater elevation data satisfies the TNC recommendation for using wells that are located within 5 kilometers (3.1 miles) of the Natural Communities polygons (TNC, 2019).
[25] Groundwater elevations are generally the highest in the spring, following recharge from winter rains. Spring-time groundwater elevations in 2015, a relatively dry year, are considered representative of average modern conditions as measured throughout the spring-summer months, during the period of maximum annual evapotranspiration. It also represents the period when SGMA was enacted; GDEs observed after January 2015 are subject to evaluation under SGMA.

Table 3-12. Potential Wetland GDEs in the EMA (Excluding Santa Ynez River Area)

Natural Communities Wetland Classification	Acres
Palustrine, Emergent, Persistent, Seasonally Flooded	0.4
Palustrine, Forested, Seasonally Flooded	3
Riverine, Upper Perennial, Unconsolidated Bottom, Permanently Flooded	11
Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded	7
Riverine, Unknown Perennial, Unconsolidated Bottom, Semi-permanently Flooded	6
Total	**27[1]**

Note

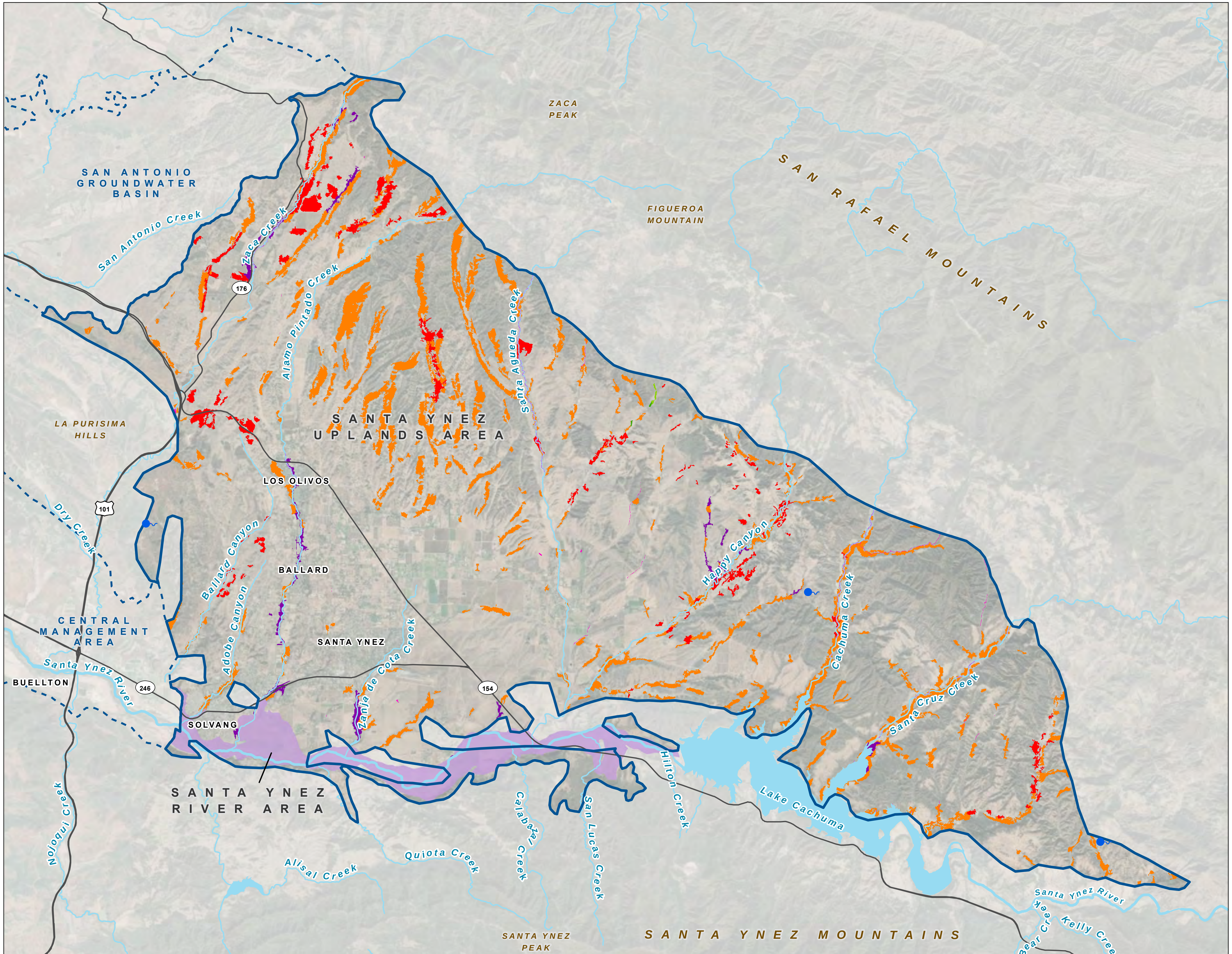
[1] The potential wetland GDE acres overlap in many areas with potential vegetation type GDEs. Therefore, the total potential GDE acreage in the EMA is less than the sum of the potential wetland GDE and the potential vegetation type GDE acres.

Three USGS mapped springs are located within the EMA, as shown on Figure 3-36. There are no Natural Communities polygons coincident with these mapped springs. A brief aerial imagery review reveals little evidence to support or refute the continued presence of springs at these locations. The presence of these springs and any associated GDEs will be verified during GSP implementation.

FIGURE 3-36

Native Communities Commonly Associated with Groundwater Dataset

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan



LEGEND

- Santa Ynez River Area

Native Communities Commonly Associated with Groundwater (NCCAG)

- Wetland Area

VEGETATION

- Coast Live Oak
- Valley Oak
- Riparian Mixed Hardwood
- Riversidean Alluvial Scrub
- Willow (Shrub)

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- USGS Mapped Springs
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

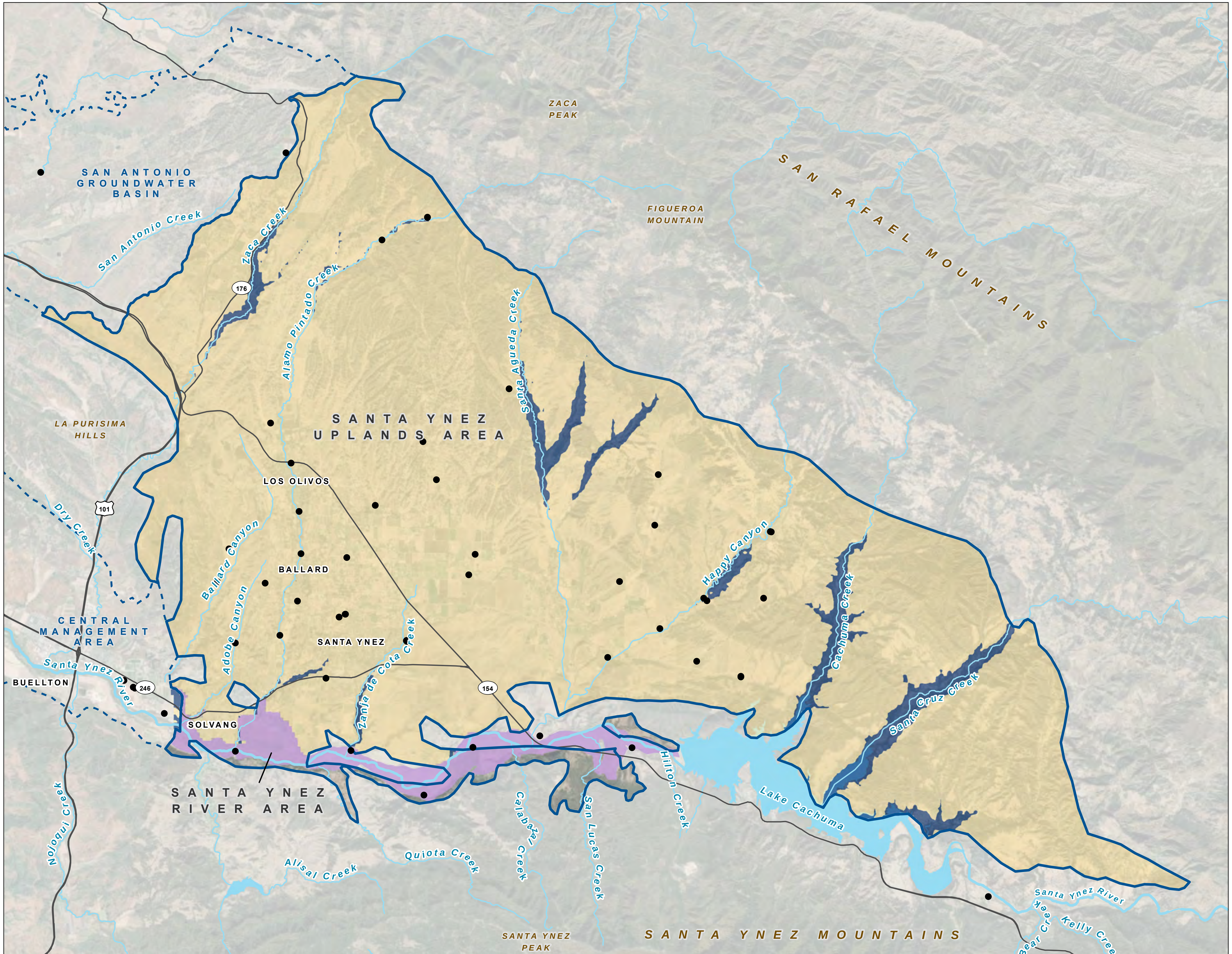
Date: June 14, 2021
Data Sources: ESRI, USGS, Maxar 2019, USFWS

GSI Water Solutions, Inc.

FIGURE 3-37

Potential Groundwater Dependent Ecosystems 30-foot Depth to Groundwater Screening

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan



LEGEND

- Santa Ynez River Area
- Spring 2015 Measured Groundwater Elevations

Spring 2015 Depth to Groundwater

- <= 30' Depth to Water
- >30' Depth to Water

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

GSI Water Solutions, Inc.

Date: July 27, 2021
Data Sources: ESRI, USGS, Maxar 2019, USFWS

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section3\Figure3_37_Potential_Groundwater_Dependent_Ecosystems_30ft_DTW_Screening.mxd, abarry

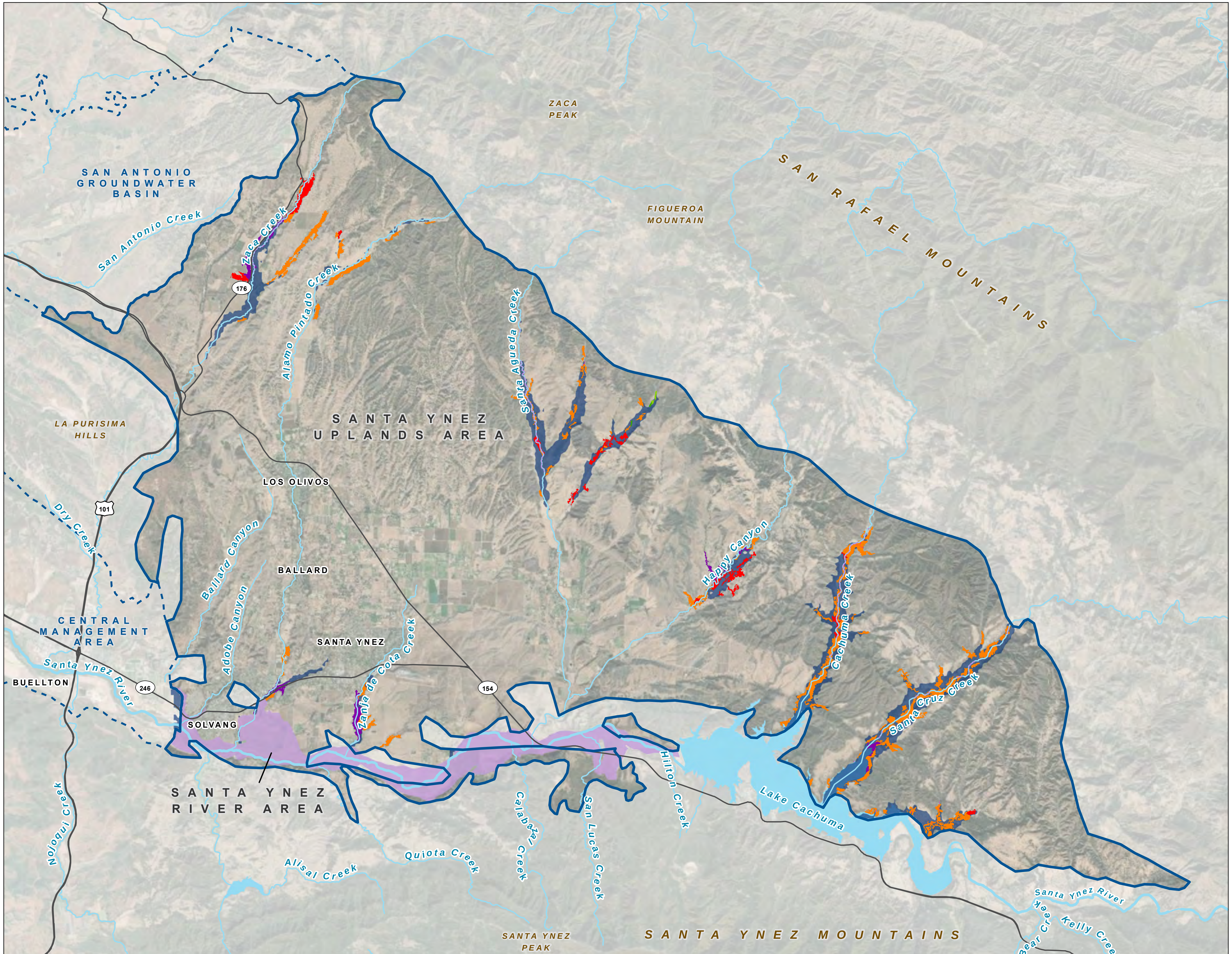


FIGURE 3-38

Potential Groundwater Dependent Ecosystems

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

Santa Ynez River Area

Native Communities Commonly Associated with Groundwater (NCCAG)

Wetland Area (27 acres)

VEGETATION

Coast Live Oak (1,250 acres)

Valley Oak (280 acres)

Riparian Mixed Hardwood (192 acres)

Riversidean Alluvial Scrub (5 acres)

Willow (Shrub) (4 acres)

Spring 2015 Depth to Water – Less than 30 feet

All Other Features

Eastern Management Area Bulletin 118 Boundary

Other Bulletin 118 Groundwater Basin Boundary

Major Road

Watercourse

Waterbody

N

0 5,000 10,000 15,000

Feet

Date: June 14, 2021

Data Sources: ESRI, USGS, Maxar 2019, USFWS

GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section3\Figure3_38_Potential_Groundwater_Dependent_Ecosystems.mxd, abarry

Categorization of Potential GDEs

The potential GDEs identified in the section above are further categorized based on their proximity to, and association with, the regional principal aquifers in the EMA (refer to Figure 3-39) as follows:

- **Category A** refers to potential GDEs that are associated with a principal aquifer in the EMA and are potentially affected by groundwater management activities.
- **Category B** refers to potential GDEs that are unlikely to be affected by pumping and groundwater management activities within the EMA.

The focus of this GSP is to preserve the existing Category A GDEs where identified, regardless of composition or condition.

The Category A potential GDEs are concentrated in the southwestern portion of the EMA in the areas surrounding the lower, generally perennial reaches of Alamo Pintado and Zanja de Cota Creeks (Figure 3-39). These potential GDEs are located where the southerly flow of groundwater in the regional confined principal aquifers is forced to the surface by the underlying bedrock of the Monterey Formation (LaFreniere and French, 1968). These potential GDEs are also supported with (1) underflow in the tributary alluvium (Upson and Thomasson, 1951) and—in the case of the GDEs surrounding the lower reaches of Zanja de Cota Creek—(2) effluent from the Chumash Casino Resort Wastewater Treatment Plant (WWTP). In total, there are 184 acres of Category A potential GDEs within the EMA, as shown on Figure 3-39 and in Table 3-13. The Category A potential GDEs are considered in the development of sustainable management criteria (Section 5) and in projects and management actions (Section 6).

In total, there are 1,546 acres of Category B potential GDEs in the EMA as shown on Figure 3-39 and in Table 3-13. All the orange areas identified on Figure 3-39 are Category B areas for the following reasons:

- The potential GDEs in the upper portions of Zaca Creek and upper Alamo Pintado Creek are categorized as Category B due to apparent hydrogeologic separation between the perched tributary alluvium, which supports the potential GDEs, and the deeper principal aquifer groundwater elevations that support significant agricultural irrigation in the area.
- The potential GDEs located in upper Santa Agueda Creek and Happy Canyon are categorized as Category B due to limited groundwater production occurring within the area and the apparent hydrogeologic separation between the perched tributary alluvium aquifers and the deeper principal aquifer groundwater elevations.
- The potential GDEs located in the eastern portion of the EMA in Cachuma and Santa Cruz Creeks are categorized as Category B due to the absence of significant groundwater production in the area and an assumed hydrogeologic separation between the perched tributary alluvium aquifers and the deeper principal aquifer groundwater elevations.

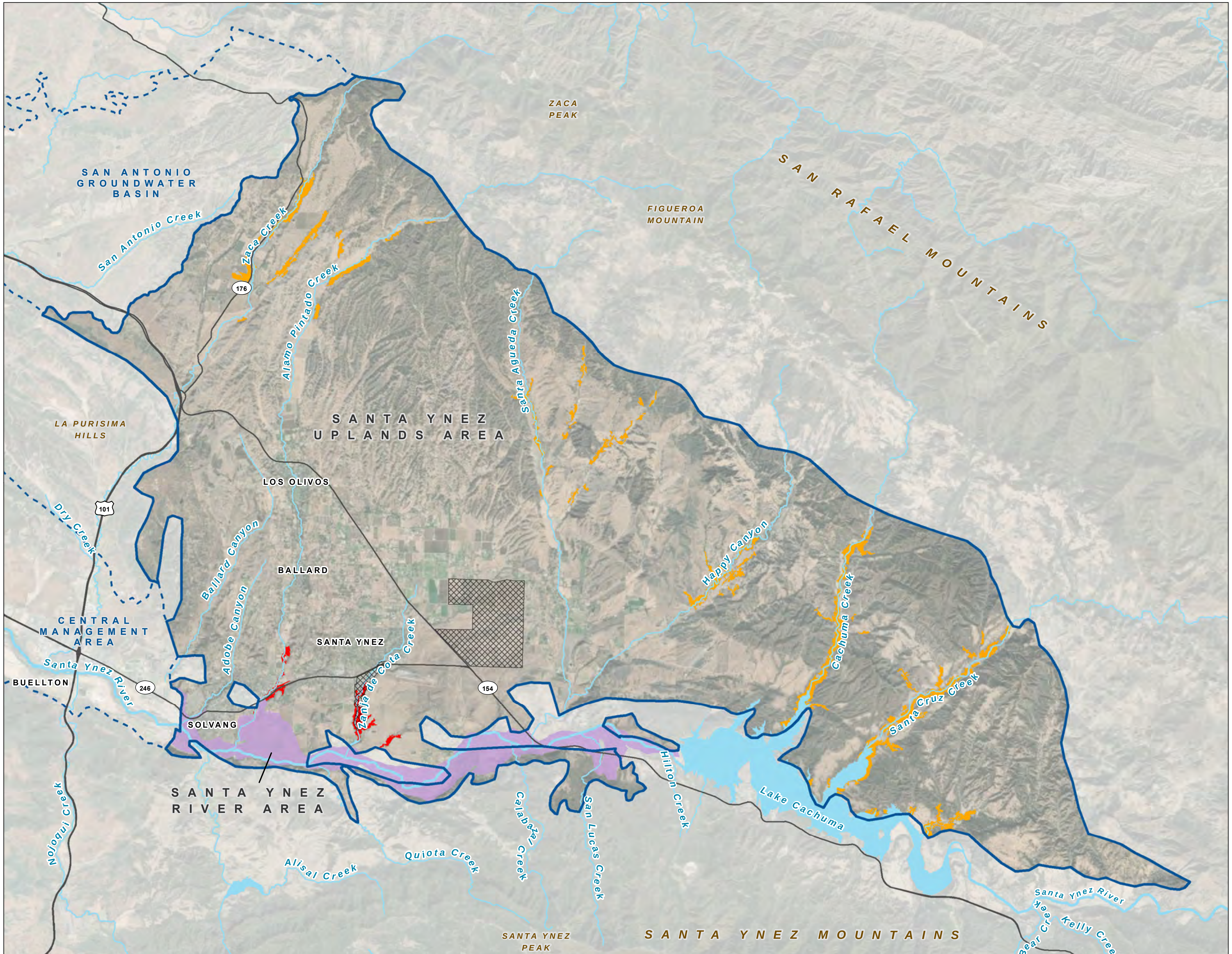


FIGURE 3-39

Categorized Potential Groundwater Dependent Ecosystems

Santa Ynez River Valley Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan

LEGEND

Santa Ynez River Area

Native Communities Commonly Associated with Groundwater (NCCAG)

Category A – Potential GDE Associated with a Principal Aquifer (184 acres[2])

Category B – Potential GDE Unlikely to be Affected by Groundwater Management Activities (1,546 acres[2])

All Other Features

Eastern Management Area Bulletin 118 Boundary

Other Bulletin 118 Groundwater Basin Boundary

Chumash Reservation Boundary

Major Road

Watercourse

Waterbody

NOTE

1. GDE: Groundwater Dependent Ecosystem
2. Includes both NCCAG Wetland and Vegetation acreage

N

0 5,000 10,000 15,000
Feet

GSI Water Solutions, Inc.

Date: June 14, 2021
Data Sources: ESRI, USGS, Maxar 2019, USFWS

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section3\Figure3_39_Categorized_Potential_Groundwater_Dependent_Ecosystem.mxd, abarry

Table 3-13. Categorized Potential GDEs in the EMA (Excluding Santa Ynez River Area)

Potential GDE Category	Natural Communities Vegetation Classification	Acres
A	Coast Live Oak	91
	Riparian Mixed Hardwood	93
	Subtotal	**184**
B	Coast Live Oak	1,159
	Valley Oak	279
	Riparian Mixed Hardwood	99
	Riversidean Alluvial Scrub	5
	Willow (Shrub)	4
	Subtotal	**1,546**
	Total	**1,731**

3.2.6.2 Special-Status Species Occurrence

A literature review was completed to determine the terrestrial and aquatic special-status species that may use potential GDE units within the EMA. The documents reviewed include a 2000 Biological Opinion prepared for USBR (NMFS, 2000),[26] the 2011 Cachuma Project Division of Water Rights Final Environmental Impact Report[27] (SWRCB, 2011), the 2012 City of Solvang Water System Master Plan Update Environmental Impact Report (Meridian Consultants, 2012), the 2016 U.S. Forest Service Happy Canyon Environmental Assessment (USDA, 2016), and the 2019 SWRCB Order regarding the USBR Cachuma Project (SWRCB, 2019). The U.S. Fish and Wildlife Service (USFWS) Critical Habitat Mapper[28] was also consulted. No original analysis was conducted for the special status species review of the EMA.

For the purposes of this GSP, special-status species are defined as those:

- Listed, proposed, or under review as endangered or threatened under the federal Endangered Species Act (ESA) or the California Endangered Species Act (CESA)
- Designated by California Department of Fish and Wildlife (CDFW) as a Species of Special Concern
- Designated by CDFW as Fully Protected under the California Fish and Game Code (§§ 3511, 4700, 5050, and 5515)

Table 3-14 lists the special-status species that are documented to occur within the EMA based on review of the documents listed above. Note that this list includes documented occurrence within the entire Bulletin 118 boundary of the EMA, including the Santa Ynez River Area, which is managed by the SWRCB and therefore not under the purview of SGMA. Wildlife species were evaluated for potential groundwater dependence using the Critical Species Lookbook (Rohde et al., 2019). This potential groundwater

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[26] *Biological Opinion, U.S. Bureau of Reclamation Operation and Maintenance of the Cachuma Project on the Santa Ynez River in Santa Barbara County, California*, issued September 11, 2000 (Biological Opinion) (NMFS, 2000).
[27] The full title of the document is *Division of Water Rights Final Environmental Impact Report, Consideration of Modifications to the U.S. Bureau of Reclamation's Water Right Permits 11308 and 11310 (Applications 11331 and 11332) to Protect Public Trust Values and Downstream Water Rights on the Santa Ynez River below Bradbury Dam (Cachuma Reservoir). State Clearinghouse #1999051051* (SWRCB, 2011).
[28] Available at https://ecos.fws.gov/ecp/report/table/critical-habitat.html. (Accessed July 26, 2021.)

dependence rating is indicative of the species' general documented reliance on groundwater and should not be considered a statement of specific groundwater reliance occurring within the potential GDEs of the EMA. As stated above, the presence of the potential GDEs will be verified during GSP implementation.

No special-status plant species were identified within the EMA.

The following sections describe three of the federally listed special-status species in greater detail.

Table 3-14. Special-Status Species within the EMA, Including the Santa Ynez River Area (Bulletin 118 Boundary)

Common Name	Scientific Name	Status	Potential Dependence on GW[1]	Potential Location
Arroyo Chub	*Gila orcutti*	State species of special concern	Direct	SYR, Up
California Red-Legged Frog	*Rana draytonii*	Federally listed (Threatened)	Direct	SYR, Up
Coast Range Newt	*Taricha torosa*	State species of special concern	Direct	SYR, Up
Southern California Coast Steelhead DPS	*Oncorhynchus mykiss*	Federally listed (Endangered)	Direct	SYR
Southwestern Pond Turtle	*Actinemys marmorata pallida*	State species of special concern	Direct	SYR, Up
Western Pond Turtle	*Emys marmorata*	State species of special concern	Direct	SYR, Up
Least Bell's Vireo	*Vireo bellii pusillus*	State and federally listed (Endangered)	Indirect[3]	SYR
Silvery Legless Lizard	*Anniella pulchra*	State species of special concern	Indirect[3]	SYR, Up
Two-Striped Garter Snake	*Thamnophis hammondii*	State species of special concern	Indirect[3]	SYR, Up
Vernal Pool Fairy Shrimp[2]	*Branchinecta lynchi*	Federally listed (Threatened)	Unknown	Up

Notes

[1] Potential reliance on groundwater (GW) is determined from the Critical Species Lookbook (Rohde et al., 2019) and is not an indication of specific GW reliance within the EMA.

[2] Although there have been no documented occurrences, USFWS has identified critical vernal pool fairy shrimp habitat within the EMA.

[3] This species relies on other groundwater dependent organism(s).

DPS = distinct population segment

GW = groundwater

SYR = Santa Ynez River area

Up = Santa Ynez Uplands area

Southern California Coast Steelhead DPS

The Santa Ynez River below Bradbury Dam supports steelhead belonging to the Southern California Coast Distinct Population Segment (DPS) (*Oncorhynchus mykiss*), which is federally listed as endangered. Within this DPS, the population of steelhead have both been identified as Core 1 populations, which means the population has the following:

- The highest priority for recovery actions
- A known ability or potential to support viable populations
- The capacity to respond to recovery actions (NMFS, 2012)

One critical recovery action listed by the National Marine Fisheries Service (NMFS) includes the implementation of operating criteria to ensure surface flows allow for essential steelhead habitat functions (NMFS, 2012). Figures 3-40 and 3-41 show the documented steelhead spawning and rearing habitat within and adjacent to the EMA (SWRCB, 2011). The occurrence of steelhead within the EMA is entirely confined to the Santa Ynez River Area (see Figures 3-40 and 3-41), which is regulated by the SWRCB and therefore not under the purview of SGMA.

The EMA GSA is fully supportive of the comprehensive and ongoing efforts, dating back to the 1990s, to develop and implement surface flow and non-flow measures in the mainstem lower Santa Ynez River and certain tributaries for the protection of public trust resources, including, but not limited to, steelhead and its critical habitat (e.g., National Marine Fisheries Service September 2000 Biological Opinion for U.S. Bureau of Reclamation Operation and Maintenance of the Cachuma Project on the Santa Ynez River in Santa Barbara County, California; State Water Resources Control Board Water Order WR 2019-0148 for the Cachuma Project on the Santa Ynez River). The member agencies of the EMA GSA remain actively involved with numerous federal, state, and local entities in proceedings before the SWRCB and in the current re-consultation process under the federal Endangered Species Act to protect steelhead and its critical habitat in the lower Santa Ynez River (refer to Appendix K for an additional discussion of this issue).

California Red-Legged Frog and Vernal Pool Fairy Shrimp

Santa Ynez River tributaries that may support the California red-legged frog (*Rana draytonii*) include Alamo Pintado and Cachuma Creeks within the EMA (Figure 3-42) (SWRCB, 2011). In 2001, the USFWS designated critical habitat for this species, including the upper reaches of Cachuma Creek and Happy Canyon within the EMA and the eastern tip of the EMA (see Figure 3-42). There are no documented occurrences of vernal pool fairy shrimp (*Branchinecta lynchi*) within the EMA, however, the USFWS has designated critical habitat for this species throughout the Happy Canyon area within the EMA (see figure 3-42).

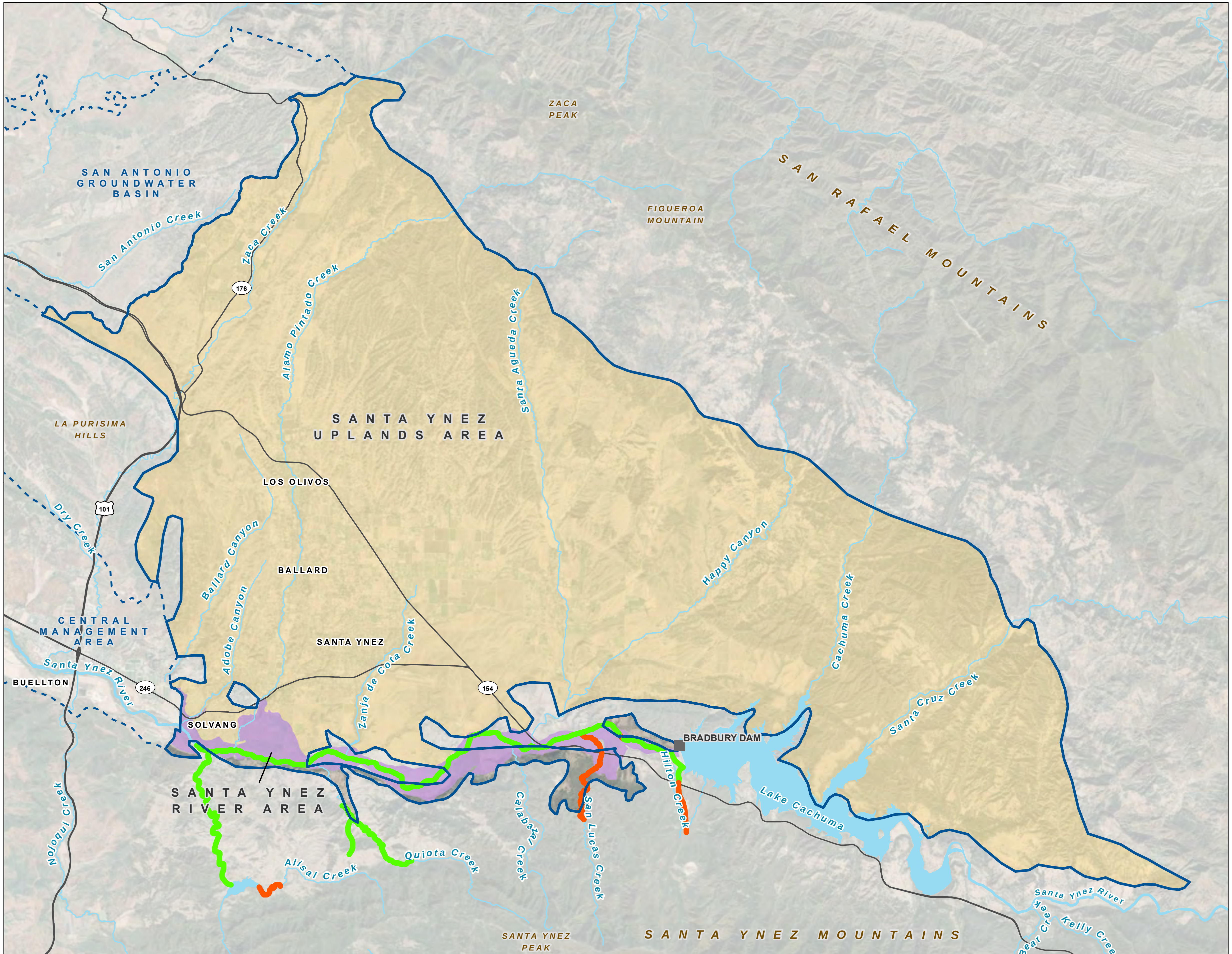
3.2.6.3 Ecological Condition of Potential GDEs

Once potential GDEs are mapped, TNC guidance recommends that the condition of each GDE unit be inventoried and documented by describing the species composition, habitat condition, and other relevant information reflected in Worksheet 2 of the guidance (Rohde et al., 2018). Then the ecological condition of the GDE unit should be characterized as having a high, moderate, or low ecological value based on the criteria provided in the TNC guidance. This additional characterization was not performed and will not be performed post-GSP. The focus of this GSP will be to preserve the existing Category A GDEs where identified, regardless of composition or condition. Further confirmation of the extent and types of plants and animals that live in the Category A potential GDE area and the extent to which they are supported by groundwater will be completed as discussed in the projects and management actions section of the GSP (see Section 6).

FIGURE 3-40

Steelhead Spawning Habitat

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan



LEGEND

- Santa Ynez Uplands Area (area covered by GSP)
- Santa Ynez River Area
- Steelhead Spawning Habitat[1]
- Potential Steelhead Spawning Habitat[1]

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Bradbury Dam
- Watercourse
- Waterbody

NOTE

[1]Cachuma Project Final EIR (2011)

N

0 5,000 10,000 15,000

Feet

Date: June 14, 2021

Data Sources: ESRI, USGS, Maxar 2019

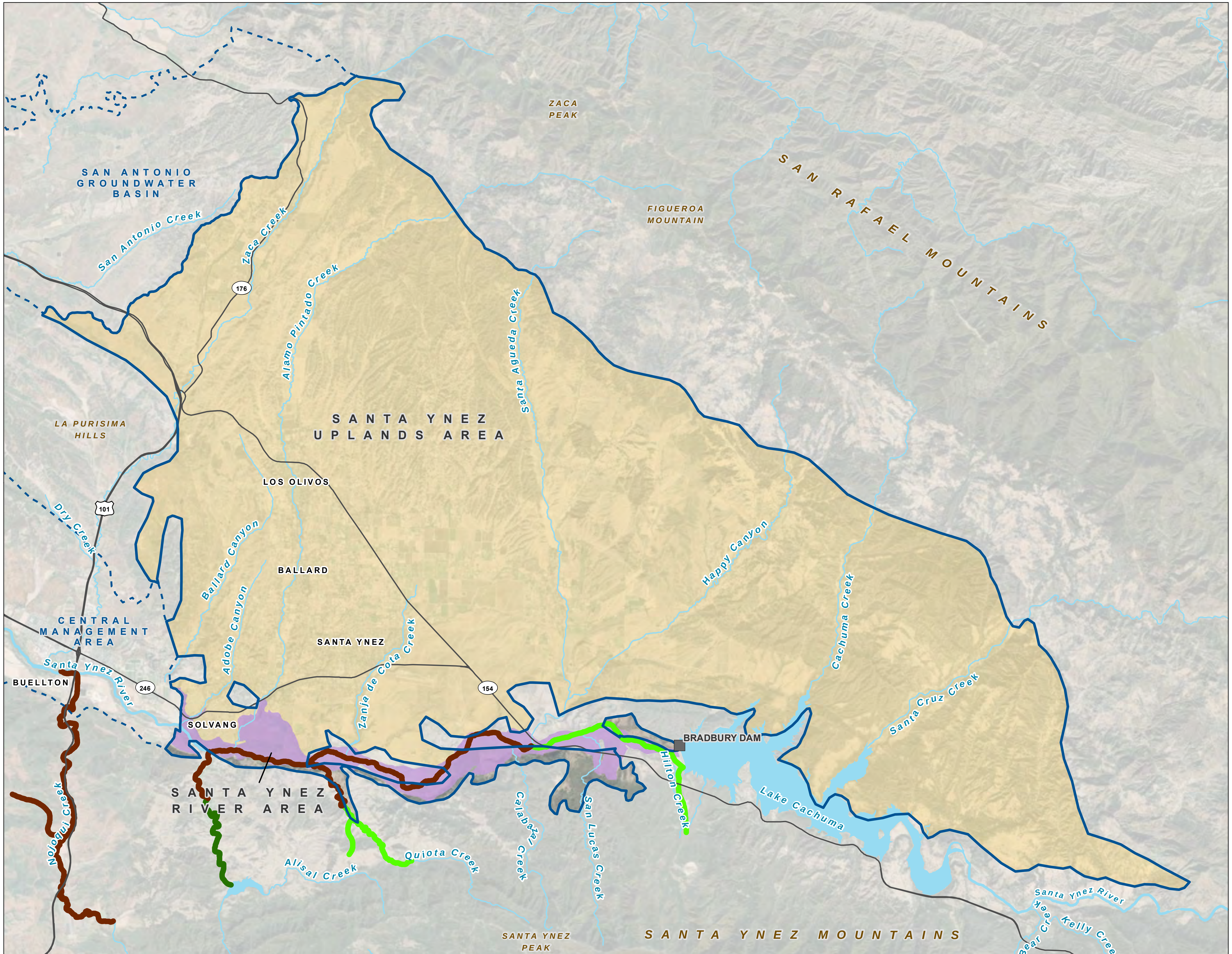
GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section3\Figure3_40_Steelhead_Spawning_Habitat.mxd, abarry

FIGURE 3-41

Steelhead Rearing Habitat

Santa Ynez River Valley Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan



LEGEND

- Santa Ynez Uplands Area (area covered by GSP)
- Santa Ynez River Area

Steelhead Rearing Habitat[1]

- Good
- Fair
- Poor

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Bradbury Dam
- Watercourse
- Waterbody

NOTE

[1]Cachuma Project Final EIR (2011)

N

0 5,000 10,000 15,000
Feet

GSI Water Solutions, Inc.

Date: June 14, 2021
Data Sources: ESRI, USGS, Maxar 2019

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section3\Figure3_41_Steelhead_Rearing_Habitat.mxd, abarry

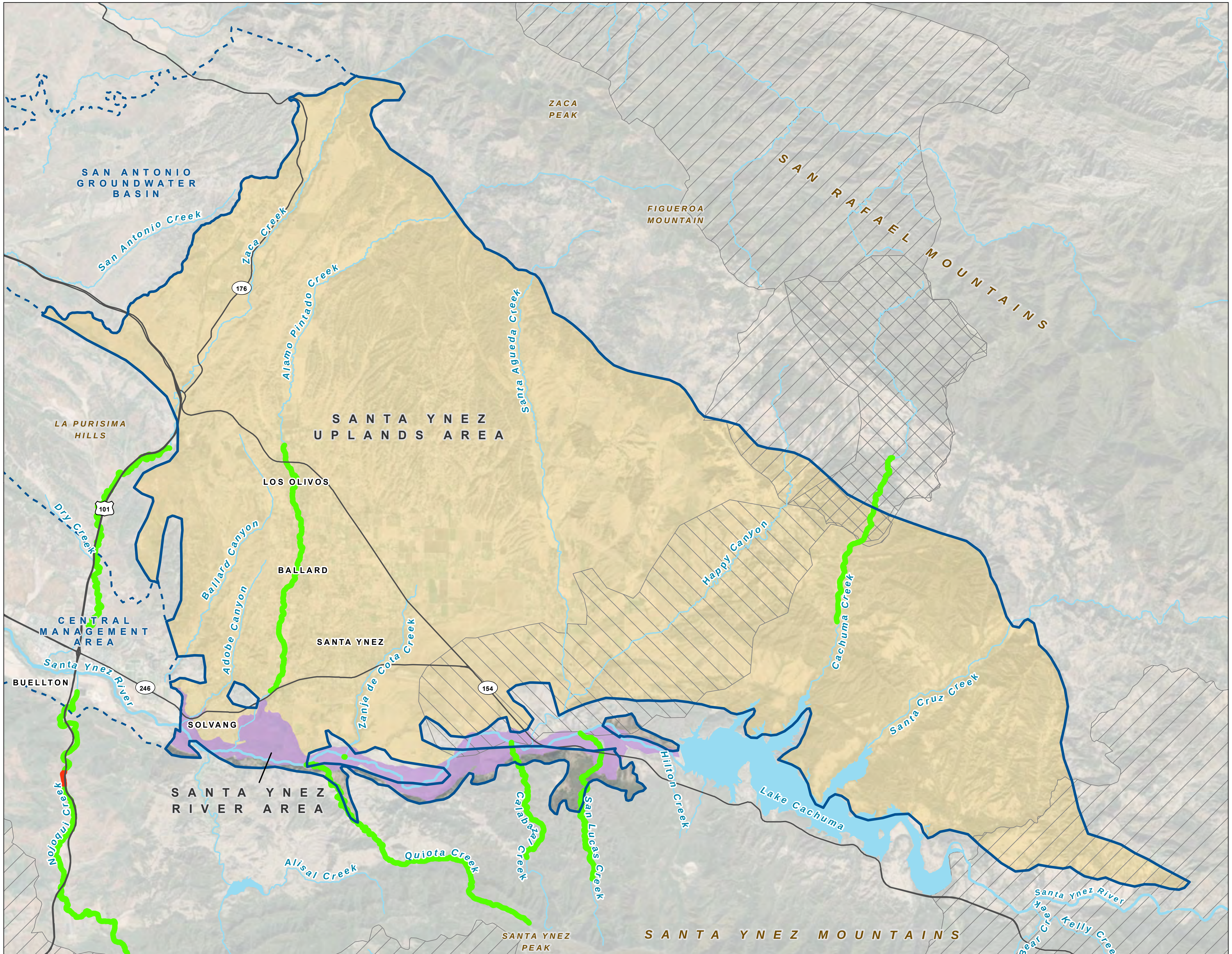


FIGURE 3-42

California Red-Legged Frog and Vernal Pool Fairy Shrimp Habitat

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

- Santa Ynez Uplands Area (area covered by GSP)
- Santa Ynez River Area
- Location of Red Legged Frogs (1992-2000)[1]
- Potential Red Legged Frog Habitat[1]

USFWS Critical Habitat

- California Red-Legged Frog
- Vernal Pool Fairy Shrimp

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

NOTE

[1]Cachuma Project Final EIR (2011)
1. Cross-hatch indicates overlap in USFWS critical habitat.

USFWS: U.S. Fish and Wildlife Service

N

0 5,000 10,000 15,000
Feet

GSI Water Solutions, Inc.

Date: June 14, 2021
Data Sources: ESRI, USGS, Maxar 2019, USFWS

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section3\Figure3_42_RLF_Habitat.mxd, abarry

3.3 Water Budget [§ 354.18]

§ 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.

(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.

(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.

(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) 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.

(6) The water year type associated with the annual supply, demand, and change in groundwater stored.

A water budget is the key integrating aspect of the Basin Setting. For the EMA, the HCM (see Section 3.1) and water budgets (this section) together form the basis for the numerical flow model to be used for quantitatively evaluating the management alternatives to be considered in this GSP.

This section summarizes the estimated water budgets for the EMA, including information required by the SGMA regulations and information that is important for developing an effective GSP that achieves groundwater sustainability. In accordance with SGMA regulations § 354.18, the GSP must include a water budget that provides an accounting and assessment of the annual volume of groundwater and surface water entering and leaving the Basin and include the historical, current, and projected hydrologic conditions, as well as the change in the annual volume of groundwater in storage. The regulations require that the water budget be reported in graphical and tabular formats.

3.3.1 Overview of Water Budget Development

§ 354.18 Water Budget.

(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.

(2) Current water budget information for temperature, water year type, evapotranspiration, and land use.

(3) Projected water budget information for population, population growth, climate change, and sea level rise.

(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.

(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.

This section presents an overview of the data sources used for development of the water budget from a variety of publicly available data. As noted above, this water budget refers to the EMA portion of the Basin, as defined in Section 1.2 and depicted on Figure 1-1. This section presents a water budget as required by the regulations, which accounts for and assesses the annual volume of groundwater and surface water entering and leaving the EMA, including historical, current, and projected water budget conditions, each of which present both surface water and groundwater components.

The estimated inflow and outflow components as well as the sustainable yield are presented following the water budget. The sustainable yield is not a fixed constant value but can fluctuate over time as the groundwater inflows and outflows change; thus, the calculated sustainable yield within the EMA can be estimated and likely modified during a future update of the GSP, depending on the representativeness of the long-term hydrologic conditions present at that time or availability of improved estimates of the water budget components.

The water budget analysis is inextricably tied to the SGMA requirement to ensure the Basin is operated within its sustainable yield. Sustainable yield is defined in SGMA as "the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing an undesirable result." An undesirable result is one or more of the following effects caused by groundwater conditions occurring throughout the EMA:

- Chronic lowering of groundwater levels in the aquifer(s) indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if groundwater extractions and recharge are managed as necessary to ensure that reductions of groundwater levels or storage during a period of drought are offset by increases of groundwater levels or storage during other periods.
- Significant and unreasonable reduction of groundwater in storage.
- Significant and unreasonable degradation of water quality, including the migration of contaminant plumes that impair water supplies.
- Seawater intrusion.
- Significant and unreasonable land subsidence that substantially interferes with surface land uses.
- Depletion of interconnected surface water that has significant and unreasonable adverse impacts on beneficial uses of surface water.

Defining the sustainable yield of a groundwater basin based upon a water budget provides a starting point that may be adjusted by considering whether there are undesirable results associated with any of the six sustainability indicators described above. Consideration of the sustainability indicators for defining sustainable yield is presented in Section 5.

Section 354.18 of the SGMA regulations requires development of a water budget that includes both groundwater and surface water components to provide an accounting of the total volume of water entering and leaving a basin. To satisfy the requirements of the regulations, a water budget was prepared for the EMA for each water budget period. A general schematic diagram of the hydrologic cycle, each component of which is included in the water budget, is presented on Figure 3-43.

The Santa Ynez River and associated underflow within the Santa Ynez River Alluvium is included in the surface water system that is summarized in the budget, along with the surface water in the tributaries within the Santa Ynez Uplands and Santa Ynez mountains to the south. As surface water, the Santa Ynez River Alluvium is not considered a principal aquifer because the water within this geological unit is present within the defined bed and banks of the channel and thus is not considered groundwater in accordance with Water Code, § 10721(g). The surface water system is managed under the jurisdiction of SWRCB and is not within the purview of SGMA. The description of principal aquifers and the authority associated with managing the Santa Ynez River and associated underflow is discussed in Section 3.1. On the basis of this authority and the Water Code definitions, water both aboveground and belowground within the Santa Ynez River (SYRWCD's Zone A portion of the EMA) is part of the surface water budget for the EMA. The extents of the Santa Ynez Uplands (groundwater area) and Santa Ynez River (surface water area) are shown on Figure 3-1.

The surface water budget also includes estimates of the flow through the tributaries that drain the San Rafael Mountains and Santa Ynez Uplands to the north and Santa Ynez Mountains to the south (including Zaca Creek, Alamo Pintado Creek, Happy Canyon, Alisal Creek, Hilton Creek, Quiota Creek, San Lucas Creek, Santa Aqueda Creek, and Teqepis Creek). Flows from Cachuma Creek and Santa Cruz Creek are included in the numerical groundwater flow model, but are not included in the surface water budget, because implementation of the GSP will not affect groundwater use (for agricultural, domestic, municipal or environmental uses), nor groundwater and surface water conditions within these tributaries.

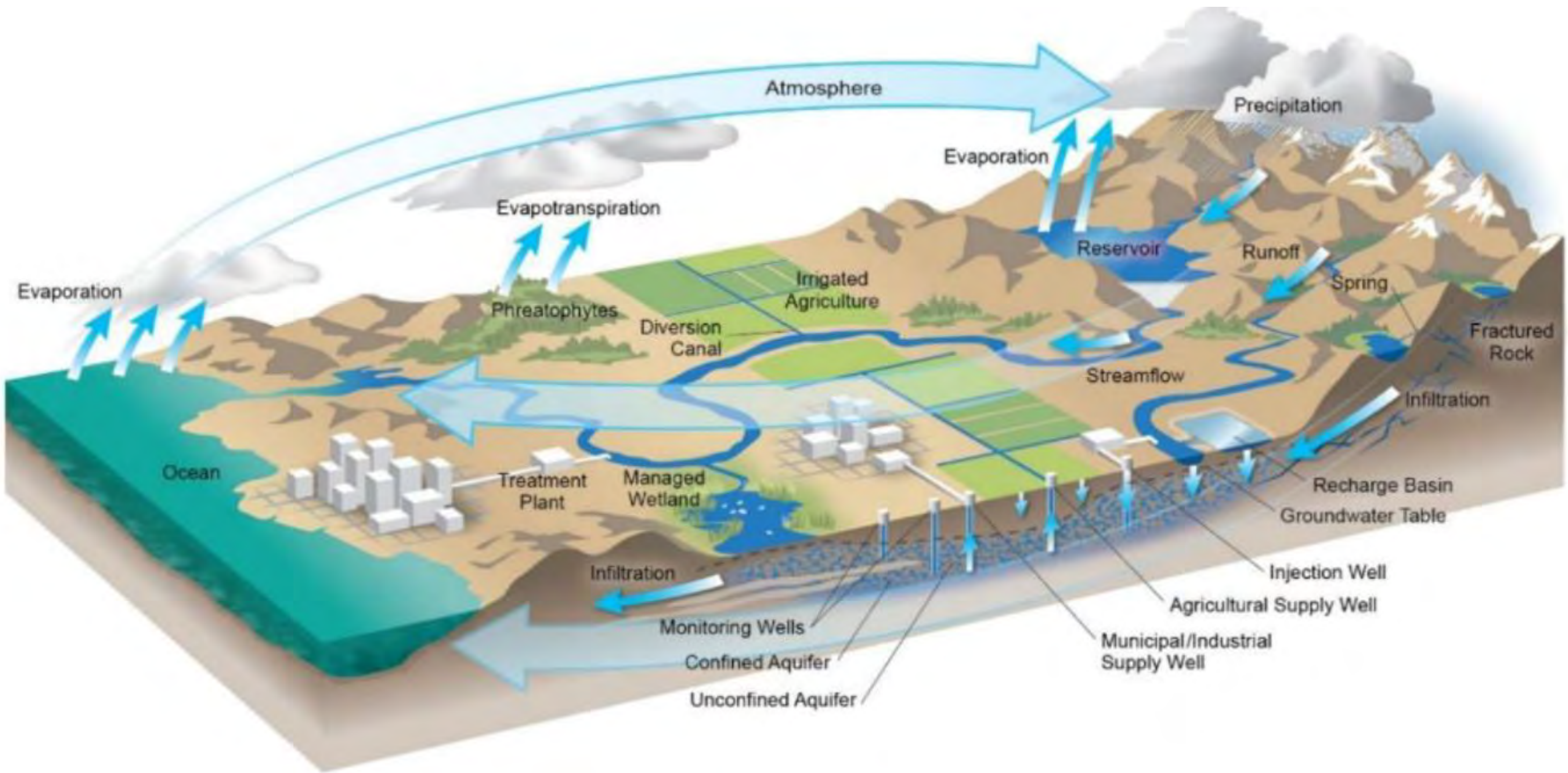


Figure 3-43. Hydrologic Cycle

(Source: DWR, 2016a)

A few components of the water budget, such as streamflow at a gauging station or groundwater pumping from a metered well, can be measured directly. Other components of the water budget, such as recharge from precipitation or unmetered groundwater pumping, are estimated. The water budget is an inventory and accounting of total surface water and groundwater inflows (recharge) and outflows (discharge) from the EMA, including the following:

Surface Water Inflows (Santa Ynez River):

- Streamflow and subsurface inflow into the Santa Ynez River Alluvium from both the upstream Santa Ynez River and Santa Ynez Uplands tributaries
- Runoff of precipitation into streams and rivers or diversion structures that enter the EMA from the surrounding watershed
- Irrigation return flow to the Santa Ynez River Alluvium
- Return flows from septic systems
- Imported surface water (e.g., from the SWP)

Surface Water Outflows (Santa Ynez River):

- Streamflow exiting the EMA through the Santa Ynez River and Zaca Creek
- Subsurface flow through the Santa Ynez River Alluvium into the downstream CMA
- Pumping from river wells completed in the Santa Ynez River Alluvium
- Phreatophyte ET

Groundwater Inflows:

- Recharge from precipitation
- Percolation of tributary flows to groundwater
- Subsurface groundwater inflow, including mountain front recharge
- Irrigation return flow (water not consumed by crops/landscaping)
- Percolation of treated wastewater
- Septic tank return flows
- Urban irrigation return flow (including water distribution system leakage and water from imported sources)

Groundwater Outflows:

- Groundwater pumping
- Phreatophyte ET
- Subsurface groundwater outflows to adjoining groundwater system
- Groundwater discharge to surface water

The difference between inflows to and outflows from the groundwater system in the Santa Ynez Uplands is equal to the change of groundwater in storage.

The historical water budget period is water years 1982 through 2018. The current water budget period is water years 2011 through 2018. The projected water budget extends to 2072 (Figure 3-44).

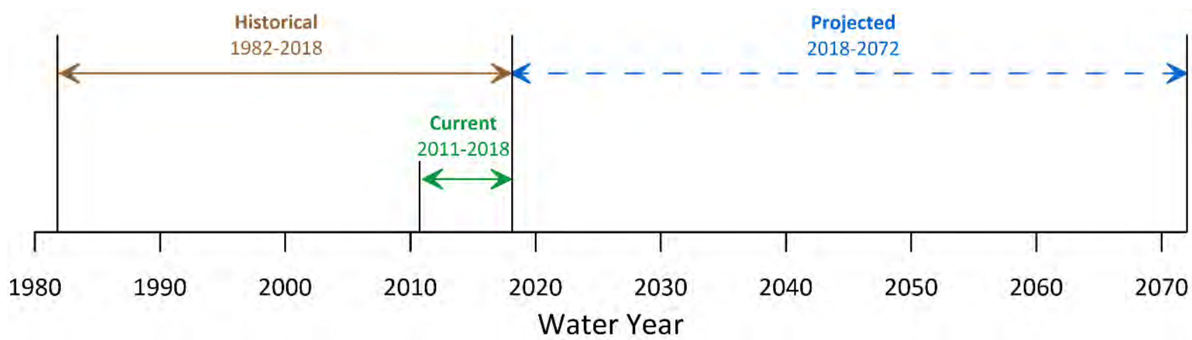


Figure 3-44. Historical, Current, and Projected Water Budget Periods

In the GSP, the discussion of the historical water budget period refers to water years, which run between October 1 and September 30 of the following year. For example, the period between October 1, 2017, and September 30, 2018, constitutes water year 2018.

The 37-year period between water years 1982 and 2018 (inclusive) has been selected for the historical water budget to comply with DWR regulatory requirements. This same period is used on all three GSPs prepared for the Basin, which require the following:

"a quantitative assessment of the historical water budget (be prepared) starting with the most recently available information and extending back a minimum of 10 years, or as 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."

The 37-year period selected for the historical water budget includes the most recently available information, two wet and two dry hydrologic cycles, recent changes in imported water supply availability, changes to water demand associated with cropping patterns, and associated land use. The selection of the historical period considered the availability of good-quality data for the principal water budget components, including streamflow, precipitation, and land use, which will be discussed individually later. For example, in the historical period (since the first land use survey of the EMA was available in 1985), the documented land uses changed significantly, with decreases in pastureland and coincident increases in other types of agricultural uses.

The historical water budget period was chosen to define a specific period for which all of the elements of recharge and discharge to the EMA may be compared to other periods (current and projected). This historical period allows for the identification of long-term trends in basin supply and demand, water level trends, changes of groundwater in storage, and estimates of the annual components of inflow and outflow to the zone of saturation. This information is fundamental to development of the EMA numerical groundwater flow model (discussed in Appendix F).

Further, the SGMA regulations require that the historical water budget provide a "quantitative evaluation of the availability or reliability of historical surface water supply deliveries… based on the most recent ten years of surface water supply information" (§ 354.18[c][2]).

A representative historical water budget period should do the following:

- Be representative of long-term hydrologic conditions (precipitation and streamflow)
- Include wet, dry, and average (normal)[29] years of precipitation
- Span a 20-to-30-year period (Mann, 1968)
- Have its start and end years preceded by comparatively similar rainfall quantities (DWR, 2002)
- Preferably start and end in a dry period (Mann, 1968), which minimizes water draining (in transit) through the vadose zone
- Include recent cultural conditions (DWR, 2002)

Determination of an appropriate historical water budget period included consideration of data availability, surface water inflows, and the historical development of water supplies imported from outside of the Basin and the EMA.

This historical water budget period selection also helps inform the projected water budget which utilizes "50 years of historical precipitation, ET, and streamflow information as the baseline condition for estimating future hydrology" (SGMA regulations § 354.18(c)(3)). Notably, the selection of both the historical and current water budget periods are based on this requirement. The historical water budget period (base period) closely approximates long-term hydrologic conditions based on precipitation. While the historical water budget period selection may include consideration of streamflow, the flow in the Santa Ynez River upstream of the EMA is highly regulated by three upstream dams. Because of this, the consideration of streamflow in the Santa Ynez River is neither meaningful nor useful for the selection of the historical period. Therefore, precipitation data are used as the principal recharge component for the selection of the historical period.

In addition to the consideration of precipitation and streamflow variability, the historical period selected must include high-quality, reliable data with regard to all of the principal components of the water budget. The historical period generally includes reliable data for most, but not all, of the water budget components. For components for which reliable data were not readily available, additional analysis was conducted to provide reliable estimates of the components. Many of these components were verified by numerical groundwater flow modeling (discussed in Appendix F).

The historical period was determined based on review of long-term precipitation records from 12 precipitation stations located in, and adjacent to, the EMA (discussed in Section 2). Of the 12 stations, eight were chosen for this analysis based on approximately representing the historical record (based on both geographic distribution and period of record). A map of these stations, with the exception of the upstream stations to the west, is presented as Figure 2-14.

The four stations excluded from the analysis were either located too far from the EMA (i.e., Los Alamos) or had limited available data (i.e., Foxen Canyon, Midland School, and Happy Canyon). The eight precipitation stations used for the analysis are summarized in Table 3-15.

[29] Normal: average precipitation over a long period, sometimes 30 years

Table 3-15. Precipitation Stations Used for Historical Period Selection

Station No.	Station Name	Beginning of Record	Location	Elevation (Feet)	Period Average (Inches)
218	Santa Ynez Fire Station #32	1951	Within EMA	600	15.7
393	Solvang PW Water	1965	Within EMA	485	18.3
233	Buellton Fire Station	1955	Surrounding	360	17.2
421	Figueroa Mountain	1961	Surrounding	3,200	21.3
332	Cachuma	1953	Adjacent to EMA	800	19.7
204	Los Alamos Fire Station	1910	San Antonio Groundwater Basin	580	15.3
230	Gibraltar Reservoir	1920	Upstream	1,500	26.2
232	Jameson Dam	1926	Upstream	2,230	28.7

Note

EMA = Eastern Management Area

Graphs showing the cumulative departure from mean precipitation for the eight precipitation stations were created. The precipitation station with the longest period of record (more than 100 years) is the Los Alamos Fire Station, located 6 miles west of the EMA in the adjacent San Antonio Groundwater Basin. For the five precipitation stations within or immediately surrounding the EMA, precipitation averages approximately 18 to 19 inches per year. These five stations each have at least 53 years of reliable precipitation data: Santa Ynez, Solvang, Buellton, Figueroa Mountain, and Cachuma. From these data, it was determined that the Santa Ynez Fire Station #32 data were most representative for the EMA.

The precipitation data for the Santa Ynez Fire Station #32 gauge is presented as Figure 3-45. In the EMA, precipitation occurs primarily as rainfall. The average EMA precipitation, measured at the Santa Ynez Fire Station #32 is 15.7 inches for the period of record since 1951. The upper portion of the chart shows the annual precipitation. Climatic trends (historical wet-dry cycles) were identified using DWR guidance for defining water year type. GSI selected climactic trends in the context of longer-term multi-year climatic periods of wet, normal, and drought conditions within the EMA, which are more relevant to the EMA than the year-to-year climatic conditions used by the SWRCB or USGS. These wet, variable, normal, and dry periods determined from the EMA precipitation data are presented on all hydrographs and water budget graphs in this GSP and help to inform groundwater management within the EMA to a greater degree than individual water years. The lower portion of the chart shows the climatic variability by showing the cumulative departure from the mean precipitation; upward trending portions (blue areas) represent wet periods of above-average rainfall, and downward trending portions (tan areas) represent drought periods of below-average rainfall.

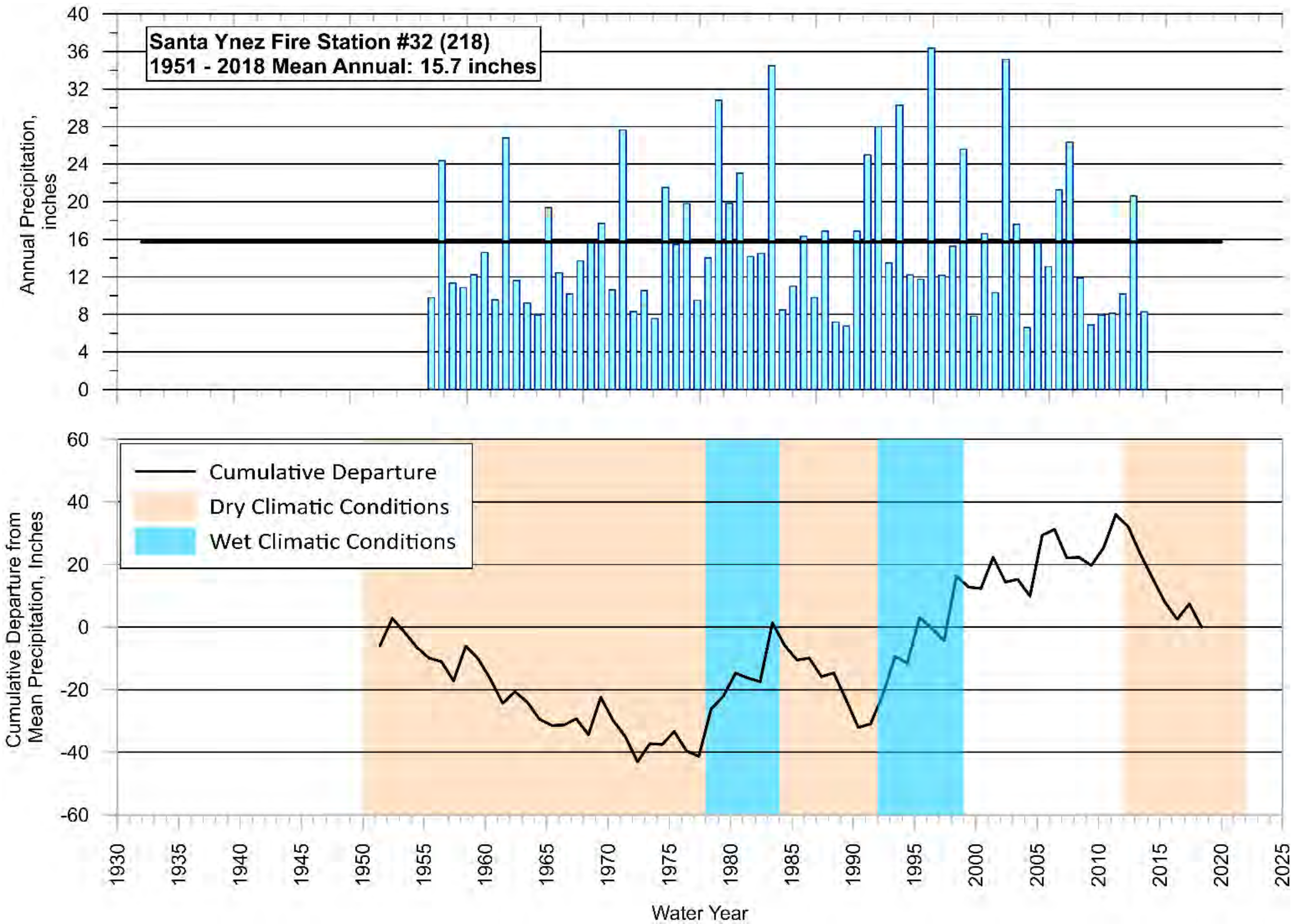


Figure 3-45. Precipitation and Climatic Periods, Santa Ynez Fire Station #32

Highly variable precipitation patterns —multi-year cycles of drought punctuated by shorter, intense wet periods—are common to the area. EMA climate variability is evident on Figure 3-45 and Table 3-16.

Table 3-16. Historical Hydrologic Conditions - Water Year Type

Period (Water Years)	Hydrologic Condition	Duration (No. of Years)	Precipitation Deviation (Inches)	Deviation Rate (Inches per year)
1951 to 1977	Drought	27	- 40	- 1.5
1978 to 1983	Wet	6	+ 44	+ 7.3
1984 to 1991	Drought	8	- 33	- 4.1
1992 to 1998	Wet	7	+ 48	+ 6.8
1999 to 2011	Variable	13	+20	+ 1.6
2012 to 2018 (onward through 2021)	Drought	7	- 36	- 5.1

Notable aspects of these periods include the following:

- A long, moderate drought occurred between the beginning of the period of record in water year 1951 and lasted through 1977. During this 27-year drought, the annual precipitation deviated below the long-term average by a modest 1.5 inches per year.
- Between 1978 and 1983, a short but intense wet period occurred, during which the average precipitation was 7.3 inches above the long-term average.
- After the intense wet period, a 6-year drought (1992 to 1998) and a 6-year wet periods (1992 to 1998). The wettest month on record occurred during this wet period occurred in February of 1998, when a total of 16.2 inches of rain fell. That year (1998) was the wettest on record with more than 36 inches of rain.
- The current drought started in water year 2012 and remains the most severe drought during this period with an average rainfall deficit of 5.1 inches per year, compared to the long-term average. The period included a single wet year in 2017 (and another in 2019, not shown on the table). The two prior droughts had similar total deviation from the long-term average. The current drought is continuing beyond the years shown on the Table 3-2 into water year 2021, extending the current drought to 10 years (water years 2012 through 2021 inclusive).

Based on review of precipitation data, the initial year for a suitable historical period could be 1976, 1978, 1981, or 1982, all of which start in a dry year preceded by at least one dry year. The ending year of 2018 is a dry year in an overall dry period. The period between 1982 and 2018 (inclusive) is the most balanced period and representative of the long-term period of record. In consideration of the availability of good-quality data, especially reported groundwater pumping data, the period between 1982 and 2018 (inclusive) will be used for the EMA numerical groundwater flow modeling and for the historical water budget analysis. The historical water budget information is presented in Section 3.3.3.

The current water budget period was selected to be between 2011 and 2018. This period represents a very dry period overall, which—although not as hydrologically balanced as the historical period—is considered representative of the current drought conditions. Precipitation at the Santa Ynez Fire Station #32 during this period averaged 12.5 inches, which is just 79 percent of the historical period. The current water budget information is presented in Section 3.3.4.

The projected water budget, for the 55-year period between 2018 and 2072, extends 50 years past the 2022 submittal of this GSP. The projected water budget information is presented in Section 3.3.5.

3.3.2 Water Budget Data Sources

The historical and current water budget analysis was developed in a tabular accounting format by water year using various publicly available data sets. The projected water budget analysis was developed in part using the EMA numerical groundwater flow model, described further below. The groundwater inflow and outflow components of the water budget pertain to the principal aquifers, the Paso Robles Formation and the Careaga Sand, which are located within the Santa Ynez Uplands portion of the EMA. The surface water inflow and outflow components of the water budget generally refer to the SWRCB-regulated Santa Ynez River (aboveground and underflow within the Santa Ynez River Alluvium) and the surface flow from the tributaries in the Santa Ynez Uplands to the Santa Ynez River.

Table 3-17 provides a summary of the data sources used for developing the historical and current water budget analyses and a description of each data set's qualitative data rating. Each of these data sets is described in further detail in the following sections.

A qualitative discussion of the estimated level of uncertainty associated with each data source is described in the table below and for each water budget term. This discussion focuses on the level of uncertainty and the authors' confidence in the data, as well as the assumptions and interpretations of the information used to develop the water budgets. Higher quality data represent lower uncertainty. The level of uncertainty can significantly affect the GSA's ability sustainably manage the EMA. In our opinion, the data associated with the EMA is adequate to estimate the surface and groundwater inflow and outflow components of the water budget. The qualitative data rankings presented in Table 3-17 acknowledge that the directly measured data —which includes gauged streamflow (surface water), groundwater pumpage, precipitation and groundwater levels (groundwater)— is of the highest quality (and lowest uncertainty). Generally, the surface water flow volumes and metered pumpage in the Santa Ynez Uplands (groundwater) and Santa Ynez River Area (surface water) are of the highest quality and lowest uncertainty.

The calculated and modeled values are generally of medium quality. Data derived from other sources—including water duty factors for irrigated crops for the estimation of agricultural pumping and related irrigation return flow—are less certain and therefore of medium/low quality (with the highest uncertainty).

These are the best-available data available for the EMA and are similar to the quality and sources of data available in similar groundwater basins throughout the state. Importantly, these data and the resulting water budgets summarized in this section support the sustainable management of the groundwater resource. As discussed in this section and later in Section 6 (Projects and Management Actions), the quality of many of these data will improve during GSP implementation, which will enable adaptive and sustainable groundwater management. Moreover, the sustainable management criteria (Section 5) are based largely on groundwater elevation measurements, which are data of high quality and low uncertainty.

Any significant uncertainty in the data could limit the GSA's ability to effectively develop sustainable management criteria, select appropriate projects and management actions, and determine whether the Basin is being sustainably managed. These uncertainties are discussed within each water budget data source section and later within the subsequent sections. Data with significant uncertainty that may have an impact on management of the EMA are identified and will be addressed as part of the management actions associated with this GSP.

Table 3-17. Water Budget Data Sources

Water Budget Component	Data Source(s)	Comment(s)	Qualitative Data Rating[1]
Surface Water Inflow Components			
Bradbury Dam Releases	U.S. Bureau of Reclamation	Data provided by Stetson Engineers	Metered - High
Cachuma Project	U.S. Bureau of Reclamation	Data provided by SYRWCD, ID No.1	Metered - High
Native Streamflow	USGS BCM runoff, gauge data	BCM calibrated to existing data	Calibrated Model - Medium
Imported: State Water Project	Central Coast Water Authority	Data provided by SYRWCD, ID No. 1	Metered - High
Groundwater Inflow Components			
Deep Percolation of Precipitation	USGS BCM Recharge	BCM calibrated to Basin weather station data	Calibrated Model - Medium
Tributary Percolation	Santa Ynez RiverWare Model, USGS BCM	Collaborative modeling efforts: Stetson Engineers and GSI Water Solutions, Inc.	Calibrated Model – Medium/Low
Subsurface Groundwater Inflow: Mountain Front Recharge	USGS BCM Recharge	BCM calibrated to Basin precipitation and streamflow station data	Calibrated Model – Medium
Irrigation Return Flows	Land use surveys, SYRWCD crop-specific water duty factors, self-reported pumping data	Methods described in text	Estimated – Medium/Low
Percolation of Treated Wastewater	Chumash Casino Resort WWTP Operations Manager	Verbal, described in text	Estimated – Medium/Low
Percolation from Septic Systems (includes urban return flow)	RWQCB data set, census data	Methods described in text	Estimated – Medium
Surface Water Outflow Components			
Santa Ynez River Outflow	U.S. Bureau of Reclamation, USGS BCM runoff, gauge data	Methods described in text	Gauged and Estimated – High/Medium
Pumping from River Wells[2]	City of Solvang, ID No. 1, SYRWCD self-reported pumping data	Methods described in text	City of Solvang: High, SYRWCD, ID No. 1: High, Self-reported SYRWCD: Medium/Low
Groundwater Outflow Components			
Agricultural Irrigation Pumping	Land use surveys, SYRWCD crop-specific water duty factors, self-reported pumping data	Methods described in text	Estimated – Medium/Low
Municipal Pumping[2]	City of Solvang, ID No. 1, SYRWCD self-reported pumping data	Methods described in text	City of Solvang: High, SYRWCD, ID No. 1: High, self-reported: Medium/Low
Rural Domestic Pumping (outside SYRWCD)	RWQCB data set, census data	Methods described in text	Estimated - Low
Small Public Water Systems Pumping (outside SYRWCD)	DRINC, census data	Methods described in text	Estimated – Medium/Low
Phreatophyte ET	LandFire	Methods described in text	Estimated – Medium
Subsurface Outflow	Darcian Flux Calculations, Numerical Groundwater Flow Model	Methods described in text	Estimated - Low

Notes

[1] Higher quality data represent lower uncertainty.

[2] Includes all self-reported domestic pumping that occurs within the SYRWCD area.

The quality of other data sources central to compliance with sustainable management criteria (Section 5) is not shown on this table. These data include groundwater water elevation and ground surface elevation measurements, which are of high quality and low uncertainty.

BCM = Basin Characterization Model
DRINC = Drinking Water Information Clearinghouse
ET = evapotranspiration
GSI = GSI Water Solutions, Inc.
RWQCB = Regional Water Quality Control Board
Stetson = Stetson Engineers
SYRWCD = Santa Ynez River Water Conservation District
SYRWCD, ID No.1 = Santa Ynez River Water Conservation District, Improvement District No. 1
USGS = U.S. Geological Survey
WWTP = wastewater treatment plant

3.3.2.1 Surface Water Inflow Components

Surface water inflows to the EMA include runoff in the Santa Ynez River main stem that is attributable to precipitation, releases from the Lake Cachuma, and rainfall runoff in various tributaries to the Santa Ynez River within the EMA. Surface water inflows also include water imported into the EMA as part of the SWP.

The individual components of surface water inflows are described below.

Bradbury Dam Releases

Downstream releases and spillway flows from Lake Cachuma are controlled and monitored by USBR at Bradbury Dam (the dam). Flows in the Santa Ynez River below the dam are a combination of volumes released through the Bradbury Dam outlet works, the Hilton Creek Watering System, and occasional releases over the dam spillway. Except for releases over the spillway, releases from Lake Cachuma are governed by both a State Water Rights Order 2019-0148 and the 2000 NMFS Biological Opinion to support fish migration, spawning, and habitat maintenance in the Lower Santa Ynez River. These releases satisfy downstream water rights, replenish the Santa Ynez River alluvium, and ensure protection of public trust resources downstream of Bradbury Dam. The USBR monthly release and spillway flow data for Bradbury Dam were provided by Stetson Engineers for water years 1982 through 2018. These data were used as provided for EMA surface water inflows.

The uncertainty associated with the data from Bradbury Dam releases provided by the USBR is considered low and does not limit the GSA's ability to sustainably manage the Santa Ynez Uplands groundwater within the EMA.

Native Streamflow

Native streamflow in the Santa Ynez River main stem and in tributary creeks to the Santa Ynez River downstream of Bradbury Dam (see Table 3-18) were estimated using a combination of the USGS Basin Characterization Model (BCM) for California (Flint and Flint, 2017), runoff data, and stream gauge data (as available). The BCM data are provided statewide on a 270 by 270-meter grid.[30] As a quality assurance check on the BCM data, the gridded BCM monthly precipitation data were compared to the monthly precipitation reported at weather stations across the entire Santa Ynez River Basin. On average, over the 37-year period of record, from October 1981 through September 2018, the BCM precipitation across all these stations was 1.4 percent higher than the weather station reported values. For month-to-month comparisons, however, weather stations reported more discrepancies between the BCM values for individual locations. A correction was applied to the BCM values for each monthly time step such that the adjusted BCM data exactly matched all recorded weather station monthly precipitation values. These monthly adjustments were also applied to the BCM-generated runoff and recharge data sets. These adjusted BCM runoff and recharge data sets were then compared to tributary stream flow gauge data, where available, and calibrated to fit the gauge data.[31]

The native streamflow in tributary creeks where they enter the Basin were determined using the adjusted and calibrated BCM recharge and runoff data sets summed over the contributing watershed areas outside the Basin. The BCM data were initially adjusted to match existing data and then calibrated using the

[30] Inflow from the Santa Cruz and Cachuma Creek sub-water sheds flow into Lake Cachuma. Implementation of the GSP will not affect groundwater use in the Santa Cruz or Cachuma Creek sub-watersheds (for agricultural, domestic, municipal, or environmental uses), nor groundwater and surface water conditions within these tributaries.
[31] The BCM runoff data were calibrated to match stream gauge data (where available) by routing excess or deficit volumes to/from recharge (discussed further in Section 3.3.2.2 as Streamflow Percolation, Mountain Block Recharge, and/or Deep Percolation of Precipitation).

numerical groundwater flow model as discussed in greater detail in the model documentation included in Appendix F.

The Santa Ynez River is accurately gauged and highly regulated. Therefore, the level of uncertainty of these data is low. The flow from the tributary creeks, however, is ungauged and estimated based on BCM and Santa Ynez River Hydrologic Model (SYRHM) data outputs. The tributaries to the Santa Ynez River within the EMA are listed in Table 3-18. The uncertainty of these data is considered moderate, because large scale regional models (the USBR BCM) and a calibrated model for the EMA (SYRHM) are being used to estimate these water budget terms. The uncertainty associated with estimated tributary flow will not limit the GSA's ability to manage the Santa Ynez Uplands groundwater system because these water budget terms for tributary inflow are small relative to other water budget terms. Likewise, projects and management actions will be developed to avoid significant and unreasonable depletion of interconnected surface water, will be developed to avoid impacts to GDEs in two of the tributaries that have been determined to be interconnected with groundwater present in the principal aquifers (refer to Section 5).

Table 3-18. Tributary Creeks to the Santa Ynez River Downstream of Bradbury Dam

Creek Name	Contributing Watershed Area
Santa Agueda Creek	San Rafael Mountains (north from Santa Ynez Uplands)
Zanja de Cota Creek	San Rafael Mountains (north from Santa Ynez Uplands)
Alamo Pintado Creek	San Rafael Mountains (north from Santa Ynez Uplands)
Zaca Creek	San Rafael Mountains (north from Santa Ynez Uplands)
Hilton Creek	Santa Ynez Mountains (south)
San Lucas Creek	Santa Ynez Mountains (south)
Calabazal Creek	Santa Ynez Mountains (south)
Alisal Creek	Santa Ynez Mountains (south)

Note

Santa Cruz and Cachuma Creeks flow though the Santa Ynez Uplands directly into Lake Cachuma. The flow in tributaries discharging to Lake Cachuma are included in the numerical groundwater flow model but are not included in the surface water budget because these flows will not affect groundwater conditions or use (for agricultural, domestic, municipal, or environmental uses) within the Basin.

Cachuma Project/Imported State Water Project Supplies

As described in Section 3.3.2.1, ID No. 1 receives a portion of its water supply through the USBR Cachuma Project. Prior to 1997, Cachuma Project water was delivered directly to ID No. 1 via pipeline. Since 1997, when the Coastal Branch of the SWP came online, ID No. 1 has received its Cachuma Project water through the 1993 Santa Ynez River/State Water Project Exchange Agreement (Exchange Agreement) with the South Coast Cachuma Project Member Units, whereby the South Coast Members take ID No.1's portion of Cachuma water and ID No. 1 takes an equivalent amount of SWP water at the ID No. 1 turnout. As a member agency of CCWA, ID No. 1 imports additional SWP water through its contractual entitlement to SWP Table A supplies, a portion of which ID No. 1 has contractually allocated to the City of Solvang. USBR monthly Cachuma Project water delivery data were provided by ID No. 1 for the water year 1981 to 1997 period. CCWA monthly SWP water delivery data (for both ID No. 1 Exchange Agreement deliveries and Table A deliveries to ID No. 1 and City of Solvang) were provided by ID No. 1 for the period from 1997 to present.

The level of uncertainty of these data is low because they are measured values and thus, do not limit the GSA's ability to sustainably manage the Santa Ynez Uplands groundwater within the EMA.

Subsurface Inflow: Mountain Front Recharge to Surface Water

The southern portion of the EMA along the Santa Ynez River is bounded by the Santa Ynez Mountains (Figure 3-1). Water enters the Basin around the edges of the EMA where water-bearing deposits abut the Monterey Formation and underlying bedrock on the mountain slopes. This component of inflow is called mountain front recharge. This recharge component occurs both from the north via the San Rafael Mountains, which contribute groundwater recharge to the Santa Ynez Uplands, and from the south via the Santa Ynez Mountains, which contribute recharge to the Santa Ynez River both above and belowground. Mountain front recharge from the Santa Ynez Mountains, which flows directly into the tributary streams (surface water) and ultimately into the Santa Ynez River Alluvium (considered to be surface water) was calculated using the adjusted and calibrated BCM model.

The uncertainty of these data is considered moderate because large-scale regional models are being used to estimate this water budget term. The authors do not have other reliable methods for estimating this term and are applying best available science. However, the authors have attempted to constrain this term through the calibration process for the numerical groundwater flow model. The authors do not believe that uncertainty associated with estimates of mountain front recharge limit the GSA's ability to manage the Santa Ynez Uplands groundwater system, because the overall water budget is consistent with the calibrated numerical groundwater flow model. Refer to the model documentation in Appendix F and Section 3.2.

Imported Water: State Water Project

As noted above, monthly volumes of imported SWP water were provided by ID No. 1 from September 1997 through to the present. These volumes include imported SWP water received by ID No. 1 in exchange for Cachuma Project water. Prior to 1997, no water was imported into the Basin. The SWP data are measured values with low uncertainty and the data do not limit the GSA's ability to sustainably manage the Santa Ynez Uplands groundwater within the EMA.

3.3.2.2 Groundwater Inflow Components

The data sources used for inflows to the groundwater system of the Santa Ynez Uplands are described below. Note that the groundwater system includes only the aquifers in the Santa Ynez Uplands portion of the EMA and specifically excludes all water in the Santa Ynez River Alluvium, which is managed as surface water under the jurisdiction of the SWRCB (refer to Section 3.1.1.1 for additional discussion of these conclusions).

Deep Percolation of Precipitation

Precipitation falling on the land surface of the EMA represents the principal source of inflows to the groundwater in the Santa Ynez Uplands. Precipitation varies spatially and exhibits a strong seasonal variability (GSI, 2020). The precipitation that falls on the ground surface within contributing watersheds to the Basin either runs off into stream channels that eventually discharge to the Santa Ynez River or infiltrates into the soil zone.

Recharge to groundwater from deep percolation of precipitation was determined using the USGS BCM gridded recharge data set. As described in Section 3.3.2.1, the BCM recharge data set has been adjusted, based on comparison to monthly precipitation records at weather stations, across the entire Basin. The adjusted BCM recharge data set was then further adjusted in conjunction with comparisons to tributary streamflow gauge data as described in Section 3.3.2.1. As a result of these adjustments[32] in the water budget, approximately 14 percent of the BCM recharge volume (not the total precipitation volume) was routed to streamflow and the remaining 86 percent was input as deep percolation of precipitation. That is, of the volume of precipitation that initially infiltrates, 86 percent percolates deeply to groundwater, while the small remainder of 14 percent flows laterally and subsequently discharges to nearest stream channel as base flow.[33]

The level of uncertainty of these data is considered moderate. These data are based on calibrated analytical methods and the calibrated numerical groundwater flow model and are within the range of values commonly applied in similar geologic settings. Further discussion of the numerical groundwater flow model, specifically with regard to its calibration, is included in the model documentation included in Appendix F.

Tributary Percolation

Tributary percolation, the deep percolation of surface water to groundwater through the tributary streambeds, was estimated using the adjusted BCM model. Portions of the adjusted BCM runoff and recharge data sets routed to tributary streamflow percolation were determined in conjunction with comparisons to tributary streamflow gauge data, as described in Section 3.3.2.1. The level of uncertainty of these data is moderate. These data are based on a calibrated analytical methods and calibrated numerical groundwater flow model and are within the range of values commonly applied to similar geologic settings.

Subsurface Inflow: Mountain Front Recharge

The EMA is surrounded by the San Rafael Mountains to the north and east, as shown on Figure 3-1. Groundwater enters around the edges of the EMA where water-bearing deposits abut the Monterey Formation and underlying bedrock on the mountain slopes; this groundwater inflow is called mountain front recharge.

Mountain front recharge was calculated as the sum of the adjusted and calibrated BCM recharge data set over the contributing watershed areas outside the EMA minus the portion routed to native streamflow and the Santa Ynez River Alluvium. The calculation is further described in Section 3.3.2.1.

The uncertainty of these data is considered moderate because large-scale regional models are being used to estimate this water budget term. The authors do not have other reliable methods for estimating this term and are applying best available science and have attempted to constrain this term through the groundwater model calibration process. The authors do not believe that uncertainty associated with estimates of mountain front recharge limits the GSA's ability to manage the Santa Ynez Uplands groundwater system, because the overall water budget is consistent with the calibrated numerical groundwater flow model. Refer to the model documentation in Appendix F and Section 3.2.

Irrigation Return Flows

Irrigation return flow is the water applied to crops in excess of crop ET demand, which percolates below the root zone and back to groundwater. The proportion of applied water that is utilized to satisfy crop ET demand is equivalent to the irrigation efficiency, expressed as a percentage. The remaining percentage of applied water is equivalent to the irrigation return flow. Return flows can re-enter the hydrologic system as deep

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[32] The adjustments to the BCM data were conducted in conjunction with consultants who are preparing the GSPs for the CMA and WMA within the Basin. Adjustments similar to those made for the EMA were made for the CMA and WMA, based on the same data. Similar adjustments were also made for the adjacent San Antonio Groundwater Basin. Furthermore, these adjustments were verified by the numerical groundwater flow model created for the EMA.
[33] These percentages pertain to the historical period (water years 1982 through 2018).

drainage and recharge to groundwater, or as water that leaves the cropped field as surface flow tail water and discharges to a nearby stream. It is assumed that most of the irrigation return flow percolates to groundwater within the EMA. For irrigated agriculture in the EMA, an irrigation efficiency of 80 percent is assumed for all crops except vineyards, which are generally irrigated using a drip system at an efficiency of 90 percent.[34] The urban (residential and commercial) landscape irrigation efficiency is assumed to be 70 percent,[35] which results in return flow recharge to the groundwater system. These irrigation return flow proportions were estimated using a consistent method for all three management areas in the Basin. The assumed values are based on published values and information from representatives from the CMA, WMA, and the adjacent San Antonio Groundwater Basin GSAs. Irrigation return flow volumes have been calculated using the previously stated efficiencies multiplied by the calculated annual volumes of irrigation water applied to each crop type (based on land use surveys within the EMA in 1985, 1996, 2014, 2016, and 2018), assigned crop-specific water duty factors, and self-reported irrigation pumping data. These applied water volumes are discussed further in Section 3.3.2.4.

A portion of the water that ID No. 1 serves its customers is used for agricultural irrigation, which is derived in part from imported sources (SWP Table A, Exchange Agreement, and Cachuma). Water from imported and native surface water sources is commingled with other sources of water within ID No. 1's distribution system and used throughout ID No. 1's service area for agricultural, municipal, domestic, commercial, and industrial uses. As noted above, ID No. 1 also produces surface water (underflow) from the Santa Ynez River main stem pursuant to licenses issued by the SWRCB. Those waters are applied for domestic, agricultural, commercial, and institutional uses in portions of the Santa Ynez Uplands groundwater system.

For agricultural uses, ID No. 1 delivered an estimated 1,364 AFY from imported sources (SWP Table A, Exchange Agreement, and Cachuma Project) and another 620 AFY of surface water produced from river wells located within the Santa Ynez River main stem during the historical period. In total, 1,984 AFY was derived from these sources and used for irrigation in both the Santa Ynez Uplands and the Santa Ynez River Alluvium. The proportion of the return flow within the Santa Ynez Uplands was based on an analysis of irrigated acreage of agricultural areas within ID No. 1's service area and within the Santa Ynez River Alluvium (Zone A) area (Figure 2-4) (Stetson, 2021). Of this applied irrigation water derived from imported and surface water sources, a total of 317 AFY (16 percent)[36] returned to the ground; 287 AFY of which returned to the upland groundwater system, and 30 AFY of which returned to the Santa Ynez River (Zone A).

These groundwater recharge components were estimated based on published values for irrigation efficiency, which were used throughout both the entire Basin and adjacent basins. Therefore, the level of uncertainty of these data is relatively low. The variability and magnitude of this recharge component are included in the calibrated numerical groundwater flow model provided in Appendix F, using best available science and industry-standard methods.

Percolation of Treated Wastewater

There are two WWTPs in the EMA: a small treatment plant for the Chumash Casino Resort (Casino) owned by the Santa Ynez Band of Chumash Indians (Tribe) and a larger municipal treatment plant that serves the City of Solvang.

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[34] Irrigation efficiencies in vineyards have increased from 70 percent in the 1970s to 80 percent in the 1980s and to 90 percent more recently, based on Tetra Tech, 2010, and DWR, 1994, and personal conversations with local irrigators including Kevin Merrill and Kris Beal.
[35] Irrigation return flows estimated based in part on data provided in Tetra Tech, 2010 *Assessment of Groundwater Availability on the Santa Ynez Chumash Reservation* and DWR 1994, *California Water Plan Update.*
[36] Based on weighted average irrigation efficiency.

Discharge of treated wastewater from the Casino was estimated based on verbal communication with Casino WWTP operator Kevin McKennon, as well as details of plant operation specified in the *Assessment of Groundwater Availability on the Santa Ynez Chumash Reservation* report (Tetra Tech, 2010). Prior to 2003, all Casino wastewater was transmitted to the Solvang WWTP. Beginning in 2003, upon completion of the Chumash WWTP for the Casino, between 40 AFY and 120 AFY of effluent have been discharged from the Casino WWTP into Zanja de Cota Creek. This discharge subsequently flows into the Santa Ynez River underflow. There has been a trend of increasing wastewater reuse by the Casino, causing a reduction in discharge to the creek over time. The Santa Ynez Community Services District maintains the Chumash wastewater treatment and collection system.

The residences and businesses in the City of Solvang and much of the eastern portion of the town of Santa Ynez, west of Highway 154, are connected to sewer service. Wastewater flows from these properties are collected by the Santa Ynez Community Services District and are transmitted to the Solvang WWTP and subsequently discharged to the percolation ponds located adjacent to Santa Ynez River downstream of the western EMA border near the Santa Ynez River. These WWTP discharges occur within the CMA and do not contribute to the EMA water budget.

This groundwater recharge component of this flow term was estimated using a range of industry accepted values for soils in this region. The volume of flow is relatively small; therefore, uncertainties in this estimate do not appreciably affect the overall water budget.

Percolation from Septic Systems

Outside of the sewer service areas in the EMA, domestic, commercial, and institutional wastewater is discharged to on-site wastewater treatment systems (OWTSs, formerly referred to as septic tank – leach field systems). Return flows from these OWTS provide recharge to the groundwater in the Santa Ynez Uplands. The locations and distribution of these OWTS were estimated by using aerial photography to identify residences not served by a sewer system and then comparing OWTS data to data provided by Heal the Ocean (HTO, 2019). Within the EMA, the total number of OWTS in 2018 was multiplied by an estimated return flow rate of 0.11 AFY per unit (Tetra Tech, 2010). This was then scaled through time using a compilation of census data for nearby communities.

The water used within the service areas of ID No. 1 and the City of Solvang are derived in part from native and imported surface water sources (Section 3.3.2.1) and from groundwater pumped from upland wells completed in the Paso Robles Formation and Careaga Sand. Water for ID No. 1 from imported and native surface water sources is commingled with Santa Ynez Uplands groundwater within its distribution system and used throughout the ID No. 1's service area for agricultural, potable domestic, commercial, and institutional uses. On average, ID No. 1 delivered a total of 2,587 AFY for non-agricultural uses, of which 1,117 AFY of water was delivered from imported sources (SWP Table A, Exchange Agreement, and Cachuma Project), and another 539 AFY of which was from surface water sources. The remainder of 931 AFY of water was delivered from groundwater pumped from the Santa Ynez Uplands groundwater sources.

A portion of the water from these sources (60 to 65 percent on average) is used for exterior landscaping on domestic parcels and a portion (35 to 40 percent) is used for indoor use.[37] Where the indoor water use is not located within an area with sewer service, the indoor water is delivered to septic systems, the vast majority of which ultimately percolates to groundwater. Assuming a wastewater generation rate of 0.4 AFY per dwelling unit, a total 900 AFY of septic system percolation flows returned to the groundwater basin on average during the historical period.

[37] 1992 *Water Resources Management Plan* for the Santa Ynez River Water Conservation District (Stetson).

These groundwater recharge components were estimated based primarily on published values for municipal water and wastewater deliveries, estimated return flow rates, and indoor and outdoor water use proportions. The level of uncertainty of these data is considered moderate because the values are estimated from published literature and not measured; however, this component of the water budget is relatively small compared to the rest of the area and so will not have a significant effect on the GSA's ability to manage the EMA.

3.3.2.3 Surface Water Outflow Components

The data sources used for surface water outflows are described below.

Santa Ynez River Outflow

Santa Ynez River surface water outflows were quantified based on gauged flow as measured near the City of Solvang and from Zaca Creek from a gauge near the intersection of Highways 154 and 101. The location of the streamflow gauges is shown on Figure 2-13.

The Santa Ynez River is accurately gauged and, therefore, the level of uncertainty of this data is low.

Subsurface Outflow

Subsurface outflow from the Santa Ynez River is accounted for in the water budget as surface water outflows. This outflow occurs at the downstream end of the EMA along the border with the CMA. The magnitude of this flow has been calculated using Darcy's law with estimated values for hydraulic conductivity, the average hydraulic gradient, and the outflow plane cross-sectional area (based on saturated thickness estimates). This estimate was made in coordination with Stetson Engineers for the downstream CMA, which accounts for this same volume of outflow from the EMA as inflow into the CMA. Furthermore, these flow volumes have been verified by the numerical groundwater models being created separately for the CMA and EMA.

The quantity of subsurface outflow through Santa Ynez River Alluvium was estimated using industry standard methods and a calibrated surface water model prepared by Stetson Engineers. The level of uncertainty of this data is considered low.

Pumping Extractions

Pumping extractions occur from the Santa Ynez River Alluvium for municipal, domestic, industrial, and agricultural uses, including water used for urban landscape irrigation. Pumping data from this area of the EMA are provided by the City of Solvang, ID No. 1, and from SYRWCD as "self-reported" pumping data from well owners within SYRWCD. These data from ID No. 1 and the other self-reported pumping records aggregate uses together into three categories: (1) agricultural; (2) "other" water, which includes municipal, industrial, small public water systems, and domestic use; and (3) "special" irrigation water, which refers to urban landscape and golf course irrigation. These pumping volumes have been compiled on a water year basis and are reported annually on a July-through-June fiscal year basis in SYRWCD's annual reports, which have been prepared for 42 years. These data include all of the agricultural and non-agricultural groundwater pumping that occurs within the SYRWCD. ID No. 1 and the City of Solvang produce surface water from the underflow of the Santa Ynez River main stem pursuant to a pending permit (City of Solvang) and licenses (ID No. 1) issued by the SWRCB.

Pumping volumes provided by the City of Solvang and ID No. 1 are from metered pumping and are considered highly reliable. Likewise, some of the self-reported pumping data provided by SYRWCD annual reports are also from metered pumping records. These data sets have low uncertainty. A large portion of the self-reported SYRWCD pumping data outside of the municipal providers is estimated from self-reported records utilizing crop-specific water duty factors provided by SYRWCD for its water use estimates and annual reports. Pumping estimates based on self-reported records are of medium quality with moderate uncertainty, due to the uncertainty of standardized crop water duty factors and reliability of self-reporting.

Phreatophyte ET

Phreatophyte ET, also referred to as riparian ET, was calculated using the LandFire Existing Vegetation Type (EVT) spatial data set[38] to determine acreages of riparian vegetation types occurring within the Santa Ynez River Alluvium portion of the EMA between the base of Bradbury Dam, through the EMA to the shared border with the CMA near the City of Solvang. The LandFire EVT data set was constrained to the lateral extent of SYRWCD's Zone A to avoid including acreage on adjacent hillsides and riparian vegetation within the tributaries that are part of the groundwater budget, which is accounted for there as a groundwater outflow component. Because flows within the Santa Ynez River are carefully managed and subject to the conditions of the 2020 Biological Assessment (USBR, 2020), the NMFS Biological Opinion (NMFS, 2000), and SWRCB's 2019 Cachuma Project Order (SWRCB, 2019), it is assumed that the riparian acreage in the EMA did not change significantly during the historical period.

The riparian acreage determined from the LandFire EVT analysis was then multiplied by a variable riparian water duty factor (determined by the LandFire EVT), which varied based on water year type. The riparian water duty factor used in the water budget is 4.5 AF per acre per year, on average. Phreatophyte ET is a major component of surface water outflow and thought to decrease surface water flow in the tributary alluvium and reduce infiltration into the upland groundwater basin.

The acreage and water use factors used to estimate phreatophyte ET are based on authoritative sources. The acreage, however, has been collected by remote-sensing methods and has not been field-verified to confirm the presence of the indicated plants. In addition, there is considerable uncertainty associated with the phreatophyte ET, because the inputs to this water budget term are not directly measured and there is likely to be considerable variability. Therefore, the uncertainty associated with this data source is considered to be high.

3.3.2.4 Groundwater Outflow Components

The data sources used for groundwater outflows are described below.

Agricultural Irrigation Pumping

To satisfy the crop irrigation demand, groundwater is pumped and subsequently applied to the cropped land throughout the Santa Ynez Uplands portion of the EMA. The bulk of water used to irrigate crops in the EMA is sourced by pumping groundwater from the Santa Ynez Uplands. To a lesser degree, imported and native surface water is applied for agricultural irrigation purposes within the service area of ID No. 1, which overlaps and is within the boundaries of SYRWCD. Within its system, water from imported and native surface water is commingled with pumped groundwater from wells located in the Santa Ynez Uplands.

In the absence of metered pumping records, individual groundwater pumpers located within the SYRWCD boundaries area are required to report their estimated pumping volumes for each 6-month period to SYRWCD. These estimates are based on planted acreages and crop-specific water duty factors specified in SYRWCD's Groundwater Production Information and Instructions (Groundwater) pamphlet (SYRWCD, 2010).

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[38] LandFire is a shared program between the wildland fire management programs of the U.S. Department of Agriculture Forest Service and U.S. Department of the Interior, providing landscape scale geo-spatial products to support cross-boundary planning, management, and operations. More information on LandFire is available at https://landfire.gov. (Accessed September 3, 2021.)

The groundwater users specify the type of water they are using (agricultural, special [i.e., parks, schools, and golf courses], or other [i.e., M&I]). The self-reported agricultural irrigation volumes, categorized as Agricultural Water, were provided by SYRWCD for inclusion in the water budget.

Groundwater produced by ID No. 1 and the City of Solvang, which is reported to SYRWCD, is based on metered production.

For areas of the EMA outside of the SYRWCD boundaries area (the SGMA-designated “white area”[39] shown on Figure 2-4), agricultural pumping is not reported. Therefore, the agricultural irrigation pumping was estimated using periodic land use surveys provided by DWR to determine crop types and acreages and applying the crop-specific water duty factors specified in the SYRWCD Groundwater pamphlet to estimate crop water demand in the white areas. The land use surveys for the EMA were available for the periods 1985, 1996, 2014, 2016, and 2018 from DWR-provided sources. Land and water uses were also estimated based on an analysis for the area prepared by Dudek Consultants for Santa Barbara County (Dudek, 2016). As discussed below, agricultural water use was estimated for each year of the three water budget periods based on the water duties from the SYRWCD Groundwater pamphlet.

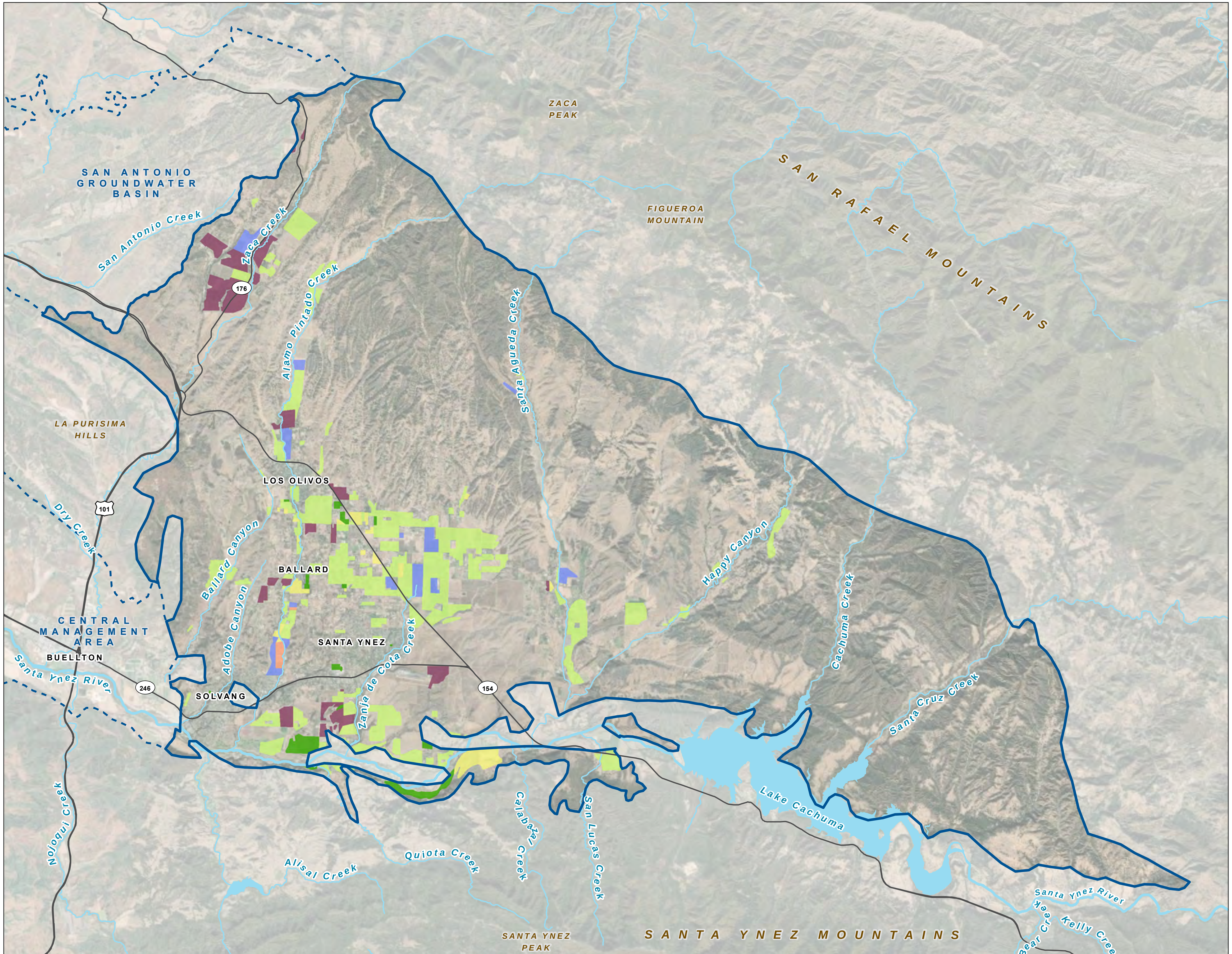
The spatial distribution of six main crop groups for the four land use survey periods between 1985 and 2018 are presented as Figure 3-46 through 3-50. The crops presented on these maps are combined into six groups: deciduous fruit and nuts; field crops; ornamentals; pasture; truck, nursery, and berry crops; and vineyards. Cannabis, a crop new to the EMA, has not been documented in any of the crop surveys. A summary of the total area of irrigated crops in the past 20 years within the Santa Ynez Uplands (outside of the SYRWCD) is presented in Table 3-19.

[39] “White areas” under SGMA are areas that are not served by a water district and that depend solely on groundwater supplies.

FIGURE 3-46

Crop Distribution 1985

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan



LEGEND

Crop Type

- Field Crops
- Pasture
- Deciduous Fruit and Nuts
- Ornamentals
- Truck, Nursery, and Berry Crops
- Vineyards

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

GSI Water Solutions, Inc.

Date: August 11, 2021
Data Sources: ESRI, USGS, Maxar 2019, DWR

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section3\Figure3-46_Crop_Dist_1985.mxd, abarry

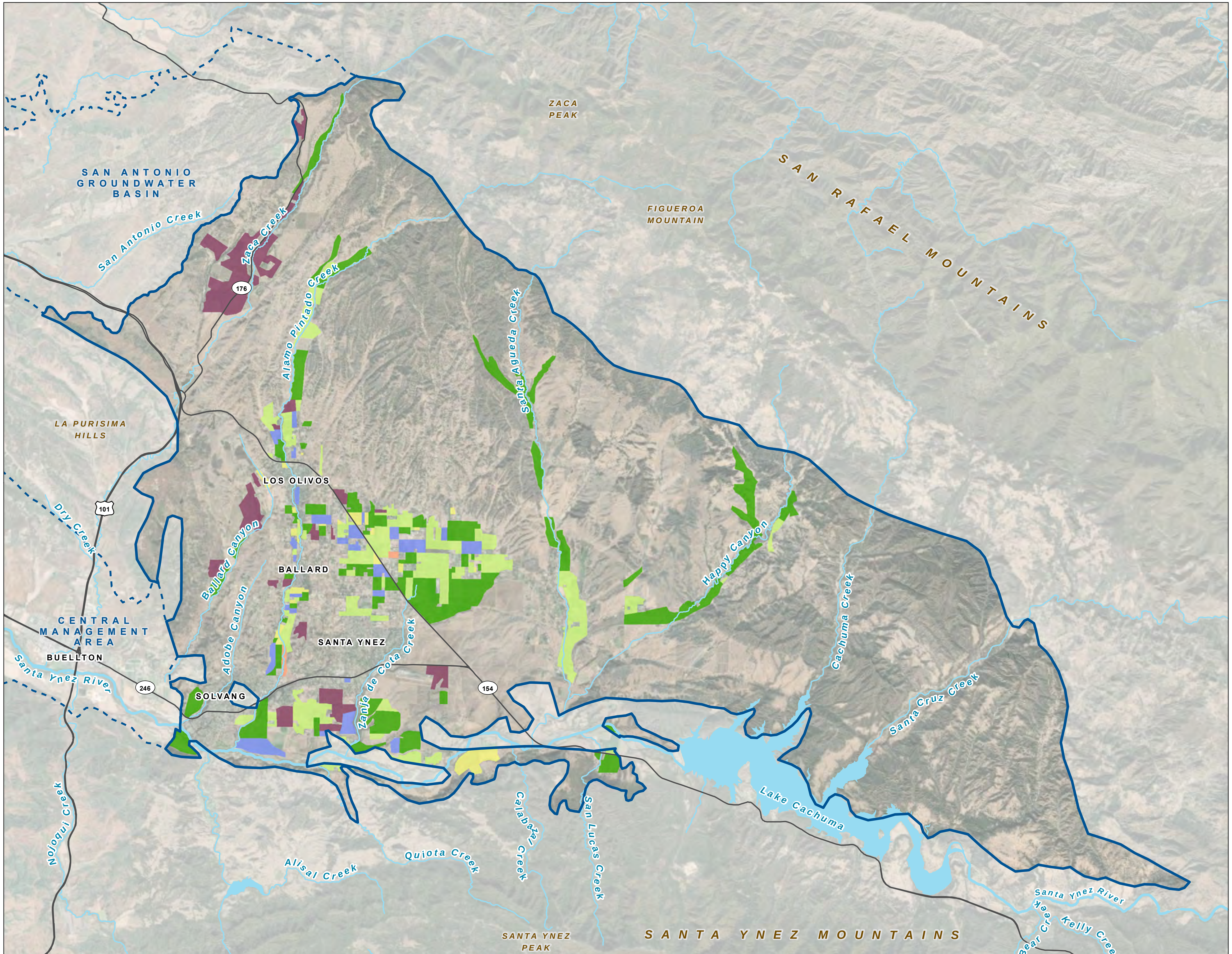


FIGURE 3-47

Crop Distribution 1996

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

Crop Type

- Field Crops
- Pasture
- Deciduous Fruit and Nuts
- Ornamentals
- Truck, Nursery, and Berry Crops
- Vineyards

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

Date: August 11, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section3\Figure3-47_Crop_Dist_1996.mxd, abarry

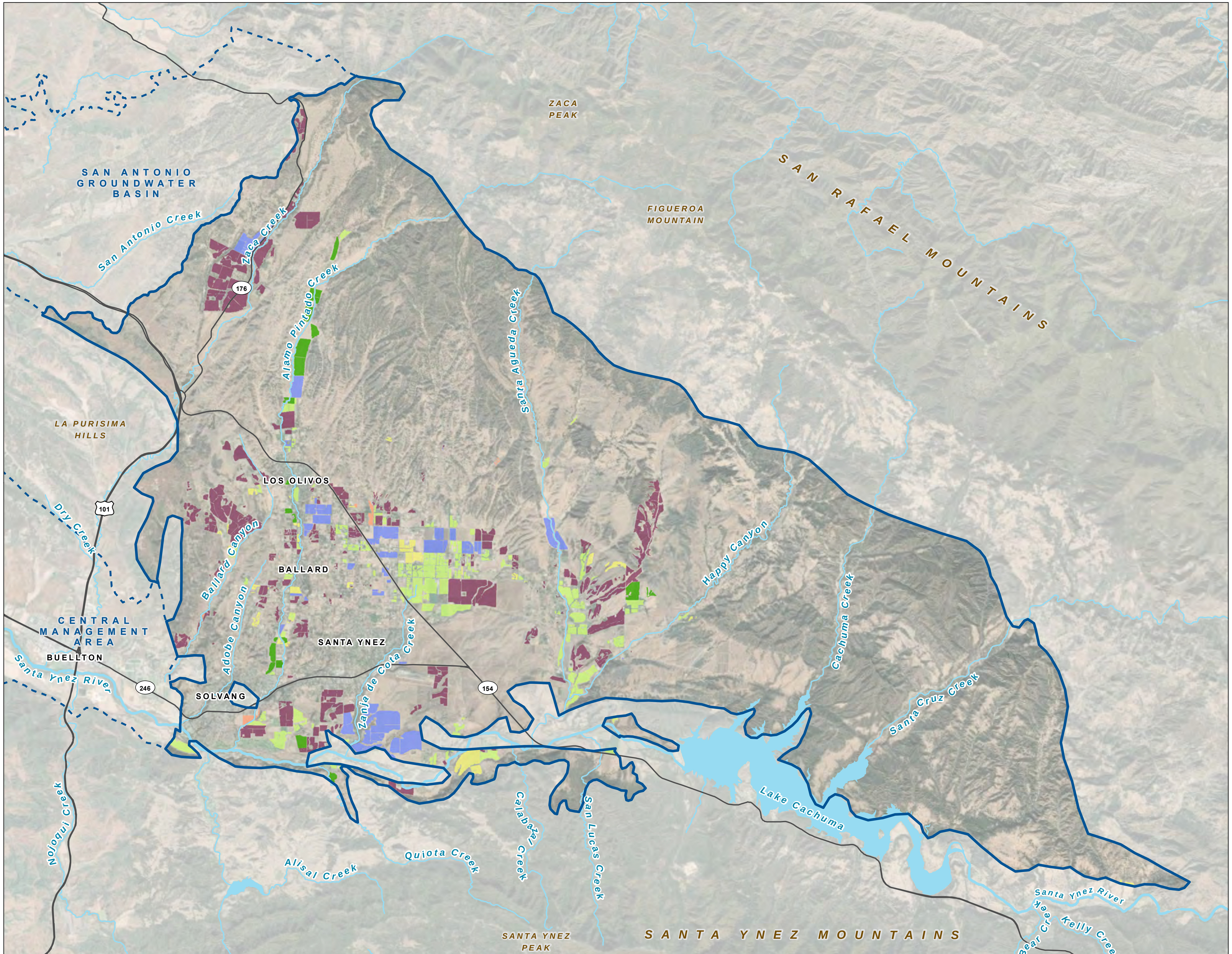


FIGURE 3-48

Crop Distribution 2014

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

Crop Type

- Field Crops
- Pasture
- Deciduous Fruit and Nuts
- Ornamentals
- Truck, Nursery, and Berry Crops
- Vineyards

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

GSI Water Solutions, Inc.

Date: August 11, 2021
Data Sources: ESRI, USGS, Maxar 2019

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section3\Figure3-48_Crop_Dist_2014.mxd, abarry

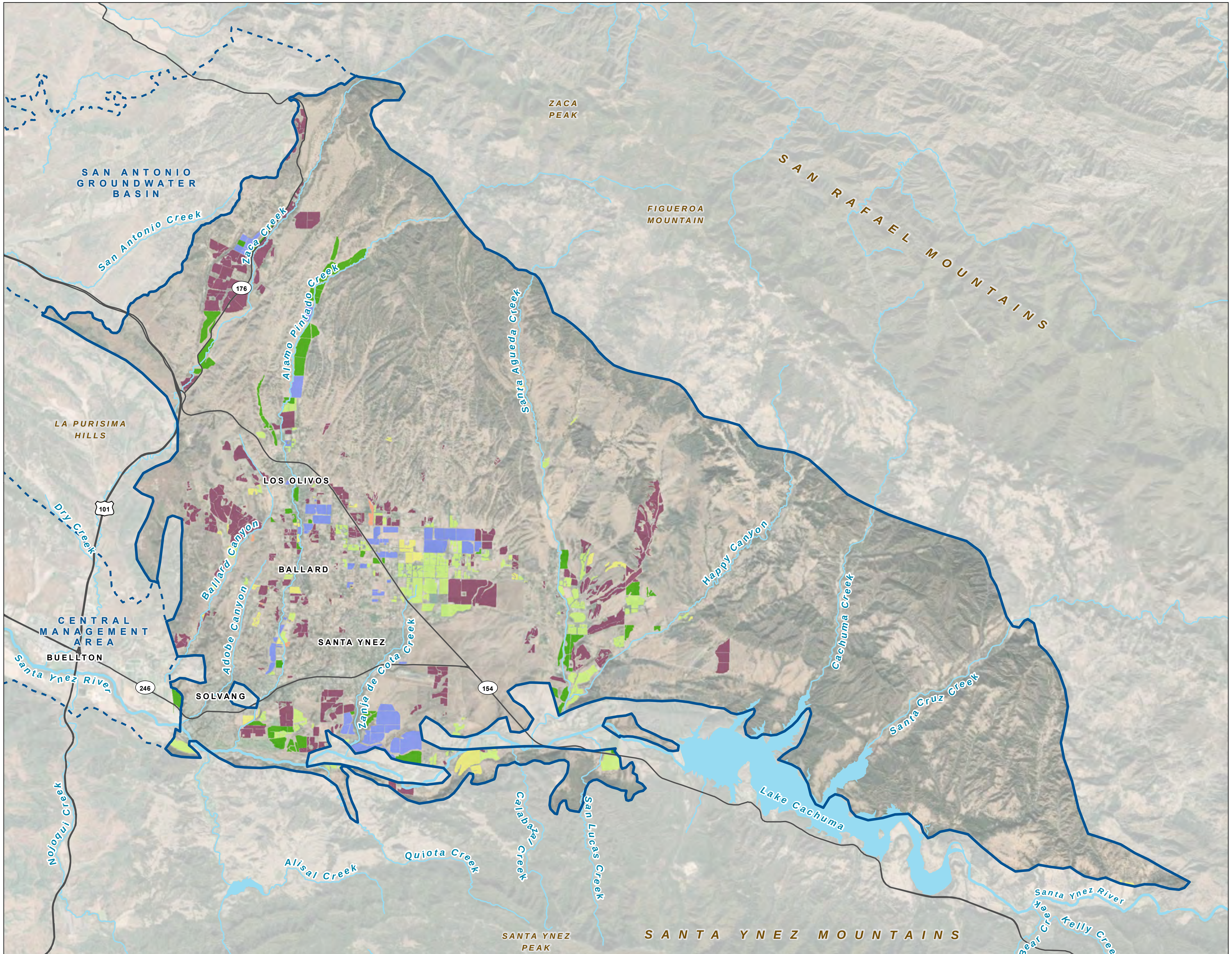


FIGURE 3-49

Crop Distribution 2016

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

Crop Type

- Field Crops
- Pasture
- Deciduous Fruit and Nuts
- Ornamentals
- Truck, Nursery, and Berry Crops
- Vineyards

All Other Features

- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

Date: August 11, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section3\Figure3-49_Crop_Dist_2016.mxd, abarry

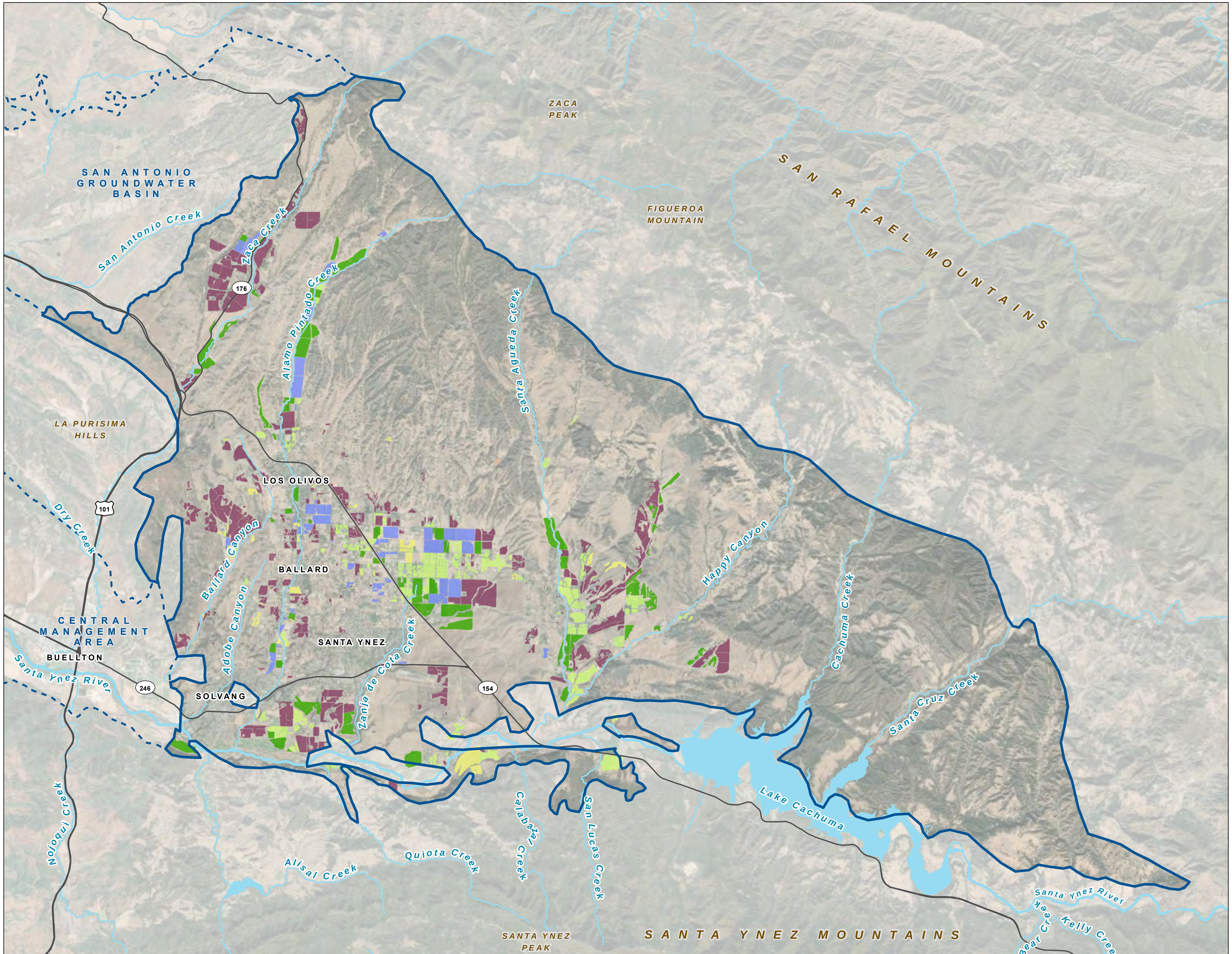


FIGURE 3-50

Crop Distribution 2018

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

LEGEND

Crop Type
- Field Crops
- Pasture
- Deciduous Fruit and Nuts
- Ornamentals
- Truck, Nursery, and Berry Crops
- Vineyards

All Other Features
- Eastern Management Area Bulletin 118 Boundary
- Other Bulletin 118 Groundwater Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

Date: August 11, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section3\Figure3-50_Crop_Dist_2018.mxd, abarry

Table 3-19. Summary of Irrigated Acres Outside of Santa Ynez River Water Conservation District

(Values in acres)

Crop Group	1996	2014	2016	2018
Deciduous Fruit and Nuts	37	93	93	74
Field Crops	267	273	812	1,090
Ornamentals	5	29	21	3
Pasture	1,350	839	858	747
Truck, Nursery, and Berry Crops	141	714	675	498
Vineyards	944	1,804	1,932	1,828
Cannabis	0	0	0	0
Total	**2,743**	**3,752**	**4,390**	**4,241**

The total irrigated area outside of the SYRWCD was 4,241 acres in 2018, the period of the most recent land use survey. In the 22 years between 1996 and 2018, a total of 1,678 acres of irrigated acres were added within the EMA area outside of the SYRWCD boundaries. As of 2018, a total of 1,828 acres of vineyards were planted. While a further discussion of the projected trends in irrigated acreages is included in the Projected Water Budget Section 3.3.5, a brief discussion of the trends in individual crops is also warranted here. The expansion of vineyard acreage has slowed considerably in recent years, compared to the rapid growth that occurred between during the late 1990s and early 2000s. Between 1996 and 2014, vineyards were growing at an average rate of approximately 3.7 percent per year; however, since 2014 this has moderated to near zero growth.

The acreages of the crop groups presented in Table 3-19 show significant variability and slight reduction in acreages in the most recent years. While deciduous fruit and nuts and ornamentals were relatively unchanged, field crops experienced a large increase in recent years, which has added an average of 28 acres per year since 1996. Meanwhile, the acreage of truck, nursery, and berry crops, as well as pastureland, have declined significantly, as shown on Figures 3-46 through 3-50. Truck, nursery, and berry crops increased from 171 acres in 1996 to 714 acres in 2014, and has since declined significantly, losing more than 50 acres per year on average. The acreage of pasture has likewise declined, by approximately 23 acres per year on average since 2014 (Figure 3-48).

The land use surveys provide estimates of irrigated crop acreages, crop evapotranspiration (ETc), evapotranspiration of applied water (ETAW), effective precipitation (EP), and applied water (AW) for 20 crop categories each year that the survey was performed. These values are estimated from reference evapotranspiration (ETo) or pan evaporation (Ep) data, crop development over time (crop coefficients), soil characteristics, rooting depths, and the quantity and timing of precipitation. ETAW estimates include adjustments for irrigation efficiencies as well as the amount of water required for specific agricultural practices, such as the ponding of water in rice fields or extra water applied to leach-accumulated salts from the soil. Spatial-temporal interpolations were made between the land use surveys for the intervening years and water duty factors from the SYRWCD Groundwater pamphlet. The 2014, 2016, and 2018 land use data, prepared by Land IQ and provided to DWR, are the most recent data sets pertaining to the historical and current water budget time periods. For these recent years, the data represent a statewide, comprehensive, field-scale assessment of agricultural land use, as well as urban and managed wetland boundaries. The data were delineated from imagery provided by the National Agriculture Imagery Program.[40] The data are derived from a combination of remote sensing, agronomic analysis, and ground verification. The data set provides information for resource planning and assessments across multiple agencies throughout the state and serves as a consistent base layer for a broad array of potential users and multiple end uses.

While the accuracy of the land use mapping of irrigated crops for the recent years is high, uncertainty remains in the estimates of water use from these irrigated lands and hence the assumed amount of pumping needed to meet the crop water requirement. The volume of groundwater pumping needed to satisfy these agricultural crop water demands are presented below.

Municipal and Other Reported Pumping

Groundwater pumping in the Santa Ynez Uplands serves municipal, domestic, industrial, and agricultural uses, including urban landscape irrigation. Pumping data were provided by the City of Solvang, ID No. 1, and the SYRWCD (as self-reported pumping data). The City of Solvang provides water only for municipal and potable uses. The SYRWCD summarizes pumping within its boundaries into three categories including "other" water, which includes municipal, industrial, small public water systems, and domestic use. These pumping volumes have been compiled on a water-year basis from data reported annually on a fiscal year basis (July 1 through June 30),[41] in SYRWCD's annual reports, which have been prepared for 42 years. These data include all the agricultural and non-agricultural (other and special) groundwater pumping that occurs within the SYRWCD. Pumping from all of Zone E (Santa Ynez Uplands) and the portion of Zone C (Other Areas) that are within the EMA are derived from the two principal aquifers: the Paso Robles Formation and the Careaga Sand.

Pumping volumes from the City of Solvang and ID No. 1 are from metered pumping and are considered highly reliable. Likewise, some of the self-reported pumping data provided by SYRWCD annual reports to estimate this use are also from metered pumping records. A large portion of the self-reported SYRWCD pumping data outside of the municipal providers is estimated from self-reported acreage of irrigated crops multiplied by SYRWCD-provided water use factors. The data derived from the metered pumpers are considered to be of very high quality with a low level of uncertainty. However, the water use estimates based on self-reported acreages for irrigated crops is of medium quality with moderate uncertainty due to the uncertainty of standardized crop water duty factors and reliability of self-reporting. In addition, there is uncertainty about whether the crop water duty factors should be adjusted downward during periods of above-normal rainfall.

Rural Domestic Pumping (Outside of SYRWCD)

Rural domestic pumping is considered to be all non-agricultural pumping that occurs outside of SYRWCD's jurisdiction that is not associated with a small public water system. This area includes all of the rural areas of the EMA that are not served by a water district or mutual water company and are solely reliant on groundwater supplies. These areas constitute unincorporated lands outside of the SYRWCD, ID No. 1, and the City of Solvang boundaries, where all groundwater pumping is considered rural domestic. This area (Figure 2-4) is not within the boundaries of any water agency and therefore falls under the jurisdiction of Santa Barbara County (Stetson, 2021). Rural domestic pumping was estimated based on a review of the potential rural domestic parcels outside of SYRWCD from 2018 satellite imagery and parcel data provided by the County of Santa Barbara.[42] The domestic water demand for each of these land parcels was estimated

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[40] Data are available at https://www.fsa.usda.gov/programs-and-services/aerial-photography/imagery-programs/naip-imagery/. (Accessed February 15, 2021.)
[41] As defined by the Water Code Section 75507 (a).
[42] Data are available at https://countyofsb.org/mapping.sbc. (Accessed March 12, 2021.)

using variable demand factors based on parcel acreage, as estimated by Tetra Tech (Tetra Tech, 2010) (see Table 3-20). The calculated 2018 rural domestic demand was then scaled through time for other years included in the water budget using a compilation of census data for nearby communities.

Table 3-20. Rural Domestic Demand Factors Based on Lot Size

Lot Size (Acres)	Annual Water Use (AFY per lot)
0.16	0.14
0.5	0.52
1	0.82
5	0.98
10	1.15

Note

Source: Tetra Tech (2010)

While the accuracy of the rural domestic pumping is roughly estimated, the overall magnitude of this pumping is small. Therefore, the relatively moderate uncertainty does not adversely affect the GSA's ability to sustainably manage the groundwater resource.

Small Public Water Systems Pumping (Outside of SYRWCD)

Reported pumping data was compiled from California Drinking Water Information Clearinghouse[43] for a limited number of years for most of the small public water systems within the EMA but outside of SYRWCD (listed in Table 3-21. Small public water systems production volumes reported for 2018 were scaled through time using a compilation of census data for nearby communities. While additional small water systems in the EMA have been identified, the systems listed in Table 3-21 are those for which production data were available.

Table 3-21. Small Public Water Systems Outside of SYRWCD

Small Public Water System Name
Midland School Corporation
Oak Trail Estates Mutual Water Company
Oak Trail Ranch Mutual Water Company
Rancho Ynecita Mutual Water Company
Santa Ynez Rancho Estates Mutual Water Company
Woodstock Property Owners Association
Cachuma Village
Bridlewood Winery
San Lorenzo Seminary

[43] Available at https://drinc.ca.gov/drinc/. (Accessed February 15, 2021.)

Small public water system pumping is roughly estimated. Because the overall magnitude of this pumping is small, the relatively moderate uncertainty does not adversely affect the GSA's ability to sustainably manage the groundwater resource.

Phreatophyte ET

Phreatophyte ET outflow from the underlying groundwater within the Santa Ynez Uplands was calculated using the LandFire EVT spatial data set to determine acreages of riparian vegetation types occurring within the EMA. The LandFire EVT data set was constrained to the extent of the tributary (younger) alluvium located outside of the main stem of the Santa Ynez River. It is assumed that the riparian acreage in the EMA has not changed significantly and therefore was kept constant for the historical period. The riparian acreage determined from the LandFire EVT analysis was multiplied by a variable riparian water duty factor determined by the LandFire EVT, which varied based on water year type. The riparian water duty factor used in the water budget is 4.5 AF per acre per year, on average. Phreatophyte ET is a major component of outflow from the Santa Ynez Uplands and is thought to decrease infiltration and reduce groundwater recharge. This value of ET from phreatophytes is separate from the ET derived from BCM data, which, in this analysis, have been assigned mutually exclusive areal extents. Additional details regarding the use of LandFire EVT and BCM to estimate phreatophyte and natural vegetation ET are presented in documentation for the numerical groundwater flow model (refer to Appendix F).

The acreage and water use factors utilized to estimate phreatophyte extractions are based on authoritative sources. The acreage, however, has been collected by remote-sensing methods and has not been field-verified to confirm the presence of the indicated plants. In addition, there is considerable uncertainty associated with phreatophyte ET because the inputs for this term are not directly measured and there is likely to be considerable variability. Therefore, the uncertainty associated with this data source is considered to be high.

Subsurface Groundwater Outflow

A relatively small volume of subsurface groundwater outflow occurs to the west through the shallow alluvial canyons along Ballard Canyon, near the Purisima Hill and through the alluvium of Zaca Creek. For the annual water budget, the magnitude of this flow has been calculated using Darcy's law with estimated values for hydraulic conductivity, the average hydraulic gradient, and the outflow plane cross-sectional area (based on saturated thickness estimates). This estimate was made in coordination with Stetson Engineers for the downstream CMA. Ultimately, these values have been verified by the numerical groundwater model.

Limited groundwater level data and numerical modeling results indicate that neither subsurface inflow nor outflow occurs along the shared boundary with the San Antonio Groundwater Basin on the northwest boundary of the EMA. The USGS is developing a groundwater flow model for the San Antonio Groundwater Basin and has characterized this boundary as a no-flow boundary. This boundary has also been investigated by Santa Barbara County using aerial electromagnetic geophysical methods (SkyTEM); however, the results of this work are discussed in Section 3.1.4.2.

The quantity of subsurface outflow through shallow alluvial canyons was estimated using industry standard methods and terms associated with the calibrated surface water model prepared by Stetson Engineers. The level of uncertainty of this water budget term is considered low and is not considered a substantial part of the water budget that affects management of the EMA.

3.3.3 Historical Water Budget (Water Years 1982 through 2018)

§ 354.18 Water Budget.

(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.

The SGMA regulations require that a historical water budget be based on at least the most recent 10 years of data. The period for water years 1982 through 2018 was selected as the historical water budget period because it is long enough to capture typical climate variations (with two wet and two dry hydrologic cycles) and includes recent changes in imported water supply availability, changes to water demand associated with cropping patterns, and associated land use.

Estimates and assumptions of the surface water and groundwater inflows and outflows and changes in total water and groundwater in storage for the historical period are provided below.

3.3.3.1 Surface Water Inflows

Local Surface Water Inflow

Local surface water inflows include (1) surface water flows that enter the EMA from precipitation runoff within the watershed and (2) Santa Ynez River inflow to the EMA, regulated by SWRCB as release outflows from Lake Cachuma. Also included in the local surface water inflow totals is water delivered from the Cachuma Project directly to ID No. 1 via pipeline prior to 1997. Prior to 1997, ID No. 1 received an average of 2,200 AFY from the Cachuma Project. As noted in the next section, Cachuma Project deliveries to ID No. 1 after 1997 are derived from imported SWP supplies under the Exchange Agreement. The Cachuma Project deliveries after 1997 are of volumes similar to those prior to 1997 (2,500 AFY).

The estimated average annual total inflow from these sources, including surface flows, over the historical period is about 93,000 AFY. The largest component of this average inflow is due to releases from Bradbury Dam and subsequent flow in the Santa Ynez River. The surface water flow into the EMA during this historical period averaged 60,800 AFY as measured from Bradbury Dam outflow. This outflow into the Santa Ynez

River below the dam is a combination of volumes released through the Bradbury Dam outlet works, the Hilton Creek Watering System, and occasional releases over the dam spillway. A more complete discussion of the outflow from Bradbury Dam is presented in Section 3.1.1.3.

The annual average, minimum, and maximum volumes of local surface water sources (native and imported) during the historical period of 1982 through 2018 are presented in Table 3-22. The large difference between the minimum and maximum inflows reflects the climatic variability and the difference between dry and wet years in the EMA and contributing watershed.

Imported Surface Water from State Water Project

As described in Section 3.3.3.1, imported surface water through the SWP became available after completion of the Coastal Branch pipeline in 1997. As a member agency of the CCWA, ID No. 1 has an annual contractual SWP Table A allocation of 2,000 AFY and a drought buffer of 200 AFY. Of this total, 1,500 AFY are contractually committed for use by the City of Solvang. The annual amount of SWP Table A supplies available to ID No. 1 (and the City of Solvang) depends on the yearly SWP allocation issued by DWR.

Separate from the SWP Table A supplies utilized by ID No. 1 and the City of Solvang, additional SWP supplies are used by ID No. 1 pursuant to the Exchange Agreement between ID No. 1 and the South Coast Cachuma Project Member Units (SYRWCD and SYRWCD ID No. 1, 1993). Prior to the SWP coming online, ID No. 1 received its Cachuma Project supplies by direct delivery via the Santa Ynez Valley pipeline. Between 1982 and 1997, this averaged 2,223 AFY.

Since completion of the SWP Coastal Branch in 1997, ID No. 1 has been receiving its Cachuma Project supplies in accordance with the Exchange Agreement, whereby the South Coast Cachuma Member Units take ID No. 1’s portion of Cachuma Project water and ID No. 1 takes an equivalent amount of SWP water at the ID No. 1 turnout. Under a full allocation of Cachuma Project supplies, ID No. 1’s 10.31 percent share is 2,651 AFY. Based on Cachuma Project allocations during the 1998 through 2018 period, approximately 2,100 AFY on average has been delivered to ID No. 1 in the form of exchanged SWP deliveries.

Imported surface water from the SWP has been utilized at times as supplemental water supply, in lieu of groundwater pumping, for domestic and agricultural purposes. The annual average, minimum, and maximum volumes of imported SWP water during the historical period are presented in Table 3-22. The imported water supply provides approximately 4.6 percent of the total volume of surface water that enters the EMA. Native inflow from tributaries from the Santa Ynez Uplands and the Santa Ynez Mountains contributes 29 percent of the total surface water inflow.

Table 3-22. Annual Surface Water Inflow, Historical Period (1982 through 2018)

(Values in acre-feet per year)

Surface Water Inflow Component	Average	Minimum[1]	Maximum[1]
Santa Ynez River Inflow	61,600	3,100	397,600
Santa Ynez River Tributary Inflow[2]	27,000	1,000	147,800
Mountain Front Recharge	4,200	0	10,200
Precipitation Recharge	200	0	800
Septic Return Flow	10	10	10
Agriculture Irrigation Return Flows	70	40	110
Cachuma Project (Imported)[3]	960	0	5,050
SWP Exchange Agreement (Imported)[3]	1,230	0	3,240
SWP Table A (Imported)[4]	720	0	1,350
Local	**93,070**	—	—
Imported	**2,910**	—	—
Total	**95,980**	—	—

Notes

[1] Minimum and maximum values are not totaled because the values for each component may have occurred in different years.

[2] Tributaries include Hilton, San Lucas, Calabazal, Alisal, Santa Agueda, Zanja de Cota, Alamo Pintado, and Zaca Creeks. Tributary inflow from Cachuma and Santa Cruz Creeks are accounted after they enter Lake Cachuma, enter the Santa Ynez River and enter the Santa Ynez River area portion of the EMA as surface and subsurface flow.

[3] Since 1998, ID No. 1 exchanged its Cachuma Project entitlement supplies for an equivalent amount of SWP water that is delivered to the ID No. 1 turnout, referred to as "SWP Exchange" water.
Cachuma Project average 1982 to 1997: 2,223 AFY.
Exchange Agreement average 1998 to 2018: 2,165 AFY.

[4] SWP Table A includes 426 AFY Table A water for the City of Solvang and 291 AFY Table A water for ID No. 1.

SWP = State Water Project

3.3.3.2 Surface Water Outflows

The estimated annual average total historical surface water outflow from the EMA (as aboveground and belowground flow) in the Santa Ynez River is summarized in Table 3-23.

Table 3-23. Annual Surface Water Outflow, Historical Period (1982 through 2018)

(Values in acre-feet per year)

Surface Water Outflow Component	Average	Minimum[1]	Maximum[1]
Santa Ynez River Outflow (including Zaca Creek)	85,700	600	655,500
Pumping (River Wells)	5,000	1,900	9,000
Subsurface Outflow	1,800	1,800	1,800
Phreatophyte ET	4,100	4,000	4,300
Total	**96,600**	—	—

Note

[1] Minimum and maximum values are not totaled because the values for each component may have occurred in different years.

ET = evapotranspiration

Note that imported water from SWP Table A, Exchange Agreement, and the Cachuma Project sources are included as an inflow component in the water budgets. The outflow of this water, along with the commingled water from Santa Ynez Uplands groundwater sources includes consumptive use, percolation as irrigation return flow and urban irrigation return flow (which includes system leakage) and septic system return flow. The remainder of this water flows to the municipal treatment plant, which serves the City of Solvang, where it is percolated back into the Santa Ynez River Alluvium downstream and outside of the EMA. Subsurface outflow through the Santa Ynez River Alluvium has been calculated using Darcy's law with estimated values for hydraulic conductivity, average hydraulic gradient, and outflow plane cross-sectional area near the downstream shared border with the CMA (based on relatively steady saturated thickness estimates). This estimate was made in coordination with Stetson Engineers for the downstream CMA, where this same volume of outflow is accounted for as inflow to the CMA. Furthermore, these flow volumes have been verified by the numerical groundwater models being created separately for the CMA and EMA.

Components of surface water outflow vary less than inflow components. Whereas the variability of inflow is large, the extraction by phreatophytes is continual during most climatic conditions and subsurface outflow is very steady due to a stable subsurface hydraulic gradient at the western end of the Santa Ynez River Alluvium.

The estimated average annual total outflow from these surface water sources for the historical period is approximately 96,600 AFY. The largest component of this outflow is gauged surface flow within the Santa Ynez River near the City of Solvang and flow through Zaca Creek near the intersection of Highways 101 and 154, which together total 89 percent of the total surface water outflow. The remainder of the surface water outflow, or 11 percent of the total, leaves the EMA through the Santa Ynez River Alluvium either as subsurface outflow near the City of Solvang; pumping by the City of Solvang, ID No. 1 and other users; or phreatophyte ET. The large difference between the minimum and maximum outflows reflects the difference between dry and wet years in the EMA and contributing watershed.

3.3.3.3 Groundwater Inflows and Outflows

During the historical period from water year 1982 through water year 2018, groundwater from both of the two principal aquifers (the Paso Robles Formation and the Careaga Sand) supplied a vast majority of the water used in the EMA. This section presents a summary of estimated groundwater inflows, groundwater outflows, and a change of groundwater in storage under historical conditions.

3.3.3.4 Groundwater Inflow

Groundwater inflow components include deep percolation of direct precipitation, stream percolation, subsurface groundwater inflow (including mountain front recharge), agricultural irrigation return flow, domestic/urban irrigation return flow, domestic/urban septic return flow, and percolation of treated wastewater. The annual groundwater inflows during the historical period are summarized in Table 3-24.

Table 3-24. Groundwater Inflow, Historical Period (1982 through 2018)

(Values in acre-feet per year)

Groundwater Inflow Component	Average	Minimum[1]	Maximum[1]
Deep Percolation of Direct Precipitation	11,300	100	25,500
Tributary Percolation	700	300	1,600
Subsurface Groundwater Inflow[2]	3,100	0	7,200
Agricultural Irrigation Return Flow	2,600	2,100	3,400
Domestic/Urban Irrigation Return Flow	130	10	260
Septic Return Flow	900	700	1,100
Wastewater Effluent Percolation	40	0	120
Total	**18,770**	—	—

Notes

[1] Minimum and maximum values are not totaled because the values for each component may have occurred in different years.

[2] Subsurface inflow includes mountain front recharge.

During the historical period, an average of 18,770 AFY of groundwater inflow occurred. During this time, the groundwater inflow ranged from 4,060 to 53,200 AFY. This large variation was due primarily to variations in precipitation over the historical period. The largest groundwater inflow component was percolation of direct precipitation, which accounts for approximately 60 percent of the total annual average inflow.

3.3.3.5 Groundwater Outflows

Groundwater outflow components include groundwater pumping from all water use sectors, subsurface groundwater outflow to tributaries and the adjacent management area, and phreatophyte ET. Groundwater discharges to surface water are included as discharges that ultimately flow to surface water in the Santa Ynez River. This volume was estimated using the EMA numerical groundwater flow model in consultation with consultants in the adjacent management areas. Details about the numerical modeling are presented in Appendix F. The estimated annual groundwater outflows for the historical period are summarized in Table 3-25.

Table 3-25. Annual Groundwater Outflow, Historical Period (1982 through 2018)

(Values in acre-feet per year)

Groundwater Outflow Component	Average	Minimum[1]	Maximum[1]
Total Groundwater Pumping	14,700	13,280	16,680
Subsurface Groundwater Outflow	2,800	100	17,600
Phreatophyte ET	3,100	3,000	3,200
Total	**20,600**	—	—

Notes

[1] Minimum and maximum values are not totaled because the values for each component may have occurred in different years.

ET = evapotranspiration

Components of groundwater outflow vary much less than the components of inflow. The variability of inflow is large, such as percolation of precipitation that can vary by two orders of magnitude (100x) in response to widely varying climatic conditions. Outflow components associated with beneficial uses (including pumping, plant uptake, or subsurface outflow) vary by a single order of magnitude. Groundwater pumping is relatively steady as shown in Table 3-26 based on the available data and methodology used for this estimate. Extraction by phreatophytes is similarly continual and relatively steady.

Table 3-26. Annual Groundwater Pumping by Water Use Sector, Historical Period (1982 through 2018)

(Values in acre-feet per year)

Water Use Sector	Average	Minimum[1]	Maximum[1]
Agricultural[2]	11,700	10,600	13,100
Municipal/Reported Domestic[3]	1,950	800	3,920
Rural Domestic[4]	300	200	300
Small Public Water Systems[4]	820	650	950
Total	**14,770**	—	—

Notes

[1] Minimum and maximum values are not totaled because the values for each component may have occurred in different years.

[2] Includes all metered and estimated agricultural irrigation pumping, both inside and outside of the SYRWCD.

[3] Includes all metered and self-reported domestic pumping that occurs within the SYRWCD.

[4] Includes only pumping that occurs outside of the SYRWCD.

SYRWCD = Santa Ynez River Water Conservation District

The estimated annual groundwater pumping by water use sector for the historical period is summarized in Table 3-26. Of all pumping, agricultural production was the largest component, followed by municipal production, accounting for about 79 percent and 13 percent, respectively, of total pumping over the historical period. Agricultural pumping fluctuated over time, but only slightly increased overall during the historical period. Municipal pumping that occurs within the SYRWCD area generally increased through 1997 when imported SWP water became available; the rate of pumping has since remained approximately constant. Rural domestic and small water system pumping occurring outside of the SYRWCD account for 2 percent and 6 percent, respectively, of total pumping during the historical period.

3.3.3.6 Changes of Groundwater in Storage

Annual variations in the volumes of groundwater in storage were calculated for each year of the historical period. The changes of groundwater storage for the 37-year period were used to (1) evaluate conditions of water supply in storage, surplus, and/or deficiency and (2) identify long-term lowering of groundwater levels and associated depletion of storage.

A summary of the average inflows and outflows associated with each component of the water budget within the EMA for the historical period are presented graphically on Figure 3-51. The average inflow of approximately 18,770 AFY is less than the average total outflow of 20,600 AFY. This indicates that, on average, there has been a reduction of groundwater in storage with an average groundwater in storage deficit (also referred to as overdraft occurring over multiple years) of 1,830 AFY over the historical period of 1982 through 2018.

Average inflow and outflow components of the water budget are presented for each year of the historical period on Figure 3-52. Inflow components are shown above the zero line and outflow components are shown below the zero line. The figure also presents the cumulative change of groundwater in storage during each year and the overall historical period. Note that this section refers to changes of groundwater in storage, which not the same as “dewatered storage.” Increases of groundwater in storage indicate that more water is present in the ground, while increases in “dewatered storage” (used outside of the SGMA context) refers to a decrease of water present in the ground. The data are also presented in Table 3-27. In addition, references to a deficit of groundwater in storage is equivalent to overdraft if this consistently occurs over many years.

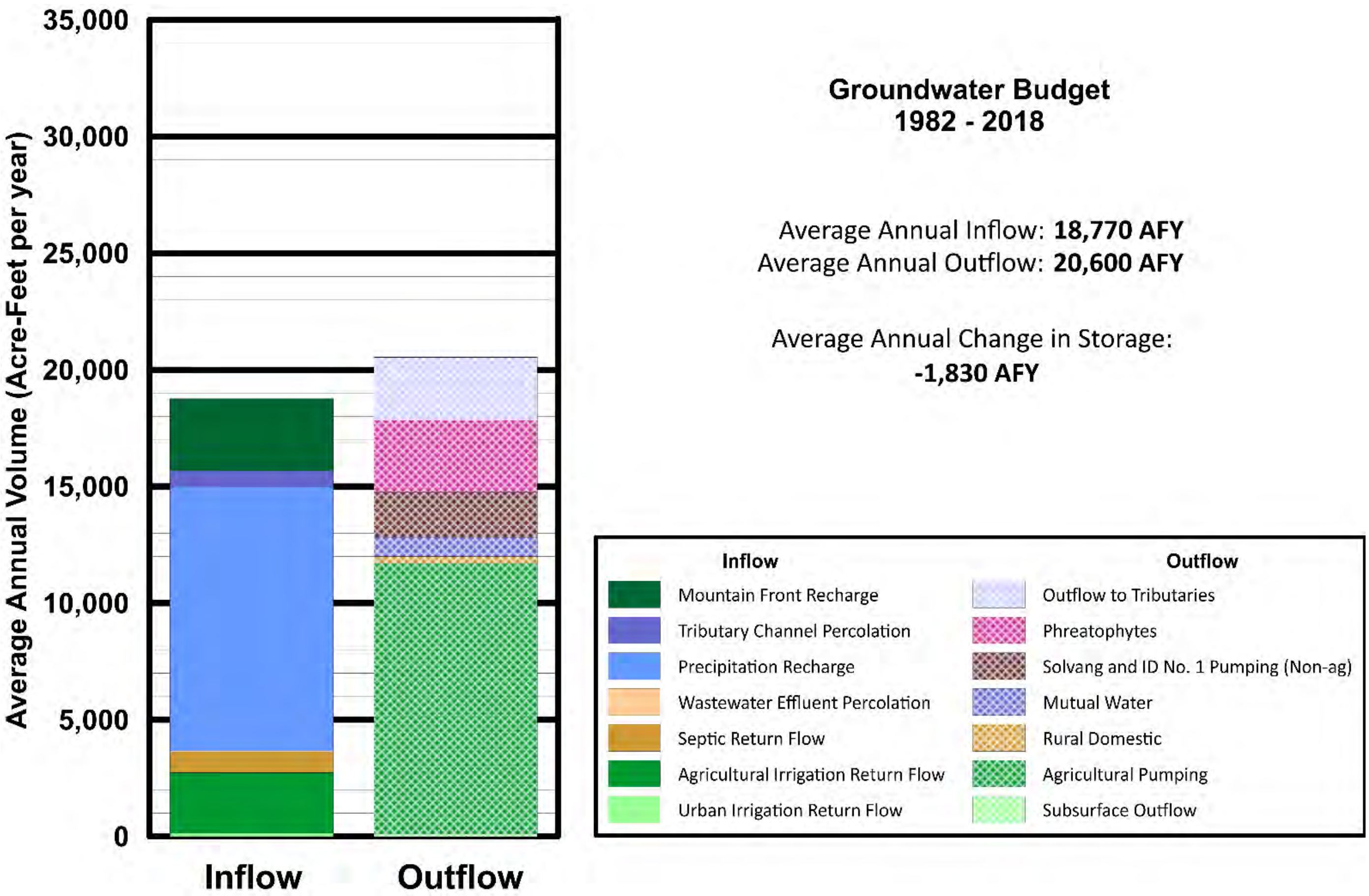


Figure 3-51. Average Groundwater Budget Volumes, Historical Period (1982 through 2018)

Table 3-27. Santa Ynez River Groundwater Basin Eastern Management Area Historical and Current Water Budget Summaries

Values in acre-feet

Water Budget	Water Year	Rainfall		Surface Water Inflow							Groundwater Inflow							Total Inflow
		Inches	% of Average	Santa Ynez River Inflow	Tributary Inflow	Mountain Front Recharge (River)	Precipitation Recharge	Ag Irrigation Return Flows	Imported	Septic Return Flows	Mountain Front Recharge	Tributary Percolation	Precipitation Recharge	Chumash WWTP Effluent	Septic Return Flows	Ag Irrigation Return Flows	Urban Irrigation Return Flows	
Historical	1982	15	92%	4,000	11,100	4,000	100	90	3,000	10	3,300	600	6,600	0	700	3,000	60	36,560
	1983	35	219%	366,200	147,800	8,700	800	70	1,500	10	7,000	700	41,900	0	700	2,800	60	578,240
	1984	7	46%	20,100	3,800	3,900	100	110	5,100	10	1,900	1,600	7,200	0	700	3,400	50	47,970
	1985	11	68%	5,400	2,100	400	0	90	2,700	10	700	300	1,400	0	800	3,200	20	17,120
	1986	17	106%	8,100	21,200	5,700	200	90	2,700	10	4,900	500	10,500	0	800	3,200	30	57,930
	1987	9	56%	4,200	1,700	500	0	100	3,800	10	700	800	2,500	0	800	3,300	40	18,450
	1988	17	105%	4,900	9,700	3,500	200	90	2,800	10	3,800	400	9,800	0	800	3,200	30	39,230
	1989	7	46%	6,700	1,300	500	0	80	2,800	10	400	800	1,200	0	900	2,900	50	17,640
	1990	6	40%	4,800	1,000	0	0	70	800	10	100	300	100	0	900	2,700	40	10,820
	1991	17	105%	5,600	21,000	3,200	100	90	1,700	10	3,100	300	5,500	0	900	3,000	30	44,530
	1992	25	155%	14,800	42,200	6,700	300	80	900	10	6,200	800	14,800	0	900	2,800	40	90,530
	1993	28	174%	284,000	74,400	8,800	500	70	2,000	10	7,200	1,100	27,200	0	900	2,700	10	408,890
	1994	14	84%	9,600	5,200	2,500	100	60	1,800	10	1,700	1,200	6,000	0	900	2,400	10	31,480
	1995	30	187%	360,200	117,200	9,500	500	50	100	10	4,500	600	26,700	0	900	2,300	10	522,570
	1996	12	76%	11,800	5,700	3,500	100	70	2,100	10	1,900	1,300	6,800	0	900	2,500	10	36,690
	1997	12	73%	15,700	13,000	5,800	200	60	2,000	10	5,600	500	11,200	0	900	2,400	10	57,380
	1998	36	226%	397,600	144,000	10,200	700	50	3,500	10	5,900	500	33,500	0	900	2,500	30	599,390
	1999	12	76%	3,100	7,100	3,300	200	70	4,000	10	2,200	1,600	8,700	0	900	2,800	120	34,100
	2000	15	95%	12,900	16,500	7,800	300	70	3,200	10	4,200	500	14,100	0	1,000	3,000	260	63,840
	2001	26	159%	117,900	59,900	8,400	500	70	2,700	10	6,300	700	25,800	0	1,000	2,900	240	226,420
	2002	8	49%	13,700	1,700	100	0	60	2,600	10	200	1,100	1,400	0	1,000	2,600	250	24,720
	2003	17	103%	4,700	14,100	6,900	300	70	5,000	20	4,600	300	12,700	120	1,000	2,700	260	52,770
	2004	10	64%	16,300	5,100	3,000	100	60	3,600	20	1,800	700	6,200	120	1,000	2,500	240	40,740
	2005	35	219%	266,500	108,900	9,600	700	50	4,600	20	6,900	500	34,900	120	1,000	2,400	240	436,430
	2006	18	109%	71,200	20,600	7,900	300	60	4,600	20	5,200	1,600	15,900	120	1,000	2,400	180	131,080
	2007	7	42%	14,300	1,000	0	0	60	4,300	20	0	800	800	120	1,000	2,400	200	25,000
	2008	16	98%	33,300	20,800	6,600	300	60	4,200	20	5,600	300	13,600	120	1,000	2,400	240	88,540
	2009	13	82%	8,700	4,300	900	100	50	3,100	20	1,200	700	3,400	120	1,000	2,300	260	26,150
	2010	21	132%	14,400	19,400	6,200	300	40	4,200	20	4,300	600	12,800	120	1,000	2,100	240	65,720
	2011	26	164%	93,700	54,100	8,900	600	40	5,000	20	7,000	900	30,000	110	1,000	2,100	170	203,640
	2012	12	74%	6,900	4,200	700	100	60	4,400	20	800	1,200	2,700	40	1,000	2,300	190	24,610
	2013	7	42%	16,600	1,600	600	0	60	3,500	20	400	500	700	40	1,000	2,400	210	27,630
	2014	8	49%	10,200	1,200	0	0	60	2,100	20	0	300	100	40	1,100	2,300	220	17,640
	2015	8	50%	14,800	1,800	100	0	70	2,100	20	100	400	100	40	1,100	2,600	170	23,400
	2016	10	62%	13,500	2,500	400	0	50	400	20	300	400	200	40	1,100	2,300	160	21,370
	2017	21	128%	10,100	28,300	5,700	300	60	3,000	20	5,900	400	14,200	40	1,100	2,500	170	71,790
	2018	8	49%	14,200	2,700	600	200	50	1,800	20	500	900	8,200	40	1,100	2,300	200	32,810
	Minimum	6.5	40%	3,100	1,000	0	0	40	100	10	0	300	100	0	700	2,100	10	10,820
	Maximum	36.4	226%	397,600	147,800	10,200	800	110	5,100	20	7,200	1,600	41,900	120	1,100	3,400	260	599,390
	Average	**16.1**	**100%**	**61,600**	**27,000**	**4,200**	**200**	**70**	**2,900**	**10**	**3,100**	**700**	**11,300**	**40**	**900**	**2,600**	**130**	**115,000**
			% of Total:	54%	23%	4%	0.2%	0.1%	2.5%	0.0%	3%	1%	10%	0.0%	1%	2%	0.1%	
Current	2011	26.3	164%	93,700	54,100	8,900	600	40	5,000	20	7,000	900	30,000	110	1,000	2,100	170	203,640
	2012	11.9	74%	6,900	4,200	700	100	60	4,400	20	800	1,200	2,700	40	1,000	2,300	190	24,610
	2013	6.8	42%	16,600	1,600	600	0	60	3,500	20	400	500	700	40	1,000	2,400	210	27,630
	2014	7.9	49%	10,200	1,200	0	0	60	2,100	20	0	300	100	40	1,100	2,300	220	17,640
	2015	8.1	50%	14,800	1,800	100	0	70	2,100	20	100	400	100	40	1,100	2,600	170	23,400
	2016	10.0	62%	13,500	2,500	400	0	50	400	20	300	400	200	40	1,100	2,300	160	21,370
	2017	20.6	128%	10,100	28,300	5,700	300	60	3,000	20	5,900	400	14,200	40	1,100	2,500	170	71,790
	2018	7.9	49%	14,200	2,700	600	200	50	1,800	20	500	900	8,200	40	1,100	2,300	200	32,810
	Minimum	6.8	42%	6,900	1,200	0	0	40	400	20	0	300	100	40	1,000	2,100	160	17,640
	Maximum	26.3	164%	93,700	54,100	8,900	600	70	5,000	20	7,000	1,200	30,000	110	1,100	2,600	220	203,640
	Average	**12.4**	**77%**	**22,500**	**12,100**	**2,100**	**200**	**60**	**2,790**	**20**	**1,900**	**600**	**7,000**	**50**	**1,100**	**2,400**	**200**	**52,900**
			% of Total:	43%	23%	4%	0.4%	0.1%	5.3%	0.0%	4%	1%	13%	0.1%	2%	5%	0.4%	

Table 3-27. Santa Ynez River Groundwater Basin Eastern Management Area Historical and Current Water Budget Summaries

Values in acre-feet

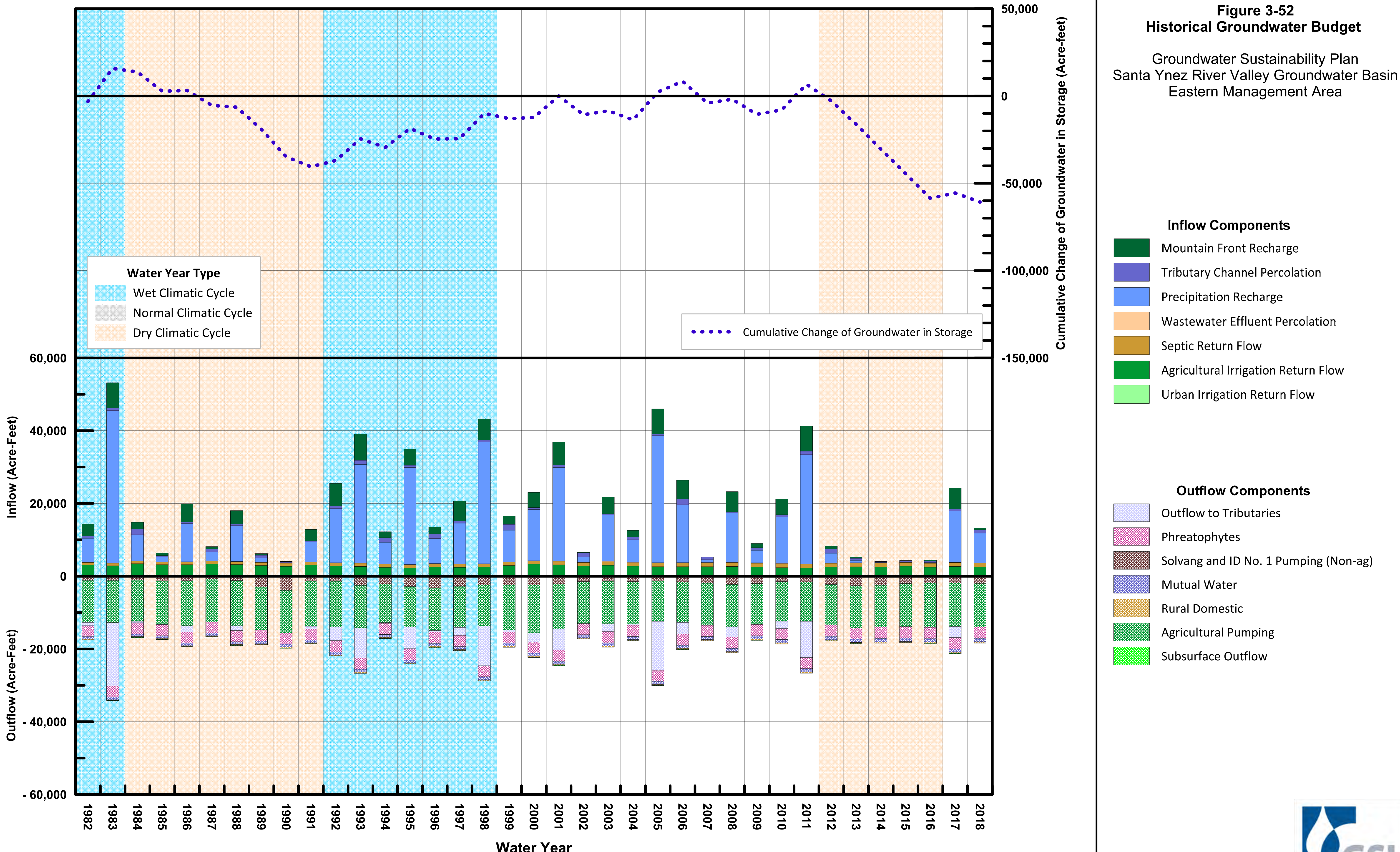
Water Budget	Water Year	Rainfall		Surface Water Outflow						Groundwater Outflow												Total Outflow	Change of Groundwater in Storage	Cumulative Change in Storage
				Subsurface Outflow	Surface Outflow	Pumping Extractions			Phreatophyte ET	City of Solvang Pumping	ID No. 1 and SYRWCD Self-Reported Pumping			"White Area" Pumping [1]			Total Pumping	Outflow to Tributaries	Phreatophyte ET	Evaporative Losses	Subsurface Outflow			
		Inches	% of Average			City of Solvang	ID No. 1	SYRWCD			"Agricultural Water" Pumping	"Other Water" Pumping	"Special Irrigation Water" Pumping	Ag Irrigation Pumping	Mutual Water Companies	Rural Domestic Pumping								
Historical	1982	15	92%	1,800	3,900	1,100	300	2,700	4,100	90	4,300	1,000	0	7,200	650	200	13,440	900	3,000	0	100	31,400	-3,180	-3,180
	1983	35	219%	1,800	511,200	1,200	400	2,400	4,100	90	4,400	1,100	0	7,200	670	200	13,660	17,500	3,100	0	100	555,300	18,800	15,620
	1984	7	46%	1,800	24,900	1,200	1,000	2,700	4,200	90	4,100	1,000	0	7,200	690	200	13,280	400	3,100	0	100	52,700	-2,030	13,590
	1985	11	68%	1,800	2,700	1,300	700	2,900	4,100	100	4,800	1,200	0	7,200	710	200	14,210	0	3,100	0	100	30,900	-10,990	2,600
	1986	17	106%	1,800	12,300	1,300	500	3,000	4,100	110	4,700	1,100	0	7,700	730	200	14,540	1,700	3,100	0	100	42,500	490	3,090
	1987	9	56%	1,800	1,900	1,300	700	3,300	4,100	100	4,000	700	0	7,800	740	200	13,540	0	3,100	0	100	29,700	-8,600	-5,510
	1988	17	105%	1,800	4,100	1,400	700	3,100	4,100	30	4,600	1,100	0	7,800	740	200	14,470	1,300	3,100	0	100	34,400	-940	-6,450
	1989	7	46%	1,800	1,800	1,300	600	3,500	4,100	20	4,100	2,900	0	7,800	750	200	15,770	0	3,100	0	100	32,000	-12,720	-19,170
	1990	6	40%	1,800	600	1,400	700	3,300	4,200	20	4,100	3,900	0	7,700	760	200	16,680	0	3,100	0	100	31,700	-15,740	-34,910
	1991	17	105%	1,800	12,400	1,100	1,600	2,900	4,100	150	4,800	1,200	0	7,600	770	200	14,720	700	3,000	0	100	42,500	-5,690	-40,600
	1992	25	155%	1,800	40,100	1,200	1,200	3,000	4,200	130	5,000	1,300	0	7,600	780	200	15,010	3,700	3,100	0	100	73,400	3,630	-36,970
	1993	28	174%	1,800	364,100	400	1,400	2,000	4,200	470	4,200	2,100	0	7,400	780	200	15,150	8,300	3,100	0	100	400,600	12,460	-24,510
	1994	14	84%	1,800	9,400	600	2,000	1,800	4,200	350	3,300	1,800	0	7,300	790	300	13,840	200	3,100	0	100	36,800	-5,030	-29,540
	1995	30	187%	1,800	533,900	500	800	2,100	4,100	490	3,900	2,400	0	7,200	800	300	15,090	6,000	3,000	0	100	567,400	10,820	-18,720
	1996	12	76%	1,800	15,900	1,000	1,100	2,100	4,200	310	4,500	3,000	0	7,100	810	300	16,020	400	3,100	0	100	45,700	-6,210	-24,930
	1997	12	73%	1,800	15,300	1,000	100	2,400	4,200	480	3,600	2,300	0	7,700	810	300	15,190	2,100	3,100	0	100	45,300	120	-24,810
	1998	36	226%	1,800	655,500	900	0	2,300	4,100	500	3,000	1,800	60	8,300	820	300	14,780	10,900	3,000	0	100	693,300	14,550	-10,260
	1999	12	76%	1,800	11,000	900	1,500	3,000	4,000	480	3,300	1,900	20	9,000	830	300	15,830	600	3,000	0	100	41,700	-3,210	-13,470
	2000	15	95%	1,800	24,200	700	2,000	4,200	4,200	560	3,400	1,800	10	9,700	830	300	16,600	2,500	3,100	0	100	59,500	760	-12,710
	2001	26	159%	1,800	157,900	300	3,100	4,100	4,100	740	3,100	1,400	10	9,200	840	300	15,590	5,800	3,100	0	100	196,000	12,350	-360
	2002	8	49%	1,800	8,500	300	900	4,000	4,100	370	2,900	1,100	20	8,700	840	300	14,230	0	3,100	0	100	36,900	-10,880	-11,240
	2003	17	103%	1,800	7,700	200	2,700	3,700	4,100	200	2,900	1,200	10	8,700	850	300	14,160	2,200	3,100	0	100	39,700	2,120	-9,120
	2004	10	64%	1,800	10,100	300	1,000	3,700	4,200	180	2,800	1,300	20	8,800	860	300	14,260	300	3,100	0	100	38,900	-5,200	-14,320
	2005	35	219%	1,800	373,600	100	1,000	3,200	4,100	140	2,300	1,200	20	8,800	860	300	13,620	13,400	3,000	0	100	413,800	15,940	1,620
	2006	18	109%	1,800	96,500	100	1,500	3,000	4,200	100	2,500	1,400	20	8,700	870	300	13,890	3,200	3,100	0	100	127,200	6,110	7,730
	2007	7	42%	1,800	10,900	200	1,500	3,100	4,100	140	3,100	1,800	20	8,500	880	300	14,740	0	3,100	0	100	39,500	-12,620	-4,890
	2008	16	98%	1,800	49,600	200	1,700	3,300	4,100	190	3,300	2,100	30	8,300	880	300	15,100	2,900	3,100	0	100	81,800	2,060	-2,830
	2009	13	82%	1,800	4,800	200	1,600	3,600	4,200	160	2,900	1,800	20	8,300	890	300	14,370	100	3,100	0	100	33,700	-8,690	-11,520
	2010	21	132%	1,800	18,600	200	400	3,300	4,100	140	2,700	1,300	20	8,200	890	300	13,550	2,000	3,000	0	100	46,900	2,510	-9,010
	2011	26	164%	1,800	120,400	100	500	2,600	4,100	0	2,800	1,500	20	8,100	900	300	13,620	10,000	3,000	0	100	156,300	14,560	5,550
	2012	12	74%	1,800	4,900	100	1,100	3,900	4,100	110	3,200	2,200	30	8,000	910	300	14,750	0	3,100	0	100	33,800	-9,720	-4,170
	2013	7	42%	1,800	11,500	200	1,400	3,900	4,200	180	3,600	2,400	20	8,000	910	300	15,410	0	3,100	0	100	41,700	-13,360	-17,530
	2014	8	49%	1,800	6,100	200	1,700	4,000	4,200	290	3,400	2,200	20	8,100	920	300	15,230	0	3,100	0	100	36,500	-14,370	-31,900
	2015	8	50%	1,800	9,500	300	2,200	4,100	4,300	230	3,300	1,800	10	8,600	930	300	15,170	0	3,200	0	100	40,500	-13,960	-45,860
	2016	10	62%	1,800	8,000	400	600	3,800	4,200	290	3,200	1,600	10	9,000	930	300	15,330	0	3,100	0	100	37,200	-14,030	-59,890
	2017	21	128%	1,800	18,700	300	1,400	4,500	4,200	190	3,000	1,700	10	9,000	940	300	15,140	3,000	3,100	0	100	52,100	2,970	-56,920
	2018	8	49%	1,800	9,300	300	1,200	3,300	4,200	370	2,900	1,700	10	9,000	950	300	15,230	0	3,100	0	100	38,500	-5,190	-62,110
	Minimum	6.5	40%	1,800	600	100	0	1,800	4,000	0	2,300	700	0	7,100	650	200	13,280	0	3,000	0	100	29,700	-15,740	
	Maximum	36.4	226%	1,800	655,500	1,400	3,100	4,500	4,300	740	5,000	3,900	60	9,700	950	300	16,680	17,500	3,200	0	100	693,300	18,800	
	Average	**16.1**	**100%**	**1,800**	**85,700**	**600**	**1,200**	**3,200**	**4,100**	**230**	**3,600**	**1,700**	**10**	**8,100**	**820**	**300**	**14,700**	**2,700**	**3,081**	**0**	**100**	**117,200**	**-1,830**	
			% of Total:	2%	73%	1%	1%	3%	3%	0.2%	3%	1%	0%	7%	1%	0%		2%	3%	0%	0%			
Current	2011	26.3	164%	1,800	120,400	100	500	2,600	4,100	0	2,800	1,500	20	8,100	900	300	13,620	10,000	3,000	0	100	156,300	14,560	14,560
	2012	11.9	74%	1,800	4,900	100	1,100	3,900	4,100	110	3,200	2,200	30	8,000	910	300	14,750	0	3,100	0	100	33,800	-9,720	4,840
	2013	6.8	42%	1,800	11,500	200	1,400	3,900	4,200	180	3,600	2,400	20	8,000	910	300	15,410	0	3,100	0	100	41,700	-13,360	-8,520
	2014	7.9	49%	1,800	6,100	200	1,700	4,000	4,200	290	3,400	2,200	20	8,100	920	300	15,230	0	3,100	0	100	36,500	-14,370	-22,890
	2015	8.1	50%	1,800	9,500	300	2,200	4,100	4,300	230	3,300	1,800	10	8,600	930	300	15,170	0	3,200	0	100	40,500	-13,960	-36,850
	2016	10.0	62%	1,800	8,000	400	600	3,800	4,200	290	3,200	1,600	10	9,000	930	300	15,330	0	3,100	0	100	37,200	-14,030	-50,880
	2017	20.6	128%	1,800	18,700	300	1,400	4,500	4,200	190	3,000	1,700	10	9,000	940	300	15,140	3,000	3,100	0	100	52,100	2,970	-47,910
	2018	7.9	49%	1,800	9,300	300	1,200	3,300	4,200	370	2,900	1,700	10	9,000	950	300	15,230	0	3,100	0	100	38,500	-5,190	-53,100
	Minimum	6.8	42%	1,800	600	100	0	1,800	4,000	0	2,800	1,500	10	8,000	900	300	13,280	0	3,000	0	100	33,800	-14,370	
	Maximum	26.3	164%	1,800	655,500	1,400	3,100	4,500	4,300	370	3,600	2,400	30	9,000	950	300	16,680	10,000	3,200	0	100	156,300	14,560	
	Average	**12.4**	**77%**	**1,800**	**23,600**	**200**	**1,300**	**3,800**	**4,200**	**210**	**3,200**	**1,900**	**20**	**8,500**	**920**	**300**	**15,000**	**1,600**	**3,100**	**0**	**100**	**54,600**	**-1,700**	
			% of Total:	3%	43%	0%	2%	7%	8%	0.4%	6%	3%	0%	16%	2%	1%		2.9%	6%	0%	0%			

Table 3-27. Santa Ynez River Groundwater Basin Eastern Management Area Historical and Current Water Budget Summaries
Values in acre-feet

Notes
[1] White areas under SGMA refer to areas that are not served by an irrigation district, which depend solely on groundwater supplies.
ag = agriculture
ET = evapotranspiration
ID No. 1 = Santa Ynez River Water Conservation District ID No. 1
SGMA = Sustainable Groundwater Management Act
SYRWCD = Santa Ynez River Water Conservation District
WWTP = wasterwater treatment plant

Figure 3-52
Historical Groundwater Budget

Groundwater Sustainability Plan
Santa Ynez River Valley Groundwater Basin
Eastern Management Area



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Variability in the components of the water budget is directly influenced by annual variations in climatic conditions, as shown on Figure 3-52. During the historical period, two full periods of wet and dry climatic cycles were evident. Dry climatic conditions (drought) prevailed from 1984 through 1991 and again from 2012 through the current water in 2021, as depicted by the peach-colored areas on Figure 3-52. During these dry climatic periods (drought), the amount of recharge was relatively low. For example, during the drought between 2012 and 2016, recharge from precipitation and mountain front recharge were reduced significantly, to near zero. The graph indicates that the drought resulted in a net reduction of groundwater in storage. The variability within the water budget generally follows the trends evident in the representative water level wells, which are presented as hydrographs in Figures 3-22 through 3-24.

In contrast, wet conditions prevailed in the early 1980s, again between 1992 and 1998 (as shown by blue areas on Figure 3-52), as well as during occasional single alternating wet/dry years. During otherwise normal (average) periods (indicated by gray areas on Figure 3-52) and during the wet periods, the amount of recharge and streamflow percolation was relatively high. The net result during these periods was a gain of groundwater in storage.

The water budget for the historical period is also influenced by the amount of groundwater pumping that occurs. Over the historical period, the total amount of groundwater pumping decreased in the early 1990s, corresponding with a period when irrigation of alfalfa and pasture acreage (high water use factors) declined and irrigated vineyard acreage (a low water use factor) increased. The transition from alfalfa and pasture to vineyards resulted in an estimated net decrease of groundwater pumping because the irrigation demand per acre of vineyards is significantly less than the per-acre demand for alfalfa and pasture. This decrease in pumping contributed to an increase of groundwater in storage during the 1990s.

Over the 37-year historical period, a total net decline of groundwater in storage of about 62,100 AF occurred. The average annual groundwater storage decline during the historical period—or the difference between inflow and outflow to groundwater in the EMA—is approximately 1,830 AFY. This estimate of the groundwater deficit is similar to the deficit projected by the County of Santa Barbara, which, in 2003, estimated the demand in 2020 to be 1,600 AFY. It was projected that this shortfall would continue at approximately this level through 2040.

Sustainable Yield Estimate of the Basin

The water budget for the historical period of 1982 through 2018 indicates that total groundwater outflow exceeded the total inflow in the EMA by an average of 1,830 AFY. The sustainable yield in the EMA was estimated by adding the average change of groundwater in storage (negative 1,830 AFY) to the estimated total average amount of groundwater pumping (14,700 AFY) for the historical period. This results in a sustainable yield of about 12,870 AFY. This estimated value reflects balanced historical climatic and hydrologic conditions and provides insight into the amount of groundwater pumping that can be sustained in the EMA such that groundwater inflows (including pumping) do not exceed outflows (recharge).

The sustainable yield estimate includes recharge and discharge estimates from a combination of imported and native local sources. Of the groundwater recharge components, which averaged 18,770 AFY during the historical period, approximately 287 AFY is derived from percolation of irrigation water into the Santa Ynez Uplands from imported sources and another 339 AFY from septic return flow from imported sources. Together, these two components add 626 AFY, or 3 percent of the groundwater recharge from imported sources.

Long-term withdrawals in excess of sustainable yield can lead to undesirable results. It should be recognized that the concepts of safe yield, sustainable yield, and overdraft reflect conditions of water supply and use over a long-term period. Given the importance of the conjunctive use of both surface water and groundwater in the EMA, short-term water supply differences are satisfied largely by groundwater pumping, which, in any given year, often exceed the sustainable yield of the groundwater within the EMA. The EMA, however, has a very large amount of groundwater in storage that can be used as carryover storage during years when there is little native recharge. The large amount of groundwater in storage can be replenished in future years by reduced pumping and increased surface water use, or from various types of projects, including, for instance, artificial recharge.

3.3.3.7 Reliability of Historical Surface Water Supplies

§ 354.18 Water Budget.

(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.

The historical reliability of the surface water supply has been a function of the availability of local and imported surface water, subject to the SWP allocation and operation of the Cachuma Project. The long-term reliability of the surface water from the local sources, including Bradbury Dam outflow releases and tributary runoff from the Santa Ynez Uplands, is subject to climatic variability and is subject to requirements for dam releases to meet in-stream habitat and water rights requirements. Releases from Lake Cachuma for these purposes have maintained a stable surface water supply within the EMA. Flow in the Santa Ynez River main stem will continue to be regulated and determined by terms of the State Board Order (SWRCB, 2019) and NMFS Biological Opinion (NMFS, 2000).

The variability of historical supply was discussed in Section 3.3.2.1, which documents the sources of surface water supply as (1) surface water flows that enter the EMA from precipitation runoff within the watershed;(2) Santa Ynez River inflow to the EMA, regulated by SWRCB as release outflows from Lake Cachuma; (3) water delivered from the Cachuma Project directly to ID No. 1 via pipeline prior to 1997; and (4) deliveries of imported SWP supplies under the Exchange Agreement (since 1997).

The estimated average annual total inflow into the entire EMA, including the Santa Ynez River area, from all sources over the historical period is about 93,000 AFY. The largest component of this average inflow is due to releases from Bradbury Dam and subsequent flow in the Santa Ynez River, which averaged 60,800 AFY during the historical period. A more complete discussion of the outflow from Bradbury Dam is presented in Section 3.1.1.3. The large difference between the minimum and maximum inflows in Table 3-22 reflects the climatic variability and the difference between dry and wet years in the EMA and contributing watershed.

The annual average, minimum, and maximum volumes of local surface water sources (native and imported) during the historical period are presented in Table 3-22. The imported surface water averaged 2,910 AFY. During most years this averaged 3,200 AFY, except for the 4 exceptionally dry years during this period (1990, 1992, 1995, and 2016), when much less water was delivered. During these 4 years, the volume of water delivered from imported sources (SWP Table A and Cachuma Project) was as little as no water delivered (2016) to 891 AFY delivered (1992).

If drought conditions persist locally, regionally, and state-wide, surface water supplies from Lake Cachuma releases and imported surface water from the SWP may be curtailed. This condition would increase the reliance on local groundwater supplies to meet demands for water, which could lead to lowered groundwater levels and an increase in the annual deficit of groundwater in storage. DWR best management practices acknowledge that overdraft that occurs during drought conditions does not necessarily require implementation of projects and management actions; however, if water levels do not recover after normal climate conditions return, then projects and management actions must be implemented (refer to Section 6) (DWR 2016a, 2016b, and 2016c). The GSA may decide to implement some projects and management actions at some point during the drought to avoid undesirable results and extend the availability of groundwater to meet demands during an unprecedented drought.

3.3.4 Current Water Budget (Water Years 2011 through 2018)

§ 354.18 Water Budget.

(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.

SGMA regulations require that a water budget under current conditions be developed based on the most recent hydrology, water supply, water demand, and land use information. For this GSP, the period selected to represent current conditions is water years 2011 through 2018. This period is a subset of the historical period described above in Section 3.3.3.

The current water budget period is dominated by a drought period when annual precipitation averaged about 78 percent of the historical average and percolation of direct precipitation averaged about 62 percent of the historical average. As a result, the current water budget period represents drought conditions and is not representative of the long-term, balanced conditions needed for sustainability planning purposes.

Estimates of the surface water and groundwater inflow and outflow, and changes in groundwater storage for the current water budget period are provided below.

3.3.4.1 Surface Water Inflows

As with the water budget under historical conditions, the current water budget includes two surface water source types: local supplies and SWP.

Local Surface Water Supplies

Current local surface water supplies include surface water flows that enter the EMA from precipitation runoff within the watershed and Santa Ynez River inflow to the EMA, regulated as releases from Lake Cachuma at Bradbury Dam. The annual average, minimum, and maximum values for these inflows for the current period are shown in Table 3-28. Both ID No. 1 and the City of Solvang produce local surface water from the Santa Ynez River main stem (including underflow) for applied use in the Santa Ynez Uplands area of the EMA.

Table 3-28. Annual Surface Water Inflow, Current Period (2011 through 2018)

(Values in acre-feet per year)

Surface Water Inflow Component	Average	Minimum[1]	Maximum[1]
Santa Ynez River Inflow	22,500	6,900	93,700
Santa Ynez River Tributary Inflow[2]	12,100	1,200	54,100
Mountain Front Recharge	2,100	0	8,900
Precipitation Recharge	200	0	600
Septic Return Flow	20	20	20
Agricultural Irrigation Return Flow	60	40	70
Cachuma Project (Imported)[3]	0	0	0
SWP Exchange Agreement (Imported)[3]	1,570	0	3,126
SWP Table A (Imported)[3]	1,220	69	2,330
Local	**36,980**	—	—
Imported	**2,790**	—	—
Total	**39,770**	—	—

Notes

[1] Minimum and maximum values are not totaled because the values for each component may have occurred in different years.

[2] Tributaries include Hilton, San Lucas, Calabazal, Alisal, Santa Agueda, Zanja de Cota, Alamo Pintado, and Zaca Creeks.

[3] ID No. 1 exchanged its Cachuma Project entitlement supplies for an equivalent amount of SWP water that is delivered to the ID No. 1 turnout.

SWP = State Water Project

The estimated average annual total inflow from these sources during the current water budget period was about 39,770 AFY, or about 41 percent of the average annual inflow during the historical period of 95,980 AFY. Inflow of surface water from the Santa Ynez River and contributing tributaries during the current period was significantly lower than during the historical period. The reduction in surface water inflows reflects the drought conditions that prevailed during the current water budget period.

Imported Surface Water from State Water Project

Imported SWP water has been used by ID No. 1 and the City of Solvang during the current water budget period, as described in Section 3.3.2.1. The annual average, minimum, and maximum values for the imported SWP water use during the current water budget period are summarized in Table 3-28.

3.3.4.2 Surface Water Outflows

The estimated annual surface water outflow leaving the EMA as flow in the Santa Ynez River and subsurface flow over the current water budget period is summarized in Table 3-29. Reductions in surface water outflow for the current water budget period were similar to reductions for the surface water inflows.

Table 3-29. Annual Surface Water Outflow, Current Period (2011 through 2018)

(Values in acre-feet per year)

Surface Water Outflow Component	Average	Minimum[1]	Maximum[1]
Santa Ynez River Outflow (including Zaca Creek)	23,600	4,900	120,400
Pumping (River Wells)	5,300	3,200	7,100
Subsurface Outflow	1,800	1,800	1,800
Phreatophyte ET	4,200	4,100	4,300
Total	**34,900**	—	—

Notes

[1] Minimum and maximum values are not totaled because the values for each component may have occurred in different years.

ET = evapotranspiration

3.3.4.3 Groundwater Inflows and Outflows

The water budget for the current period includes a summary of the estimated groundwater inflows, groundwater outflows, and change of groundwater in storage. Groundwater supplied most of the water used in the EMA during the current water budget period.

Groundwater Inflows

Groundwater inflow components include deep percolation of direct precipitation, streamflow percolation, subsurface groundwater inflow (including mountain front recharge), agricultural irrigation return flow, domestic/urban irrigation return flow, and domestic/urban septic return flow, and percolation of treated wastewater. The annual groundwater inflows during the historical period are summarized in Table 3-24. Groundwater inflows during the current period are summarized in Table 3-30.

Table 3-30. Groundwater Inflow, Current Period (2011 through 2018)

(Values in acre-feet per year)

Groundwater Inflow Component	Average	Minimum[1]	Maximum[1]
Deep Percolation of Direct Precipitation	7,000	100	30,000
Tributary Percolation	600	300	1,200
Subsurface Groundwater Inflow[2]	1,900	0	7,000
Agricultural Irrigation Return Flow	2,400	2,100	2,600
Domestic/Urban Irrigation Return Flow	200	160	220
Septic Return Flow	1,100	1,000	1,100
Wastewater Effluent Percolation	50	40	110
Total	**13,250**	—	—

Notes

[1] Minimum and maximum values are not totaled because the values for each component may have occurred in different years.

[2] Subsurface groundwater inflow includes mountain front recharge.

For the current period, estimated total inflow to the groundwater from the Santa Ynez Uplands ranged from 4,060 to 41,300 AFY, with an average inflow of 13,250 AFY. Notable observations from the summary of groundwater inflows for the current period include the following:

- Average total inflow during the current water budget period was about 70 percent of the average total inflow for the historical period.
- Total annual average recharge from direct precipitation for the current period was about 62 percent of the recharge from direct precipitation for the historical period.

Groundwater Outflows

Groundwater outflow components include groundwater pumping from all water use sectors, subsurface groundwater outflow to tributaries and the adjacent management area, and phreatophyte ET. Groundwater discharges to surface water are included as discharges that ultimately flow to surface water in the Santa Ynez River. This volume was estimated using the EMA numerical groundwater flow modeling in consultation with consultants within the adjacent management areas. The estimated annual groundwater outflows for the current period are summarized in Table 3-31.

Table 3-31. Annual Groundwater Outflow, Current Period (2011 through 2018)

(Values in acre-feet per year)

Groundwater Outflow Component	Average	Minimum[1]	Maximum[1]
Total Groundwater Pumping	15,000	13,620	15,410
Subsurface Groundwater Outflow	1,700	100	10,100
Phreatophyte ET	3,100	3,000	3,200
Total	**19,800**	**—**	**—**

Notes

[1] Minimum and maximum values are not totaled because the values for each component may have occurred in different years.

ET = evapotranspiration

Groundwater pumping was the largest groundwater outflow component, totaling 76 percent of all of the groundwater outflow. The estimated annual groundwater pumping by water use sector for the current period is summarized in Table 3-32.

Table 3-32. Annual Groundwater Pumping by Water Use Sector, Current Period (2011 through 2018)

(Values in acre-feet per year)

Water Use Sector	Average	Minimum[1]	Maximum[1]
Agricultural[2]	11,700	10,900	12,200
Municipal/Reported Domestic[3]	2,100	1,500	2,600
Rural Domestic[4]	300	300	300
Small Public Water Systems[4]	900	900	950
Total	**15,000**	—	—

Notes

[1] Minimum and maximum values are not totaled because the values for each component may have occurred in different years.

[2] Includes all metered and estimated agricultural irrigation pumping, both inside and outside of the SYRWCD.

[3] Includes all metered and self-reported domestic pumping that occurs within the SYRWCD.

[4] Includes only pumping that occurs outside of the Santa Ynez River Water Conservation District.

Pumping for municipal uses accounts for 14 percent of total pumping over the current period. Agricultural pumping fluctuated over time but is estimated to have increased only slightly during the current period. As noted above, agricultural pumping outside SYRWCD is not reported. Rural domestic and small water system pumping occurring outside of the SYRWCD boundaries area account for 2 percent and 4 percent, respectively, of total pumping during the current period. Overall, the total average groundwater outflows during the current period were very similar to groundwater outflows during the historical period.

3.3.4.4 Changes of Groundwater in Storage

Average groundwater inflows and outflows within the EMA for the current period are presented on Figure 3-53, and a summary of annual groundwater inflows and outflows are presented on Figure 3-54. Inflow components are graphed above the zero line and outflow components are graphed below the zero line on Figure 3-54. The cumulative change of groundwater in storage during the current period on Figure 3-53 indicates that the average inflow of approximately 13,250 AFY is less than the average total outflow of 19,800 AFY. On average, there has been a reduction of groundwater in storage with an average deficit of approximately 6,580 AFY over the current period of 2011 through 2018. The total reduction of groundwater in storage during the current period was approximately 52,800 AF. As stated previously, the current water budget was developed during a severe drought period and is not representative of long-term basin conditions.

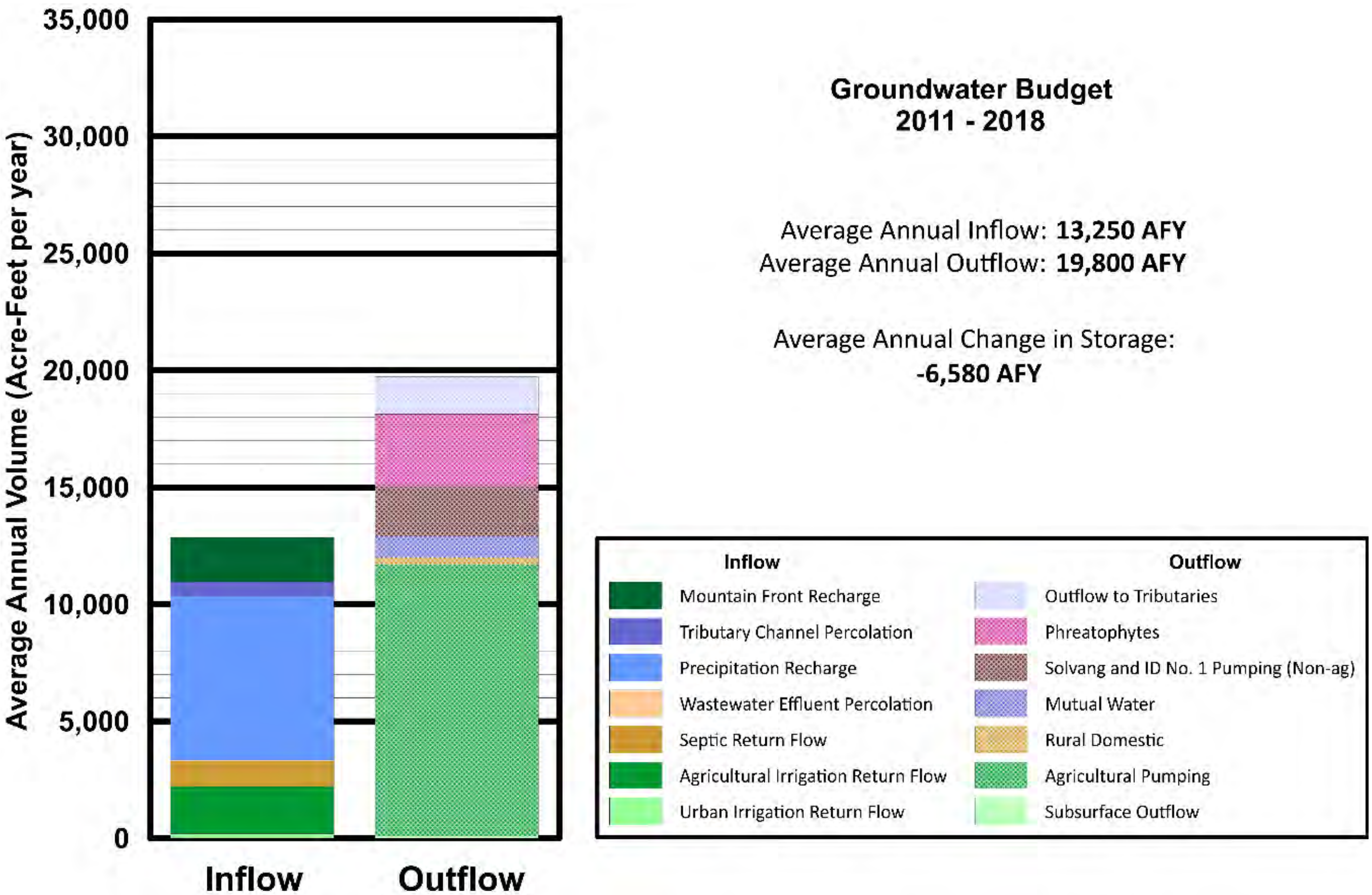
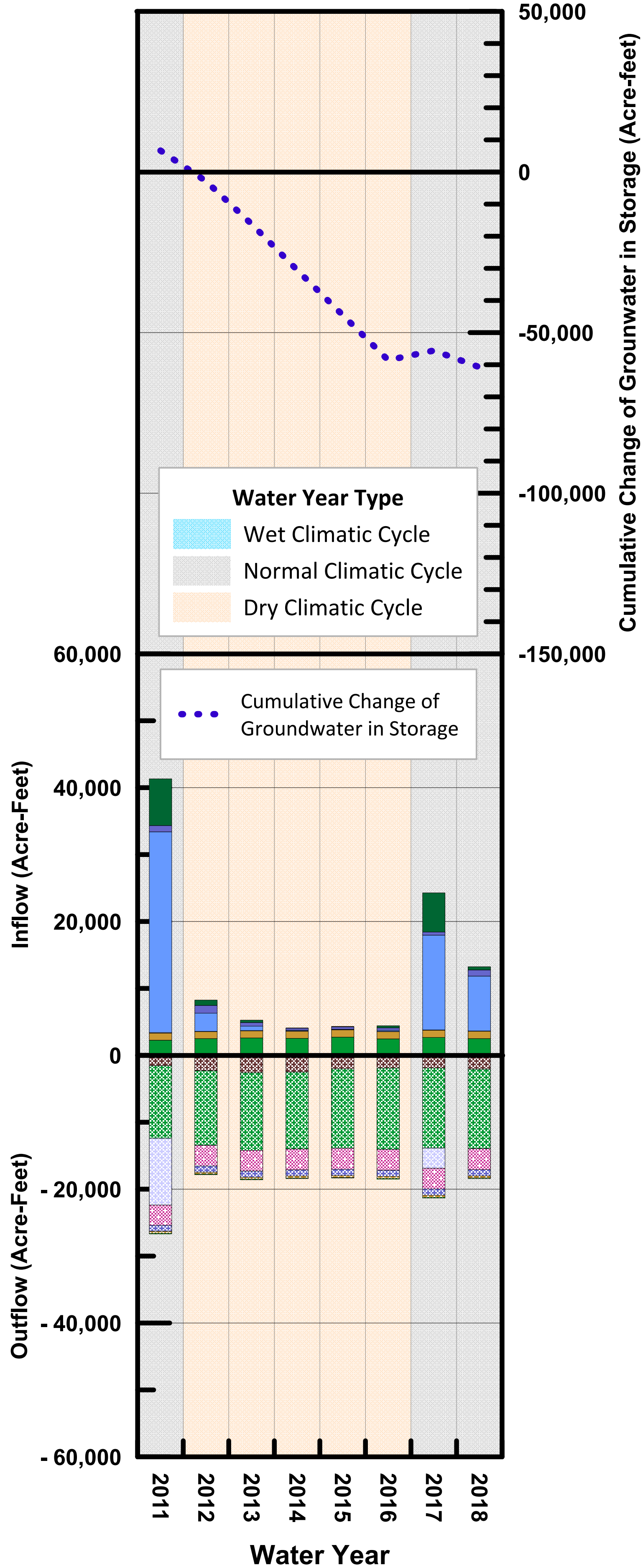


Figure 3-53. Average Groundwater Budget Volumes, Current Period

Figure 3-54
Current Groundwater Budget

Groundwater Sustainability Plan
Santa Ynez River Valley Groundwater Basin
Eastern Management Area



Inflow Components

- Mountain Front Recharge
- Tributary Channel Percolation
- Precipitation Recharge
- Wastewater Effluent Percolation
- Septic Return Flow
- Agricultural Irrigation Return Flow
- Urban Irrigation Return Flow

Outflow Components

- Outflow to Tributaries
- Phreatophytes
- Solvang and ID No. 1 Pumping (Non-ag)
- Mutual Water
- Rural Domestic
- Agricultural Pumping
- Subsurface Outflow

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3.3.5 Projected Water Budget

§ 354.18 Water Budget.

(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.**

3.3.5.1 Projected Water Budget Calculation Methods [§ 354.18(d)(1),(d)(2),(d)(3),(e), and (f)]

The SGMA regulations require the following regarding projected water budgets:

- 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.
- Projected hydrology shall utilize 50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition for estimating future hydrology.
- Projected water demand shall utilize the most recent land use, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demand.
- Projected surface water supply shall utilize the most recent water supply information as the baseline condition for estimating future surface water supply.

The subsurface groundwater inflow and outflow components of the projected water budget in the EMA were estimated utilizing estimated future land uses from the Santa Barbara County Association of Governments, related pumping volumes, and repeating factors associated with the historical climatic conditions projected forward in time through 2032 and 2072. The effects of climate change were also evaluated using DWR-provided climate change factors. This section briefly describes the estimated components of the projected water budget that include (1) the effects of changing land use and water demand and (2) effects caused by climate change.

The 2030 and 2070 precipitation and ET climate change factors are available on 6-kilometer resolution grids. The climate data sets have also been analyzed with a soil moisture accounting model known as the Variable Infiltration Capacity (VIC) hydrology model and routed to the outlet of subbasins defined by 8-digit Hydrologic Unit Codes (HUCs). The resulting downscaled hydrologic time series are available on the SGMA Data Viewer hosted by DWR.[44] Precipitation and ET data used in this analysis were downloaded from the SGMA Data Viewer for climate grid cells covering the EMA within HUC 18060010, which covers the entire Santa Ynez River Valley Groundwater Basin. Monthly time series change factors were then developed for the EMA. Monthly time series change factors for inflow in the Santa Ynez River—which will continue to be regulated by the State Board Order (SWRCB, 2019) and the 2000 Biological Opinion (NMFS, 2000)—were similarly retrieved from the SGMA Data Viewer. Mean monthly and annual values were computed from the time series to show projected patterns of change under 2030 and 2070 conditions.

Projected Hydrology [§ 354.18(c)(3)(A)]

§ 354.18 Water Budget.

(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.

DWR's Water Budget and Modeling Best Management Practices (DWR, 2016b, 2016c, and 2020b) describe the use of climate change data to estimate projected hydrology. DWR has also provided SGMA Climate Change Data and published a Guidance for Climate Change Data Use for Groundwater Sustainability Plan Development (DWR, 2018b) as the primary source of technical guidance used in this analysis.

The DWR-provided climate change data are based on the California Water Commission's Water Storage Investment Program climate change analysis results, which used global climate models and radiative forcing scenarios recommended for hydrologic studies in California by the Climate Change Technical Advisory Group. Climate data from the recommended General Circulation Model models and scenarios have also been

[44] Available at https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. (Accessed February 15, 2021.)

downscaled and aggregated to generate an ensemble time series of change factors that describe the projected change in precipitation and ET values for climate conditions that are expected to prevail at midcentury and late century, centered around 2030 and 2070, respectively. The DWR data set also includes two additional simulation results for extreme climate scenarios under 2070 conditions. Use of the extreme scenarios (which represent Drier/Extreme Warming [2070DEW] and Wetter/Moderate Warming [2070WMW] conditions in GSPs) is optional.

This section describes the retrieval, processing, and analysis of DWR-provided climate change data to project the impact of climate change on precipitation, ET, upstream inflow, and imported flows under 2030 and 2070 conditions using at least 50 years of observed historical hydrology, and up to 97 years of hydrology, projected forward in time.

Projected Changes in Streamflow. Within the entire Basin, and therefore the EMA, streamflow is projected to increase slightly, by 0.5 percent in 2030 and 3.8 percent in 2070, based on the DWR climate change factors and other factors in the VIC analyses for the Basin. This projected change in streamflow pertains to the flow in the Santa Ynez River and flow from the tributaries both upstream and downstream of Lake Cachuma to the Santa Ynez River. Notably, the projection of changes of local surface water flow into the Santa Ynez River portion of the EMA is complicated and subject to significant error due to (1) the impoundment of the flow in the Santa Ynez River behind three reservoirs, (2) diversions through three tunnels to communities outside of the watershed to the south along the coast, and (3) requirements for regulated releases to the river, which flow into the EMA and onward downstream. The projected changes to streamflow resulting from the climate change factors have been applied to the flow that will occur through the tributaries that flow through the Santa Ynez Uplands and ultimately into the Santa Ynez River.

Projected Changes in Evapotranspiration. Crops require more water to sustain growth in a warmer climate, and this increased water requirement is characterized in climate models using the rate of ET. Under 2030 conditions, the EMA is projected to experience average annual ET increases of 3.8 percent relative to the historical period. The largest monthly changes would occur in winter and early summer with projected increases of 4.3 percent to 4.8 percent in January and 3.8 percent to 4 percent in June. Under 2070 conditions, annual ET is projected to increase by 8 percent relative to the historical period. The largest monthly changes would occur in December with projected increases of between 12.8 percent and 13.5 percent. Summer increases peak at approximately 8 percent in May and June.

Projected Changes in Precipitation. The seasonal timing of precipitation in the EMA is projected to change. Sharp decreases in early fall and late spring precipitation accompanied by increases in winter and early summer precipitation are projected to occur. Under 2030 conditions, the largest monthly changes would occur in May with projected decreases of 14 percent, while increases of approximately 9 percent and 10 percent are projected in March and August, respectively. Under 2070 conditions, decreases of up to 31 percent are projected in May while the largest increases are projected to occur in September (25 percent) and January (17 percent). The EMA is projected to experience minimal changes in total annual precipitation, although, the drought that has continued since before 2012 is concerning to Basin stakeholders. Annual precipitation increases by 0.8 percent or less are projected under 2030 conditions relative to the historical period. Under 2070 conditions, small decreases in annual precipitation are projected, with changes of less than 1 percent.

Projected Water Budget [§ 354.18(c)(3)(B)]

§ 354.18 Water Budget.

(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:

(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.

Based on the conditions documented in the historical water budget, the inflow and outflow from the EMA were estimated into the future through the GSP implementation period through 2042 as well as for 50 total years after this GSP is submitted, through 2072. This section describes the methods and results to estimate the groundwater inflow and outflow components in the Santa Ynez Uplands through 2042 and 2072. Obviously, uncertainty exists in the estimates for the current and projected water supply and demand. The level of uncertainty is compounded as the forecast time horizon extends from 20 to 50 years. To minimize the uncertainty that will always exist, this projected water budget is based the best available data and compiled in coordination and collaboration with water users within the EMA, the entire Basin, and adjacent groundwater basin.

Agricultural Acreage. Between water years 1982 and 2018, irrigated agricultural pumping within the Santa Ynez Uplands averaged 11,700 AFY. During 2018, the year of the most recent crop survey, there was an estimated 6,818 acres of irrigated land within the Santa Ynez Uplands. Of this area, a total of 4,241 acres were planted in irrigated crops in the areas outside of the SYRWCD boundaries, for which a total of 8,976 AFY was pumped. This is equal to an application rate of an average of 2.11 acre-feet per acre per year.

The available crop survey data from 1985, 1996, 2014, 2016, and 2018 indicate that groundwater pumping occurred in areas outside of the SYRWCD boundaries is used to satisfy a variety of crops, the acreages of which vary from year to year. A summary of the land use trends for the recent years is presented in Table 3-33. The crop types presented are combined into six groups of similar crops (and cannabis).

Table 3-33. Summary of Historical and Projected Irrigated Agricultural Acreage, Outside of Santa Ynez River Water Conservation District

(Values in acres)

Crop Group	Recent Trend	1996	2014	2016	2018	2042 (Projected)	2072 (Projected)
Deciduous Fruit and Nuts	Modest increase	37	93	93	74	130	199
Field Crops	Rising (+ 4.5% / year)	267	273	812	1,090	1,752	2,581
Ornamentals	Unchanged	5	29	21	3	14	28
Pasture	Declining	1,350	839	858	747	500	500
Truck, Nursery, and Berry Crops	Declining	141	714	675	498	300	300
Vineyards	Very modest increase	944	1,804	1,932	1,828	1,900	1,990
Cannabis	Large increase expected	0	0	0	0	500	1,000
	Total	**2,743**	**3,752**	**4,390**	**4,241**	**5,096**	**6,598**
					Change Since 2018	**+ 856**	**+2,357**
					Annual Increase	**+ 36**	**+ 45**
					Annual Change, Percent	**+ 0.77 %**	**+ 0.82 %**

The total irrigated area outside of the SYRWCD was 4,241 acres in 2018, the period of the most recent land use survey. The total irrigated area consisted principally of vineyards and field crops, as well as lesser acreages of pasture and truck, nursery, and berry crops. The projection of estimated changes of irrigated crop acreages into the future were considered individually for the six crop groups (and cannabis) in consultation with the GSA Committee and EMA GSA member agency staff, at a public meeting with the input of local irrigators.[45]

Based on the available data, only field crops exhibited an upward trend in recent years, rising at 4.5 percent per year. This projection was projected into the future at this rate, which would add 28 acres of field crops on average per year. By 2042, the number of acres of field crops outside of the SYRWCD is projected to increase from 1,090 acres in 2018 to 1,752 acres. This may increase further to 2,581 acres by 2072 using this projected rate of growth.

The data indicated that the area of truck, nursery, and berry crops has declined significantly. Truck, nursery, and berry crops have lost an average of 50 acres per year since 2014 and covered 498 acres in 2018. For the sake of the projection, the authors have estimated that a total of 300 acres of these crops will remain within the EMA for the foreseeable future (through 2042 and 2072).

[45] Based on personal conversations with local irrigators, including Kevin Merrill, and feedback from board members and public comments collected during a public meeting held February 25, 2021. Considerations for projection of individual crop groups included market conditions and projected changes in water availability and cost.

Likewise, pasture, which covered 747 acres in 2018, has been declining recently, losing more than 20 acres per year on average. For the sake of the projection of this crop type, the authors have assumed that this decline will continue but will not drop below a total of 500 total acres within the area outside of the SYRWCD.

The expansion of vineyard acreage has slowed considerably in recent years, compared to the rapid growth that occurred during the late 1990s and early 2000s. Between 1996 and 2014, vineyards grew at an average rate of approximately 3.7 percent per year; however, since 2014 this has moderated to near zero growth, which is included in the projection as less than 0.2 percent per year annual growth. This is equal to an increase of 3 acres per year on average.

While not included as a crop category in the recent crop surveys, cannabis production is projected to enter the Santa Ynez Valley and the EMA in the coming years. The County of Santa Barbara has placed an upper limit on the maximum number of acres county-wide allowed to be planted with cannabis. The assumption for the EMA is that cannabis production will reach a limit for the Santa Ynez Valley over the next several years and will increase beyond the current limit. Review of the four current cannabis permit applications, one of which has been approved, suggest that a total of approximately 350 acres of cannabis production are being considered within the EMA. Three of the four parcels with pending cannabis permits are located on parcels that are not currently irrigated; thus, the authors have assumed that this land use will represent newly irrigated acreage within the EMA. The estimated acreage of this crop projected through 2042 and 2072 are only estimates and are subject to much uncertainty.

The estimated projected total acreages of the ornamentals and deciduous fruit and nuts remained relatively unchanged, based on the crop surveys and are not projected to increase significantly during the projected water budget period.

Overall, the summation of the individual cropping changes result in a projected increase in irrigated acreage outside of SYRWCD from 4,241 acres in 2018 to 5,259 acres in 2042, at an annual growth rate of approximately 0.8 percent per year. Between 2042 and 2072, the total irrigated acreage is projected to increase further relative to 2018, to 6,598 acres at the same average annual growth rate. This growth is expected to occur mostly due to increases in field crops and cannabis acreage. The projected agricultural acreages and water use are projected to increase only modestly over the next 20 and 50 years. This increase, based principally on conversion to field crops and a more modest increase in vineyard acreage, are together similar in scale to the estimated projected increase in cannabis acreage. The projected rate of expansion of acreage is equal to 36 acres added per year. This rate is reasonably consistent with the current rate of change of the crop groups presented in and was confirmed with the GSA Committee and member agency staff to reasonably represent an estimate of future land use.

Agricultural Pumping. Projected future ET values were derived for each of these crop groups for 2042 and 2072 by multiplying the acreage of each crop by historical crop ET and the DWR climate change factors. The water use of each crop group varies between 1.05 acre-feet per acre per year for field crops to 3.11 acre-feet per acre per year for truck, nursery, and berry crops, as shown in Table 3-34.

The assigned water duty factors are based on SYRWCD’s Groundwater pamphlet (SYRWCD, 2010). There has been some discussion in public meetings that the water duty factor of 1.60 acre-feet per acre per year for vineyards may be too high and the current water use for the crop may be closer to 1.0 to 1.2 acre-feet per acre per year inclusive of irrigation and frost protection. Adjusting the water use factor for this crop could have an effect on the current and projected water budgets. This is discussed further later in this section.

Table 3-34. Water Duty Factors for Crop Groups

Crop Group	Annual Crop Demand (acre-feet per acre per year)
Deciduous Fruit and Nuts	2.14
Field Crops	1.05
Ornamentals	3.00
Pasture	3.50
Truck, Nursery, and Berry Crops	3.11
Vineyards[1]	1.60
Cannabis[2]	1.50

Notes

[1] The assigned water duty factors are based on SYRWCD's Groundwater Production Information and Instructions pamphlet (SYRWCD, 2010).

[2] From Battany, 2019, An Initial Estimate of a Water Duty Factor for Field-Grown CBD Hemp in The Paso Robles Area. The University of California working in cooperation with San Luis Obispo County and the U.S. Department of Agriculture. April 22, 2019.

The agricultural demand was estimated throughout the Santa Ynez Uplands both within and outside of the SYRWCD. In 2018, a total of 2,900 AFY of water was pumped within the SYRWCD to satisfy agricultural demands. Agricultural pumping data from within the SYRWCD were based on metered production from ID No. 1 and the City of Solvang, and other self-reported pumping records of the total volume of water pumped but lacking information about the crops that will be irrigated. Throughout the historical period, agricultural pumping within the SYRWCD has been declining. Before 2000, agricultural pumpage averaged 4,113 AFY; since 2000, agricultural pumpage has declined to an average of 2,984 AFY. This moderate decline is equal to an average reduction of 51 AFY of agricultural pumping over the historical period within the SYRWCD. To estimate agricultural pumping within the SYRWCD, the authors assume that the modest decline will continue, from 2,900 AFY in 2018 to 2,497 AFY in 2042, as summarized in Table 3-35.

Based on results of the projection, the overall agricultural pumping within the Santa Ynez Uplands will decrease slightly. The net effect of the increase in agricultural pumping outside of SYRWCD and decrease in pumping inside SYRWCD will result in an overall decrease in agricultural pumping. In 2018, agricultural pumping in the entire Santa Ynez Uplands was 11,301 AFY, which was similar to the average for the entire historical period of 11,700 AFY. Together with the declining agricultural pumping trend within the SYRWCD and conversion of crop acreages throughout the Santa Ynez Uplands to lower water use crops, pumping to satisfy crop demands is projected to decrease slightly to 11,129 AFY in 2042 and 10,584 AFY in 2072. These projections indicate that irrigated agricultural demand, not accounting for climate change, will decline by less than a percent by 2042 and 2072, as summarized in Table 3-35.

Table 3-35. Summary of Projected Irrigated Agricultural Pumping (Excluding Climate Change), Santa Ynez Uplands

(Values in acre-feet per year)

Crop Group	2018	2042 (Projected)	2072 (Projected)
Deciduous Fruit and Nuts	159	277	425
Field Crops	1,143	1,838	2,707
Ornamentals	10	43	85
Pasture	2,615	1,750	1,750
Truck, Nursery, and Berry Crops	1,550	933	933
Vineyards	2,925	3,040	3,184
Cannabis	0	750	1500
SYRWCD	2,900	2,497	2,270
Total	**11,301[1]**	**11,129**	**10,584**
	Change	**- 172**	**- 717**
	Annual Change	**-7**	**-13**
	Annual Change, Percent	**- 0.06 %**	**- 0.12 %**

Note

[1] Agricultural pumping from Santa Ynez Uplands between 1982 and 2018 averaged 11,700 AFY

SYRWCD = Santa Ynez River Water Conservation District

Climate Change. The effects of climate change are projected to increase ET and therefore groundwater pumping for agriculture. DWR requires that consideration of climate change factors is consistent with DWR guidance for water budget projections. By 2042, the EMA is projected to experience average annual ET increases of 5.1 percent relative to the baseline historical period, and 8.2 percent by 2072. To satisfy these increases in ET, the total pumping for agriculture is projected to rise at magnitudes that are similar to the projected decreases due to cropping changes. Precipitation is projected to change slightly as a result of climate change in the future, increasing by 0.8 percent in 2042 and decreasing by 1 percent in 2072.

As presented on the Table 3-36, climate change may increase pumping demand for agriculture by 568 AFY by 2042 and by 868 AFY by 2072. With the projected decrease in agricultural demand due to changes in cropping patterns and increase in demand due to climate change, the net effect is a slight increase in agricultural water demand of 3.5 percent in 2042 and a lesser increase of 1.3 percent in 2072.

Table 3-36. Summary of Projected Irrigated Agricultural Pumping Including Climate Change

(Values in acre-feet per year)

Crop Group	2018	2042 (Projected)	2072 (Projected)
Agricultural Demand	11,301	11,129	10,584
Climate Change	--	+ 568 (+5.1%)	+ 868 (+8.2%)
Ag + Climate Change	11,301[1]	11,696	11,452
	Change Since 2018	**+ 395**	**+ 151**
	Change Since 2018, Percent	**+ 3.5 %**	**+ 1.3 %**
	Change Since Historical Average, Percent	**- 0.03 %**	**- 2.1 %**

Notes

[1] Agricultural pumping from Santa Ynez Uplands between 1982 and 2018 averaged 11,700 AFY.
Ag = Agricultural demand

The average agricultural pumping during the historical period was higher than the average for the single year of 2018. During the historical period, pumping for agriculture averaged 11,700 AFY, which was 400 AFY higher than in the single year 2018. Therefore, the projected effect of climate change combined with changes in cropping patterns into the future may result in little change in overall water use relative to the historical period, with a net decline of 0.03 percent in 2042 and 2.1 percent in 2072.

A water duty factor of 1.1 acre-feet per acre per year for vineyards (which is relatively lower than the value of 1.6 acre-feet per acre per year used in the calculation above) would decrease the overall agricultural pumping estimate from 11,129 AFY in 2042 to 10,179 AFY, for a net reduction of projected pumping by 950 AFY. Likewise, the estimated pumping for vineyard irrigation would decline from 10,584 AFY in 2072 to 9,589 AFY, for a reduction of 995 AFY relative to the values presented in Table 3-36. Including climate change, this would reduce the overall pumping for all crops to 10,698 AFY in 2042 and 10,375 AFY in 2072.

Municipal and Industrial Pumping. Future M&I demands were estimated based on records of current demand for non-agricultural uses for the City of Solvang, ID No. 1, mutual water companies, and rural domestic users. To estimate future M&I demands, GSI reviewed historical demand records from the City of Solvang and ID No. 1, along with population projections for the City of Solvang and unincorporated communities in the EMA based on pumping records from several mutual water companies, Santa Barbara County Association of Governments Regional (population) Growth Forecasts (SBCAG, 2012), the California Department of Finance Population and Housing Estimates (DOF, 2020) and discussions with agency staff. Based on these data sources, it was determined that the City of Solvang anticipates a population increase of approximately 1 percent per year while ID No. 1 and the unincorporated areas of the EMA (including Los Olivos, Ballard, the Chumash Reservation, and other areas) are not expected to increase in population through 2042 and 2072. Overall, the net effects of the increased population in the City of Solvang and unchanged populations within the other areas are a net increase in water use. This net change has also been assigned to the mutual water companies and rural domestic users.

Together, the growth estimates from these sources were used to project overall changes in municipal demand as presented in Table 3-37. The minor expansion of M&I pumping within the Santa Ynez Uplands is equal to a 5 percent overall increase by 2042 and an 11 percent increase by 2072 compared to the historical period. This component of the water budget was applied to the projected growth of M&I; mutual and rural demands (outflow components); and Chumash WWTP effluent flow, septic return flow and urban irrigation return flows (inflow components).

Table 3-37. Summary of Projected Municipal, Industrial, and Rural Domestic Pumping

(Values in acre-feet per year)

Water Budget Component	Historical Average	2042 (Projected)	2072 (Projected)
City of Solvang and ID No. 1 (Non-agricultural)	1,940	2,040	2,150
Mutual Water Companies	820	860	910
Rural Domestic	300	320	330
Total	**3,060**	**3,220**	**3,390**
Change, AFY	**–**	**+ 160**	**+ 330**
Change, Percent	**–**	**+ 5 %**	**+ 11 %**

Other Groundwater Inflow Components. All of the components of the groundwater budget were projected forward into the future for the 2042 and 2072 periods. In addition to changes to both agricultural and M&I pumping discussed above, the other components were adjusted to reflect the projected climate and hydrological changes, which are presented in Table 3-38.

The water budget components related to agricultural pumping (agricultural return flow) were adjusted by the same magnitude as the adjustments to agricultural pumping described above. That is, increasing pumping for irrigated agricultural pumping in turn increases agricultural return flow by the same amount.

Water budget components related to streamflow include tributary percolation (inflow) and outflow of groundwater to these tributaries. Both of these components were varied based on guidance by DWR, which projected that streamflow would increase in EMA by 1 percent in 2042 and 4 percent in 2072. These changes are incorporated into the projected water budget in Table 3-38.

Precipitation recharge is projected to change slightly in the future, increasing by 0.8 percent in 2042 and decreasing by 1 percent in 2072. These adjustments were applied to projected change in precipitation recharge and mountain front recharge, which are both inflow components.

The only component that did not change in the projected water budget was the subsurface outflow, which is minor and not significantly affected by the hydrologic changes projected to occur.

Within the EMA Santa Ynez Uplands, agricultural and M&I demands are projected to increase.

Table 3-38. Summary of Historical, Current, and Projected Water Budget with Climate Change, Santa Ynez Uplands

(Values in acre-feet per year)

Water Budget Component	Historical	Current	2042 (Projected)	2072 (Projected)
Inflow Components				
Mountain Front Recharge	3,100	1,900	3,110	3,070
Tributary Percolation	700	600	710	730
Precipitation Recharge	11,300	7,000	11,330	11,190
Chumash WWTP Effluent	40	50	40	40
Septic Return Flows	900	1,100	950	1,000
Ag Irrigation Return Flows	2,600	2,400	2,660	2,630
Urban Irrigation Return Flows	130	200	140	140
Groundwater Inflow	**18,770**	**13,250**	**18,940**	**18,800**
Outflow Components				
City of Solvang and ID No. 1 Pumping (Non-agricultural)	1,940	2,130	2,040	2,150
Agricultural Pumping	11,700	11,700	11,700	11,450
Mutual Water	820	900	860	910
Rural Domestic	300	300	320	330
Outflow to Tributaries	2,700	1,600	2,740	2,800
Phreatophyte ET	3,081	3,100	3,240	3,330
Subsurface Outflow	100	100	100	100
Groundwater Outflow	**20,641**	**19,800**	**21,000**	**21,070**
Groundwater Change in Storage	**-1,830**	**-6,580**	**-2,060**	**-2,270**

Notes

Ag = agriculture

ET = evapotranspiration

WWTP = wastewater treatment plant

The M&I and agricultural demands are satisfied with both groundwater pumping from the Santa Ynez Uplands and surface water from local and imported water sources. Imported SWP water became available to the City of Solvang in 2002, which caused groundwater pumping demand to decrease compared to previous years. M&I demand is projected to increase by 5 percent in 2042 and 11 percent in 2072. Agricultural demand with climate change is projected to decrease very slightly by 0.03 percent in 2042 and decrease by 2.1 percent in 2072. A summary of the projected pumping from the Santa Ynez Uplands is presented as Table 3-39.

Table 3-39. Summary of Projected Pumping with Climate Change

(Values in acre-feet per year)

Pumping Component	Historical Average	2042 (Projected)	2072 (Projected)
Agricultural	11,700	11,700	11,450
Municipal, Rural Domestic, and Industrial	3,060	3,220	3,390
Total Pumping	**14,760**	**14,920**	**14,840**
	Change	**+ 160**	**+ 80**
	Change, Percent	**+ 1.1 %**	**+ 0.5 %**
	Average Annual Change, Percent	**+ 0.04 %**	**+ 0.01 %**

At the end of the GSP implementation period in 2042 and into 2072, the total pumping in the EMA is projected to increase very slightly (by 1.1 percent or less relative to the historical period) in response to the combination of agricultural and M&I demands along with climate change projections. This increase represents an annual growth of projected pumping of approximately 0.1 percent per year through 2042 and 2072. The modest increase in demand in 2042 is presented graphically on Figure 3-55 and in 2072 on Figure 3-56.

Projected Surface Water Supply [§ 354.18(c)(3)(C)]

§ 354.18 Water Budget.

(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:

(C) 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.

Now and in the future, surface water is expected to be supplied to the EMA for use both in the Santa Ynez River and Santa Ynez Uplands. The surface water supplies from local and imported sources have been approximately 2,900 AFY through the historical period. Notably, the water supply available to the EMA was significantly lower between 2012 and 2016 (and 2018), when supplemental surface water supplies from the SWP were reduced due to drought conditions statewide.

Based on planning guidance from the CCWA and DWR's Delivery Capability Report (DWR, 2020a), the average delivery allocation of SWP water to the EMA was 58 percent. However, since that report was published, the CCWA and DWR delivery projection for 2022 is less than 5 percent of planned allocations.

This would suggest that the volume of imported water supply available to serve ID No. 1 (including the City of Solvang) for the near future may be significantly less than the historical deliveries; therefore, the EMA will need to rely more on local groundwater if drought conditions persist.

Water supply from local surface water sources (diversion from the Santa Ynez River) was estimated based on climate-based adjustments to Santa Ynez River streamflow, which indicate that streamflow will increase by a total of 0.5 percent by 2030 and 3.8 percent by 2072. Together, pumping from the Santa Ynez River, managed as surface water diversions, averaged 5,000 AFY during the historical period, which is projected to increase to 5,520 AFY by 2042 and 5,550 AFY by 2072, or up to the pumping volume allowed by the SWRCB for individual water rights. These calculations indicate that downstream surface water production by ID No. 1, City of Solvang, and other river water right holders and riparian landowners will likely be maintained.

3.3.5.2 Summary of Projected Water Budget

Overall, groundwater outflows from the Santa Ynez Uplands are projected to exceed inflows in the future. At the end of the implementation period in 2042, the groundwater outflows will exceed the groundwater inflows by 2,060 AFY as presented on Figure 3-55, which includes the anticipated effects of climate change. This represents a deficit.

In 2072, groundwater outflows from the Santa Ynez Uplands are projected to exceed inflow components by 2,270 AFY as presented on Figure 3-56, which includes the anticipated effects of climate change. This represents a deficit.

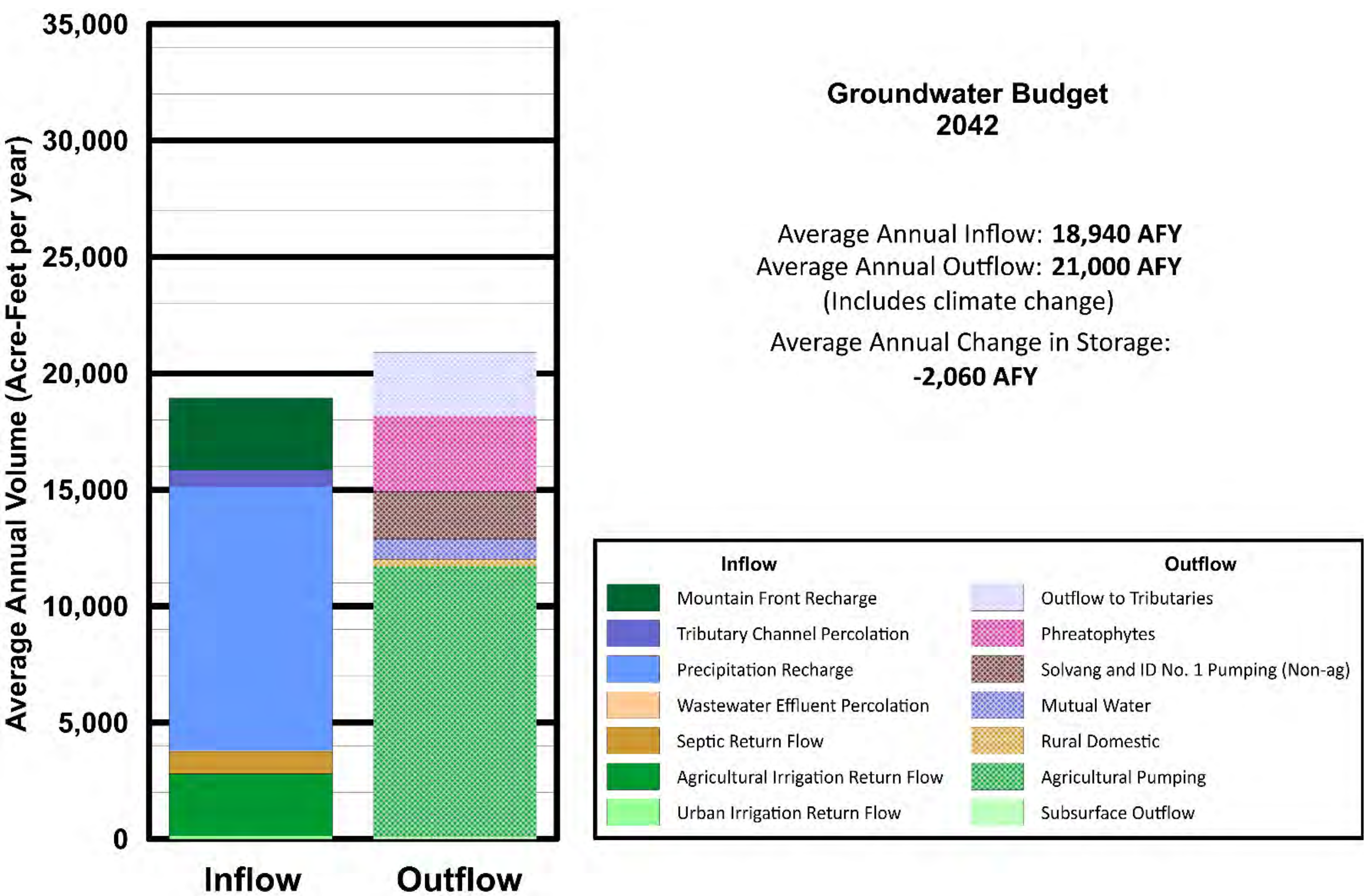

Figure 3-55. Projected Groundwater Budget, 2042

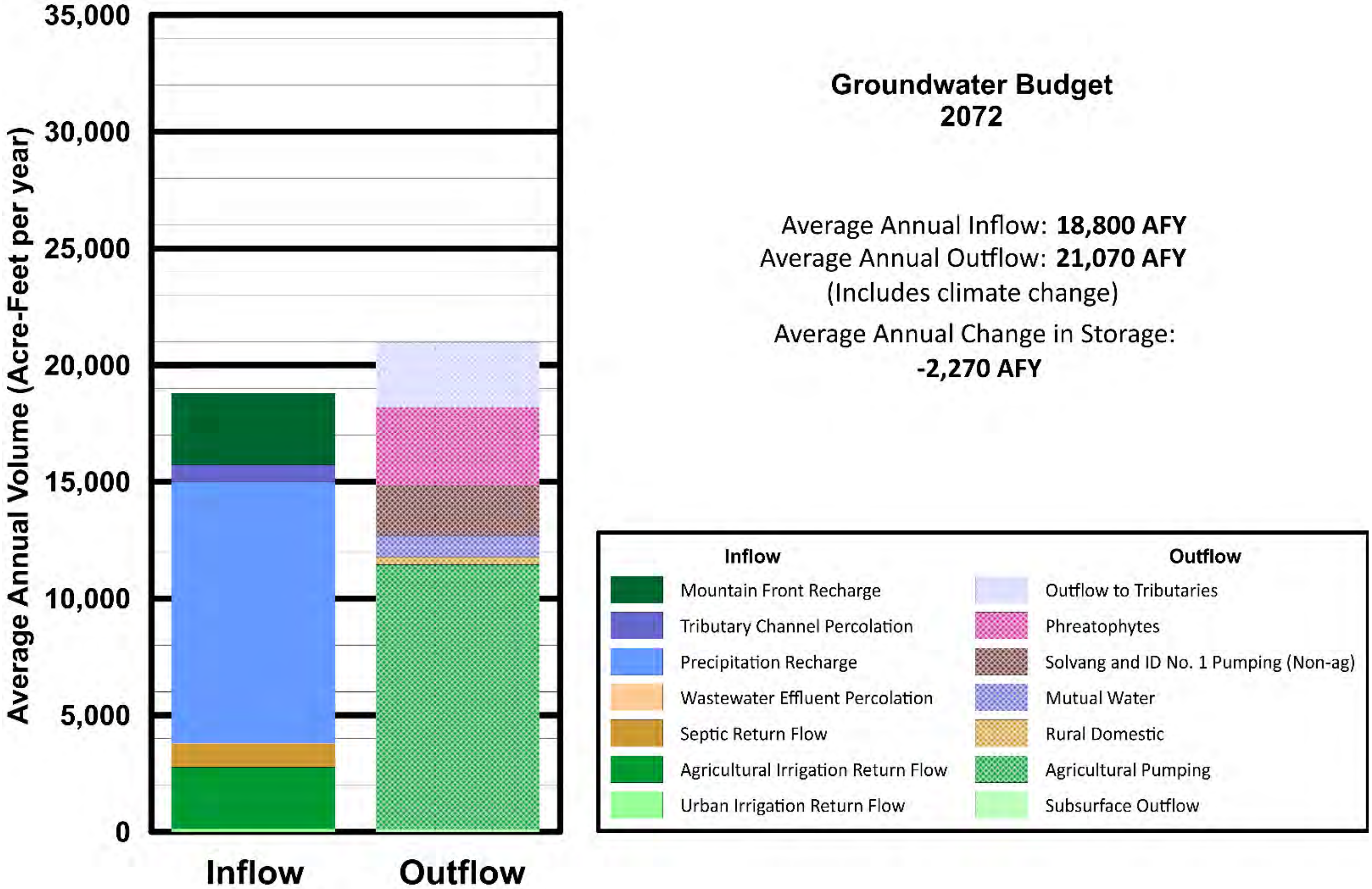

Figure 3-56. Projected Groundwater Budget, 2072

During the historical period, production from wells in the Santa Ynez Uplands served increasing demands for areas that did not have access to surface water supply. In the future, it is assumed that surface water supplies, including imported water sources, will not be sufficient to meet new demand from agricultural and M&I uses, and so increased demand will be supplied by local groundwater.

The combined effects of these changes in supply and demand are that total groundwater pumping in the EMA may increase by approximately 1.1 percent, from 14,760 AFY under historical conditions to 14,920 AFY under 2042 conditions, and to 14,840 AFY by 2072, unless measures are implemented to increase supply or reduce demand. The water budget calculations indicate that the current deficit (outflows exceeding inflows) could increase to an average of 2,060 AFY in 2042 and further to 2,270 AFY in 2072.

This analysis points out that, if demand for groundwater increases in the future, projects and management actions may need to be developed to address the current and projected deficit (overdraft) anticipated to remain in 2042, the year that DWR requires the Basin to be balanced and sustainable without undesirable results.

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SECTION 4: **Monitoring Networks**

4.1 Introduction to 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.

This section describes existing monitoring networks and improvements to the monitoring networks that will be developed for the Santa Ynez River Valley Groundwater Basin (Basin) Eastern Management Area (EMA) as part of Groundwater Sustainability Plan (GSP) implementation. This section is prepared in accordance with the Sustainable Groundwater Management Act (SGMA) regulations § 354.32, § 354.34, § 354.36, § 354.38, and § 354.40 and includes monitoring objectives, monitoring protocols, assessment and improvement of monitoring network, representative monitoring, and data reporting requirements.

The monitoring networks presented in this section are largely based on existing monitoring sites. During the 20-year GSP implementation period, it may be necessary to expand the existing monitoring networks, if existing wells are unavailable, and identify or install more monitoring sites to fully demonstrate sustainability and improve the groundwater flow model. Monitoring networks and data gaps are described for each of the five applicable sustainability indicators. Identified data gaps will be addressed during GSP implementation to improve the Groundwater Sustainability Agency's (GSA's) ability to track progress and demonstrate sustainability.

The groundwater level monitoring network section of this GSP is largely based on historical groundwater data compiled by the U.S. Geological Survey (USGS) National Water Information System (NWIS) program, the California Statewide Groundwater Elevation Monitoring (CASGEM) program,[46] and semi-annual groundwater monitoring conducted by Santa Barbara County. The groundwater quality monitoring network section of this GSP is largely based on historical groundwater data compiled by the USGS Groundwater Ambient Monitoring and Assessment (GAMA) Program.[47] The subsidence monitoring program will rely on existing Interferometric Synthetic Aperture Radar (InSAR) and University NAVSTAR Consortium (UNAVCO) satellite monitoring information that may be supplemented with surveyed benchmarks if the satellite data suggest that subsidence is occurring as a result of groundwater pumping. Depletion of interconnected surface water and potential significant and unreasonable adverse impacts to GDEs will be monitored in new piezometers that will be installed in two tributaries where groundwater is interconnected with surface water. Data gaps have been identified in the monitoring programs that will be addressed during GSP implementation.

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[46] Available at NWIS, https://maps.waterdata.usgs.gov/mapper/index.html; CASGEM, https://water.ca.gov/Programs/Groundwater-Management/Groundwater-Elevation-Monitoring--CASGEM; and http://www.countyofsb.org/pwd/SYRVGWB.sbc; respectively. (Accessed May 20, 2021.)
[47] Available at GAMA, https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/. (Accessed May 20, 2021.)

4.2 Monitoring Network Objectives and Design Criteria

§ 354.34 Monitoring Network.

(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.

(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.

(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.

(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.

The SGMA regulations require monitoring networks be developed to promote the collection of data of sufficient quality, frequency, and spatial distribution to characterize groundwater and related surface water conditions in the basin and to evaluate changing conditions that occur through implementation of the GSP. Development of the monitoring network in this GSP considered four factors (§ 354.34)(f)(1-4):

- Amounts of groundwater use
- Aquifer characteristics that affect groundwater flow
- Impacts to beneficial uses and users
- Adequate monitoring results to demonstrate an understanding of aquifer response

Furthermore, the monitoring network is intended to accomplish the following:

- Demonstrate progress toward achieving measurable objectives described in the GSP.
- Monitor impacts to the beneficial uses and users of groundwater.
- Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.
- Quantify annual changes in water budget components.

The density of monitoring sites and frequency of measurements are described in Sections 4.3.2, 4.4.2, 4.5.2, 4.6.2, and 4.7.

The minimum thresholds and measurable objectives established for each sustainability indicator to be monitored are described in Section 5. Section 6 includes a discussion of how the monitoring data will be used to inform the GSA regarding progress toward achieving measurable objectives and avoiding undesirable results caused by groundwater conditions occurring throughout the EMA.

4.2.1 Monitoring Networks

Monitoring networks have been developed considering the factors presented above for each of the five sustainability indicators that are applicable to the EMA:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon
- Significant and unreasonable reduction of groundwater storage
- Significant and unreasonable degraded water quality
- Significant and unreasonable land subsidence that substantially interferes with surface land uses
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

The EMA is isolated from the Pacific Ocean and is not threatened by seawater intrusion; therefore, this GSP does not provide monitoring for the seawater intrusion sustainability indicator.

The SGMA regulations allow the GSP to use existing monitoring sites for the monitoring network; however, some monitoring sites do not presently meet all SGMA requirements that include state well identification number, well location, ground surface elevation, well depth, and perforated intervals. Well information and data will be submitted to the SGMA Portal Monitoring Network Module (MNM). Currently, some wells in the groundwater level monitoring network do not have well construction information. Well construction information and other monitoring well information will be obtained during GSP implementation.

The approach for establishing the monitoring network for the EMA is to leverage historical or existing monitoring programs and incorporate, as needed, additional monitoring locations that have been made available by cooperating entities. The monitoring networks are limited to locations with data that are publicly available and not collected under confidentiality agreements. This section identifies data gaps in each monitoring network and proposes locations and methods for filling those data gaps.

4.2.2 Management Areas

The Santa Ynez River Valley Groundwater Basin is identified by the California Department of Water Resources (DWR) in Bulletin 118 as Basin No. 3-015 (DWR, 2018). The greater Santa Ynez River Valley Basin is located in the Central Coastal region of California. For the purposes of groundwater management and SGMA compliance, the Santa Ynez River Valley Groundwater Basin is divided into three separate management areas: the Western Management Area (WMA), the Central Management Area (CMA), and the EMA (County of Santa Barbara et al., 2016). Each management area has its own monitoring networks. The quantity and density of monitoring sites in the EMA is sufficient to evaluate conditions of the EMA and establish sustainable management criteria specific to the EMA.

4.3 Groundwater Level Monitoring Network

§ 354.34 Monitoring Network.

(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.

(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.

(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.

(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.

The minimum thresholds and measurable objectives for the chronic lowering of groundwater levels sustainability indicator are evaluated by monitoring groundwater levels at wells identified as representative monitoring sites (RMSs). The SGMA regulations require a network of monitoring wells sufficient to demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features. To the degree possible, the four factors of (1) groundwater use, (2) aquifer characteristics that affect groundwater flow, (3) impacts to beneficial uses and users and (4) adequate monitoring results to demonstrate an understanding of aquifer response, were central to the development of the water level monitoring network, within the limits of the available data.

Groundwater well construction information and water level data were obtained from the following sources:

- USGS NWIS
- DWR CASGEM
- County of Santa Barbara
- City of Solvang
- Santa Ynez River Water Conservation, District Improvement District No. 1 (ID No.1)
- DWR Online System for Well Completion Reports[48]

These data sources resulted in a data set of more than 600 wells, each analyzed using the following steps to assess whether they would be included in the groundwater level monitoring network:

- **Include only currently measured wells:** To reduce the possibility of selecting a well that has not been monitored in many years or that may no longer be accessible, wells were excluded that could not be measured in 2021.
- **Remove wells for which access agreements were denied by well owners:** The monitoring agency (i.e., the County of Santa Barbara) was not able to obtain access agreements for some private wells included in the groundwater level monitoring program, and therefore these wells are excluded from the existing groundwater level monitoring network. An effort is ongoing to reach out to private and public well owners to discuss participation in the groundwater level monitoring network.

All wells in the groundwater level monitoring network presented in this GSP are RMSs, which are also referred to as representative wells. The representative wells are defined in the SGMA regulations as monitoring sites that are representative of groundwater conditions in each of the principal aquifers within the EMA. These representative wells are evaluated in terms of sustainable management criteria in Section 5. The groundwater level representative wells network is summarized in Tables 4-1 and 4-2. There are 24 representative wells in the groundwater level monitoring network. Additionally, there are 13 wells in the EMA monitored by Santa Barbara County that do not meet the criteria of representative wells, totaling 37 wells that are currently monitored in the EMA. The distribution of both the representative wells and all the wells included in the Santa Barbara County's monitoring network within the EMA are shown on Figure 4-1.

Representative wells have the following characteristics:

- They are spatially distributed to provide information across most of the EMA (factors 1 and 3).
- They are screened exclusively within a single principal aquifer (factor 2).
- They have a reasonably long record of data (period of record) so that trends can be determined (factors 3 and 4).
- The wells serve multiple beneficial uses including agricultural, domestic, and municipal uses (factor 3).
- They have hydrograph signatures that are representative of wells in the surrounding area (factor 4).

[48] Available at DWR, https://water.ca.gov/Programs/Groundwater-Management/Wells/Well-Completion-Reports. (Accessed May 20, 2021.)

The representative wells network for groundwater level consists of 24 wells (15 wells in the Paso Robles Formation and 9 wells in the Careaga Sand) that will be used to monitor groundwater levels and storage. Ten wells are production wells used for agricultural irrigation, seven wells are domestic drinking water wells, and seven wells are municipal drinking water wells. While not ideal for use as a monitoring well because they are production wells, these wells are currently included as representative wells because of their locations in the EMA, available well construction information, and a long period of record. Seventeen of the wells lack complete well construction information such as total depth and the top and bottom depths of perforations (see Tables 4-1 and 4-2). This is a data gap that will be addressed during GSP implementation.

Table 4-1. Groundwater Level Monitoring Network – Paso Robles Formation Wells

Representative Well ID	Well Use	Well Depth (ft)	Screen Interval(s) (ft bgs)	Ground Elevation (ft NAVD 88)	Reference Point Elevation (ft NAVD 88)	First Date Measured	Last Date Measured	Years
6N/29W-07L01	Agricultural	—	—	868.9	870.7	1960	2021	62
6N/29W-08P01	Domestic	—	210 to ?	915.2	915.4	1934	2021	88
6N/29W-08P02	Domestic	—	—	896.0	897.0	1966	2021	56
6N/30W-07G05	Municipal	166	—	604.3	606.7	1962	2021	60
6N/30W-07G06	Municipal	566	305 to 410	602.3	604.3	1962	2021	60
6N/30W-11G04	Agricultural	400	130 to 390	681.1	683.1	2010	2021	12
6N/31W-01P03	Municipal	505	195 to 490	633.1	634.7	1967	2021	55
6N/31W-02K01	Domestic	—	—	619.6	620.8	1942	2021	80
6N/31W-13D01	Domestic	152	—	625.1	626.6	1941	2021	81
7N/30W-16B01	Agricultural	—	—	1,066.4	1,069.3	1950	2021	72
7N/30W-19H01	Agricultural	—	—	1,090.1	1,105.9	1954	2021	68
7N/30W-29D01	Agricultural	—	—	917.8	919.3	1905	2021	117
7N/30W-30M01	Agricultural	—	—	806.5	807.5	1905	2021	117
7N/30W-33M01	Agricultural	349	150 to 340	764.3	764.7	1954	2021	68
7N/31W-36L02	Domestic	—	—	722.6	723.6	1942	2021	80

Notes

— = No data available
? = Unknown
bgs = below ground surface
ft = feet
NAVD 88 = North American Vertical Datum of 1988

Table 4-2. Groundwater Level Monitoring Network – Careaga Sand Wells

Representative Well ID	Well Use	Well Depth (ft)	Screen Interval(s) (ft bgs)	Ground Elevation (ft NAVD 88)	Reference Point Elevation (ft NAVD 88)	First Date Measured	Last Date Measured	Years
7N/31W-34M02	Agricultural	—	—	671.1	673.1	2014	2021	8
6N/31W-03A01	Domestic	—	—	738.5	740.0	1963	2021	59
6N/31W-04A01	Domestic	259	—	601.1	603.1	1956	2021	66
6N/31W-09Q02	Municipal	550	250 to 540	756.9	754.0	2011	2021	11
6N/31W-10F01	Agricultural	265	—	555.6	556.7	1966	2021	56
6N/31W-11D04	Agricultural	447	93 to ?	565.3	560.6	1955	2021	67
6N/31W-16N07	Municipal	145	99 to 127	479.3	478.2	2011	2021	11
6N/31W-xxxx[1]	Municipal	329	190 to 325	503.2	500.9	2011	2021	11
Solvang HCA[1]	Municipal	490	180 to 470	398.0	402.8	2011	2021	11

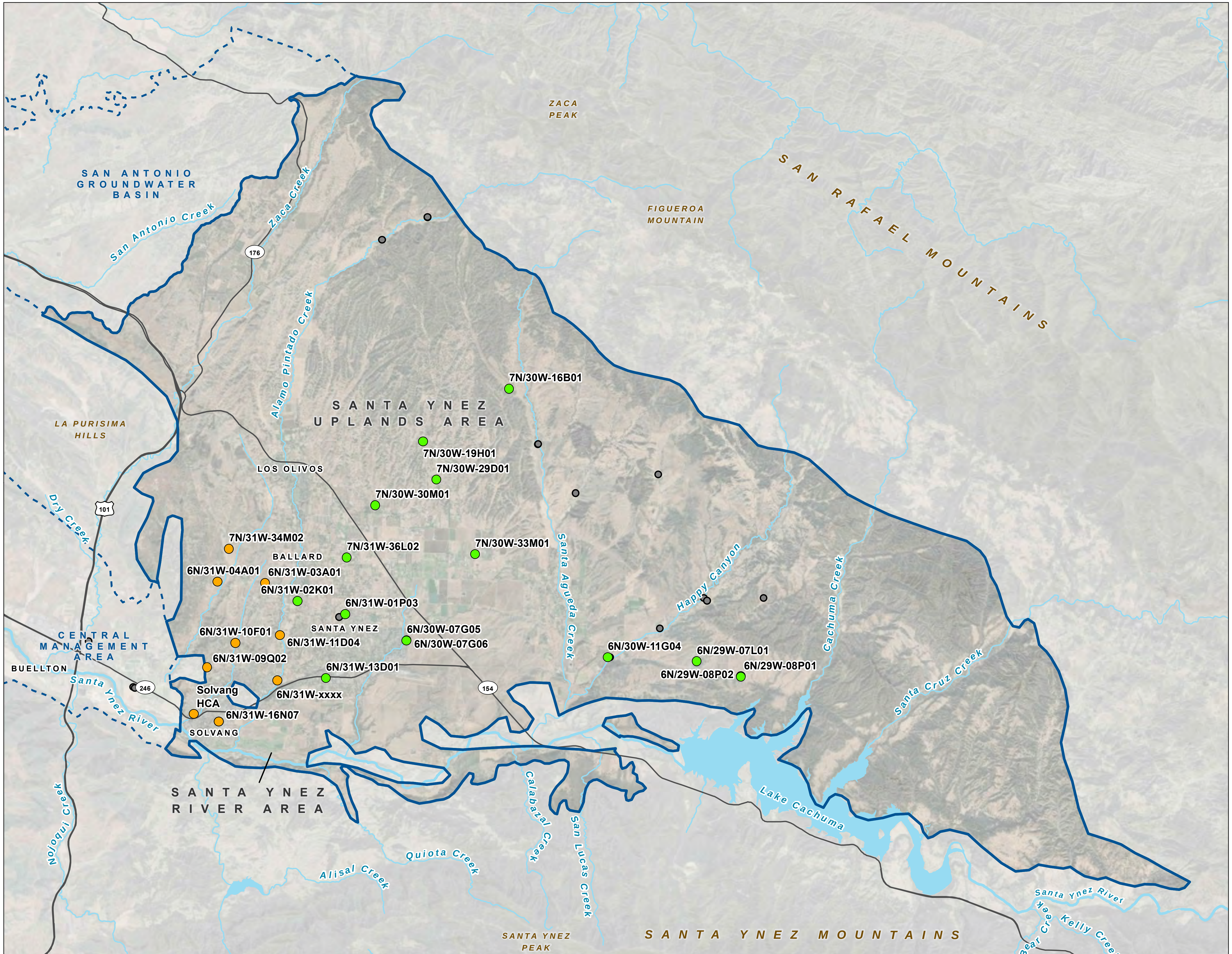
Notes

[1] The State Well Number for these wells is not known at this time.
— = No data available
? = Unknown
bgs = below ground surface
ft = feet
NAVD 88 = North American Vertical Datum of 1988

FIGURE 4-1

Groundwater Level Monitoring Network

Santa Ynez River Valley
Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan



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LEGEND

Representative Well (by screened aquifer)

- Careaga Sand
- Paso Robles Formation

Other Wells

- Monitored by Santa Barbara County

All Other Features

- Eastern Management Area Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

Date: November 12, 2021
Data Sources: ESRI, USGS, Maxar 2020

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4.3.1 Protocols for Monitoring Groundwater Levels

§ 354.34 Monitoring Network.

(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.

The GSA adopted monitoring protocols using guidelines in the SGMA regulations and Best Management Practices (BMPs) published by DWR on monitoring protocols (DWR, 2010 and 2016a). The following information or procedure is collected and documented for each monitoring site:

- Informal access agreements. Access agreements include semi-annual access to the site.
- A unique identifier that includes a general written description of the site location, date established, access instructions and point of contact, type of information to be collected, latitude, longitude, and elevation. The written description for each monitoring location also tracks all modifications to the site in a modification log.

The following considerations for groundwater level measuring protocols are considered:

- Groundwater level data are taken from the correct location and relative to the correct measuring point.
- Groundwater level data are accurate and reproducible, by measuring the water level three times during each measurement event.
- Groundwater level data collection protocols are completed in accordance with the Data Quality Objectives process defined by the U.S. Environmental Protection Agency (EPA) *Guidance on Systematic Planning Using the Data Quality Objective Process* (EPA, 2006).
- All important information is recorded to correct, if necessary, and compare data.
- A data collection and management quality assurance/quality control (QA/QC) program has been implemented to ensure data integrity.

Water level data is collected under the following conditions:

- All groundwater levels are collected within as short a time as possible, preferably within a 1- to 2-week period.
- Well owners (or operators) will ensure that the wells are not pumped for a period of 8 to 12 hours prior to measurement to ensure that the water levels represent static conditions.
- Depth to groundwater is measured relative to an established reference point (RP) on the well casing. The RP is usually identified with a permanent marker, paint spot, or a notch in the lip of the well casing. By convention, in open casing monitoring wells, the RP reference point is located on the north side of the well casing. If no mark is apparent, the person performing the measurement measures the depth to groundwater from the north side of the top of the well casing.
- The elevation of the RP of each well is surveyed to the North American Vertical Datum of 1988. The elevation of the RP is accurate to within 0.5 foot (ft).

- The sampler removes the appropriate cap, lid, or plug that covers the monitoring access point listening for pressure release. If a release is observed, the measurement follows a period of time to allow the water level to equilibrate.
- Depth to groundwater is measured to an accuracy of 0.1 ft below the RP.
- If used in the future, water level transducers must be able to record groundwater elevation to an accuracy of 0.1 ft. Transducer data should be compared to hand-measured groundwater levels to monitor electronic drift or cable movement.
- The water level meter is decontaminated before measuring domestic wells.

4.3.2 Assessment and Improvement of Groundwater Level Monitoring Network

§ 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.

(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.

(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.

(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.

(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.

§ 354.34 Monitoring Network.

(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.

(B) Static groundwater elevation measurements shall be collected at least two times per year, to represent seasonal low and seasonal high groundwater conditions.

This section summarizes several portions of the groundwater level monitoring network that constitute data gaps, focused primarily on those data gaps that that "could affect the ability of the Plan to achieve the sustainability goal" (§ 354.38 [a]) for the EMA. Table 4-3 compares the suggested attributes of a groundwater level monitoring network from the BMPs to the current network and identifies data gaps (DWR, 2016b).

Per the SGMA regulations, a data gap:

> "refers to a lack of information that significantly affects the understanding of the basin setting or evaluation of the efficacy of Plan implementation and could limit the ability to assess whether a basin is being sustainably managed."

This section also presents estimates of uncertainty regarding the principal data relied upon for the GSP.

The SGMA regulations require a sufficient density of monitoring wells to characterize the groundwater table or potentiometric surface for each principal aquifer. Professional judgment is also used to determine an adequate level of monitoring density. The monitoring density should allow for the sustainable management of the groundwater resource.

The BMP suggests a range of 0.2 to 10 wells per 100 square miles, with a median of 5 wells per 100 square miles from various cited studies to be sufficient to adequately represent groundwater conditions within a basin. For this density to be considered sufficient, the distribution of the wells within the basin to "yield representative information and about groundwater conditions as necessary to evaluate Plan implementation" (§ 354.34). The EMA is approximately 156 square miles, and the groundwater level monitoring network consists of 15 wells in the Paso Robles Formation and 9 wells in the Careaga Sand; which equates to approximately 10 wells and 6 wells per 100 square miles for the well density in the Paso Robles Formation and Careaga Sand, respectively.

Although the existing groundwater level monitoring network satisfies the well density guidance cited in the BMP, there are two areas identified within the EMA (see Figure 4-2) where the addition of monitoring wells would improve the hydrogeologic conceptual model (HCM) discussed in Section 3.2.

Table 4-3. Summary of Best Management Practices, Implementation Measures, and Data Gaps in the Groundwater Level Monitoring Network

Best Management Practice	Implementation Measures	Data Gap
Groundwater level data will be collected from each principal aquifer in the basin.	Groundwater level data is collected from 15 wells in the Paso Robles Formation and 9 wells in the Careaga Sand.	There are two areas of low density of monitoring points identified in the Paso Robles Formation. The GSA will contact well owners in these areas to determine if additional wells can be added to the network.
Groundwater level data must be sufficient to produce seasonal maps of groundwater elevations throughout the basin that clearly identify changes in groundwater flow direction and gradient (spatial density).	The groundwater level monitoring network is sufficient to produce seasonal maps of groundwater elevations throughout the EMA that clearly identify changes in groundwater flow direction and gradient (spatial density).	Some data used to prepare groundwater elevation maps (see Section 3.2) lack well construction information. Well construction information will be obtained from video surveys as funding allows.
Groundwater levels will be collected during the middle of October and March for comparative reporting purposes, although more frequent monitoring may be required (frequency).	All wells in the groundwater level monitoring network are monitored semi-annual basis in the spring and fall.	None Identified.
Data must be sufficient for mapping groundwater depressions, recharge areas, and along margins of basins where groundwater flow is known to enter or leave a basin.	The groundwater level monitoring network is sufficient for mapping groundwater depressions, recharge areas, and along margins of the EMA where groundwater flow is known to enter or leave the EMA, except in the vicinity of the Baseline Fault.	The addition of groundwater monitoring located on either side of the Baseline Fault would clarify the relationship of water levels across the fault and, by extension, its potential role in controlling groundwater flow. Selection of wells for this purpose will be considered when expanding the groundwater level monitoring network.

Best Management Practice	Implementation Measures	Data Gap
Well density must be adequate to determine changes in storage.	The groundwater level monitoring network is sufficiently distributed and meets California Department of Water Resources density requirements to determine changes in groundwater in storage.	The distribution of wells used to determine changes of storage would be optimized by including wells in the northwestern and central portions of the EMA. The GSA will contact well owners in these areas to determine if wells can be added to the network.
Long-term access agreements should be obtained for wells included in the monitoring network. Access agreements include year-round site access to allow for increased monitoring frequency.	There are currently informal well access agreement for wells included in the groundwater level monitoring network.	Formalized well access agreements will be obtained for wells in the groundwater level monitoring network. The GSA will contact well owners to formalize well access agreements during the GSP implementation period.

Notes

EMA = Santa Ynez River Valley Groundwater Basin Eastern Management Area

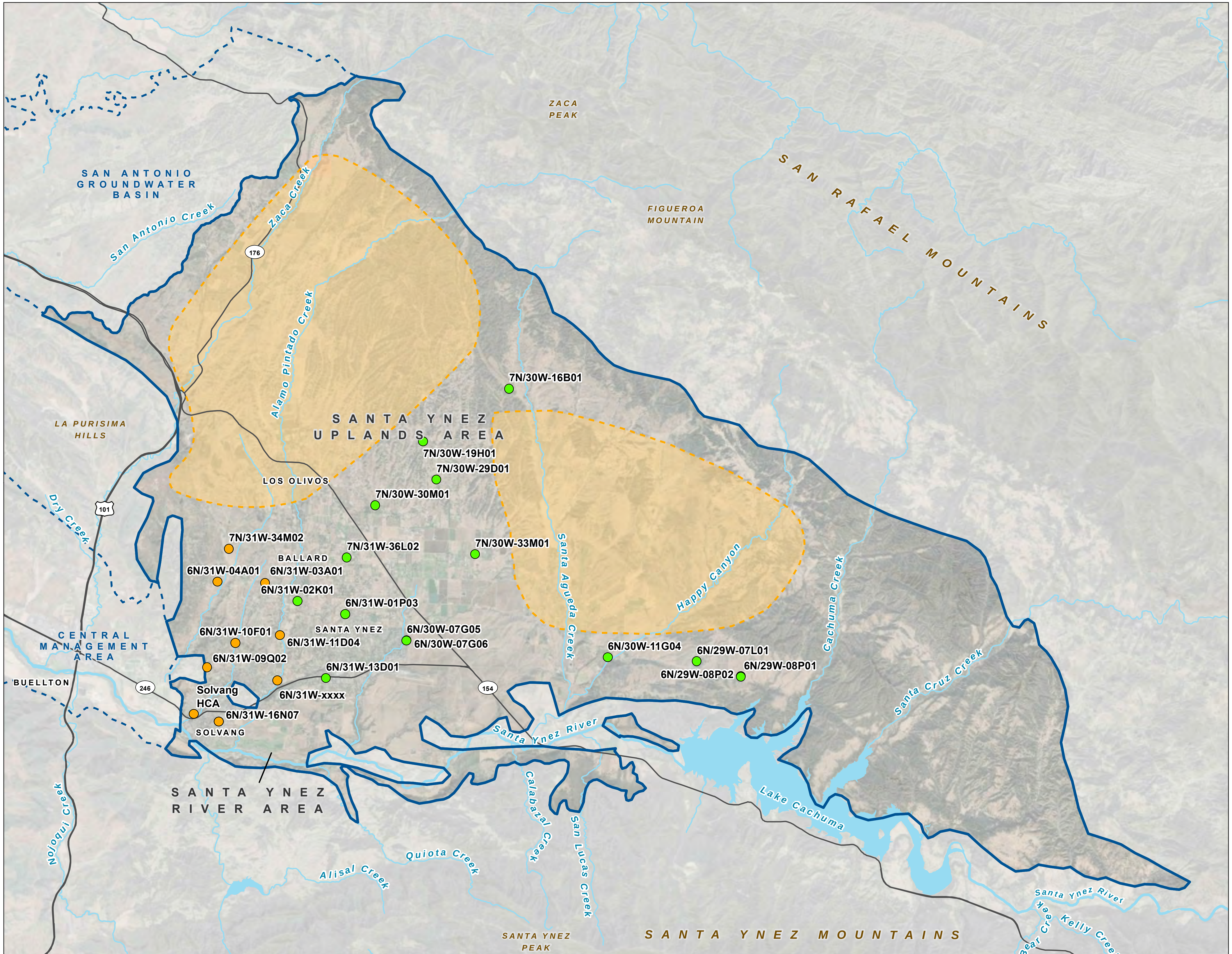

FIGURE 4-2

Groundwater Level Monitoring Network Low Well Density Areas

Santa Ynez River Valley Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan

LEGEND

Data Gap Area

Well (by screened aquifer)

- Careaga Sand
- Paso Robles Formation

All Other Features

- Eastern Management Area Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

Date: November 12, 2021
Data Sources: ESRI, USGS, Maxar 2020

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One area where the addition of monitoring wells would improve the HCM is in the Paso Robles Formation in the northwestern portions of the Santa Ynez Uplands from Los Olivos to the northern boundary of the Basin, including the northern reaches of Zaca creek and Alamo Pintado Creek. A second area where the addition of monitoring wells would improve the HCM is in the Paso Robles Formation in the central portion of the Basin, generally between Santa Agueda Creek and Happy Canyon (see Figure 4-2) An effort will be made during GSP implementation to contact owners of wells in these areas to determine if they can be included in the monitoring program. Including these additional wells in the groundwater level monitoring network would minimize the uncertainty of groundwater elevation trends and assist in sustainably managing the EMA.

Based on the State Water Resources Control Board (SWRCB) Irrigated Lands Regulatory Program (ILRP), private agricultural supply and domestic supply wells have been identified in the northwestern uplands and the central portion of the EMA. There are wells monitored by Santa Barbara County in these areas. However, most of these wells do not represent a single aquifer and therefore do not meet the criteria for a representative well. The Los Olivos Community Service District (LOCSD) is currently developing a monitoring plan for monitoring nitrate concentrations near Los Olivos. The nitrate monitoring plan will include the installation of at least one nested monitoring well completed in the Paso Robles Formation. This monitoring well (or wells) may be included in the EMA groundwater level monitoring network once completed. An effort will be made by the EMA GSA to strategically coordinate with the LOCSD monitoring program.

There are currently informal well access agreements for wells in the monitoring network. The GSP will contact well owners to formalize well access agreements during GSP implementation. Additionally, well construction information for 14 of 24 wells included in the groundwater level monitoring network is unknown. Section 352.4 of the SGMA regulations states that the water level within a well must represent a single aquifer, requiring accurate well construction information of the well. The well construction information in the groundwater level monitoring network should be determined using either video logs of wells and/or encouragement of owners to provide any well construction information for wells included in the groundwater level monitoring network.

The current understanding of groundwater flow across the Baseline Fault, discussed in Section 3.1.2.1 is that the Baseline Fault is either permeable or semipermeable and does not constitute a barrier to groundwater flow. The addition of groundwater monitoring on either side of the fault would clarify the relationship of water levels across the fault and, by extension, its potential role in controlling groundwater flow. Selection of wells for this purpose should be considered when expanding the groundwater level monitoring network.

There may be opportunities to optimize the groundwater level monitoring network in the EMA with regard to the monitoring frequency and density of the monitoring sites to provide an adequate level of detail about groundwater conditions. The number of wells included in the groundwater level monitoring network will be evaluated during each 5-year GSP interim review period to assess the effectiveness of management actions in response to (1) minimum threshold exceedances, (2) variable spatial or temporal conditions, (3) adverse impacts to beneficial uses and users of groundwater, and (4) the potential to adversely affect the implementation of the GSP or impede achievement of the sustainability goals. Hydrograph signatures from wells included in the groundwater level monitoring network will be compared for redundancy. Section 6 includes a discussion of how the monitoring network will be improved during GSP implementation.

4.4 Groundwater Storage Monitoring Network

§ 354.34 Monitoring Network.

(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.

(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.

(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.

(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.

This GSP uses groundwater levels as a proxy for assessing change in groundwater in storage (see Section 5). The groundwater level monitoring network described in Section 4.3 will be used to create groundwater elevation contour maps and calculate change of groundwater in storage for each principal aquifer. The SYRWCD prepares annual reports, which present calculations of the change of groundwater in storage within the SYRWCD boundaries. To the extent possible, wells used for this purpose are included in this groundwater level monitoring network. Therefore, the four factors of (1) groundwater use, (2) aquifer characteristics that affect groundwater flow, (3) impacts to beneficial uses and users, and (4) adequate monitoring results to demonstrate an understanding of aquifer response, that must be considered for the density of this monitoring network were considered for the development of the groundwater storage monitoring network.

4.4.1 Protocols for Monitoring Groundwater Storage

§ 354.34 Monitoring Network.

(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.

The groundwater level monitoring network will be used as a proxy for the groundwater storage monitoring network. Therefore, the protocols described in Section 4.3.1 for the groundwater level monitoring network are representative of protocols for the groundwater storage monitoring network.

4.4.2 Assessment and Improvement of Groundwater Storage Monitoring Network

§ 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.

(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.

(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.

(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.

(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.

§ 354.34 Monitoring Network.

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(2) Reduction of Groundwater Storage. Provide an estimate of the change in annual groundwater in storage.

The groundwater level monitoring network will be used as a proxy for the groundwater storage monitoring network. Therefore, the data gaps discussed in Section 4.3.2 for the groundwater level monitoring network are representative of data gaps in the groundwater storage monitoring network.

4.5 Seawater Intrusion Monitoring Network

§ 354.34 Monitoring Network.

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(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.

(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.

(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.

(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.

(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.

(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.

§ 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.

(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.

(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.

(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.

(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 EMA is isolated from the Pacific Ocean and is not threatened by seawater intrusion; therefore, this GSP does not provide monitoring for the seawater intrusion sustainability indicator.

4.6 Degraded Water Quality Monitoring Network

§ 354.34 Monitoring Network.

(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.

(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.

(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.

(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.

The sustainability indicator for degraded water quality is evaluated by monitoring groundwater quality at a network of existing supply and monitoring wells. The SGMA regulations require sufficient spatial and temporal data from each principal aquifer to determine groundwater quality trends for water quality indicators to address known water quality issues. To the degree possible, the four factors of (1) groundwater use, (2) aquifer characteristics that affect groundwater flow, (3) impacts to beneficial uses and users, and (4) adequate monitoring results to demonstrate an understanding of aquifer response, were central to the development of the degraded water quality monitoring network. However, the degraded monitoring network for water quality included all of the data discussed in this section and, therefore, considers all of these factors to the greatest extent possible. Section 6 discusses management actions intended to improve the water quality monitoring network.

Potential point sources of groundwater quality degradation were identified using the SWRCB GeoTracker data management system. Waste Discharge Requirement permits from the SWRCB GeoTracker data management system were also reviewed. Section 3.2.3.1.3 summarizes information from GeoTracker for open/active contaminated sites. Figure 3-25 shows the locations of these potential groundwater contaminant point sources and the locations of completed/case-closed sites. The single open/active case is Jim's Service Center (Site ID T0608300118) that was eligible for closure as of January 30, 2019, per the Central Coast Regional Water Quality Control Board (RWQCB) Low-Threat Closure Policy (SBCPHD, 2019) and is included in the SWRCB leaking underground storage tank (LUST) Program. Site assessment reports indicate there are dissolved-phase benzene and methyl tert-butyl ether (MTBE) plumes in groundwater beneath the site. Alamo Pintado Creek was determined to be the sensitive downgradient receptor. Due to (1) the measured groundwater gradient in the area of the site, (2) the classification of Alamo Pintado Creek as a losing stream by the USGS National Hydrography Dataset (NHD), and (3) decreasing benzene and MTBE concentrations, a minimal threat to groundwater as a potable water source was determined (Flowline Consulting, Inc., 2018). Two monitoring sites (Well T0608300118-MW-8A and T0608300118-MW-4) are currently monitored at this site as part of the LUST program. However, these are shallow monitoring wells are completed in the tributary alluvium, which is not one of the two principal aquifers and hence the wells are not included in monitoring plan.

According to the California Department of Conservation, Geologic Energy Management Division online Well Finder, or WellSTAR, tool, the Zaca Oil Field is the only oil and gas field located within or adjacent to the EMA. The USGS, in cooperation with SWRCB, initiated the California Oil, Gas, and Groundwater (COGG) Program in 2015[49]. The objective of the COGG Program is to determine where and to what extent groundwater quality may be adversely impacted by proximal oil and gas development activities (Davis, et al., 2018). Results and interpretations from the COGG Program are not yet available for review. If results and interpretations do become available during the implementation period of this GSP, the GSA will consider these findings during GSP review periods.

Existing groundwater quality monitoring programs in the EMA and groundwater quality distribution and trends are described in Section 3.2.3. Identified constituents of concern are based on state and federal regulatory standards (maximum contaminant levels [MCLs] and secondary MCLs [SMCLs]) for drinking water established by the SWRCB Division of Drinking Water (DDW)[50] and the EPA, respectively. For agricultural uses, constituents of concern are based on water quality objectives presented in the *Water Quality Control Plan for the Central Coastal Basin* (WQ Basin Plan) (RWQCB, 2019). No minimum thresholds have been established for regulated contaminants because state regulatory agencies, including the RWQCB and the Department of Toxic Substances Control, have the responsibility and authority to regulate and direct actions that address contamination. Minimum thresholds and measurable objectives pertaining to concentrations of salts and nutrients (total dissolved solids [TDS], chloride, sulfate, boron, sodium, and nitrate) have been established based upon water quality objectives established in the WQ Basin Plan by the RWQCB.

Constituents of concern for drinking water will be assessed at municipal water supply wells as part of the SWRCB DDW program. Constituents of concern for agricultural and domestic use will be assessed as part of the state ILRP and reported on the GeoTracker website. According to the RWQCB proposed Ag Order 4.0, beginning in 2022, all ranches enrolled in the ILRP must conduct annual sampling of all on-farm domestic drinking water supply and irrigation wells between March 1 and May 31 of each year. All groundwater samples must be collected by a qualified third party using proper sample collecting and handling method. All groundwater monitoring data sampled to meet the minimum groundwater monitoring requirements of the Order will be submitted electronically to the SWRCB's GeoTracker database by the testing laboratory. (RWQCB, 2021)

Wells included in the groundwater level monitoring network are listed in Tables 4-1 and 4-2 and shown on Figure 4-3. All the wells from the GSP groundwater water quality monitoring network are RMS wells. Only wells completed in one of the two principal aquifers in the Santa Ynez Uplands are included in the groundwater quality monitoring network.

The groundwater quality monitoring network includes 26 municipal and public water system wells that were identified by reviewing data available from the SWRCB DDW located in the SWRCB's GAMA database.

49 Description available at https://webapps.usgs.gov/cogg/. (Accessed May 18, 2021.)
50 Available at SWRCB, https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Chemicalcontaminants.html (Accessed May 21, 2021)

Selected wells were sampled for at least one of the constituents of concern during 2015 or more recently. The 26 wells are listed in Table 4-4 and shown on Figure 4-3.

The agricultural supply wells and domestic supply wells included in the groundwater quality monitoring network were identified by reviewing data available from the ILRP located in the SWRCB's GAMA database. Selected wells were sampled in 2015 or more recently. There is a total of 35 ILRP wells in the groundwater quality monitoring network; 10 wells were determined to be domestic supply wells based on their GAMA ID and 25 wells were determined to be agricultural supply wells. ILRP wells are listed in Table 4-4 and shown on Figure 4-3. All wells in Table 4-4 associated with an Agricultural or Domestic "Well Use" are part of the ILRP. Going forward, wells that are sampled as part of the ILRP will be used to assess groundwater quality at agricultural and domestic wells.

Table 4-4. Groundwater Quality Monitoring Network

Well ID	Well Use[1]	Well Depth (ft bgs)	Top of Screen (ft bgs)	First Date Measured	Last Date Measured[2]	Years Measured	Number of Sampling Events	Aquifer
4200531-010	Municipal	—	75	10/25/1999	12/10/2018	20	52	Unknown
4200612-006	Municipal	—	25	11/9/1999	2/7/2019	21	24	Unknown
4200616-004	Municipal	—	120	8/16/2000	12/2/2018	19	47	Unknown
4200800-001	Municipal	—	523	10/6/1987	2/14/2019	33	78	Unknown
4200802-001	Municipal	—	243	4/13/1988	12/1/2018	31	47	Unknown
4200802-002	Municipal	—	180	3/31/1999	12/1/2018	20	33	Unknown
4200804-006	Municipal	—	410	5/8/2002	10/17/2018	17	36	Unknown
4200804-008	Municipal	—	440	3/6/2003	10/17/2018	16	16	Unknown
4200807-006	Municipal	—	230	7/14/2000	12/1/2018	19	23	Unknown
4200807-009	Municipal	—	360	2/7/2001	12/2/2018	18	28	Unknown
4200837-003	Municipal	—	480	1/8/2001	10/10/2018	18	37	Unknown
4200837-004	Municipal	—	395	8/21/2002	10/10/2018	17	29	Unknown
4200881-002	Municipal	—	—	3/3/2003	12/1/2018	16	17	Unknown
4200881-005	Municipal	—	650	10/31/2001	12/1/2018	18	15	Unknown
4200893-002	Municipal	—	240	7/23/2003	5/16/2018	16	10	Unknown
4200893-003	Municipal	—	280	7/18/2005	5/16/2018	14	8	Unknown
4200895-001	Municipal	—	125	8/5/2002	11/12/2018	17	16	Unknown
4200915-001	Municipal	—	—	6/6/2000	3/25/2019	20	17	Unknown
4200931-002	Municipal	—	—	10/21/2010	7/31/2018	9	3	Unknown
4210013-001	Municipal	145	100	1/19/1984	11/14/2018	35	75	Tca
4210013-006	Municipal	550	250	6/12/1995	12/19/2018	24	39	Tca
4210013-015	Municipal	490	—	11/4/2014	12/19/2018	5	11	Tca
4210020-011	Municipal	—	—	7/24/1987	5/19/2015	29	39	Unknown
4210020-018	Municipal	—	130	3/22/1989	1/22/2019	31	53	Unknown

Table 4-4. Groundwater Quality Monitoring Network

Well ID	Well Use[1]	Well Depth (ft bgs)	Top of Screen (ft bgs)	First Date Measured	Last Date Measured[2]	Years Measured	Number of Sampling Events	Aquifer
4210020-027	Municipal	—	540	11/8/2005	12/26/2018	14	28	Unknown
4210020-031	Municipal	—	640	8/13/2008	12/27/2018	11	23	Unknown
AGL020000786-ROBLAR_D/I	Domestic/ Agricultural	—	—	12/9/2013	11/29/2017	5	4	Unknown
AGL020000888-CLMWC	Agricultural	—	—	10/15/2012	9/7/2018	7	4	Unknown
AGL020000888-FAITH WELL	Agricultural	—	—	10/15/2012	9/7/2018	7	4	Unknown
AGL020001203-BW DOM	Domestic	—	—	10/10/2012	10/25/2017	6	4	Unknown
AGL020001203-WELL BW1	Agricultural	—	—	10/10/2012	10/25/2017	6	4	Unknown
AGL020002508-WELL	Agricultural	—	—	6/25/2015	11/10/2017	3	3	Unknown
AGL020003217-J BLOCK	Agricultural	—	—	11/21/2014	10/18/2017	4	4	Unknown
AGL020003217-WINERY	Agricultural	—	—	11/21/2014	10/18/2017	4	4	Unknown
AGL020003217-XRDS	Agricultural	—	—	4/25/2017	10/18/2017	1	2	Unknown
AGL020003684-TIERRA ALTA AG	Agricultural	—	—	11/28/2012	10/26/2017	6	4	Unknown
AGL020003684-TIERRA ALTA DOM	Domestic	—	—	11/28/2012	10/26/2017	6	4	Unknown
AGL020003688-FOX AG/DOMESTIC	Domestic/ Agricultural	—	—	3/27/2013	10/26/2017	5	3	Unknown
AGL020003701-STAG CANYON DOM	Domestic	—	—	11/28/2012	10/26/2017	6	4	Unknown

Table 4-4. Groundwater Quality Monitoring Network

Well ID	Well Use[1]	Well Depth (ft bgs)	Top of Screen (ft bgs)	First Date Measured	Last Date Measured[2]	Years Measured	Number of Sampling Events	Aquifer
AGL020004012-ESTELLE 8 & 9	Agricultural	—	—	3/27/2013	10/26/2017	5	3	Unknown
AGL020004012-ESTELLE VINEYAR	Agricultural	—	—	11/28/2012	10/26/2017	6	4	Unknown
AGL020004744-PRIMARY	Agricultural	—	—	9/19/2012	12/4/2017	6	4	Unknown
AGL020006120-COGVIN_D/I	Domestic/ Agricultural	—	—	12/4/2013	8/1/2017	5	4	Unknown
AGL020007172-VINEYARD WELL	Agricultural	—	—	10/15/2012	10/20/2017	6	4	Unknown
AGL020007556-WDVINEYARD	Agricultural	—	—	6/21/2015	12/12/2017	3	3	Unknown
AGL020007594-MIDDLE WELL	Agricultural	—	—	6/12/2017	12/29/2017	1	2	Unknown
AGL020012024-CAMP4_DOM	Domestic	—	—	12/3/2013	8/1/2017	5	3	Unknown
AGL020012024-CAMP4_IRR	Agricultural	—	—	12/3/2013	8/1/2017	5	3	Unknown
AGL020012024-CMP4NEW_I	Agricultural	—	—	8/1/2017	8/1/2017	1	1	Unknown
AGL020014886-SANGER RANCH A	Domestic	—	—	11/28/2012	10/26/2017	6	4	Unknown
AGL020023842-CCGC_0520	Agricultural	—	—	8/1/2017	8/1/2017	1	1	Unknown
AGL020027368-WELL	Agricultural	—	—	6/7/2016	9/15/2016	1	2	Unknown
AGL020027634-EDISON WELL	Agricultural	—	—	8/12/2015	11/19/2015	1	2	Unknown

Table 4-4. Groundwater Quality Monitoring Network

Well ID	Well Use[1]	Well Depth (ft bgs)	Top of Screen (ft bgs)	First Date Measured	Last Date Measured[2]	Years Measured	Number of Sampling Events	Aquifer
AGL020027634-IRRIGATION WELL	Agricultural	—	—	8/12/2015	11/19/2015	1	2	Unknown
AGL020027994-SYV#1	Agricultural	—	—	6/15/2017	6/15/2017	1	1	Unknown
AGL020027994-SYV#2	Agricultural	—	—	12/1/2017	12/1/2017	1	1	Unknown
AGL020028004-AG WELL 1	Agricultural	—	—	12/26/2017	1/16/2018	2	2	Unknown
AGL020028294-PEGASUS DOM	Domestic	—	—	4/12/2018	4/12/2018	1	1	Unknown
AGL020028294-PEGASUS IRR	Agricultural	—	—	11/20/2017	4/11/2018	2	2	Unknown
AGL020028389-VINE WELL	Agricultural	—	—	4/28/2017	10/26/2017	1	2	Unknown
AGL020028425-RODNEYSVYD	Domestic	—	—	12/20/2017	4/12/2018	2	2	Unknown

Notes

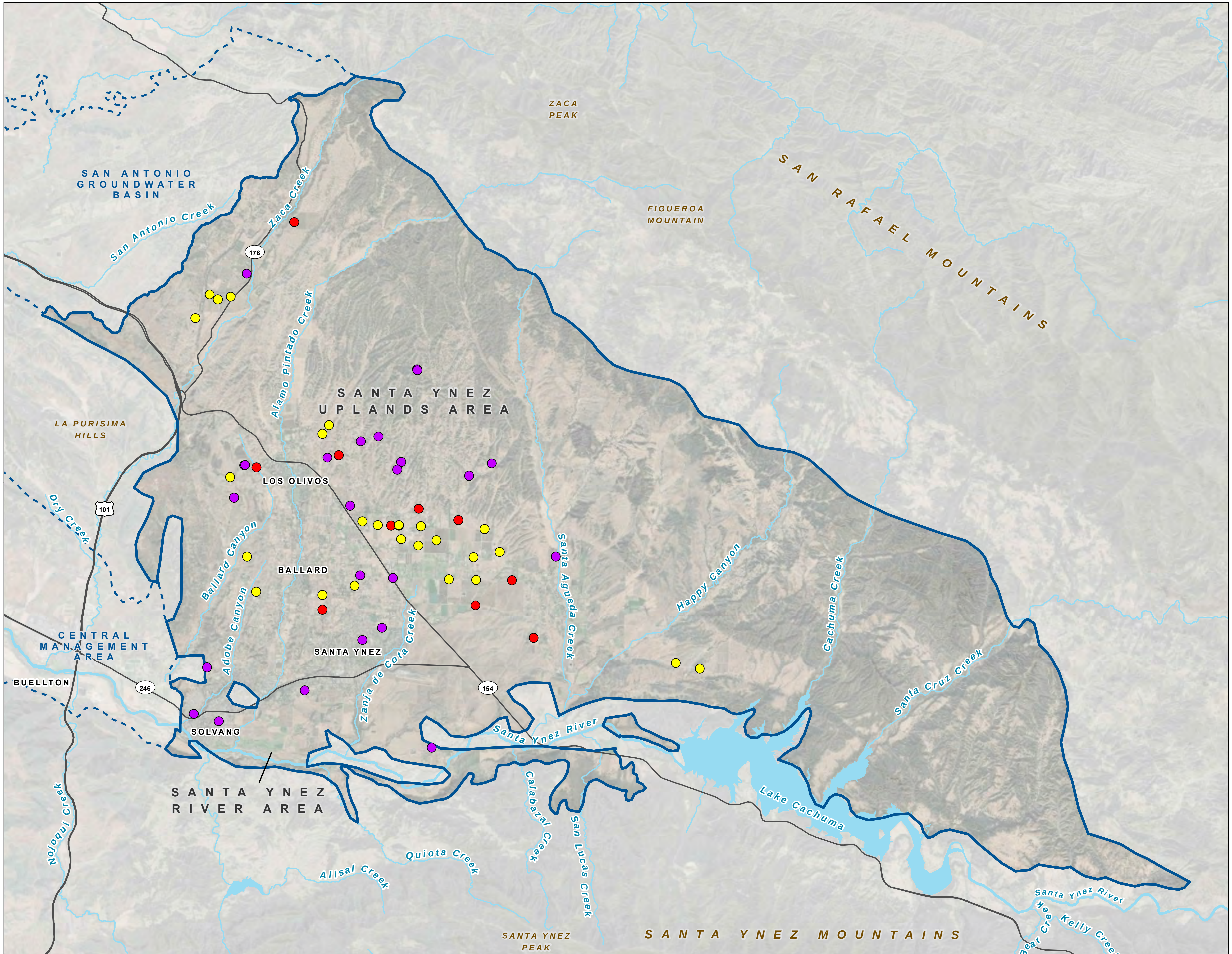
[1] Municipal designation includes municipal wells and other public water supply wells.
[2] Based on data available at the time of this analysis.
Data available at: https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/

— = No data available
? = Unknown
bgs = below ground surface
Tca = Careaga Sand

FIGURE 4-3

Groundwater Quality Monitoring Network

Santa Ynez River Valley Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan



LEGEND

Well Type

- Agricultural
- Domestic
- Municipal

All Other Features

- Eastern Management Area Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

GSI Water Solutions, Inc.

Date: November 12, 2021
Data Sources: ESRI, USGS, Maxar 2020

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\Section4\Figure4-3_Groundwater_Quality_Monitoring_Network.mxd, abarry

4.6.1 Protocols for Monitoring Degraded Water Quality

§ 354.34 Monitoring Network.

(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.

Water quality samples are currently being collected in accordance with the SWRCB DDW for municipal drinking water supply wells and ILRP requirements for agricultural and domestic wells. The ILRP data are currently collected under Central Coast RWQCB Agricultural Order 3.0 (see Section 2). The ILRP samples are collected under the Tier 1, Tier 2, or Tier 3 monitoring and reporting programs. Beginning in 2022, ILRP water quality data will be collected under Central Coast RWQCB Ag Order 4.0. Copies of these monitoring and reporting programs are included in Appendix G and incorporated herein as monitoring protocols. These protocols will continue to be followed during GSP implementation for the groundwater quality monitoring.

4.6.2 Assessment and Improvement of Water Quality Monitoring Network

§ 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.

(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.

(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.

(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.

(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.

§ 354.34 Monitoring Network.

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(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.

Groundwater quality data do not indicate a need for additional monitoring locations and that current programs provide adequate spatial and temporal coverage for the purposes of the GSP. There is adequate spatial coverage in the groundwater quality monitoring network to assess impacts, if any, to beneficial uses and users. Table 4-5 summarizes the recommendations for groundwater quality monitoring from DWR BMPs, the current network, and identified data gaps. For 40 of 61 wells in the monitoring network, well construction information is unknown and will be addressed during GSP implementation by using DWR Online System for Well Completion Reports data and continued outreach by the GSA to groundwater users in EMA.

The LOCSD is currently developing a monitoring plan for monitoring nitrate concentrations near Los Olivos, including constructing new wells. An effort will be made by the EMA to strategically coordinate with the LOCSD monitoring program and include the Los Olivos monitoring wells into the EMA monitoring program.

The degraded groundwater quality monitoring network in the EMA will be optimized during the implementation period with regard to the monitoring frequency and density of the monitoring sites to provide an adequate level of detail about groundwater conditions. The number of wells included in the groundwater level monitoring network will be evaluated during each 5-year GSP interim review period to assess the effectiveness of management actions in response to (1) minimum threshold exceedances, (2) variable spatial or temporal conditions, (3) adverse impacts to beneficial uses and users of groundwater, and (4) the potential to adversely affect the implementation of the GSP or impede achievement of the sustainability goal. Section 6 discusses management actions intended to improve the water quality monitoring network.

Table 4-5. Summary of Best Management Practices, Implementation Measures, and Data Gaps in the Water Quality Monitoring Network

Best Management Practice	Implementation Measure	Data Gap
Monitor groundwater quality data from each principal aquifer in the basin that is currently, or may be in the future, impacted by degraded water quality. The spatial distribution must be adequate to map or supplement mapping of known contaminants. Monitoring should occur based upon professional opinion, but generally correlate to the seasonal high and low groundwater level, or more frequent as appropriate.	Public databases provide adequate spatial and temporal water quality data to identify and evaluate water quality trends in principal aquifers in the EMA.	The current groundwater quality monitoring network is of adequate spatial distribution to map or supplement mapping of any known contaminants. Due to a lack of well construction information, aquifers are not assigned to 58 of 61 wells in the water quality monitoring network. Well construction information will be included as available, and aquifers will be assigned as funding allows.
Collect groundwater quality data from each principal aquifer in the basin that is currently, or may be in the future, impacted by degraded water quality. Agencies should use existing water quality monitoring data to the greatest degree possible. For example, these could include ILRP, GAMA, existing RWQCB monitoring and remediation programs, and drinking water source assessment programs.	The water quality monitoring network within the EMA includes 26 municipal wells (monitored by the SWRCB DDW program) and 35 agricultural and domestic wells (monitored by the SWRCB ILRP) within principal aquifers that have been regularly sampled since at least 2015 for groundwater quality.	The current monitoring network utilizes existing water quality monitoring data from the SWRCB DDW and ILRP. Wells included in these programs provide adequate spatial distribution to map water quality in principal aquifers in the EMA. Well construction information will be developed as funding allows
Define the three-dimensional extent of any existing degraded water quality impact.	The water quality monitoring network provides adequate spatial distribution and coverage of principal aquifers to define the three-dimensional extent of any existing degraded water quality impact.	Well construction information for 40 of 61 wells in the groundwater quality monitoring network is unknown. Well construction information will be developed as funding allows
Data should be sufficient to assess groundwater quality impacts to beneficial uses and users.	The water quality monitoring network provides sufficient water quality data, spatial distribution, and coverage of principal aquifers to assess potential impacts to beneficial uses and users of groundwater in the EMA.	Well construction information for 40 of 61 wells in the groundwater quality monitoring network is unknown. Well construction information will be developed as funding allows.

Best Management Practice	Implementation Measure	Data Gap
Data should be adequate to evaluate whether management activities are contributing to water quality degradation.	Projects and management actions proposed for implementation by the GSA will be evaluated for potential impacts to all five sustainability indicators applicable to the EMA. Existing groundwater quality monitoring programs (SWRCB DDW, ILRP, and LUST program), spatial distribution of monitored wells, and coverage of principal aquifers will provide adequate data to evaluate whether management activities are contributing to water quality degradation throughout the GSP implementation period. Additionally, select projects and management actions (e.g., recharge of treated wastewater) may be subject to further regulatory review such as the California Environmental Quality Act.	None identified.

Notes

DDW = Division of Drinking Water
GSA = Groundwater Sustainability Agency
GSP = Groundwater Sustainability Plan
ILRP = Irrigated Lands Regulatory Program
InSAR = Interferometric Synthetic-Aperture Radar
LUST = leaking underground storage tank
RWQCB = Regional Water Quality Control Board
SWRCB = State Water Resources Control Board

4.7 Land Subsidence Monitoring Network

§ 354.34 Monitoring Network.

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(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.

(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.

(g) Each Plan shall describe the following information about the monitoring network:

(g) Each Plan shall describe the following information about the monitoring network:

(1) Scientific rationale for the monitoring site selection process.

(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.

(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.

(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.

Locally defined significant and unreasonable conditions for land subsidence are (1) land subsidence rates exceeding rates estimated by using InSAR data that are collected by the European Space Agency Sentinel-1A satellite and processed by TRE ALTAMIRA, Inc. for the period from June 13, 2015, through September 19, 2019 (TRE ALTAMIRA, Inc., 2020) and the National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory (JPL) for the period between spring of 2015 and summer of 2017 (NASA JPL, 2018); and (2) land subsidence that causes significant and unreasonable damage to or substantially interferes with groundwater supply, land uses, infrastructure, and property interests. InSAR measured subsidence in the EMA are presented on Figure 3-33. The dark blue areas are areas with measured ground surface rise of between 0 feet (ft) and 0.25 ft. The teal area on Figure 3-33 is the area with measured ground surface drop of 0 ft to 0.25 ft. Random sampling of the 100-meter by 100-meter (328-ft by 328-ft) calculation grid cells indicates the greatest amount of subsidence in the EMA has occurred in the wedge-shaped area that is bound by and includes Los Olivos, State Highway 154, and the base of the San Rafael Mountains. Total measured negative change in land surface elevation in the EMA from June 13, 2015, through September 19, 2019, has been less than 0.06 ft, or 0.015 ft per year. Recorded subsidence could be due to tectonic activity, groundwater extraction, oil and gas extraction, or a combination of the three. This is considered a minor rate of land surface elevation change and is relatively insignificant and not a major concern for the EMA. However, ongoing subsidence over many years could add up to a more significant ground surface drop.

The EMA will continue to monitor annual land surface elevation change using InSAR and UNAVCO satellite systems.

4.7.1 Protocols for Monitoring Land Subsidence

§ 354.34 Monitoring Network.

(g) Each Plan shall describe the following information about the monitoring network:

(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.

(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.

The DWR BMP notes that no standard operating procedures exist for collecting land subsidence data. DWR InSAR data will continue to be monitored annually throughout the GSP implementation period. If additional relevant data sets become available, they will be evaluated and incorporated into the monitoring program.

Should potential land subsidence be observed at rates exceeding the minimum threshold (see Section 5), the GSA will first assess whether the subsidence may be due to (1) groundwater pumping and (2) elastic processes (subsidence that will recover with rising groundwater). If subsidence is observed, approaches the minimum threshold, causes undesirable results, and appears to be related to pumping, the GSA will undertake a program to install land surface elevation benchmarks at critical infrastructure locations, and monitor subsidence with measured land surface elevations on an annual basis.

4.7.2 Assessment and Improvement of Land Subsidence Monitoring Network

§ 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.

(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.

(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.

(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.

(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 subsidence minimum thresholds are set to avoid significant and unreasonable subsidence that could substantially interfere with groundwater supply, land uses, infrastructure, and property interests. Available data indicate that there is currently little subsidence occurring in the EMA that affects groundwater supply, land uses, infrastructure, and property interests. If an undesirable result occurs, the land subsidence monitoring network may be expanded to include additional monitoring stations near areas identified as having critical infrastructure, oil and gas extraction, or significant groundwater pumping.

The adequacy of the subsidence monitoring network in the EMA will be evaluated annually during preparation of the annual report. If the satellite monitoring data indicate that subsidence may be occurring, a network of land surface elevation benchmarks will be added to the monitoring program.

4.8 Depletion of Interconnected Surface Water Monitoring Network

§ 354.34 Monitoring Network.

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(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.

(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.

(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.

(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.

(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.

The classification of the streams within the EMA using the USGS NHD are presented in Section 3.2.5 (USGS, 2020). Stream classifications in the EMA include perennial, intermittent, and streams that are perennial in some segments and intermittent in other segments.

According to the NHD, the entire Santa Ynez River is defined as a perennial stream, as are several of its tributaries. Upstream of Bradbury Dam, perennial creeks include both Santa Cruz Creek and Cachuma Creek, which flow into Cachuma Reservoir (Lake Cachuma). Below Bradbury Dam, the other creeks classified as perennial include the following (in order from upstream to downstream): San Lucas Creek, Zanja de Cota Creek, Quiota Creek, and Alisal Creek. The entirety of three creeks are classified as intermittent: Happy Canyon Creek, Alamo Pintado Creek, and Ballard Canyon. The upstream portions of Santa Agueda Creek and Zaca Creek are perennial and become intermittent downstream.

Diversions from the Santa Ynez River alluvium are regulated by the SWRCB because it is considered underflow associated with the Santa Ynez River. Therefore, the EMA GSA will not be responsible for managing any aspect of the Santa Ynez River.

A significant source of recharge to the Paso Formation occurs within the shallow alluvial sand and gravel beds of tributaries where they are in direct contact with the underlying Paso Robles Formation. Percolating water moves readily through the alluvium in the Santa Ynez Uplands (LaFreniere and French, 1968). In these areas, the tributaries are losing streams, contributing to the groundwater in the underlying Paso Robles Formation (and Older Alluvium). Further south, near the distal ends of the tributaries, the streams draining the Santa Ynez Uplands discharge into the north side of the Santa Ynez River. Groundwater in the tributary alluvium at these locations encounters relatively impermeable bedrock underlying the Santa Ynez River, which forces the groundwater to discharge to surface water (Upson and Thomasson, 1951).

Where the valleys are narrow and the cross-sectional area of tributary alluvium is decreased, groundwater may be forced to the surface and at times become intermittent or perennial flow in the stream channels. Such narrowing occurs where stream channels have cut through the consolidated rocks that form the south boundary of the Santa Ynez Uplands area. This causes the re-emergence of streamflow typically during the spring and early summer months within Alamo Pintado, Santa Agueda, Zanja de Cota, and Zaca Creeks (Figure 3-34). The entirety of Cachuma and Santa Cruz Creeks as well as the lower end of Zanja De Cota Creek and the upper portion of Santa Agueda Creek are perennial. All other groundwater that discharges naturally from the EMA is either transpired by plants or discharged as underflow through thin, narrow strands of alluvium that line the valley's tributaries to the Santa Ynez River.

Santa Agueda Creek and Ballard Canyon Creek have had streamflow gauging stations, which have been removed. Streamflow gages remain in the tributaries to the Santa Ynez River within Alamo Pintado Creek and Santa Cruz Creek. Surface water flow has been estimated for Alisal, Santa Agueda, Zanja de Cota, Alamo Pintado, and Zaca Creeks for the period between 1941 and 2019 based on correlations with documented streamflow in Salsipuedes Creek and the prior stream gages that no longer exist (Stetson, 2008).

As discussed in Section 3.2, an analysis was completed to identify potential groundwater dependent ecosystems (GDEs) within the Santa Ynez Uplands (identified as Category A GDEs). To avoid impacts to Category A GDEs, groundwater levels will be used as a proxy for monitoring interconnected surface water because installation of surface water gauging stations is not considered feasible due to access and channel configuration limitations. Shallow monitoring wells, or piezometers, are planned to be installed and monitored within the Category A GDE areas identified near the confluence of Alamo Pintado and Zanja de Cota Creeks with the Santa Ynez River (see Figure 4-4). Piezometers will be constructed in accordance with SGMA requirements (§ 352.4). Avoiding adverse impacts on beneficial uses of interconnected surface water present in the EMA and preserving existing habitat are the focus of the depletion of interconnected surface sustainability indicator (see Section 5.10). The sustainability criterion for depletion of interconnected surface water is focused on avoiding significant and unreasonable adverse impacts to GDEs and sensitive species.

There is no intention at this time, nor a regulatory requirement, to create new habitat or restore habitat that existed prior to the enactment of SGMA in January of 2015. In conjunction with the Natural Communities Commonly Associated with Groundwater data set available from DWR, measured groundwater elevation data was used to identify locations in the EMA where groundwater levels were within 30 ft of ground surface. The Nature Conservancy guidelines suggest that areas overlying groundwater by more than 30 ft may be removed from the GDE category, as the depth is too great to support habitat (TNC, 2019). The evaluation mapped GDEs in the watershed include both aquatic and riparian habitat types located in Alamo Pintado and Zanja de Cota Creek.

Groundwater elevation near the potential GDEs discussed in Section 3.2 will be used as a proxy for the depletion of interconnected surface water sustainability indicator. The existing condition supports significant habitat values. As a result, significant and unreasonable effects to Category A GDEs include the following:

- Permanent loss or significant degradation of existing native riparian or aquatic habitat due to lowered groundwater levels caused by groundwater extractions
- Temporary acute loss of aquatic habitat in specific locations critical to sensitive aquatic species due to lowered groundwater levels caused by groundwater extractions
- Groundwater levels will be used as a proxy for the depletion of interconnected surface water sustainability indicator. Groundwater levels measured below the maximum rooting depth of GDEs along with an aforementioned loss of habitat would be significant and unreasonable

Monitoring of groundwater levels near the confluence of Alamo Pintado and Zanja de Cota Creek with the Santa Ynez River will be conducted by the GSA as part of the EMA interconnected surface water monitoring program to assess whether there is potential for a long-term depletion of interconnected surface water and decline in the health of the vegetation and eventual permanent habitat loss. Minimum thresholds and measurable objectives for the surface water depletion indicator have been established at these locations.

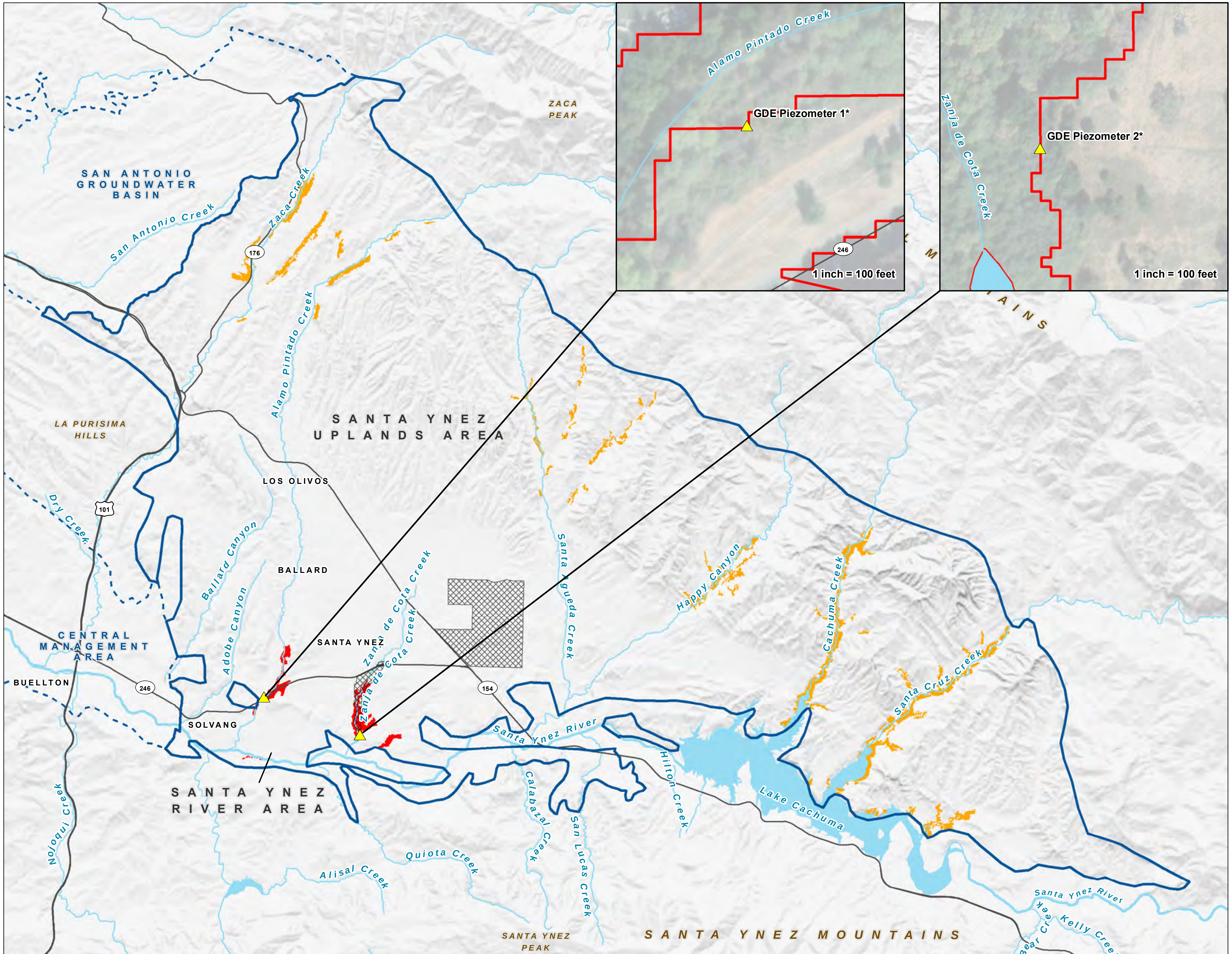


FIGURE 4-4

Interconnected Surface Water Monitoring Network

Santa Ynez River Valley Groundwater Basin –
Eastern Management Area
Groundwater Sustainability Plan

LEGEND

- Piezometer Location

Natural Communities Commonly Associated with Groundwater (NCCAG)

- Category A – Potential GDE Associated with a Principal Aquifer (184 acres[2])
- Category B – Potential GDE Unlikely to be Affected by Groundwater Management Activities (1,546 acres[2])
- Eastern Management Area Basin Boundary
- Santa Ynez River Area
- Chumash Reservation Boundary

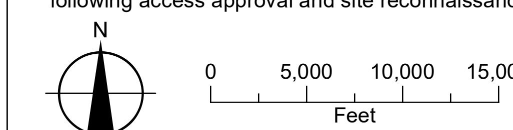
All Other Features

- Major Road
- Watercourse
- Waterbody

NOTES

1. GDE: Groundwater Dependent Ecosystem
2. Includes both NCCAG Wetland and Vegetation acreage

* The proposed piezometers locations are generalized. Exact locations of the piezometers will be determined following access approval and site reconnaissance.



Date: November 12, 2021
Data Sources: ESRI, USGS, Maxar 2019, USFWS

GSI Water Solutions, Inc.

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4.8.1 Protocols for Monitoring Depletion of Interconnected Surface Water

§ 354.34 Monitoring Network.

(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.

Groundwater level measurements from piezometers will be used for the interconnected surface water monitoring network. Pressure transducers will continuously monitor groundwater levels in the piezometers. When there is time of drought/reduced surface water flow, data will be collected from the transducers in the piezometers monthly. Manual measurements will be used to calibrate the pressure transducers. Therefore, the protocols described for the groundwater level monitoring network are representative of protocols for the interconnected surface water network.

4.8.2 Assessment and Improvement of Depletion of Interconnected Surface Water Monitoring Network

Groundwater levels will be used as a proxy for monitoring interconnected surface water. To that end, shallow monitoring wells, or piezometers, are planned to be installed and monitored within the Category A GDE areas identified near the confluence of Alamo Pintado and Zanja de Cota Creeks with the Santa Ynez River (see Figure 4-4). Piezometers will be constructed in accordance with SGMA requirements (§ 352.4).

As discussed in the Projects and Management Actions section (Section 6) and the implementation plan (Section 7), groundwater levels will be used as a proxy for monitoring surface water depletion because it is not feasible to install reliable surface water gauging stations. New piezometers are planned to be installed to monitor surface water depletion in two tributaries where interconnected surface water and groundwater is evident. The adequacy of the interconnected surface water monitoring network will be evaluated annually and during each 5-year GSP review period to assess the effectiveness of management actions considering (1) minimum threshold exceedances, (2) variable spatial or temporal conditions, (3) adverse impacts to beneficial uses and users of groundwater, and (4) the potential to adversely affect the implementation of the GSP or impede achievement of the sustainability goal.

4.9 Representative Monitoring Sites

§ 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.

(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.

All the wells in the EMA groundwater level monitoring network are RMSs. Representative wells for the groundwater level monitoring network were selected based on criteria presented in Section 4.3. Minimum thresholds and measurable objectives for chronic groundwater level decline are presented in Sections 5.5.2 and 5.5.3, and minimum thresholds and measurable objectives for reduction of groundwater in storage are presented in Sections 5.6.2 and 5.6.3.

The RMS wells are included in the broader EMA groundwater quality monitoring program that includes municipal wells monitored for DDW compliance and agricultural and domestic wells that are sampled as part of the ILRP. Data from RMS wells are evaluated in terms of the sustainable management criteria presented in Section 5.8. The groundwater quality RMS network is indicated in Table 4-4 and shown in Figure 5-3. Minimum thresholds and measurable objectives for degraded groundwater quality are presented in Sections 5.8.2 and 5.8.3.

The potential for impacts to interconnected surface water and GDEs are discussed in Section 5.10.1. Minimum thresholds and measurable objectives for interconnected surface water and GDEs are presented in Sections 5.10.2 and 5.10.3.

4.10 Reporting Monitoring Data to the Department (Data Management System)

§ 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.

The SGMA regulations provide broad requirements on data management, stating that a GSP must adhere to the following guidelines for a data management system (DMS):

- Article 3, Section 352.6: "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."
- Article 5, Section 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."

SGMA-related data for the EMA will be incorporated into the DMS. Entities in the EMA that collect and report data will have access and authorization to enter their data into the DMS. The data and information stored in the DMS will be presented on a web-based map viewer that displays data relevant to SGMA implementation, GSP development, and annual reporting to the DWR. The map viewer accommodates data within and outside of GSA monitoring networks. The types of data visualized on the map and available via the map's navigation menu are listed in Table 4-6. Details of the DMS are included in Appendix H.

Data sources used to populate the DMS are listed on Table 4-7. Details of the data sources are included in Appendix H. Data templates are used to standardize the format of the data going into the DMS to support data consistency and provide for QA/QC of the data. The templates are Excel documents that include rules restricting formatting and alphanumeric properties. The templates include pop-up windows to describe the type of data that should be entered in each column. As a second level of QA/QC, the compiled data is reviewed by the DMS development team before they are migrated into the database. This review is focused and limited in scope. It includes the following checks:

- Identifying outliers that may have been introduced during the original data entry process
- Removing or flagging questionable data
- Visualizing data in various software platforms outside the DMS to further assess the quality of the data

The automated and manual data checks above make sure data is in an appropriate range but do not confirm the quality of the data for a single observation.

Data stored in the DMS are separated by categories into tables. Each field within the tables hold a specific type of data, such as a number, text, or date, as shown in Figure 4-5. The figure is color-coordinated to show the relationship between tables:

- Main tables (shown in blue) include point data with a unique identification and unique point location to be added to database (e.g., Well_Info and Station_Info).
- Sub-tables (shown in green) are related to the main table and hold additional details about the well or unique identifier (e.g., correlation of a well point with a water level or water quality)

A brief description of the main tables and sub tables is provided as Table 4-8.

Table 4-6. Summary of Data Available for Sustainability Indicators

Sustainability Indicator	Data Types
Groundwater Levels	Water level data and well construction information
Groundwater in storage	Groundwater storage monitoring network sites
Water Quality	Water quality well and station data as reported by GAMA, including the DDW, ILRP, and LUST programs
Land Subsidence	Land elevation data from the UNAVCO CGPS ORES and InSAR data.
Interconnected Surface Water	Groundwater levels, stream gages, and precipitation stations.

Notes

CGPS = continuous global positioning system
DDW = Division of Drinking Water
GSA = Groundwater Sustainability Agency
GAMA = Groundwater Ambient Monitoring and Assessment Program
ILRP = Irrigated Lands Regulatory Program
InSAR = Interferometric Synthetic-Aperture Radar
LUST = leaking underground storage tank
UNAVCO = University NAVSTAR Consortium

Table 4-7. Summary of Data Sources

Data Type	Source	Coverage	Period of Record
Well and Site Info	DWR, ID No. 1, SYRWCD, Cities, local agencies, mutual water companies	Entire EMA	Current
Aquifer Properties	Participating Agencies Aquifer Testing (forthcoming)	Southern	
Water Level Data	USGS (NWIS) includes CASGEM, local agencies and Santa Barbara County data	583 wells within and surrounding EMA	1905 to present
Water Level Data	City of Solvang	Solvang	2008 to present
Water Level Data	ID No. 1	ID No. 1 within EMA	Pending
Water Level Data	Mutual water companies	Uplands	Recent years
Water Quality Data	GeoTracker Groundwater Ambient Monitoring & Assessment (GAMA)[1]	Entire EMA	Historical and current
Precipitation Data	Santa Barbara County	EMA and surrounding	1910 to present (Mostly 1950 to present)
Groundwater Pumpage	SYRWCD	SYRWCD	1979 to present
Oil and Gas Well Geophysical Logs	California Geologic Energy Management Division (CalGEM)	117 wells within EMA	Complete
Ground Surface Elevation	USGS	1 Meter Lidar	2018
Land Subsidence	UNAVCO CGPS ORES and InSAR data	Entire watershed and EMA	2001 to present (UNAVCO) 2015 to 2019 (InSAR)
Pumping Data (including injections for recharge)	SYRWCD and SWRCB	SYRWCD and some outlying portions of EMA	Various years through present

Notes

[1] Available at https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/

CASGEM = California Statewide Groundwater Elevation Monitoring CGPS = continuous global positioning system DWR = California Department of Water Resources
GAMA = Groundwater Ambient Monitoring and Assessment Program ID No. 1 = Santa Ynez River Water Conservation District, Improvement District No. 1
InSAR = Interferometric Synthetic Aperture Radar NWIS = National Water Information System SWRCB = State Water Resources Control Board
USGS = U.S. Geological Survey UNAVCO = University NAVSTAR Consortium

Table 4-8. Data Management System Table Descriptions

Table	Description
Main Tables	
Station Info	Information about type of station (well, recharge site, diversion, gage, extensometer, GSP) and location information
Well Info	General information about well, including identifiers used by various agencies
Sub Tables	
Agencies	Agency associated with the well or site
Sustainability Indicators	Minimum thresholds and measurable objectives set for monitoring network sites tracking sustainable management criteria for SGMA compliance
Well Construction	Well construction information, including depth, diameter, etc.
Well Construction Screen	Supplements 'Well Construction' with well screen information (one well can have many screens)
Well Geologic Aquifer	Information about the aquifer parameters of the well such as pumping test information, confinement, and transmissivity
Well Geologic Lithology	Lithologic information at a well site (each well may have many lithologies at different depths)
Water Level	Water level measurements for wells
Well Pumping	Pumping measurements for wells, annual or monthly
Managed Recharge	Recharge measurements for a recharge site, annual or monthly
SW Diversion	Diversion volume measurements for a diversion site, annual or monthly
Water Quality	Contains water quality data for wells or any other type of site

Notes

GSP = Groundwater Sustainability Plan
SGMA = Sustainable Groundwater Management Act

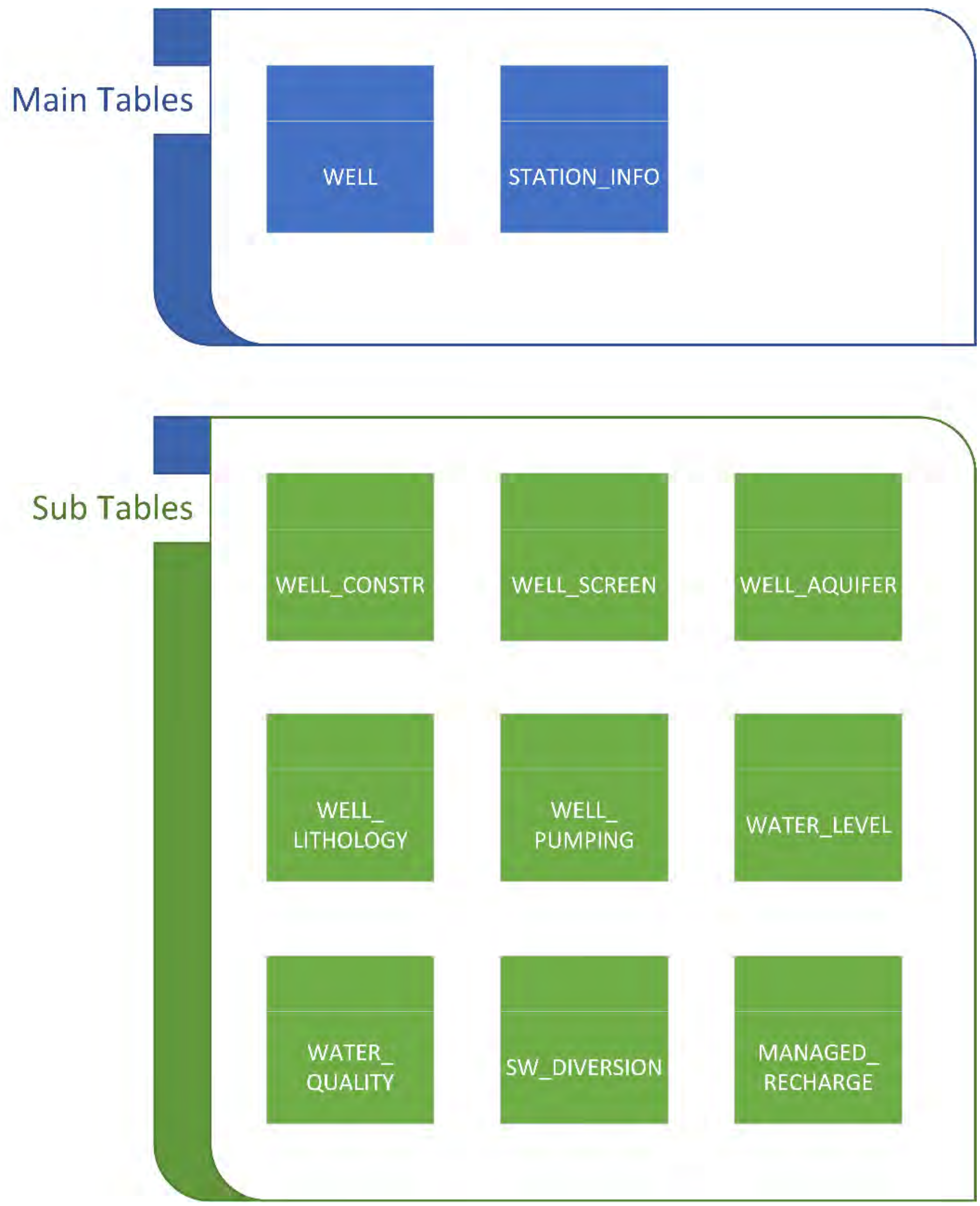

Figure 4-5. Santa Ynez Groundwater Basin Eastern Management Area Data Management System Tables

4.11 References and Technical Studies

§ 354.4 General Information.

(b) Each Plan shall include the following general information: 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.

County of Santa Barbara et al. 2016. *Draft Memorandum of Understanding for Implementation of the Sustainable Groundwater Management Act in the Santa Ynez River Valley Groundwater Basin*. Executed by the County of Santa Barbara; Santa Ynez River Water Conservation District; Santa Ynez River Water Conservation District, Improvement District No. 1; City of Solvang, City of Buellton; City of Lompoc; Vandenburg Village Community Services District; and Mission Hills Community Services District.

Davis, T.A, M.K Landon, and G.L Bennett. 2018. Prioritization of Oil and Gas Fields for Regional Groundwater Monitoring Based on Preliminary Assessment of Petroleum Resource Development and Proximity to California's Groundwater Resources. Scientific Investigation Report 2018-5065.

DWR. 2010. California Statewide Groundwater Elevation Monitoring (CASGEM) Program Procedures for Monitoring Entity Reporting. December.

DWR. 2016a. Best Management Practices for the Sustainable Management of Groundwater – Monitoring Protocols, Standards, and Sites.

DWR. 2016b. Best Management Practices for the Sustainable Management of Groundwater – Monitoring Networks and Identification of Data Gaps.

DWR. 2018. Santa Ynez River Valley Groundwater Basin Bulletin 118 Update 2016. Prepared by the California Department of Water Resources.

EPA. 2006. Guidance on Systematic Planning Using the Data Quality Objective Process. Prepared by the U.S. Environmental Protection Agency.

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SECTION 5: **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.

This section defines the conditions that constitute sustainable groundwater management and discusses the process by which the Santa Ynez River Valley Groundwater Basin (Basin) Eastern Management Area (EMA) Groundwater Sustainability Agency (GSA) will characterize undesirable results and establish minimum thresholds and measurable objectives for the five sustainability indicators in the EMA in accordance with the Sustainable Groundwater Management Act (SGMA).

Section 5 presents the data and methods used to develop sustainable management criteria (SMCs) and demonstrates how these criteria take into consideration beneficial uses and groundwater users. The SMCs presented in this section are based on currently available data and application of the best available science. As noted in Section 3 of this EMA Groundwater Sustainability Plan (GSP or Plan), data gaps exist in the hydrogeologic conceptual model. Uncertainty caused by these data gaps was considered when developing the SMCs. These SMCs are considered initial criteria and will be reevaluated and potentially modified in the future as new data become available.

The SMCs are grouped by sustainability indicator. The following five sustainability indicators are applicable in the EMA and could lead to significant and unreasonable effects caused by groundwater conditions occurring throughout the EMA:

- Chronic lowering of groundwater levels
- Reduction of groundwater in storage
- Degraded water quality
- Land subsidence
- Depletion of interconnected surface water

The EMA is isolated from the Pacific Ocean and is not threatened by seawater intrusion; therefore, the sixth SMC, seawater intrusion, is not applicable in the EMA.

According to SGMA regulations, "Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin." (GSP Regulations, § 354.26(a)).

To retain a consistent and organized approach, this section follows the same format for each sustainability indicator. The description of each SMC includes all the information required by § 354.22 et seq. of the SGMA regulations and outlined in the SMC best management practice (BMP) guidance (DWR, 2017), including the following:

- How the definition of what might constitute significant and unreasonable effects was developed
- How undesirable results were developed, including:
  - The criteria for defining when and where the potential effects on beneficial uses and users of groundwater as described by the sustainability indicators cause undesirable results (when the effects are significant and unreasonable), based on a quantitative description of the combination of minimum threshold exceedances (§ 354.26 (b)(2))
  - The potential causes of undesirable results (§ 354.26 (b)(1))
  - The effects of these undesirable results on beneficial users and uses, and on land uses and property interests (§ 354.26 (b)(3))
- How minimum thresholds were developed, including the following:
  - The information and methodology used to develop minimum thresholds (§ 354.28 (b)(1))
  - The relationship between minimum thresholds and each sustainability indicator (§ 354.28 (b)(2))
  - The effect of minimum thresholds on neighboring basins (§ 354.28 (b)(3))
  - The effect of minimum thresholds on beneficial uses and users, and on land uses and property interests (§ 354.28 (b)(4))
  - How minimum thresholds relate to relevant federal, state, or local standards (§ 354.28 (b)(5))
  - The method for quantitatively measuring minimum thresholds (§ 354.28 (b)(6))
- How measurable objectives and interim milestones were developed, including the following:
  - The methodology for setting measurable objectives (§ 354.30)
  - The methodology for setting interim milestones (§§ 354.30 (a), 354.30 (e), and 354.34 (g)(3))

5.1 Definitions

SGMA and the SGMA regulations include several terms relevant to the SMCs. The terms below use the definitions in the SGMA regulations (§ 351, Article 2). Where appropriate, additional explanatory text is added in italics. This explanatory text is not part of the official definitions of these terms. To the extent where appropriate, plain language, with only a limited use of highly technical terms and acronyms, was used to assist as broad an audience as possible in understanding the development process and implications of the SMCs.

Groundwater-dependent ecosystem (GDE) refers to ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface.

Interconnected surface water refers to 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. *Interconnected surface waters are parts of streams, lakes, or wetlands where the groundwater table is close enough to the ground surface to influence water in the lakes, streams, or wetlands or vice versa.*

Interim milestone refers to a target value representing measurable groundwater conditions, in increments of five years, set by an Agency as part of a Plan.

Management area (MA) refers to an area within a basin for which the Plan may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors.

Measurable objectives (MOs) refer to specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin. Measurable objectives are goals that the Plan is designed to achieve.

Minimum thresholds (MTs) refer to numeric values for each sustainability indicator that are used to define undesirable results. Minimum thresholds have been established at representative monitoring sites. *Minimum thresholds are set once potential undesirable results are defined when an unreasonable condition might occur. For example, a particular groundwater level might be a minimum threshold if lower groundwater levels would result in a significant and unreasonable reduction of groundwater in storage or depletion of supply.*

Representative monitoring site (RMS) refers to a monitoring site within a broader network of sites that typifies one or more conditions within the basin or an area of the basin. This term is synonymous with representative well site.

Sustainability indicator refers to any of the effects caused by groundwater conditions due to groundwater use occurring throughout the basin that, when significant and unreasonable, cause undesirable results. *They are the set of six conditions defined by the California Department of Water Resources (DWR) that may be present in a basin that may result in effects, when significant and unreasonable, that cause undesirable results (defined below), and impact sustainability of the basin as described in California Water Code § 10721(x).*

Uncertainty refers to a lack of understanding of the basin setting that significantly affects the Agency's[51] ability to develop SMCs and appropriate projects and management actions in the Plan,[52] or to evaluate the efficacy of Plan implementation, and therefore may limit the ability to assess whether a basin is being sustainably managed.

Undesirable result refers to the definition provided in § 10721(x) of SGMA, which states that:

> *Undesirable result means one or more of the following effects caused by groundwater conditions occurring throughout the basin:*
>
> *(1) **Chronic lowering of groundwater levels** indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.*
>
> *(2) Significant and unreasonable **reduction of groundwater storage**.*
>
> *(3) Significant and unreasonable **seawater intrusion**.*
>
> *(4) Significant and unreasonable **degraded water quality**, including the migration of contaminant plumes that impair water supplies.*
>
> *(5) Significant and unreasonable **land subsidence** that substantially interferes with surface land uses.*
>
> *(6) **Depletions of interconnected surface water** that have significant and unreasonable adverse impacts on beneficial uses of the surface water.*

[51] The EMA-GSA is the Agency referred to in this definition.
[52] The EMA GSP is the Plan referred to in this definition.

Section 354.26(b)(2) of the SGMA regulations states that "The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin."

5.2 Sustainability Goal [§ 354.24]

§ 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.

Per § 354.24 of the SGMA regulations, this GSP's discussion of the sustainability goal consists of three parts:

- A description of the sustainability goal
- A discussion of the measures that will be implemented to ensure the EMA will be operated within sustainable yield
- An explanation of how the sustainability goal is likely to be achieved

Sustainability Goal: Because each of the groundwater management areas together encompass the entire Basin, a single sustainability goal has been adopted for the entire Santa Ynez River Valley Groundwater Basin as follows:

> *In accordance with the Sustainable Groundwater Management Act (SGMA), the sustainability goal for the Santa Ynez River Valley Groundwater Basin (Basin) is to sustainably manage the groundwater resources in the Western, Central, and Eastern Management Areas to ensure that the Basin is operated within its sustainable yield for the protection of reasonable and beneficial uses and users of groundwater. The absence of undesirable results, as defined by SGMA and the Groundwater Sustainability Plans (GSPs), will indicate that the sustainability goal has been achieved. Sustainable groundwater management as implemented through the GSPs is designed to ensure that:*
>
> 1. *Long-term groundwater elevations are adequate to support existing and future reasonable and beneficial uses throughout the Basin,*
> 2. *A sufficient volume of groundwater storage remains available during drought conditions and recovers during wet conditions,*
> 3. *Groundwater production, and projects and management actions undertaken through SGMA, do not degrade water quality conditions in order to support ongoing reasonable and beneficial uses of groundwater for agricultural, municipal, domestic, industrial, and environmental purposes.*
>
> *Groundwater resources will be managed through projects and management actions implemented under the GSPs by the respective Groundwater Sustainability Agencies (GSAs). Management of the Basin will be supported by monitoring groundwater levels, groundwater*

in storage, groundwater quality, land surface elevations, interconnected surface water, and seawater intrusion. The GSAs will adaptively manage any projects and management actions to ensure that the GSPs are effective and undesirable results are avoided.

The EMA GSP includes a monitoring program (see Section 4) that addresses each of the applicable sustainability indicators. If, based on the results of the monitoring program, minimum thresholds are exceeded such that undesirable effects are present or imminent, the GSA will identify management actions and projects that will be implemented to avoid an undesirable result (see Section 6). Other projects and management actions may be implemented immediately upon GSP adoption, without a specific nexus to undesirable results, to address data gaps and collect important data regarding basin conditions.

5.2.1 Qualitative Objectives for Meeting Sustainability Goals

Qualitative objectives are designed to help stakeholders understand the overall purpose for sustainably managing groundwater resources (e.g., avoid chronic lowering of groundwater levels) and reflect the local economic, social, and environmental values within the EMA. A qualitative objective is often compared to a mission statement. The qualitative objectives for the EMA are the following:

- **Avoid Chronic Lowering of Groundwater Levels**
  - Maintain groundwater levels that continue to support current and ongoing beneficial uses and users of groundwater use in the EMA.
- **Avoid Chronic Reduction of Groundwater in Storage**
  - Maintain sufficient groundwater volumes in storage to sustain current and ongoing beneficial uses and users of groundwater which maintains access to groundwater supplies, including during prolonged drought conditions while avoiding permanent degradation of GDEs resulting from groundwater conditions occurring throughout the EMA.
- **Avoid Degraded Groundwater Quality**
  - Maintain groundwater access to suitable water quality for all beneficial uses to ensure sustainability of groundwater drinking water supplies for all beneficial uses.
  - Evaluate changes in groundwater quality resulting from groundwater conditions occurring throughout the EMA.
- **Avoid Land Subsidence**
  - Reduce or prevent land subsidence that causes significant and unreasonable effects to groundwater supply, current land uses, and water supply infrastructure, and property interests.
- **Avoid Depletion of Interconnected Surface Water**
  - Avoid depletions of interconnected surface water that have significant and unreasonable adverse impacts to beneficial uses of the surface water, including GDEs, caused by groundwater conditions occurring throughout the EMA.
  - Maintain sufficient groundwater levels to maintain areas of interconnected surface water existing as of January 2015 when SGMA was enacted.
- **Avoid Seawater Intrusion**
  - Not applicable due to the inland location of the EMA.

5.3 Process for Establishing Sustainable Management Criteria [§ 354.26(a)]

§ 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.

This section presents the process that was used to develop the SMCs for the EMA, including input obtained from EMA stakeholders, the criteria used to define undesirable results, and the information used to establish minimum thresholds and measurable objectives.

5.3.1 Public Input

The public input process was developed in conjunction with the GSA member agencies and included engagement with local stakeholders and interested parties on GSP issues. This included the formation of the Citizens Advisory Group (CAG), whose members were selected by the GSA Committee because they have an interest in maintaining a healthy agricultural and business community, good water quality, and a healthy environment as being representative of the various beneficial uses and users of groundwater in the EMA. The SMCs and beneficial uses presented in this section were developed using a combination of information from public input, public meetings, written comments submitted to the GSA, hydrogeologic analysis, and meetings with CAG members. Details of outreach efforts and efforts to obtain public input are described in Section 2.3.

The general process for establishing SMCs included the following:

- Holding a CAG meeting that outlined the GSP development process and introduced stakeholders to SMCs.
- Conducting public meetings to present initial conceptual minimum thresholds and measurable objectives and receive additional public input. Six public meetings on SMCs were held.[53] The meetings were held remotely due to COVID-19 restrictions on public gatherings.

[53] See https://portal.santaynezwater.org/calendar?gsaKey=EMA for details on the meetings and workshops.

5.3.2 Criteria for Defining Undesirable Results [§ 354.26(b)(1) and (d), (b)(3)]

§ 354.26 Undesirable Results.

(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.

(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.

(3) Description of 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.

Section 5.2.1 discusses the qualitative objectives for meeting sustainability goals. These goals were discussed in terms of avoiding undesirable results for each of the sustainability indicators. The general criteria used to define undesirable results in the EMA are as follows:

- There must be significant and unreasonable effects caused by groundwater conditions occurring throughout the basin
- A minimum threshold is exceeded in a specified number of representative wells over a prescribed period such that there is a depletion of supply
- Impacts to beneficial uses, including GDEs, are likely to occur, including to GDEs and/or threatened or endangered species

These criteria may be refined periodically during the 20-year GSP implementation period based on monitoring data and analysis.

5.3.3 Information and Methodology Used to Establish Minimum Thresholds and Measurable Objectives [§ 354.28(b)(1),(c)(1)(A)(B), and (e)]

§ 354.28 Minimum Thresholds.

(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 the uncertainty in the understanding of the basin setting.

(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 trend, water year type, and projected water use in the basin.

(B) Potential effects on other sustainability indicators.

(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.

The following information and data were used to establish minimum thresholds and measurable objectives for each of the sustainability indicators.

5.3.3.1 Avoid Chronic Lowering of Groundwater Levels

The information used for establishing the minimum thresholds and measurable objectives that pertain to chronic lowering of groundwater levels includes the following:

- Information gathered from the public meetings about the public's perspective of significant and unreasonable conditions and preferred current and future groundwater levels.
- Historical groundwater level data plotted versus time from wells monitored by the U.S. Geological Survey (USGS); Santa Ynez River Water Conservation District Improvement District No. 1 (ID No. 1); City of Solvang; U.S. Bureau of Reclamation; mutual water companies; Santa Barbara County; and other public agencies.
- Well construction details and locations of existing wells were compiled from DWR databases and from water purveyors. A well impact analysis was performed by comparing spring 2018 water level elevations with top of well screen elevations for agricultural, municipal wells, and domestic wells. The percentage of wells with water levels below top of screen was calculated in 5-foot increments, starting with spring 2018 water levels (see Section 3.2). Water levels that are chronically below the top of screen in more than 40 percent of wells used in the analysis is considered undesirable because a reduction in well production and depletion of supply may occur.

- Maps of current and historical groundwater level data.
- Mapping of the location and types of GDEs where groundwater is interconnected with surface water.

The monitoring network and protocols that will be used to measure groundwater levels at the RMSs are presented in Section 4.

5.3.3.2 Avoid Significant and Unreasonable Reduction of Groundwater in Storage

Groundwater levels can be used as a proxy for assessing changes in groundwater in storage and evaluating whether total groundwater withdrawals within the EMA could lead to undesirable results. Therefore, the information that is used to establish minimum thresholds and measurable objectives for the chronic groundwater level decline sustainability indicator will be used to define the sustainability criteria for significant and unreasonable reduction of groundwater in storage.

5.3.3.3 Avoid Significant and Unreasonable Degraded Groundwater Quality

The information used for assessing degraded groundwater quality thresholds includes the following:

- Historical groundwater quality data from wells in the EMA
- Municipal drinking water supply wells (City of Solvang, ID No. 1, and mutual water company wells) and water quality data obtained from the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) public supply well water quality program
- Domestic and irrigation well water quality data obtained from the SWRCB Irrigated Lands Regulatory Program (ILRP) and USGS National Water Information System
- Observation well water quality data obtained from Santa Barbara County and the California Statewide Groundwater Elevation Monitoring (CASGEM) program, the USGS Groundwater Ambient Monitoring and Assessment (GAMA) Program, and SWRCB GeoTracker database
- Federal and state drinking water quality standards (SWRCB, 2019) and EMA water quality objectives (WQOs) presented in the Water Quality Control Plan for the Central Coastal Basin (WQ Basin Plan) (RWQCB, 2019)
- Feedback about significant and unreasonable conditions from the GSA Committee Members, CAG, and the public

The historical groundwater quality data used to establish thresholds are presented in Section 3.2.3.

Thresholds for contaminants (e.g., volatile organic compounds) are not proposed because assessment, source identification, and cleanup of these constituents of concern are regulated under the authority of state agencies, including the Central Coast Regional Water Quality Control Board (RWQCB). The GSA does not have the responsibility nor the authority to manage contaminants. It is, however, the responsibility of the GSA to ensure concentrations, if any, of these constituents present in groundwater prior to the enactment of SGMA in January 2015 are not increased because of groundwater pumping, or actions taken by the GSA. Elevated concentrations of salts and nutrients (e.g., total dissolved solids [TDS], sulfate, chloride, and nitrate) can impact beneficial uses, including drinking water and agricultural uses. Thus, minimum thresholds and measurable objectives are proposed for these constituents in accordance with the WQ Basin Plan.

5.3.3.4 Avoid Significant and Unreasonable Land Subsidence

Minimum thresholds for land subsidence were established to protect groundwater supply, land uses, and infrastructure from significant and unreasonable land subsidence that may lead to undesirable results. Changes in land surface elevation may be caused by tectonic activity, oil and gas production, and groundwater pumping. Changes in ground surface elevation are presently measured using Interferometric Synthetic Aperture Radar (InSAR) data available from DWR and the two University NAVSTAR Consortium (UNAVCO) Continuous Global Positioning Systems (CGPSs), located on the periphery of the EMA in Solvang and Los Olivos. The general minimum threshold is the absence of long-term significant and unreasonable land subsidence arising from groundwater pumping in the EMA that substantially interferes with surface land uses. Section 3.2.4 includes a detailed discussion of the InSAR data provided by DWR and the measured land subsidence data collected by the UNAVCO CGPSs.

As described in Section 3.1.3 of the GSP, the Principal Aquifers in the Basin include the Paso Robles Formation and Careaga Sand. The Paso Robles Formation contains relatively thin, often discontinuous sand and gravel layers interbedded with thicker layers of silt and clay; however, the fine-grained material that would be subject to subsidence are not laterally continuous, which tends to reduce the likelihood for significant subsidence. The Careaga Sand consists of fine-grained to medium-grained, uniform, massive, marine sand with some gravel and limestone; therefore, lacking laterally continuous fine-grained material susceptible to significant subsidence. Land surface elevation changes recorded by the UNAVCO CGPSs located in periphery of EMA during the 19-year period of record (approximately 2001 through 2020) is approximately plus or minus 10 millimeters (mm), or 0.03 feet. There have been no reports from landowners or public agencies of impacts resulting from subsidence.

To supplement the InSAR and UNAVCO data, a preliminary subsidence evaluation was completed to assess the range of possible long-term ground surface elevation changes related to withdrawal of groundwater from the EMA. The preliminary evaluation included developing stratigraphic profiles from well logs and estimating ranges of possible long-term subsidence that might be expected in the future. The analysis was completed at two well locations (ID1 5a and ID1 6) with estimated potential subsidence on the order of 0.5 to 3 feet over the next 20 years resulting from the changes in groundwater elevation reported in the hydrographs. This report is presented in Appendix E and additional discussion is included in Section 3.2.4. This estimate is considered speculative due to the lack of data on material properties of geologic materials in the basin. Due to a lack of subsidence data for the portion of the EMA where pumping effects are likely to be the greatest, a subsidence monitoring program is proposed and presented in Section 4.

5.3.3.5 Avoid Significant and Unreasonable Depletion of Interconnected Surface Water

The information used for establishing minimum thresholds and measurable objectives for depletion of interconnected surface water includes the following:

- Available data from streamflow gauging stations (see Table 3-1).
- Water budget computations using the groundwater model that show estimated exchanges between surface water and groundwater within the areas where groundwater is interconnected with surface water (distal ends of Zanja de Cota and Alamo Pintado Creeks).
- Published documents and independent analysis that identify the extent and distribution of potential GDEs, including designated critical habitat for steelhead.
- Public input.

5.3.4 Relationship between Individual Minimum Thresholds and Other Sustainability Indicators [§ 354.28(b)(2)]

§ 354.28 Minimum Thresholds.

(b) The description of minimum thresholds shall include the following:

(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.

Section 354.28 of the SGMA regulations requires that the description of all minimum thresholds include a discussion about the relationship between the minimum thresholds for each sustainability indicator. In its BMP guidance for SMCs (DWR, 2017), DWR has clarified this requirement. The GSP must describe the relationship between each sustainability indicator's minimum threshold and describe the relationship between the selected minimum threshold and minimum thresholds for other sustainability indicators.

5.4 Representative Monitoring Sites

Minimum thresholds and measurable objectives are measured at RMSs (also referred to as representative wells) that are deemed to be representative of local and EMA-wide groundwater conditions in each Principal Aquifer. Representative wells were selected from a subset of the wells that have been monitored over time in the EMA and have the following characteristics:

- They are screened exclusively within a Principal Aquifer.
- They are spatially distributed to provide information across most of the EMA.
- They are presently being monitored and have a reasonably long record of data (period of record) so that trends can be determined.
- They have signatures (groundwater levels or water quality trends) that are representative of wells in the surrounding area.

See Section 4 for a detailed discussion of the rationale for selecting RMSs. In summary, the RMS network for groundwater levels consists of 24 wells (15 wells in the Paso Robles Formation and 9 wells in the Careaga Sand) that will be used to help identify whether chronic reductions in groundwater levels and significant and unreasonable reductions of groundwater storage are occurring. Seven wells are municipal drinking water supply wells operated by the City of Solvang and ID No. 1, 10 wells are production wells used for agricultural irrigation, and seven wells are domestic drinking water wells. These active pumping wells are currently included as RMSs because of their location in the EMA, available well construction data, and a long period of record.

RMS wells and many other wells with historical water level data were used in the modeling of groundwater level changes under historical and predicted future groundwater demand with and without climate change influences. Minimum thresholds and measurable objectives have been established using measured groundwater level data.

The RMS for subsidence utilizes InSAR and UNAVCO satellite data. Should these satellite-based subsidence monitoring methods indicate that subsidence may be occurring or if there is evidence of damage to infrastructure and property interests, benchmarks for monitoring land surface elevations will be established in the EMA. The RMS for monitoring depletion of interconnected surface water and impacts to GDEs will be established at two new piezometers installed on the distal ends of Alamo Pintado and Zanja de Cota Creeks.

Minimum thresholds and measurable objectives for chronic groundwater level decline are presented in Section 5.5, and minimum thresholds and measurable objectives for reduction of groundwater in storage are presented in Section 5.6. The potential for impacts to GDEs for the chronic lowering of groundwater levels sustainability indicator are discussed in Section 5.5 and for the interconnected surface water sustainability indicator in Section 5.10. Minimum thresholds and measurable objectives for degraded groundwater quality are discussed in Section 5.8 and for land subsidence in Section 5.9.

5.5 Chronic Lowering of Groundwater Levels Sustainable Management Criterion

5.5.1 Undesirable Results for Water Levels [§ 354.26(a),(b)(2),(c) and (d)]

§ 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.

(b) The description of undesirable results shall include the following:

(2) 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.

(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.

(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.

Conditions in the EMA that could lead to significant and unreasonable effects on groundwater levels include the following:

- **Extended drought.** Extensive droughts may lead to excessively low groundwater levels and undesirable results. Short-term impacts due to drought are anticipated in the SGMA regulations with recognition that management actions need sufficient flexibility to accommodate drought periods and ensure short-term impacts can be offset by increases in groundwater levels or storage during normal or wet periods.

- **High rate of pumping in the Paso Robles Formation.** If the amount of pumping in the Paso Robles Formation exceeds the long-term rate of recharge, then groundwater levels may decline, which could affect Paso Robles Formation well production and result in depletion of supply, a reduction in groundwater discharge to interconnected surface water, and potential impacts to GDEs.
- **High rate of pumping in the Careaga Sand.** If the amount of pumping in the Careaga Sand exceeds the long-term rate of natural recharge then groundwater levels may decline, which could affect Careaga Sand well production and result in depletion of supply, a reduction in groundwater discharge to interconnected surface water, and potential impacts to GDEs.

Lowering of groundwater levels that are likely to cause undesirable results are characterized as follows:

- Groundwater levels in the Paso Robles Formation or Careaga Sand aquifers remain below minimum thresholds (see Section 5.5.2) after 2 consecutive years of average and above-average precipitation in 50 percent of representative wells.
- Existing agricultural, municipal, and domestic wells are unable to produce the estimated sustainable yield of the EMA due to chronic decline in groundwater levels caused by groundwater conditions occurring throughout the EMA (e.g., significant and unreasonable depletion of supply).

As discussed in Section 3.2.1, Paso Robles Formation and Careaga Sand well hydrographs illustrate that water levels go up and down in response to changes in rainfall. Water levels have still not recovered fully from the severe drought observed between water year (WY) 2012 and 2016 and rainfall continues to be below average. Based on input from water users in the EMA and review of available water level data, no significant and unreasonable effects associated with groundwater level decline have been observed in the EMA, including the period since 2015 after SGMA came into effect. There have been no specific reports from stakeholders that wells have needed to be deepened or replaced. DWR's database on dry domestic wells in the state was reviewed and there was no data showing domestic wells going dry within the EMA. Local drillers were also consulted, and they indicated that there have not been a significant number of deeper replacement wells drilled in the EMA. If current and/or increased rates of pumping continue and drought conditions persist (see Section 3.3.5), undesirable results could occur in the future.

5.5.2 Minimum Thresholds for Water Levels [§ 354.28(a),(b)(1),(c)(1)(A)(B),(d), and (e)]

§ 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.

(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 the uncertainty in the understanding of the basin setting.

(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 trend, water year type, and projected water use in the basin.

(B) Potential effects on other sustainability indicators.

(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.

Section 354.28(c)(1) of the SGMA regulations states that "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." In a public GSA meeting, one of the GSA Committee members identified several guiding principles for setting minimum thresholds that other committee members unanimously supported, including:

- Thresholds should be adaptive to observed conditions – not everything is known
- Learn from other basins that have significant problems that must be avoided
- Use the same thresholds for all well types

- Protect the most vulnerable groundwater users and well types
- An ounce of prevention is worth more than a pound of cure

When selecting the minimum thresholds, the GSA Committee considered these principles: the groundwater in storage deficit that was estimated for the historical period and the projected future period (see Section 3.3); the potential for impacts to domestic, municipal, and agricultural wells if water levels continue to decline (discussed below); and the potential for depletion of surface water and impacts to identified GDEs (see Section 5.10). Members of the GSA Committee were also concerned about the severity of the existing drought and the lack of rainfall recharge in the Basin.

The well impact analysis was performed to aid in identifying undesirable results and selecting minimum thresholds for the chronic lowering of groundwater levels sustainability indicator. Spring 2018 groundwater elevations were compared with top of well screen elevations for a total of 487 agricultural, municipal, and domestic wells screened in principal aquifers within the EMA. These wells were selected because of known location and well construction details. The percentage of wells with water levels below top of screen was calculated in 5-foot increments, starting with spring 2018 water levels (see Figures 3-20 and 3-21). Water levels that consistently fall below the top of screen are likely to result in increased well clogging from biological growth and mineral precipitation, cascading water, sand pumping, and reduced yield and pump efficiencies and possibly if continued, well failure. Fundamental to this analysis is the assumption that these conditions are indicative of a significant and unreasonable depletion of supply.[54]

These conditions are considered by the GSA to be undesirable. The magnitude of this impact on well production differs depending on well type (i.e., agricultural versus municipal, versus domestic). For example, domestic wells tend to be shallower and may be more sensitive to water levels falling within the screen interval. Likewise, municipal wells serve drinking water to citizens living in the EMA and so supply reduction cannot be easily addressed. Agricultural wells often are deeper and have longer well screens that can tolerate loss of efficiency and more drawdown resulting from water levels falling below top of screen.

Spring 2018 groundwater elevations measured in EMA monitoring wells were used to assess how many wells have static water levels that are below the top of screen elevation as of that date and how many would be below top of screen if groundwater levels were lower.[55] The well impact analysis was used to determine the number and type of wells in the EMA that would be further impacted (groundwater elevations below well top of screen elevation) if groundwater elevations decline further compared to spring 2018 groundwater elevations. When considering where to set the minimum thresholds, specific consideration was given to domestic wells, which are generally shallower, and municipal wells, which serve larger populations.[56]

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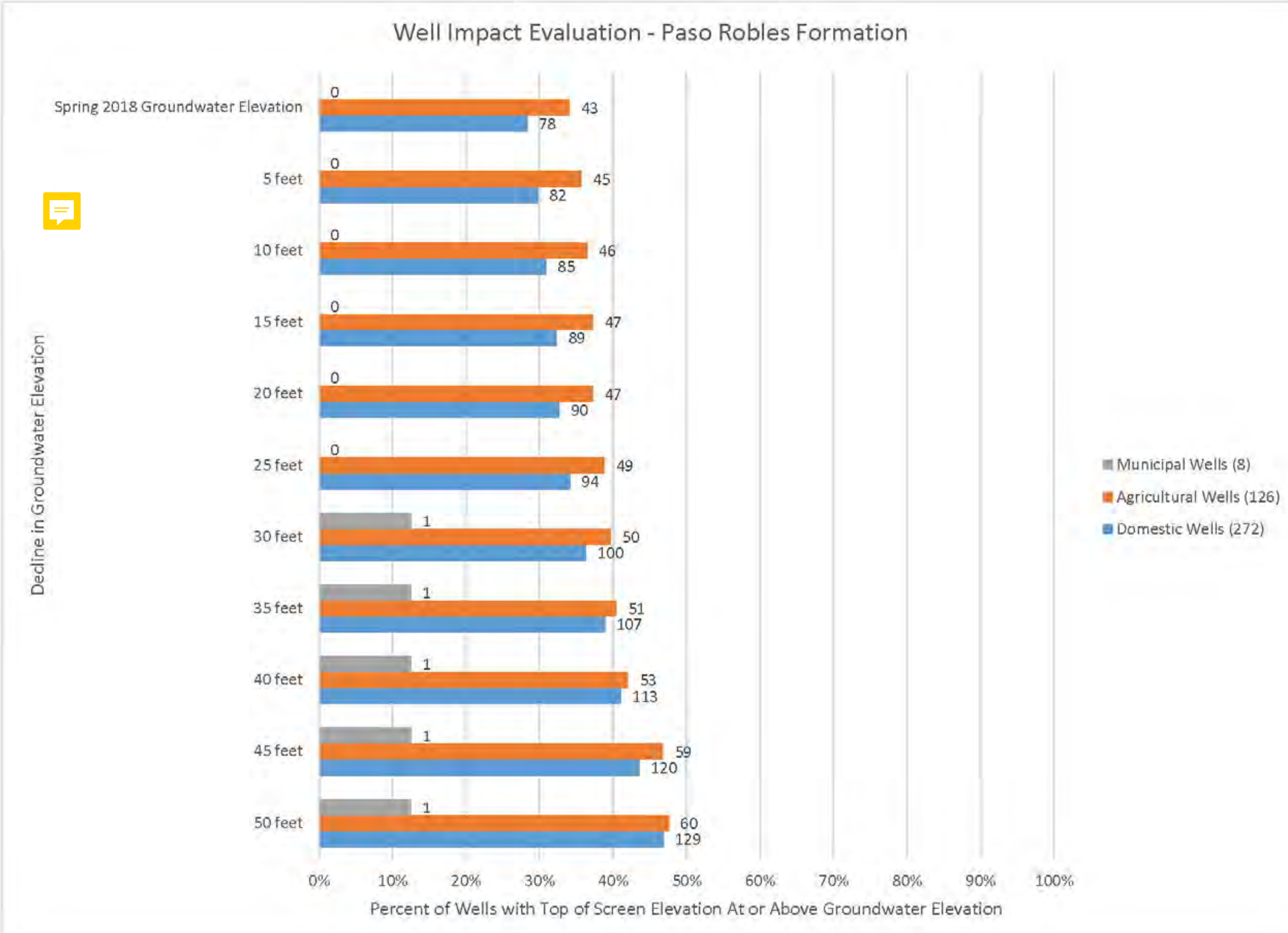
[54] There was considerable debate among stakeholders about how much depletion of supply could result from water levels falling below the top of screen. Municipal, agricultural, and domestic wells have different sensitivities to this condition and will experience depletion of supply differently. The methodology and results of this analysis were discussed with stakeholders and ultimately accepted by the GSA Committee as the basis for establishing undesirable results and minimum thresholds.

[55] Spring 2018 groundwater elevations were selected based on recent available data with the greatest number of monitoring locations.

[56] Domestic well owners and local municipalities cannot easily respond to a reduction in supply, particularly during extended dry periods, and would have to absorb substantial cost if wells had to be deepened or replaced. The GSA decided to not allow water levels in municipal wells to drop below the top of screen if possible. Local agricultural interests were less concerned about water levels falling below top of screen because they have not observed undesirable results or depletion of supply and so wanted to set the minimum thresholds deeper.

The results of the analysis presented in Figures 5-1 and 5-2 indicate that groundwater water elevations in spring 2018 were below top of screen in 28 percent of domestic wells and 34 percent of agricultural wells screened in the Paso Robles Formation. No municipal wells had groundwater elevations below the top of well screen (see Figure 5-1). Groundwater elevations in the Careaga Sand aquifer were below top of screen in 35 percent of domestic wells, 28 percent of agricultural wells, and 17 percent of municipal wells (including one well owned by the City of Solvang; see Figure 5-2).

Table 5-1 presents the minimum thresholds and measurable objectives to be measured at representative wells completed in the Paso Robles Formation and Careaga Sand. Appendix I of the GSP presents a well location map and hydrographs showing the minimum thresholds for each representative well that will be used to monitor for chronic lowering of groundwater levels and depletion of storage.


Well Impact Evaluation - Paso Robles Formation
Decline in Groundwater Elevation
Spring 2018 Groundwater Elevation
5 feet
10 feet
15 feet
20 feet
25 feet
30 feet
35 feet
40 feet
45 feet
50 feet
0
43
78
0
45
82
0
46
85
0
47
89
0
47
90
0
49
94
1
50
100
1
51
107
1
53
113
1
59
120
1
60
129
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Wells with Top of Screen Elevation At or Above Groundwater Elevation
Municipal Wells (8)
Agricultural Wells (126)
Domestic Wells (272)

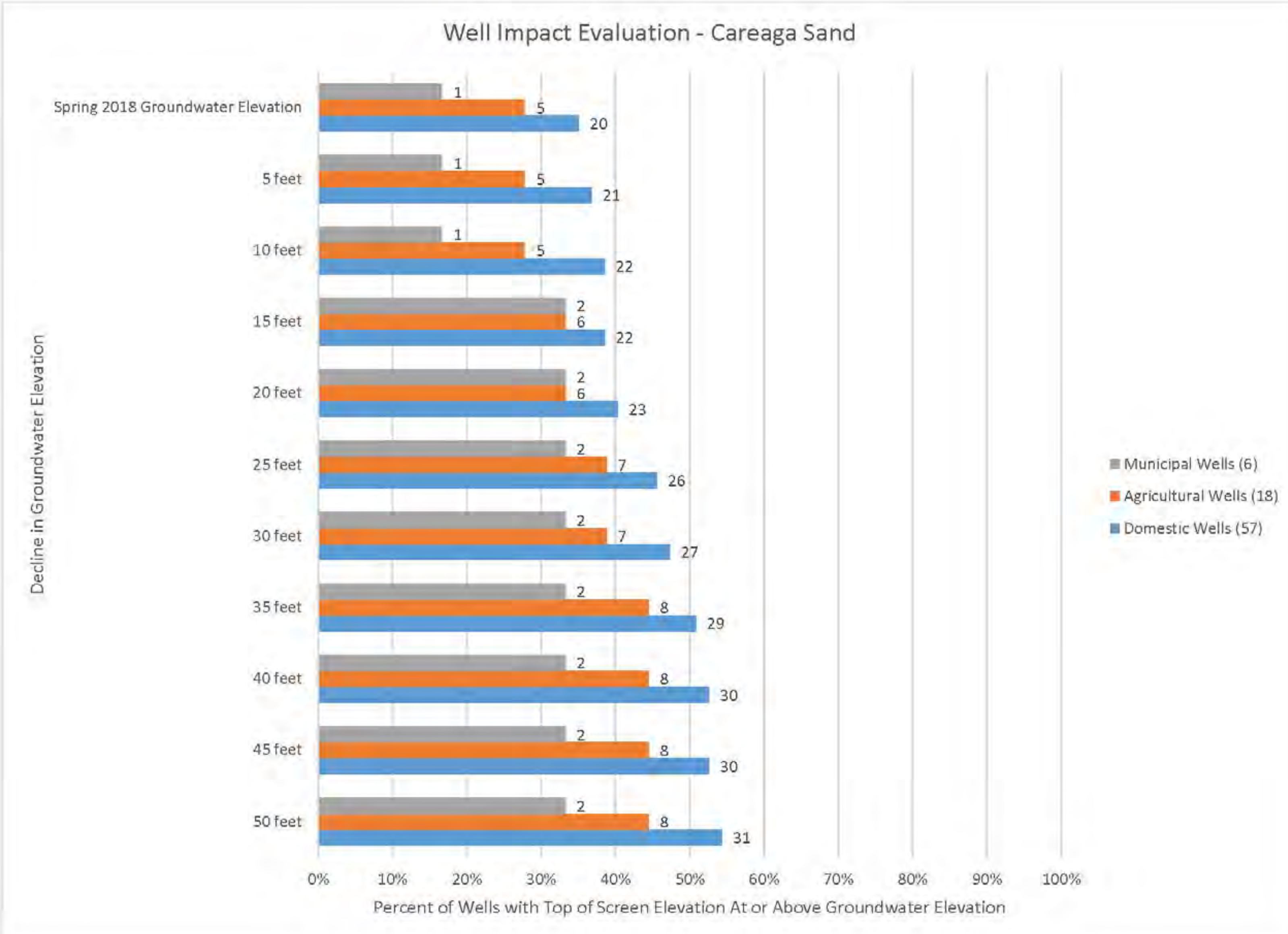

Well Impact Evaluation - Careaga Sand
Spring 2018 Groundwater Elevation
5 feet
10 feet
15 feet
20 feet
25 feet
30 feet
35 feet
40 feet
45 feet
50 feet
1
5
20
1
5
21
1
5
22
2
6
22
2
6
23
2
7
26
2
7
27
2
8
29
2
8
30
2
8
30
2
8
31
Decline in Groundwater Elevation
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Wells with Top of Screen Elevation At or Above Groundwater Elevation
Municipal Wells (6)
Agricultural Wells (18)
Domestic Wells (57)

Table 5-1. Chronic Lowering of Groundwater Levels Minimum Thresholds and Measurable Objectives for the Paso Robles Formation and the Careaga Sand

RMS ID[1]	Well Type	Minimum Threshold (feet NAVD 88)	Measurable Objective (feet NAVD 88)
Paso Robles Formation			
6N/29W-07L01	Agricultural	639	681
6N/29W-08P01	Domestic	676	712
6N/29W-08P02	Domestic	654	686
6N/30W-07G05	Municipal	515	554
6N/30W-07G06	Municipal	513	552
6N/30W-11G04	Agricultural	512	609
6N/31W-01P03	Municipal	516	556
6N/31W-02K01	Domestic	557	592
6N/31W-13D01	Domestic	495	520
7N/30W-16B01	Agricultural	1,021	1,047
7N/30W-19H01	Agricultural	912	932
7N/30W-29D01	Agricultural	850	893
7N/30W-30M01	Agricultural	559	669
7N/30W-33M01	Agricultural	514	565
7N/31W-36L02	Domestic	616	681
Careaga Sand			
7N/31W-34M02	Agricultural	484	505[2]
6N/31W-03A01	Domestic	573	598
6N/31W-04A01	Domestic	483	506
6N/31W-09Q02 21	Municipal	446	476[2]
6N/31W-10F01	Agricultural	464	483
6N/31W-11D04	Agricultural	502	526
6N/31W-16N07 4	Municipal	377	397
6N/31W-xxxx 22	Municipal	467	484
Solvang HCA South	Municipal	320	360[2]

Notes

[1] Refer to Figure 3-19 and Appendix I for representative well locations.

[2] No water level data is available for spring 2011.

NAVD 88 = North American Vertical Datum of 1988

RMS = representative monitoring site

5.5.2.1 Minimum Thresholds for the Paso Robles Formation

Based on the well impact analysis, the GSA Committee agreed to set the minimum threshold for representative wells screened in the Paso Robles Formation at 15 feet below spring 2018 groundwater levels. If groundwater levels continued to decline at current rates (2019 to 2021) in representative wells, minimum thresholds for the chronic lowering of groundwater levels sustainability indicator would be exceeded in 50 percent of representative wells (see Section 5.5.2.7), approximately one to 2 years following implementation of the GSP. Section 6 discusses management actions and projects that are intended to reduce the chances for this to occur. Water levels at or above these thresholds are not expected to cause significant and unreasonable depletion of supply in municipal, agricultural, and domestic wells, or cause a significant and unreasonable reduction of groundwater in storage.

5.5.2.2 Minimum Thresholds for the Careaga Sand

Based on the well impact analysis, the GSA Committee agreed to set the minimum threshold for representative wells screened in the Careaga Sand at 12 feet below spring 2018 groundwater levels. If groundwater levels continued to decline at current rates (2019 to 2021) in representative wells, minimum thresholds for the chronic lowering of groundwater levels sustainability indicator would be exceeded in 50 percent of representative wells (see Section 5.5.2.7), approximately 4 to 5 years following implementation of the GSP. Water levels at or above these thresholds are not expected to cause a significant and unreasonable reduction of groundwater in storage.

5.5.2.3 Relationship between Individual Minimum Thresholds and Relationships to Other Sustainability Indicators [§ 354.28(b)(2) and (d)]

§ 354.28 Minimum Thresholds.

(b) The description of minimum thresholds shall include the following:

(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.

(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.

Groundwater level minimum thresholds can potentially influence other sustainability indicators, such as the following:

- **Avoid Significant and Unreasonable Reduction of Groundwater in Storage.** Changes in groundwater levels reflect changes in the amount of groundwater in storage. Pumping at, or less than, the sustainable yield will maintain long-term average groundwater levels in the EMA. Likewise, the groundwater level minimum thresholds will maintain an adequate amount of groundwater in storage over an extended period when pumping is equal to or less than the sustainable yield. Thus, maintaining groundwater levels at or above minimum thresholds will not result in long-term significant and unreasonable reduction of groundwater in storage.

- **Avoid Significant and Unreasonable Degraded Groundwater Quality.** A significant and unreasonable condition for groundwater quality is the increase in concentration of constituents of concern exceeding EMA WQOs or state or federal maximum contaminant level (MCL) or secondary maximum contaminant level (SMCL) (regulatory thresholds) for drinking water caused by groundwater pumping. As described below, maintaining groundwater levels above minimum thresholds helps minimize the potential for experiencing degraded groundwater quality (since enactment of SGMA in 2015) or exceeding regulatory thresholds for constituents of concern in drinking water and agricultural wells. Groundwater quality could be affected through two processes:

    1. Low groundwater levels caused by pumping in an area could cause deeper, poor-quality groundwater to flow into existing supply wells. Groundwater level minimum thresholds are set below current groundwater levels, meaning a flow of deep, poor-quality groundwater could occur in the future at or below minimum threshold levels. The Careaga Sand is underlain by marine deposits. Consequently, groundwater within these underlying marine deposits likely contains increased salt concentrations and is of poorer quality than the groundwater within the overlying Careaga Sand. Should groundwater quality degrade due to lower groundwater levels, the groundwater level minimum thresholds will be reviewed.

    2. Changes in groundwater levels arising from management actions implemented by the GSA to achieve sustainability could change groundwater gradients, which could cause poor-quality groundwater to flow towards supply wells that would not have otherwise been impacted. Examples of these actions may include installation of groundwater recharge facilities (e.g., gravity stormwater recharge or aquifer recharge with recharge wells using treated wastewater). Because these kinds of projects are subject to review under the California Environmental Quality Act, concerns about the potential to introduce or mobilize contaminant plumes would be evaluated before such a project could be implemented.

- **Avoid Significant and Unreasonable Land Subsidence.** A significant and unreasonable condition for subsidence is permanent pumping-induced subsidence that substantially interferes with surface land use and damages infrastructure. The groundwater level minimum thresholds are set just below existing and historical groundwater elevations, which is unlikely to induce additional subsidence. Based on a geotechnical study performed for the EMA, local geological conditions do not appear to be susceptible to compaction and subsidence because there are no known thick clay layers that extend across the full area where the Paso Robles Formation is present (although some clay layers are distinctly present in localized areas). Groundwater levels would likely have to be substantially lower than are predicted to occur in the future to produce significantly more subsidence (see Appendix E). Should significant and unreasonable subsidence be observed from lowering groundwater levels, the GSA may consider adjusting groundwater level minimum thresholds to avoid this subsidence.
- **Avoid Significant and Unreasonable Depletion of Interconnected Surface Water.** Significant increases in groundwater pumping beyond what has been observed in the past could result in the depletion of interconnected surface water resulting in impacts to GDEs on the distal, or lower, ends of Zanja de Cota and Alamo Pintado creeks where the interconnection potentially exists. Although the minimum thresholds for groundwater levels are set a short distance below the historical low groundwater elevation observed in some RMSs, no significant or unreasonable effects have been observed in association with interconnected surface water during the historical period (1981 to 2018) and none are expected in the future. Results from groundwater modeling indicate that groundwater will continue to discharge to surface water at the lower ends of the tributaries (e.g., Alamo Pintado and Zanja de Cota Creeks) and so significant and unreasonable depletion of surface water is not expected.

- **Avoid Seawater Intrusion.** This sustainability indicator is not applicable to the EMA.

The minimum thresholds set for chronic groundwater level decline are protective of all beneficial uses and users of groundwater and do not result in significant and unreasonable effects for the other sustainability indicators.

5.5.2.4 Effects of Minimum Thresholds on Neighboring Basins [§ 354.28(b)(3)]

§ 354.28 Minimum Thresholds.

(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.

Neighboring basins include the Central Management Area (CMA) of the Santa Ynez River Valley Groundwater Basin and the San Antonio Creek Valley Groundwater Basin (SACV). The CMA is hydrologically downgradient of the EMA and the SACV is not hydraulically connected to the EMA; groundwater flows from the Paso Robles Formation in the EMA to the Santa Ynez River Alluvium where gaps in the underlying Monterey Formation bedrock occur. The Santa Ynez River Alluvium is present in the EMA and CMA management areas. Groundwater present within the Careaga Sand flows from the EMA and discharges directly to the CMA as subsurface flow. Therefore, changes in groundwater levels within the EMA could have an impact on groundwater levels in the CMA if a substantial reduction in groundwater levels in the EMA were to occur (depending on the location in the EMA) and over a long period, the amount of groundwater flowing into the CMA could be reduced. The groundwater level minimum thresholds for the EMA are set just below historical and current levels, which could theoretically reduce groundwater flow into the adjacent CMA during certain periods. Changes in groundwater levels in the EMA are not anticipated to result in significant and unreasonable changes in groundwater flow to the CMA because, as discussed in Section 3.3, the average surface water outflow and groundwater subsurface outflow was less than 2,000 acre-feet per year (AFY) over the historical period (1981 to 2018). This amount of annual subsurface outflow is small compared with annual variations in pumping and the amount of annual climate-driven variation that occurs in several of the water budget terms in the EMA and CMA. The EMA GSA has developed a cooperative working relationship with the downstream Santa Ynez River Valley Groundwater Basin – Central Management Area GSA (CMA GSA) that is preparing the GSP for the CMA. Additionally, a SGMA-compliant Coordination Agreement is being prepared and will remain in place between the EMA GSA, the CMA GSA, and the downstream Western Management Area GSA.

Based on limited available information, groundwater gradients at the boundary between the EMA and SACV are such that groundwater does not flow between the EMA and SACV and therefore, the SACV would not be impacted by the minimum threshold for the chronic lowering of groundwater levels sustainability indicator in the EMA. However, if production wells are located in close proximity of the boundary, it is possible that the gradient would change in either direction, depending on where the well is located. Identification of additional monitoring wells and continued monitoring of water levels is needed to improve the understanding of groundwater flow in this area.

5.5.2.5 Effects of Minimum Thresholds on Beneficial Uses and Land Uses [§ 354.28(b)(4)]

§ 354.28 Minimum Thresholds.

(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.

The groundwater level minimum thresholds have been selected to protect beneficial uses in the EMA while providing a reliable and sustainable groundwater supply. Groundwater modeling indicates that future projected water levels in the Paso Robles Formation and Careaga Sand are unlikely to impact Category A GDEs; however, extended extreme droughts could reduce groundwater elevations below historically measured levels, potentially affect Category A GDEs, and reduce baseflow in the tributary creeks and discharge to the Santa Ynez River (see Section 3.2 and Figure 3-40).

When setting the minimum threshold for chronic water level decline, consideration was given to several factors that could have a significant or unreasonable effect on beneficial uses. These factors included effects on existing municipal, domestic, and agricultural wells (see Section 5.5.2); continued reduction of groundwater in storage (see Section 5.6); and depletion of interconnected surface water and associated impacts to GDEs (see Section 5.10).

5.5.2.6 Relevant Federal, State, or Local Standards [§ 354.28(b)(5)]

§ 354.28 Minimum Thresholds.

(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.

No federal, state, or local standards exist for chronic lowering of groundwater levels.

5.5.2.7 Methods for Quantitative Measurement of Minimum Thresholds [§ 354.28(a) and (b)(6)]

§ 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.

(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 level minimum thresholds will be directly measured from existing representative monitoring wells. The groundwater level monitoring program will be conducted in accordance with the monitoring plan outlined in Section 4 and will consist of collecting groundwater level measurements that reflect non-pumping conditions. The groundwater level monitoring program will be designed and conducted to meet the requirements of the technical and reporting standards included in the SGMA regulations. As discussed in Section 5.5.1, the potential exists for undesirable results to occur if minimum thresholds are exceeded in 50 percent of the representative wells for 2 consecutive years of average and above-average precipitation.

5.5.3 Measurable Objectives for Water Levels [§ 354.30(a),(b),(c),(d), and (g)]

§ 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.

(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.

(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.

(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.

(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.

The measurable objectives for chronic lowering of groundwater levels provides a target to be reached over the 20-year GSP implementation period to ensure reliable access to groundwater through dry to critically dry hydrologic periods, such as the critically dry period from 2012 through 2016. Measurable objectives for chronic lowering of groundwater levels provide operational flexibility above minimum threshold levels to ensure that the EMA can be managed sustainably over a reasonable range of climate and hydrologic variability. Measurable objectives may change after GSP adoption, as new information and hydrologic data become available.

5.5.3.1 Methodology for Setting Measurable Objectives

Measurable objectives were established to meet the sustainability goal and were based on trends in historical groundwater level data, historical precipitation data, and input from the CAG, other public stakeholders, and the EMA-GSA Committee. The measurable objective levels were set so that: (1) natural variations in groundwater levels as were observed in the past during wet and dry periods are considered, and (2) there is enough groundwater in storage to get through a multi-year drought as was observed in WYs 2012 to 2021 with 2 wet years in WYs 2017 and 2019 without undesirable results. Table 5-1 includes the estimated elevations for the measurable objectives established for the Paso Robles Formation and the Careaga Sand.

5.5.3.2 Measurable Objectives for the Paso Robles Formation

The measurable objectives for the Paso Robles Formation are the average groundwater levels measured at each RMS prior to the recent drought beginning in WY 2012. These levels were selected using available groundwater elevation monitoring data and climatic data.

5.5.3.3 Measurable Objectives for the Careaga Sand

The measurable objectives for the Careaga Sand are the average groundwater levels measured at each RMS prior to the recent drought beginning in WY 2012. These levels were selected using available groundwater elevation monitoring data and climatic data.

5.5.4 Interim Milestones for Water Levels [§ 354.30(e)]

§ 354.30 Measurable Objective.

(e) Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin with 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.

Interim milestones show how the GSA would move from current conditions to meeting the measurable objectives in the 20-year GSP implementation horizon. Prior to the recent drought (WYs 2012 to 2021 with 2 wet years in WYs 2017 and 2019), the cumulative change of groundwater in storage in the EMA was positive (see Table 3-11). During the historical period (1981 to 2018), which included the recent drought, the estimated average annual change in groundwater in storage was -1,830 AFY (see Table 3-11). The recent drought was the most severe drought during the historical period and, consequently, much of the observed decline in water levels and current groundwater in storage deficit is due to the drought and not pumping of groundwater. While no significant and unreasonable effect has been observed in the EMA as a result of lowering of groundwater levels to date, interim milestones are being proposed in order to ensure that the GSA is on track for eliminating the storage deficit going forward (see Table 5-2). The GSA intends to move forward with selected projects and management actions (see Section 6) very early after GSP submittal to ensure that groundwater levels recover when normal or above normal rainfall conditions return. The proposed approach for setting interim milestones recognizes that it will take some time to plan and implement the management actions; therefore, it is possible that if drought conditions persist, water levels could approach or fall below the minimum threshold in some representative wells. Progress toward achieving the measurable objective will be slow initially and then steadily increase over the 20-year implementation period. The general approach for setting the interim milestone values for each representative well is shown on Figure 5-3 and Table 5-2.

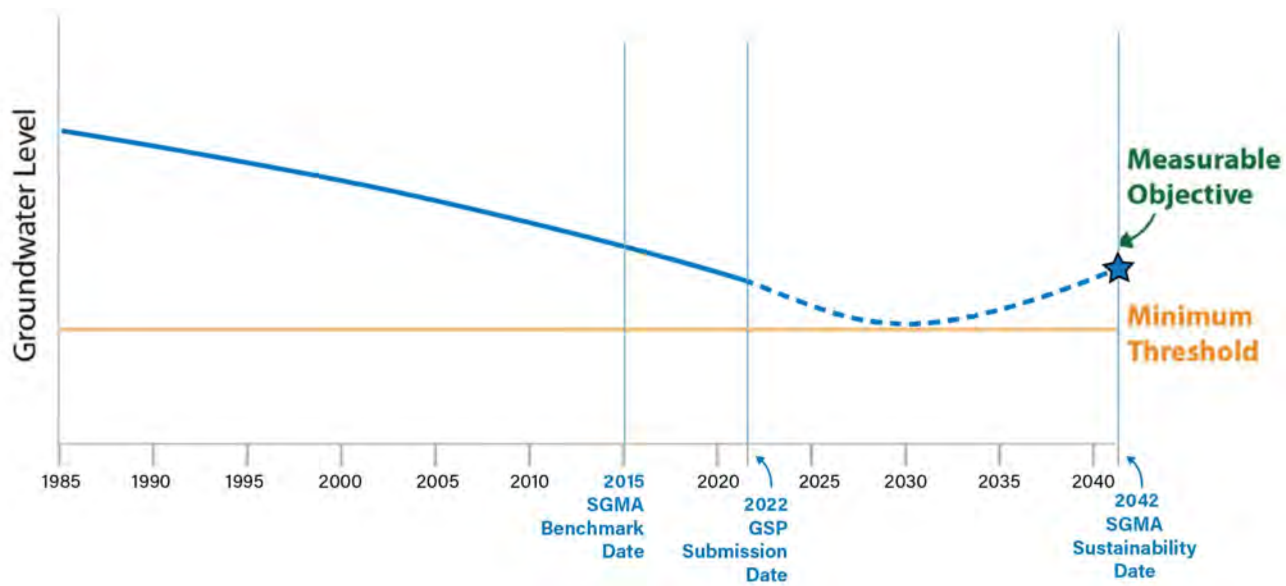


Figure 5-3. Generalized Approach to Setting Interim Milestones

Table 5-2. Chronic Lowering of Groundwater Levels and Chronic Reduction of Groundwater in Storage Interim Milestones for the Paso Robles Formation and the Careaga Sand

RMS ID[a]	Well Type	Year 5[b]	Year 10	Year 15	Year 20
Paso Robles Formation					
6N/29W-07L01	Agricultural	641	639	671	681
6N/29W-08P01	Domestic	686	676	703	712
6N/29W-08P02	Domestic	654	640[c]	675	686
6N/30W-07G05	Municipal	523	517	545	554
6N/30W-07G06	Municipal	521	516	543	552
6N/30W-11G04	Agricultural	516	512	585	609
6N/31W-01P03	Municipal	523	516	546	556
6N/31W-02K01	Domestic	562	557	583	592
6N/31W-13D01	Domestic	508	495	514	520
7N/30W-16B01	Agricultural	1,043	1,022	1,041	1,047
7N/30W-19H01	Agricultural	927	913	927	932
7N/30W-29D01	Agricultural	862	855	884	893
7N/30W-30M01	Agricultural	561	562	642	669
7N/30W-33M01	Agricultural	526	514	552	565
7N/31W-36L02	Domestic	614[c]	616	665	681
Careaga Sand					
7N/31W-34M02	Agricultural	484	479	499	505-[d]
6N/31W-03A01	Domestic	581	572[c]	592	598
6N/31W-04A01	Domestic	492	482[c]	500	506
6N/31W-09Q02 21	Municipal	476[e]	468	474	476-[d]
6N/31W-10F01	Agricultural	472	462[c]	478	483
6N/31W-11D04	Agricultural	502	500[c]	520	526
6N/31W-16N07 4	Municipal	395	377	392	397
6N/31W-xxxx 22	Municipal	473	467	480	484
Solvang HCA South	Municipal	328	322	351	360-[d]

Notes

[a] Refer to Figure 3-19 and Appendix I for representative well locations.

[b] Based on estimates from spring 2021 measurements.

[c] Value is below the minimum thresholds.

[d] No water level data is available for spring 2011. IM values have been estimated from water level trends.

[e] Measurable objective based on recent water levels.

NAVD 88 = North American Vertical Datum of 1988

RMS = representative monitoring site

5.6 Reduction of Groundwater in Storage Sustainable Management Criterion

5.6.1 Undesirable Results for Storage Reduction [§ 354.26(a),(b)(2),(c), and (d)]

§ 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.

(b) The description of undesirable results shall include the following:

(2) 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.

(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.

(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.

Conditions in the EMA that could lead to significant and unreasonable effects on groundwater in storage include the following:

- **Extended drought.** Extensive droughts may lead to excessively low groundwater levels, a reduced amount of groundwater in storage, and undesirable results. Short-term impacts due to drought are anticipated in the SGMA regulations with recognition that management actions need sufficient flexibility to accommodate drought periods and ensure short-term impacts can be offset by increases in groundwater levels or storage during normal or wet periods.
- **High rate of pumping in the Paso Robles Formation.** If the amount of pumping in the Paso Robles Formation exceeds the long-term rate of recharge, then groundwater levels may decline, which could affect Paso Robles Formation well production, groundwater discharge to surface water, GDEs, groundwater quality, and the volume of groundwater in storage.
- **High rate of pumping in the Careaga Sand.** If the amount of pumping in the Careaga Sand exceeds the long-term rate of natural recharge, then groundwater levels may decline, which could affect Careaga Sand well production, reduce groundwater discharge to surface water, GDEs, groundwater quality, and the volume of groundwater in storage.

Significant and unreasonable reduction of groundwater in storage that are likely to cause undesirable results are characterized as follows:

- Groundwater levels in the Paso Robles Formation or Careaga Sand aquifers fall below minimum thresholds (see Section 5.5.2) after 2 consecutive years of average and above-average precipitation in 50 percent of representative wells.
- Existing agricultural, municipal, and domestic wells are unable to produce historical average quantities of groundwater due to chronic decline in groundwater levels (e.g., depletion of supply).

As discussed in Section 3.2.1, Paso Robles Formation and Careaga Sand well hydrographs illustrate that water levels go up and down in response to changes in rainfall. Water levels continue to decline from the severe drought observed between WYs 2012 to 2021 with 2 wet years in WYs 2017 and 2019 and rainfall continues to be below average. Based on input from water users in the EMA and review of available water level data, no significant and unreasonable effects associated with the observed groundwater level decline or reduction in storage have been observed in the EMA. However, the decline indicates the potential for undesirable results and if current/or increased rates of pumping continue and drought conditions persist (see Section 3.3.5), undesirable results could occur in the future.

The practical effect of protecting against undesirable results arising from a reduction of groundwater in storage is that it encourages the maintenance of long-term stability in groundwater levels and storage during average hydrologic conditions over multiple years and decades. Maintaining long-term stability in groundwater levels also maintains long-term stability in groundwater storage and prevents chronic declines, thereby providing beneficial uses and users with continued access to groundwater on a long-term basis and preventing undesirable results associated with groundwater withdrawals. Pumping above the long-term sustainable yield during drought years would likely temporarily lower groundwater levels and reduce the amount of groundwater in storage. Such short-term impacts due to drought are anticipated in SGMA and the SGMA regulations with recognition that management actions need sufficient flexibility to accommodate drought periods and ensure short-term impacts can be offset by increases in groundwater levels or storage during normal or wet periods. Prolonged reductions in the amount of groundwater in storage could lead to undesirable results affecting beneficial users and uses of groundwater. In particular, groundwater pumpers that rely on water from shallow wells (e.g., domestic wells) in the EMA may be temporarily impacted by temporary reductions in the amount of groundwater in storage and lower groundwater levels in their wells.

5.6.2 Minimum Thresholds for Storage Reduction [§ 354.28(a),(b)(1),(c)(2),(d), and (e)]

§ 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.

(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 the uncertainty in the understanding of the basin setting.

(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 my 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.

(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.

Section 354.28(c)(2) of the SGMA regulations states that "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."

The minimum threshold for reduction of groundwater in storage is based on the estimated sustainable yield and is consistent with the minimum thresholds for chronic groundwater level decline because they are interrelated; therefore, the minimum thresholds for reduction in groundwater in storage is established for the EMA as a whole, not for individual aquifers.

In accordance with the SGMA regulation cited above, the minimum threshold metric is a volume of pumping per year, or an annual pumping rate. Conceptually, the sustainable yield is the total volume of groundwater that can be pumped annually from the EMA on a long-term (multi-year/multi-decadal) basis without leading to undesirable results. This GSP adopts changes in groundwater levels as a proxy for the change of groundwater in storage metric. As provided in § 354.36(b)(1) of the SGMA regulations, an average of the groundwater elevation data at the RMSs will be reported annually as a proxy to track changes in the amount of groundwater in storage.

Based on well-established hydrogeologic principles, maintaining long-term stability in groundwater levels above the minimum threshold for chronic lowering of groundwater levels will limit continued depletion of groundwater from storage. Therefore, using groundwater elevation levels as a proxy, the minimum threshold for chronic reduction of groundwater in storage at each RMS is defined by the minimum threshold for chronic lowering of groundwater levels (see Table 5-1).

5.6.2.1 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators [§ 354.28(b)(2)]

§ 354.28 Minimum Thresholds.

(b) The description of minimum thresholds shall include the following:

(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.

The minimum threshold for reduction of groundwater in storage is based on the groundwater level minimum thresholds established for chronic groundwater level decline at RMSs. Therefore, the concept of potential conflict between minimum thresholds at different locations in the EMA is not applicable.

The minimum threshold for reduction of groundwater in storage could influence other sustainability indicators. The minimum threshold for reduction of groundwater in storage was selected to avoid undesirable results for other sustainability indicators, as outlined below:

- **Avoid Chronic Lowering of Groundwater Levels.** Because groundwater levels will be used as a proxy for estimating groundwater pumping and changes in groundwater storage, the groundwater in storage sustainability criteria would not cause undesirable results for this sustainability indicator.
- **Avoid Degraded Groundwater Quality.** The minimum threshold proxy of long-term stability in groundwater levels helps minimize the potential for experiencing degraded groundwater quality or exceeding regulatory limits for constituents of concern in supply wells.
- **Avoid Land Subsidence.** Future groundwater levels would likely have to be substantially lower than are predicted to occur in the future to produce significant subsidence. Should significant and unreasonable subsidence be observed from future groundwater levels, the groundwater level minimum thresholds for this sustainability indicator will be revisited by the EMA-GSA to avoid this subsidence.

- **Avoid Depletion of Interconnected Surface Water.** A significant and unreasonable condition for depletion of interconnected surface water is a pumping-induced reduction in groundwater discharge in specific locations where groundwater is interconnected to surface water and resulting impacts to Category A GDEs (see Section 3.2 and Figure 3-40). As discussed in Section 5.10, groundwater levels and related groundwater in storage that continues to decline below historical levels in the future may have an impact on Category A GDEs. No significant or unreasonable effects have been observed thus far in association with interconnected surface water during periods of historical low groundwater levels and groundwater in storage.
- **Avoid Seawater Intrusion.** This sustainability indicator is not applicable to the EMA.

5.6.2.2 Effects of Minimum Thresholds on Neighboring Basins [§ 354.28(b)(3)]

§ 354.28 Minimum Thresholds.

(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 SACV Basin abuts the EMA on the northwest side. Based on available information, groundwater gradients at the boundary between the EMA and SACV are such that groundwater does not flow between the EMA and SACV and, therefore, the SACV would not be impacted by the minimum threshold for the groundwater in storage sustainability indicator in the EMA.

The CMA is hydrologically downgradient of the EMA; groundwater flows from the Paso Robles Formation in the EMA to the Santa Ynez River Alluvium where gaps in the underlying Monterey Formation bedrock occur. The Santa Ynez River Alluvium is present in the EMA and CMA management areas. Groundwater present within the Careaga Sand flows from the EMA and discharges directly to the CMA as subsurface flow. Therefore, changes in groundwater levels within the EMA could have an impact on groundwater levels in the CMA if a substantial reduction in groundwater levels in the EMA were to occur (depending on location in the EMA) and over a long period, the amount of groundwater flowing into the CMA could be reduced. The groundwater level minimum thresholds for the EMA are set just below historical and current levels, which could theoretically reduce groundwater flow into the adjacent CMA during certain periods. Changes in groundwater levels in the EMA are not anticipated to result in significant and unreasonable changes in groundwater flow to the CMA because, as discussed in Section 3.3, the average surface water outflow and groundwater subsurface outflow was less than 2,000 AFY over the historical period (1981 to 2018). This amount of annual subsurface outflow is small compared with annual variations in pumping and the amount of annual climate-driven variation that occurs in several of the water budget terms in the EMA and CMA. The EMA GSA has developed a cooperative working relationship with the downstream CMA GSA that is preparing the GSP for the CMA. Additionally, a Coordination Agreement has been prepared and entered into between the EMA GSA, the CMA GSA, and the WMA GSA and will be uploaded to the SGMA Portal.

5.6.2.3 Effects of Minimum Thresholds on Beneficial Uses and Land Uses [§ 354.28(b)(4)]

§ 354.28 Minimum Thresholds.

(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.

The minimum thresholds for reduction of groundwater in storage and lowering of groundwater levels have been established to avoid undesirable results for multiple sustainability indicators. For this reason, groundwater serving beneficial uses (including current pumpers, pumping volumes, and GDEs) and land uses will not be adversely affected.

5.6.2.4 Relevant Federal, State, or Local Standards [§ 354.28(b)(5)]

§ 354.28 Minimum Thresholds.

(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.

No federal, state, or local standards exist for reductions in groundwater storage.

5.6.2.5 Methods for Quantitative Measurement of Minimum Thresholds [§ 354.28(b)(6)]

§ 354.28 Minimum Thresholds.

(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.

The measurement program for evaluating the minimum thresholds for reductions in groundwater in storage will rely on the groundwater elevation monitoring program described previously for chronic lowering of groundwater levels (see Section 5.5). Groundwater levels (as a surrogate for change of groundwater in storage) that drop below the minimum threshold values for decline in groundwater levels in 50 percent of the same representative wells over 2 years of average or above-average precipitation may lead to long-term reduction of groundwater in storage.

5.6.3 Measurable Objectives for Storage Reduction [§ 354.30(a),(c),(d), and (g)]

§ 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.

(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.

(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.

(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.

The sustainability indicators for avoiding chronic reductions of groundwater in storage use average groundwater levels as a proxy. The minimum thresholds and measurable objectives that protect against significant and unreasonable reduction in groundwater storage are based on those used to protect against chronic lowering of groundwater levels. The measurable objective for chronic reduction in groundwater in storage, using the groundwater level proxy, is equivalent to the measurable objective for chronic lowering of groundwater levels, using average groundwater levels measured at each RMS prior to the recent drought beginning in WY 2012. These levels were selected using available groundwater elevation monitoring data and climatic data. Measurable objectives may change after GSP adoption, as new information and hydrologic data become available.

5.6.4 Interim Milestones for Storage Reduction [§ 354.30(e)]

§ 354.30 Measurable Objective.

(e) Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin with 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.

Interim milestones show how the GSA would move from current conditions to meeting the measurable objectives in the 20-year GSP implementation horizon. Prior to the recent drought (WYs 2012 to 2021 with 2 wet years in WYs 2017 and 2019) the cumulative change of groundwater in storage in the EMA was positive (see Table 3-11). During the historical period (1981 to 2018), which included the recent drought, the estimated average annual change in groundwater in storage was -1,830 AFY (see Table 3-11). The recent drought was the most severe drought during the historical period and, consequently, much of the observed decline in water levels and current groundwater in storage deficit is due to the drought and not pumping of groundwater. Rainfall continues to be well below average and so the drought may not actually be over.

While no significant and unreasonable effect on groundwater in storage has been observed in the EMA as a result of lowering of groundwater levels to date, interim milestones are being proposed in order to ensure that the GSA is on track for eliminating the storage deficit going forward (see Table 5-2). The GSA intends to move forward with selected projects and management actions (see Section 6) very early after GSP submittal to ensure that groundwater levels recover when normal or above normal rainfall conditions return.

5.7 Seawater Intrusion Sustainable Management Criterion (Not Applicable)

The seawater intrusion sustainability indicator is not applicable to the EMA.

5.8 Degraded Groundwater Quality Sustainable Management Criterion

This sustainability indicator takes into consideration protection of municipal drinking water supplies, domestic uses, and agricultural uses of groundwater in the EMA. For municipal wells and drinking water supplied by domestic wells, federal and state regulatory standards (MCL and SMCL) established by the SWRCB DDW and U.S. Environmental Protection Agency, respectively, were used to establish thresholds. For agricultural uses, thresholds were established using WQOs presented in the WQ Basin Plan (RWQCB, 2019). The GSA is not charged with managing groundwater quality unless it can be shown that water quality degradation is caused by groundwater pumping in the EMA or the GSA implements a project that degrades water quality.[57]

5.8.1 Undesirable Results for Water Quality [§ 354.26(a),(b)(1),(b)(2), and (d)]

§ 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.

(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.

(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.

The following conditions may lead to an undesirable result for groundwater quality in the EMA:

- **Concentrations of regulated contaminants** in untreated groundwater pumped from private domestic wells, agricultural wells, or municipal wells exceed regulatory thresholds as a result of pumping or GSA activities.

[57] A group of agricultural stakeholders proposed establishing minimum thresholds for concentrations of salts and nutrients in groundwater considering constituent concentrations suitable for agricultural use and SMCL (whichever standard was higher). Feedback was offered that different standards could also be applied to different well types, depending upon their use (e.g., agricultural vs. domestic). Some of the proposed concentration standards are higher than WQOs in the WQ Basin Plan. The GSA determined it appropriate to reference the WQOs established by the RWQCB because they were developed to be protective of all beneficial uses. It was also decided to use a consistent methodology for all wells when setting minimum thresholds for salts and nutrients because there are multiple well types located in proximity to one another, and all wells share a common resource (the Paso Robles Formation and Careaga Sand aquifers).

- **Groundwater pumping or GSA activities** cause concentrations of TDS, chloride, sulfate, boron, sodium, or nitrate to increase and exceed WQOs and is greater than concentrations since SGMA was enacted in January 2015.

5.8.2 Minimum Thresholds for Water Quality [§ 354.28(b)(1),(c)(4), and (e)]

§ 354.28 Minimum Thresholds.

(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 the uncertainty in the understanding of the basin setting.

(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 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.

(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.

Section 354.28(c)(42) of the SGMA regulations states that "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." The purpose of the minimum thresholds for constituents of concern in the EMA is to avoid increased degradation of groundwater quality from baseline concentrations since enactment of SGMA in January 2015. Minimum thresholds established for contaminants and for salts and nutrients are presented in the following subsections.

5.8.2.1 Non-Point Source Contaminants

No minimum thresholds have been established for contaminants because: 1) there is little if any documented contamination in the basin and so setting minimum thresholds for contamination is not warranted, and 2) state regulatory agencies, including RWQCB and DTSC, have the responsibility and authority to regulate and direct actions that address contamination.

Groundwater quality samples have been collected and analyzed throughout the EMA for various studies and programs. Historical groundwater quality data was acquired from the SWRCB GeoTracker GAMA database. Water quality data was also obtained for wells owned by municipal water purveyors as part of its DDW compliance monitoring program.

Constituents of concern for agricultural and domestic use will be assessed as part of the state ILRP and reported on the GeoTracker website (see Section 4). According to the RWQCB proposed Ag Order 4.0, beginning in 2022, all ranches enrolled in the ILRP must conduct annual sampling of all on-farm domestic drinking water supply and irrigation wells between March 1 and May 31 of each year. The GSA will use this database to track water quality in domestic and agricultural wells (i.e., private wells) in the EMA. Exceedance of WQOs in the WQ Basin Plan in 50 percent of the private wells will be the basis for minimum thresholds for degraded groundwater quality at private agricultural and domestic wells. It may be necessary to adjust the threshold for the percentage of wells exceeding the limit if there are many wells in a particular area that experience degraded groundwater quality.

Table 5-3 presents regulatory standards for selected constituents of concern for drinking water listed in the WQ Basin Plan (RWQCB, 2019) and California Code of Regulations, Title 22, drinking water quality standards (SWRCB, 2019), and concentration of select constituents of concern in groundwater around the time SGMA was enacted (January 2015). The constituents with reported concentrations at or above the respective WQO for all wells, for wells known to be completed in each Principal Aquifer, and for surface water samples are presented as Table 3-9. Based on available data, wells with reported constituent concentrations in groundwater at or above the respective WQO are distributed throughout the EMA with increasing concentrations in the direction of the groundwater flow towards the southwest. Wells with reported concentrations of TDS, sodium, chloride, and boron at or above the WQO are located in the Santa Ynez Uplands, adjacent to Santa Ynez River and its tributaries, with the largest number of wells in the southwest region of the EMA (specifically for concentrations of TDS and boron).

While there are some wells that have constituent concentrations that exceed regulatory standards, it is possible that these exceedances are a result of natural conditions and not caused by land use or other anthropogenic activities. Elevated boron concentrations are naturally occurring in many central coast basins and elevated TDS, chloride, and sodium are often associated with rocks of marine origin that are present in the EMA.

Figure 3-25 shows the locations of potential groundwater contaminant point sources and the locations of completed/case closed sites. The single open/active leaking underground storage site case is Jim's Service Center (GeoTracker Site ID T0608300118) that was eligible for closure as of January 30, 2019, per the RWQCB Low Threat Closure Policy (SBCPHD, 2019). Site assessment reports indicate there are dissolved-phase benzene and methyl tert-butyl ether (MTBE) concentrations in groundwater beneath the site. Alamo Pintado Creek was determined to be the sensitive downgradient receptor. Due to the measured groundwater gradient in the area of the site, the classification of Alamo Pintado Creek as a losing stream by the USGS National Hydrography Dataset, and decreasing benzene and MTBE concentrations, this site was determined to be a minimal threat to groundwater as a drinking water source (Flowline Consulting, Inc., 2018).
Figure 3-25 also shows a landfill site (L10004697449) that is presently closed. Site monitoring wells indicate that contaminants are either not detected or below regulatory standards. One active oil and gas project site (T10000011845) is present in the northwest corner of the EMA (see Section 3.2.3.1.3 for more details on these sites). Based on available information, none of the identified sources of contamination have widespread unremediated contaminant plumes and detected contaminants appear to be localized.

Table 5-3. Water Quality Standards for Selected Constituents of Concern

Constituent	MCL (mg/L)	SMCL[2] (mg/L)	WQO (mg/L)
Chromium	0.05	—	—
Fluoride	2	—	—
Gross Alpha[2]	15	—	—
Nitrate[3]	10	—	1
Trihalomethanes	0.080	—	—
Carbon Tetrachloride	0.0005	—	—
Foaming Agents (MBAS)	—	0.5	—
Iron	—	0.3	—
Manganese	—	0.05	—
Boron	—	—	0.5
Chloride	—	500	50
Sodium	—	—	20
Sulfate	—	500	10
Total Dissolved Solids	—	1,000	600

Notes

[1] Nitrate concentration measured as nitrogen (EPA MCL)

[2] Upper consumer acceptance level

[3] State of California DDW MCL

SWRCB. 2019. California Code of Regulations, Title 22. April 16. California State Water Resources Control Board (SWRCB).

RWQCB. 2019. Water Quality Control Plan for the Central Coastal Basin, June 2019 Edition. California Environmental Protection Agency. Central Coast Regional Water Quality Control Board (RWQCB).

— = No value

DDW = Division of Drinking Water

EPA = U.S. Environmental Protection Agency

mg/L = milligram per liter

MCL = maximum contaminant level (drinking water)

SMCL = secondary maximum contaminant level (drinking water)

WQO = water quality objective (median groundwater objective)

5.8.2.2 Salts and Nutrients [§ 354.28(a) and (d)]

§ 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.

(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.

Minimum thresholds pertaining to salts and nutrients measured in groundwater are as follows:

- Concentrations of TDS, chloride, sulfate, boron, sodium, and nitrate are equal to or greater than WQOs in 50 percent of representative wells or are equal to concentrations present when SGMA was enacted (January 2015).

The WQOs for each constituent are presented in Table 5-3 are considered the minimum thresholds for salts and nutrients. In cases where the ambient (prior to January 2015) water quality exceeds the WQO, the ambient water quality is considered the minimum threshold.

5.8.2.3 Relationship between Individual Minimum Thresholds and Other Sustainability Indicators [§ 354.28(b)(2) and (c)]

§ 354.28 Minimum Thresholds.

(b) The description of minimum thresholds shall include the following:

(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.

(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 groundwater quality minimum thresholds were set based on state and federal drinking water quality standards, as well as WQOs included in the WQ Basin Plan.

Because SGMA regulations do not require projects or actions to improve groundwater quality beyond what existed prior to January 1, 2015 (Water Code § 10727.2(b)(4)), or beyond that required by other regulatory agencies with clear jurisdiction over the matter and because the basin has no history of material water quality issues in this regard, there will be no direct actions under the GSP associated with the groundwater quality minimum thresholds at this time, though the GSA will continue to monitor water quality. Therefore, there are no actions that directly influence other sustainability indicators, as described below.

- **Avoid Chronic Lowering of Groundwater Levels.** Groundwater quality minimum thresholds could influence groundwater level minimum thresholds by limiting the types of water that can be used for groundwater recharge to raise groundwater levels. Water used for recharge cannot exceed any of the groundwater quality minimum thresholds.
- **Avoid Chronic Reduction of Groundwater in Storage.** Nothing in the groundwater quality minimum thresholds promotes pumping in excess of the sustainable yield. Therefore, the groundwater quality minimum thresholds will not result in an exceedance of the groundwater storage minimum threshold.
- **Avoid Land Subsidence.** Nothing in the groundwater quality minimum thresholds promotes a condition that will lead to additional subsidence; therefore, the groundwater quality minimum thresholds will not result in a significant or unreasonable level of subsidence.
- **Avoid Depletion of Interconnected Surface Waters.** There is no information indicating that the groundwater quality minimum thresholds would have significant and unreasonable effects on interconnected surface waters. Nothing in the groundwater quality minimum thresholds promotes additional pumping or lower groundwater levels in areas where interconnected surface waters may exist. Therefore, the groundwater quality minimum thresholds will not result in a significant or unreasonable depletion of interconnected surface waters.
- **Avoid Seawater Intrusion.** This sustainability indicator is not applicable to the EMA.

5.8.2.4 Effects of Minimum Thresholds on Neighboring Basins [§ 354.28(b)(3)]

§ 354.28 Minimum Thresholds.

(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 CMA is hydrologically downgradient of the EMA; thus, groundwater generally flows from the EMA into the CMA. Poor groundwater quality, should such condition ever occur in the EMA, could flow into the CMA, affecting the ability to achieve sustainability in the CMA. The degraded groundwater quality minimum threshold for salts and nutrients is set to prevent unreasonable movement of poor-quality groundwater or further degrade groundwater quality that could impact overall beneficial uses of groundwater. Therefore, it is unlikely that the groundwater quality minimum thresholds established for the EMA will prevent the CMA from achieving sustainability. The groundwater gradients at the boundary between the EMA and SACV are such that groundwater does not flow between the EMA and SACV and, therefore, the SACV would not be impacted by the minimum threshold for the degraded groundwater quality sustainability indicator in the EMA.

5.8.2.5 Effects of Minimum Thresholds on Beneficial Uses and Land Uses [§ 354.26(b)(3)]

§ 354.26 Undesirable Results.

(b) The description of undesirable results shall include the following:

(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 minimum thresholds for degraded groundwater quality have been established to avoid undesirable results. For this reason, groundwater serving beneficial uses (including GDEs) and land uses will not be adversely affected, as described below:

- **Agricultural land uses and users.** The degraded groundwater quality minimum thresholds generally benefit the agricultural water users in the EMA. For example, setting the minimum threshold for salts and nutrients at the WQOs described in the WQ Basin Plan ensures that a supply of usable groundwater will exist for beneficial all agricultural uses.
- **Municipal uses and users.** The degraded groundwater quality minimum thresholds generally benefit the municipal water users in the EMA because there are existing regulatory programs and agencies that ensure there is an adequate supply of good quality groundwater are in place to ensure that drinking water standards are satisfied for municipal uses. In addition, water quality standards and the related minimum thresholds for salts and nutrients are intended to be protective of drinking water uses.
- **Domestic users.** The degraded groundwater quality minimum thresholds for municipal generally benefit the domestic water users in the EMA because these uses share the aquifer with municipal water supply wells. In addition, water quality standards and the related MTs for contaminants, salts, and nutrients are intended to be protective of drinking water uses.
- **Ecological land uses and users.** Although the degraded groundwater quality minimum thresholds do not directly benefit ecological uses, it can be inferred that the degraded groundwater quality minimum thresholds will indirectly benefit ecological water uses in the EMA because these thresholds limit future increases in concentrations of constituents of concern from what they are now, or prior to what they were when SGMA was enacted in January of 2015.

5.8.2.6 Relevant Federal, State, or Local Standards [§ 354.28(b)(5)]

§ 354.28 Minimum Thresholds.

(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.

The degraded groundwater quality minimum thresholds for salts and nutrients specifically incorporate federal and state drinking water standards. State regulatory agencies have responsibility and authority for responding to contaminant detections that may impair drinking water quality.

5.8.2.7 Methods for Quantitative Measurement of Minimum Thresholds [§ 354.28(b)(6)]

§ 354.28 Minimum Thresholds.

(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.

Degraded groundwater quality will be directly measured from existing or new municipal (DDW compliance monitoring program), domestic (if landowners participate in monitoring), and agricultural supply wells (ILRP). Degraded groundwater quality minimum thresholds will be directly measured from RMSs. Exceedances of regulatory standards and WQOs will be assessed on an annual basis in accordance with the monitoring program (see Section 4). Minimum thresholds for the degradation of groundwater quality sustainability indicator are met when concentrations of constituents of concern exceed the regulatory threshold (WQOs defined in the WQ Basin Plan and concentrations present when SGMA was enacted [January 2015]) for three consecutive monitoring events in more than 50 percent of RMSs.

5.8.3 Measurable Objectives for Water Quality [§ 354.30(a),(b),(c),(d), and (g)]

§ 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.

(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.

(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.

(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.

(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.

5.8.3.1 Measurable Objectives Pertaining to Contaminants

Remediating groundwater contamination Improving groundwater quality is not a required under SGMA; however, protecting it from further degradation due to groundwater production or GSA activity is important to the beneficial users and uses of the resource in the EMA so that pumping can be maintained at desired levels. Thus, the measurable objective as it relates to contaminants is to not make contamination issues worse and to maintain groundwater quality equal to or below regulatory standards or, equal to or below concentrations present in groundwater when SGMA was enacted.

5.8.3.2 Measurable Objectives Pertaining to Salts and Nutrients

The measurable objective as it relates to salts and nutrients (i.e., TDS, chloride, sulfate, boron, sodium, and nitrate) is to maintain groundwater quality equal to or below WQOs presented in the WQ Basin Plan, or equal to or below concentrations present in groundwater when SGMA was enacted.

5.8.4 Interim Milestones for Water Quality [§ 354.30(e)]

§ 354.30 Measurable Objective.

(e) Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin with 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.

Interim milestones show how the GSA anticipates moving from current conditions to meeting the measurable objectives. No significant and unreasonable results have been observed in the EMA in association with degraded groundwater quality. Therefore, no interim milestones are being proposed.

5.9 Land Subsidence Sustainable Management Criterion

5.9.1 Undesirable Results for Subsidence [§ 354.26(a),(b)(1),(b)(2), and (d)]

§ 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.

(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.

(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.

Conditions that may lead to an undesirable result in the EMA include a shift in pumping locations or substantial increase in pumping beyond what has been observed, which could lead to a substantial decline in groundwater levels that could result in land subsidence that exceeds the minimum thresholds. Presently, there is no data to indicate whether the geologic materials comprising the basin are susceptible to subsidence. The Basin is located in a very tectonically active region and so the ground surface may rise or fall as a result.

Locally defined significant and unreasonable conditions for land subsidence are land surface elevation change rates exceeding rates estimated by using the data sets described below and land subsidence that causes damage to groundwater supply, land uses, infrastructure, and property interests:

- Estimated land surface elevation using InSAR data that are collected by the European Space Agency Sentinel-1A satellite and processed by TRE ALTAMIRA Inc. for the period from June 13, 2015, through September 19, 2019 (TRE ALTAMIRA, Inc., 2020).
- Estimated land surface elevation using InSAR data processed by European Space Agency Sentinel-1A satellite and processed by the National Aeronautics and Space Administration Jet Propulsion Laboratory for the period between spring of 2015 and summer of 2017 (NASA JPL, 2018).
- Measured land surface elevation data collected by a network of CGPS stations operated by UNAVCO. Measured land subsidence data collected by CGPSs located in areas immediately outside of the EMA were reviewed (UNAVCO, 2020).

For clarity, this SMC uses two related concepts to define significant and unreasonable conditions:

- **Land subsidence** is a gradual settling of the land surface caused by, among other processes, compaction of subsurface materials due to lowering of groundwater levels from groundwater pumping. Land subsidence from dewatering subsurface clay layers can be an inelastic process and the potential decline in land surface could be permanent. This can also be caused by exploitation of oil and gas from fields located within or near the EMA.
- **Land surface elevation fluctuation.** Land surface may rise or fall, elastically, in any one year. Land surface elevation fluctuation may or may not indicate long-term permanent subsidence. This can be caused by tectonic activity in the earth. It can also be caused by grading activities, particularly in agricultural areas or housing developments.

By regulation, the ground surface subsidence undesirable result is a quantitative combination of subsidence minimum threshold exceedances. Therefore, the ground surface subsidence undesirable results include the following:

- Significant and unreasonable subsidence caused by groundwater extraction exceeds the minimum threshold and causes damage to structures and infrastructure and substantially interferes with surface land uses.

Figure 3-36 shows the InSAR measured land surface elevation changes in the EMA. The dark blue areas are areas with measured ground surface rise of between 0 feet and 0.25 feet. The teal area on Figure 3-36 is the area with measured ground surface drop of 0 feet to 0.25 feet. Random sampling of the 100-meter by 100-meter (328-foot by 328-foot) calculation grid cells indicates the greatest amount of land surface elevation changes in the EMA has occurred in the wedge-shaped area that is bound by and includes Los Olivos, State Highway 154, and the base of the San Rafael Mountains. Total measured land surface elevation changes in the area from June 13, 2015, through September 19, 2019, is less than 0.06 feet, or 0.015 feet per year. The data accuracy report for the InSAR data (Towill, Inc., 2020) states that "InSAR data accurately models change in ground elevation to an accuracy tested to be 16 mm at 95% confidence." Therefore, the InSAR-based annual land surface elevation decline of 0.015 feet (0.18 inches) is below the accuracy range of 0.053 feet (0.63 inches). The reported rate of decline is below the range of uncertainty of the InSAR data, indicating that no significant subsidence within the Basin has been recorded.

Elevation data recorded from the UNAVCO CGPS Stations is presented on Figure 3-37, which includes time-series plots of land surface elevation. One of these stations is located near the Santa Ynez Airport, while the other two stations are located in the periphery of the Basin and indicate what is occurring with regard to surface elevations regionally. Total subsidence, or uplift, recorded by the station within the EMA, indicate that, since 2015, land surface elevation change is 4 mm per year (plus or minus approximately 1 mm per year), for a total decline of 20 mm (0.065 feet). For the stations immediately surrounding the EMA during the approximately 19-year period of record (approximately 2001 through 2020) total land surface elevation decline has been approximately plus or minus 10 mm (0.03 feet). This is a minor rate of decline or uplift and is insignificant.

To supplement the InSAR and UNAVCO data, a preliminary evaluation was completed to assess the range of possible long-term ground surface elevation changes related to withdrawal of groundwater from the EMA. The preliminary evaluation included developing stratigraphic profiles from well logs and estimating ranges of possible long-term subsidence that might be expected in the future. The analysis was completed at two well locations (ID1 5a and ID1 6) with estimated potential subsidence of on the order of 0.5 to 3 feet resulting from the changes in groundwater elevation reported in the hydrographs. This report is presented in Appendix E and additional discussion is included in Section 3.2.4. Due to a lack of land surface elevation data for the portion of the EMA where pumping effects are likely to be the greatest, a land surface elevation (subsidence) monitoring program is proposed and presented in Section 4.

Recorded land surface elevation changes could be due to tectonic activity, groundwater extraction, oil and gas extraction, or a combination of the three. Should potential subsidence be observed, the GSA will first assess whether the land surface elevation changes may be due to (1) groundwater pumping and (2) elastic processes (land surface elevations that will recover with rising groundwater). If the subsidence is not elastic or is due to pumping, the GSA will undertake a program to correlate the observed subsidence with measured groundwater elevations.

Staying above the minimum threshold will avoid the subsidence undesirable result and protect the beneficial uses and users from impacts to groundwater supply, land uses, infrastructure, and property interests.

5.9.2 Minimum Thresholds for Subsidence [§ 354.26(c) and 354.28(a),(b)(1),(c)(5)(A)(B),(d), and (e)]

§ 354.26 Undesirable Results.

(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.

§ 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.

(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 the uncertainty in the understanding of the basin setting.

(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 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 affects.

(B) Maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum threshold and measurable objectives.

(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.

Section 354.28(c)(5) of the SGMA regulations states that "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."

The subsidence minimum threshold is as follows and summarized in Table 5-4:

- The rate of subsidence does not exceed 0.08 feet (1 inch) per year for 3 consecutive years.

This minimum threshold was selected because undesirable results have not been observed and this rate of subsidence is consistent with what has been measured by the InSAR and UNACVO CGPS datasets. Three consecutive years of observed land surface elevation decline was chosen because the available land surface elevation data shows that the land surface may rise or fall over 1 or 2 years. Three data points are needed to define a trend. The GSA may conduct land surface elevation monitoring using high-resolution GPS equipment at benchmarks located in the vicinity of critical infrastructure. The expected precision and accuracy of this method will be equal to or better than the InSAR and UNAVCO CGPS methods.

Table 5-4. Land Subsidence Minimum Threshold

RMS ID	Rate of Land Subsidence (feet per year)
InSAR and UNAVCO Methods	0.08[1]

Notes

[1] Land subsidence must also cause damage to groundwater supply, land uses, infrastructure, and property interests.

InSAR = Interferometric Synthetic Aperture Radar

RMS = representative monitoring site

UNAVCO = University NAVSTAR Consortium

5.9.2.1 Relationship between Individual Minimum Thresholds and Other Sustainability Indicators [§ 354.28(b)(2)]

§ 354.28 Minimum Thresholds.

(b) The description of minimum thresholds shall include the following:

(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.

Subsidence minimum thresholds have little or no impact on other minimum thresholds, as described below:

- **Avoid Chronic Lowering of Groundwater Levels.** Subsidence minimum thresholds will not result in significant or unreasonable lowering of groundwater levels.
- **Avoid Chronic Reduction of Groundwater in Storage.** The subsidence minimum thresholds will not change the amount of groundwater pumping and will not result in a significant or unreasonable change of groundwater in storage.
- **Avoid Degraded Groundwater Quality.** The subsidence minimum thresholds will not change the groundwater flow directions or gradients of groundwater pumping and therefore and will not result in a significant or unreasonable change in groundwater quality.
- **Avoid Depletion of Interconnected Surface Waters.** The groundwater level subsidence minimum thresholds will not change the amount or location of groundwater pumping and will not result in a significant or unreasonable depletion of interconnected surface waters.
- **Avoid Seawater Intrusion.** This sustainability indicator is not applicable in the EMA.

5.9.2.2 Effects of Minimum Thresholds on Neighboring Basins [§ 354.28(b)(3)]

§ 354.28 Minimum Thresholds.

(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 ground surface subsidence minimum thresholds are set to prevent any long-term subsidence that could harm groundwater supply, land uses, infrastructure, and property interests. Therefore, the subsidence minimum thresholds for the EMA will not prevent the downstream CMA and adjacent SACV from achieving sustainability.

5.9.2.3 Effects of Minimum Thresholds on Beneficial Uses and Land Uses [§ 354.28(b)(4)]

§ 354.28 Minimum Thresholds.

(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.

The subsidence minimum thresholds are set to prevent subsidence that could harm groundwater supply, land uses, infrastructure, and property interests. Available data indicate that there is currently little subsidence occurring in the EMA, and no subsidence that has been observed to substantially interfere with groundwater supply, land uses, infrastructure, and property interests. Therefore, there is no likely negative impact on any beneficial uses or users of groundwater.

5.9.2.4 Relevant Federal, State, or Local Standards [§ 354.28(b)(5)]

§ 354.28 Minimum Thresholds.

(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 federal, state, or local regulations related to subsidence.

5.9.2.5 Methods for Quantitative Measurement of Minimum Thresholds [§ 354.28(b)(6)]

§ 354.28 Minimum Thresholds.

(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.

Minimum thresholds will be assessed using DWR-supplied InSAR and UNAVCO CGPS data and land surface elevation monitoring (see Section 4).

5.9.3 Measurable Objectives for Subsidence [§ 354.30(a)]

§ 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.

5.9.3.1 Methodology for Setting Measurable Objectives

The measurable objectives are set based on maintaining current conditions (e.g., rate of subsidence does not significantly change). Changes are measured by DWR-supplied InSAR data, UNAVCO CGPS data, and land surface elevation monitoring if performed by the GSA.

5.9.3.2 Measurable Objectives for the Basin [§ 354.30(b),(c),(d), and (g)]

§ 354.30 Measurable Objectives.

(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.

(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.

(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.

(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.

The measurable objectives for subsidence represent target land surface elevation change rates in the EMA. Available information does not suggest the occurrence of significant and unreasonable subsidence in the EMA. Therefore, the measurable objective for subsidence is the accuracy range of the InSAR data at 95 percent confidence (0.053 feet) and is summarized in Table 5-5.

Table 5-5. Land Subsidence Measurable Objective

RMS ID	Rate of Land Subsidence (feet per year)
InSAR	0.053

Notes

RMS = representative monitoring site

InSAR = Interferometric Synthetic Aperture Radar

5.9.4 Interim Milestones for Subsidence [§ 354.30(e)]

§ 354.30 Measurable Objective.

(e) Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin with 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.

Interim milestones show how the GSA anticipates moving from current conditions to meeting the measurable objectives. No significant or unreasonable effect has been observed in the EMA in association with land subsidence. Therefore, no interim milestones are being proposed.

5.10 Depletion of Interconnected Surface Water Sustainable Management Criterion

5.10.1 Undesirable Results for Surface Water Depletion [§ 354.26(a),(b)(1)(2), and (d)]

§ 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.

(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.

(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.

The conditions that may lead to an undesirable result for interconnected surface water in the EMA include the following:

- **Groundwater level declines.** A significant and unreasonable condition for depletion of interconnected surface water is a pumping-induced reduction in groundwater levels in specific locations where groundwater is interconnected with surface water that causes depletion of the interconnected surface water, resulting in significant and unreasonable adverse impacts to Category A GDEs (see Section 3.2 and Figure 3-40). As discussed in Section 5.10, groundwater levels that continue to decline below historical levels in the future may reduce groundwater flow in areas that are connected to surface water and have significant and unreasonable adverse impacts on Category A GDEs and reductions of discharge of surface water to the Santa Ynez River. No significant or unreasonable effects have been observed thus far in areas identified as being interconnected with surface water during periods of historical low groundwater levels and groundwater in storage.
- **Severe drought** would reduce recharge to the Paso Robles Formation and Careaga Sand aquifers; thus, lowering groundwater levels and reducing surface water flow in Alamo Pintado and Zanja de Cota Creeks, which could result in depletions of interconnected surface water that could have a significant and unreasonable adverse impact to Category A GDEs and reductions of discharge of surface water to the Santa Ynez River. Short-term impacts due to drought are anticipated in SGMA and the SGMA regulations, with recognition that management actions need sufficient flexibility to accommodate

drought periods and ensure short-term impacts can be offset by increases in groundwater levels or storage during normal or wet periods.

Locally defined significant and unreasonable conditions for depletion of interconnected surface water that could cause significant and unreasonable adverse impacts to Category A GDEs were assessed using several resources:

- Potential GDE identification using the Natural Communities Commonly Associated with Groundwater (NCCAG) data set from DWR and The Nature Conservancy guidance on screening for potential GDEs (see Section 3.2.6)
- Identification of interconnected surface water (see Section 3.2.5)
- Groundwater elevation monitoring data (see Section 3.2.1)
- Groundwater flow model of the EMA used to assess whether surface water depletion is evident during the historical period and the projected future period, with and without climate change

As discussed in Section 3.1.1.1, groundwater discharge as subsurface outflow from the Santa Ynez Uplands portion of the EMA is relatively small (LaFreniere and French, 1968). At the time that the USGS studied groundwater outflow (1946 to 1964), much of the groundwater flow was understood to exit the uplands as surface water flow, particularly on the lower end of Zanja de Cota Creek, with an average of 2,800 AFY for all tributaries. This groundwater discharge from the higher-elevation Santa Ynez Uplands into the lower-lying Santa Ynez River along the southern border of this area is limited due to the relatively impermeable bedrock boundary that forms a barrier to groundwater flow along the Santa Ynez River and the relatively limited thickness of saturated alluvium within the major tributaries in this area (Hoffman, 1996). Conceptually, it is believed that this discharge occurs primarily as surface water flow leaving the tributaries just upstream of the confluence with the Santa Ynez River.

The focus of this sustainability indicator is avoiding significant and unreasonable adverse impacts on beneficial uses of interconnected surface water in the EMA caused by groundwater use. Category A GDEs are a beneficial use in the subject areas. In addition, significant and unreasonable reductions in interconnected surface water flowing into the Santa Ynez River caused by groundwater use in the principal aquifers should be avoided. Section 3.2 describes the methodology used to identify GDEs in the EMA. In summary, measured groundwater level data and groundwater elevation contours within the Principal Aquifers were compared to the NCCAG data set available from DWR to identify locations within the EMA where groundwater levels were within 30 feet of ground surface. The Nature Conservancy's guidelines suggests that potential GDEs in areas where groundwater occurs more than 30 feet below ground surface can be removed from the GDE category since this depth is too great to support habitat (TNC, 2019). Based on this evaluation, GDEs (Category A) associated with one of the Principal Aquifers were identified on the downstream ends of Alamo Pintado and Zanja de Cota Creek (see Figure 3-40) where there is evidence that groundwater is interconnected with surface water. Other potential GDEs were identified in other parts of the Basin; however, they were excluded from consideration because they are located in higher elevations above the regional water table, likely supported by perched water, not associated with a Principal Aquifer, or are outside of the areas that are affected by groundwater use in the Basin (e.g., north and east of Cachuma Reservoir [Lake Cachuma]).

According to local stakeholders, Alamo Pintado and Zanja de Cota Creeks are generally dry except during periods of rainfall. The lower end of these creeks near the confluence with the Santa Ynez River are reported to be perennially wet because groundwater present in the underlying Principal Aquifer (Paso Robles Formation or Careaga Sand) is "upwelling" into the creek at these locations. The upwelling occurs because low permeability marine bedrock that underly the Santa Ynez River form a groundwater dam that causes the upwelling and discharge to surface water. This is the reason why GDEs have been sustained in these areas.

The current GDEs have survived through the recent drought (WYs 2012 to 2021 with 2 wet years in WYs 2017 and 2019) that saw historical low groundwater levels in many EMA groundwater wells. When surface water is present or when groundwater levels are above the maximum rooting depth of the plants, it can be inferred that GDEs are not adversely affected (because no impacts to GDEs have been observed to date).

No studies have been found that evaluated historical or existing habitat composition or condition in the GDE area along Alamo Pintado and Zanja de Cota Creek. Without completing an additional assessment, it cannot be determined whether the Alamo Pintado and Zanja de Cota Creek's ability to support GDEs has changed over time as a result of drought conditions in the region or whether pumping in the EMA has caused impacts. To avoid impacts to Category A GDEs in the future, groundwater monitoring is planned. Construction of shallow monitoring wells, or piezometers, are proposed within the Category A GDE areas identified near the confluence of Alamo Pintado and Zanja de Cota Creek with the Santa Ynez River (see Figure 3-40). Groundwater elevation will be used as a proxy for the depletion of interconnected surface water sustainability indicator.

Because GDEs are a beneficial use of interconnected surface water in the subject areas, the minimum threshold for depletion of interconnected surface water is focused on avoiding significant and unreasonable adverse impacts to Category A GDEs. It also will avoid significant and unreasonable depletion of surface water that discharges to the Santa Ynez River. The areas near the confluence of Alamo Pintado and Zanja de Cota Creek with the Santa Ynez River (see Figure 3-40) are the only locations identified in the EMA where groundwater from a Principal Aquifer is interconnected with surface water.

Significant and unreasonable adverse impacts on beneficial uses of surface water that result in undesirable results include the following:

- Permanent loss or significant and unreasonable adverse impacts to existing native riparian or aquatic habitat in the Category A GDE area due to lowered groundwater levels caused by pumping

A sustained drop in groundwater levels below root zones caused by groundwater pumping could result in permanent loss of GDEs and reduce surface water discharge to the Santa Ynez River. Monitoring of groundwater levels near the confluence of Alamo Pintado and Zanja de Cota Creek with the Santa Ynez River will be conducted by the GSA as part of EMA monitoring programs (see Section 4) to assess whether there is potential for significant and unreasonable adverse impacts and long-term decline in the health of the GDEs in the subject areas and significant reduction in surface water discharge to the river.

5.10.2 Minimum Thresholds for Surface Water Depletion [§ 354.28(a),(b)(1),(c)(6)(A)(B),(d), and (e)]

§ 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.

(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 the uncertainty in the understanding of the basin setting.

(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 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.

(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.

Section 354.28(c)(6) of the SGMA regulations states that "The minimum thresholds for depletion 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 numerical groundwater model was used to assess the timing and magnitude of potential depletions of interconnected surface waters that may have occurred in the past along these two creeks where an interconnection with groundwater likely exists since there are no surface water gauging sites. The model was also used to assess whether future predicted changes in land use, pumping, and climate (with and without climate change) cause depletion that may cause significant and unreasonable adverse impacts to beneficial uses (e.g., GDEs and discharge to the river) in the Category A GDE area shown on Figure 3-40. As has been observed from past monitoring, groundwater levels vary significantly in response to wet and dry cycles and so the interconnection with surface water is also expected to vary. The groundwater flow model of the EMA was used to assess whether surface water depletion is evident where groundwater is discharging to surface water in Alamo Pintado and Zanja de Cota Creeks. The approach used was to create a zone water budget for each of these two subareas using the model and determine the quantity of groundwater discharge to surface water during the historical period and the projected future period, with and without climate change. It is expected that the discharge volumes would vary as a result of climatic variation. Chronic depletion would be exhibited by a steady reduction in discharge over time.

The results of the depletion analysis using the groundwater model are illustrated on Figures 5-4 and 5-5 for Alamo Pintado and Zanja de Cota Creeks, respectively.

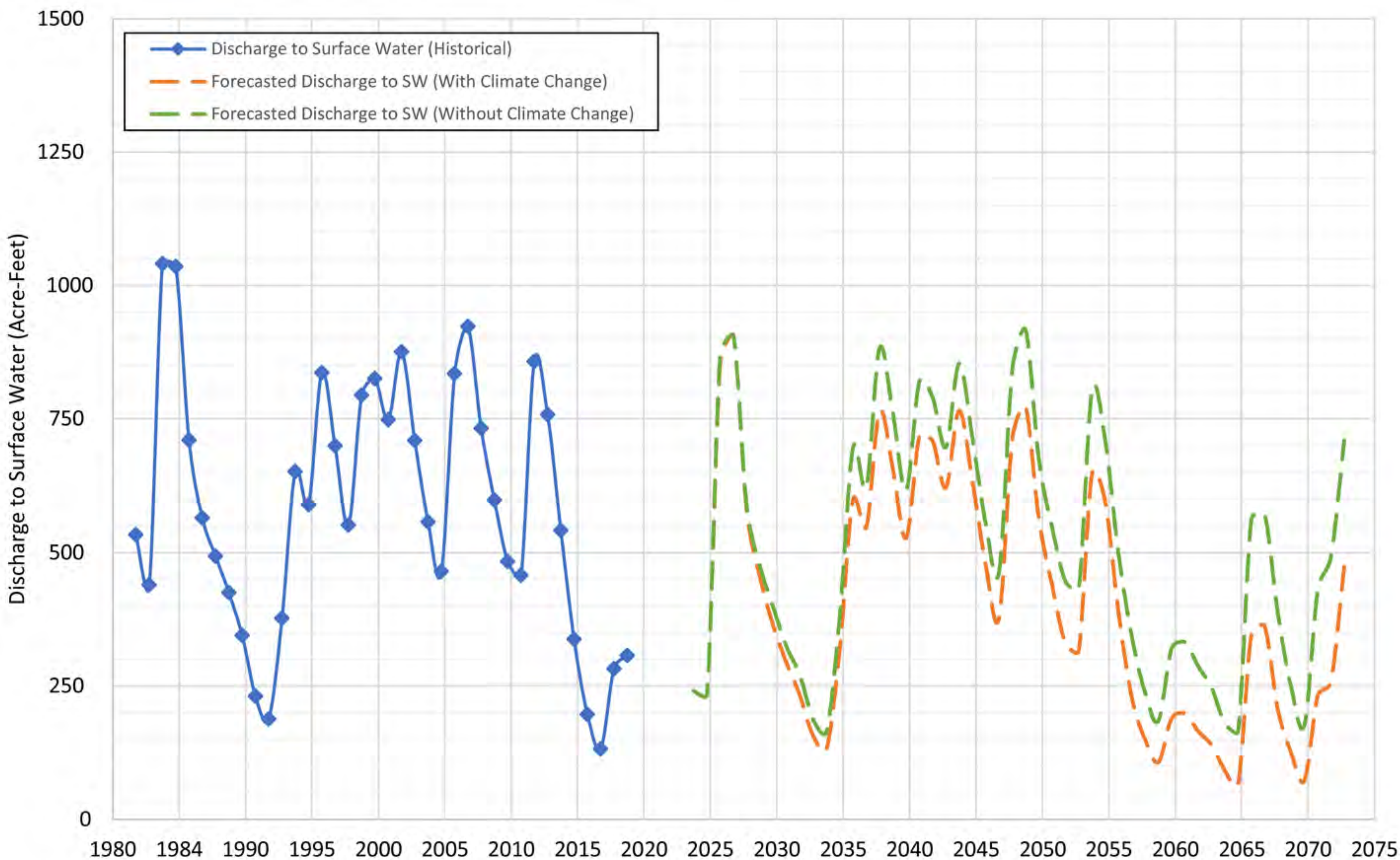


Figure 5-4. Modeled Discharges to Surface Water in Alamo Pintado, Category A GDE Area

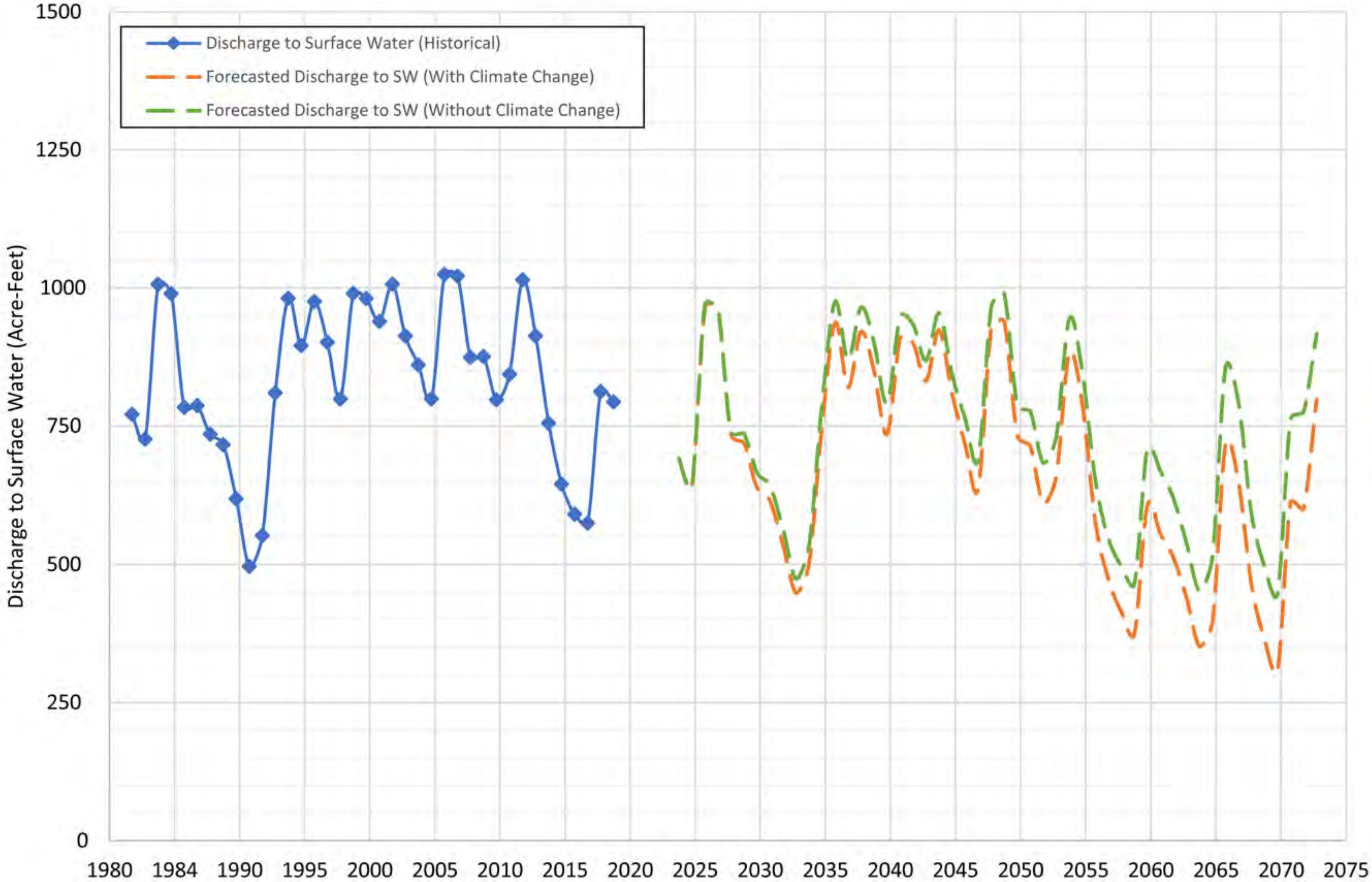


Figure 5-5. Modeled Discharges to Surface Water in Zanja de Cota Creek, Category A GDE Area

The modeling results show fluctuating amounts of discharge to surface water depending on climate but no distinct negative trend that would indicate that surface water depletion occurred as a result of groundwater use during the historical period. The results for the predicted future condition (green dashed lines, without climate change) at these locations show a similar range of groundwater discharge to surface water as the historical period. A slight decrease in groundwater discharge to surface water of less than 25 acre-feet (AF) can be observed for relatively short durations in the future period compared to the historical period. It is inferred that this slight decrease is a result of groundwater use since the historical climate was projected forward in time and there are expected to be small increases in pumping and changes in land use in the future. This change in flow (<25 AF) is very small relative to the range of 150 to 900 AF of groundwater discharge to surface water and is not considered significant. The future condition with climate change shows that surface water depletion caused by climate change can be expected. This is particularly true after the year 2050. Based on these modeling analyses, it is not believed that groundwater use results in significant and unreasonable depletion of surface water. Climate is predicted to have the predominant effect.

GDEs in the Category A GDE area are a beneficial use of interconnected surface water in the upland area. In addition, significant and unreasonable reductions in interconnected surface water flowing into the Santa Ynez River caused by groundwater use in the principal aquifers should be avoided. Because surface water gauges on these tributaries do not exist, gauges may not be feasible to install, and continued use of the groundwater model for estimating future depletion is not as reliable as direct measurements, groundwater levels will be used as a proxy for establishing the minimum the minimum threshold for depletion of interconnected groundwater and surface water. The minimum threshold for this sustainability indicator is presented below and in Table 5-6:

- Groundwater levels measured at the piezometers proposed to be installed in the GDE areas of Alamo Pintado and Zanja de Cota Creek are 15 feet below the stream bed.

This minimum threshold was selected because it represents the lowest groundwater level that most GDE plants can typically access with their roots, assuming that capillary action will bring groundwater further up into the profile. It is also intended to ensure that groundwater use does not significantly reduce the flow of surface water from the tributaries into the Santa Ynez River. The modeling results indicate that surface water flowing seasonally within the tributaries will continue to support the GDEs present there and discharge to the Santa Ynez River unless there is a reduced rainfall or significant drought. During drought conditions, GDEs must rely on groundwater levels being maintained within the root zone. Capillary action in fine-grained sediments within the creek bed will also bring water farther up (as much as several feet) into the vicinity of the plant roots. Based on groundwater modeling results, this threshold has not been reached in the past and is not expected in the future with the assumed climate and land use changes (see Appendix C). Groundwater levels measured at proposed monitoring wells located within the Category A GDE areas of Alamo Pintado and Zanja de Cota Creeks will be used to assess whether depletion of interconnected surface water is occurring and whether significant and unreasonable adverse impacts to GDEs or reductions in discharge of interconnected surface water to the Santa Ynez River are likely to occur as a result of groundwater use. Once sufficient groundwater levels data is obtained from the new monitoring wells, the minimum threshold for surface water depletion will be reviewed and reevaluated if necessary.

Figure 4-4 shows the location of the proposed piezometers in the Category A GDE areas identified in Alamo Pintado and Zanja de Cota Creek.

Table 5-6. Depletion of Interconnected Surface Water Minimum Thresholds

RMS ID	Minimum Threshold
Piezometer(s)[1]	15 feet below respective stream bed[2]

Notes

[1] See Figure 4-4 for locations of proposed piezometers.

[2] To meet the minimum threshold, groundwater levels in piezometers must be equal to or below 15 feet below the stream bed in the Category A GDE areas of Alamo Pintado and Zanja de Cota Creek.

RMS = representative monitoring site

5.10.2.1 Relationship between Individual Minimum Thresholds and to Other Sustainability Indicators [§ 354.28(b)(2)]

§ 354.28 Minimum Thresholds.

(b) The description of minimum thresholds shall include the following:

(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.

Because of the interrelationship between groundwater level, changes in storage, and interconnected surface water, it is possible that one set of thresholds could affect the other set of thresholds for these indicators. The relationship between the depletion of interconnected surface water and the other sustainability indicators is presented below:

- **Avoid Chronic Lowering of Groundwater Levels.** The depletion of interconnected surface water minimum threshold is related to groundwater level minimum thresholds because they are interdependent. If groundwater levels in the Principal Aquifers decline such that there is a significant reduction in upwelling to Zanja de Cota and Alamo Pintado Creeks near their confluences with the Santa Ynez River, surface water depletion of interconnected surface water and significant and unreasonable adverse impacts to GDEs is possible. Monitoring of groundwater levels within the Category A GDE areas will indicate whether this is occurring. If groundwater levels reach depletion of surface water minimum thresholds, then an evaluation, and potentially management actions, would be conducted in a timely manner to avoid significant and unreasonable adverse impacts to GDEs.
- **Avoid Chronic Reduction of Groundwater in Storage.** Nothing about the minimum threshold promotes groundwater pumping in excess of the sustainable yield. Therefore, the minimum threshold for depletion of interconnected surface water will not result in an exceedance of the groundwater in storage minimum threshold.
- **Avoid Degraded Groundwater Quality.** The minimum threshold for depletion of interconnected surface water will not change the groundwater flow directions or gradients, and, therefore, will not result in a significant or unreasonable change in groundwater quality.
- **Avoid Land Subsidence.** Nothing about the minimum threshold for depletion of interconnected surface water promotes a condition that will lead to additional subsidence. Therefore, the minimum threshold for depletion of interconnected surface water will not result in a significant or unreasonable level of subsidence.
- **Avoid Seawater Intrusion.** This sustainability indicator is not applicable to the EMA.

5.10.2.2 Effects of Minimum Thresholds on Neighboring Basins [§ 354.28(b)(3)]

§ 354.28 Minimum Thresholds.

(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 CMA is hydrologically downgradient of the EMA. As discussed in Section 3.1, groundwater and surface water generally flow from the EMA into the CMA. The minimum threshold for depletion of interconnected surface water is set to protect habitat and sensitive species at specific locations in the EMA where there is a connection between groundwater and surface water. The minimum threshold for depletion of interconnected surface water in the EMA is not anticipated to impact sustainability in the CMA because according to the groundwater model, conditions that are necessary to avoid impacts to Category A GDEs in the EMA will continue to support flows into the CMA.

Groundwater gradients at the boundary between the EMA and SACV indicate that groundwater does not flow between the EMA and SACV and, therefore, the SACV would not be impacted by the minimum threshold for the depletion of interconnected surface water sustainability indicator in the EMA.

5.10.2.3 Effects on Beneficial Uses and Land Uses [§ 354.28(b)(4)]

§ 354.28 Minimum Thresholds.

(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.

The minimum threshold for depletion of interconnected surface water has been selected to avoid significant and unreasonable adverse impacts to Category A GDEs in the EMA and reductions in surface water discharge to the Santa Ynez, while providing a reliable and sustainable groundwater supply. The minimum thresholds for depletion of interconnected surface water have been established to avoid undesirable results. For this reason, groundwater serving beneficial uses (including GDEs) and land uses will not be adversely affected. The groundwater flow model indicates that significant and unreasonable depletion of surface water caused by groundwater use has not been occurring or is expected to occur near the locations where groundwater is connected to surface water in the tributaries. Consequently, reductions in surface water flowing from the tributaries into the Santa Ynez River is not expected to be significant or unreasonable. However, the modeling results indicate that future climate change may have an effect on these beneficial uses.

5.10.2.4 Relevant Federal, State, or Local Standards [§ 354.28(b)(5)]

§ 354.28 Minimum Thresholds.

(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 federal, state, or local regulations related to interconnected surface water depletion where this interconnection with groundwater has been identified. The groundwater flow model indicates that significant and unreasonable depletion of surface water as a result of groundwater use has not been occurring and is not expected in the future under climatic conditions observed in the past near the location where groundwater is connected to surface water in the tributaries. Consequently, reductions in surface water flowing from the tributaries into the Santa Ynez River are not expected to be significant or unreasonable.

5.10.2.5 Methods for Quantitative Measurement of Minimum Thresholds [§ 354.28(b)(6)]

§ 354.28 Minimum Thresholds.

(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.

As a surrogate for surface water flow measurements, groundwater levels will be measured in piezometers proposed to be installed in the Category A GDE areas of Alamo Pintado and Zanja de Cota Creek as shown on Figure 4-4. Details of this monitoring program are presented in Section 4.

5.10.3 Measurable Objectives for Depletion of Surface Water [§ 354.30(a),(b),(c),(d), and (g)]

§ 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.

(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.

(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.

(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.

(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.

The measurable objective for depletion of interconnected surface water uses groundwater levels as a proxy because of the lack of locations of existing surface water gaging stations and because avoiding impacts to Category A GDEs in Alamo Pintado and Zanja de Cota Creeks is the focus for this sustainability indicator. The measurable objective for depletion of interconnected surface water has been established in groundwater at 5 feet below the streambed level measured at the piezometers proposed to be installed in the Category A GDE areas of Alamo Pintado and Zanja de Cota Creek (see Figure 4-4). This groundwater level was chosen because it is well within the root zone of vegetation commonly associated with GDEs and is a target by which to compare future groundwater levels. The measurable objective for depletion of interconnected surface water is summarized in Table 5-7.

Table 5-7. Depletion of Interconnected Surface Water Measurable Objectives

RMS ID	Measurable Objectives
Piezometer(s)[1]	Groundwater level that is 5 feet below the stream bed[2]

Notes

[1] See Figure 4-4 for locations of proposed piezometers.

[2] To meet the measurable objective, groundwater levels in piezometers must be 5 feet below the stream bed in the Category A GDE areas of Alamo Pintado and Zanja de Cota Creek for consecutive summer and fall monitoring events.

RMS = representative monitoring site

5.10.4 Interim Milestones for Depletion of Surface Water [§ 354.30(e)]

§ 354.30 Measurable Objective.

(e) Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin with 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.

Interim milestones show how the GSA anticipates moving from current conditions to meeting the measurable objectives. Interim milestones are set for each 5-year interval following GSP adoption. For this sustainability indicator, there has been no known or documented significant and unreasonable adverse impact to beneficial uses of surface water, nor impacts to GDEs, to date. The recent historical drought resulted in low groundwater levels and surface water flows. However, there is no indication that any impacts to GDEs were a result of groundwater extractions. The groundwater flow model indicates that significant and unreasonable depletion of surface water as a result of groundwater use has not been occurring and is not expected in the future near the location where groundwater is connected to surface water in the tributaries. Consequently, reductions in surface water flowing from the tributaries into the Santa Ynez River is not expected to be significant or unreasonable. For these reasons, no interim milestones are planned.

5.11 References and Technical Studies [§ 354.4(b)]

§ 354.4 General Information.

(b) Each Plan shall include the following general information: 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.

DWR. 2017. Best Management Practices for the Sustainable Management of Groundwater: DRAFT Sustainable Management Criteria. Prepared by the California Department of Water Resources Sustainable Groundwater Management Program.

Flowline Consulting, Inc. 2018. Fourth Quarter 2018 Monitoring Report and Request for Case Closure, 2015 Mission Drive (Hwy 246), Solvang, California, LUFT Site #50121, SWRCB Global ID #T0608300118. December 20, 2018.

Hoffman. 1996. Revised Preliminary Summary Report regarding the Hydrogeology of the Basin, Santa Ynez Uplands Groundwater Basin, Santa Ynez Valley, California. Prepared by Rick Hoffman & Associates.

LaFreniere, G.F., and J.J. French. 1968. Ground-Water Resources of the Santa Ynez Upland Ground-Water Basin, Santa Barbara County, California. Prepared by G.F. LaFreniere and J.J. French in cooperation with the Santa Barbara County Water Agency for the U.S. Geological Survey.

NASA JPL. 2018. InSar Land Surveying and Mapping Services in Support of the DWR SGMA Program Technical Report. Department of Water Resources. Ben Brezing. February.

RWQCB. 2019. Water Quality Control Plan for the Central Coastal Basin. June 2019 Edition. Prepared by the California State Water Resources Control Board. Available at https://www.waterboards.ca.gov/rwqcb3/publications_forms/publications/basin_plan/docs/2019_basin_plan_r3_complete_webaccess.pdf. (Accessed July 26, 2021.)

SBCPHD. 2019. 2015 Mission Drive, Solvang, California; Jim's Service Center, LUFT Site # 50121. Santa Barbara County Public Health Department, Environmental Health Services Division: Letter from E. Steven Nailor, REHS, EIT, SBCPHD, to Jim Enderle, Jim's Service Center.

SWRCB. 2019. California Code of Regulations, Title 22. April 16. California State Water Resources Control Board (SWRCB).

TNC. 2019. Identifying GDEs Under SGMA, Best Practices for Using the NC Dataset. Prepared by The Nature Conservancy (TNC). July 2019.

Towill, Inc. 2020. InSar Data Accuracy for California Groundwater Basins, CGPS Data Comparative Analysis, January 2015 to September 2019. Prepared for the California Department of Water Resources. March 23.

TRE ALTAMIRA, Inc. 2020. InSar Land Surveying and Mapping Services in Support of the DWR SGMA Program Technical Report. March.

UNAVCO. 2020. ORES - Overview | Station Page. September. https://www.unavco.org/instrumentation/networks/status/nota/overview/ORES. University NAVSTAR Consortium.

SECTION 6: **Projects and Management Actions**

6.1 Introduction [§ 354.42, 354.44(a),(c), and (d)]

§ 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 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.

(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.

Sustainable Groundwater Management Act (SGMA) regulations require each Groundwater Sustainability Plan (GSP) to include a description of projects and management actions necessary to achieve the basin sustainability goals and to respond to changing conditions in the basin discussed. This section describes the projects and management actions that will allow the Santa Ynez River Valley Groundwater Basin (Basin) Eastern Management Area (EMA), as part of GSP implementation, to attain sustainability in accordance with § 354.42 and § 354.44 of SGMA regulations. In this GSP, groundwater management actions generally refer to activities that support groundwater sustainability through policy and regulations without infrastructure; projects are defined as activities supporting groundwater sustainability that require infrastructure.

The EMA Groundwater Sustainability Agency (GSA) has developed a portfolio of potential management actions and projects compatible with EMA GSA sustainability goals that can be implemented in a phased manner as the conditions in the Basin dictate. The identified potential management actions and potential future projects are categorized into three groups, with the management actions included in Group 1 to be initiated within 1 year of GSP adoption by the EMA GSA. The Group 2 management actions and Group 3 projects may be considered for implementation in the future as conditions in the Basin dictate and the effectiveness of the other management actions are assessed. It is important to note that the Group 2 management actions and Group 3 projects may not be necessary if the implementation of the Group 1 management actions results in conditions within the EMA that are trending toward meeting the EMA GSA sustainability goals and measurable objectives. Further, the EMA GSA may determine that the implementation of Group 2 management actions and/or Group 3 projects is desirable for reasons other than reaching sustainability within the EMA and may elect to implement initiatives from either Group 2 or 3 at any time.

Based on the results of the analysis that was performed in conjunction with the development of this GSP, the EMA GSA concludes that the sustainability goals described in this GSP and required under the provisions of SGMA can be achieved through the implementation, as needed, of the Group 1 management actions described in Sections 6.3 through 6.6. Therefore, the EMA GSA does not plan at this time to implement any of the Group 2 management actions and /or to initiate the construction of any Group 3 project infrastructure for the specific goal of achieving sustainability until such time that evidence exists that the effects of the Group 1 implemented management actions are considered insufficient.

The EMA GSA plans to continually monitor and assess its progress toward meeting the sustainable management criteria (SMCs) (see Section 5). Under conditions where minimum thresholds are projected to be reached, the EMA GSA will perform assessments to determine whether the trends are related to groundwater pumping, drought conditions, or other factors. If groundwater level data are trending toward reaching minimum thresholds as a direct consequence of groundwater pumping in the EMA, then the EMA GSA may consider the implementation of Group 2 management actions and Group 3 projects.

Management actions and potential future projects discussed in this section have been developed to address sustainability goals, measurable objectives, and undesirable results identified for the EMA in Section 5. Inclusion of management actions and projects in this GSP does not forego obligations under local, state, or federal regulatory programs. While the EMA GSA has an obligation to oversee progress toward groundwater sustainability, it is not the primary regulator of land use, water quality, or environmental project compliance. The GSA will work with the County of Santa Barbara land use staff and outside regulatory agencies, as needed, to ensure that projects and management actions undertaken pursuant to SGMA are in compliance with all applicable laws. The EMA GSA may choose to collaborate with land use and regulatory agencies on specific overlapping interests, such as well permitting, water supply considerations, water quality monitoring, and oversight of projects developed within the EMA.

The projects and management actions in this GSP are designed to achieve several outcomes, including:

- Achieving groundwater sustainability within 20 years of GSP adoption.
- Ensuring that they benefit all uses and users of groundwater.
- Developing funding for GSA operations. Funds will also be used for future EMA monitoring and the implementation of projects and management actions that are identified by the GSA to be appropriate.
- Providing controls and incentives to manage groundwater pumping, if needed, to support sustainability goals.

The projects and management actions described in this section provide a framework for achieving sustainability; however, specific details will need to be finalized and negotiated before any of the projects and management actions can be implemented. Costs for implementing projects and management actions are in addition to the agreed-upon funding to sustain the operation of the EMA GSA and the funding needed for monitoring and reporting. The array of projects and management actions developed by the GSA included in this section demonstrate that options and alternative paths exist to reach sustainability, and it may not be necessary to implement all the projects and management actions to maintain sustainability over the long term. Importantly, the projects and management actions included herein should be considered as a list of options that will be refined during GSP implementation, during which stakeholders will be provided an opportunity to participate in the public process before projects and actions are undertaken.

SGMA regulation § 354.44 requires that projects and management actions described in the GSP include a discussion of the following:

- Relevant measurable objectives being addressed
- The expected benefits of the action
- The circumstances under which management actions or projects will be implemented
- How the public will be noticed
- Relevant regulatory and permitting considerations
- Implementation schedules

- Legal authority required to take the actions
- Estimated costs

A summary of the management actions and projects identified by the EMA are listed below.

Potential Management Actions

- Address Data Gaps
  - Expand Monitoring Well Network in the EMA to Increase Spatial Coverage and Well Density
  - Perform Video Surveys in Representative Wells That Currently Do Not Have Adequate Construction Records to Confirm Well Construction
  - Install Shallow Piezometers in Alamo Pintado Creek and Zanja de Cota Creek Groundwater Dependent Ecosystem (GDE) Areas
  - Review/Update Water Usage Factors and Crop Acreages and Update Water Budget
  - Survey and Investigate Potential Groundwater Dependent Ecosystems (GDEs) in the EMA
- Groundwater Pumping Fee Program
- Well Registration and Well Meter Installation Programs
- Water Use Efficiency Programs
- Groundwater Base Pumping Allocation (BPA) Program
- Groundwater Extraction Credit (GEC) Marketing and Trading Program
- Voluntary Agricultural Crop Fallowing Programs

Potential Projects

- Distributed Stormwater Managed Aquifer Recharge (DSW-MAR) Basins (In-Channel and Off-Stream Basins)
- City of Solvang / Santa Ynez Community Services District (SYCSD) Wastewater Treatment Facility (WWTF) Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse
- Los Olivos Community Service District (LOCSD) Wastewater Treatment Facility (WWTF) Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse
- Santa Ynez Band of Chumash Indians Wastewater Treatment Facility (WWTF) Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse
- EMA GSA to Become Funding Partner to Santa Barbara County Precipitation Enhancement Program
- Conjunctive Use - Managed Aquifer Recharge (MAR) Projects Using Imported (State Water Project [SWP] and Santa Ynez River [SYR]) Water
- In Lieu Recharge Projects to Deliver Unused and Surplus Imported Water to Offset Groundwater Extractions
- Aquifer Storage and Recovery Projects

Table 6-1 presents a summary of the benefits, costs, reliability, and permitting requirements for management actions and projects presented in this GSP. These projects and management actions are itemized by group. The EMA GSA will perform periodic assessments of the effectiveness of the implemented projects and management actions and utilize adaptive management strategies to re-evaluate the implementation sequencing and priorities, as deemed appropriate. At any point, the GSA may choose to implement any of the individual projects or programs listed in any group, if it is determined that it would be beneficial to do so. Further, the EMA GSA may identify other projects and/or management actions that are not included in Groups 1 through 3, for implementation at any time. A brief description of each the management actions and projects in Groups 1 through 3 is presented below, followed by more detailed discussion of each management action and project.

Table 6-1. Summary of Benefits, Cost, Reliability, and Permitting Requirements for Projects and Management Actions

	Group No.	Relevant Measurable Objective Benefits: Groundwater Levels	Reduction in Storage	Water Quality	Groundwater Dependent Ecosystems	Subsidence	Required Permits	Pumping Reduction Outcome Reliability	Estimated Implementation Cost[1]	Benefit : Cost Ratio
Potential Management Actions										
Address Data Gaps										
Expand Monitoring Well Network in the EMA to Increase Spatial Coverage and Well Density	1	N/A	N/A	N/A	N/A	N/A	Santa Barbara County (if a new well)	N/A	$20,000 to $200,000	Moderate - High
Perform Video Surveys in Representative Wells That Currently Do Not Have Adequate Construction Records to Confirm Well Construction	1	N/A	N/A	N/A	N/A	N/A	None	N/A	$25,000 to $75,000	High
Install Shallow Piezometers in Alamo Pintado Creek and Zanja de Cota Creek Groundwater Dependent Ecosystem (GDE) Areas	1	N/A	N/A	N/A	N/A	N/A	Santa Barbara County, CDFW	N/A	$75,000 to $125,000	High
Review/Update Water Usage Factors and Crop Acreages and Update Water Budget	1	N/A	N/A	N/A	N/A	N/A	None	N/A	$20,000 to $30,000	High
Survey and Investigate Potential Groundwater Dependent Ecosystems (GDEs) in the EMA	1	N/A	N/A	N/A	N/A	N/A	None	N/A	$20,000 to $40,000	High
Groundwater Pumping Fee Program	1	√	√	√	√	√	Proposition 26 / 218 or Local Ballot Initiative	Moderately Reliable	$100,000 to $200,000	Moderate - High
Well Registration and Well Meter Installation Programs	1	√	√	√	√	√	None	Moderately Reliable	$75,000 to $150,000	Moderate - High
Water Use Efficiency Programs	1	√	√	√	√	√	None	Moderately Reliable	$50,000 to $125,000	Moderate - High
Groundwater Base Pumping Allocation (BPA) Program	2	√	√	√	√	√	None	Highly Reliable	$75,000 to $150,000	Moderate - High
Groundwater Extraction Credit (GEC) Marketing and Trading Program	2	√	√	√	√	√	None	Highly Reliable	$150,000 to $200,000	Moderate - High
Voluntary Agricultural Crop Fallowing Programs	2	√	√	√	√	√	None	Highly Reliable	$75,000 to $150,000	Moderate - High

	Group No.	Relevant Measurable Objective Benefits: Groundwater Levels	Reduction in Storage	Water Quality	Groundwater Dependent Ecosystems	Subsidence	Required Permits	Pumping Reduction Outcome Reliability	Estimated Implementation Cost[1]	Benefit : Cost Ratio
Potential Projects										
Distributed Stormwater Managed Aquifer Recharge (DSW-MAR) Basins (In-Channel and Off-Stream Basins)	3	√	√	N/A	√	√	Santa Barbara County, USACE, DWR, CDFW, CEQA	Highly Variable	>$1,000,000	Low - Moderate
City of Solvang / Santa Ynez Community Services District (SYCSD) Wastewater Treatment Facility (WWTF) Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse	3	√	√	N/A	√	√	Santa Barbara County, RWQCB, DWR, CEQA	Moderately Reliable	>$5,000,000	Low
Los Olivos Community Service District (LOCSD) Wastewater Treatment Facility (WWTF) Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse	3	√	√	N/A	√	√	Santa Barbara County, RWQCB, DWR, CEQA	Moderately Reliable	>$5,000,000	Low
Santa Ynez Band of Chumash Indians Wastewater Treatment Facility (WWTF) Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse	3	√	√	N/A	√	√	Santa Barbara County, RWQCB, DWR, CEQA	Moderately Reliable	>$5,000,000	Low
EMA GSA to Become Funding Partner to Santa Barbara County Precipitation Enhancement Program	3	√	√	√	√	√	Santa Barbara County, CEQA	Highly Variable	>$200,000	Moderate
Conjunctive Use - Managed Aquifer Recharge (MAR) Projects Using Imported (State Water Project and Santa Ynez River) Water	3	√	√	N/A	√	√	Santa Barbara County, RWQCB, DWR, CDFW, CEQA	Moderately Reliable	>$1,000,000	Low - Moderate
In Lieu Recharge Projects to Deliver Unused and Surplus Imported Water to Offset Groundwater Extractions	3	√	√	N/A	√	√	Santa Barbara County, RWQCB, DWR, CEQA	Moderately Reliable	>$1,000,000	Low - Moderate
Aquifer Storage and Recovery Projects	3	√	√	N/A	√	√	Santa Barbara County, RWQCB, DWR, CEQA	Moderately Reliable	>$1,000,000	Low - Moderate

Notes

[1] The estimates in this table are planning-level cost estimates that are subject to refinement and revision by the EMA GSA after GSP adoption.

CDFW = California Department of Fish and Wildlife
CEQA = California Environmental Quality Act
DWR = California Department of Water Resources
EMA = Eastern Management Area
N/A = not applicable
RWQCB = Regional Water Quality Control Board
USACE = U.S. Army Corps of Engineers

Group 1 Management Actions

The EMA GSA will initiate Group 1 management actions within 1 year of GSP adoption and submittal. These management actions are focused primarily on filling identified data gaps, developing funding for GSA operations and future EMA monitoring, registering and metering wells, and developing new and expanding existing water use efficiency programs for implementation within the EMA.

As a critical element of GSP implementation, the Groundwater Pumping Fee Program is included as a Group 1 management action to provide the GSA with a source of funding for ongoing operations, including continued monitoring of conditions in the EMA. The ancillary benefits include the generation of funding for the EMA GSA to invest in the Group 2 management actions and Group 3 projects in this GSP that may be pursued.

Group 2 Management Actions

The EMA GSA may consider initiating work on Group 2 management actions to the extent that implementation of the Group 1 management actions does not make sufficient progress toward EMA sustainability goals.

The Group 2 management actions include the development and implementation of a Groundwater BPA Program, a GEC Marketing and Trading Program, and a Voluntary Agricultural Crop Fallowing Program. The Groundwater BPA Program would provide a structured process for managing pumping allocations over time to reach the sustainable yield within the next 20 years. Prior to initiating this program, any new production and/or well installation may be required to follow a California Environmental Quality Act (CEQA) review process to assess potential impacts (including environmental). If potential impacts are found, mitigation actions might include purchasing credits through the GEC may be required.

The GEC Marketing and Trading Program and the Voluntary Agricultural Crop Fallowing Program go hand in hand with the BPA program and have multiple benefits. They can provide flexibility for groundwater pumpers to adjust their operations and business models. They also can allow for enhanced water conservation, voluntary fallowing of irrigated agricultural croplands, and promotion of beneficial uses of water and land by providing for the potential to monetize voluntary water conservation and the elimination of water-intensive uses. In combination, the Group 2 management actions are designed to assist the EMA GSA in the avoidance of undesirable results, including chronic lowering of groundwater levels, reduction of groundwater in storage, depletion of interconnected surface water, and potentially degraded water quality.

If implemented, the EMA GSA will monitor the effectiveness of Group 2 management actions to determine whether they will be sufficient to achieve groundwater basin sustainability. The overall effectiveness of individual Group 2 management actions will be evaluated periodically to determine whether continued investment in those activities is warranted or whether other projects and actions should be considered.

Group 3 Projects

In this GSP, all potential projects that have been identified and evaluated are included in Group 3. The EMA GSA does not have a current plan to initiate the construction of any Group 3 project infrastructure for the specific goal of achieving sustainability until data have been collected that determine that Group 1 management actions have made insufficient progress towards sustainability goals. Although the EMA GSA has no near-term plans to initiate construction of any specific projects for the purposes of achieving sustainability, there may be interest by the EMA GSA in the future in proceeding with the study, planning, and preliminary design/engineering and permitting phases for one or more projects that have been identified by the EMA GSA for potential future consideration. A brief description of the Group 3 projects is included in Section 6.10.

As work on supplemental water supply and resource management efforts is ongoing, it may be the case that additional projects and/or management actions may be identified and added to the list in future GSP updates.

6.2 Management Action Implementation Approach [§ 354.44(b)(6)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(6) An explanation of how the project or management action will be accomplished. If the project 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.

The amount of groundwater pumping in the EMA in recent years is more than the estimated sustainable yield of about 12,870 acre-feet per year (AFY), as discussed in Section 3.3, and declining groundwater levels have been documented. As a result, the EMA GSA will begin to initiate implementation of Group 1 management actions within 1 year after GSP adoption. The effect of the management actions will be reviewed periodically, and additional Group 2 management actions and Group 3 projects may be considered and implemented as necessary to avoid undesirable results. A graphical depiction of the implementation sequence is presented in Figure 6-1.

In general, the management actions will apply to all areas within the EMA. The management actions reflect basic GSP implementation requirements, such as extraction measurement, monitoring, reporting and outreach, necessary studies and early planning work, monitoring and filling data gaps, annual reports and GSP updates. The EMA GSA anticipates that new policies, ordinances, and regulations may be necessary to implement of some of the potential projects and management actions. Developing and adopting these policies, ordinances, and regulations would likely require substantial planning and negotiations among the EMA GSA, local public, and various EMA stakeholders. Outreach and negotiations will be used to define and gain approvals for the scope and detail associated with GSA-imposed requirements after GSP adoption.

Public meetings and hearings will be held, as needed, during the process of determining when and where in the EMA projects and management actions may be implemented to maximize their benefits to the Basin. Implementation of some of these actions may require compliance with CEQA and other legal requirements.

A proportional and equitable approach to funding implementation of the GSP and any optional actions will be developed in accordance with all state laws and applicable public process requirements. During these meetings and hearings, input from the public, interested stakeholders, and groundwater pumpers will be considered and incorporated into the decision-making process. The EMA GSA will periodically assess the progress that the implemented projects and management actions have made in stabilizing groundwater levels and meeting the sustainability metrics described in this GSP. The EMA GSA will reassess the need for continuing and/or expanding these actions. At a minimum, the reassessment process will be done as part of the 5-year review and reporting on the GSP.

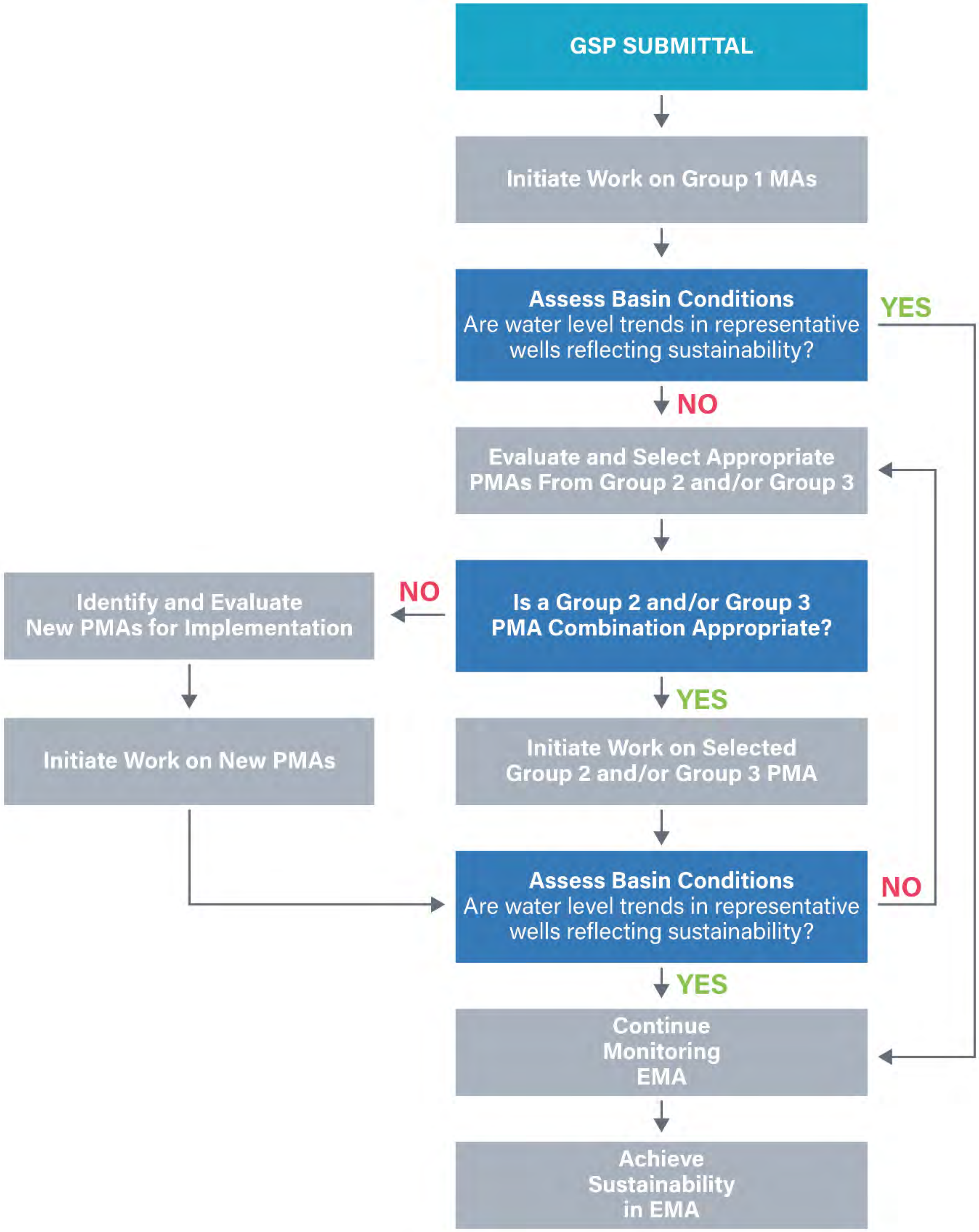


Figure 6-1. Adaptive Implementation Strategy for Projects and Management Actions

Notes

EMA = Santa Ynez River Valley Groundwater Basin Eastern Management Area

MA = management action

PMA = project and/or management action

6.3 Group 1 Management Action 1 – Address Data Gaps [§ 354.44(b)(1), (d)]

§ 354.44 Projects and Management Actions.

(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.

(d) An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.

SGMA regulations require identification of data gaps and a plan for filling them (§ 354.38(b)). In conjunction with the development of this GSP, data have been collected and reported for each of the five sustainability indicators that are relevant to the following:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon
- Significant and unreasonable reduction in groundwater storage
- Significant and unreasonable degraded water quality
- Significant and unreasonable land subsidence that substantially interferes with surface land uses
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

As part of the process, it has been determined that specific data gaps exist that require additional investigation because they are important for future management of the EMA. The identified initial management actions undertaken will be designed to fill the identified data gaps, which include the following activities:

- Expand Monitoring Well Network in the EMA to Increase Spatial Coverage and Well Density
- Perform Video Surveys in Representative Wells That Do Not Have Adequate Well Construction Records
- Install Shallow Piezometers in Alamo Pintado Creek and Zanja de Cota Creek Identified GDE Areas
- Review/Update Water Usage Factors and Crop Acreages and Update Water Budget
- Survey and Investigate Additional Potential GDEs in the EMA

6.3.1 Expand Monitoring Well Network in the EMA to Increase Spatial Coverage and Well Density

The specific data gaps identified in Section 4 are related to the existing groundwater level monitoring network, including increasing the spatial coverage and density of wells in portions of the EMA. The areas where additional monitoring well data are needed are depicted in Figure 4-2. The areas where the addition of monitoring wells would improve the understanding of basin conditions have been previously discussed in

Section 3.2. As previously described, the data gap areas include both the Paso Robles Formation and the Careaga Sand units (the northwestern and northcentral portions of the uplands from Los Olivos to the northern boundary of the EMA, including the northern reaches of Zaca Creek and Alamo Pintado Creek) where the addition of monitoring wells would improve the understanding of basin conditions.

The proposed strategy for adding monitoring wells and Representative Monitoring Sites (RMS) to the monitoring network will be to first incorporate existing wells to the extent possible. Owners of identified candidate existing wells will be contacted to determine interest in participating in the monitoring program. Wells considered for incorporation into the monitoring network will be inspected to ensure they are adequate for monitoring and to determine depth, perforated intervals, and aquifer designation. Access agreements will be secured with well owners to ensure that data can be reported from the wells.

If an existing well in a particular area cannot be identified or permission to use data from an existing well cannot be secured to fill a data gap, then a new monitoring well and/or RMS may be considered. The EMA GSA will obtain required permits and access agreements before drilling new wells. The EMA GSA will retain the services of licensed geologists and/or engineers and qualified drilling companies for drilling new wells. The EMA GSA will also evaluate the availability of grants to provide funding assistance for new wells. Once drilled, the new wells will be tested as necessary and equipped for monitoring. All well construction information, including the aquifer that is being monitored, will be registered with the well.

6.3.2 Perform Video Surveys in Representative Wells That Currently Do Not Have Adequate Construction Records to Confirm Well Construction

The EMA GSA has determined that several of the representative wells that are planned to be included in the GSP monitoring well network do not have adequate documentation regarding the depth, geologic formations intersected, casing characteristics, screened intervals, pump setting, and/or well construction details. To address this data gap, the EMA GSA will perform video logging to ascertain well construction details and the location of well production zones. The information gained will be incorporated into the monitoring well network.

Concurrent with the video surveys, EMA GSA representatives will interview each well owner regarding the well maintenance history, operational issues or events, surface issues that may affect the well, and water quality within the well. The objective of the video survey work and owner interview is to assess the characteristics of each well regarding the following criteria:

- Depth
- Screened interval
- Material type and condition of the casing and screen
- Presence of scaling, sediment, or bacteria
- Well integrity
- Color and clarity of the water
- Gas intrusion
- Water quality
- Other similar observations that may relate to potential water-quality issues
- Historical pumping rate
- Specific capacity

Note that some information may be unobtainable at specific sites due to well construction or other factors.

All relevant information acquired on wells will be added to the Data Management System (DMS), subject to the requirements of any confidentiality agreements with the well owner. All wells in the monitoring well network and wells identified as RMSs, including those used for water quality monitoring, will be registered under the GSP Well Registration Program. During the well video survey process, if other wells are identified that may further improve the network, they may also be added to the network.

6.3.3 Install Shallow Piezometers in Alamo Pintado Creek and Zanja de Cota Creek Identified GDE Areas

As discussed in Section 3.2, Category A GDEs appear to be concentrated in the southwestern portion of the EMA in the areas surrounding the lower, generally perennial reaches of Alamo Pintado and Zanja de Cota Creeks (see Figure 3-39). These GDEs are located where the southerly flow of groundwater in the regional confined principal aquifers is forced to the surface by the underlying bedrock of the Monterey Formation (LaFreniere and French, 1968). These GDEs appear to be receiving underflow in the tributary alluvium (Upson and Thomasson, 1951), and, in the case of the GDEs surrounding the lower reaches of Zanja de Cota Creek, they also receive effluent from the Chumash Casino Resort Wastewater Treatment Plant (WWTP).

To avoid undesirable results to Category A GDEs and interconnected surface water discharging to the Santa Ynez River from these tributaries, construction of shallow piezometers are proposed within the Category A GDE areas identified near the confluence of Alamo Pintado and Zanja de Cota Creeks with the Santa Ynez River (see Figure 4-4). The proposed shallow piezometers (<50 feet in depth) are expected to provide valuable data that will allow an enhanced understanding of the interconnected surface water system in Category A GDEs and provide the basis for future refinements in the EMA hydrogeologic conceptual model (HCM) (see Section 3.1).

6.3.4 Review/Update Water Usage Factors and Crop Acreages and Update Water Budget

As described in Section 3.3, approximately 7,329 acres of irrigated cropland in the EMA use an estimated 14,545 acre-feet (AF) of groundwater annually. The estimated volume of water pumped is calculated from individual groundwater pumpers located within the EMA and Santa Ynez River Water Conservation District (SYRWCD) boundaries and is based partially on reported extractions and partially on planted acreages and crop-specific water duty factors. These water duty factors are calculated using information included in SYRWCD's Groundwater Production Information and Instructions pamphlet (SYRWCD, 2010). Some landowners within SYRWCD have meters on their groundwater wells and report their production values. For areas of the EMA outside of the SYRWCD boundaries, agricultural pumping is neither metered nor reported. For purposes of developing the groundwater budgets in this GSP for recent years, the agricultural groundwater extractions were estimated using land use data provided by DWR and the crop-specific water use factors provided by SYRWCD. The DWR data sets are derived from a combination of remote sensing, agronomic analysis, and ground verification.

While the accuracy of the DWR and SYRWCD data for irrigated crops for the recent years is relatively high, uncertainty remains regarding the estimates of water use on the irrigated lands within the EMA. To address this uncertainty, the EMA GSA plans to review and update water usage factors and crop acreages, which will be incorporated into future refinements in the EMA water budget. Once the metering program is fully implemented, crop-specific water usage factors may no longer be needed.

6.3.5 Survey and Investigate Potential GDEs in the EMA

As described in Section 3.2.6, a preliminary assessment evaluated the potential GDEs within the EMA. The assessment methodology was applied in accordance with guidance developed by The Nature Conservancy (TNC, 2019). Based on the results of the preliminary assessment, it was determined that GDEs may exist within the EMA. No biological or habitat surveys have yet been completed to verify the existence of the potential GDEs in preparation of this GSP. Note that potential GDEs relating to the Santa Ynez River were excluded from the GDE analysis because the Santa Ynez River and its underflow are considered to be surface water underflow managed by the State Water Resources Control Board (SWRCB), rather than "groundwater" as defined by SGMA, and therefore is not under the purview of SGMA or the EMA GSA. The EMA GSA will not be responsible for managing any aspect of the Santa Ynez River and related underflow (including assessment of impacts to GDEs).

The potential GDEs identified in the EMA for additional evaluation are further categorized based on their proximity to and association with the regional principal aquifers in the EMA. The potential GDEs located within the northern and eastern portions of the EMA are Category B potential GDEs, indicating that they are unlikely to be affected by groundwater management activities and pumping. Therefore, no additional investigation is planned for these Category B GDE areas.

A preliminary evaluation indicates there are insufficient data available to confirm the existence of and the full nature and extent of Category A potential GDEs and certain other potential GDE areas identified in Section 3.1. To address this uncertainty, the recommended next step is to conduct field surveys to document and characterize the Category A potential GDEs. The findings from the proposed field surveys could be incorporated into future refinements in the EMA HCM (see Section 3.1) and SMCs (see Section 5).

6.3.6 Relevant Measurable Objective(s) for Addressing Data Gaps [§ 354.44(b)(1)]

§ 354.44 Projects and Management Actions.

(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.

Each of the management actions described in herein will be designed and implemented for the specific purpose of obtaining data that will support understanding of the groundwater conditions in the EMA, the interconnected surface water systems in areas of the EMA, and the agricultural water demands in the EMA, from a spatial and temporal perspective. The information that will be data obtained through these management actions will support future refinements in the EMA HCM and the EMA water budget (see Sections 3.1 and 3.3, respectively). Although extremely valuable in supporting EMA GSA management decisions, the implementation of these management actions will not have any direct impact on meeting the measurable objectives described in Section 5, except insofar as they are used as a basis to trigger other management actions by the GSA.

6.3.7 Implementation Triggers for Addressing Data Gaps [§ 354.44(b)(1)(A)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) 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, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.

The management actions described in this section are deemed critical for the successful implementation of this GSP and are included in the Group 1 implementation category. The EMA GSA will initiate work on Group 1 management actions within 1 year of GSP adoption.

6.3.8 Public Notice Process for Addressing Data Gaps [§ 354.44(b)(1)(B)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) The Plan shall include the following:

(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.

Public outreach meetings, in addition to regularly scheduled EMA GSA meetings, will be held periodically to inform groundwater users and other stakeholders of the current and projected EMA groundwater conditions, the need to address data gaps, and the parameters of the actions to be undertaken. At these meetings, groundwater users and interested stakeholders will have the opportunity to provide input and comments on how the management actions related to addressing data gaps are being or will be implemented in the EMA.

Information on the progress towards achieving an enhanced understanding of groundwater conditions in the EMA, the interconnected surface water systems in areas of the EMA, and the agricultural water demands in the EMA will also be provided to the public through annual GSP reports and links to relevant information on the EMA GSA website.

Additionally, specific well owners may be contacted directly to discuss specific management actions, including the potential for requesting to include their existing wells in the monitoring and/or RMS network, if not already included. Well owners may also be contacted regarding access to wells for performing video surveys to determine operational status, construction details, and aquifer designation.

6.3.9 Overdraft Mitigation for Addressing Data Gaps [§ 354.44(b)(2)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

Each of the management actions described in this section will be designed and implemented for the specific purpose of obtaining data that will support understanding of the groundwater conditions in the EMA, the interconnected surface water systems in areas of the EMA, and the agricultural water demands in the EMA, from a spatial and temporal perspective. The data obtained from these management actions will provide the basis for future refinements in the EMA HCM and the EMA water budget (see Sections 3.1 and 3.3, respectively). Although extremely valuable and important, the implementation of these management actions will not have any direct impact on the mitigation of the estimated storage deficit as described in Section 3.3, except insofar as the data collected are used as a basis to trigger other management actions by the GSA.

6.3.10 Permitting and Regulatory Process for Addressing Data Gaps [§ 354.44(b)(3)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(3) A summary of the permitting and regulatory process required for each project and management action.

The EMA GSA anticipates that well construction permits may need to be obtained from the Santa Barbara County Department of Public Health Environmental Health Services for any proposed monitoring wells, including piezometers. It is not expected that preparation of CEQA documentation would be required prior to construction of monitoring wells. All new wells will require registration with the EMA GSA and the SYRWCD.

No permitting or regulatory processes are required for the implementation of the remaining management actions that are associated with filling data gaps.

6.3.11 Implementation Timeline for Addressing Data Gaps [§ 354.44(b)(4)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(4) The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.

The Group 1 management actions described in this section are deemed critical for the successful implementation of this GSP. The EMA GSA will initiate work on Group 1 management actions within 1 year of GSP adoption.

6.3.12 Anticipated Benefits for Addressing Data Gaps [§ 354.44(b)(5)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The management actions described in this section will be designed and implemented for the specific purpose of obtaining data that will allow an enhanced understanding of groundwater conditions in the EMA, the interconnected surface water system in areas of the EMA, and the agricultural water demands in the EMA, from a spatial and temporal perspective. The information that will be gained through these management actions will provide the basis for future refinements in the EMA HCM and the EMA water budget (see Sections 3.1 and 3.3, respectively). In addition, the information acquired through the implementation of the management actions described in this section will help guide the EMA GSA in determining the optimal strategy for sequencing the implementation of the Group 2 management actions and Group 3 projects (if needed), which are described in the following Sections 6.4 through 6.10.

6.3.13 Legal Authority for Addressing Data Gaps [§ 354.44(b)(7)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(7) A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.

SGMA regulations require identification of data gaps and a plan for filling them (§ 354.38). The legal authority required to implement the Group 1 management actions, if any, are described in Table 6-1.

6.3.14 Cost and Funding for Addressing Data Gaps [§ 354.44(b)(8)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

Costs associated with this management action will be defined during the early stages of GSP implementation. An appropriate fee collection structure will be determined during that time. For budgetary planning purposes, the following estimates are provided for each of the identified data gaps (see Table 6-1):

- Expand Monitoring Well Network in the EMA to Increase Spatial Coverage and Well Density
  - Budgetary Estimate: $20,000 to $200,000 (high end if well has to be drilled)
- Perform Video Surveys in Representative Wells That Currently Do Not Have Adequate Construction Records to Confirm Well Construction
  - Budgetary Estimate: $25,000 to $75,000
- Install Shallow Piezometers in Alamo Pintado Creek and Zanja de Cota Creek GDE Areas
  - Budgetary Estimate: $75,000 to $125,000
- Review/Update Water Usage Factors and Crop Acreages and Update Water Budget
  - Budgetary Estimate: $20,000 to $30,000
- Survey and Investigate Potential GDEs in the EMA
  - Budgetary Estimate: $20,000 to $40,000

6.3.15 Drought Offset Measures for Addressing Data Gaps [§ 354.44(b)(9)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

Although valuable and important, the implementation of the management actions described herein will not have any direct impact regarding ensuring 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, except insofar as the data collected are used as a basis to trigger other management actions by the GSA.

6.4 Group 1 Management Action 2 – Groundwater Pumping Fee Program [§ 354.44(b)(1)(d)]

§ 354.44 Projects and Management Actions.

(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.

(d) An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.

As part of the GSP implementation process, the EMA GSA will explore various financing options to cover its operational costs and to generate funding for the ongoing EMA monitoring program and the implementation of Group 1 management actions and potential future Group 2 management actions and Group 3 projects. Based on the results of these efforts, the EMA GSA may adopt a management action to levy groundwater pumping fees to generate funding for the EMA GSA.

The initial financing evaluation will be focused on program design, policy and regulatory development, CEQA compliance, and stakeholder outreach. The EMA GSA will identify and evaluate an effective and equitable fee structure for the EMA. The following potential fee structures may be considered as well as others that the EMA GSA may identify in the future.

- Per Parcel Fee
- Parcel Fee and Groundwater Extraction Based Fee
- Parcel Tax
- Fee on Groundwater Extraction
- Fee on Estimated Groundwater Extraction

Fees to be levied for groundwater pumping will likely be in addition to a tiered base fee structure that will be levied against all groundwater pumpers in the EMA, including de minimis pumpers. The base fees will provide funding for the general administration and operation of the EMA GSA. The groundwater pumping fees to be collected would also be used to fund the costs for GSA operations, the EMA monitoring program, and for the implementation of Group 1 management actions. If the implementation of Group 1 management actions prove insufficient to achieve basin sustainability, then the fees may also be used for funding potential future Group 2 management actions and Group 3 projects. It is expected that the imposition of fees will encourage all pumpers to use groundwater as efficiently as possible.

6.4.1 Relevant Measurable Objective(s) for the Groundwater Pumping Fee Program [§ 354.44(b)(1)]

§ 354.44 Projects and Management Actions.

(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 primary benefits of the Groundwater Pumping Fee Program would be to fund to the EMA GSA for administration, operation, and continued monitoring of the condition of the EMA. Secondarily, the measurable objectives supported by implementation of the Groundwater Pumping Fee Program include:

- **Groundwater Elevation Measurable Objectives:** The Groundwater Pumping Fee Program creates a financial incentive to reduce pumping, which may result in higher groundwater elevations.
- **Groundwater Storage Measurable Objectives:** Implementation of the Groundwater Pumping Fee Program creates a financial incentive to reduce pumping and would help achieve the goal of reducing total extractions from the long-term sustainable yield.
- **Land Subsidence Measurable Objectives:** The Groundwater Pumping Fee Program creates incentives for reducing pumping, thereby reducing the pumping stress on the local aquifer(s) and reducing the potential for subsidence.
- **Depletion of Interconnected Surface Water Measurable Objective:** The Groundwater Pumping Fee Program creates incentives for reducing pumping, which would result in higher groundwater elevations in support of identified GDEs.
- **Degradation of Water Quality:** Improvements to water quality are expected as a result of reduction of groundwater pumping and fertilizer use and irrigation return flows to the aquifer, thereby limiting the amount of nitrate and total dissolved solids (TDS) infiltrating to the aquifer.

6.4.2 Implementation Triggers for the Groundwater Pumping Fee Program [§ 354.44(b)(1)(A)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) 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, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.

The management action described in this section is deemed critical for the successful implementation of the GSP and is included in Group 1. The EMA GSA will initiate work on Group 1 management actions within 1 year of GSP adoption. The initial phase of the Groundwater Pumping Fee program will be focused on program design, policy and regulatory development, CEQA compliance, and stakeholder outreach. As part of program development, the EMA GSA will undertake a study to evaluate an effective and equitable fee structure. In conjunction with the development of the Groundwater Pumping Fee Program, the EMA GSA will (1) ensure that any charges that the GSA plans to place on groundwater extraction are carefully reviewed under applicable standards and (2) identify the required regulatory/statutory processes. Levying groundwater pumping fees will be implemented in concert with the installation of flow meters and other quantification methods for groundwater users as described in Section 6.5. Meters will be required for groundwater users who pump more than 2 AFY. De minimis pumpers, i.e., those that pump less than 2 AFY for domestic purposes, will need to report groundwater pumping using an approved alternative method. Full implementation of the metering program is anticipated to take time; therefore, the pumping fee program will be based on both metering data and estimated pumping data using other methods. Once fully implemented, the Groundwater Pumping Fee Program will result in immediate benefit to the EMA by provided needed funds for EMA GSA administration and operation, along with funding to support ongoing monitoring of the EMA. Additionally, funds may be available for the implementation of potential future Group 2 management actions and Group 3 projects, if necessary. The program is expected to be ongoing throughout the GSP implementation period and may be modified by the EMA GSA in response to changing needs.

6.4.3 Public Notice Process for the Groundwater Pumping Fee Program [§ 354.44(b)(1)(B)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) The Plan shall include the following:

(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.

The Groundwater Pumping Fee Program will be developed in an open and transparent process. Targeted outreach meetings and technical workshops, in addition to regularly scheduled EMA GSA meetings, will be held periodically to inform all groundwater pumpers and other stakeholders about the details of the proposed Groundwater Pumping Fee Program. Groundwater pumpers and interested stakeholders will have the opportunity at these meetings to learn about the programs as well as the opportunity to provide input and comments on how the pumping fee program may be implemented in the EMA. The targeted public outreach meetings and technical workshops may be supplemented with informational mailers to be sent to all identified well owners in the EMA and informational press releases will be distributed to local media. If deemed valuable, EMA GSA representatives may work directly with individual well owners to explain program requirements and help with program implementation. The Groundwater Pumping Fee Program may also be promoted through annual GSP reports and links to relevant information on the EMA GSA website.

6.4.4 Overdraft Mitigation for the Groundwater Pumping Fee Program [§ 354.44(b)(2)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The Groundwater Pumping Fee Program is expected to directly result in greater focus on efficiency by pumpers and a related reduction of the total volume of groundwater that will be pumped, and consequently mitigation of the estimated storage deficit within the EMA. These reductions in pumping are expected to occur during periods of normal, above normal, and below normal rainfall year conditions.

6.4.5 Permitting and Regulatory Process for the Groundwater Pumping Fee Program [§ 354.44(b)(3)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(3) A summary of the permitting and regulatory process required for each project and management action.

California Water Code Sections 10730 and 10730.2 authorize the imposition and collection of fees by the EMA GSA. Notably, SGMA does not interfere with the ability of the GSA or other agencies to impose fees under other legal authorities (Water Code § 10730.8). This legislation states the following:

> *A groundwater sustainability agency may impose fees, including, but not limited to, permit fees and fees on groundwater extraction or other regulated activity, to fund the costs of a groundwater sustainability program, including, but not limited to, preparation, adoption, and amendment of a groundwater sustainability plan, and investigations, inspections, compliance assistance, enforcement, and program administration, including a prudent reserve. A groundwater sustainability agency shall not impose a fee pursuant to this subdivision on a de Minimis extractor unless the agency has regulated the users pursuant to this part.*

6.4.6 Implementation Timeline for the Groundwater Pumping Fee Program [§ 354.44(b)(4)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(4) The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.

The Groundwater Pumping Fee Program is critical for funding the operations of the GSA and for the successful implementation of this GSP. It is included as a Group 1 management action. The EMA GSA will initiate work on Group 1 management actions within 1 year of GSP adoption. The initial phase of the program will be focused on program design, policy and regulatory development, CEQA compliance, and stakeholder outreach. This phase is anticipated to take 12 to 18 months. Metering will be required with implementation of this GSP, with all non-de minimis wells in the EMA to be equipped with meters, or an EMA GSA-approved alternative method of extraction measurement. Full implementation of the program is anticipated following CEQA review, if needed. Once implemented, the program will result in immediate benefit to the Basin. The program is expected to be ongoing throughout the GSP implementation period with periodic fee structure reviews to occur as the effectiveness of the implemented management actions and projects are assessed.

6.4.7 Anticipated Benefits from the Groundwater Pumping Fee Program [§ 354.44(b)(5)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The primary purpose of the program will be to provide a source of funding for GSA operations and EMA future monitoring. Funding may also be used for the development and implementation of potential projects and management actions as needed.

As a critical element of the GSP implementation, the Groundwater Pumping Fee Program is expected to mitigate a portion of the estimated storage deficit by motivating groundwater users to reduce pumping or pump groundwater supplies in a more sustainable fashion. In 2018, there was an estimated 7,329 acres of irrigated cropland in the EMA with a corresponding water demand of approximately 14,545 AFY. Assuming a Groundwater Pumping Fee Program would result in a 5 percent reduction in EMA-wide agricultural pumping on an annual basis, the resulting benefit would be approximately 725 AFY.

The Groundwater Pumping Fee Program will help contribute to achieve the avoidance of undesirable results. The benefits to the Basin may vary significantly depending upon levied fees, water year, and sensitivity to cost factors.

6.4.8 Legal Authority for the Groundwater Pumping Fee Program [§ 354.44(b)(7)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(7) A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.

See Section 6.4.5 for more information on the permitting and regulatory process. SGMA's enabling legislation included establishing California Water Code § 10730, which states that:

> *A groundwater sustainability agency may impose fees, including, but not limited to, permit fees and fees on groundwater extraction or other regulated activity, to fund the costs of a groundwater sustainability program, including, but not limited to, preparation, adoption, and amendment of a groundwater sustainability plan, and investigations, inspections, compliance assistance, enforcement, and program administration, including a prudent reserve. A groundwater sustainability agency shall not impose a fee pursuant to this subdivision on a de Minimis extractor unless the agency has regulated the users pursuant to this part.*

6.4.9 Cost and Funding for the Groundwater Pumping Fee Program [§ 354.44(b)(8)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The planning-level development cost for establishing the Groundwater Pumping Fee Program is estimated to be approximately $100,000 to $200,000 and separate from development of this GSP.

Potential sources of funding for the Groundwater Pumping Fee Program components include state grants, reimbursement through groundwater extraction fees, transaction fees from extraction credit trades, and other mechanisms as may be identified by the EMA GSA.

6.4.10 Drought Offset Measures for the Groundwater Pumping Fee Program [§ 354.44(b)(9)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The development and implementation of the Groundwater Pumping Fee Program in the EMA would provide a source of funding that the EMA GSA can use to fund future projects and/or management actions, as the EMA GSA deems necessary, to ensure that groundwater production is carried out within the sustainable yield of the EMA. More specifically, as indicated above, a Groundwater Pumping Fee Program is expected to incentivize more efficient water use and reduce groundwater pumping. Assuming a fee program would result in a 5 percent reduction in EMA-wide agricultural pumping on an annual basis, the resulting benefit would be approximately 725 AFY. These reductions in pumping are expected to occur during periods of normal, above normal, and below normal rainfall year conditions.

As groundwater level monitoring in the EMA continues, the EMA GSA will quantify the impact that the implemented management actions are having on basin conditions. This data will be used to refine the EMA water budget. This information will assist the EMA GSA in making adaptive management decisions during periods of drought.

6.5 Group 1 Management Action 3 – Well Registration and Well Meter Installation Programs [§ 354.44(b)(1)(d)]

§ 354.44 Projects and Management Actions.

(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.

(d) An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.

The EMA GSA will require that all groundwater production wells, including wells used by de minimis pumpers, be registered with the EMA GSA. If the wells have a meter, the meter should be calibrated on a regular schedule in accordance with manufacturer standards and any programs developed by the EMA GSA. Well registration is intended to establish an accurate count of all the active wells in the EMA. Well metering is intended to improve estimates of the amount of groundwater extracted from the EMA. The EMA GSA may also develop and implement reporting protocols applicable to de minimis pumpers to ensure their production is reflected in the total amount of pumping in the EMA and to address circumstances in which de minimum pumpers are or may be exceeding the de minimis thresholds. De minimis production is defined in part by SGMA and by other provisions of the California Water Code and Code of Regulations.

The EMA GSA will require all non-de minimis groundwater pumpers to report extractions at an interval to be determined by the EMA GSA and use a water-measuring method satisfactory to the EMA GSA in accordance with Water Code § 10725.8. It is anticipated that the EMA GSA will develop and adopt guidelines and a regulatory framework to implement this program, which may also include a system for reporting and accounting for water conservation initiatives, voluntary irrigated land fallowing (temporary and permanent), stormwater capture projects, or other activities that individual pumpers may elect to implement. The information collected will be used to account for pumping that would have otherwise occurred, to provide additional information to be used by the EMA GSA for analyzing projected EMA conditions, updating the HCM, and completing annual reports and 5-year GSP assessment reports for DWR.

The existing water supply wells that are operated by SYRWCD, Improvement District No. 1 (ID No. 1) and the City of Solvang are fully metered, and all groundwater extractions are reported to the SYRWCD. However, most other groundwater extraction by private well owners throughout the EMA has never been metered. Moreover, except for those who report the amounts of their groundwater pumping within the boundaries of the SYRWCD, most of the pumping is not reported in any fashion. Extractions from these wells, which are used primarily for irrigated agricultural operations, will be required to be metered and extractions reported. Until the metering program is fully implemented, water-measuring methods satisfactory to the GSA may be utilized in accordance with Water Code § 10725.8.

Agriculture irrigators have voiced concerns regarding the costs associated with the requirement for meters. Although the cost associated with installing and maintaining meters is a legitimate concern, meters can improve the overall management of water and improve the efficiency of the groundwater supply system. The resulting improvement of water efficiency provides a return on the investment. Research and on-the-ground observations have demonstrated that greater water use efficiency directly benefits pumpers by lowering pumping and distribution costs and reducing water use. Research at the Irrigation Technology Center at Texas A&M University has demonstrated that water measurement by itself can reduce crop irrigation water use by 10 percent. When measurement was combined with education about on-farm irrigation management, water use was reduced by 20 to 40 percent (TWRI, 2001).

As a Group 1 management action, the EMA GSA plans to initiate a pilot program to determine the most feasible means of implementing a well metering/measurement program within 1 year of GSP adoption. The measurement alternatives and data processing methods to be evaluated may include the following:

- Use of power records to correlate energy usage with volume of water pumped (to be considered until meters are fully installed)
- Conventional mechanical or magnetic flow meters
- Automated meter infrastructure (AMI) systems

Although the EMA GSA does not have permitting authority for issuing permits for new well construction within the EMA (permits for new wells are required to be obtained from the Santa Barbara County Department of Public Health Environmental Health Services), the EMA GSA will require registration of all new wells and the installation of meters on those wells. The EMA GSA will work with the County as the well permitting authority to evaluate the applicability of CEQA for new wells, or categories thereof, in the EMA.

6.5.1 Relevant Measurable Objective(s) for the Well Registration and Well Meter Installation Programs [§ 354.44(b)(1)]

§ 354.44 Projects and Management Actions.

(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 Well Registration and Well Meter Installation Programs will be designed and implemented for the specific purpose of obtaining data that will allow an enhanced understanding of the total volume of water being extracted from the EMA, both from a spatial and temporal perspective. The information that will be gained through this management action will provide the basis for future refinements in the EMA HCM and the EMA water budget (see Sections 3.1 and 3.3, respectively). The installation of metering on non-de minimis wells, particularly in conjunction with a fee program, is projected to result in a reduction in the volume of groundwater extracted on an annual basis. These reductions would result in progress toward achieving or maintaining relevant measurable objectives in the EMA, including:

- **Groundwater Elevation Measurable Objectives:** Well Registration and Well Meter Installation Programs will focus on reducing pumping through an enhanced understanding of actual water usage by the pumper. Less pumping will result in higher groundwater elevations.

- **Groundwater Storage Measurable Objectives:** This measurable objective is based on total pumping in the EMA. Therefore, the implementation of Well Registration and Well Meter Installation Programs will focus on providing the water user with an enhanced understanding of actual water usage that will encourage reduced pumping and will help achieve the goal of reducing total extractions to the long-term sustainable yield.
- **Land Subsidence Measurable Objectives:** Well Registration and Well Meter Installation Programs will focus on reducing pumping through an enhanced understanding of actual water usage by the pumper, thereby reducing the pumping stress on the local aquifer(s) and reducing the potential for subsidence.
- **Depletion of Interconnected Surface Water Measurable Objective:** Well Registration and Well Meter Installation Programs will focus on reducing pumping through an enhanced understanding of actual water usage by the pumper. Less pumping will result in higher groundwater elevations, which will eventually benefit GDEs.
- **Degradation of Water Quality:** Improvements to water quality are expected if less water is being used and as a result of reduction of irrigation return flows to the aquifer, thereby limiting the amount of primarily nitrate and TDS infiltrating to the aquifer.

6.5.2 Implementation Triggers for the Well Registration and Well Meter Installation Program [§ 354.44(b)(1)(A)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) 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, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.

The management action described in this section is deemed critical for the successful implementation of this GSP and is included in Group 1 management actions. The EMA GSA will initiate work on the Group 1 management actions within 1 year of GSP adoption. This management action is linked to the Groundwater Pumping Fee Program and is a prerequisite to the possible future implementation of a Groundwater BPA Program (see Management Action 6 in Section 6.8).

6.5.3 Public Notice Process for the Well Registration and Well Meter Installation Program [§ 354.44(b)(1)(B)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) The Plan shall include the following:

(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.

Public outreach meetings, in addition to regularly scheduled EMA GSA meetings, will be held periodically to inform groundwater pumpers and other stakeholders regarding the development and implementation of the Well Registration and Well Metering Program. Groundwater pumpers and interested stakeholders will have the opportunity at these meetings to provide input and comments on how the management actions related to registering wells and the requirements for groundwater extraction measurement are being implemented in the EMA. The public outreach meetings will be supplemented with informational mailers to be sent to all well owners in the EMA and informational press releases will be distributed to local media. It is probable that EMA GSA representatives will need to contact some individual well owners to explain the program requirements and help some well owners achieve compliance.

As additional information is gained through the implementation of these management actions, it will be conveyed to the participants in future public outreach meetings and will be used to update the EMA HCM and the EMA water budget (see Sections 3.1 and 3.3, respectively). These future refinements will also be provided through annual GSP reports and links to relevant information on the EMA GSA website.

6.5.4 Overdraft Mitigation for the Well Registration and Well Meter Installation Program [§ 354.44(b)(2)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The management action described in this section will be designed and implemented for the specific purpose of obtaining data that will allow an enhanced understanding of the total volume of water being extracted from the EMA, both from a spatial and temporal perspective. The information that will be gained through this management action will help the EMA GSA better understand the factors involved in the storage deficit and how it can be mitigated. Reduced pumping associated with implementation of this management action will mitigate some of the estimated storage deficit as described in Section 3.3.

6.5.5 Permitting and Regulatory Process for the Well Registration and Well Meter Installation Program [§ 354.44(b)(3)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(3) A summary of the permitting and regulatory process required for each project and management action.

To implement this management action, the EMA GSA will develop a program that requires all non-de minimis extractors to report extractions and use a water-measuring method satisfactory to the GSA in accordance with Water Code § 10725.8. Pursuant to SGMA and other applicable authorities, additional reporting protocols will be developed for de minimis producers. The EMA GSA may adopt a regulation governing the Well Registration and Well Meter Installation Program.

6.5.6 Implementation Timeline for the Well Registration and Well Meter Installation Program [§ 354.44(b)(4)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(4) The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.

The management action described in this section is deemed critical for the successful implementation of this GSP and is included in the Group 1 management actions. The EMA GSA will initiate work on Group 1 management actions within 1 year of GSP adoption. This management action is a prerequisite to the possible implementation of a future Groundwater BPA Program (see Management Action 6 in Section 6.8).

6.5.7 Anticipated Benefits from the Well Registration and Well Meter Installation Program [§ 354.44(b)(5)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The management action described in this section will be designed and implemented for the specific purpose of obtaining data that will allow an enhanced understanding of the total volume of water being extracted from the EMA, both from a spatial and temporal perspective. The information that will be gained through this management action will provide the basis for future refinements in the EMA HCM and the EMA water budget (see Sections 3.1 and 3.3, respectively). In addition, the information acquired though the implementation of the management action described in this section will help guide the EMA GSA in determining the optimal strategy for sequencing the implementation of the future management actions and projects (described in Sections 6.6 through 6.10) should they be necessary. This management action is a prerequisite to the implementation of a Groundwater BPA Program, should it become necessary (see Management Action 6 in Section 6.8).

Additionally, studies have shown that the installation of meters on wells can directly result in reduced groundwater pumping by 10 percent or more. For perspective, assuming the meter installation program achieves 5 percent reduction in pumping, the resulting benefit would be approximately 725 AFY.

6.5.8 Legal Authority for the Well Registration and Well Meter Installation Program [§ 354.44(b)(7)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(7) A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.

The legal authority to empower the EMA GSA to require well registration and groundwater extraction by pumpers in the EMA is included in SGMA. For example, Water Code § 10725.8 authorizes a GSA to require through its GSP that the use of every groundwater extraction facility (except those operated by de minimis extractors) be measured.

6.5.9 Cost and Funding for the Well Registration and Well Meter Installation Program [§ 354.44(b)(8)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

Planning-level costs for developing and establishing the Well Registration and Well Meter Installation Programs are estimated to be approximately $75,000 to $150,000 and are separate from development of this GSP. According to SGMA § 10725.8(b), costs associated with individual measurement devices are to be borne by the well owner/operator, so the cost exposure to EMA GSA for implementing a Well Registration and Well Metering Program can be distributed among all well owners. Depending on the method of extraction measurement that the EMA GSA approves, the costs associated with the selected method to measure and record groundwater extractions within the EMA may vary widely, based on the requirements for equipment, infrastructure, installation, and for operations and maintenance. EMA GSA members that provide public water supplies (i.e., City of Solvang and ID No. 1) already fund and operate metering facilities on their wells; therefore, costs associated with the acquisition and installation of metering equipment will be borne by the owners of wells used for agricultural irrigation and other non-de minimis well owners.

Potential sources of funding for the Well Registration and Well Meter Installation Programs components may include well owners, state and/or federal grants, reimbursement via groundwater extraction fees, transaction fees from extraction credit trades, and other mechanisms as may be identified by the EMA GSA.

6.5.10 Drought Offset Measures for the Well Registration and Well Meter Installation Program [§ 354.44(b)(9)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The information that will be gained through the metering of all non-de minimis groundwater pumpers will provide the basis for future refinements in the EMA HCM and the EMA water budget (see Sections 3.1 and 3.3, respectively). In addition, the metered groundwater extraction data would be used in the possible development and administration of a future groundwater (BPA) allocation and GEC marketing and trading programs should they be necessary. The information acquired through well metering will be critical to the EMA GSA in making adaptive management decisions, where lowering of groundwater levels or depletion of supply during periods of drought could be offset by increases in groundwater levels or storage during other periods.

6.6 Group 1 Management Action 4 – Water Use Efficiency Programs [§ 354.44(b)(1)(d)]

§ 354.44 Projects and Management Actions.

(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.

(d) An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.

The EMA GSA has included the implementation of Water Use Efficiency Programs for public water agencies, domestic well owners, and agricultural groundwater pumpers in the Group 1 management actions. The Water Use Efficiency Programs are generally described as follows:

- **Urban and Domestic Water Use Efficiency Programs:** Initiatives that promote increasing water use efficiency by achieving reductions in the amount of water used for municipal, commercial, industrial, landscape irrigation, rural domestic, and aesthetic purposes. These programs can include incentives, public education, technical support, and other efficiency-enhancing programs.
- **Agricultural Water Use Efficiency Programs:** Initiatives that promote increasing water use and irrigation efficiency and achieving reductions in the amount of water used for agricultural irrigation. These programs can include incentives, public education, technical support, training, implementation of best management practices (BMPs), and other efficiency-enhancing programs.

Urban, rural, and agricultural water use efficiency has been practiced in the EMA for more than two decades and has been effective in significantly reducing water use within the region outside of the EMA. Existing programs promote responsible design of landscapes and appropriate choices of appliances, irrigation equipment, and the other water-using devices to enhance the efficient use of water. In recent years, many agencies in the state have passed regulations that require efficient plumbing devices, appliances, and landscape designs. Retail water supply agencies in the EMA offer programs that encourage and/or require customers to conserve.

The water use efficiency management actions to be developed for implementation by municipal, agricultural, and rural domestic pumpers will promote expansion and supplementation of the existing water use efficiency programs that currently exist. These programs will also be developed to be aligned with the requirements of water conservation mandates that have been put in place by the State of California. Effective urban water use efficiency measures could include the following:

- High Water Use Outreach (High Use Reports)
- Meter Audits to Proactively Detect Leaks (Leak Reports)
- Rebates on Water-Saving Fixtures (i.e., clothes/dish washers)
- Rebates on Sustainable Landscape Conversion Programs (i.e., Cash for Grass)

- Water Awareness Outreach Events (i.e., at library/outdoor market events)
- Enhanced Efficient Irrigation/BMPs
- U.S. Environmental Protection Agency's WaterSense Program Alignment (Fix-a-Leak Week)

As described in Section 3.3, groundwater pumping from the EMA for agricultural irrigation represents a significant demand. For this reason, the EMA GSA will strongly encourage and incentivize pumpers to implement the most effective water use efficiency methods applicable, often referred to as BMPs. Provisions of the Agricultural Water Conservation Act (amending Division 6, Part 2.55 of the Water Code and passed into law in November 2009 regarding agricultural water conservation and management) can be used to inform GSA decisions and water use efficiency programs. While these new laws do not require water use objectives or savings thresholds, they do encourage more efficient use of water by the agricultural sector. It is anticipated that key stakeholders and industry leaders in the Basin will assist the EMA GSA in facilitating workshops and technical training programs or support the implementation of other programs designed to communicate the latest best water use practices for their industry. Effective BMPs could result in the following:

- Enhanced efficient irrigation/BMPs.
- Irrigation audits and delivery of technical support for optimizing water use.
- Development of new weather stations and automated data for landowners using frost protection.
- Encourage non-water intensive methods for frost protection.
- Encourage use of soil amendments (i.e., compost) to improve health of soils, plant health, and reduce water use.
- Encourage cover cropping and no-till/reduced tillage for increased water percolation/infiltration and less runoff, decreased soil moisture loss and less bare soil.
- More optimal irrigation practices by monitoring crop water use with soil and plant monitoring devices and tie monitoring data to evapotranspiration estimates.
- Encourage conversion from high water demand crops to lower water demand crops.
- Use satellite spectral/remote sensing data to refine irrigation practices.
- Encourage urban greening, shade trees, and grass to increase evapotranspiration rates for cooling and to reduce heat buildup from surfaces such as roofs, roads, and sidewalks.

Many growers already use BMPs, but improvements can be made. A goal of promoting BMPs is to broaden their use to more growers in the EMA. Rural de minimis groundwater users will be encouraged to use BMPs as well. Promoting BMPs will include broad outreach to groundwater pumpers in the EMA to emphasize the importance of using BMPs and communicate their positive benefits for mitigating declining groundwater levels and forestalling potential mandated limitations in groundwater extraction on their properties.

The EMA GSA will also collaborate with other entities that can offer resources and technical assistance to the water users in the EMA. The organizations will include, without limitation, the Cachuma Resource Conservation District; the U.S. Department of Agriculture, Natural Resources Conservation Service, Conservation Technical Assistance Program; California Water Efficiency Partnership; Santa Barbara Water Wise Program; and the California Polytechnic State University Irrigation Training and Research Center.

6.6.1 Relevant Measurable Objective(s) for the Water Use Efficiency Programs [§ 354.44(b)(1)]

§ 354.44 Projects and Management Actions.

(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 measurable objectives benefiting from the implementation of Water Use Efficiency Programs include:

- **Groundwater Elevation Measurable Objectives:** Water use efficiency programs will focus on reducing pumping through water conservation. Less pumping can likely result in higher groundwater elevations.
- **Groundwater Storage Measurable Objectives:** This measurable objective is based on total pumping in the EMA. Therefore, the implementation of water use efficiency programs will focus on identifying BMPs that will reduce pumping and will help achieve the goal of reducing total extractions to the long-term sustainable yield.
- **Land Subsidence Measurable Objectives:** Water use efficiency programs will focus on reducing pumping through water conservation, thereby reducing the pumping stress on the local aquifer(s) and reducing the potential for subsidence.
- **Depletion of Interconnected Surface Water Measurable Objective:** Water use efficiency programs will focus on reducing pumping through water conservation. Less pumping will result in higher groundwater elevations in support of identified GDEs.
- **Degradation of Water Quality:** Improvements to water quality are expected as a result of Water Use Efficiency Programs that reduce irrigation return flows to the aquifer, thereby potentially limiting the amount of nitrate and TDS infiltrating to the aquifer.

6.6.2 Implementation Triggers for the Water Use Efficiency Programs [§ 354.44(b)(1)(A)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) 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, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.

The management action described in this section is critical for the successful implementation of the GSP and is included in Group 1 management actions. The EMA GSA will initiate work on this Group 1 management action within 1 year of GSP adoption.

6.6.3 Public Notice Process for the Water Use Efficiency Programs [§ 354.44(b)(1)(B)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) The Plan shall include the following:

(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.

Targeted outreach meetings and technical and training workshops, in addition to regularly scheduled EMA GSA meetings, will be held periodically to inform the groundwater pumpers and other stakeholders regarding the development and implementation of the water use efficiency workshops. Groundwater pumpers and interested stakeholders will have the opportunity at these meetings to learn about water conservation methods, technologies, and BMPs as well as the opportunity to provide input and comments on how the management actions related to development, implementation and performance of the water use efficiency programs that are being implemented in the EMA. The targeted public outreach meetings and technical and training workshops will be supplemented with informational mailers to be sent to all well owners and water agency customers in the EMA and informational press releases will be distributed to local media. If deemed valuable, the EMA GSA representatives may work directly with individual well owners to explain program requirements and help with program implementation. The Water Use Efficiency Programs will also be promoted through annual GSP reports and links to relevant information on the EMA GSA website.

6.6.4 Overdraft Mitigation for the Water Use Efficiency Programs [§ 354.44(b)(2)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The development and implementation of Water Use Efficiency Programs within the EMA are intended to directly result in a reduction of the volume of groundwater that will be pumped from the EMA. These reductions in pumping will occur during periods of normal, above normal, and below normal rainfall year conditions. Pumping reductions that occur as a result of the implementation of both urban and agricultural water efficiency programs will directly result in groundwater pumping demand reductions and mitigation of the estimated storage deficit within the EMA.

6.6.5 Permitting and Regulatory Process for the Water Use Efficiency Programs [§ 354.44(b)(3)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(3) A summary of the permitting and regulatory process required for each project and management action.

No permitting or regulatory process is needed for the development and implementation of urban and agricultural water use efficiency programs.

6.6.6 Implementation Timeline for the Water Use Efficiency Programs [§ 354.44(b)(4)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(4) The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.

The management action described in this section is deemed critical for the successful implementation of this GSP and included as a Group 1 project and management action. The EMA GSA will initiate work on this Group 1 management action within 1 year of GSP adoption.

6.6.7 Anticipated Benefits from the Water Use Efficiency Programs [§ 354.44(b)(5)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The benefits to the EMA from the implementation of Water Use Efficiency Programs include:

- Water use efficiency programs will focus on reducing pumping through water conservation, which would likely result in higher groundwater elevations.
- The implementation of water use efficiency programs will focus on identifying BMPs that will reduce pumping and help achieve the goal of reducing total extractions to support the long-term sustainable yield.
- Water use efficiency programs will focus on reducing pumping through water conservation, thereby reducing the pumping stress on the local aquifer(s) and reducing the potential for subsidence.
- Water use efficiency programs will focus on reducing pumping through water conservation, resulting in higher groundwater elevations in support of identified GDEs.

For perspective, the implementation of water use efficiency and best management measures have been shown to reduce water usage by up to 20 percent or more. Assuming EMA-wide implementation of these programs achieves a 10 percent reduction in pumping, the resulting benefit would be approximately 1,450 AFY.

6.6.8 Legal Authority for the Water Use Efficiency Programs [§ 354.44(b)(7)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(7) A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.

None required.

6.6.9 Cost and Funding for the Water Use Efficiency Programs [§ 354.44(b)(8)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

Planning-level development costs for establishing the Water Use Efficiency Programs are estimated to be approximately $50,000 to $125,000 and separate from development of this GSP.

Potential sources of funding for the Water Use Efficiency Programs' components include state grants and the groundwater extraction fee program to be implemented by the EMA GSA.

6.6.10 Drought Offset Measures for the Water Use Efficiency Programs [§ 354.44(b)(9)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The development and implementation of Water Use Efficiency Programs within the EMA will directly result in a reduction of the volume of groundwater that will be pumped from the Basin, which will contribute to the mitigation of the estimated storage deficit within the Basin. These reductions in pumping will occur during periods of normal, above normal, and below normal rainfall year conditions.

As monitoring of the groundwater levels in the Basin occur in the future, the EMA GSA will quantify the beneficial impact that the water use efficiency initiatives are having on the condition of the EMA, which will allow for future refinements to the program in the EMA. The information acquired will be critical to the EMA GSA in making adaptive management decisions that may allow lowering of groundwater levels or depletion of supply during periods of drought to be offset by increases in groundwater levels or storage during other periods.

6.7 Group 2 Management Action 5 – Groundwater Base Pumping Allocation (BPA) Program [§ 354.44(b)(1)(d)]

§ 354.44 Projects and Management Actions.

(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.

(d) An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.

The volume of groundwater pumped from the EMA in recent years is more than the estimated sustainable yield of about 12,870 AFY. This condition has led to a persistent deficit of groundwater in storage. Although there will be benefits to the EMA because of the other planned and potential projects and management actions, the EMA GSA has determined that the volume of groundwater being pumped must be stabilized to maintain the sustainable yield of the EMA over the next 20-year period and beyond. To achieve this goal, the EMA GSA may seek to develop and implement a regulatory program to equitably allocate a groundwater BPA volume of water to be pumped annually from the EMA. Under such a program, individual non-de minimis pumpers could be provided an annual groundwater BPA to further assist in stabilizing overall production, which then could be adjusted over time, as needed, to ensure sustainable yield within the EMA by 2042. As described in SGMA, any limitation on extractions by the EMA GSA “shall not be construed to be a final determination of rights to extract groundwater from the basin or any portion of the basin” (Water Code, § 10726.4(a)(2)).

The amount of pumping reduction, if needed in the future, is uncertain and will depend on several factors including climate conditions, the effectiveness and timeliness of voluntary actions by pumpers, and the success of other planned and potential projects and management actions described in this GSP. The water budget presented in Section 3.3 indicates that the current estimated annual storage deficit is approximately 1,830 AFY. It is reasonable to expect that the Group 1 management actions may eliminate this relatively modest deficit. If they do not, it may be necessary to develop and implement other projects and management actions, which could include a Groundwater BPA Program. After GSP adoption, developing a Groundwater BPA Program would require various analyses and steps, including but not limited to:

- Establishing a methodology for determining baseline pumping considering:
  - Sustainable yield of the EMA
  - Groundwater level trends

   - Historical groundwater production
   - Land uses and corresponding water use requirements.
   - CEQA compliance

- Establishing a methodology to consider, among other factors determine groundwater, water rights and evaluation of anticipated benefits from other relevant actions individual pumpers take.
- An implementation timeline.
- Approving a formal regulation to enact the program.

As noted above, a baseline pumping allocation schedule could be implemented and adjusted over time, as needed, and according to relevant factors, to meet groundwater extraction targets in the EMA (consistent with the sustainable yield). Analyses would be updated periodically as new data are developed. It is anticipated that the EMA groundwater model would be used as a tool to evaluate alternative pumping reduction programs and schedules as part of any Groundwater BPA Program. It is also expected that CEQA review would be undertaken in advance of considering the formal adoption and implementation of any Groundwater BPA Program.

Should the EMA GSA elect to develop a Groundwater BPA Program, the program would consist of the following general components:

- Estimation of the EMA sustainable yield.
- Determination of pumping allocation amounts (i.e., groundwater extraction credits) for groundwater producers, including an evaluation of de minimis production in the EMA.
- Pumping allocation reduction recommendations over the implementation period to ensure sustainable yield in the EMA by 2042.

The EMA GSA understands that municipalities and public water agency groundwater pumpers face public health and safety requirements and other considerations regarding the volume of water produced by these agencies to meet demands within their service areas. These factors would be specifically considered and addressed during the development of a Groundwater BPA Program.

The EMA GSA also realizes that certain landowners may need or desire to periodically use an amount of groundwater in excess of their annual allocations. To this end, it would be possible for a pumping fee policy be developed in connection with a BPA Program to allow landowners, under special circumstances, to pump groundwater beyond their groundwater allocations, but at considerably higher cost.

Through coordination with the County of Santa Barbara well permitting authority, the EMA GSA may seek to develop supplemental conditions to be placed on new wells and new production in the EMA. The GSA may also work with the County well permitting authority to evaluate the applicability of CEQA for new wells, or categories thereof, in the EMA.

Given that the Basin currently has an estimated storage deficit, the EMA GSA may elect to place an adjustment factor in the groundwater BPA that would establish an additional limitation on the volume of water that can be pumped annually from any new well and new production from existing wells.

6.7.1 Relevant Measurable Objective(s) for the Groundwater Base Pumping Allocation (BPA) Program [§ 354.44(b)(1)]

§ 354.44 Projects and Management Actions.

(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 measurable objectives benefiting from the implementation of the Groundwater BPA Program include:

- **Groundwater Elevation Measurable Objectives:** A Groundwater BPA Program would focus on reducing pumping that is likely to result in higher groundwater elevations, provided that additional pumping in the aggregate is not allowed to occur.
- **Groundwater Storage Measurable Objectives:** This measurable objective is based on total pumping in the Basin. Therefore, the implementation of a Groundwater BPA Program would focus on reducing pumping and maintaining support the long-term sustainable yield.
- **Land Subsidence Measurable Objectives:** A Groundwater BPA Program would focus on reducing pumping, thereby reducing the pumping stress on the principal aquifers and reducing the potential for subsidence.
- **Depletion of Interconnected Surface Water Measurable Objective:** A Groundwater BPA Program would focus on reducing pumping, which will result in higher groundwater elevations in support of identified GDEs.
- **Degradation of Water Quality:** Improvements to water quality are expected as a result of reduction of pumping and related associated reduction in irrigation return flows to the aquifer, thereby limiting the amount of nitrate and TDS (primarily) infiltrating to the aquifer.

6.7.2 Implementation Triggers for the Groundwater Base Pumping Allocation (BPA) Program [§ 354.44(b)(1)(A)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) 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, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.

The management action described in this section is included in the Group 2 management actions. Implementation of Group 2 management actions may be considered by the EMA GSA if previously implemented projects and management actions are not resulting in trends towards achieving the EMA GSA sustainability goals. If the EMA GSA elects to implement a Groundwater BPA Program, the initial phase of the program will be focused on program design, policy and regulatory development, CEQA compliance, and stakeholder outreach. Once implemented, the program could result in immediate benefit to the EMA. The program could be adjusted throughout the GSP implementation period.

6.7.3 Public Notice Process for the Groundwater Base Pumping Allocation (BPA) Program [§ 354.44(b)(1)(B)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) The Plan shall include the following:

(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.

A Groundwater BPA Program would be developed in an open and transparent process. Targeted outreach meetings and technical workshops, in addition to regularly scheduled EMA GSA meetings, would be held periodically to inform groundwater pumpers and other stakeholders about the details of a proposed Groundwater BPA Program. Groundwater pumpers and interested stakeholders would have the opportunity at these meetings to learn about potential elements of a BPA Program, as well as the opportunity to provide input and comments on how a program could be implemented in the EMA. The targeted public outreach meetings and technical workshops could be supplemented with informational mailers sent to well owners and stakeholders in the EMA and informational press releases distributed to local media. If deemed valuable, EMA GSA representatives may work directly with individual well owners to explain potential program requirements and help with program implementation. A Groundwater BPA Program could also be promoted through annual GSP reports and links to relevant information on the EMA GSA website.

6.7.4 Overdraft Mitigation for the Groundwater Base Pumping Allocation (BPA) Program [§ 354.44(b)(2)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

If needed, the development and implementation of a Groundwater BPA Program within the EMA could directly result in a reduction of the volume of groundwater being pumped from the EMA, provided, however, that new wells and new production in the EMA would need to be suspended to ensure that increased production in the aggregate would not negate the effects of reducing existing production. Pumping allocations and reduced production could occur during periods of normal, above normal, and below normal rainfall year conditions. Pumping reductions associated with a BPA Program could directly result in reducing groundwater pumping demands and mitigation of the estimated storage deficit within the Basin.

6.7.5 Permitting and Regulatory Process for the Groundwater Base Pumping Allocation (BPA) Program [§ 354.44(b)(3)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(3) A summary of the permitting and regulatory process required for each project and management action.

Any permitting or other regulatory compliance requirements will be identified and pursued during the initial phase of the implementation of this management action. A Groundwater BPA Program would be accompanied by CEQA review and developed in accordance with all applicable groundwater laws and include protections for all groundwater rights.

6.7.6 Implementation Timeline for the Groundwater Base Pumping Allocation (BPA) Program [§ 354.44(b)(4)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(4) The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.

The management action described in this section is included in the Group 2 management actions. Implementation of Group 2 management actions may be considered by the EMA GSA if previously implemented projects and management actions are not resulting in trends towards achieving the EMA GSA sustainability goals. The initial phase of a BPA Program would be focused on program design, policy and regulatory development, CEQA compliance, and stakeholder outreach. This phase may take 12 to 18 months or more.

6.7.7 Anticipated Benefits of the Groundwater Base Pumping Allocation (BPA) Program [§ 354.44(b)(5)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

If implemented, a Groundwater BPA Program could result in immediate benefit to the EMA, including supporting the avoidance of undesirable results including chronic lowering of groundwater levels, reduction of groundwater in storage, and potentially degraded water quality. Peripheral benefits may also include potential investment in alternate land uses or taking advantage of potential GEC and/or land fallowing management programs (see Sections 6.8 and 6.9, respectively).

6.7.8 Legal Authority for the Groundwater Base Pumping Allocation (BPA) Program [§ 354.44(b)(7)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(7) A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.

SGMA provides the EMA GSA with authority to "control groundwater extractions by regulating, limiting, or suspending extractions from individual groundwater wells or extractions from groundwater wells in the aggregate, . . . or otherwise establishing groundwater extraction allocations" (Water Code, § 10726.4(a)).

6.7.9 Cost and Funding for Groundwater Base Pumping Allocation (BPA) Program [§ 354.44(b)(8)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The planning-level development cost for establishing a Groundwater BPA Program is estimated to be approximately $75,000 to $150,000 and is separate from development of this GSP.

Potential sources of funding for the Groundwater BPA Program components include state grants, groundwater extraction fees, and other mechanisms as may be identified by the EMA GSA.

6.7.10 Drought Offset Measures for the Groundwater Base Pumping Allocation (BPA) Program [§ 354.44(b)(9)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The development and implementation of a Groundwater BPA Program within the EMA could directly result in a reduction of the volume of groundwater being pumped from the Basin. These reductions in pumping could occur during periods of normal, above normal, and below normal rainfall year conditions, depending on how the program is structured. Pumping reductions resulting from the implementation of a Groundwater BPA Program could directly result in reduced groundwater pumping demands and mitigation of the estimated storage deficit within the EMA. Notably, construction of new wells and new groundwater production in the EMA may need to be suspended as part of a Groundwater BPA Program to ensure that increased production in the aggregate would not negate the effects of reductions in existing production.

As monitoring of groundwater levels in the EMA occurs in the future, the EMA GSA would quantify the effects of a Groundwater BPA Program on the conditions of the Basin, which would assist in future refinements in the EMA water budget. The information acquired would be critical to the EMA GSA in making adaptive management decisions that could allow lowering of groundwater levels or depletion of supply during periods of drought to be offset by increases in groundwater levels or storage during other periods.

6.8 Group 2 Management Action 6 – Groundwater Extraction Credit (GEC) Marketing and Trading Program [§ 354.44(b)(1)(d)]

§ 354.44 Projects and Management Actions.

(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.

(d) An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.

As previously described, the EMA GSA may, as needed, develop and implement a Groundwater BPA Program that would assign pumping allocations in the EMA annually and, if necessary, impose a schedule on the pumping allocations over time to bring total pumping in the EMA within its sustainable yield within 20 years of GSP adoption. In conjunction with a Groundwater BPA Program, the EMA GSA may also pursue the development and implementation of a Groundwater Extraction Credit (GEC) Marketing and Trading Program to provide increased flexibility to groundwater producers in using their pumping allocations. The program could enable voluntary transfers of allocations between parties, on a temporary or permanent basis, through an exchange of GECs. Among other potential benefits, a GEC Marketing and Trading Program could assist existing groundwater users or new groundwater users in acquiring needed groundwater supplies from other pumpers, in the form of GECs, to support economic activities in the EMA, encourage and incentivize water conservation, enable temporary and permanent fallowing of agricultural lands, and facilitate a control of pumping allocations as needed during the 20-year GSP implementation period.

Within the confines and rules of a GEC Marketing and Trading Program that may be developed and managed by the EMA GSA, participants could privately negotiate the sale of all or a portion of their GECs with willing purchasers. For example, upon agreement between pumpers, a proposed trade would be submitted to the EMA GSA for review and approval, or separate mechanisms may be established regarding trades.

Additionally, appropriate limitations could be developed to prevent unintended consequences such as hoarding, out-of-basin transfers, well interference, price fixing, or overpumping in any one part of the EMA. The program could also include requirements for demonstrating actual water use within a specified period for irrigated lands that are being used as a credit. As warranted, the GEC Marketing and Trading Program would be reviewed as part of the GSP review process and updated as needed.

As part of a GEC Marketing and Trading Program, the EMA GSA may consider a policy to define groundwater extraction carryover provisions from year to year and/or to allow multi-year pumping averages. These types of components could provide useful flexibility and may be useful to growers who could change cropping patterns or voluntarily fallow acreage. Though there is a risk that extreme drought may induce exceptionally high pumping in a single year, under this program, groundwater users may be able to strategize and better manage their assets. A groundwater extraction credit and carryover structure would be designed to provide groundwater pumpers with as much flexibility as possible in using their groundwater allocation from year to year.

A potential approach by the EMA GSA to develop a GEC Marketing and Trading Program would likely include the following elements:

- Identify stakeholders/participants and conduct interviews and meetings to receive input and identify concerns to be addressed in program development.
- Evaluate existing programs in other basins and guidance from DWR.
- Identify potential unintended consequences of the GEC Marketing and Trading Program to be addressed in development of governing documents.
- Present findings of the interviews and fact-finding effort and provide recommendations to the EMA GSA.
- Collaborate with pumpers, EMA GSA member agencies, and key stakeholders to develop core components of a GEC Marketing and Trading Program.
- Draft preliminary provisions for a GEC Marketing and Trading Program (i.e., allowable frequency and amount of water to be traded), allowable water uses (i.e., area of origin/spatial restrictions, fees and penalties requirements, accounting scope, enforcement requirements, and other similar provisions)
- Develop a governing structure for GEC trades and program administration.
- Develop a monitoring and enforcement structure.
- Develop and test an accounting/register system to track groundwater BPA, pumping allowance, GEC trades and compliance through metering of groundwater production.
- Determine applicability of and undertake any required CEQA review for a GEC Marketing and Trading Program.
- Finalize the details of the initial GEC Marketing and Trading Program into a comprehensive GEC Marketing and Trading Program Policy document to be approved by the EMA GSA.
- Adopt GEC Marketing and Trading Program implementing regulations.

6.8.1 Relevant Measurable Objective(s) for the Groundwater Extraction Credit (GEC) Marketing and Trading Program [§ 354.44(b)(1)]

§ 354.44 Projects and Management Actions.

(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.

A GEC Marketing and Trading Program would be intended, as necessary, to avoid undesirable results in the EMA by providing incentives and flexibility to Basin pumpers for water conservation, the transfer of GECs between users to allow voluntary fallowing and other beneficial uses, conversion of irrigated lands to dry land farming operations, and the reduction of water intensive land uses. A GEC Marketing and Trading Program would be implemented in a manner consistent with a Groundwater BPA Program to achieve the sustainability objectives developed for the GSP.

The measurable objectives benefiting from the implementation of a GEC Marketing and Trading Program include:

- **Groundwater Elevation Measurable Objectives:** A GEC Marketing and Trading Program would provide pumpers greater flexibility to conserve water, fallow irrigated cropland, and otherwise reduce pumping that could likely result in higher groundwater elevations.
- **Groundwater Storage Measurable Objectives:** This measurable objective is based on total pumping in the EMA. Therefore, the implementation of a GEC Marketing and Trading Program would provide pumpers greater flexibility to conserve water, fallow irrigated cropland, and otherwise reduce pumping that could help achieve the goal of reducing total extractions consistent with supporting the long-term sustainable yield of the EMA.
- **Land Subsidence Measurable Objectives:** A GEC Marketing and Trading Program would provide pumpers greater flexibility to conserve water, fallow irrigated cropland, and otherwise reduce pumping, thereby reducing the pumping stress on the principal aquifer and reducing the potential for subsidence.
- **Depletion of Interconnected Surface Water Measurable Objective:** A GEC Marketing and Trading Program would provide pumpers greater flexibility to conserve water, fallow irrigated cropland, and otherwise reduce pumping that could result in higher groundwater elevations in support of identified GDEs.
- **Degradation of Water Quality:** Improvements to water quality are expected as a result of the combination of the BPA and GEC programs that result in reduced pumping and reduced irrigation return flows to the aquifer, thereby limiting the amount of nitrate and TDS infiltrating to the aquifer.

6.8.2 Implementation Triggers for the Groundwater Extraction Credit (GEC) Marketing and Trading Program [§ 354.44(b)(1)(A)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) 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, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.

The management action described in this section is included in the Group 2 management actions. Implementation of Group 2 management actions may be considered by the EMA GSA if previously implemented projects and management actions are not resulting in trends towards achieving the EMA GSA sustainability goals. The initial phase of a BPA Program would be focused on program design, policy and regulatory development, CEQA compliance, and stakeholder outreach. This phase may take 12 to 18 months or more.

A Groundwater BPA Program (see Section 6.7), which would need to be developed in parallel with this program, would need to be deployed before this management action could be initiated. Once implemented, a GEC Marketing and Trading Program could result in immediate benefit to the EMA and stakeholders by providing flexibility to landowners and allowing for credits to be held by the EMA GSA for the benefit of the EMA. A GEC Marketing and Trading Program could be ongoing throughout the GSP implementation period in coordination with a Groundwater GPA Program.

6.8.3 Public Notice Process for the Groundwater Extraction Credit (GEC) Marketing and Trading Program [§ 354.44(b)(1)(B)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) The Plan shall include the following:

(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.

A GEC Marketing and Trading Program would be developed in an open and transparent process. Targeted outreach meetings and technical workshops, in addition to regularly scheduled EMA GSA meetings, could be held periodically to inform groundwater pumpers and other stakeholders about the details of a GEC Marketing and Trading Program. Groundwater pumpers and interested stakeholders would have the opportunity at these meetings to learn about the program, as well as the opportunity to provide input and comments on how a GEC Marketing and Trading Program would be implemented in the EMA. The targeted public outreach meetings and technical workshops could be supplemented with informational mailers to be sent to all well owners in the EMA and informational press releases could be distributed to local media. If deemed valuable, EMA GSA representatives may work directly with individual well owners to explain potential program requirements and help with program implementation. A Groundwater GEC Program could also be promoted through annual GSP reports and links to relevant information on the EMA GSA website.

6.8.4 Overdraft Mitigation for the Groundwater Extraction Credit (GEC) Marketing and Trading Program [§ 354.44(b)(2)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The development and implementation of a GEC Marketing and Trading Program, in conjunction with the implementation of a Groundwater BPA Program within the EMA, could directly result in a reduction of the volume of groundwater being pumped from the Basin, provided, however, that new wells and new groundwater production in the EMA would need to be controlled to ensure that increased production in the aggregate would not negate the effects of reducing baseline production through an allocation, marketing, and trading framework. These reductions in pumping could occur during periods of normal, above normal, and below normal rainfall year conditions. Pumping reductions could help mitigate the estimated storage deficit within the Basin.

6.8.5 Permitting and Regulatory Process for the Groundwater Extraction Credit (GEC) Marketing and Trading Program [§ 354.44(b)(3)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(3) A summary of the permitting and regulatory process required for each project and management action.

No specific permit or regulatory compliance process would be required for the EMA GSA to develop and adopt a GEC Marketing and Trading Program, although, as noted above, CEQA compliance may be required in connection with the overall program or individual trades. The program would be developed and implemented in accordance with all applicable groundwater laws and respect all groundwater rights.

6.8.6 Implementation Timeline for the Groundwater Extraction Credit (GEC) Marketing and Trading Program [§ 354.44(b)(4)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(4) The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.

The management action described in this section is included in the Group 2 management actions. Implementation of Group 2 management actions may be considered by the EMA GSA if previously implemented projects and management actions are not resulting in trends towards achieving the EMA GSA sustainability goals. The initial phase of work would be to conduct the appropriate stakeholder outreach, draft the policy development, solicit public comment, undertake legal review, develop an accounting system, and finalize an initial GEC policy. This phase would be anticipated to take 12 to 18 months or more. As noted above, a Groundwater BPA Program (see Section 6.7) would need to be developed and established prior to a GEC Program, and, as further described below, a Voluntary Agricultural Crop Fallowing Program (see Sections 6.9) could be developed as a complement to the GEC Program. The timetable for implementation of a GEC Marketing and Trading Program would depend on the schedule to complete any required CEQA review. Once implemented, a program could result in immediate benefit to the Basin and could be ongoing throughout the GSP implementation period.

6.8.7 Anticipated Benefits of the Groundwater Extraction Credit (GEC) Marketing and Trading Program [§ 354.44(b)(5)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

If implemented, a GEC Marketing and Trading Program could result in immediate benefit to the EMA, including supporting the avoidance of undesirable results including chronic lowering of groundwater levels, reduction of groundwater in storage, and potentially degraded water quality. Such a program could be designed to provide an economic incentive for conserving water, voluntary fallowing of irrigated agricultural croplands, and promote beneficial uses of water and land uses by providing for the potential to monetize voluntary water conservation or the elimination of water intensive uses. For example, a GEC Program could encourage the restoration of irrigated lands for use as open or recreational space, which also could serve to reduce pumping in certain areas or shift pumping from areas with declining groundwater levels. The implementation of a GEC Marketing and Trading Program could be designed to result in more efficient use of water and greater resiliency to long-term climate variability.

6.8.8 Legal Authority for the Groundwater Extraction Credit (GEC) Marketing and Trading Program [§ 354.44(b)(7)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(7) A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.

It is the established policy of the State of California “to facilitate the voluntary transfer of water and water rights where consistent with the public welfare” (Water Code, § 109(a)). Additionally, “the Legislature hereby finds and declares that voluntary water transfers between water users can result in a more efficient use of water, benefitting both the buyer and the seller” (Water Code, § 475).

Under SGMA, the EMA GSA can “authorize temporary and permanent transfers of groundwater extraction allocations within the agency’s boundaries, if the total quantity of groundwater extracted in any water year is consistent with the provisions of the groundwater sustainability plan” (Water Code, § 10726.4(a)(3)).

6.8.9 Cost and Funding for the Groundwater Extraction Credit (GEC) Marketing and Trading Program [§ 354.44(b)(8)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The planning-level cost to develop and establish a GEC Marketing and Trading Program is estimated to be approximately $150,000 to $200,000; the cost of a program would be separate from the development of this GSP.

Potential sources of funding for a GEC Marketing and Trading Program include state grants, groundwater extraction fees, transaction fees from extraction credit trades, and other mechanisms as may be identified by the EMA GSA.

6.8.10 Drought Offset Measures for the Groundwater Extraction Credit (GEC) Marketing and Trading Program [§ 354.44(b)(9)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The development and implementation of a GEC Marketing and Trading Program, in conjunction with the implementation of a Groundwater BPA Program within the EMA, could directly result in a reduction of the volume of groundwater being pumped from the Basin because an allocation and market-based framework would be designed to reduce overall water production and increase efficient water use. These reductions in pumping could occur during periods of normal, above normal, and below normal rainfall year conditions and thereby mitigate the estimated storage deficit within the EMA.

As monitoring of the groundwater levels in the EMA occurs in the future, the EMA GSA would quantify the beneficial effects of any Groundwater BPA and GEC Marketing and Trading Programs that are developed and implemented, which would promote achievement of EMA sustainability objectives. The information acquired could be utilized in making adaptive management decisions that may allow lowering of groundwater levels or depletion of supply during periods of drought to be offset by increases in groundwater levels or storage during other periods.

6.9 Group 2 Management Action 7 – Voluntary Agricultural Crop Fallowing and Crop Conversion Programs [§ 354.44(b)(1)(d)]

§ 354.44 Projects and Management Actions.

(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.

(d) An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.

In 2018, there were approximately 7,329 acres of active irrigated agriculture within the EMA, which were being irrigated with approximately 14,545 AF of water on an annual basis. Voluntary land fallowing and conversion to lower water use crops have been used historically in other locations as both a temporary and permanent solution to water shortages. The EMA GSA has identified voluntary agricultural crop fallowing and crop conversion as a potential management action that may be considered if Group 1 management actions are not proving effect in achieving sustainability in the EMA within 20 years of GSP adoption. As deemed necessary during the GSP implementation period, the EMA GSA may develop programs that would permit voluntary fallowing and land use conversions on a temporary or permanent basis as a means of reducing total water production in the EMA. As with the Groundwater BPA and GEC Marketing and Trading Programs discussed above, an important consideration in developing a voluntary fallowing and crop conversion program would be to include protections of water rights for producers who choose to fallow or carry out their land use conversions.

Factors that may be considered during the development of a fallowing and land conversion program could include, without limitation, the current extent of agriculture land and water use, the intended land and water use after fallowing or conversion, and the potential environmental impacts associated with fallowing / conversion, such as airborne emissions through wind-blown dust, the introduction or spreading of invasive plant species, and changes to the landscape that could adversely affect visual quality. The land uses proximal to proposed fallowing / conversion projects would also be considered as part of this management action. For example, differing levels of site stabilization or restoration may be needed or required based on the land use intended post-fallowing. Temporary stabilization may be less expensive and may be appropriate for properties to be developed for other uses in the near term. A passive restoration approach may be applied for permanent fallowing if the goal is for the property to eventually return to native habitat, and active restoration may be applied for relatively near-term restoration to native habitat with the goal of providing open space, parks, or public trails.

An initial program phase would be to evaluate key issues associated with program development, such as:

- Guidelines for maintaining water rights associated with land that is temporarily fallowed or converted to a lower water use crop.
- Development of a framework for incentivizing landowners to voluntarily fallow.
- Development and implementation of an incentive framework for conversion from irrigated agriculture to dry land farming.
- Evaluation of future land use alternatives.
- Ensuring avoidance of unintended consequences from unmanaged fallowed land.
- Identification of land restoration goals.
- Identifying land management, inspection, and enforcement procedures.
- Development of a regulatory document that includes rules for characterizing and tracking fallowed ground.
- Consideration of programmatic and/or project-based CEQA review.

As part of this management action, the EMA GSA would develop an EMA-wide accounting system that tracks landowners who decide to voluntarily fallow or convert their land and reduce groundwater pumping or otherwise refrain from using groundwater. If given the opportunity to create a “placeholder” for their ability to pump under regulations adopted by the EMA GSA, some property owners currently irrigating crops (or that might want to irrigate in the future) may choose to forego the expense of farming and extracting water if those rights can be accounted for and protected. A Voluntary Agricultural Crop Fallowing Program could be developed in parallel with Groundwater BPA and GEC Marketing and Trading Programs described in Sections 6.7 and 6.8.

The implementation of a voluntary fallowing and crop conversion program within the EMA may benefit from the provisions of Assembly Bill (AB) 252, which was introduced in January 2021. If passed, AB 252 would create the Multi-Benefit Land Repurposing Incentive Program, which is intended to help alleviate the impacts of SGMA on farmers and ensure that farmland taken out of production due to SGMA is reused to provide conservation, recreation, or other benefits to local communities. Specifically, this bill would create a pilot program to support repurposing formerly irrigated agricultural land for groundwater recharge, biodiversity conservation, pollinator habitat, cattle grazing, and other beneficial and less water-intensive uses. A primary goal of the Multi-Benefit Land Repurposing Program is to help make the critical transition to sustainable groundwater management. The program proposed in this bill also can reduce potential negative impacts of taking land out of production, such as spreading invasive weeds and greater dust emissions, and instead bring substantial benefits to rural communities and wildlife habitat.

6.9.1 Relevant Measurable Objective(s) for the Voluntary Agricultural Crop Fallowing and Crop Conversion Programs [§ 354.44(b)(1)]

§ 354.44 Projects and Management Actions.

(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 measurable objectives benefiting from the implementation of a Voluntary Agricultural Crop Fallowing Program include:

- **Groundwater Elevation Measurable Objectives:** A voluntary fallowing and crop conversion program would focus on reducing pumping, which could result in higher groundwater elevations.
- **Groundwater Storage Measurable Objectives:** This measurable objective is based on total pumping in the EMA. Therefore, the implementation of a voluntary fallowing and crop conversion program would focus on reducing pumping and help achieve the goal of reducing total extractions consistent with the long-term sustainable yield.
- **Land Subsidence Measurable Objectives:** A voluntary fallowing and crop conversion program would focus on reducing pumping, thereby reducing the pumping stress on the principal aquifers and reducing the potential for subsidence.
- **Depletion of Interconnected Surface Water Measurable Objective:** A voluntary fallowing and crop conversion program would focus on reducing pumping which could result in higher groundwater elevations in support of identified GDEs.
- **Degradation of Water Quality:** Improvements to water quality are expected as a result of reduction of groundwater pumping and associated irrigation return flows to the aquifer, thereby limiting the amount of nitrate and TDS infiltrating to the aquifer.

6.9.2 Implementation Triggers for the Voluntary Agricultural Crop Fallowing and Crop Conversion Programs [§ 354.44(b)(1)(A)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) 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, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.

The management action described in this section is included in the Group 2 management actions. Implementation of Group 2 management actions may be considered by the EMA GSA if previously implemented projects and management actions are not resulting in trends towards achieving the EMA GSA sustainability goals. The initial phase of a Voluntary Agricultural Crop Fallowing and Crop Conversion Program would be focused on program design, policy development, CEQA compliance, and stakeholder outreach. This phase is anticipated to take 6 to 9 months or more, and (as noted above) would need to follow the development and establishment of a Groundwater BPA Program. Once implemented, a voluntary fallowing and crop conversion program could result in immediate reductions in groundwater pumping, which may increase with the addition of fallowed lands and fluctuate depending on the nature and timing of converted land use. As noted above, new wells and new production in the EMA would need to be controlled to ensure that increased production in the aggregate would not negate the effects of reducing baseline production through an allocation, marketing, and/or fallowing and crop conversion framework.

6.9.3 Public Notice Process for the Voluntary Agricultural Crop Fallowing and Crop Conversion Programs [§ 354.44(b)(1)(B)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) The Plan shall include the following:

(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.

Targeted outreach meetings and technical and training workshops, in addition to regularly scheduled EMA GSA meetings, could be held periodically to inform groundwater pumpers and other stakeholders about the details of a voluntary fallowing and crop conversion program. Groundwater pumpers and interested stakeholders would have the opportunity at these meetings to learn about the proposed components of a fallowing and crop conversion program as well as the opportunity to provide input and comments on how the fallowing and crop conversion initiatives could be implemented in the EMA. The targeted public outreach meetings and technical and training workshops could be supplemented with informational mailers to be sent to all well owners in the EMA and informational press releases could be distributed to local media. If deemed valuable, EMA GSA representatives may work directly with individual well owners to explain program requirements and help with program implementation. A Voluntary Agricultural Crop Fallowing and Crop Conversion Program could also be promoted through annual GSP reports and links to relevant information on the EMA GSA website.

6.9.4 Overdraft Mitigation for the Voluntary Agricultural Crop Fallowing and Crop Conversion Programs [§ 354.44(b)(2)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The development and implementation of a voluntary fallowing and crop conversion program within the EMA could directly result in a reduction of the volume of groundwater being pumped from the Basin. These reductions in pumping could occur during periods of normal, above normal, and below normal rainfall year conditions and thereby mitigate the estimated storage deficit within the EMA.

6.9.5 Permitting and Regulatory Process for the Voluntary Agricultural Crop Fallowing and Crop Conversion Programs [§ 354.44(b)(3)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(3) A summary of the permitting and regulatory process required for each project and management action.

Establishment of a voluntary land fallowing and crop conversion program is expressly authorized under SGMA (Water Code, § 10726.2(c)). The fallowing and crop conversion program, including program standards, would be developed and undergo CEQA review, as necessary.

6.9.6 Implementation Timeline for the Voluntary Agricultural Crop Fallowing and Crop Conversion Programs [§ 354.44(b)(4)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(4) The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.

The management action described in this section is included in the Group 2 management actions. Implementation of Group 2 management actions may be considered by the EMA GSA if previously implemented projects and management actions are not resulting in trends towards achieving the EMA GSA sustainability goals. The initial phase of a voluntary fallowing and crop conversion program would be focused on program design, policy development, CEQA compliance, and stakeholder outreach. This phase would be anticipated to take 6 to 12 months or more, and (as noted above) would need to follow the development and establishment of a Groundwater BPA Program. Once implemented, the program could result in immediate groundwater savings, which may continue to increase with the addition of fallowed lands and fluctuate depending on the nature and timing of converted land use.

6.9.7 Anticipated Benefits for the Voluntary Agricultural Crop Fallowing and Crop Conversion Programs [§ 354.44(b)(5)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

In addition to the benefits from reduced pumping, the program may allow for a level of land use and community planning for converted properties not otherwise available. Depending on the nature of land uses implemented, the program could result in increased recreational space or potential economic benefits from conversion of land use types. For example, the conversion of previously fallowed land to Managed Aquifer Recharge (MAR) projects discussed in Section 6.10 may be investigated.

For perspective, in 2018, there was an estimated 7,329 acres of irrigated cropland in the EMA with a corresponding water demand of approximately 14,545 AFY. A voluntary fallowing and conversion program involving 10 percent of the irrigated cropland could result in a benefit of approximately 1,450 AFY.

6.9.8 Legal Authority for the Voluntary Agricultural Crop Fallowing and Crop Conversion Programs [§ 354.44(b)(7)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(7) A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.

Establishment of a voluntary land fallowing and crop conversion program is expressly authorized under SGMA (Water Code, § 10726.2(c)).

6.9.9 Cost and Funding for the Voluntary Agricultural Crop Fallowing and Crop Conversion Programs [§ 354.44(b)(8)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The planning-level cost for developing and establishing a Voluntary Agricultural Crop Fallowing and Crop Conversion Program is estimated to be approximately $75,000 to $150,000 and is separate from development of this GSP.

Potential sources of funding for a Voluntary Fallowing Program include state grants, groundwater extraction fees, transaction fees from extraction credit trades, and other mechanisms as may be identified by the EMA GSA.

6.9.10 Drought Offset Measures for the Voluntary Agricultural Crop Fallowing and Crop Conversion Programs [§ 354.44(b)(9)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

The development and implementation of a Voluntary Agricultural Crop Fallowing and Crop Conversion Program within the EMA could directly result in a reduction of the volume of groundwater that would be pumped from the Basin. These reductions in pumping could occur during periods of normal, above normal, and below normal rainfall year conditions and thereby mitigate the estimated storage deficit within the EMA.

As monitoring of the groundwater levels in the EMA occurs in the future, the EMA GSA would quantify the beneficial effects of a voluntary fallowing and crop conversion program, which may allow for future refinements in the EMA water budget. The information acquired could be used by the EMA GSA in making adaptive management decisions that may allow lowering of groundwater levels or depletion of supply during periods of drought to be offset by increases in groundwater levels or storage during other periods.

6.10 Group 3 Projects [§ 354.44(b)(1)(d)]

§ 354.44 Projects and Management Actions.

(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.

(d) An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.

The EMA GSA does not currently plan to initiate the construction of any Group 3 project infrastructure for the specific goal of achieving basin sustainability until evidence exists that such a project may prove effective and economically feasible. Although the EMA GSA has no near-term plans to initiate construction of any specific projects for the purposes of achieving basin sustainability, the EMA GSA and/or other local agencies may be interested in proceeding with the study, planning, preliminary design/engineering, and permitting phases for several projects that were identified by the EMA GSA for potential future consideration. A description of the projects that the EMA GSA identified for future consideration and associated summary information are presented in the Sections 6.10.1 through 6.10.10.

The projects that the EMA GSA identified for future consideration include the following:

- Distributed Stormwater Managed Aquifer Recharge (DSW-MAR) Basins (In-Channel and Off-Stream Basins)
- City of Solvang / Santa Ynez Community Services District WWTF Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse
- Los Olivos Community Service District WWTF Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse
- Santa Ynez Band of Chumash Indians WWTF Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse
- GSA to become Funding Partner to Santa Barbara County Precipitation Enhancement Program
- Conjunctive Use - MAR Projects Using Imported (SWP and SYR) Water

- In Lieu Recharge Projects to Deliver Unused and Surplus Imported Water to Offset Groundwater Extractions
- Aquifer Storage and Recovery Projects

A brief description of the projects that have been identified by the EMA GSA for possible implementation in the future is presented below.

Distributed Stormwater Managed Aquifer Recharge (DSW-MAR) Basins (In-Channel and Off-Stream Basins)

DSW-MAR is a landscape management strategy that could help to reduce the storage deficit and maintain long-term water supply reliability. DSW-MAR targets relatively small drainage areas (generally 100 to 1,000 acres) from which stormwater runoff can be collected to infiltrate 100 to 300 AF of water per year, per individual basin. Infiltration can be accomplished in surface basins, typically having an area of 1 to 5 acres, or potentially through flooding of agricultural fields or flood plains, use of drywells, or other strategies. Smaller projects might provide additional benefit, but unit costs are likely to be somewhat greater. Larger projects may require more infrastructure and/or maintenance costs.

The initial phase of this project may include the completion of a study to identify the optimal number and location of a series of DSW-MAR facilities, based on hydrogeologic and watershed conditions. The subject study may include an evaluation of the potential benefits to the EMA, from an expansion of the precipitation enhancement program described below.

City of Solvang WWTF Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse

The City of Solvang (City) currently operates a Sequencing Batch Reactor type WWTP with a design capacity of 1.5 million gallons per day (MGD) which is operated under a Waste Discharge Permit issued by the Central Coast Regional Water Quality Control Board (RWQCB). In 2021, the average daily flow was approximately 0.8 MGD. The WWTP currently receives and treats wastewater from the City and the Santa Ynez Community Services District (SYCSD), which serves the town of Santa Ynez. The SYCSD utilizes 0.30 MGD capacity in the Solvang WWTP. The WWTP provides full secondary treatment of the wastewater received. The WWTP discharges treated wastewater to percolation ponds located adjacent to the Plant. The WWTP, including percolation ponds, is located near the southwestern limits but outside of the EMA. Treated effluent percolates into the ground and ultimately discharges to the Santa Ynez River.

The City has plans to upgrade the WWTP, with initial phases to include a new aeration system and the addition of clarifiers, offices, and laboratory facilities. Subsequent phases may provide for adding treatment processes that could allow the City to produce recycled water that meets Title 22 requirements and the construction of a recycled water distribution (“purple pipe”) system. The future supply of recycled water may be used by agricultural and/or commercial water users in lieu of pumping groundwater or introduced into the basin aquifers for indirect potable water reuse. A potentially long pipeline would have to be constructed at considerable cost to serve users and uses located within or outside of the City limits in the EMA.

Los Olivos Community Service District WWTF Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse

The unincorporated community of Los Olivos has a population of approximately 1,150 residents, along with several commercial businesses, which currently use onsite wastewater treatment systems (OWTS) exclusively for the disposal of wastewater. In 2016, the estimated average daily flow (ADF) from the collective OWTS’s was estimated to be 0.107 MGD at 20-year build-out conditions (i.e., 2036) (AECOM, 2016). The Los Olivos Community Service District (LOCSD) was formed by voters in 2018 to provide a funding mechanism for the development, building, and operation of facilities necessary to collect and treat wastewater. The Los Olivos Wastewater Reclamation Program Project was undertaken by the LOCSD to define a strategy to provide economically viable wastewater treatment and reclamation solutions that meet public health needs and the regulatory requirements of the RWQCB. A primary component of this project includes the proposed construction of a phased collection and treatment system that will include the construction of a membrane bioreactor treatment facility to serve the central business core and immediate surrounding residential areas. The membrane bioreactor treatment facility will be sited to accommodate modular expansion, should further study warrant a facility expansion. The system will be designed for potential future expansion and to provide treatment that improves wastewater quality before it is reused, recycled, or discharged. Reclaimed wastewater is proposed to be treated to levels compliant with California Code of Regulations, Title 22 discharge requirements to allow for the following:

- Beneficial reuse through underground infiltration
- Groundwater recharge
- Strategic flushing of existing nitrate/contaminates
- Local irrigation as site conditions allow

The future supply of recycled water may be used by agricultural and/or other water users in lieu of pumping groundwater or introduced into basin aquifers for indirect potable water reuse.

Santa Ynez Band of Chumash Indians WWTF Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse

The Santa Ynez Band of Chumash Indians own and operate a WWTF that serves approximately 6,450 people (including hotel guests) on the Santa Ynez Reservation, Casino & Hotel Complex, Administration Buildings and Health Clinic, which serves about 350 residents, 100 employees, and 6,000 patrons per day. The existing plant utilizes membrane bioreactor treatment to provide a treatment capacity of 0.32 MGD, and produces effluent that meets California Code of Regulations, Title 22 recycled water use standards. The average discharge flow rate is approximately 0.12 MGD. Wastewater collected through the sewer system gravity flows to the WWTP. Operation and maintenance of the facility and collection system is conducted by the SYCSD.

The facility is permitted to discharge into Zanja de Cota Creek, a tributary of the Santa Ynez River. Approximately 1.3 miles downstream of the outfall, the creek flows off the Reservation and into California state waters. Tertiary treated effluent that is not discharged is stored on-site before being reused on-site for toilet flushing, on-site irrigation, off-site irrigation, or in the cooling system at the casino. The facility has obtained a Waste Discharge Restrictions Requirements permit from the Central Coast RWQCB to send recycled wastewater off-site outside of Tribal boundaries (i.e., land Tribally owned but not held in trust). Water is reused primarily during periods of drought. Some potential may exist for utilizing the recycled water from this facility by agricultural and/or other water users in lieu of pumping groundwater or introduced into the Basin aquifers for indirect potable water reuse.

GSA to Become Funding Partner to Santa Barbara County Precipitation Enhancement Program

The project would provide financial assistance to the Santa Barbara County Water Agency for the continued operation and potential expansion of the existing precipitation enhancement program that has been operated by Santa Barbara County Water Agency since 1981. This program has been historically operated by the County in the vicinity of upper elevation tributaries entering Cachuma Reservoir (Lake Cachuma). The precipitation enhancement project involves implementation of a cloud seeding program to augment natural precipitation to increase surface water runoff and aquifer recharge in the Basin. This process includes introduction of silver iodide into clouds to increase nucleation (i.e., the process by which water in clouds freezes to then precipitate out). The precipitation enhancement program would potentially expand the use of both ground-based seeding and aerial seeding to improve the probability of increased rainfall. Ground-based seeding would be conducted using remote-controlled flare systems, set up along key mountain ridges and would be automated. Aerial seeding would use small aircraft carrying flare racks along its wings to release silver iodide into clouds while flying through and above them. This program has lost participation from some of its historical funding partners and this project would allow the GSA to support the continued operation of this program.

Conjunctive Use - MAR Projects Using Supplemental (SWP and SYR) Water

Direct recharge of aquifers can be done by introducing supplemental water supplies, including water from the SWP and/or the SYR system, through recharge basins or injection wells. Intentional, direct recharge is commonly referred to as Managed Aquifer Recharge (MAR). Recharge basins are large artificial ponds that are filled with water that seeps from the basin into the groundwater system. Recharge efficiencies can range greatly, and the recharge efficiency of a recharge basin is contingent on the size, geometry and location of the basin along with the properties of the underlying soil, losses to evaporation, and potential seepage into streams or shallow sediments before it can recharge the deeper aquifers. Recharge efficiencies are difficult to measure without sophisticated subsurface monitoring.

Recharge through recharge basins using supplemental water supplies can occur year-round to the extent that access to imported water is available; although efficiency might be lower during the rainy seasons if underlying soils are already saturated. Recharge basins have the advantage of generally being less expensive to build and operate than in lieu distribution systems or injection systems.

Injection wells are used to inject available water supplies directly into the groundwater basin when source water is available and then recovering the water during times of water scarcity. Injection can occur year-round, including during the rainy season. Injection wells are typically more efficient at raising groundwater elevations than recharge basins because they target specific aquifers; although a well's recharge ability is affected by the surrounding aquifer properties. The injected water typically flows through the aquifer from the injection location to locations with lower groundwater elevations. The rate of travel depends on the hydraulic conductivity of the aquifer. Although they have a very high efficiency, injection wells are generally more expensive to operate than recharge basins. Additionally, injection wells require higher quality water than recharge basins.

The availability and reliability of supplemental supplies from the SWP and SYR are limiting factors. For example, the latest estimates of anticipated SWP water availability under future conditions are included in the DWR *2019 SWP Delivery Capability Report* (DCR) (DWR, 2019). The 2019 DCR anticipates approximately 59 percent of Table A, and other contract amounts, will be available on average to the SWP Contractors under anticipated future conditions. These estimates are based on outputs from the CalSim-2 Operations Model (DWR, 2019). However, the availability of these SWP water supplies will be variable year by year based on hydrologic conditions. The historical delivery of annual allocations from the SWP ranges from 5 to 100 percent of the contracted amount. Given the variable availability of SWP water supplies, and current uses to which SWP supplies are already dedicated in the area, a MAR project to would likely need to be designed to operate sporadically, with recharge occurring during wet years to balance out lower, or non-existent delivery amounts, during dry years.

In Lieu Recharge Projects to Deliver Unused and Surplus Supplemental Water to Offset Groundwater Extractions

Direct delivery of surplus SWP and/or SYR system supplies, to the extent they are physically and legally available, could be done in lieu of groundwater pumping. This option could offset the use of groundwater, allowing the groundwater basin to recharge naturally. Direct delivery projects rely on the construction of pipelines and associated infrastructure to deliver the water to agricultural or municipal users, as well as pumping stations and storage facilities to handle supply and demand variations. Direct delivery is a highly efficient method to reduce groundwater pumping because it directly offsets the amount of water pumped from the aquifer, allowing the principal aquifer groundwater elevations to rebound through natural recharge. One of the drawbacks of direct delivery is that the delivered water must be available during the times when the users need it, which often occurs at times when competition for those water supplies are highest and are less likely to be available, especially during a dry year. The construction of storage facilities can mitigate these challenges to some extent, but this additional infrastructure results in substantially increased capital and operational costs.

Aquifer Storage and Recovery Projects

Aquifer storage and recovery (ASR) would provide for the injection of supplemental water supplies, to the extent they are available, into the natural structure of basin aquifers for use as an underground storage reservoir. The source water for injection must be drinking water quality. The supplemental water to be injected would be from the SWP coastal pipeline route, which is a treated supply. Water stored in the Basin as a result of an ASR project could provide a drought supply for the EMA service area or could be used in connection with other projects and management actions in the Basin.

A significant limitation of this project is the availability and cost of the supplemental SWP water used for injection source water. Existing SWP water supplies within the EMA are fully allocated to existing users; SWP water would have to be purchased from other users that do not intend to fully use their allocation or from a water bank located elsewhere in the SWP system.

Any ASR project would need to be designed with additional capacity to contribute to the sustainability of the Basin. Prior to implementing an ASR project, the EMA GSA would perform supplemental hydrogeologic and engineering investigations and initiate a pilot testing program. Pilot testing involves injecting water into the Basin's aquifers and recovering it to assess injection and recovery capacities and monitor water quality impacts to native groundwater resources and recovered water quality. Information generated by pilot test evaluations will help quantify the degree to which ASR is a feasible part of EMA GSA strategy to improve the reliability of its water supply, along with helping to evaluate whether an ASR project can be developed.

6.10.1 Relevant Measurable Objective(s) for Group 3 Projects [§ 354.44(b)(1)]

§ 354.44 Projects and Management Actions.

(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.

Because the EMA GSA does not currently plan to implement the identified Group 3 projects, they will not have any impact on the measurable objectives for the EMA. If the EMA GSA determines that one or more of the Group 3 projects may be required or desirable, then there will be a benefit to all the measurable objectives that are identified in this GSP.

6.10.2 Implementation Triggers for Group 3 Projects [§ 354.44(b)(1)(A)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) 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, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.

The projects identified in this section are not deemed critical for the successful implementation of this GSP and are included in the Group 3 projects as future options should they become necessary or otherwise desirable in the overall strategy for sustainable EMA management. Although, the EMA GSA does not currently plan to initiate construction on any of these projects, there may be interest in proceeding with the study, planning, preliminary design/engineering, CEQA compliance, and permitting phases for several projects that are identified by the EMA GSA for potential future consideration.

6.10.3 Public Notice Process for Group 3 Projects [§ 354.44(b)(1)(B)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(1) The Plan shall include the following:

(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.

No specific notice to the public or other agencies is currently planned regarding the identified Group 3 projects. If the EMA GSA elects to pursue one or more of the projects, an approach for informing the public and other agencies will be developed and implemented.

6.10.4 Overdraft Mitigation for Group 3 Projects [§ 354.44(b)(2)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

Because the EMA GSA does not currently plan to implement the identified Group 3 projects, they will not have any impact on the mitigation of the estimated storage deficit within the Basin. The potential effects that any specific project may have on the Basin would be addressed during the study, planning, and preliminary design/engineering phases of any projects that are identified by the EMA GSA for potential future consideration.

6.10.5 Permitting and Regulatory Process for Group 3 Projects [§ 354.44(b)(3)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(3) A summary of the permitting and regulatory process required for each project and management action.

Each of the identified Group 3 projects would require planning and permitting prior to implementation, and all would require compliance with applicable regulations, including CEQA. These permitting and regulatory compliance issues for any specific project would be addressed during the study, planning, preliminary design/engineering, and permitting phases of any project that is identified by the EMA GSA for potential future consideration.

6.10.6 Implementation Timeline for Group 3 Projects [§ 354.44(b)(4)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(4) The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.

The Group 3 projects identified in this section are not deemed critical for the successful implementation of the GSP. The EMA GSA has no near-term plans to initiate construction of any specific projects for the purposes of achieving basin sustainability. However, there may be interest in proceeding with the study, planning, preliminary design/engineering, CEQA compliance, and permitting phases for several projects that are identified by the EMA GSA for potential future consideration.

6.10.7 Anticipated Benefits from Group 3 Projects [§ 354.44(b)(5)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

Because the EMA GSA does not currently plan to implement the identified Group 3 projects, they will not have any direct benefit to the Basin. If the EMA GSA determines that one or more of the projects may be required or otherwise desirable, assessment of anticipated benefits will be characterized at that time. Anticipated benefits that any specific project may have on the EMA will be addressed during the study, planning, preliminary design/engineering, and permitting phases of all projects that are identified by the EMA GSA for potential future consideration.

6.10.8 Legal Authority for Group 3 Projects [§ 354.44(b)(7)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(7) A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.

Legal authority for any specific project would be addressed during the study, planning, preliminary design/engineering, and permitting phases of all projects that are identified by the EMA GSA for potential future consideration.

6.10.9 Cost and Funding for Group 3 Projects [§ 354.44(b)(8)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

Project costs and proposed mechanisms for funding for any specific project would be addressed during the study, planning, preliminary design/engineering, and permitting phases of all projects that are identified by the EMA GSA for potential future consideration.

6.10.10 Drought Offset Measures for Group 3 Projects [§ 354.44(b)(9)]

§ 354.44 Projects and Management Actions.

(b) Each Plan shall include a description of the projects and management actions that include the following:

(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.

Because the EMA GSA does not currently plan to implement the identified Group 3 projects, they will not have any impact on mitigating chronic lowering of groundwater levels or depletion of supply during periods of drought within the Basin. The potential effects that any specific project may have on the Basin regarding offsetting the effects of drought would be addressed during the study, planning, preliminary design/engineering, and permitting phases of any projects that are identified by the EMA GSA for potential future consideration.

6.11 References

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SYRWCD. 2010. Groundwater Production Information and Instructions. Prepared by Santa Ynez River Water Conservation District.

TNC. 2019. Identifying GDEs Under SGMA, Best Practices for Using the NC Dataset. Prepared by The Nature Conservancy (TNC). July 2019.

TWRI. 2001. Potential Water Savings in Irrigated Agriculture in the Lower Rio Grande Basin of Texas. Texas Water Resources Institute.

Upson, J.E., and H.G. Thomasson, Jr. 1951. Geology and Water Resources of the Santa Ynez River Basin, Santa Barbara County, California. Prepared by J.E. Upson and H.G. Thomasson, Jr. in cooperation with Santa Barbara County for the U.S. Geological Survey.

SECTION 7: Groundwater Sustainability Plan Implementation

7.1 Introduction

This section provides a conceptual roadmap for the Santa Ynez River Valley Groundwater Basin (Basin) – Eastern Management Area (EMA) Groundwater Sustainability Agency's (GSA's) efforts to implement this Groundwater Sustainability Plan (GSP) after adoption and discusses implementation efforts in accordance with Sustainable Groundwater Management Act (SGMA) regulations § 354.8(f)(2).

This implementation plan is based on the EMA GSA's current understanding of the EMA's conditions and anticipated administrative considerations that affect the management actions described in Section 6. Understanding of Basin conditions and administrative considerations will evolve over time, based on future refinement of the hydrogeologic setting, groundwater flow conditions, and input from EMA stakeholders.

Implementation of this GSP requires robust administrative and financing structures, with adequate staff and funding to support compliance with SGMA. The GSP calls for the EMA GSA to routinely provide information to the public about GSP implementation, progress towards sustainability, and the need to use groundwater efficiently. The GSP calls for a website to be maintained as a communication tool for posting data, reports, and meeting information.

Section 6 identifies three groups of projects and management actions that may be considered for implementation by the EMA GSA that could do the following:

- Address data gaps and reduce uncertainty
- Improve understanding of Basin conditions and how they may change over time
- Create opportunities to promote conservation and optimize water use in the Basin

The EMA GSA developed a portfolio of projects and management actions that can be implemented as the conditions in the Basin dictate. The identified management actions and potential future projects are categorized into three groups, with the management actions included in Group 1 to be initiated within 1 year of GSP adoption by the GSA. The Group 2 management actions and Group 3 projects may be considered for implementation in the future as conditions in the Basin dictate and the effectiveness of the other management actions are assessed. It is important to note that the projects and management actions included in Groups 2 and 3 may not be necessary if the implementation of Group 1 management actions result in conditions within the EMA that are trending toward meeting the EMA GSA sustainability goals and measurable objectives. However, the EMA GSA may determine that the implementation of Group 2 management actions and/or Group 3 projects is desirable for reasons other than reaching sustainability within the EMA and may elect to implement initiatives from either Group 2 or Group 3 at any time.

Based on the results of the analysis performed in conjunction with the development of this GSP, the EMA GSA concludes that the sustainability goals described in this GSP and required under the provisions of SGMA can be achieved through the implementation, as needed, of the Group 1 management actions described in Sections 6.3 through 6.6. Therefore, the EMA GSA does not plan at this time to implement any of the Group 2 management actions and/or to initiate the construction of any project infrastructure (Group 3) for the specific goal of achieving sustainability until such time as evidence shows that the effects of the Group 1 implemented management actions are insufficient. These possible future Group 2 management actions and Group 3 projects are briefly described in Sections 6.7 through 6.10.

This section of the GSP describes how these Group 1 management actions will be—and possible future Group 2 management actions and Group 3 projects may be—implemented, and includes descriptions of the following:

- Administrative approach and implementation timing
- Annual Reporting
- 5-Year GSP Evaluation and Update
- Management Action Implementation
- EMA GSA Annual Budget Estimates
- Funding Sources

7.2 Administrative Approach and Implementation Timing

The EMA GSA will likely hire consultant(s), assign a member agency to conduct or manage the effort, and/or hire staff to implement the GSP. If consultants are hired, it is anticipated that qualified professionals will be identified and hired through a competitive selection process. It is also anticipated that the lead for a particular task will keep the EMA GSA informed via periodic updates to the EMA GSA Committee and the public. As needed, the EMA GSA would likely conduct specific studies and analyses necessary to improve understanding of Basin conditions. The EMA GSA would likely then use new information on Basin conditions to identify, evaluate, and/or improve management actions to achieve sustainability. This GSP calls for actions considered by the EMA GSA to be vetted through a public outreach process whereby groundwater pumpers and other stakeholders will have opportunities to provide input to the decision-making process.

Using authorities outlined in California Water Code §§ 10725 to 10726.9, the EMA GSA will ensure the maximum degree of local control and flexibility consistent with this GSP to commence management actions. Because the amount of groundwater pumping in the EMA in recent years has been more than the estimated sustainable yield of about 12,870 acre-feet per year, as discussed in Section 3.3, and groundwater levels have been declining in some areas, the EMA GSA will begin to implement Group 1 management actions within 1 year after GSP adoption. The EMA GSA plans to continually monitor and assess its progress toward meeting the sustainable management criteria (SMCs) (see Section 5). Under conditions in which minimum thresholds are projected to be reached, the EMA GSA will perform assessments to determine whether the trends are related to groundwater pumping, drought conditions, or other factors. If groundwater level data are trending toward reaching minimum thresholds as a direct consequence of groundwater pumping in the EMA, then the EMA GSA may consider the implementation of Group 2 management actions and/or Group 3 projects. A graphical depiction of the implementation sequence is presented in Figure 7-1.

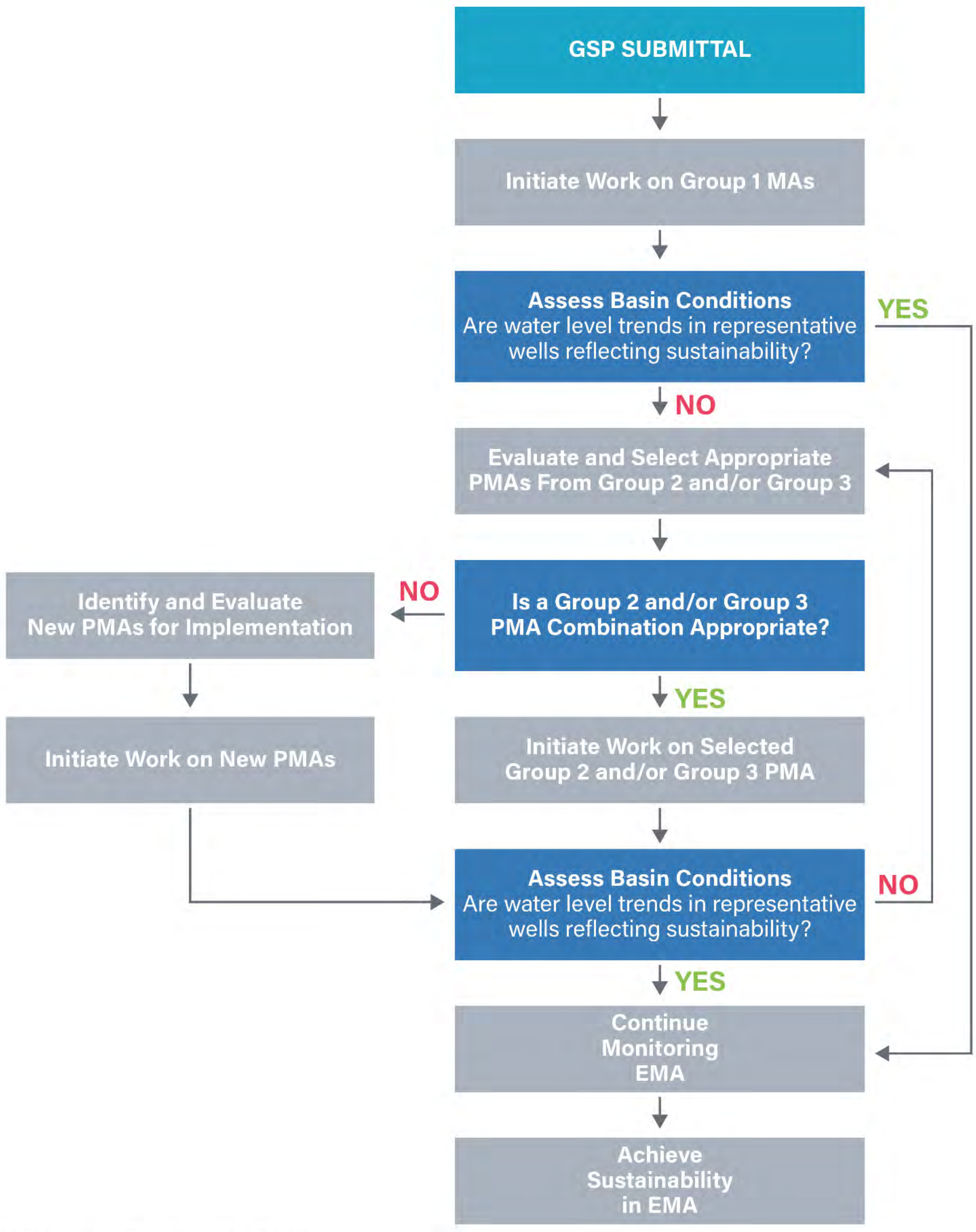

Figure 7-1. Adaptive Implementation Strategy for Projects and Management Actions

Notes

EMA = Santa Ynez River Valley Groundwater Basin Eastern Management Area

MA = management action PMA = project and/or management action

7.3 Annual Reporting

The EMA GSA will submit an annual report to the DWR by April 1 of each year following the adoption of the GSP. The annual report will include the following components for the preceding water year:

1. General information, including an executive summary and a location map depicting the Basin covered by the report.
2. A detailed description and graphical representation of the following conditions of the Basin managed in the GSP:
   a. Groundwater elevation data from monitoring wells identified in the monitoring network will be analyzed and displayed as follows:
      i. Groundwater elevation contour maps for each principal aquifer in the Basin illustrating, at a minimum, the seasonal high and seasonal low groundwater conditions.
      ii. Hydrographs of groundwater elevations and water year type using historical data to the greatest extent available.
   b. Groundwater extraction for the preceding water year. Data will be collected using the best available measurement methods and will 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.
   c. Surface water supply used or available for use, for groundwater recharge or in lieu use, will be reported based on quantitative data that describes the annual volume and sources for the preceding water year.
   d. Total water use will be collected using the best available measurement methods and will 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.
   e. Change in groundwater in storage will include the following:
      i. Change in groundwater in storage maps for each principal aquifer in the Basin.
      ii. 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.
3. A description of progress towards implementing the GSP, including achieving interim milestones, and implementation of projects or management actions since the previous annual report (California Code of Regulations [CCR] § 356.2).

7.4 5-Year GSP Evaluation and Update

The EMA GSA will evaluate its GSP at least every 5 years and whenever the GSP is amended and provide a written assessment to DWR. The assessment will describe whether the GSP implementation, including implementation of projects and management actions, are meeting the sustainability goal in the EMA, and will include the following:

1. A description of current groundwater conditions for each applicable sustainability indicator relative to measurable objectives, interim milestones and minimum thresholds.
2. A description of the implementation of any projects or management actions, and the effect on groundwater conditions resulting from those projects or management actions.
3. Elements of the GSP, including the Basin setting, management areas, or the identification of undesirable results and the setting of minimum thresholds and measurable objectives, will be reconsidered and revisions proposed, if necessary.
4. 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 EMA GSA's evaluation shows that the Basin is experiencing overdraft conditions, the EMA GSA will include an assessment of measures to mitigate that overdraft.
5. 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 the GSP Regulations (23 CCR §§ 352.4 and 354.34(c)). The description will include the following:
    a. 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 § 354.38.
    b. If the EMA GSA identifies data gaps, the GSP will 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 GSP.
    c. The GSP will prioritize the installation of new data collection facilities and analysis of new data based on the needs of the Basin.
6. A description of significant new information that has been made available since GSP adoption or amendment, or the last 5-year assessment. The description will also include whether new information warrants changes to any aspect of the GSP, including the evaluation of the Basin setting, measurable objectives, minimum thresholds, or the criteria defining undesirable results.
7. A description of relevant actions taken by the EMA GSA, including a summary of regulations or ordinances related to the GSP.
8. Information describing any enforcement or legal actions taken by the EMA GSA in furtherance of the sustainability goal for the Basin.
9. A description of completed or proposed GSP amendments.
10. Where appropriate, a summary of coordination that occurred between multiple GSAs in a single basin, GSAs in hydrologically connected basins, and land use agencies.
11. Other information the EMA GSA deems appropriate, along with any information required by DWR to conduct a periodic review as required by California Water Code § 10733 (CCR § 356.4).

7.5 Management Action Implementation

Details of the projects and management actions identified by the EMA GSA for possible implementation are presented in Section 6. The identified projects and management actions are categorized into three groups. The management actions included in Group 1 are to be initiated within 1 year of GSP adoption by the GSA. The Group 2 management actions and Group 3 projects may be considered for implementation in the future as conditions in the Basin dictate and the effectiveness of the other management actions are assessed. It is important to note that the management actions and projects included in Groups 2 and 3 may not be necessary if the implementation of Group 1 management actions result in EMA conditions that trend toward meeting the EMA GSA sustainability goals and measurable objectives. However, the EMA GSA may determine that the implementation of Group 2 management actions and/or Group 3 projects is desirable for reasons other than reaching sustainability within the EMA and may elect to implement initiatives from either Group 2 or 3 at any time. An estimate of the planning- level costs associated with the implementation of the Group 1 and Group 2 management actions are summarized in Table 7-1. The EMA GSA will develop planning-level costs for the Group 3 project(s), along with any other potential projects and management actions that may be identified for consideration by the EMA GSA in the future.

Table 7-1. Conceptual Planning-Level Cost Estimate for Potential GSP Management Action Implementation

Activity	Planning Level Estimate[1]	
	Low	High
Address Data Gaps		
Expand Monitoring Well Network in the EMA to Increase Spatial Coverage and Well Density	$20,000	$200,000
Perform Video Surveys in Representative Wells That Currently Do Not Have Adequate Construction Records to Confirm Well Construction	$25,000	$75,000
Install Shallow Piezometers in Alamo Pintado Creek and Zanja de Cota Creek GDE Areas	$75,000	$125,000
Review/Update Water Usage Factors and Crop Acreages and Update Water Budget	$20,000	$30,000
Survey and Investigate Potential GDEs in the EMA	$20,000	$40,000
Groundwater Pumping Fee Program	$100,000	$200,000
Well Registration and Well Meter Installation Programs	$75,000	$150,000
Water Use Efficiency Programs	$50,000	$125,000
Groundwater BPA Program	$75,000	$150,000
Groundwater Extraction Credit (GEC) Marketing and Trading Program	$150,000	$200,000
Voluntary Agricultural Crop Fallowing Programs	$75,000	$150,000
TOTAL	**$685,000**	**$1,445,000**

Notes

[1] The estimates in this table are planning-level cost estimates that are subject to refinement and revision by the EMA GSA after GSP adoption.

Basin = Santa Ynez River Valley Groundwater Basin
BPA = Base Pumping Allocation
EMA = Santa Ynez River Valley Groundwater Basin – Eastern Management Area
EMA GSA = Eastern Management Area Groundwater Sustainability Agency
GDE = groundwater- dependent ecosystem
GSP = groundwater sustainability plan

7.6 EMA GSA Annual Budget Estimates

The EMA GSA will incur costs for internal management and operation of the EMA GSA, including monitoring of the condition in the EMA and GSP implementation. The associated cost estimates are still in the development stages and will depend on the management and organizational structure that the EMA GSA selects. Additional variable costs may include engineering and other consulting services, permits and fees, California Environmental Quality Act compliance, legal expenses, and other administrative costs associated with the implementation of the Group 1 management actions, along with the potential for additional costs associated with the potential future implementation of the Group 2 management actions and/or Group 3 projects. Additionally, the EMA GSA will incur costs associated with the preparation of required annual reports to DWR and the required 5-year GSP evaluation and, if necessary, updates to the GSP. An estimate of the conceptual planning-level costs for EMA GSA annual management and operation are summarized in Table 7-2.

Table 7-2. Conceptual Planning-Level Cost Estimate for EMA GSA Annual Management and Operation

Activity	Planning Level Estimate[1]	
	Low	High
EMA GSA Staffing	$120,000	$200,000
Consulting Services	$75,000	$100,000
Public Outreach	$15,000	$30,000
Basin Monitoring[2]	$50,000	$75,000
Legal	$20,000	$50,000
Insurance	$4,500	$7,500
Audit / Accounting	$7,500	$15,000
Miscellaneous Expenses	$10,000	$15,000
GSP Annual Reporting	$65,000	$95,000
TOTAL	**$367,000**	**$425,500**

Notes
[1] The estimates in this table are planning-level cost estimates that are subject to refinement and revision by the EMA GSA after GSP adoption.
[2] Responsibility for executing the Basin monitoring program has not been established.
Basin = Santa Ynez River Valley Groundwater Basin
EMA = Santa Ynez River Valley Groundwater Basin – Eastern Management Area
EMA GSA = Eastern Management Area Groundwater Sustainability Agency
GSA = Groundwater Sustainability Agency
GSP = groundwater sustainability plan

7.7 Funding Sources

A Groundwater Pumping Fee Program is included as a Group 1 management action in this GSP. As described in Section 6.4, the EMA GSA may consider measures to fund GSP implementation using a combination of groundwater extraction charges, including monthly fixed charges and variable pumping fees, assessments/parcel taxes, parcel fees, and grants. Because of constitutional limitations imposed through California Propositions 13, 218, and 26, there are strict rules about what constitutes a fee, charge, assessment, or tax. Santa Barbara County Water Agency and grants from DWR have funded the majority of the EMA GSP costs to date and it is expected that grants available from general obligation bonds, such as Proposition 68, may be available to help fund GSP implementation.

Regarding potential funding opportunities, the DWR has issued a Proposal Solicitation Package (PSP) for the implementation of GSPs. Funding for the program will be from the Sustainable Groundwater Management Grant Program Implementation Grants using funds authorized by the California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access for All Act of 2018 (Proposition 68). These funds can be used for eligible projects that address drought and groundwater challenges to achieve regional sustainability for investments in groundwater recharge projects with surface water, stormwater, recycled water, and other conjunctive use projects. Eligible projects include those activities associated with the implementation of an adopted GSP or approved alternative and must also be listed within an adopted GSP or approved alternative. The Round 2 grant solicitation will provide approximately $77 million for medium- and high-priority (including critically over-drafted) basins.

- At least $62 million for medium- and high-priority basins that meet the eligibility requirements outlined in the 2019 Guidelines and those in Section III of the PSP.
- At least $15 million for projects that solely benefit and are located within an Underrepresented Community, address the needs of those communities as outlined in the 2020 Disadvantaged Community Initiative Statewide Needs Assessment Report, have a minimum of five letters of support from the community, and meet the requirements outlined within the Public Resources Code § 80146(a).

Only one application will be accepted per basin. Applicants who apply on behalf of a GSA(s) are required to obtain and submit a letter of support from each GSA they represent. The tentative schedule is for the Round 2 Grants Solicitation to open in spring 2022 with grant awards to be announced in fall 2022. The minimum grant amount is $2 million per basin and the maximum grant amount is $5 million per basin. A minimum match of 25 percent of the project cost as local cost share is required. Eligible project expenses must be incurred after January 31, 2022.

Additionally, on May 14, 2021, Governor Newsom rolled out his California Comeback Plan marking unprecedented and notable one-time funding investments. This comes after a year of unprecedented moments from a global pandemic, record-breaking wildfires, and increased momentum to build equity across multiple segments of society. Of particular interest to the EMA GSA is potential funding from Assembly Bill 350, a bill to create a 3-year grant program to assist farmers and ranchers in critically over-drafted basins with conservation management planning. As part of this measure, the Governor is proposing $300 million in funds for implementation and planning of the SGMA.

After GSP adoption, the EMA GSA may perform a preliminary financing plan options evaluation to determine a funding structure to fund the proposed EMA GSA activities and expected financial commitments throughout GSP implementation. Development of the funding mechanism(s) is critical to facilitate successful implementation of the GSP consistent with the requirements of SGMA. A key success factor is preparing a cost allocation that is equitable to EMA GSA members and stakeholders. After the evaluation of financing plan options, a preliminary financing model may be developed to determine revenue required to fund the operating plan, reserve balances, and to evaluate required adjustments to the fee structure over time.

APPENDIX A

Agreements Establishing the Santa Ynez River Valley Groundwater Basin Eastern Management Area Groundwater Sustainability Agency

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SANTA YNEZ RIVER VALLEY BASIN
EASTERN MANAGEMENT AREA
GROUNDWATER SUSTAINABILITY AGENCY

CITY OF SOLVANG,
SANTA YNEZ RIVER WATER CONSERVATION DISTRICT, IMPROVEMENT DISTRICT NO. 1,
SANTA BARBARA COUNTY WATER AGENCY, AND
SANTA YNEZ RIVER WATER CONSERVATION DISTRICT

May 1, 2017

Mr. Mark Nordberg, GSA Project Manager
Sustainable Groundwater Management Section
California Department of Water Resources
P.O. Box 942836
Sacramento, CA 94236-0001

Re: Notice of Decision to Become a Groundwater Sustainability Agency - Santa Ynez River Valley Basin, Eastern Management Area

Dear Mr. Nordberg:

Per Section §10723.8(a) of the California Water Code, the Santa Ynez River Water Conservation District (SYRWCD), the City of Solvang (City), the Santa Ynez River Water Conservation District-Improvement District No. 1 (ID No. 1) and the Santa Barbara County Water Agency (County Water Agency) hereby give notice of their decision to form the Eastern Management Area Groundwater Sustainability Agency (GSA) for the Eastern Portion of the Santa Ynez River Valley Basin (Basin Number 3-015, DWR Bulletin 118), which includes the Santa Ynez Uplands and all reaches of the Santa Ynez River within the Eastern Portion of the Santa Ynez River Valley Basin. However, it should be noted that under the Sustainable Groundwater Management Act (SGMA), surface waters are exempt from SGMA.

SGMA, passed in 2014, requires that all basins designated as high- or medium-priority are to be managed under a groundwater sustainability plan (GSP) or coordinated GSPs (Section §10720.7). The California Department of Water Resources (DWR) designated the Santa Ynez River Valley Basin (the Basin) as a medium-priority basin not in overdraft.

Water Code §10723.8(a)(1) requires that this GSA notification include information regarding the service area boundaries of the GSA, local public agencies and the boundaries of the basin the GSA intends to manage. Exhibit 1 includes three figures to satisfy those requirements. In lieu of attaching the Exhibits to this document, all Exhibits were uploaded to the appropriate section of the DWR SGMA Portal, as required.

Exhibit 1, Figure 1 shows the Santa Ynez River Valley Basin identifying three portions within the basin as described in DWR Bulletin 118. Figure 2 shows the three management areas and service area boundaries of all local public agencies within the Santa Ynez River Valley Basin. Figure 3 shows the boundary of the Eastern Management Area GSA. The digital GIS data corresponding to the three figures in Exhibit 1 is included with this submittal.

The Eastern Portion will consist of the Eastern Management Area GSA (EMA GSA). The agencies that will be part of the EMA GSA include the City, ID No. 1, the County Water Agency, and the SYRWCD, herein referred to as the "EMA Agencies". The EMA Agencies are the only public agencies in the EMA GSA, as defined by SGMA, eligible to form a GSA. The EMA GSA will be a non-overlapping, multi-agency GSA with boundaries that follow the entire Eastern Portion of the Santa Ynez River Valley Basin as defined by the 2016 version of DWR Bulletin 118. The EMA Agencies agreed to form a GSA under a Memorandum of Agreement (MOA) as discussed below.

Public hearings (Water Code §10723 (b)) on the EMA GSA formation were held on February 16, 2017, April 11, 2017, April 18, 2017, April 24, 2017 and April 27, 2017. The public hearings on February 16, 2017 and April 27, 2017 were jointly held by all the EMA Agencies. A copy of the public notice for the April 27, 2017 public hearing is provided in Exhibit 2.

On April 24, 2017, the Solvang City Council passed Resolution 17-1012 wherein the City resolved to become a member of the EMA GSA in cooperation with the other EMA Agencies. On April 11,2017, the Santa Barbara County Board of Supervisors serving as the Santa Barbara County Water Agency Directors passed Resolution 17-78 wherein the County Water Agency resolved to become a member of the EMA GSA in cooperation with the other EMA Agencies. On April 18, 2017, ID No. 1 passed Resolution 766, wherein the ID No. 1 resolved to become a member of the EMA GSA in cooperation with the other EMA Agencies. On April 27, 2017, the Board of Directors for the SYRWCD passed Resolution 667 wherein the SYRWCD resolved to become a member of the EMA GSA in cooperation with the other EMA Agencies. Exhibit 3 contains a copy of each approved resolution to form the Santa Ynez River Basin EMA GSA by each EMA Agency.

The MOA between the City, ID No. 1, SYRWCD and the County Water Agency to form the Santa Ynez River Basin EMA GSA is provided as Exhibit 4.

Water Code §10723.8(a)(1) also requires information regarding other agencies managing or proposing to manage groundwater within the basin. The Santa Ynez River Valley Basin is divided into three portions by DWR as shown on Figure 1 in Exhibit 1. In addition to the EMA GSA, there will be two other GSAs formed in the Santa Ynez River Valley Basin (for a total of three GSAs), including the Central Management Area and the Western Management Area. The three GSAs will lie contiguously from west to east across the Santa Ynez River Valley Basin with no over-lapping boundaries. All areas of the Basin are included in one of the three GSAs.

The Central portion of the Basin will consist of the Central Management Area GSA. The agencies, as defined by the Act that will be part of the Central Management GSA include the SYRWCD, the City of Buellton and the County Water Agency. A public hearing on the Central Management GSA formation was held on November 8, 2016 at the Buellton City Council Chambers. The public hearing was jointly held by the three agencies forming the GSA. DWR was notified of the intent to form the Central Management Area GSA on February 2, 2017. The Central Management Area GSA is expected to be the exclusive GSA on May 10, 2017.

The Western Portion of the Basin will consist of the Western Management Area GSA. The agencies, as defined by the Act include the SYRWCD, the City of Lompoc, the Vandenberg Village Community Services District, the Mission Hills Community Services District and the County Water Agency. A public hearing on the Western Management Area GSA formation was held on November 17, 2016 at the Lompoc City Council Chambers. The public hearing was jointly held by the Western Management Area agencies. DWR was notified of the intent to form the Western Management Area GSA on February 2, 2017. The Western Management Area GSA is expected to be the exclusive GSA on May 10, 2017.

Per California Water Code §10723.2, GSAs shall consider the interests of all beneficial uses and users of groundwater within their service area, as well as GSA members who are responsible for implementing GSPs. A list summarizing the Users and Uses of Groundwater in the EMA is provided as Exhibit 5. The list was developed pursuant to Water Code §10723.2 and describes how these users and uses will be considered during the development and operation of the GSA GSP for the EMA. Included as Exhibit 6 is a letter of intent to participate in the GSA by the Santa Ynez Band of Chumash Indians. If additional interested parties are discovered, they will be included in the development and operation of the GSA and the development and implementation of the agency's sustainability plan (Water Code §10723.8(a)(4)).

Water Code §10723.4 states that a GSA shall also 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. The EMA GSA will establish and maintain such a list of persons interested in receiving notices.

Except for the authorities granted to a GSA pursuant to Part 2.74 of Division 6 of the California Water Code (SGMA) and the MOA itself providing for the rights and duties of the parties, no bylaws, ordinances, or authorities have been adopted by the District, City, ID No. 1 or County Water Agency relating to the Santa Ynez River Valley Basin EMA GSA (Water Code §10723.8(a)(3)).

The undersigned hereby represents that the information required by the California Water Code §10728.3 is included within this notice and that the notification process is complete.

If you have any further questions or require any clarification regarding the information provided in this GSA Notification submittal, please do not hesitate to contact Mr. Bill Buelow at 805-693-1156 or by email at bbuelow@syrwcd.com. Mr. Buelow will be the primary point of contact for the EMA GSA.

Sincerely,

Bruce A. Wales
General Manager
Santa Ynez River Water Conservation District

cc: Chris Dahlstrom, ID No. 1
Matt Van der Linden, City of Solvang
Matt Young, Santa Barbara County Water Agency
Tim Ross, DWR Southern Regional Office
Brian Monese, DWR Southern Regional Office
Anita Regmi, DWR Southern Regional Office
Chris Petersen, GEI Consultants

Exhibits Submitted to the SGMA Portal:

Exhibit 1 – Figures
- Figure 1 – Santa Ynez River Valley Groundwater Basin Management Areas
- Figure 2 – Santa Ynez River Valley Groundwater Basin Management Areas and Local Jurisdictions
- Figure 3 – Santa Ynez River Valley Groundwater Basin EMA GSA

Exhibit 2 – Copies of Notices for Public Hearing on February 16, 2017
Exhibit 3 – Copies of Approved Resolutions Forming the EMA GSA
Exhibit 4 – Signed Copy of Memorandum of Agreement to form the EMA GSA
Exhibit 5 – List of Uses and Users of Groundwater in the EMA GSA
Exhibit 6 – Letters of Intent to Participate in the EMA GSA

RESOLUTION NO. 667

RESOLUTION OF THE BOARD OF DIRECTORS OF THE SANTA YNEZ RIVER WATER CONSERVATION DISTRICT DECIDING TO BECOME A GROUNDWATER SUSTAINABILITY AGENCY PURSUANT TO THE SUSTAINABLE GROUNDWATER MANAGEMENT ACT FOR THE EASTERN MANAGEMENT AREA

WHEREAS, the California legislature passed a statewide framework for sustainable groundwater management, known as the Sustainable Groundwater Management Act (California Water Code § 10720 et seq.) as amended, which became effective January 1, 2015; and

WHEREAS, pursuant to the Sustainable Groundwater Management Act, sustainable groundwater management is intended to occur pursuant to Groundwater Sustainability Plans that are created and adopted by local Groundwater Sustainability Agencies; and

WHEREAS, Bulletin 118 describes the Santa Ynez River Valley Groundwater Basin (Basin) in three portions: eastern, central, and western; the western portion consists of the Lompoc Plain, Lompoc Terrace, and Lompoc Uplands; the central portion is the Buellton Uplands, and the eastern portion is the Santa Ynez Uplands; for purposes of administering its groundwater usage program and other water management functions, the Santa Ynez River Water Conservation District (District) also generally recognizes these hydrogeologic units; for the purpose of implementing SGMA, each portion of the Basin as described by DWR and recognized by the District, is designated as a corresponding groundwater "Management Area" as defined by the Act; this Resolution concerns the Eastern portion of the Basin, known as the "Eastern Management Area"; and

WHEREAS, pursuant to California Water Code §10723(a), a Local Agency or combination of Local Agencies, as defined in California Water Code §10721(n), may decide to become or form a Groundwater Sustainably Agency; and

WHEREAS, Santa Ynez River Water Conservation District (District) is a California Water Conservation District formed and operating pursuant to and in accordance with Division 21 of the California Water Code (commencing with Water Code §74000), manages water and has water management powers, and overlies approximately thirty-five percent of the Eastern Management Area, and is therefore a "Local Agency" as defined within California Water Code 10721 (n); and

WHEREAS, the City of Solvang (City) overlies a portion of the Eastern Management Area, has a water supply, manages water and has land-use responsibilities, and is therefore a "Local Agency" as defined by California Water Code §10721 (n); and

WHEREAS, the Santa Ynez River Water Conservation District, Improvement District Number 1 (ID No. 1) overlies a portion of the Eastern Management area, has a water supply, manages water and is therefore a "Local Agency as defined by California Water Code §10721 (n); and

WHEREAS, the Santa Barbara County Water Agency (County Water Agency) overlies the Eastern Management Area including sixty-five percent not overlain by the District and the Santa Barbara County Planning and Development Department has land use responsibilities. The County Water Agency is therefore a "Local Agency" as defined by the California Water Code 10721 (n); and

WHEREAS, the District, City, ID No. 1 and County Water Agency (EMA Agencies) collectively include all of the lands within the Eastern Management Area of the Basin; and

WHEREAS, the District desires to form a Groundwater Sustainability Agency in conjunction with the other EMA Agencies, and which may include at a later time other Local Agencies and other legally authorized entities and

WHEREAS, the District in conjunction with the other EMA Agencies held public hearings on February 16, 2017 and April 27, 2017; and

WHEREAS, at the public hearings, the Santa Ynez River Water Conservation District considered oral and written comments to the extent provided by the public; and

WHEREAS, it would be in the best interests of the District to form a Groundwater Sustainability Agency, in conjunction with the other EMA Agencies.

NOW, THEREFORE, BE IT RESOLVED AS FOLLOWS: that the Board of Directors of the Santa Ynez River Water Conservation District declares and directs as follows:

1. That the foregoing is true and correct.

2. That Santa Ynez River Water Conservation District herein decides to form a Groundwater Sustainability Agency in conjunction with the City, ID No. 1 and County Water Agency, known as the Santa Ynez River Valley Basin, Eastern Management Area Groundwater Sustainability Agency (EMA GSA), and which shall have all the powers granted to a groundwater sustainability agency pursuant to the Sustainable Groundwater Management Act.

3. That on April 11, 2017, the Santa Barbara County Board of Supervisors made a resolution to join the EMA GSA in conjunction with the other EMA Agencies; on April 18, 2017, the ID No. 1 Board of Directors made a resolution to join the EMA GSA in conjunction with the other EMA Agencies; on April 24, 2017, the City of Solvang City Council made a resolution to join the EMA GSA in conjunction with the other EMA Agencies.

4. That the portion of the groundwater basin that the herein formed Agency shall manage shall be that portion of the basin as depicted in the notification provided to the Department of Water Resources as the EMA, pursuant to California Water Code 10723.8, and which boundary may be modified from time to time.

5. That the Agency hereby created shall consider the interests of all beneficial uses and

users of groundwater, as well as those responsible for implementing groundwater sustainability plans, as required by California Water Code section §10723.2.

6. That the Agency hereby created 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, as required by California Water Code section §10723.4.

7. That the General Manager of Santa Ynez River Water Conservation District shall be authorized to execute a memorandum of agreement or other legal agreement(s) with the City, ID No. 1 and the County Water Agency, and cause notice to be given to the California Department of Water Resources of the decision of District in conjunction with the City, ID No. 1 and County Water Agency to create the above referenced EMA GSA.

WE, THE UNDERSIGNED, being the duly qualified and acting President and Secretary, respectively, of the Board of Directors of the Santa Ynez River Water Conservation District, County of Santa Barbara, California, do hereby certify that the above and foregoing resolution was duly and regularly adopted and passed by the Board of Directors of said Water Conservation District at a special meeting duly held on the 27th day of April 2017 by the following roll call vote:

AYES, and in favor thereof, Directors: Cynthia Allen
Larry Flinkingshelt
Art Hibbits
Brett Marymee

NOES, Directors:

ABSENT/ABSTAINING, Directors: Steve Jordan

Cynthia Allen, President

Bruce A. Wales, Secretary

RESOLUTION NO. 766

A RESOLUTION OF THE BOARD OF TRUSTEES OF THE SANTA YNEZ RIVER WATER CONSERVATION DISTRICT, IMPROVEMENT DISTRICT NO. 1 APPROVING THE MEMORANDUM OF AGREEMENT TO BECOME A GROUNDWATER SUSTAINABILITY AGENCY PURSUANT TO THE SUSTAINABLE GROUNDWATER MANAGEMENT ACT FOR THE EASTERN MANAGEMENT AREA

WHEREAS, the California legislature passed a statewide framework for sustainable groundwater management, known as the Sustainable Groundwater Management Act (California Water Code § 10720 et seq.) as amended, which became effective January 1, 2015

WHEREAS, pursuant to the Sustainable Groundwater Management Act (SGMA), sustainable groundwater management is intended to occur pursuant to Groundwater Sustainability Plans (GSP) that are created and adopted by local Groundwater Sustainability Agencies (GSA); and

WHEREAS, the California Department of Water Resources (DWR) Bulletin 118 describes the Santa Ynez River Valley Groundwater Basin (Basin) in three portions: eastern, central, and western; the western portion consists of the Lompoc Plain, Lompoc Terrace, and Lompoc Uplands; the central portion is the Buellton Uplands, and the eastern portion is the Santa Ynez Uplands; for purposes of administering its groundwater usage program and other water management functions, the Santa Ynez River Water Conservation District (SYRWCD) also generally recognizes these hydrogeologic units; for the purpose of implementing SGMA, each portion of the Basin as described by DWR is designated as a corresponding groundwater "Management Area" as defined by the Act, this Resolution concerns the Eastern portion of the Basin, known as the "Eastern Management Area";

WHEREAS, pursuant to California Water Code §10723(a), a Local Agency or combination of Local Agencies, as defined in California Water Code §10721(n), may decide to become or form a Groundwater Sustainably Agency; and

WHEREAS, the Santa Ynez River Water Conservation District, Improvement District No.1 ("ID No.1") was formed in 1959 and operating under California Water Code §74000 and §75000, overlies a portion of the Eastern Management Area, has a groundwater supply, manages groundwater, and retains authority within its service area boundaries to produce water and provide service among other powers, and is therefore a "Local Agency" as defined by California Water Code §10721 (n); and

WHEREAS, Santa Ynez River Water Conservation District (SYRWCD) is a California Water Conservation District formed and operating pursuant to an in accordance with Division 21 of the California Water Code (commencing with Water Code §74000) and overlies 35 percent of the Eastern Management Area, manages water and has water management powers and is therefore a "Local Agency" as defined within California Water Code §10721(n); a n d

WHEREAS, the City of Solvang overlies a portion of the Eastern Management Area, has a water supply, manages water and has land-use responsibilities, and is therefore a "Local Agency" as defined by California Water Code §10721 (n); and

WHEREAS, the Santa Barbara County Water Agency (County Water Agency) overlies the Eastern Management Area including sixty-five percent of the total area not overlain by the SYRWCD. The County Water Agency is therefore a "Local Agency" as defined by the California Water Code §10721(n); and

WHEREAS, ID No.1, SYRWCD, City of Solvang and County Water Agency, collectively represent all of the lands within the Eastern Management Area of the Basin; and

WHEREAS, ID No.1 desires to form a Groundwater Sustainability Agency in conjunction with the SYRWCD, City of Solvang, and County Water Agency, and which may include at a later time other Local Agencies and other legally authorized entities; and,

WHEREAS, on March 30 and April 6, 2017, a Notice of Public Hearing was duly published pursuant to California Government Code section §6066 in the general circulation newspaper, posted at the public office, and provided on the website for ID No.1 to consider becoming a groundwater sustainability agency in the EMA at a hearing on April 18, 2017 such hearing conducted in accordance with California Water Code section §10723(b); and,

WHEREAS, at the public hearing, verbal and written comments to the extent provided by the public were considered; and

WHEREAS, it would be in the best interests of ID No.1 to form a Groundwater Sustainability Agency, in conjunction with the SYRWCD, City of Solvang, and County Water Agency.

NOW, THEREFORE, BE IT RESOLVED that the Board of Trustees of the Santa Ynez River Water Conservation District, Improvement District No.1 authorizes and approves as follows:

1. The Memorandum of Agreement for the formation a Groundwater Sustainability Agency in conjunction with the SYRWCD, City of Solvang, and County Water Agency, known as the Eastern Management Area Groundwater Sustainability Agency (Agency); and,

2. The portion of the groundwater basin that the Agency hereby created to manage shall be that portion of the basin as depicted in the notification provided to the Department of Water Resources as the Eastern Management Area, pursuant to California Water Code §10723.8, and which boundary may be modified from time to time; and,

3. The General Manager as the representative of the Santa Ynez River Water Conservation District, Improvement District No.1 to execute a Memorandum of Agreement with the SYRWCD, City of Solvang, and County Water Agency, and cause notice to be given to the California Department of Water Resources of the decision of the Santa Ynez River Water Conservation District, Improvement District No.1 in conjunction with the SYRWCD, City of Solvang, and County Water Agency to create the above referenced Groundwater Sustainability Agency.

4. This Resolution shall take effect immediately.

WE, THE UNDERSIGNED, being duly qualified and President and Secretary, respectively, of the Board of Trustees of the Santa Ynez River Water Conservation District, Improvement District No. 1, do hereby certify that the above and foregoing Resolution was duly and regularly adopted and passed by the Board of Trustees of said District at a regular meeting held on April 18, 2017 by the following roll call vote:

AYES, Trustees:	Harlan Burchardi Jeff Clay Michael Burchardi Brad Joos Kevin Walsh
NOES, Trustees:	None
ABSENT, Trustees:	None

Kevin Walsh

Kevin Walsh, President

ATTEST:

Mary Martone

Mary Martone, Secretary

County of Santa Barbara
BOARD OF SUPERVISORS
Minute Order

April 11, 2017

Present: 5 - Supervisor Williams, Supervisor Wolf, Supervisor Hartmann, Supervisor Adam, and Supervisor Lavagnino

PUBLIC WORKS, BOARD OF DIRECTORS, WATER AGENCY   File Reference No. 17-00274

RE: HEARING - Consider recommendations regarding Santa Ynez River Valley Groundwater Basin Groundwater Sustainability Agency Formation, Third and Fifth Districts, as follows: (EST. TIME: 1 HR.)

Acting as the Board of Directors, Water Agency:

a) Approve and authorize the Chair to execute the "Memorandum of Agreement for the Formation of a Groundwater Sustainability Agency for the Eastern Management Area in the Santa Ynez River Valley Groundwater Basin under the Sustainable Groundwater Management Act" to form a Groundwater Sustainability Agency in the Santa Ynez Valley Groundwater Basin Eastern Management Area;

b) Adopt the Resolution entitled "Resolution to Participate in the Formation of a Groundwater Sustainability Agency Pursuant to the Sustainable Groundwater Management Act for the Eastern Management Area for the Santa Ynez Valley Groundwater Basin"; and

c) Determine that the proposed actions are not a project under the California Environmental Quality Act, pursuant to Guidelines Section 15378(b) (5), organization or administrative activities that will not result in a direct or indirect physical change in the environment.

COUNTY EXECUTIVE OFFICER'S RECOMMENDATION: APPROVE

Received and filed staff presentation and conducted public hearing.

A motion was made by Supervisor Williams, seconded by Supervisor Adam, that this matter be acted on as follows:

a) Approved and authorized; Chair to execute;

b) Adopted.

RESOLUTION NO. 17-78

c) Approved.

The motion carried by the following vote:

Ayes: 5 - Supervisor Williams, Supervisor Wolf, Supervisor Hartmann, Supervisor Adam, and Supervisor Lavagnino

RESOLUTION OF THE
BOARD OF DIRECTORS OF THE SANTA BARBARA COUNTY WATER AGENCY
STATE OF CALIFORNIA

RESOLUTION TO PARTICIPATE IN THE FORMATION OF A GROUNDWATER SUSTAINABILITY AGENCY PURSUANT TO THE SUSTAINABLE GROUNDWATER MANAGEMENT ACT FOR THE EASTERN MANAGEMENT AREA OF THE SANTA YNEZ RIVER VALLEY GROUNDWATER BASIN	**RESOLUTION NO.** 17-78

WHEREAS, the California legislature passed a statewide framework for sustainable groundwater management, known as the Sustainable Groundwater Management Act (California Water Code § 10720 *et seq.*) as amended, which became effective January 1, 2015; and

WHEREAS, pursuant to the Sustainable Groundwater Management Act (SGMA), sustainable groundwater management is intended to occur pursuant to Groundwater Sustainability Plans (GSP) that are created and adopted by local Groundwater Sustainability Agencies (GSA); and

WHEREAS, the California Department of Water Resources (DWR) Bulletin 118 describes the Santa Ynez River Valley Groundwater Basin (Basin) in three portions: eastern, central, and western; the western portion consists of the Lompoc Plain, Lompoc Terrace, and Lompoc Uplands; the central portion is the Buellton Uplands, and the eastern portion is the Santa Ynez Uplands; for the purpose of implementing SGMA, each portion of the Basin as described by DWR is designated as a corresponding groundwater "Management Area" as defined by the Act, this Resolution concerns the Eastern portion of the Basin, known as the "Eastern Management Area";

WHEREAS, pursuant to Water Code §10723(a), a Local Agency or combination of Local Agencies, as defined in Water Code §10721(n), may decide to become or form a Groundwater Sustainably Agency; and

WHEREAS, the Santa Barbara County Water Agency (County Water Agency) overlies the Eastern Management Area and is a "Local Agency" as defined in Water Code §10721(n) ; and

WHEREAS, the County Water Agency, the Santa Ynez River Water Conservation District, the Santa Ynez River Water Conservation District Improvement District No. 1, and the City of Solvang are "Local Agencies" as defined in Water Code §10721(n), and collectively include all of the lands within the Eastern Management Area of the Basin; and

WHEREAS, the Santa Barbara County Water Agency desires to form a Groundwater Sustainability Agency in conjunction with the Santa Ynez River Water Conservation District, the Santa Ynez River Water Conservation District Improvement District No. 1, and the City of Solvang, and which may include at a later time other Local Agencies and other legally authorized entities; and

WHEREAS, the County Water Agency in conjunction with the Santa Ynez River Water Conservation District, the Santa Ynez River Water Conservation District Improvement District No. 1, and the City of Solvang, held a public hearing on February 16, 2017 pursuant to Water Code §10723(b), after publication of notice of such hearing pursuant to California Government Code §6066; and

WHEREAS, at the public hearing, the County Water Agency, the Santa Ynez River Water Conservation District, the Santa Ynez River Water Conservation District Improvement District No. 1, and the City of Solvang, considered oral and written comments provided by the public; and

WHEREAS, it would be in the best interests of the County Water Agency to form a Groundwater Sustainability Agency, in conjunction with the Santa Ynez River Water Conservation District, the Santa Ynez River Water Conservation District Improvement District No. 1, and the City of Solvang.

NOW, THEREFORE, BE IT RESOLVED AS FOLLOWS: that the Board of Directors of the Santa Barbara County Water Agency declares and directs as follows:

1. That the foregoing recitals are true and correct.

2. That the Board of Directors of the Santa Barbara County Water Agency herein decides to form a Groundwater Sustainability Agency in conjunction with the Santa Ynez River Water Conservation District, the Santa Ynez River Water Conservation District Improvement District No. 1, and the City of Solvang, known as the Eastern Management Area Groundwater Sustainability Agency (Agency), and which shall have all the powers granted to a groundwater sustainability agency pursuant to the Sustainable Groundwater Management Act.

3. That the portion of the groundwater basin that the Agency hereby created shall manage shall be that portion of the basin as depicted in the notification provided to the Department of Water Resources as the Eastern Management Area, pursuant to California Water Code 10723.8, and which boundary may be modified from time to time.

4. That the Agency hereby created shall consider the interests of all beneficial uses and users of groundwater, as well as those responsible for implementing groundwater sustainability plans, as required by California Water Code §10723.2.

5. That the Agency hereby created 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, as required by California Water Code §10723.4.

6. That the Chair of the Board of Directors of the Santa Barbara County Water Agency shall be authorized to execute a Memorandum of Agreement with the Santa Ynez River Water Conservation District, the Santa Ynez River Water Conservation District Improvement District No. 1, and the City of Solvang, and cause notice to be given to the California Department of Water Resources of the decision of the Board of Directors of the Santa Barbara County Water Agency in conjunction with the Santa Ynez River Water Conservation District, the Santa Ynez River Water Conservation District Improvement District No. 1, and the City of Solvang to create the above referenced Groundwater Sustainability Agency.

PASSED, APPROVED, AND ADOPTED by the Board of Directors of the Santa Barbara County Water Agency, State of California, on this 11th day of April, 2017 by the following vote:

AYES: Supervisors Williams, Wolf, Hartmann, Adam, and Lavagnino

NAYS: None

ABSENT: None

ABSTAIN: None

ATTEST:
MONA MIYASATO,
COUNTY EXECUTIVE OFFICER
Ex Officio Clerk of the Board Directors
of the Santa Barbara County Water Agency

By: [signature]
Deputy

ACCEPTED AND AGREED:
SANTA BARBARA COUNTY WATER AGENCY

By: [signature]
Joan Hartmann, Chair, Board of Directors

APPROVED AS TO FORM:
MICHAEL C. GHIZZONI
COUNTY COUNSEL

By: [signature]
Deputy

RESOLUTION NO. 17-1012

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SOLVANG ENTERING INTO A MEMORANDUM OF AGREEMENT FOR FORMATION OF A GROUNDWATER SUSTAINABILITY AGENCY FOR THE EASTERN MANAGEMENT AREA IN THE SANTA YNEZ RIVER VALLEY GROUNDWATER BASIN UNDER THE SUSTAINABLE GROUNDWATER MANAGEMENT ACT

WHEREAS, the California legislature passed a statewide framework for sustainable groundwater management, known as the Sustainable Groundwater Management Act (California Water Code § 10720 et seq.) as amended, which became effective January 1, 2015; and

WHEREAS, pursuant to the Sustainable Groundwater Management Act (SGMA), sustainable groundwater management is intended to occur pursuant to Groundwater Sustainability Plans (GSP) that are created and adopted by local Groundwater Sustainability Agencies (GSA); and

WHEREAS, the California Department of Water Resources (DWR) Bulletin 118 describes the Santa Ynez River Valley Groundwater Basin (Basin) in three portions: eastern, central, and western; the western portion consists of the Lompoc Plain, Lompoc Terrace, and Lompoc Uplands; the central portion is the Buellton Uplands, and the eastern portion is the Santa Ynez Uplands; for purposes of administering its groundwater usage program and other water management functions, the Santa Ynez River Water Conservation District (District) also generally recognizes these hydrogeologic units; for the purpose of implementing SGMA, each portion of the Basin as described by DWR is designated as a corresponding groundwater "Management Area" as defined by the Act, this Resolution concerns the Eastern portion of the Basin, known as the "Eastern Management Area"; and

WHEREAS, pursuant to California Water Code §10723(a), a Local Agency or combination of Local Agencies, as defined in California Water Code §10721(n), may decide to become or form a Groundwater Sustainably Agency; and

WHEREAS, the City of Solvang overlies a portion of the Eastern Management Area, has a water supply, manages water and has land-use responsibilities, and is therefore a "Local Agency" as defined by California Water Code §10721 (n); and

WHEREAS, the Santa Ynez Water Conservation District, Improvement District No. 1 (ID No. 1) overlies a portion of the Eastern Management Area, has a water supply, manages water and has land-use responsibilities, and is therefore a "Local Agency" as defined by California Water Code §10721 (n); and

WHEREAS, Santa Ynez River Water Conservation District (SYRWCD) is a California Water Conservation District formed and operating pursuant to an in accordance with Division 21 of the California Water Code (commencing with Water Code §74000) and overlies 35 percent of the Eastern Management Area, manages water and has water management powers and is therefore a "Local Agency" as defined within California Water Code 10721 (n); and

WHEREAS, the Santa Barbara County Water Agency (County Water Agency) overlies the Eastern Management Area including sixty-five percent of the total area not overlain by the District. The County Water Agency is therefore a "Local Agency" as defined by the California Water Code 10721 (n); and

WHEREAS, the City of Solvang, the ID No. 1, the County Water Agency, and the SYRWCD collectively include all of the lands within the Eastern Management Area of the Basin; and

WHEREAS, the City of Solvang desires to form a Groundwater Sustainability Agency in conjunction with the ID No. 1, the County Water Agency, and the SYRWCD, and which may include at a later time other Local Agencies and other legally authorized entities; and

WHEREAS, the City of Solvang in conjunction with, the SYRWCD, the City, the County Water Agency and ID No. 1 held a public hearing on **April 24, 2017** pursuant to California Water Code section §10723(b), after publication of notice of such hearing pursuant to California Government Code section §6066; and

WHEREAS, at the public hearing, the SYRWCD, the City, the County Water Agency and ID No. 1, considered oral and written comments to the extent provided by the public; and

WHEREAS, it would be in the best interests of the City of Solvang to form a Groundwater Sustainability Agency, in conjunction with the ID No. 1, the County Water Agency, and the SYRWCD.

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Solvang declares and directs as follows:

1. That the City of Solvang herein decides to form a Groundwater Sustainability Agency in conjunction with the ID No. 1, the County Water Agency, and the SYRWCD, known as the Eastern Management Area Groundwater Sustainability Agency (Agency), and which shall have all the powers granted to a groundwater sustainability agency pursuant to the Sustainable Groundwater Management Act.

2. That the portion of the groundwater basin that the Agency hereby created shall manage shall be that portion of the basin as depicted in the notification provided to the Department of Water Resources as the Eastern Management Area, pursuant to California Water Code 10723.8, and which boundary may be modified from time to time.

3. That the Agency hereby created shall consider the interests of all beneficial uses and users of groundwater, as well as those responsible for implementing groundwater sustainability plans, as required by California Water Code section §10723.2.

4. That the Agency hereby created 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, as required by California Water Code section §10723.4.

5. That the City Manager of the City of Solvang shall be authorized to execute a Memorandum of Agreement, and cause notice to be given to the California Department of Water Resources of the decision of the City of Solvang in conjunction with the ID No. 1, the County Water Agency, and the SYRWCD to create the above referenced Groundwater Sustainability Agency.

PASSED AND ADOPTED by the City Council of the City of Solvang on this the 24th day of April 2017, by the following vote:

AYES: COUNCIL MEMBERS DUUS, JAMIESON, AND TOUSSAINT

NOES: MAYOR RICHARDSON, COUNCIL MEMBER ZIMMERMAN

ABSTAIN:

ABSENT:

Jim Richardson

Jim Richardson, Mayor

Attest:

L. Martin

Lisa S. Martin, City Clerk

MEMORANDUM OF AGREEMENT
FOR FORMATION OF A GROUNDWATER SUSTAINABILITY AGENCY FOR THE EASTERN MANAGEMENT AREA IN THE SANTA YNEZ RIVER VALLEY GROUNDWATER BASIN UNDER THE SUSTAINABLE GROUNDWATER MANAGEMENT ACT

THIS MEMORANDUM OF AGREEMENT ("MOA") is made and effective as of April 27, 2017, by and between the Parties executing the MOA below, each a "Party" and collectively the "Parties," with reference to the following facts:

A. In 2014, the State of California enacted the Sustainable Groundwater Management Act (Water Code Sections 10720 et seq.), referred to in this MOA as the "SGMA" or "Act," as subsequently amended, pursuant to which certain public agencies may become "Groundwater Sustainability Agencies" (GSA) and adopt "Groundwater Sustainability Plans" (GSP) in order to manage and regulate groundwater in underlying groundwater basins. The Act defines "basin" as a basin or sub-basin identified and defined in California Department of Water Resources (DWR) Bulletin 118. Each Party is a local public agency located within the Santa Ynez River Valley Groundwater Basin (Bulletin 118, Basin No. 3-15, "Basin") and is qualified to become a GSA and adopt a GSP under the Act for all or a portion of the Basin.

B. Bulletin 118 describes the Basin as being in three portions, that being eastern, central and western. The western portion consists of the Lompoc Plain, Lompoc Terrace and Lompoc Uplands; the central portion is the Buellton Uplands and the eastern portion is the Santa Ynez Uplands. For purposes of administrating its groundwater usage program and other water management functions, the Santa Ynez River Water Conservation District ("SYRWCD") also generally recognizes these hydrogeologic units. For the purpose of implementing SGMA, each portion of the Basin as described by DWR and recognized by the SYRWCD, is designated as a corresponding groundwater "Management Area" as defined by the Act.

C. The Parties are the agencies qualified to be a GSA under the Act for the Eastern (Santa Ynez Uplands) Management Area (EMA) of the Basin. The map attached hereto as Exhibit A designates the boundaries of the three Management Areas of the Basin.

D. A separate GSA for each Management Area is the most efficient approach to implement SGMA in the Basin. The three GSAs will be managed by an Intra-Basin Coordination Agreement, with the SYRWCD as the point of contact with DWR, pursuant to §10727.6 of the Act and California Code of Regulations, Title 23, §357.4. On May 23, 2016, the Parties, along with the other agencies qualified to be a GSA within the Basin, entered into a memorandum of understanding for implementing SGMA which recognized the three Management Areas corresponding to DWR's three portions of the Basin and outlined the process for formation of GSAs and development of GSPs for the Basin. These three Management Areas cover the entire Basin that is subject to SGMA. Attached as Exhibit B is a chart of the anticipated organization of the three GSAs.

E. The SYRWCD covers approximately 35 percent of the land area in the Eastern Management Area (EMA), including the City of Solvang, the communities of Santa Ynez, Los Olivos, and Ballard, many ranchettes (parcels are 5-20 acres in size) and larger agricultural parcels. These communities are provided water by the City of Solvang, the Santa Ynez River Water Conservation District-Improvement District Number 1 (or "ID No. 1"), mutual water companies and private wells. Estimates of pumping within the SYRWCD in the EMA vary widely over time and are attributed to in-fill development within the built-up areas and changes in agricultural practice. In general, areas of the Santa Ynez Uplands within the SYRWCD have produced 4,000 to 5,500 AF/year of water.

F. The Santa Barbara County Water Agency (County Water Agency) covers the remaining 65 percent of the EMA land area, including ranchettes and agricultural lands where water is provided by mutual water companies and private wells. Areas outside of the jurisdiction of a local public agency are called "Un-Managed Areas" and are under the jurisdiction of the County Water Agency. Estimates of pumping outside of the SYRWCD in the so called "Un-Managed Area" range from 10,000-12,000 AF/year of water, but may be higher.

G. Lake Cachuma (U.S. Bureau of Reclamation), small portions of Los Padres National Forest (U.S. Forest Service) and the Santa Ynez Band of Chumash Indians Reservation lie within the EMA. As Federal entities and Federally-Recognized Indian Tribe, these organizations are exempt from SGMA.

H. The SYRWCD, ID No. 1, the City of Solvang and the County Water Agency represent all the agencies (as defined by the Act) that are eligible to form a GSA in the EMA. The formation of the EMA GSA is supported by the following:

- The SYRWCD was formed in 1939 to protect the water rights and supplies of those within its borders, which in part encompasses the Santa Ynez Uplands;
- In 1949, the SYRWCD acquired 10.31% of the entitlement to the yield of the Cachuma project, principally to serve in its portion of the Santa Ynez Uplands. ID No. 1 was formed in 1959 for this purpose, to store and distribute such water, and subsequently assumed the rights and responsibilities associated with the entitlement;
- ID No. 1 later acquired SWRCB-issued licenses for three alluvial water-well fields downstream of the Cachuma Reservoir in the Santa Ynez River. ID No. 1 also produces water from the Santa Ynez Uplands and contracts for State Water Project (SWP) water, all in part to supplement the water supplies in the southwest corner of the Santa Ynez Uplands;
- Since 1979, the SYRWCD has registered wells, monitored groundwater production and tracked dewatered storage within its portions of the Santa Ynez Uplands;
- The City of Solvang diverts water from the Santa Ynez River and produces water from the Santa Ynez Uplands to serve in its portion of the Santa Ynez Uplands. Additionally, the City receives SWP water through an agreement with ID No. 1, most of which is used to augment the City water supply in the Uplands;
- The SYRWCD, ID No. 1 and the City of Solvang have collaboratively monitored and managed groundwater within the SYRWCD's portion of the EMA for many decades at significant expense to the respective entities. Approximately 40 percent of the groundwater pumped in the EMA is produced within the boundaries of the SYRWCD;
- The County Water Agency has collected groundwater level information and periodically produced County-wide reports describing the status of the County's groundwater resources, including the Santa Ynez Uplands. The County Water Agency's portion of the EMA has not been studied or managed to the same degree as the areas within the SYRWCD in the

EMA. Approximately 60 percent of the groundwater pumped in the EMA is produced within the County Water Agency's portion of the Uplands;

I. The Parties wish to provide a framework to form a GSA and to implement SGMA in the EMA, such that the implementation is through local control and management and is implemented effectively, efficiently, fairly and at a reasonable cost.

THEREFORE, in consideration of the mutual promises set forth below and to implement the goals described above, the Parties agree as follows:

1. Formation of the EMA GSA. The purpose of this MOA is to form a GSA for the EMA prior to June 30, 2017, and to facilitate a cooperative and ongoing working relationship between the Parties that will allow them to explore, study, evaluate, develop and implement mutually beneficial approaches and strategies for development of a GSP for the EMA. By execution of this MOA, the Parties collectively determine and elect to be the GSA for the Eastern Management Area of the Basin. It is presumed the EMA GSA will be the sole GSA for this portion of the Basin.

2. Development of the GSP. A separate GSP will be developed for each of the three Management Areas. An Intra-Basin Coordination Agreement will be incorporated into each GSP, as provided for in Section §10727.6 of the Act. The SYRWCD will coordinate the efforts of the Parties and be the point of contact with DWR, as defined by the Act, to meet and cooperatively develop the GSP for the EMA. In developing the GSP the GSA shall consider all beneficial uses and users of groundwater in the EMA, including the interests listed in Section §10723.2 of the Act.

3. GSA Committee. There is hereby established a GSA Committee for the EMA which shall be subject to the following:

a. Committee Membership. The GSA Committee will be comprised of one representative and an alternate from each Party. A quorum to hold a meeting shall be a simple majority of Parties (3 of the 4 Parties to this Agreement).

b. Voting will be weighted. The County Water Agency will have five votes, SYRWCD will have three votes, ID No. 1 will have two votes and the City of Solvang will have one vote in the EMA GSA Committee.

c. The GSA Committee may adopt resolutions, bylaws and policies to provide further details for conducting its affairs consistent with this MOA and applicable law. Meetings of the GSA Committee shall be called, noticed and conducted subject to the provisions of the Ralph M. Brown Act (Govt. Code sections 54950 et seq.).

d. All proposed actions or resolutions must be passed by a simple majority of the voting membership. Actions or resolutions to enter into a comprehensive MOA or Joint Powers Agency agreement ("JPA") and adopt or to approve the GSP must pass by a 70 percent vote (at least 8 votes needed) with the concurrence of each Party's governing body.

e. The terms of this MOA including, but not limited to, composition, voting procedures, and powers of the GSA Committee, and whether the GSA

Committee shall be replaced by a comprehensive MOA or JPA to implement the GSP, shall be negotiated, reviewed and reaffirmed or modified by the Parties no later than adoption of a GSP or January 31, 2021, whichever occurs first, as part of the process to adopt a GSP, which is due no later than January 31, 2022.

4. Powers of GSA. The GSA Committee shall develop the GSP and the Parties to this Agreement shall have all the powers that a GSA is authorized to exercise and to implement the GSP within the Party's respective boundaries, all consistent with the Act and DWR's regulations, including establishing budgets and imposing fees to fund GSA and GSP activities. The GSA Committee shall proceed in a timely fashion to develop a comprehensive MOA or JPA and GSP for the EMA, and consider the interests of all beneficial uses and users of groundwater within the EMA as prescribed by Section 10723.2 of the Act.

5. EMA GSP Hydrogeologic Study. The County Water Agency intends to fund and conduct a hydrogeologic study ("Study") to be used for the GSP in the EMA. The Study shall be conducted with a scope of work and on a schedule to comply with SGMA regulations with regard to GSPs and shall be coordinated with the GSPs developed in the Central and Western Management Areas of the Santa Ynez River Valley Groundwater Basin. As the Coordinating Agency, SYRWCD will consult with the County Water Agency and provide input on the selection of the consultant, and the scope and conduct of the Study.

6. Costs. All Parties shall bear the costs incurred with respect to activities under this MOA to participate on the GSA Committee and its proceedings and related matters. Specifically, each Party shall pay the costs for its staff to attend GSA Committee meetings and participate in GSA activities. The County Water Agency intends to fund the GSP hydrogeologic study as described in Section 5 above. Other costs associated with the development and implementation of the GSP shall be shared as agreed to by all of the Parties. All Parties may consider levying a charge pursuant to the Act, including, but not limited to, § 10726.8(b). There are several vehicles to capture costs for implementing the SGMA pursuant to §10730 et seq. of the Act.

7. Staff. Each Party shall designate a principal contact person, if other than the designated GSA Committee member, and other appropriate staff members and consultants to participate on such Party's behalf in activities undertaken pursuant to this MOA. The SYRWCD shall be responsible for meetings and other activities under this MOA with the GSA Committee and principal contact persons for the other Parties, and shall be the point of contact with DWR. Informal staff meetings may occur as needed.

8. Ongoing Cooperation. The Parties acknowledge that activities under this MOA will require the frequent interaction between them in order to pursue opportunities and resolve issues that arise. The Parties shall work cooperatively and in good faith. The goal of the Parties shall be to preserve flexibility with respect to the implementation of the Act and consistency with the other GSAs in the Basin, including development of a comprehensive MOA or JPA, the Study, a GSP and an Intra-Basin Coordination Agreement, which will be negotiated.

9. Notices. Any formal notice or other formal communication given under the terms of this MOA shall be in writing and shall be given personally, by facsimile, by electronic mail (email), or by certified mail, postage prepaid and return receipt requested. Any notice shall be delivered or addressed to the Parties at the mailing addresses, facsimile numbers or email addresses

set forth below under each signature and at such other address, facsimile number or email address as shall be designated by notice in writing in accordance with the terms of this MOA. The date of receipt of the notice shall be the date of actual personal service, confirmed facsimile transmission or email, or three days after the postmark on certified mail.

10. Entire Agreement/Amendments/Counterparts. This MOA incorporates the entire and exclusive agreement of the Parties with respect to the matters described herein and supersedes all prior negotiations and agreements (written, oral, or otherwise) related thereto. This MOA may be amended only in writing, as executed by all the Parties. This MOA may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

11. Termination/Withdrawal. This MOA shall remain in effect unless terminated by the unanimous consent of the voting Parties, which consent will not be unreasonably withheld. Upon 60 days written notice, any of the Parties may withdraw from this MOA provided that the withdrawal shall be in accordance with the requirements of the Act. Upon withdrawal of a Party, this MOA shall remain in effect for the remaining Parties. Nothing herein shall be construed as prohibiting a Party that has withdrawn from this GSA to become a separate groundwater sustainability agency within its jurisdiction, provided the withdrawing Party coordinates with the other Parties pursuant to the Act. A withdrawing Party shall be liable for expenses incurred through the effective date of the withdrawal and for its share of any contractual obligations incurred by the EMA GSA while the withdrawing voting Party was a party to this Agreement.

12. Assignment. No rights or duties of any of the Parties under this MOA may be assigned or delegated without the express prior written consent of all the other Parties, and any attempt to assign or delegate such rights or duties without such written consent shall be null and void.

13. Indemnification. The Parties shall each defend, indemnify and hold harmless the other Parties, and their respective directors/supervisors, officers, employees and agents, from any claims or liabilities for the indemnifying Party's acts or omissions, or that of its directors/supervisors, officers, employees and agents, arising from or related to carrying out this MOA. Any claims or liabilities by a third Party arising from or related to the Parties collective action in carrying out and/or implementing this MOA shall be defended by each Party.

14. Insurance. Each Party shall maintain its own insurance coverage, through commercial insurance, self-insurance or a combination thereof, against any claim, expense, cost, damage, or liability arising out of the performance of its responsibilities pursuant to this MOA.

15. Access to Information. The Parties shall have access to, and the right to use any and all information, data, summaries, charts, and other materials developed during and pursuant to this MOA and shall protect the confidentiality of such information as provided in this MOA and to the extent authorized by law. In furtherance thereof, the Parties will develop a confidentiality agreement to address sharing of confidential information, particularly existing confidential information that the Parties may possess that would be assist with preparation of the GSP. In the event any outside Party seeks disclosure of information developed pursuant to this MOA, the Parties shall cooperate and mutually comply with the Public Records Act.

16. Amendment. This MOA may be amended, from time to time, with the written consent of all Parties.

17. Authority. The individuals executing this MOA represent and warrant that they have the authority to enter into this MOA and to perform all acts required by this MOA, and that the consent, approval or execution of or by any third party is not required to legally bind either Party to the terms and conditions of this MOA.

18. Incorporation of Recitals. The recitals set forth above are hereby incorporated into this MOA.

WITNESS WHEREOF, the Parties have executed this MOA as of the date first above written.

SANTA YNEZ RIVER WATER CONSERVATION DISTRICT–IMPROVEMENT DISTRICT NO. 1

By: [signature]
CHRIS DAHLSTROM, General Manager

Address: P.O. BOX 157
SANTA YNEZ, CA 93460

Email cdahlstrom@syrwd.org

Facsimile 805-688-3078

CITY OF SOLVANG

By: ______________________

Address: ______________________

____

Email ______________________

Facsimile ______________________

SANTA YNEZ RIVER WATER CONSERVATION DISTRICT

By: ______________________

Address: ______________________

____

Email ______________________

Facsimile ______________________

16. Amendment. This MOA may be amended, from time to time, with the written consent of all Parties.

17. Authority. The individuals executing this MOA represent and warrant that they have the authority to enter into this MOA and to perform all acts required by this MOA, and that the consent, approval or execution of or by any third party is not required to legally bind either Party to the terms and conditions of this MOA.

18. Incorporation of Recitals. The recitals set forth above are hereby incorporated into this MOA.

WITNESS WHEREOF, the Parties have executed this MOA as of the date first above written.

SANTA YNEZ RIVER WATER CONSERVATION DISTRICT–IMPROVEMENT DISTRICT NO. 1

By: ____________________________

Address: ____________________________
____

Email ____________________________
Facsimile ____________________________

CITY OF SOLVANG

By: [signature]

Address: 1644 Oak Street
Solvang, CA 93463
Email bradv@cityofsolvang.com
Facsimile 805-686-2049

SANTA YNEZ RIVER WATER CONSERVATION DISTRICT

By: ____________________________
Address: ____________________________
____

Email ____________________________
Facsimile ____________________________

16. Amendment. This MOA may be amended, from time to time, with the written consent of all Parties.

17. Authority. The individuals executing this MOA represent and warrant that they have the authority to enter into this MOA and to perform all acts required by this MOA, and that the consent, approval or execution of or by any third party is not required to legally bind either Party to the terms and conditions of this MOA.

18. Incorporation of Recitals. The recitals set forth above are hereby incorporated into this MOA.

WITNESS WHEREOF, the Parties have executed this MOA as of the date first above written.

SANTA YNEZ RIVER WATER CONSERVATION DISTRICT–IMPROVEMENT DISTRICT NO. 1

By: ______________________

Address: ______________________

____

Email ______________________

Facsimile ______________________

CITY OF SOLVANG

By: ______________________

Address: ______________________

____

Email ______________________

Facsimile ______________________

SANTA YNEZ RIVER WATER CONSERVATION DISTRICT

By: Bruce A. Wales

Address: 3669 SAGUNTO ST. Suite 108

SANTA YNEZ, CA 93460

Email bwales@SYRWCD.COM

Facsimile 805-693-1156

SANTA BARBARA COUNTY WATER AGENCY

By: ____(Signatures below)

Address: ____________________
____

Email ____________________
Facsimile ____________________

ATTEST:
Mona Miyasato
County Executive Officer
Clerk of the Board, Ex Officio Clerk of the Santa Barbara County Water Agency

By: ____________________
Deputy Clerk

SANTA BARBARA COUNTY WATER AGENCY:

By: ____________________
Chair, Board of Directors

Date: 4/11/17

RECOMMENDED FOR APPROVAL:
Santa Barbara County Water Agency

By: ____________________
Department Head

APPROVED AS TO FORM:
Risk Management

By: ____________________
Risk Management

APPROVED AS TO FORM:

Michael C. Ghizzoni
County Counsel

By: ____________________
Deputy County Counsel

APPROVED AS TO ACCOUNTING FORM:
Theodore A. Fallati, CPA
Auditor-Controller

By: ____________________
Deputy

Intra-Basin Administrative Agreement

For Implementation of the Sustainable Groundwater Management Act

In the Santa Ynez River Valley Groundwater Basin

This Intra-Basin Administrative Agreement ("Agreement") is made and effective as of February 26, 2020 ("Effective Date") by and between the Parties executing this Agreement below, each referred to herein as a "Party" and collectively as the "Parties."

A. **WHEREAS**, in 2014 the State of California enacted the Sustainable Groundwater Management Act, including but not limited to Water Code section 10720 et seq., referred to in this Agreement as the "Act" or "SGMA," as subsequently amended, pursuant to which certain agencies may become or participate in "Groundwater Sustainability Agencies" ("GSAs") and prepare, adopt, and implement "Groundwater Sustainability Plans" ("GSPs") to achieve sustainable groundwater management in basins throughout the State. The Act defines a groundwater "basin" as a basin or sub-basin identified and defined in California Department of Water Resources ("DWR") Bulletin 118 or as modified pursuant to the Act. Each Party is a local agency located within the Santa Ynez River Valley Groundwater Basin (Bulletin 118, Basin No. 3-15, "Basin"), each is qualified to become a GSA or participate in a GSA or multiple GSAs, and each is authorized to adopt a GSP or participate in the adoption of a GSP or multiple GSPs under the Act for all or a portion of the Basin, as applicable; and

B. **WHEREAS**, the Parties previously executed a "Memorandum of Understanding for Implementation of the Sustainable Groundwater Management Act in the Santa Ynez River Valley Groundwater Basin" dated May 23, 2016 ("2016 MOU") to, among other things, provide for the initial organization of the Basin according to three separate Management Areas, ensure the timely formation and filing of a separate GSA for each of the three Management Areas, and establish the basis for a cooperative and ongoing working relationship between and among the Parties and GSAs for implementing the goals and requirements of SGMA throughout the Basin; and

C. **WHEREAS**, in accordance with SGMA and the 2016 MOU, three separate GSAs have been formed and are operating within the Basin, wherein one GSA represents the Western Management Area, one GSA represents the Central Management Area, and one GSA represents the Eastern Management Area; and

D. **WHEREAS**, the Western Management Area Groundwater Sustainability Agency ("WMA GSA") was formed by the City of Lompoc, the Vandenberg Village Community Services District, the Mission Hills Community Services District, the Santa Ynez River Water Conservation District, and the Santa Barbara County Water Agency pursuant to the January 11, 2017 Memorandum of Agreement for Formation of a Groundwater Sustainability Agency for the Western Management Area in the Santa Ynez River Valley Groundwater Basin Under the Sustainable Groundwater Management Act ("WMA MOA"); and

E. **WHEREAS**, the Central Management Area Groundwater Sustainability Agency ("CMA GSA") was formed by the City of Buellton, the Santa Ynez River Water Conservation District, and the Santa Barbara County Water Agency pursuant to the January 11, 2017 Memorandum of Agreement for Formation of a Groundwater Sustainability Agency for the Central Management Area in the Santa Ynez River Valley Groundwater Basin Under the Sustainable Groundwater Management Act ("CMA MOA"); and

F. **WHEREAS**, the Eastern Management Area Groundwater Sustainability Agency ("EMA GSA") was formed by the City of Solvang, the Santa Ynez River Water Conservation District, Improvement District No.1, the Santa Ynez River Water Conservation District, and the Santa Barbara County Water Agency pursuant to the April 27, 2017 Memorandum of Agreement for Formation of a Groundwater Sustainability Agency for the Eastern Management Area in the Santa Ynez River Valley Groundwater Basin Under the Sustainable Groundwater Management Act ("EMA MOA"); and

G. **WHEREAS**, the Parties hereto wish to supplement and provide a further framework for cooperative and ongoing efforts among themselves and among the WMA GSA, the CMA GSA, and the EMA GSA for implementation of SGMA throughout the Basin in a manner that is effective, efficient, fair, and at reasonable costs.

THEREFORE, in consideration of the Recitals set forth above and the mutual promises set forth below, the Parties agree as follows:

1. Purpose. The primary purpose of this Agreement is to facilitate a cooperative and ongoing working relationship between the Parties and among the WMA GSA, the CMA GSA, and the EMA GSA that will allow them to explore, study, evaluate, develop, and carry out mutually beneficial approaches and strategies for implementing SGMA throughout the Basin in an effective, efficient, fair, and cost-effective manner.

2. Development of Separate Groundwater Sustainability Plans.

   (a) In accordance with the WMA MOA, the CMA MOA, and the EMA MOA, a separate GSP will be developed by the respective GSAs for each of the three Management Areas identified in the Recitals above. As a part of their cooperative and ongoing efforts under this Agreement, the Parties through their respective GSAs shall continue to discuss and explore the potential formation of one or more new joint powers authority or alternative arrangement(s) to implement the GSPs and carry out the objectives and requirements of SGMA throughout the Basin in a coordinated fashion.

   (b) As further described at Section 3 below, the Parties acknowledge and agree that the respective GSPs must be developed in a coordinated fashion and that a Coordination Agreement must be developed and submitted to the California Department of Water Resources ("DWR") together with the three GSPs for the Basin. As foundation to the Coordination Agreement, and in accordance with Section 10727.6 of the Act, the Parties further acknowledge and agree that their respective GSAs shall coordinate with each other in the preparation of the respective GSPs to ensure that the GSPs utilize the same data and methodologies for the following assumptions:

- Groundwater elevation data;
- Groundwater extraction data;
- Surface water supply;
- Total water use;
- Change in groundwater storage;
- Water budget; and
- Sustainable yield.

(c) Governance and decision-making processes within the individual GSAs shall be governed by the respective Memoranda of Agreement described in the Recitals above, as those documents may be modified or supplemented from time to time by applicable bylaws, policies, amendments, or other agreements.

3. Coordination Agreement. Because multiple GSPs will be developed for the Basin, the Parties agree that a Coordination Agreement shall be developed and entered in accordance with Sections 10727(b)(3), 10727.6, and 10733.4(b)(3) of the Act, and the requirements and elements set forth in Section 357.4 of Title 23 of the California Code of Regulations ("SGMA Regulations") to ensure that the GSPs are developed and implemented utilizing the same data and methodologies and that elements of the GSPs necessary to achieve the sustainability goal for the Basin are based upon consistent interpretations of the basin setting.

Because developing and executing the Coordination Agreement is a prerequisite to filing the respective GSPs, the Parties agree to commence negotiation of the Coordination Agreement through their respective GSAs as soon as practicable, but no later than July 1, 2020. In the event that essential terms and elements of the Coordination Agreement, as set forth by Section 357.4 of the SGMA Regulations, have not been developed in draft for consideration by the Parties and the respective GSAs by June 1, 2021, any Party to this Agreement may demand in writing to the other Parties that the remaining process for developing and finalizing the Coordination Agreement be administered with the services of a mediator as provided by Section 7 below.

4. Sharing of DWR Grant Funds. The Parties acknowledge that the Santa Ynez River Water Conservation District (SYRWCD) is the grantee of a DWR Proposition 1 grant award of $1,000,000 ("DWR Grant Funds") on behalf of the respective GSAs for the three Management Areas and that such DWR Grant Funds are administered pursuant to the 2018 Grant Agreement Between the State of California (DWR) and the SYRWCD ("DWR Grant Agreement"). The Parties agree, individually and through their respective GSAs, that the DWR Grant Funds shall be shared and allocated equally (one-third each) among the WMA GSA, the CMA GSA, and the EMA GSA on behalf of the respective Management Areas for development of their

respective GSPs and related SGMA costs as authorized by the DWR Grant Agreement; and that if any GSA does not incur costs that are reimbursable from its respective one-third share of DWR Grant Funds, such unutilized funds shall be allocated equally (one-half each) to the two remaining GSAs; and that if either of the two remaining GSAs does not incur costs that are reimbursable from its one-half share of such remaining DWR Grant Funds, such unutilized funds shall be allocated to the one remaining GSA; and if the remaining GSA does not incur costs that are reimbursable from such remaining DWR Grant Funds, such unutilized funds shall be administered in accordance with the DWR Grant Agreement. Subject to the requirements of the DWR Grant Agreement, decisions related to the use and application of DWR Grant Funds within any given Management Area shall be made by the respective GSA for that Management Area.

5. Cost Sharing Among GSAs and Securing Joint Services.

(a) The Parties anticipate the need or opportunity from time to time to perform certain services or activities that are common to and will benefit all three Management Areas and GSAs in preparing their respective GSPs, which services or activities otherwise would be funded individually through the GSAs, and where jointly securing and undertaking such services or activities can improve efficiencies in preparing the GSPs and save costs at a Basin-wide level. These common and mutually beneficial services, activities, and associated costs may include, but are not limited to, SGMA website development, data management systems, technical review, and administrative support. Any decision(s) on a case-by-case basis to secure and undertake services or activities that are common and mutually beneficial to the three Management Areas and GSAs, and to incur the costs associated with any such decision(s), shall require prior approval by all three GSAs, wherein the method, terms, and costs for securing and undertaking such services or activities shall be presented to each GSA as part of the aforementioned approval requirements.

(b) Costs incurred for services or activities that are undertaken as described in Section 5(a) above shall be equally apportioned among and paid by the three GSAs (one-third each); provided, however, that each GSA shall make its own determination in coordination with SYRWCD of whether to seek reimbursement for its proportionate share of such costs from DWR Grant Funds made available to that GSA as described in Section 4 above. Cost sharing within the individual GSAs shall be administered in accordance with the terms of the WMA MOA, the CMA MOA, and the EMA MOA, along with any applicable amendments to those documents

(c) SYRWCD shall coordinate cost sharing among the GSAs and administer any agreement or contract to provide such services or activities on behalf of the three GSAs as described in Section 5(a) above; provided, however, that SYRWCD may elect in the future not to provide such coordination or administration services, and provided further that the GSAs may agree in writing for a different Party or third-party to coordinate such cost sharing or to administer any such agreement or contract as part of the approval requirements described in Section 5(a) above. The Parties agree that the costs incurred by SYRWCD or other Party or third-party for providing such coordination or administration services shall be apportioned and shared by the GSAs in accordance with this Section 5.

(d) Subject to the availability of DWR Grant Funds and other sources of funding that may be available to any of the GSAs, all other SGMA-related costs that are not shared among the three GSAs in accordance with this Agreement, including but not limited to those for preparation and implementation of their respective GSPs, shall be borne by the respective GSAs and Parties thereto in accordance with their respective Memoranda of Agreement described in the Recitals above, as those documents may be modified or supplemented from time to time by applicable bylaws, policies, amendments, or other agreements. Nothing in this Agreement is intended to nor shall limit any Party or any of the GSA from seeking recovery of SGMA-related costs, including but not limited to those for preparation or implementation of the GSPs, from water users and other persons and entities in any lawful manner, including but not limited to the authorities provided by SGMA.

6. Ongoing Cooperation. In accordance with the primary purpose of this Agreement, the Parties agree to coordinate with each other in good faith to ensure a cooperative and ongoing working relationship between the Parties and among the WMA GSA, the CMA GSA, and the EMA GSA that will allow them to explore, study, evaluate, develop, and carry out mutually beneficial approaches and strategies for implementing SGMA throughout the Basin in an effective, efficient, fair, and cost-effective manner. In furtherance of this purpose, each Party shall identify a principal contact person and other appropriate staff and/or consultant(s) to participate on such Party's behalf in carrying out this Agreement.

7. Dispute Resolution.

(a) The Parties agree to mediate any claim or dispute arising from this Agreement before filing any court action; provided, however, that any Party may elect not to mediate, where any Party that elects not to mediate or commences a court action based on a dispute or claim arising from this Agreement without first attempting to resolve the matter through mediation as provided in this Section 7 shall not be entitled to recover attorneys' fees or costs, even if such fees and costs otherwise would be available to that Party in any such action. A Party shall satisfy the requirement for "first attempting to resolve the matter through mediation" by proceeding or otherwise participating in accordance with the entire process set forth in Section 7(b) below.

(b) In the event of a claim or dispute, or where the Parties or respective GSAs cannot reach agreement on any matter arising under this Agreement, including but not limited to preparing GSPs in a coordinated fashion as described in Section 2(b) above, or developing a Coordination Agreement as described in Section 3 above, any Party may provide a written Notice of Dispute to the other Parties that describes in detail the claim or disputed matter ("Dispute"). Upon issuance of a Notice of Dispute, a meeting shall be conducted within

twenty (20) calendar days from the date of the Notice of Dispute among all Parties that elect to participate in the meeting as a good faith attempt to resolve the Dispute informally ("Informal Dispute Resolution"). In the event the Dispute is not resolved through Informal Dispute Resolution within thirty (30) calendar days from the date of the Notice of Dispute, the Party that initially provided the Notice of Dispute shall provide a separate written notification to all Parties that participated in the Informal Dispute Resolution process which identifies three mediator candidates, all of whom must be an attorney, engineer, or hydrogeologist experienced and familiar with SGMA, to mediate the Dispute ("Formal Dispute Resolution"). Furthermore, all mediator candidates must be unbiased neutrals who are not participants in any of the GSAs in the Basin and who are not officials, officers, employees, contractors, consultants, or agents of any of the Parties to this Agreement. Within ten (10) days of receiving a written notification of qualified mediator candidates, all Parties that elect to participate in such Formal Dispute Resolution may provide a written response consenting to one or more of the mediator candidates or identifying up to three additional qualified mediator candidates. Thereafter, if a mediator is not mutually-agreed upon by said participating Parties from the combined list within fifteen (15) calendar days, each party shall submit two potential mediators that they would approve and a mediator shall be picked by a non-party through random selection from the Parties' combined lists of remaining mediators. Once initiated, the mediation shall be completed within 30 days.

(c) Mediation fees, if any, shall be divided equally among the Parties that elect to be involved in a mediation process pursuant to Section 7(b) above. Each Party involved in the mediation shall be responsible for its own attorneys' fees and costs.

(d) This Section 7 shall not preclude any Party from meeting and conferring with any other Party or Parties to mutually resolve a dispute or claim prior to requesting or participating in the mediation processes described in Section 7(b) above.

(e) This Section 7 shall not preclude any Party from seeking a preliminary injunction or other interlocutory relief if necessary to avoid irreparable harm or damages.

8. Indemnification. To the extent authorized by law, each Party shall defend, indemnify, and hold harmless the other Parties and their respective elected officials, officers, supervisors, employees, agents, contractors, and consultants from and against any and all damages, demands, actions, claims, or liabilities for the indemnifying Party's acts or omissions arising from carrying out this Agreement.

9. Miscellaneous/General Provisions.

(a) Notices. Any formal notice required or other formal communication given under the terms of this Agreement shall be in writing to all of the Parties and shall be given personally, by electronic mail (email), or by certified mail, postage prepaid and return receipt requested.

The date of receipt of any written notice provided hereunder shall be the date of actual personal service, or email, or three days after the postmark on certified mail.

(b) Entire Agreement/Amendments/Counterparts. This Agreement incorporates the entire and exclusive agreement of the Parties with respect to the matters described herein and supersedes all prior negotiations and agreements (written, oral, or otherwise) related thereto, including the 2016 MOU; provided, however, this Agreement does not amend, supersede, or modify the WMA MOA, the CMA MOA, or the EMA MOA as described in the Recitals above, as those documents may be amended or supplemented. This Agreement may be amended (including without limitation to add new Parties) only in a writing executed by all of the Parties. This Agreement may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

(c) Termination/Withdrawal. This Agreement shall remain in effect unless terminated by the mutual consent of the Parties. Upon 30 days written notice to the other Parties, any Party may withdraw from this Agreement, and the Agreement shall remain in effect for the remaining Parties. No Party shall be liable to any other Party for electing to withdraw from this Agreement.

(d) Assignment. No rights or duties of any of the Parties under this Agreement may be assigned or delegated without the express prior written consent of all of the other Parties, and any attempt to assign or delegate such rights or duties without such written consent shall be null and void.

(e) Insurance. Each Party shall maintain its own insurance coverage through commercial insurance, self-insurance, or a combination thereof, against any claim, expense cost, damage or liability arising out of the performance of its responsibility pursuant to this Agreement, to the extent insurable.

(f) Counsel. The Parties recognize that as of the Effective Date of this Agreement, independent legal counsel has not been retained to represent any of the three GSAs in the Basin. Until such time as any Party may decide otherwise within its sole and absolute discretion, each Party agrees, in its individual capacity and as a member agency of its respective GSA, to utilize its own legal counsel for all purposes, including but not limited to those related in any way to compliance with SGMA and any and all other legal requirements, to rely exclusively upon the legal advice of its own legal counsel, and to bear all of its own fees, costs, and expenses for legal counsel, including but not limited any experts or consultants retained through legal counsel on behalf of that Party. This arrangement shall not be construed in any way to create an attorney-client relationship or a duty of loyalty between an attorney and any Party other than the direct client of that attorney, and no such relationship will be deemed to arise by implication as a result of this

Agreement. The provisions of this Section 9(f) shall not be affected in the event, if any, that any or all of the GSAs in the Basin determine(s) to retain independent legal counsel.

(g) CEQA. The Parties recognize and agree that, pursuant to 10728.6 of the Act and Public Resources Code Section 21065, neither this Agreement nor the preparation or adoption of a GSP constitutes a "project" or approval of a project under the California Environmental Quality Act ("CEQA") or the State CEQA Guidelines.

(h) No Third-Party Beneficiaries. This Agreement is not intended and shall not be construed to confer any benefit or create any right for any third party, or to provide the power or right of a third party to bring an action to enforce any of the terms of this Agreement.

(i) Attorneys' Fees and Costs. Subject to the provisions of Section 7 above, if any action at law or equity, including an action for declaratory relief, is brought to enforce or interpret the provisions of this Agreement, the prevailing Party or Parties, as determined by the court, shall be entitled to recover reasonable attorneys' fees and costs which shall be determined by the court. The attorneys' fees and costs to be awarded shall be made to fully reimburse the prevailing Party or Parties for all reasonable attorneys' fees and costs, including but not limited to expert fees, costs, and expenses actually incurred in good faith, regardless of the size of the judgment or outcome of the action; provided, however, that recoverable fees awarded to any prevailing party shall not exceed the rate of three hundred and twenty-five dollars ($325.00) per hour for attorneys or experts.

(j) Authority/Binding Effect. Each Party represents and warrants that the individual(s) executing this Agreement is authorized to do so and thereby obligate such Party to perform all acts required by this Agreement, and that the consent, approval or execution of or by any third party is not required to legally bind the Party to this Agreement.

(k) Incorporation of Recitals. The Recitals set for the above are hereby imported into this Agreement.

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement as of the date first written above.

[*Signature Pages Below*]

SANTA BARBARA COUNTY WATER AGENCY

ATTEST:
MONA MIYASATO,
COUNTY EXECUTIVE OFFICER
Ex Officio Clerk of the Board Directors
of the Santa Barbara County Water Agency

By: Sheila dlaGuerra
Deputy

SANTA BARBARA COUNTY WATER AGENCY

By: Gregg Hart
Gregg Hart, Chair, Board of Directors

APPROVED AS TO FORM:
MICHAEL C. GHIZZONI
COUNTY COUNSEL

By: ________________
Deputy

APPROVED AS TO FORM:
RAY AROMATORIO, ARM, AIC
RISK MANAGER

By: ________________

RECOMMENDED FOR APPROVAL:
SCOTT D. MCGOLPIN
PUBLIC WORKS DIRECTOR

By: ________________
Deputy Public Works Director

SANTA YNEZ RIVER WATER CONSERVATION DISTRICT

By: Kevin Walsh
Kevin D. Walsh, General Manager

Address: P.O. Box 719
Santa Ynez, CA 93460

Email: kwalsh@syrwcd.com

SANTA YNEZ RIVER WATER CONSERVATION DISTRICT, IMPROVEMENT DISTRICT NO.1

Date: December 12, 2019

By: ______________________
Jeff Clay, President

ATTEST:

By: ______________________
Mary Martone, Secretary

CITY OF SOLVANG

By: ______________________
Xenia Bradford
Acting City Manager

Address: 1644 Oak Street, Solvang, CA 93463

Email: xeniab@cityofsolvang.com

APPROVED AS TO FORM:

City Attorney: Price, Postel and Parma, LLP

By: ______________________
Chip Wullbrandt
City Attorney

CITY OF BUELLTON

By: ______________________
Holly Sierra, Mayor

Address: P.O. Box 1819
Buellton, CA 93427

Email: hollys@cityofbuellton.com

CITY OF LOMPOC

CITY OF LOMPOC, a municipal corporation

By: ______________________
James Throop, City Manager

Attest:

By: ______________________
Stacey Haddon, City Clerk

Approved as to form:

By: ______________________
Jeff Malawy, City Attorney

VANDENBERG VILLAGE COMMUNITY SERVICES DISTRICT

Katherine A. Stewart, President
Board of Directors

7 Jan 2020
Date

APPROVED AS TO FORM:

Michael A. Munoz
Senior Deputy County Counsel

12/23/19
Date

ATTEST:

Stephanie Garner
Secretary, Board of Directors

1/7/20
Date

MISSION HILLS COMMUNITY SERVICES DISTRICT

Bruce Nix, President
Board of Directors

2-26-20
Date

Loch A Dreizler
General Manager

2.27.20
Date

ATTEST:

Kayla Barker
Secretary, Board of Directors

2-26-20
Date

APPENDIX B

Communication and Engagement

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EMA

Santa Ynez River Valley Groundwater Basin
Eastern Management Area
Groundwater Sustainability Agency

Communication and Engagement Plan

FEBRUARY 2020

GSI Water Solutions, Inc.

GEI Consultants

Communication and Engagement Plan

for Santa Ynez Eastern Management Area
Groundwater Sustainability Plan Development

Prepared for Santa Barbara County

February 21, 2020

Table of Contents

In 2014, the California legislature approved a new groundwater management law known as the Sustainable Groundwater Management Act (SGMA). SGMA requires local governments and water agencies in California's high and medium-priority groundwater basins, as defined by the California Department of Water Resources (DWR), to form Groundwater Sustainability Agencies (GSAs) and prepare and adopt Groundwater Sustainability Plans (GSPs) for their basins. The Santa Ynez River Valley Basin (DWR Bulletin 118 No. 3-15) – or Santa Ynez Basin – is designated as a medium-priority basin and thus a GSP or multiple GSPs must be adopted for the entire Basin by January 31, 2022. ***The three GSAs in the Santa Ynez Basin plan to develop three GSPs to be submitted to DWR in accordance with a coordination agreement.***

This Communication and Engagement Plan (C&E Plan) describes the planned activities for engaging interested parties in development of a GSP for the ***East Management Area (EMA)*** of the Santa Ynez Basin. It is designed to meet the stakeholder engagement requirements of SGMA and GSP Regulations. The ultimate purpose of the document is to facilitate effective communication and engagement with the multiple and varied stakeholders in the EMA.

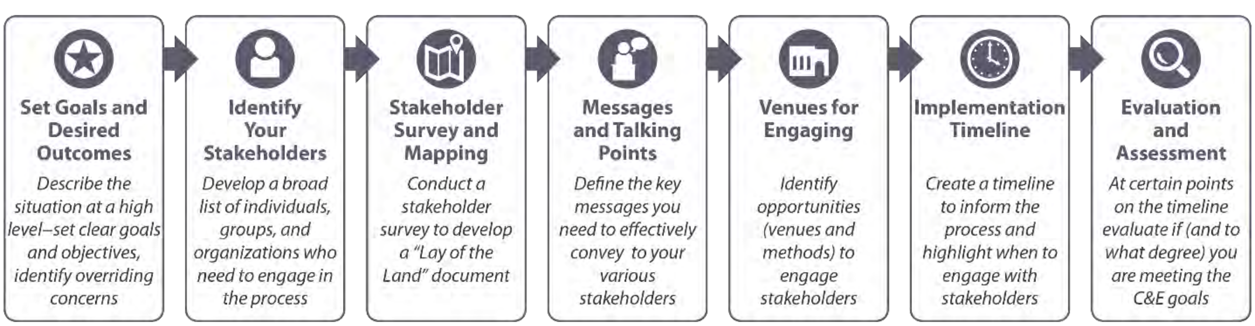
Structure of this C&E Plan

DWR's *Stakeholder Communication and Engagement Guidance Document* describes a seven-step process for communication and engagement. DWR's steps are listed below:

1. ***Set Goals and Desired Outcomes***
2. ***Identify Your Stakeholders***
3. ***Stakeholder Survey and Mapping***
4. ***Messages and Talking Points***
5. ***Venues for Engaging***
6. ***Implementation Timeline***
7. ***Evaluation and Assessment***

In addition to the groups provided on DWR's chart, the EMA will also add the following groups to the interested parties list: domestic well owners, commercial users, disadvantaged communities, municipal water agencies, and federal stakeholders such as the US Bureau of Reclamation and US Fish and Wildlife. This C&E Plan begins with an introduction to the Santa Ynez Basin and the EMA. The remainder of the plan is organized to follow the steps suggested above and shown in **Figure 1**.

Figure 1. Engagement Steps from DWR GSP Stakeholder and Engagement Guidance Document



1. Introduction to the Santa Ynez River Valley Basin EMA

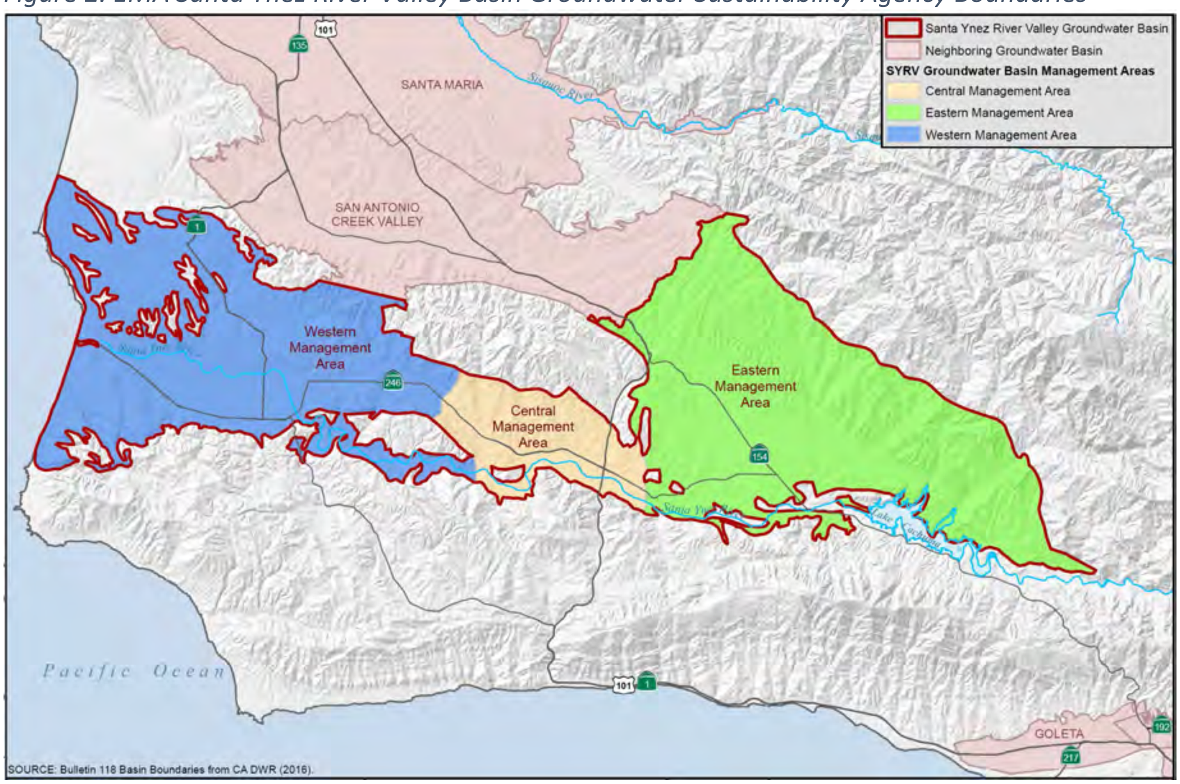
The Santa Ynez Basin is located in California's Central Coast hydrologic region in Santa Barbara County and is approximately 203,051 acres in size. The Basin is bound by the Purisima Hills on the northwest, the San Rafael Mountains on the northeast, the Santa Ynez Mountains on the south, and the Pacific Ocean on the west. On the east and underlying the groundwater basin, the basin is bounded by consolidated non-water-bearing rocks of Tertiary age. The primary sources of water supply in the Basin include groundwater from the Santa Ynez Uplands Groundwater Basin, Santa Ynez River and alluvial groundwater, State Water Project, and Cachuma Project.[1] Additional sources of supply include Lompoc Uplands and Buellton Uplands.

The Basin is divided into three Management Areas, one for each GSA established in the Basin, as shown in **Table 1** and delineated in **Figure 2**.

Table 1. Santa Ynez Basin Management Areas

Management Area	Geographic Extent
Western Management Area (WMA)	Lompoc Plain, Lompoc Terrace, and Lompoc Uplands
Central Management Area (CMA)	Buellton Uplands
East Management Area (EMA)	Santa Ynez Uplands

Figure 2. EMA Santa Ynez River Valley Basin Groundwater Sustainability Agency Boundaries



[1] http://countyofsb.org/pwd/water/downloads/IRWMP/finalplan/10_IRWMP_Section_4.pdf page 4-1 and 4-2

Each GSA will prepare a GSP for its portion of the Basin. The three resulting GSPs will be implemented following a formal Coordination Agreement signed by all GSAs.

Four agencies formed the EMA GSA. These agencies include: Santa Ynez River Water Conservation District (SYRWCD), the City of Solvang (City), the Santa Ynez River Water Conservation District, Improvement District No.1 (ID No.1), and the Santa Barbara County Water Agency (County Water Agency). A brief description of each is provided below.

- **Santa Ynez River Water Conservation District** – SYRWCD was established in 1939 to protect the water rights and supplies of its constituents in the Santa Ynez River watershed. Among other responsibilities, SYRWCD manages releases of water from Bradbury Dam to replenish the Santa Ynez River and alluvial aquifers and provides groundwater management planning and related activities for the upland basins within its boundaries.
- **City of Solvang** – The City of Solvang was founded in 1911 and includes a mix of residential, commercial, and recreational areas**.**
- **Santa Ynez River Water Conservation District, Improvement District No.1.** – ID No.1 was established in 1959 and provides retail water service to domestic and agricultural customers for the communities of Santa Ynez, Los Olivos, Ballard, and the City of Solvang.
- **Santa Barbara County Water Agency** – The County Water Agency manages several regional programs including implementation of the regional water efficiency program, the Integrated Regional Water Management Plan (IRWMP), the development of county-wide hydrologic data, and development of hydrologic models. Included in these programs are the compilation and publication of an annual report on groundwater conditions, sediment management studies, reservoir capacity studies, technical support to other public agencies, and public information.

This C&E Plan is tailored for GSP development in the EMA and, with the exception of GSA coordination efforts, does not establish any activities for the CMA or WMA GSAs.

2. Goals and Desired Outcomes

The goal of this C&E Plan is to describe the planned activities for engaging interested parties in GSP development for the Santa Ynez Basin EMA and to provide opportunities for interested parties to participate. This Plan will serve as a roadmap to support achieving the desired outcomes identified below.

- **Educate the public about the importance of the EMA GSP and their input.** Stakeholder input is a critical part of the GSP development process. Stakeholders define the values of the Basin and the priorities for sustainable groundwater management. This valuable input is what guides decision-making and development of projects and management actions to be included in the EMA GSP. The C&E Plan is designed to encourage public participation and spread information about GSP development.
- **Engage a diverse group of stakeholders.** The C&E Plan is developed with thoughtful consideration about how to engage the diverse array of stakeholders in the EMA portion of the Basin. The C&E Plan outlines multiple venues for communication with varied audiences.
- **Make stakeholder participation easy and accessible.** One way to increase engagement is to make participation easier for stakeholders. Ways in which stakeholders can engage in GSP development will be clear and accessible. The C&E Plan provides methods, such as an online portal, to make engagement easy for stakeholders.
- **Allow stakeholders the opportunity to provide meaningful input.** Aligning the stakeholder engagement schedule with the GSP development schedule allows interested parties to engage at key decision points in the GSP development process. Public meetings will inform interested parties about what decisions need to be made, provide relevant technical information, and request feedback.
- **Provide a roadmap for GSA leadership.** The C&E Plan provides a clear roadmap and schedule for EMA GSA leaders to follow, keeping engagement efforts consistent and on track.

The goal and desired outcomes listed above are the drivers for this planning document. They inform and shape the remainder of this C&E Plan.

3. GSP Participants and Decision-Making Process

Users of groundwater in the EMA are encouraged to participate in GSP development. A successful outcome requires GSA leadership, technical expertise, and active stakeholder engagement throughout the process.

GSA Leadership

The EMA GSA was formed April 2017 under a Memorandum of Agreement (MOA) by the SYRWCD, City of Solvang, ID No.1, and County Water Agency. A list of the MOA parties is shown in **Table 2** and a copy of the MOA is included as **Appendix A**. In the MOA, the parties agree to "consider the interests of all beneficial uses and users of groundwater in the EMA, including the interests listed in Section §10723.2 of the [Sustainable Groundwater Management] Act." The MOA applies to the EMA GSA only. Coordination among EMA, CMA, and WMA will be outlined in a formal coordination agreement, which is required by SGMA, and submitted with the Final GSPs.

Table 2. MOA Parties forming the EMA GSA

MOA Parties
Santa Ynez River Water Conservation District
City of Solvang
Santa Ynez River Water Conservation District, Improvement District No.1
Santa Barbara County Water Agency

GSA Committee

The MOA established a GSA Committee that leads SGMA implementation in the EMA. The Committee is composed of one representative and an alternative from each MOA party. The Committee is the governing body of the GSA and may adopt resolutions, bylaws, and policies with respect to SGMA. Therefore, all Committee meetings are called, noticed, and conducted in accordance with the Ralph M. Brown Act (Govt. Code section 54950 et seq.). As set forth in the MOA, the agencies of the EMA GSA are required to work cooperatively and in good faith to prepare the GSP and carry out the requirements of SGMA in coordination with the other two GSAs in the Basin. GSA Committee voting is weighted as established in the MOA (**Appendix A**).

Technical Expertise

The role of technical experts is to evaluate and communicate facts about the EMA, the Basin, and surrounding basins and to inform the GSA Committee and interested parties about how the groundwater system functions, and the benefits and consequences of potential projects and management actions identified during GSP development. Technical experts may include outside consultants and staff of the MOA parties.

Stakeholders

SGMA identifies a broad range of stakeholders to be engaged throughout the development of a GSP, including all beneficial uses and users of groundwater, as well as other parties responsible for implementing GSPs in the Basin (Water Code section 10723.2). Interested parties provide invaluable input regarding the priorities and values of the community, and stakeholder engagement is available and encouraged to occur through the multiple venues and tools described in this Plan. Additional information is included in **Section 4. Stakeholder Identification**.

4. Stakeholder Identification

Pursuant to California Water Code sections 10723.2 and 10723.8, the EMA GSA has considered, and will continue to consider, the interests of all beneficial uses and users of groundwater, as well as other parties/GSAs that are responsible for implementing GSPs in the Basin. The EMA GSA is committed to an open process including active and open discussions with all interested parties throughout GSP development. **Appendix B** provides an initial list of beneficial uses and users of groundwater submitted at the time of GSA formation.

Stakeholder Group Identification

The list provided in **Appendix B** was used to form the EMA's initial interested parties list. The interested parties list is a living document, has expanded since GSA formation, and is revised regularly. The interested parties list will continue to be supplemented with information gathered for the stakeholder groups identified in the Stakeholder Engagement Chart for GSP Development, as provided in DWR's Stakeholder Communication and Engagement Guidance Document[2]. The stakeholder groups provided on DWR's chart include:

- General Public
- Land Use
- Private Users
- Urban/Agricultural Users
- Industrial Users
- Environmental and Ecosystem
- Economic Development
- Human Right to Water
- Native American Tribes
- Federal and State Lands
- Integrated Water Management

In addition to the groups provided on DWR's chart, the following groups are on the EMA interested parties list: domestic well owners, commercial users, disadvantaged communities, municipal water agencies, and federal stakeholders.

Groundwater Communication Portal (GCP)

A web-based outreach tool called the Santa Ynez Groundwater Communication Portal (GCP) will be used to maintain the interested parties list for the EMA. The same tool will also be used by the other two GSAs in the Basin. The GCP electronically notifies interested parties when events are scheduled by the GSAs regarding GSP development or other SGMA-related processes. Interested parties can add themselves to the list online at any time. The GCP will track outreach engagements and store the information in a database for GSA retrieval. The database will include meeting dates, locations, times, and documents such as meeting agendas, minutes, and matters considered by the GSAs. The GCP is not meant to replace, but to enhance, outreach efforts. A description of the GCP is provided in **Appendix C.**

[2] https://water.ca.gov/Programs/Groundwater-Management/Assistance-and-Engagement(accessed May 29, 2019)

5. Stakeholder Survey

DWR created a stakeholder survey template which can be found at its Communication and Engagement Digital Toolkit[3] webpage. The survey is designed to learn about stakeholder interests, issues, and challenges. The survey asks the following questions:

- Are you familiar with SGMA regulations?
- Are you currently engaged in activity or discussions regarding groundwater management in this region?
- Do you own or manage land in this region?
- Do you manage water resources? If yes, what is your role?
- What is your primary interest in land or water resources management?
- Do you have concerns about groundwater management? If so, what are they?
- Do you have recommendations regarding groundwater management? If so, what are they?
- What else do you want me to know?
- Who else should we listen to?

The above questions and more are included in an EMA-specific survey included as **Appendix D**.

The survey is scheduled to be distributed within the EMA in 2020. The survey will be distributed via e-blast to the interested parties list, available on the GCP, and announced at public meetings. Final results will be summarized in a report and used to inform GSP development.

[3] https://water.ca.gov/Programs/Groundwater-Management/Assistance-and-Engagement

6. Venues and Methods: Opportunities for Engagement

As set forth in this C&E Plan, the Santa Ynez EMA GSA encourages the active involvement of diverse social, cultural, and economic elements of the population throughout the GSP development process. To this end, multiple stakeholder engagement methods will be employed as described below.

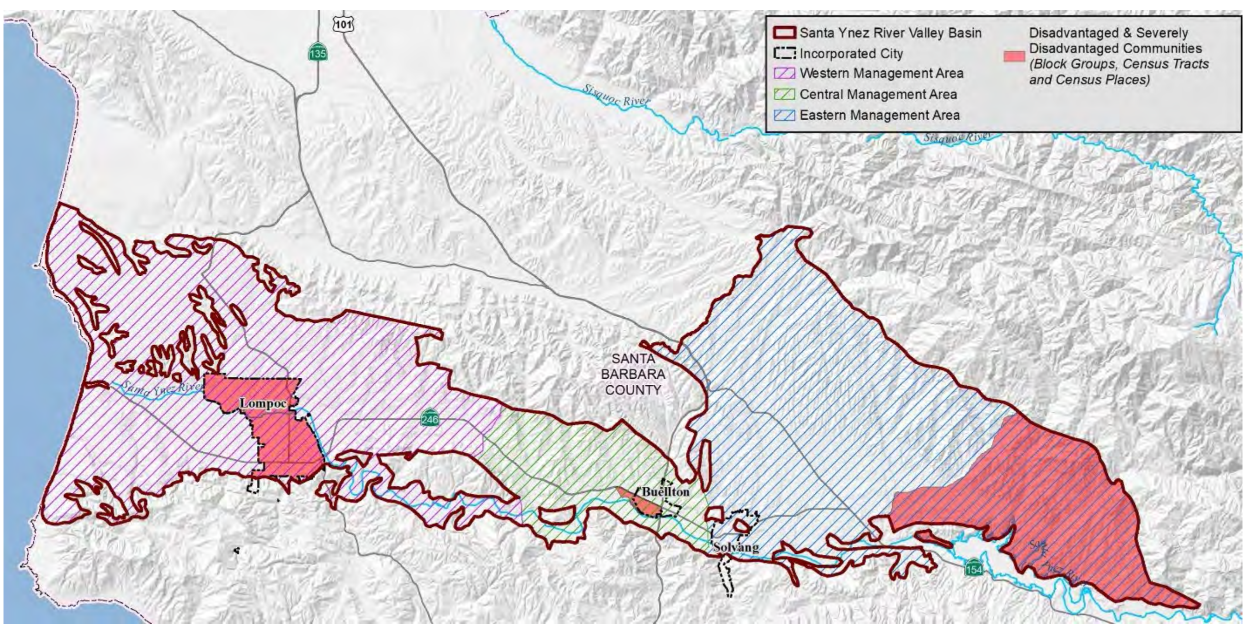
Focused Engagement

To involve a broad set of stakeholders, the groups below will be given focused attention in the engagement process.

Disadvantaged Communities

There are several disadvantaged communities within the EMA portion of the Basin based on block groups, census tracts, and census places. These areas are in the southeast portion of the EMA, as shown on **Figure 3** below. Specific efforts will be used to ensure that communications are reaching these communities, so they are informed of the GSP development process and invited to participate. Additionally, public meetings and workshops will be inclusionary by using culturally appropriate language, education, and framing[4] of the issues around sustainable groundwater management.

Figure 3. Disadvantaged Communities and EMA GSA



Tribal Governments

Per SGMA §10720.3(c), any federally recognized Indian tribes may voluntarily agree to participate in the planning, financing, and management of SGMA activities. Furthermore, Section §10723.2(h) specifically provides that California Native American tribes are among the beneficial users of groundwater that must be considered by the EMA GSA in preparing the GSP. The Santa Ynez Band of Chumash Mission Indians Tribal Reservation boundaries are within the boundary of the EMA, and the Tribal Chairman indicated early in the SGMA process that the Tribe looks forward to collaborating with the GSA. (See

[4] From Engaging Disadvantaged Communities in Resource Management https://innovation.luskin.ucla.edu/sites/default/files/Alcanza%20E-Report.pdf pg. 27, accessed 5/31/2019

correspondence attached as **Appendix E**). The EMA GSA remains in contact and welcomes participation with the Santa Ynez Band of Chumash Indians in GSP development. Currently, the Tribal Government is participating in the SGMA process for the EMA GSA through its representative on the Citizen Advisory Group (also known as CAG, discussed below).

Bilingual Residents

Information will be gathered regarding languages spoken in the communities within the EMA portion of the Basin and translation services will be offered for different languages as needed per the Dymally-Alatorre Bilingual Service Act.

Organizational Groups

GSA leadership will plan to attend or host meetings with organizational groups such as mutual water companies, cities, community organizations, or governing bodies to familiarize them with the GSP development process and invite them to participate.

Public Notices and Hearings

SGMA requires a publicly noticed hearing at three distinct points in GSP development:

- At GSA formation §10723(b) – this process is complete
- When a GSP is adopted or amended (§10728.4)
- Before imposing or increasing fees

These hearings are legally required and are not held on a regular basis like the GSA committee meetings. The GSA committee meetings (also publicly noticed) are where presentation of draft GSP documents will occur and are described in the following section. The GCP will be used to increase awareness of upcoming meetings and hearings.

GSA Committee Meetings

GSA Committee meetings are conducted on a regular basis. The purpose of these meetings is to provide updates and information regarding the status of GSP development and related issues; and to receive feedback from the GSA Committee and the public on those matters. The meetings range in length depending on what is happening in the GSP development process. As noted above, all GSA Committee meetings are noticed and open to the public in accordance with the Brown Act.

Citizen Advisory Group

The purpose of the EMA Citizen Advisory Group (CAG) is to provide an additional level of public input to the GSA Committee in a way that represents different categories of groundwater uses and users in the EMA as set forth by SGMA. At various points during development of the EMA GSP, the CAG may be asked to provide its perspective on elements or sections of the GSP and on the final draft of the GSP.

To ensure an efficient and collaborative process, the GSA Committee will select members to the CAG that reflect a diversity of interests and different types of groundwater uses and users in the EMA. At the direction of the GSA Committee, the CAG will provide input to the Committee relating to various elements or sections of the GSP, including but not limited to those pertaining to stakeholder engagement, data management, the hydrogeologic conceptual model, the numeric groundwater model, water budgets, sustainability goals, monitoring programs, and projects and management actions. Additional information regarding the EMA CAG can be found in the Santa Ynez Valley Groundwater Basin, Eastern Management Area Groundwater Sustainability Agency Citizen Advisory Group Guidelines, as adopted by the EMA GSA Committee during its April 2019 meeting, and included as **Appendix F**.

Informational Materials

The Stakeholder Survey discussed in the previous section will ask stakeholders how they would like to receive information. Initially, it is anticipated that the informational materials listed below will be developed and made available for use by all stakeholders.

GSA Webpage

A webpage[5] listing public meetings and information about SGMA implementation in the Santa Ynez Basin is currently located at the Santa Barbara County website and the SYRWCD website. The County webpage and the Santa Ynez River Water Conservation District website[6] will direct interested parties to register at the GCP (described below).

Groundwater Communication Portal

The web-based Santa Ynez GCP is an efficient, multi-functional, user-friendly tool that will be used to communicate with interested parties. The GCP will store interested party information and distribute e-mail invitations for all EMA-related meetings and events that are posted to the GCP calendar.

There are additional tools within the GCP that will be used to enhance stakeholder communication. These tools include the following:

- **E-Blast.** E-mails will be sent to interested parties using the e-blast tool. E-blasts will be effective for sending reminders of upcoming deadlines, such as the close of a survey or comment period. Interested parties can sign up to receive the e-blasts and may also choose to unsubscribe from them.
- **Public Comment.** During public comment periods, a form will be available on the GCP for interested parties to submit comments. The form allows comments to be submitted by Section of the Draft GSP and automatically stores the information for GSA review, reducing the risk of misplaced comments. Interested parties may also use the form to submit general comments.
- **Direct Mailing.** At key points in the GSP development process, direct mailings will be sent to stakeholders who have requested direct mailings and provided a mailing address.

More information about the GCP is provided in **Appendix C**.

FAQ

A frequently asked questions (FAQ) document will be created and updated periodically throughout GSP development. The FAQ will address questions about SGMA, the EMA GSA, development of the EMA GSP, and issues related to the overall SGMA process for the Basin.

Talking Points

The GSA Committee meetings and the FAQ will serve as guides for talking points to share information about GSP development with local agencies and interested parties. Materials presented in GSA Committee meetings will be made available to local agencies to use when communicating with their constituents. Sharing these materials will support consistent messaging to audiences throughout the EMA.

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[5] https://www.countyofsb.org/pwd/gsa.sbc

[6] https://syrwcd.com/

7. Evaluation and Assessment

The activities identified in this C&E Plan are designed to meet the goals and objectives identified earlier in **Section 2**. Below, **Table 3** lists tasks to implement this C&E Plan. This list will be modified and updated as needed throughout GSP development.

Table 3. Outreach Tasks

Task	Description
Launch Groundwater Communication Portal (GCP)	Launch GCP, post meetings to calendar, promote at meetings.
Include GCP on printed materials	Educate public about where they can find information and updates related to SGMA in the EMA and the Basin overall.
Announce GCP at public meetings	Encourage interested parties to sign up using the GCP.
Develop FAQ	Develop FAQ as questions come in from the GSA Committee and interested parties. Maintain FAQ on the GCP and/or other locations and update as necessary.
Form CAG	Solicit and accept applications to join the CAG, select members, seek input from the CAG at key decision points. Publicly notice CAG meetings and send invitations using the GCP.
Engage Disadvantaged Communities	Assess and implement effective methods to engage disadvantaged communities in the EMA.
Continue Communication with Native American Tribes	Remain in contact with the Santa Ynez Band of Chumash Mission Indians. Add the Tribal Chairman and other tribal contacts to the GCP interested parties list.
Conduct Stakeholder Survey	Distribute stakeholder survey at meeting(s) and online. Invite interested parties to participate using the GCP. Analyze results and summarize in a report.
Outreach Schedule	Keep outreach activities aligned with GSP development to provide opportunities for ongoing and meaningful input.
Hold a public hearing for GSP adoption	Per SGMA Section 10728.4, give 60-day notice and hold a public hearing to adopt the final EMA GSP before submitting to DWR.

The schedule for the above outreach tasks is flexible and driven by the overall schedule for GSP development. Outreach activities occur when they best serve plan development. For example, when preparing to write a chapter about projects and management actions, the GSAs will conduct outreach related to collecting input regarding potential projects.

Like the task list, this C&E Plan is a living document to be updated as needed throughout GSP development. Use and implementation of the task list and C&E Plan recommendations will indicate successful C&E Plan implementation.

8. Appendices

Appendix A.	**Memorandum of Agreement for GSA formation**
Appendix B.	**Initial list of beneficial uses and users of groundwater**
Appendix C.	**Groundwater Communication Portal**
Appendix D.	**Stakeholder Survey**
Appendix E.	**Letter from Santa Ynez Band of Chumash Indians Tribal Chairman, Kenneth Kahn, August 2016**
Appendix F.	**Santa Ynez Valley Groundwater Basin, Eastern Management Area Groundwater Sustainability Agency Citizen Advisory Group Guidelines**

Appendix A.

Memorandum of Agreement

MEMORANDUM OF AGREEMENT
FOR FORMATION OF A GROUNDWATER SUSTAINABILITY AGENCY FOR THE EASTERN MANAGEMENT AREA
IN THE SANTA YNEZ RIVER VALLEY GROUNDWATER BASIN UNDER THE SUSTAINABLE GROUNDWATER MANAGEMENT ACT

THIS MEMORANDUM OF AGREEMENT ("MOA") is made and effective as of April 27, 2017, by and between the Parties executing the MOA below, each a "Party" and collectively the "Parties," with reference to the following facts:

A. In 2014, the State of California enacted the Sustainable Groundwater Management Act (Water Code Sections 10720 et seq.), referred to in this MOA as the "SGMA" or "Act," as subsequently amended, pursuant to which certain public agencies may become "Groundwater Sustainability Agencies" (GSA) and adopt "Groundwater Sustainability Plans" (GSP) in order to manage and regulate groundwater in underlying groundwater basins. The Act defines "basin" as a basin or sub-basin identified and defined in California Department of Water Resources (DWR) Bulletin 118. Each Party is a local public agency located within the Santa Ynez River Valley Groundwater Basin (Bulletin 118, Basin No. 3-15, "Basin") and is qualified to become a GSA and adopt a GSP under the Act for all or a portion of the Basin.

B. Bulletin 118 describes the Basin as being in three portions, that being eastern, central and western. The western portion consists of the Lompoc Plain, Lompoc Terrace and Lompoc Uplands; the central portion is the Buellton Uplands and the eastern portion is the Santa Ynez Uplands. For purposes of administrating its groundwater usage program and other water management functions, the Santa Ynez River Water Conservation District ("SYRWCD") also generally recognizes these hydrogeologic units. For the purpose of implementing SGMA, each portion of the Basin as described by DWR and recognized by the SYRWCD, is designated as a corresponding groundwater "Management Area" as defined by the Act.

C. The Parties are the agencies qualified to be a GSA under the Act for the Eastern (Santa Ynez Uplands) Management Area (EMA) of the Basin. The map attached hereto as Exhibit A designates the boundaries of the three Management Areas of the Basin.

D. A separate GSA for each Management Area is the most efficient approach to implement SGMA in the Basin. The three GSAs will be managed by an Intra-Basin Coordination Agreement, with the SYRWCD as the point of contact with DWR, pursuant to §10727.6 of the Act and California Code of Regulations, Title 23, §357.4. On May 23, 2016, the Parties, along with the other agencies qualified to be a GSA within the Basin, entered into a memorandum of understanding for implementing SGMA which recognized the three Management Areas corresponding to DWR's three portions of the Basin and outlined the process for formation of GSAs and development of GSPs for the Basin. These three Management Areas cover the entire Basin that is subject to SGMA. Attached as Exhibit B is a chart of the anticipated organization of the three GSAs.

E. The SYRWCD covers approximately 35 percent of the land area in the Eastern Management Area (EMA), including the City of Solvang, the communities of Santa Ynez, Los Olivos, and Ballard, many ranchettes (parcels are 5-20 acres in size) and larger agricultural parcels. These communities are provided water by the City of Solvang, the Santa Ynez River Water Conservation District-Improvement District Number 1 (or "ID No. 1"), mutual water companies and private wells. Estimates of pumping within the SYRWCD in the EMA vary widely over time and are attributed to in-fill development within the built-up areas and changes in agricultural practice. In general, areas of the Santa Ynez Uplands within the SYRWCD have produced 4,000 to 5,500 AF/year of water.

F. The Santa Barbara County Water Agency (County Water Agency) covers the remaining 65 percent of the EMA land area, including ranchettes and agricultural lands where water is provided by mutual water companies and private wells. Areas outside of the jurisdiction of a local public agency are called "Un-Managed Areas" and are under the jurisdiction of the County Water Agency. Estimates of pumping outside of the SYRWCD in the so called "Un-Managed Area" range from 10,000-12,000 AF/year of water, but may be higher.

G. Lake Cachuma (U.S. Bureau of Reclamation), small portions of Los Padres National Forest (U.S. Forest Service) and the Santa Ynez Band of Chumash Indians Reservation lie within the EMA. As Federal entities and Federally-Recognized Indian Tribe, these organizations are exempt from SGMA.

H. The SYRWCD, ID No. 1, the City of Solvang and the County Water Agency represent all the agencies (as defined by the Act) that are eligible to form a GSA in the EMA. The formation of the EMA GSA is supported by the following:

- The SYRWCD was formed in 1939 to protect the water rights and supplies of those within its borders, which in part encompasses the Santa Ynez Uplands;
- In 1949, the SYRWCD acquired 10.31% of the entitlement to the yield of the Cachuma project, principally to serve in its portion of the Santa Ynez Uplands. ID No. 1 was formed in 1959 for this purpose, to store and distribute such water, and subsequently assumed the rights and responsibilities associated with the entitlement;
- ID No. 1 later acquired SWRCB-issued licenses for three alluvial water-well fields downstream of the Cachuma Reservoir in the Santa Ynez River. ID No. 1 also produces water from the Santa Ynez Uplands and contracts for State Water Project (SWP) water, all in part to supplement the water supplies in the southwest corner of the Santa Ynez Uplands;
- Since 1979, the SYRWCD has registered wells, monitored groundwater production and tracked dewatered storage within its portions of the Santa Ynez Uplands;
- The City of Solvang diverts water from the Santa Ynez River and produces water from the Santa Ynez Uplands to serve in its portion of the Santa Ynez Uplands. Additionally, the City receives SWP water through an agreement with ID No. 1, most of which is used to augment the City water supply in the Uplands;
- The SYRWCD, ID No. 1 and the City of Solvang have collaboratively monitored and managed groundwater within the SYRWCD's portion of the EMA for many decades at significant expense to the respective entities. Approximately 40 percent of the groundwater pumped in the EMA is produced within the boundaries of the SYRWCD;
- The County Water Agency has collected groundwater level information and periodically produced County-wide reports describing the status of the County's groundwater resources, including the Santa Ynez Uplands. The County Water Agency's portion of the EMA has not been studied or managed to the same degree as the areas within the SYRWCD in the

EMA. Approximately 60 percent of the groundwater pumped in the EMA is produced within the County Water Agency's portion of the Uplands;

I. The Parties wish to provide a framework to form a GSA and to implement SGMA in the EMA, such that the implementation is through local control and management and is implemented effectively, efficiently, fairly and at a reasonable cost.

THEREFORE, in consideration of the mutual promises set forth below and to implement the goals described above, the Parties agree as follows:

1. Formation of the EMA GSA. The purpose of this MOA is to form a GSA for the EMA prior to June 30, 2017, and to facilitate a cooperative and ongoing working relationship between the Parties that will allow them to explore, study, evaluate, develop and implement mutually beneficial approaches and strategies for development of a GSP for the EMA. By execution of this MOA, the Parties collectively determine and elect to be the GSA for the Eastern Management Area of the Basin. It is presumed the EMA GSA will be the sole GSA for this portion of the Basin.

2. Development of the GSP. A separate GSP will be developed for each of the three Management Areas. An Intra-Basin Coordination Agreement will be incorporated into each GSP, as provided for in Section §10727.6 of the Act. The SYRWCD will coordinate the efforts of the Parties and be the point of contact with DWR, as defined by the Act, to meet and cooperatively develop the GSP for the EMA. In developing the GSP the GSA shall consider all beneficial uses and users of groundwater in the EMA, including the interests listed in Section §10723.2 of the Act.

3. GSA Committee. There is hereby established a GSA Committee for the EMA which shall be subject to the following:

a. Committee Membership. The GSA Committee will be comprised of one representative and an alternate from each Party. A quorum to hold a meeting shall be a simple majority of Parties (3 of the 4 Parties to this Agreement).

b. Voting will be weighted. The County Water Agency will have five votes, SYRWCD will have three votes, ID No. 1 will have two votes and the City of Solvang will have one vote in the EMA GSA Committee.

c. The GSA Committee may adopt resolutions, bylaws and policies to provide further details for conducting its affairs consistent with this MOA and applicable law. Meetings of the GSA Committee shall be called, noticed and conducted subject to the provisions of the Ralph M. Brown Act (Govt. Code sections 54950 et seq.).

d. All proposed actions or resolutions must be passed by a simple majority of the voting membership. Actions or resolutions to enter into a comprehensive MOA or Joint Powers Agency agreement ("JPA") and adopt or to approve the GSP must pass by a 70 percent vote (at least 8 votes needed) with the concurrence of each Party's governing body.

e. The terms of this MOA including, but not limited to, composition, voting procedures, and powers of the GSA Committee, and whether the GSA

Committee shall be replaced by a comprehensive MOA or JPA to implement the GSP, shall be negotiated, reviewed and reaffirmed or modified by the Parties no later than adoption of a GSP or January 31, 2021, whichever occurs first, as part of the process to adopt a GSP, which is due no later than January 31, 2022.

4. Powers of GSA. The GSA Committee shall develop the GSP and the Parties to this Agreement shall have all the powers that a GSA is authorized to exercise and to implement the GSP within the Party's respective boundaries, all consistent with the Act and DWR's regulations, including establishing budgets and imposing fees to fund GSA and GSP activities. The GSA Committee shall proceed in a timely fashion to develop a comprehensive MOA or JPA and GSP for the EMA, and consider the interests of all beneficial uses and users of groundwater within the EMA as prescribed by Section 10723.2 of the Act.

5. EMA GSP Hydrogeologic Study. The County Water Agency intends to fund and conduct a hydrogeologic study ("Study") to be used for the GSP in the EMA. The Study shall be conducted with a scope of work and on a schedule to comply with SGMA regulations with regard to GSPs and shall be coordinated with the GSPs developed in the Central and Western Management Areas of the Santa Ynez River Valley Groundwater Basin. As the Coordinating Agency, SYRWCD will consult with the County Water Agency and provide input on the selection of the consultant, and the scope and conduct of the Study.

6. Costs. All Parties shall bear the costs incurred with respect to activities under this MOA to participate on the GSA Committee and its proceedings and related matters. Specifically, each Party shall pay the costs for its staff to attend GSA Committee meetings and participate in GSA activities. The County Water Agency intends to fund the GSP hydrogeologic study as described in Section 5 above. Other costs associated with the development and implementation of the GSP shall be shared as agreed to by all of the Parties. All Parties may consider levying a charge pursuant to the Act, including, but not limited to, § 10726.8(b). There are several vehicles to capture costs for implementing the SGMA pursuant to §10730 et seq. of the Act.

7. Staff. Each Party shall designate a principal contact person, if other than the designated GSA Committee member, and other appropriate staff members and consultants to participate on such Party's behalf in activities undertaken pursuant to this MOA. The SYRWCD shall be responsible for meetings and other activities under this MOA with the GSA Committee and principal contact persons for the other Parties, and shall be the point of contact with DWR. Informal staff meetings may occur as needed.

8. Ongoing Cooperation. The Parties acknowledge that activities under this MOA will require the frequent interaction between them in order to pursue opportunities and resolve issues that arise. The Parties shall work cooperatively and in good faith. The goal of the Parties shall be to preserve flexibility with respect to the implementation of the Act and consistency with the other GSAs in the Basin, including development of a comprehensive MOA or JPA, the Study, a GSP and an Intra-Basin Coordination Agreement, which will be negotiated.

9. Notices. Any formal notice or other formal communication given under the terms of this MOA shall be in writing and shall be given personally, by facsimile, by electronic mail (email), or by certified mail, postage prepaid and return receipt requested. Any notice shall be delivered or addressed to the Parties at the mailing addresses, facsimile numbers or email addresses

set forth below under each signature and at such other address, facsimile number or email address as shall be designated by notice in writing in accordance with the terms of this MOA. The date of receipt of the notice shall be the date of actual personal service, confirmed facsimile transmission or email, or three days after the postmark on certified mail.

10. Entire Agreement/Amendments/Counterparts. This MOA incorporates the entire and exclusive agreement of the Parties with respect to the matters described herein and supersedes all prior negotiations and agreements (written, oral, or otherwise) related thereto. This MOA may be amended only in writing, as executed by all the Parties. This MOA may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

11. Termination/Withdrawal. This MOA shall remain in effect unless terminated by the unanimous consent of the voting Parties, which consent will not be unreasonably withheld. Upon 60 days written notice, any of the Parties may withdraw from this MOA provided that the withdrawal shall be in accordance with the requirements of the Act. Upon withdrawal of a Party, this MOA shall remain in effect for the remaining Parties. Nothing herein shall be construed as prohibiting a Party that has withdrawn from this GSA to become a separate groundwater sustainability agency within its jurisdiction, provided the withdrawing Party coordinates with the other Parties pursuant to the Act. A withdrawing Party shall be liable for expenses incurred through the effective date of the withdrawal and for its share of any contractual obligations incurred by the EMA GSA while the withdrawing voting Party was a party to this Agreement.

12. Assignment. No rights or duties of any of the Parties under this MOA may be assigned or delegated without the express prior written consent of all the other Parties, and any attempt to assign or delegate such rights or duties without such written consent shall be null and void.

13. Indemnification. The Parties shall each defend, indemnify and hold harmless the other Parties, and their respective directors/supervisors, officers, employees and agents, from any claims or liabilities for the indemnifying Party's acts or omissions, or that of its directors/supervisors, officers, employees and agents, arising from or related to carrying out this MOA. Any claims or liabilities by a third Party arising from or related to the Parties collective action in carrying out and/or implementing this MOA shall be defended by each Party.

14. Insurance. Each Party shall maintain its own insurance coverage, through commercial insurance, self-insurance or a combination thereof, against any claim, expense, cost, damage, or liability arising out of the performance of its responsibilities pursuant to this MOA.

15. Access to Information. The Parties shall have access to, and the right to use any and all information, data, summaries, charts, and other materials developed during and pursuant to this MOA and shall protect the confidentiality of such information as provided in this MOA and to the extent authorized by law. In furtherance thereof, the Parties will develop a confidentiality agreement to address sharing of confidential information, particularly existing confidential information that the Parties may possess that would be assist with preparation of the GSP. In the event any outside Party seeks disclosure of information developed pursuant to this MOA, the Parties shall cooperate and mutually comply with the Public Records Act.

16. Amendment. This MOA may be amended, from time to time, with the written consent of all Parties.

17. Authority. The individuals executing this MOA represent and warrant that they have the authority to enter into this MOA and to perform all acts required by this MOA, and that the consent, approval or execution of or by any third party is not required to legally bind either Party to the terms and conditions of this MOA.

18. Incorporation of Recitals. The recitals set forth above are hereby incorporated into this MOA.

WITNESS WHEREOF, the Parties have executed this MOA as of the date first above written.

SANTA YNEZ RIVER WATER CONSERVATION DISTRICT–IMPROVEMENT DISTRICT NO. 1

By: [signature]
CHRIS DAHLSTROM, General Manager

Address: P.O. BOX 157
SANTA YNEZ, CA 93460

Email cdahlstrom@syrwd.org

Facsimile 805-688-3078

CITY OF SOLVANG

By: ____________________

Address: ____________________

____

Email ____________________

Facsimile ____________________

SANTA YNEZ RIVER WATER CONSERVATION DISTRICT

By: ____________________

Address: ____________________

____

Email ____________________

Facsimile ____________________

16. Amendment. This MOA may be amended, from time to time, with the written consent of all Parties.

17. Authority. The individuals executing this MOA represent and warrant that they have the authority to enter into this MOA and to perform all acts required by this MOA, and that the consent, approval or execution of or by any third party is not required to legally bind either Party to the terms and conditions of this MOA.

18. Incorporation of Recitals. The recitals set forth above are hereby incorporated into this MOA.

WITNESS WHEREOF, the Parties have executed this MOA as of the date first above written.

SANTA YNEZ RIVER WATER CONSERVATION DISTRICT–IMPROVEMENT DISTRICT NO. 1

By: ______________________

Address: ______________________

____

Email ______________________

Facsimile ______________________

CITY OF SOLVANG

By: [signature]

Address: 1644 Oak Street

Solvang, CA 93463

Email bradv@cityofsolvang.com

Facsimile 805-686-2049

SANTA YNEZ RIVER WATER CONSERVATION DISTRICT

By: ______________________

Address: ______________________

____

Email ______________________

Facsimile ______________________

16. Amendment. This MOA may be amended, from time to time, with the written consent of all Parties.

17. Authority. The individuals executing this MOA represent and warrant that they have the authority to enter into this MOA and to perform all acts required by this MOA, and that the consent, approval or execution of or by any third party is not required to legally bind either Party to the terms and conditions of this MOA.

18. Incorporation of Recitals. The recitals set forth above are hereby incorporated into this MOA.

WITNESS WHEREOF, the Parties have executed this MOA as of the date first above written.

SANTA YNEZ RIVER WATER CONSERVATION DISTRICT–IMPROVEMENT DISTRICT NO. 1

By: ______________________________

Address: ___________________________

____

Email ___________________________

Facsimile ___________________________

CITY OF SOLVANG

By: ______________________________

Address: ___________________________

____

Email ___________________________

Facsimile ___________________________

SANTA YNEZ RIVER WATER CONSERVATION DISTRICT

By: Bruce A. Wales

Address: 3669 SAGUNTO ST. Suite 108

SANTA YNEZ, CA 93460

Email bwales@SYRWCD.COM

Facsimile 805-693-1156

SANTA BARBARA COUNTY WATER AGENCY

By: (Signatures below)

Address: ____________________

____

Email ____________________

Facsimile ____________________

ATTEST:

Mona Miyasato
County Executive Officer
Clerk of the Board, Ex Officio Clerk of the Santa Barbara County Water Agency

By: ____________________
Deputy Clerk

SANTA BARBARA COUNTY WATER AGENCY:

By: ____________________
Chair, Board of Directors

Date: 4/11/17

RECOMMENDED FOR APPROVAL:

Santa Barbara County Water Agency

By: ____________________
Department Head

APPROVED AS TO FORM:

Risk Management

By: ____________________
Risk Management

APPROVED AS TO FORM:

Michael C. Ghizzoni
County Counsel

By: ____________________
Deputy County Counsel

APPROVED AS TO ACCOUNTING FORM:

Theodore A. Fallati, CPA
Auditor-Controller

By: ____________________
Deputy

Appendix B.

Initial list of beneficial uses and users of groundwater

SANTA YNEZ RIVER VALLEY BASIN
EASTERN MANAGEMENT AREA
GROUNDWATER SUSTAINABILITY AGENCY

LIST OF ALL BENEFICIAL USES AND USERS OF GROUNDWATER

In accordance with Section 10723.2 and Section 10723.8 (a)(4) of the SGMA, the following parties have or will be contacted to determine how best to consider and protect their interests throughout the formation of the GSA and development and implementation of the GSP. These interests include, but are not limited to the following:

(a) Holders of overlying groundwater rights, including (1) agricultural users and (2) domestic water-well owners: The City of Solvang and ID No. 1 are GSA members. Domestic water-well owners and agricultural users will be invited to join the EMA GSA Advisory Committee.

(b) Municipal Well Operators: The City of Solvang and ID No. 1 are municipal well operators and members of the GSA.

(c) Public Water Systems: Representatives from several mutual water companies in the EMA will be invited to sit on the EMA GSA Advisory Committee.

(d) Local Land Use Planning Agencies: The City of Solvang is a member of the EMA GSA and the Santa Barbara County Planning Department is a member of the EMA GSA Advisory Committee.

(e) Environmental Users of Groundwater: The California Department of Fish and Wildlife (CDFW) will be consulted regarding environmental uses of groundwater, if any.

(f) Surface Water Users: The City of Solvang and ID No. 1 divert water from the alluvial underflow of the Santa Ynez River. The City of Solvang discharges wastewater to the alluvial underflow of the Santa Ynez River. CDFW will be consulted regarding environmental uses of the Santa Ynez River.

(g) Federal Government: See item (h) below.

(h) California Native American Tribes: The Santa Ynez Band of Chumash Indians maintains a reservation with the EMA and will work with the EMA GSA.

(i) Disadvantaged Communities: None were identified within the Management Area.

(j) Entities Listed in SGMA Section 10927 that are monitoring groundwater elevations in all or part of the EMA managed by the GSA: The City of Solvang and ID No. 1 monitor their respective wells and the Santa Barbara County Water Agency is the CASGEM agency within the EMA. All of them are members of the GSA.

Appendix C.

Groundwater Communication Portal (GCP)

Santa Ynez Basin Groundwater Communication Portal (GCP)

The Santa Yenz Basin is utilizing an online tool to assist with SGMA outreach efforts. The tool, referred to as the Groundwater Communication Portal (GCP), is a web-based application where basin GSAs can post events and automatically inform interested parties. Interested parties can register with the GCP to stay informed about events related to GSP development in any of the three management areas.

The GCP serves as a repository for all information about GSA meetings and interested parties. Storing all stakeholder engagement information in one place will be beneficial both for creating the communications section of the GSP and for continued tracking of outreach efforts moving forward to GSP 5-Year Updates and implementation.

The administrative functions of the GCP give administrators, such as agency and consulting staff, the power to organize and facilitate outreach efforts. A login is required for access to the administrative functions which are described below.

GCP Features

- Maintains the GSAs' lists of interested parties
- Allows interested parties to self-register
- Displays meeting details and documents
- Automatically notifies interested parties with the click of a button
- Tracks who was notified and who replied to event invitations
- Generates a calendar of events
- Supports e-mail blasts
- Tracks outreach efforts with a communication log
- Stores project documents and collects public comments

Interested Party Maintenance

The existing lists of contacts for the EMA, WMA, and CMA were imported into the GCP when it was configured. All interested parties can visit the GCP and self-register at any time. The GCP is promoted at meetings and the website is printed on collateral materials. Administrators may access and edit the interested parties list at any time and have the option to export the list to a spreadsheet format.

Event Notification

The GCP generates a calendar based on events input by administrators. Each event allows attachments of relevant documents such as agendas and presentations. Administrators can notify interested parties about an event with the click of a button. The GCP will automatically send invitations to the interested parties and track responses.

Public Comments

All interested parties are encouraged to submit comments both in general and on draft documents. Administrators upload documents for public review to the portal and choose when to open or close the comment period. The public can submit comments through the GCP using an online form. Comments are stored in a database and can be sorted by variables such as chapter, submission date, or GSA. Administrators can enter responses to comments and post for public view.

Communication Log

The communication log is used by anyone acting on behalf of the GSA to interact with stakeholders and interested parties. It tracks outreach efforts that occur outside of regular public meetings – such as phone calls, emails, in person meetings, and postal mail. When a communication occurs, the person representing the GSA is responsible to complete a form that's entered the communication log. The form collects information such as who was involved in the communication, where/when the communication occurred, and what the outcomes of the communication were. Attachments, such as scanned handwritten notes, email documents, or Word documents, can be added to the communication log for storage in the database.

E-mail blasts

An e-blast feature allows administrators to send out information that isn't attached to an event. E-blasts are useful to inform interested parties when a new document is posted for public comment or when a public comment period is closing soon.

Appendix D.

Stakeholder Survey

DRAFT Santa Ynez EMA Stakeholder Survey

Thank you for taking the time to share your thoughts and concerns with us. All information will be collected, analyzed, and shared in aggregate. Individual responses will remain confidential.

1. Are you familiar with the Sustainable Groundwater Management Act (SGMA)?
   ☐ Yes
   ☐ No

2. Are you currently engaged in activities or discussions regarding groundwater management in this region?
   ☐ Yes
   ☐ No

3. Do you own or manage land in this region?
   ☐ Yes
   ☐ No

3b. If yes, what is the approximate size (in acres) of the largest land area you own or manage in this region?
   ☐ Residential (under 1 acre)
   ☐ 1-5 acres
   ☐ 6-20 acres
   ☐ 21-100 acres
   ☐ More than 100 acres
   ☐ Decline to state

3c. If yes, please tell us about your current land use and are you planning any future changes in land use or water use in the next 20 years? *(optional)*

____

4. Where do you get your drinking water supply?
   ☐ Private well
   ☐ Mutual Water Company or Community Service District
   ☐ Unsure
   ☐ Other, please specify ________________________

4b. *If private well is selected in Q4,* what is your well depth? If you are unsure, please leave this field blank. *(optional)*

____

4c. *If private well is* selected *in Q4,* has your well ever gone dry?

- ☐ Yes
- ☐ No
- ☐ Unsure

5. Where do you get your agricultural water supply?
   - ☐ Private well
   - ☐ Mutual Water Company or Community Service District
   - ☐ N/A
   - ☐ Other, please specify ________________________

5b. *If private well is selected in Q5,* what is your well depth? If you are unsure, please leave this field blank. *(optional)*

____

5c. *If private well is* selected *in Q5,* has your well ever gone dry?

- ☐ Yes
- ☐ No
- ☐ Unsure

6. Please indicate which type(s) of stakeholder best describes you (select all that apply):
   - ☐ Residential user of water
   - ☐ Ag user of water
   - ☐ Environmental user of water
   - ☐ Entity responsible for monitoring and reporting groundwater data
   - ☐ Local land use planning agency
   - ☐ California Native American Tribe
   - ☐ Disadvantaged/Rural Community
   - ☐ Federal government
   - ☐ Other, please specify ___________________

7. Do you manage water resources?
   - ☐ Yes
   - ☐ No

7b. If yes, please tell us more about your role. *(optional)*

____

8. What is your primary interest in land or water resource management? *(optional)*

____

9. Do you have concerns about groundwater management?
   - ☐ Yes
   - ☐ No

9b. If yes, what are your groundwater management concerns? *(optional)*

____

10. What do you see as the governance challenges for groundwater management? *(optional)*

____

____

____

11. Do you have recommendations regarding groundwater management?
   - ☐ Yes
   - ☐ No

11b. If yes, what are your groundwater management recommendations? *(optional)*

____

12. What are your preferred solutions to achieve groundwater sustainability? *(optional)*

____

____

____

13. Through which mediums would you prefer to receive SGMA updates, public meeting notices, etc.? *Select all that apply.*
   - ☐ Email
   - ☐ Website
   - ☐ Public workshops/meetings
   - ☐ Direct postal mail
   - ☐ Direct call
   - ☐ Along with my water bill
   - ☐ Newspaper
   - ☐ Social media
   - ☐ Radio
   - ☐ Other, please specify ________________________

14. Please use the space below to share any other information, thoughts, concerns, etc. regarding groundwater management in your area. *(optional)*

____

15. Please identify any other individuals, agencies, groups, resources, experts, etc. you'd recommend us being in contact with as we develop the EMA GSP. *(optional)*

____

Please provide your contact information below.

Name: ____________________________________ Date: _______________________________

Organization or Business Name: ____

Address: ____

____

Phone: ____________________________________ Email: _______________________________

Appendix E.

Letter from Santa Ynez Band of Chumash Indians Tribal Chairman, Kenneth Kahn, August 2016

SANTA YNEZ BAND OF CHUMASH INDIANS
P.O. BOX 517 · SANTA YNEZ · CA · 93460
Tel: 805.688.7997 · Fax: 805.686.9578
www.santaynezchumash.org

August 19, 2016

Mr. Bruce Wales, General Manager
Santa Ynez River Water Conservation District
P.O. Box 719
Santa Ynez, CA 93460

Re: Santa Ynez Band of Chumash Indians Reservation Participation in SGMA - Santa Ynez River Valley Groundwater Basin

Dear Mr. Wales:

Thank you for meeting with the Santa Ynez Band of Chumash Indians ("Tribe") Business Committee on June 29, 2016 regarding implementation of the Sustainable Groundwater Management Act ("SGMA") in the Santa Ynez River Valley Groundwater Basin ("SYR Basin").

We understand that the Santa Ynez River Water Conservation District ("SYRWCD") is currently working on draft agreements to form Groundwater Sustainability Agencies ("GSA") for the entire SYR Basin, including the Eastern Management Area ("Santa Ynez Upland") where the Santa Ynez Band of Chumash Indians Reservation ("Reservation") is located.

As you are aware, the Reservation is not subject to SGMA. Nonetheless, the Reservation is within the boundaries of the SYRWCD and receives potable water from Improvement District No. 1 ("ID1"). As such, the Tribe would like to work with the SYRWCD, with regard to the Reservation, in its effort to create the GSA.

We look forward to working with the SYRWCD on this task of great importance. Please contact me directly or Sam Cohen, Government Affairs and Legal Officer (Cell: 805-245-9083), if we can be of further assistance.

Sincerely,

Kenneth Kahn
Tribal Chairman

Appendix F.

Santa Ynez Valley Groundwater Basin, Eastern Management Area
Groundwater Sustainability Agency Citizen Advisory Group Guidelines

Santa Ynez River Valley Groundwater Basin

Eastern Management Area Groundwater Sustainability Agency

Citizen Advisory Group Guidelines

The Eastern Management Area (EMA) Groundwater Sustainability Agency (GSA) Committee, comprised of officials appointed from the member agencies of the EMA GSA (Santa Ynez River Water Conservation District; Santa Ynez River Water Conservation District, Improvement District No.1; City of Solvang; and Santa Barbara County Water Agency) is responsible for implementing the requirements of the Sustainable Groundwater Management Act (SGMA) in the EMA of the Santa Ynez River Valley Groundwater Basin (Basin) and for coordinating its activities with other agencies and GSAs in the Basin. Among other comprehensive efforts, the EMA GSA Committee (Committee) is overseeing the preparation of a Groundwater Sustainability Plan (GSP) for the EMA. Members of the public are strongly encouraged by the Committee to attend all meetings of the EMA GSA and to provide input and information to the Committee throughout the GSP development process. Additionally, the Committee is forming a Citizens Advisory Group (CAG) to provide an additional level of public input to the Committee on various issues related to the preparation of the GSP. The Western Management Area (WMA) GSA and the Central Management Area (CMA) GSA are also considering the designation of a CAG or similar group for their respective portions of the Basin.

Purpose of the Citizens Advisory Group

SGMA requires the Committee to consider the interests of diverse social, cultural, and economic elements of the population within the EMA during development of the GSP, including the interests of all beneficial uses and users of groundwater. Collaborative and inclusive processes will assist in making the GSP more resilient by increasing public buy-in, promoting compliance, and enhancing the quality of information on which the GSP is based. The Committee has established an open and ongoing list of interested persons to whom notices are and will be sent regarding meetings of the EMA GSA, GSP development, and other SGMA-related activities. The purpose of a CAG is to provide an additional level of public input to the Committee in a way that represents different categories of groundwater uses and users in the EMA as set forth by SGMA. At various points during development of the GSP, the CAG may be asked to provide its perspective on elements or sections of the GSP and on the final draft of the GSP that will be submitted to the California Department of Water Resources (DWR).

To ensure an efficient and collaborative process, the Committee will appoint members to the CAG that reflect a diversity of interests and different types of groundwater uses and users in the EMA. As requested by the Committee, the CAG will provide input to the Committee relating to various elements or sections of the GSP, including but not limited to those pertaining to stakeholder engagement, data management, the hydrogeologic conceptual model and numeric groundwater model, water budgets, sustainability goals, monitoring programs, and projects and management actions.

Roles and Responsibilities

The Committee is solely responsible for all matters relating to the CAG, including but not limited to the formation, membership, function, organization, operation, management, and dissolution of the CAG. The Committee may request staff from the member agencies of the EMA GSA to help administer the CAG process.

Staff Role. Responsibility for carrying out administrative aspects of the CAG process may be delegated to staff from the member agencies of the EMA GSA. At the request of the Committee, staff will schedule CAG meetings, prepare and circulate agendas, distribute materials to the CAG members for review, facilitate the meetings, prepare meeting minutes, and undertake other related tasks.

CAG Member Role. At times determined by the Committee, CAG members will be asked to provide input or recommendations on various elements or sections of the GSP and related topics. In addition to providing their individual perspectives, CAG members serve in respective capacities that represent different categories of groundwater uses and users in the EMA. All CAG members are expected to work collaboratively with each other, with other stakeholders and members of the public, with the Committee, with staff of the member agencies of the EMA GSA, and with the other GSAs, related agencies, and agency staff members throughout the Basin. CAG members may be asked to develop consensus opinions, comments, and input on the topics they are asked to address, recognizing however that consensus among the CAG members may not always be practicable and may not occur for a given topic. Input received from the CAG will be considered by the Committee in the process of developing the EMA GSP and in coordinating those efforts with the WMA GSA and the CMA GSA in the development of their respective GSPs. Member of the CAG serve on a strictly voluntary basis and, subject to being dismissed from the CAG at the discretion of the Committee, all CAG members are expected to be available and commit their time and efforts for the entire GSP process through at least January 2022.

Governance. All matters relating to the CAG, including but not limited to the formation, membership, function, organization, operation, management, and dissolution of the CAG shall remain within the sole discretion of the Committee. Certain procedural items relating to the CAG are set forth below.

Applications and CAG Selection. In order to be considered for selection as a member of the CAG, individuals must complete and submit an Application to the Committee. The Application form, included with these Guidelines as Attachment A, solicits specific information about the applicant, including the applicant's interest in serving on the CAG and the applicant's background and related qualifications. The Committee, and/or ad hoc subcommittee thereof, and/or staff of the member agencies of the EMA GSA, will review and evaluate the applications received. Applicant interviews may be conducted, and all selections to the CAG shall be made by and within the sole discretion of the Committee. The CAG applications will be screened by an ad-hoc committee consisting of one or more EMA GSA Committee members with the assistance of staff from the EMA member agencies. Applications are due June 21, 2019 by 5 PM.

Please send them to: Bill Buelow at bbuelow@SYRWCD.com, or by mail P.O. 719, Santa Ynez, CA 93460.

Composition of the CAG. The Committee shall determine how many members will serve on the CAG, where initially it is anticipated that the CAG will have a total of seven (7) members. Depending on applications received and other factors, and at any time, the Committee may decide to change the size of the CAG, tailor its representative composition, or determine not to form or to dissolve the CAG.

Term of the CAG. Initially it is expected that the CAG will be in place at least through the submittal of the GSP to DWR in January of 2022.

Dismissal of CAG Members. CAG members serve at-will and at the pleasure of the Committee. In its sole discretion, the Committee may dismiss any member or all members of the CAG at any time with or without cause.

Filling a Vacancy on the CAG. In the event a vacancy occurs on the CAG, the Committee may appoint a new member to fill the vacancy without conducting a new application process, or may re-open the application process to fill the vacancy.

Meetings. The need for and frequency of CAG meetings shall be determined by the Committee, where initially it is anticipated that regular CAG meetings will be scheduled approximately two weeks after each regular quarterly meeting of the EMA GSA, provided that the Committee may call for fewer or additional CAG meetings on an as-needed basis.

ATTACHMENT A

Santa Ynez River Valley Groundwater Basin

Eastern Management Area Groundwater Sustainability Agency

Citizen Advisory Group Application

If you are interested in serving on the Citizen Advisory Group (CAG) for the Santa Ynez River Valley Groundwater Basin Eastern Management Area (EMA) Groundwater Sustainability Agency (GSA), please complete and return the following Application to Bill Buelow (bbuelow@syrwcd.com) by June 21, 2019.

The Eastern Management Area (EMA) Groundwater Sustainability Agency (GSA) Committee, comprised of officials appointed from the member agencies of the EMA GSA (Santa Ynez River Water Conservation District; Santa Ynez River Water Conservation District, Improvement District No.1; City of Solvang; and Santa Barbara County Water Agency) is responsible for implementing the requirements of the Sustainable Groundwater Management Act (SGMA) in the EMA of the Santa Ynez River Valley Groundwater Basin (Basin) and for coordinating its activities with other agencies and GSAs in the Basin. Among other comprehensive efforts, the EMA GSA Committee (Committee) is overseeing the preparation of a Groundwater Sustainability Plan (GSP) for the EMA. Members of the public are strongly encouraged by the Committee to attend all meetings of the EMA GSA and to provide input and information to the Committee throughout the GSP development process. The Committee is forming the CAG to provide an additional level of public input to the Committee on various issues related to the preparation of the GSP. The Western Management Area (WMA) GSA and the Central Management Area (CMA) GSA are also considering the designation of a CAG or similar group for their respective portions of the Basin.

SGMA requires the Committee to consider the interests of diverse social, cultural, and economic elements of the population within the EMA during development of the GSP, including the interests of all beneficial uses and users of groundwater. Collaborative and inclusive processes will assist in making the GSP more resilient by increasing public buy-in, promoting compliance, and enhancing the quality of information on which the GSP is based. The Committee has established an open and ongoing list of interested persons to whom notices are and will be sent regarding meetings of the EMA GSA, GSP development, and other SGMA-related activities. The purpose of a CAG is to provide an additional level of public input to the Committee in a way that represents different categories of groundwater uses and users in the EMA as set forth by SGMA. At various points during development of the GSP, the CAG may be asked to provide its perspective on elements or sections of the GSP and on the final draft of the GSP that will be submitted to the California Department of Water Resources (DWR).

As set forth in the CAG Guidelines, members of the CAG are selected by the Committee and serve at the discretion of the Committee for a process that is expected to last at least through completion of the GSP in January 2022. Replacements on the CAG, if needed, would be made by the Committee.

ATTACHMENT A

Name: ____

Mailing Address: ____

Daytime Phone Number: ____

What is your relationship to the Eastern Management Area of the Santa Ynez River Valley Groundwater Basin? (See Attached Map)

Please check all that apply:

- ☐ Resident
- ☐ NGO Representative
- ☐ Domestic Well Owner/Producer
- ☐ Agricultural Well Owner/Producer
- ☐ Public Agency Representative
- ☐ California Native American Tribe
- ☐ Landowner
- ☐ Business Owner
- ☐ Representative of a landowner
- ☐ Other: ________________________

Why are you interested in serving on the CAG? (Please use additional page if more space is needed.)

What type or category of groundwater uses or users in the Eastern Management Area do you propose to represent?

What unique experience or expertise will you contribute if selected to the CAG? Please explain any technical knowledge you have regarding water resource issues in the EMA. (Please use additional page if more space is needed.)

ATTACHMENT A

Are you committed to fully participate in the CAG process through completion of the GSP in January 2022? Do you have particular time or timing limitations that may impact your ability to serve as a member of the CAG?

Please provide the names and contact information for three personal and/or professional references.

1.

Name: ____

Affiliation/Relationship: ____

Daytime Phone Number: ____

2.

Name: ____

Affiliation/Relationship: ____

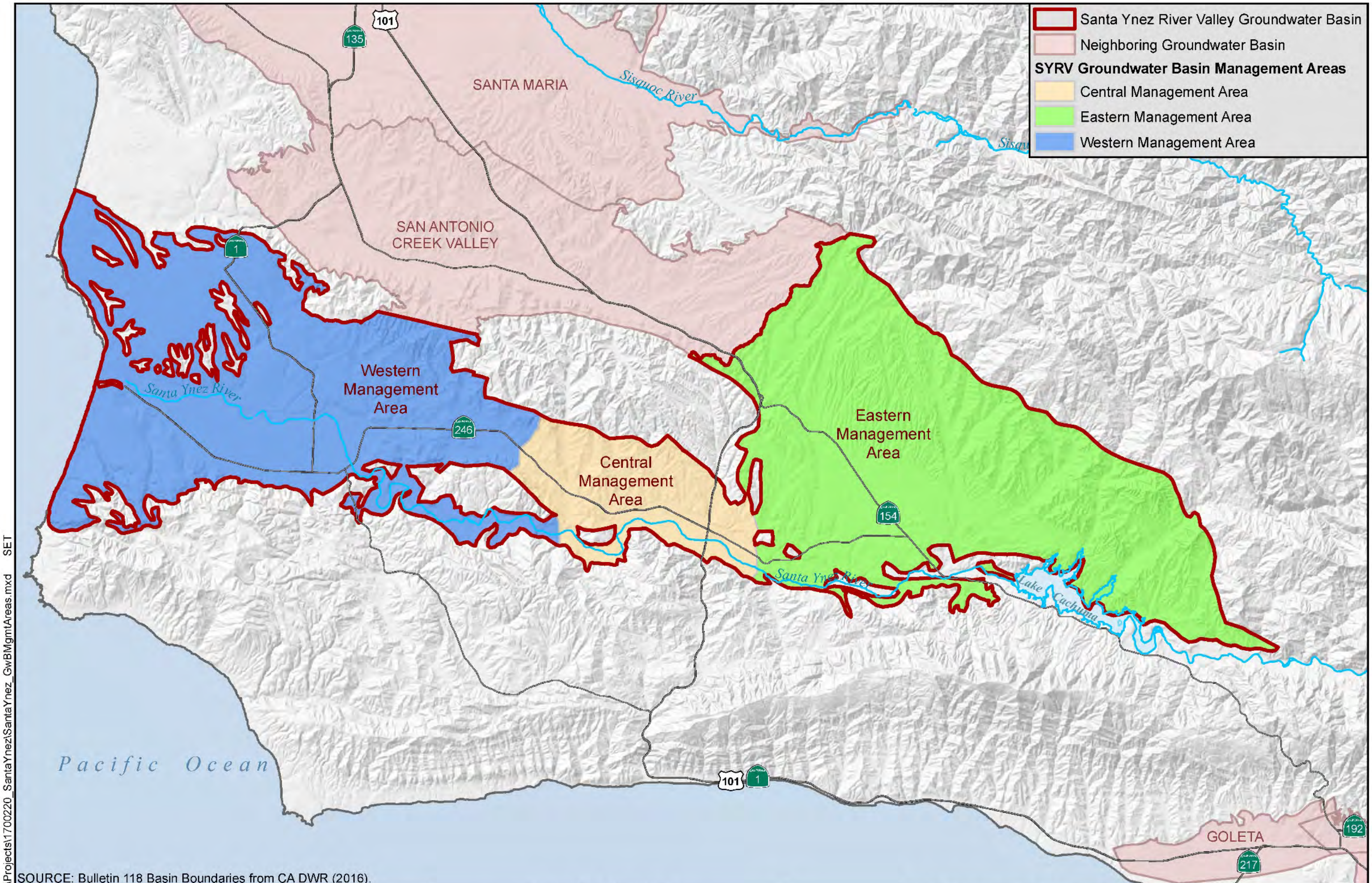
Daytime Phone Number: ____

3.

Name: ____

Affiliation/Relationship: ____

Daytime Phone Number: ____



SOURCE: Bulletin 118 Basin Boundaries from CA DWR (2016).

Santa Ynez River Valley
Groundwater Basin GSA Formation
Santa Barbara County, California

SANTA YNEZ RIVER VALLEY GROUNDWATER BASIN MANAGEMENT AREAS

APRIL 2019

FIGURE 1

25Jan2017 Z:\Projects\1700220_SantaYnez\SantaYnez_GwBMgmtAreas.mxd SET

Santa Ynez River Valley Groundwater Basin
Sustainable Groundwater Management Act
Quarterly Newsletters

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Sustainable Groundwater Management Quarterly Newsletter No. 1 June 2020

Santa Ynez River Valley Groundwater Basin (SYRVGB)

The Sustainable Groundwater Management Act (SGMA), signed into law in 2014, created a new framework for groundwater management in California. SGMA established a new structure for local groundwater management through Groundwater Sustainability Agencies (GSAs). The SYRVGB has three management areas each with their own GSA Committee comprised of local participating Agencies:

Western Management Area (WMA) GSA Committee

- Santa Ynez River Water Conservation District • City of Lompoc
- Mission Hills CSD • Vandenberg Village CSD
- Santa Barbara County Water Agency

Central Management Area (CMA) GSA Committee

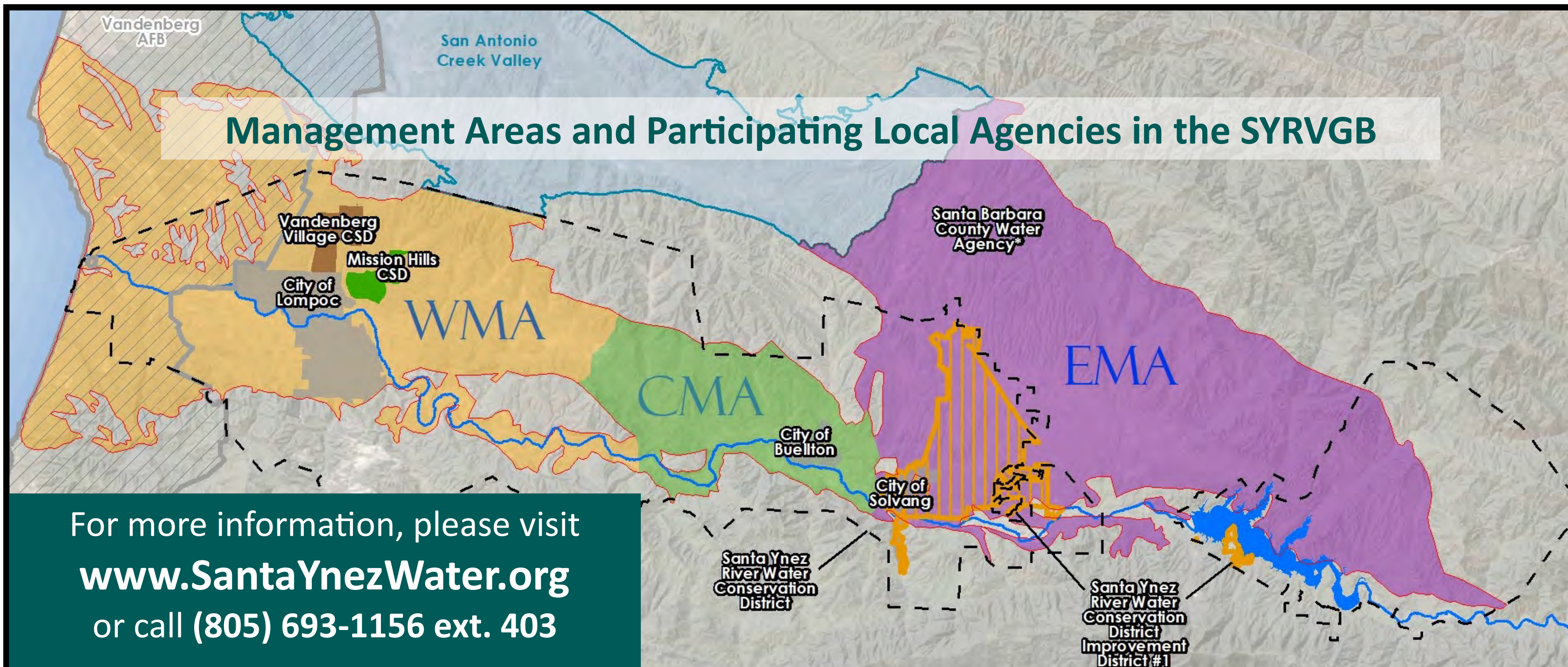
- Santa Ynez River Water Conservation District • City of Buellton
- Santa Barbara County Water Agency

Eastern Management Area (EMA) GSA Committee

- Santa Ynez River Water Conservation District • City of Solvang
- Santa Barbara County Water Agency • Santa Ynez River Water Conservation District, Improvement District No. 1

Each GSA Committee is preparing its own Groundwater Sustainability Plan (GSP) that will describe the path to groundwater sustainability. **The GSPs will determine how much groundwater can be used in the future and could include restrictions on pumping.**

All three GSPs will be completed in early 2022. Progress updates will be given in each quarterly GSA Committee meeting and draft documents will be available for public review and comment on the website (*www.SantaYnezWater.org*). **Participation by members of the community in developing the GSPs is important and each of the GSA Committees has adopted an outreach and engagement plan to guide the public participation process.**



Boletín trimestral de la Gestión Sostenible de las Agua Subterránea No. 1 junio 2020

Cuenca de Agua Subterránea del Valle del Río Santa Ynez (SYRVGB, por sus siglas en inglés)

La Ley de Gestión Sostenible de las Aguas Subterránea (SGMA, por sus siglas en inglés), firmado en ley en el 2014, estableció un nuevo marco para la gestión de el agua subterránea en California. La SGMA estableció una nueva estructura para la gestión del agua subterránea local por medio de Agencia de Sostenibilidad del Agua Subterránea (GSA, por sus siglas en inglés). La SYRVGB tiene tres zonas de gestión, cada una con su propio comité de GSA compuesto por agencias participantes locales:

Zona de Gestión del Oeste (WMA, por sus siglas en inglés) Comité de GSA

- Distrito de Conservación de Agua del Río Santa Ynez • Ciudad de Lompoc
- Mission Hills CSD • Vandenberg Village CSD
- Agencia de Agua del Condado de Santa Bárbara

Zona de Gestión Central (CMA, por sus siglas en inglés) Comité de GSA

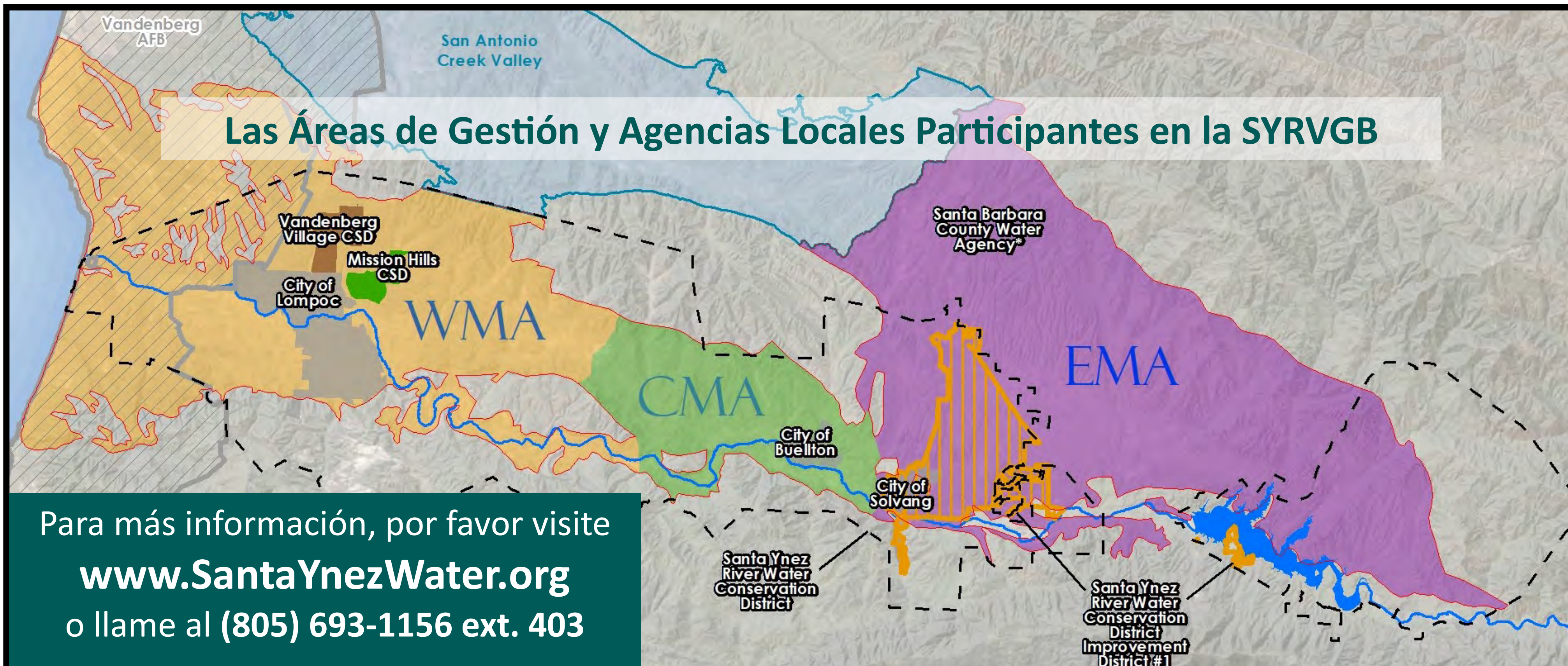
- Distrito de Conservación de Agua del Río Santa Ynez • Ciudad de Buellton
- Agencia de Agua del Condado de Santa Bárbara

Zona de Gestión del Este (EMA, por sus siglas en inglés) Comité de GSA

- Distrito de Conservación de Agua del Río Santa Ynez • Ciudad de Solvang
- Agencia de Agua del Condado de Santa Bárbara • Agua del Río Santa Ynez Distrito de Conservación, Distrito del Mejoramiento No. 1

Cada comité de GSA está preparando su propio Plan de Sostenibilidad del Agua Subterránea (GSP, por sus siglas en inglés) que describirá el camino para la sostenibilidad de el agua subterránea. **Los GSPs determinarán cuanta agua subterránea se puede usar en el futuro y podría incluir restricciones en el bombeo.**

Los tres GSPs se completarán a principios del 2022. Se darán actualizaciones de progreso en cada junta trimestral del Comité de GSA y los documentos estarán disponibles al público para revisar y comentar en la página web (*www.SantaYnezWater.org*). **Es importante la participación de los miembros de la comunidad en el desarrollo de los GSPs y cada uno de los comités de GSA han adoptado un plan de alcance y compromiso para guiar el proceso de la participación del público.**



Las Áreas de Gestión y Agencias Locales Participantes en la SYRVGB

Para más información, por favor visite

www.SantaYnezWater.org

o llame al **(805) 693-1156 ext. 403**

Sustainable Groundwater Management Act Newsletter No. 2 December 2020

Santa Ynez River Valley Groundwater Basin

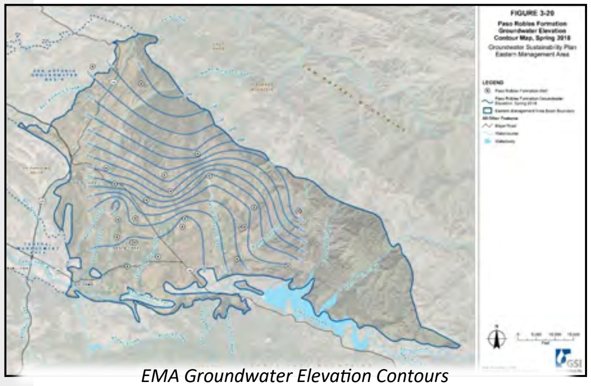
Check SantaYnezWater.org for schedule of Public Meetings and Workshops

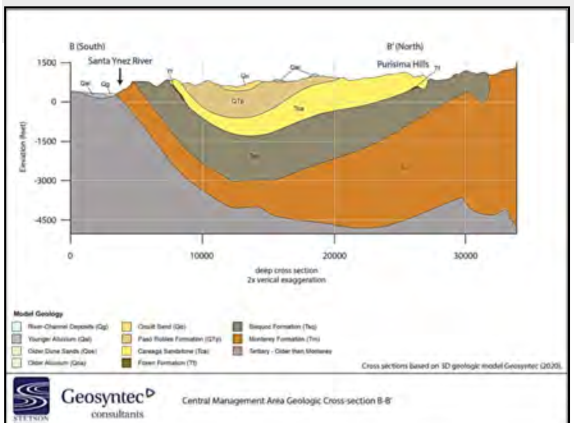
The Sustainable Groundwater Management Act (SGMA), enacted January 2015, creates a new framework for groundwater management. The management plan developed by this process will regulate future groundwater use and will be completed in early 2022.

In accordance with SGMA, DRAFT Hydrogeological Conceptual Models (HCM) have been prepared for each management area within the Santa Ynez River Groundwater Basin, including the Eastern Management Area (EMA), the Central Management Area (CMA), and the Western Management Area (WMA). Each HCM describes the basin setting and outlines the physical characteristics of the specific management area, identifies principal aquifers, and the uses and users of groundwater. The HCM documents for the EMA, CMA, and WMA are **now available for public review and comment at *SantaYnezWater.org***. Additional DRAFT documents describing groundwater conditions will be released for public review and comment, soon.

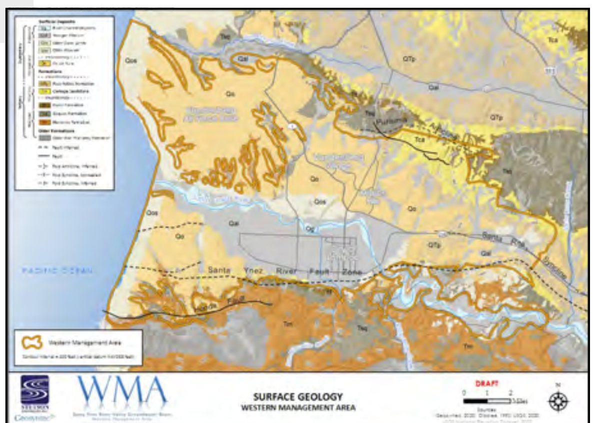
Hydrogeological Conceptual Model:
Provides understanding of basin setting, physical characteristics and basin geometry (geology), hydrogeologic conditions, land use, and groundwater uses and users.

HCMs include a series of geologic maps and scaled cross-sections to provide a representation and geographic view of different data sets, as demonstrated by these examples from the draft HCMs.


EMA Groundwater Elevation Contours



CMA Geologic Cross-section


WMA Surface Geology

For more information, meeting announcements, and draft documents, please visit

SantaYnezWater.org
or call **(805) 693-1156 ext. 403**

Sustainable Management Criteria

Sustainable Groundwater Management is defined by the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon, 20 years, without causing undesirable results.

Avoidance of undesirable results is measured through **six sustainability indicators:**

The Groundwater Sustainability Agency Committees will request public feedback on the **six sustainability indicators** and associated undesirable results based on findings presented by the basin's consultants. Public feedback to establish undesirable results thresholds will be considered to work toward sustainable groundwater management. Public participation is important at this step to develop appropriate undesirable results thresholds in order to develop a plan for sustainable groundwater management. For meeting announcements and information on how to participate, please visit the website at *SantaYnezWater.org* .

Boletín Informativo No. 2 de la Ley de Gestión Sostenible del Agua Subterránea Diciembre 2020

Cuenca de Agua Subterránea del Valle del Río Santa Ynez

La Ley de Gestión Sostenible del Agua Subterránea (SGMA, por sus siglas en inglés), promulgada en enero del 2015, crea un nuevo marco para la sostenibilidad del agua subterránea. El plan de sostenibilidad desarrollado por este proceso regulará el uso futuro del agua subterránea y se completará a principios de 2022.

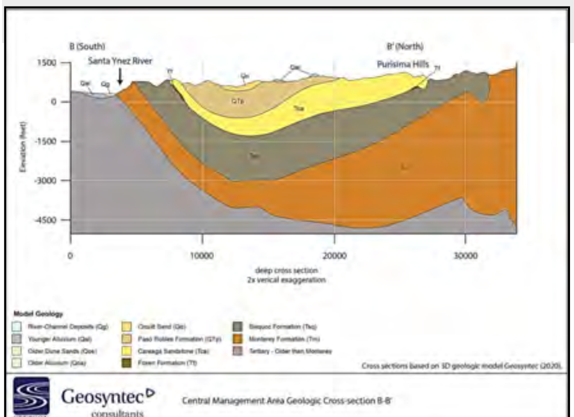
De acuerdo con la SGMA, se han preparado BORRADORES de Modelos Conceptuales Hidrogeológicos (HCM, por sus siglas en inglés) para cada área de gestión dentro de la Cuenca de Agua Subterránea del Río Santa Ynez, incluyendo el Área de Gestión Oriental (EMA, por sus siglas en inglés), el Área de Gestión Central (CMA, por sus siglas en inglés) y el Área de Gestión Occidental (WMA, por sus siglas en inglés). Cada HCM describe el entorno de la cuenca y describe las características físicas del área de gestión específica, identifica los principales acuíferos, y los usos y usuarios del agua subterránea. Los documentos de HCM para EMA, CMA, y WMA ya **están disponibles para su revisión y comentarios públicos en *SantaYnezWater.org*.** Pronto se publicarán documentos BORRADORES adicionales que describen las condiciones del agua subterránea para su revisión y comentarios públicos.

Visite SantaYnezWater.org para conocer el calendario de Reuniones Públicas y Talleres

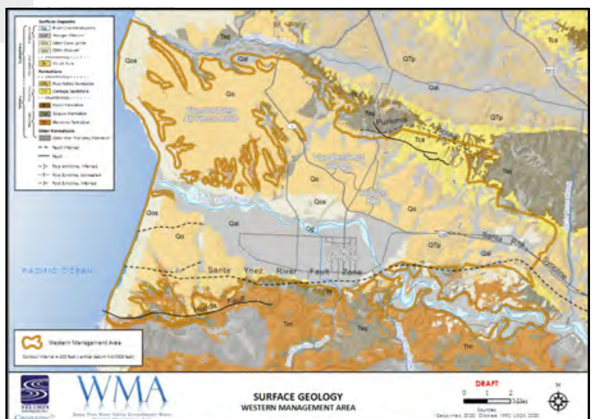
Modelo Conceptual Hidrogeológico: Proporciona una comprensión del entorno de la cuenca, las características físicas y la geometría de la cuenca (geología), las condiciones hidrogeológicas, el uso de la tierra y los usos y usuarios del agua subterránea.

Los HCM incluyen una serie de mapas geológicos y secciones transversales escaladas para proporcionar una representación y vista geográfica de diferentes conjuntos de datos, como lo demuestran estos ejemplos de los borradores de HCM.

Contornos de Elevación de Agua Subterránea EMA



Sección Transversal Geológica CMA



Geología de Superficie WMA

Criterios de Gestión Sostenible

La Gestión Sostenible del Agua Subterránea se define como la gestión y uso del agua subterránea de manera que se pueda mantener durante el horizonte de planeación e implementación, 20 años, sin generar resultados indeseables.

El evitar resultados indeseables se mide a través de **seis indicadores de sostenibilidad:**

Los Comités de la Agencia de Sostenibilidad del Agua Subterránea solicitarán la retroalimentación del público sobre los **seis indicadores de sostenibilidad** y los resultados indeseables asociados basados en los hallazgos presentados por los consultores de la cuenca. Se considerará que la retroalimentación del público para establecer umbrales de resultados no deseados tiene como fin la gestión sostenible del agua subterránea. La participación pública es importante en este paso para desarrollar umbrales de resultados indeseables apropiados con el fin de desarrollar un plan de sostenibilidad del agua subterránea. Para conocer los anuncios de reuniones e información sobre cómo participar, visite el sitio web *SantaYnezWater.org.*

Para obtener más información, anuncios de reuniones, y documentos preliminares, visite

SantaYnezWater.org

o llame al **(805) 693-1156 ext. 403**

Sustainable Groundwater Management Act Newsletter No. 3 March 2021

Santa Ynez River Valley Groundwater Basin

The Sustainable Groundwater Management Act (SGMA), enacted January 2015, creates a new framework for groundwater management. The management plan developed by this process will regulate future groundwater use and will be completed in early 2022.

Check SantaYnezWater.org for schedule of Public Meetings and Workshops

The building blocks that inform a Groundwater Sustainability Plan (GSP) are:

Basin Setting

Characterizes the basin, evaluates and assesses current and historical conditions, and quantifies groundwater flows into and out of the basin.

Summarized through the Hydrological Conceptual Model, Groundwater Conditions, and Water Budget.

Drafts Completed

Numerical Groundwater Model

A computational method that represents an approximation of the hydrologic system.

A useful tool for estimating the potential hydrologic effects of proposed water management activities.

Pending

Sustainable Management Criteria (SMC) Workshops

Emphasizing local control of groundwater management through public engagement.

Workshops are utilized to establish appropriate thresholds for undesirable results to develop a plan for sustainable groundwater management.

Coming Soon

Groundwater Sustainability Plan Sections

Plan Area and Basin Setting

- Description of the Plan Area
- Basin Setting

Sustainable Management Criteria

- Sustainability Goal
- Measurable Objectives
- Minimum Thresholds
- Undesirable Results
- Monitoring Network

Actions to Achieve Sustainability Goal

- Proposed Projects
- Proposed Management Actions

Plan Implementation

- Estimate of GSP Costs
- Schedule
- Annual Reporting
- Periodic Evaluations

The various DRAFT documents/chapters released for this plan will be compiled and form the larger GSP document as shown to the left. There are **multiple opportunities for the public to comment** on the chapters and full GSP before it is finalized in 2022.

For more information, meeting announcements, and to review and comment on draft documents, please visit

SantaYnezWater.org or call **(805) 693-1156 ext. 403**

Boletín sobre la Ley de Gestión Sostenible del Agua Subterránea No. 3 Marzo 2021

Cuenca del Agua Subterránea del Rio Valle Santa Ynez

Visite SantaYnezWater.org para programar las Reuniones y los Talleres Públicos

La Ley de Gestión Sostenible del Agua Subterránea (SGMA, por sus siglas en inglés), promulgada en enero de 2015, crea un marco para la gestión del agua subterránea. El plan de gestión desarrollado por este proceso regular el uso futuro del agua subterránea y se completará a principios del 2022.

Los componentes que informan el Plan de Sostenibilidad del Agua Subterránea (GSP, por sus siglas en inglés) son:

Configuración de la Cuenca

Caracteriza la cuenca, evalúa y determina las condiciones actuales e históricas, y cuantifica el flujo del agua subterránea hacia y desde la cuenca.

Resumido por el Modelo Conceptual Hidrológico, las Condiciones del Agua Subterránea y el Presupuesto del Agua.

Proyectos Finalizados

Modelo del Agua Subterránea Numérica

Un método computacional que representa una aproximación del sistema hidrológico .

Una herramienta útil para calcular los efectos hidrológicos potenciales de las actividades propuestas sobre la gestión del agua.

Pendiente

Talleres Sobre los Criterios de la Gestión Sostenible (SMC)

Enfatizar el control local de la gestión del agua subterránea a través de la participación del público.

Los talleres se utilizan para establecer umbrales adecuados de los resultados no deseables para poder desarrollar un plan para la gestión del agua subterránea sostenible.

Próximamente

Secciones del Plan de Sostenibilidad Del Agua Subterránea

Espacio del Plan y Configuración de la Cuenca

- Descripción del Espacio del Plan
- Caracteriza la cuenca

Criterios para la Gestión de Sustentabilidad

- Meta de Sostenibilidad
- Objetivos Mensurables
- Umbrales Mínimos
- Resultados No Deseables
- Red de Monitoreo

Acciones para Lograr el Objetivo de Sostenibilidad

- Proyectos Propuestos
- Acciones de Gestión Propuestas

Implementación del Plan

- Estimado del Costo del GSP
- Calendario
- Reporte Annual
- Evaluaciones Periódicas

Los diversos BORRADORES de los documentos y capítulos publicados para este plan serán recopilados a partir del documento GSP más grande como se muestra a la izquierda. **Habrá múltiples oportunidades para que el público comente** sobre los capítulos y el GSP completo antes de que se finalice el proyecto en el 2022.

Para más información, anuncios sobre las juntas, o para revisar y comentar sobre los documentos, por favor visite

SantaYnezWater.org o llame al (805) 693-1156 ext. 403

Sustainable Groundwater Management Act Newsletter No. 4 June 2021

Santa Ynez River Valley Groundwater Basin

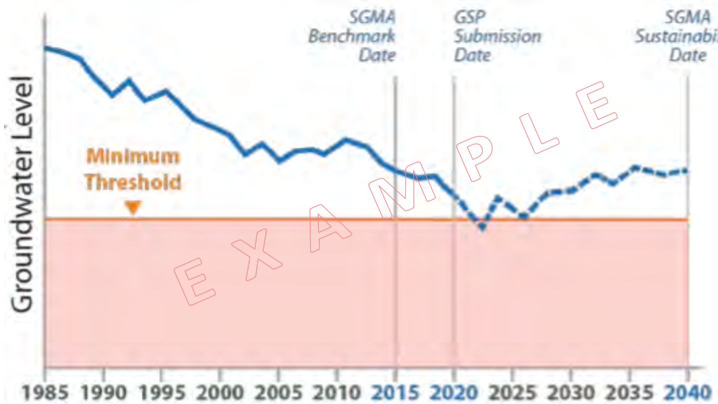
The Sustainable Groundwater Management Act (SGMA), enacted January 2015, creates a new framework for groundwater management. The management plan (GSP) developed by representatives from local municipalities and agencies will manage and regulate future groundwater use. The GSP will be completed in early 2022.

Check SantaYnezWater.org for schedule of Public Meetings and Workshops

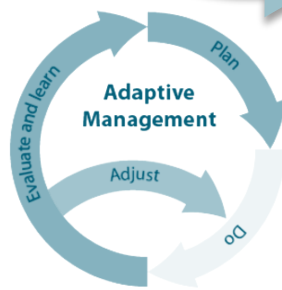
Groundwater Sustainability Agencies (GSAs) must consider and document the condi ons at which each of the six sustainability indicators become signi cant and unreasonable in their basin.

Setting Minimum Thresholds

Based on the GSA's decision of what is signifi ant and unreasonable, they will choose a representativ value that is to be avoided. This value becomes the **Minimum Threshold**.



Avoidance of the de ned undesirable results must be achieved within 20 years of Groundwater Sustainability Plan (GSP) implementatio . GSPs must clearly defin a planned pathway to reach sustainability.



Potential Management Actions and Projects

1. Identify list of management actio s and projects
2. Evaluate benefit and costs
3. Select subset of preferred management actions and projects and prioriti e them
4. Develop implementa on plan and schedule

Relationship between Minimum Thresholds and Management Actions

- Early management ac ons to be initiate upon submi al of the GSP.
- Regularly monitor and evaluate six sustainability indicators to take actions BEFORE Minimum Threshold is reached.
- Use projects and management actio s assessed in the GSP to avoid undesirable results caused by exceeding Minimum Thresholds.

For more information, meeting announcements, and to review and comment on draft documents, please visit
SantaYnezWater.org or call **(805) 693-1156 ext. 403**

Boletín sobre la Ley de Gestión Sostenible del Agua Subterránea No. 4 Junio 2021

Cuenca del Agua Subterránea del Rio Valle Santa Ynez

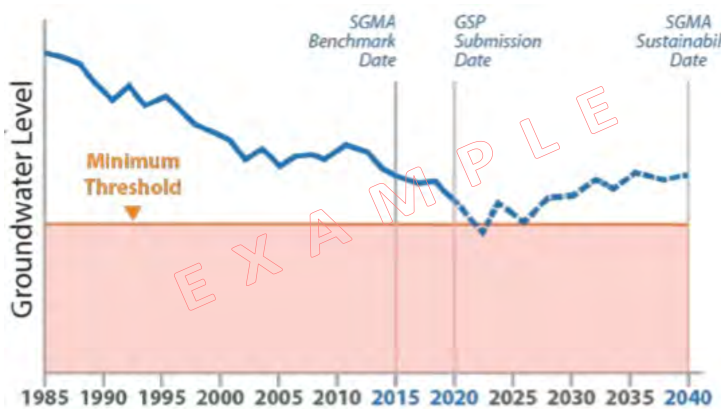
La Ley de Gestión Sostenible del Agua Subterránea (SGMA), promulgada en Enero del 2015, crea un nuevo marco para la gestión del agua subterránea. El plan de gestión (GSP) elaborado por representantes de los municipios y organismos locales, gestionará y regulará el futuro uso del agua subterránea y estará completado a principios del 2022.

Visite SantaYnezWater.org para programar las Reuniones y los Talleres Públicos

Las Agencias de Sostenibilidad del Agua Subterránea (GSAs) deben considerar y documentar las condiciones en las que cada uno de los seis indicadores de sostenibilidad se vuelven significativos y no razonables en su cuenca.

Establecimiento de Umbrales Mínimos

Basándose en la decisión de la GSA sobre lo que es significativo y no razonable, elegirán un valor representativo que debe ser evitado. Este valor se convierte en el **Umbral Mínimo**.



Se deben evitar los resultados no deseables definidos en un plazo de 20 años a partir de la implementación del Plan de Sostenibilidad del Agua Subterránea (GSP). Los GSP deben definir claramente una vía planificada para alcanzar la sostenibilidad.

Posibles Acciones y Proyectos de Gestión

1. Identificar la lista de acciones y proyectos de gestión
2. Evaluar los beneficios y costos
3. Seleccionar un subconjunto de acciones y proyectos de gestión preferentes y priorizarlos
4. Desarrollar un plan y un cronograma de implementación

Relación entre los Umbrales Mínimos y las Acciones de Gestión

- Las acciones tempranas de gestión se iniciarán tras la presentación del GSP.
- Supervisar y evaluar periódicamente seis indicadores de sostenibilidad para tomar medidas ANTES de que se alcance el Umbral Mínimo.
- Utilizar los proyectos y las acciones de gestión evaluados en el GSP para evitar resultados no deseables causados por la superación de los Umbrales Mínimos.

Para más información, anuncios sobre las juntas, o para revisar y comentar sobre los documentos, por favor visite
SantaYnezWater.org o llame al (805) 693-1156 ext. 403

Sustainable Groundwater Management Act Newsletter No. 5 September 2021

Santa Ynez River Valley Groundwater Basin

The three Groundwater Sustainability Agencies (GSAs) in the Santa Ynez River Valley Groundwater Basin have prepared **Groundwater Sustainability Plans (GSPs)** as required by the Sustainable Groundwater Management Act (SGMA) of January 2015. Final Dra s of the three GSPs are available for public review and comment online at SantaYnezWater.org. The Final GSPs must be submi ed to the California Department of Water Resources (DWR) by January 31, 2022. Upon submi al, DWR will host a public comment period on the Final GSPs via its website.

Schedule of Public Meetings, Workshops, and Comment Periods located at SantaYnezWater.org

COMMENT NOW

SGMA is implemented at the local level

Public Review and Comment on the Groundwater Sustainability Plans

All three Draft GSPs are available on-line

SantaYnezWater.org

PUBLIC COMMENT PERIODS:

See website for exact dates or sign-up for email notifications.

Draft GSP: 45 days in September - October, 2021

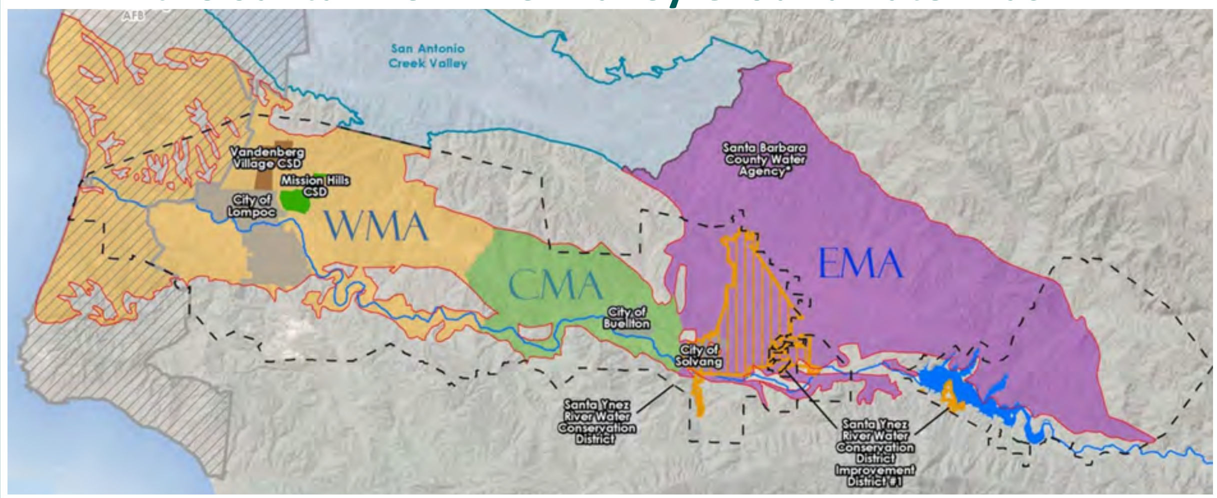
Final GSP: 75 days in February-March 2022

Final GSPs will also be available online.

Western Management Area GSP
Central Management Area GSP
Eastern Management Area GSP

A printed copy will be available for review at the following public libraries: Solvang, Buellton, Lompoc, and Vandenberg Village.

Three Groundwater Sustainability Agencies (GSAs) in the Santa Ynez River Valley Groundwater Basin



Next Steps:

- **September/October 2021:** Public Review of Dra GSPs
- **October 2021:** Citi en Advisory Groups Mee ngs to discuss Dra GSPs
- **October 2021:** GSA Commi ee Meeti gs to discuss Dra GSPs
- **December 2021/January 2022:** GSP Adoptio by GSA Commi ees
- **January 31, 2022:** Final GSPs due to DWR
- **February/March 2022:** Public Review of Final GSPs (comment via DWR website)

For more information, meeting announcements, and to review and comment on draft documents, please visit

SantaYnezWater.org or call **(805) 693-1156 ext. 403**

Cuenca de Aguas Subterráneas del Valle del Río Santa Ynez

Las tres Agencias de Sostenibilidad de Aguas Subterráneas (GSAs) en la Cuenca de Aguas Subterráneas del Valle del Río Santa Ynez han preparado **Planes de Sostenibilidad de Aguas Subterráneas (GSPs)** como lo requiere la Ley de Ges ón Sostenible de Aguas Subterráneas (SGMA) de enero de 2015. Los Borradores Finales de los tres GSP están disponibles para su revisión pública y comentarios en línea en SantaYnezWater.org. Los GSP Finales deben ser presentados al Departamento de Recursos Hídricos de California (DWR) antes del 31 de enero de 2022. Una vez presentados, el DWR organizará un período de comentarios públicos sobre los GSP Finales a través de su página web.

Calendario de Reuniones Públicas, Talleres y Períodos de Comentarios en SantaYnezWater.org

COMENTE AHORA

La SGMA es aplicada a nivel local

Revisión y Comentarios Públicos sobre los Planes de Sostenibilidad de Aguas Subterráneas

Los tres Borradores de los GSP están disponibles en línea SantaYnezWater.org

PERÍODOS DE COMENTARIOS PÚBLICOS :

Consulte el sitio web para conocer las fechas exactas o regístrese para recibir notificaciones por correo electrónico.

Borrador del GSP: 45 días en septiembre - octubre, 2021

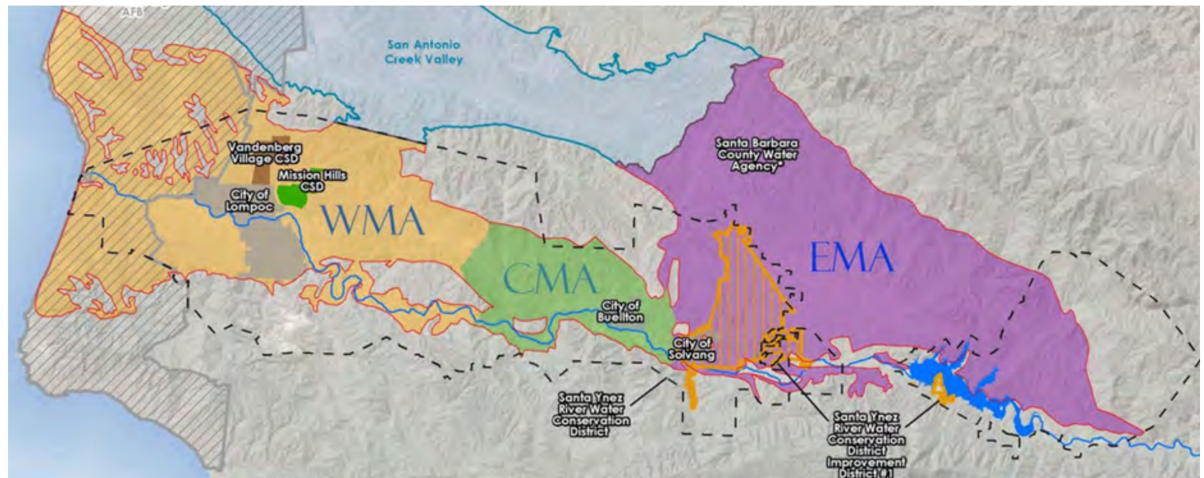
GSP Final: 75 días en febrero - marzo, 2022

Los GSP Finales también estarán disponibles en línea.

GSP del Área de Gestión Occidental (WMA)
GSP del Área de Gestión Central (CMA)
GSP del Área de Gestión Oriental (EMA)

En las siguientes bibliotecas públicas, estará disponible una copia impresa para su revisión: Solvang, Buellton, Lompoc y Vandenberg Village.

Tres Agencias de Sostenibilidad de Aguas Subterráneas (GSA) en la Cuenca de Aguas Subterráneas del Valle del Río Santa Ynez



Próximos Pasos:

- **Septiembre/octubre 2021:** Revisión Pública de los Borradores de los GSP
- **Octubre 2021:** Reuniones de Grupos Consul vos de Ciudadanos para discu r los Borradores de los GSP
- **Octubre 2021:** Reuniones del Comité de la GSA para discu r los Borradores de los GSP
- **Diciembre 2021/enero 2022:** Aprobación del GSP por los Comités de la GSA
- **31 de enero, 2022:** GSP Finales por el DWR
- **Febrero/marzo 2022:** Revisión Pública de los GSP Finales (comentarios a través del siti web del DWR)

Para más información, anuncios de reuniones y para revisar y comentar los borradores de los documentos, visite SantaYnezWater.org o llame al **(805) 693-1156 ext. 403**

Sustainable Groundwater Management Act Newsletter No. 6 December 2021

Santa Ynez River Valley Groundwater Basin

The three Groundwater Sustainability Agencies (GSAs) in the Santa Ynez River Valley Groundwater Basin have prepared **Groundwater Sustainability Plans (GSPs)** as required by the Sustainable Groundwater Management Act (SGMA) of January 2015. The **GSPs** establish a framework to manage and regulate future groundwater use. The GSPs will be submitted to the California Department of Water Resources (DWR) in January 2022. **The California Department of Water Resources (DWR) will post the GSPs online and open a 60-day public review and comment period directly through the DWR SGMA PORTAL website.**

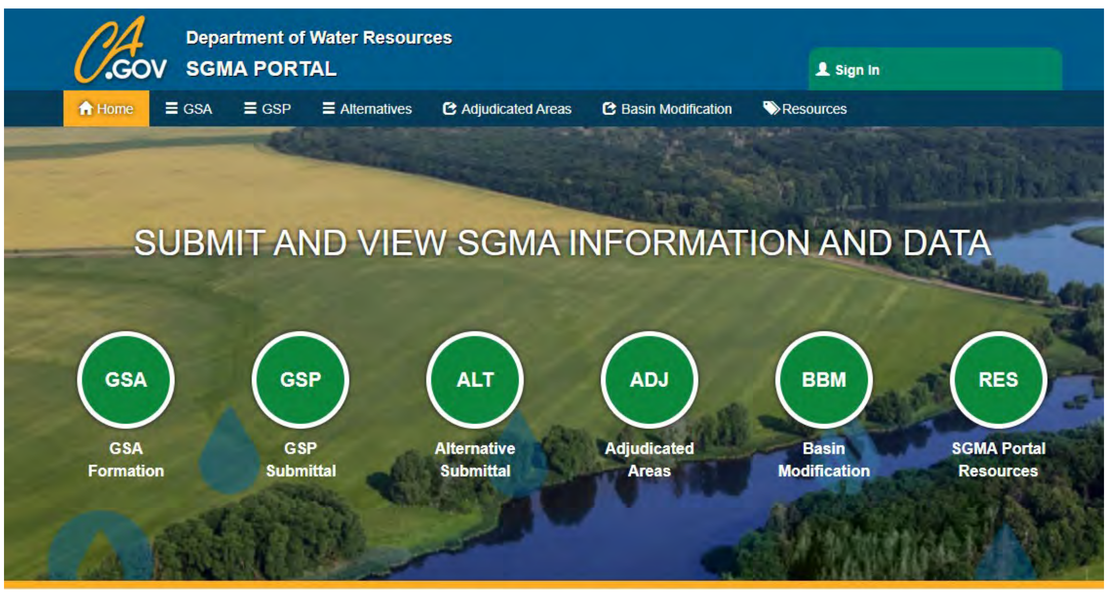
DWR PUBLIC REVIEW & COMMENT PERIOD

Provide comments directly to DWR for **60 days** **in February-March 2022**

See DWR's "SGMA PORTAL" website for exact dates.

How to view a Submitted GSP and/or submit a public comment:

Visit the DWR SGMA Portal at **https://sgma.water.ca.gov/portal/**



All three GSPs are available online SantaYnezWater.org

GSA Public Hearings on GSPs

Visit SantaYnezWater.org for in-person meeting locations and remote participation information

Monday, January 3, 2022 at 10:00 a.m.
Central Management Area GSP

Wednesday, January 5, 2022 at 10:00 a.m.
Western Management Area GSP

Thursday, January 6, 2022 at 6:30 p.m.
Eastern Management Area GSP

A printed copy will be available for review at the following public libraries: Solvang, Buellton, Lompoc, and Vandenberg Village.

Local government at work for you and with you

For more information, please visit **SantaYnezWater.org**

or call **(805) 693-1156 ext. 403** ***Versión en español disponible bajo petición.***

Schedule of Public Hearings and Meetings is located at SantaYnezWater.org

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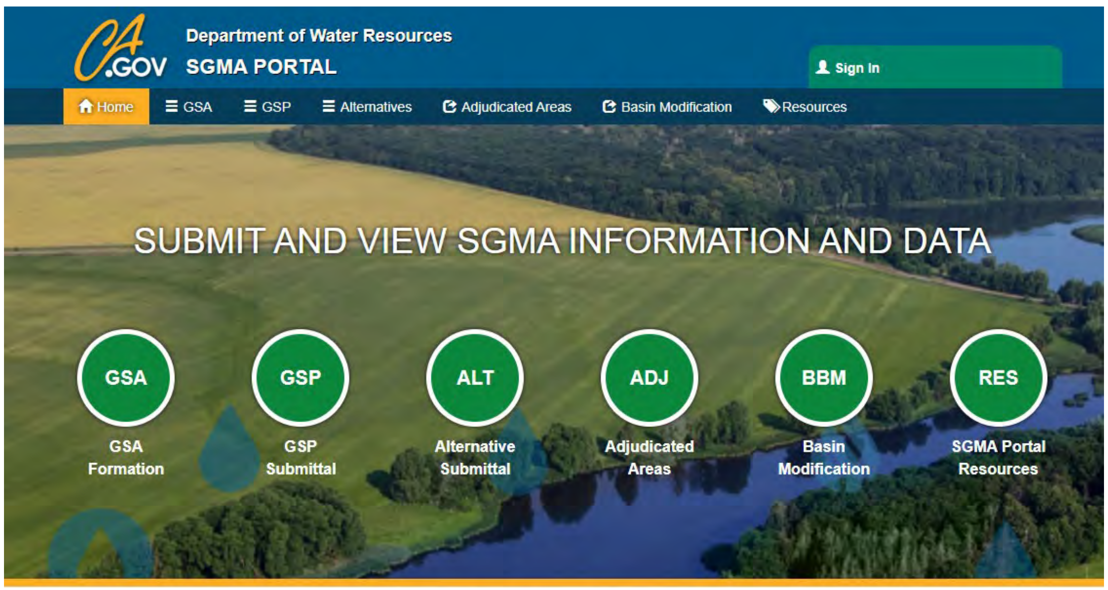
Visit the DWR SGMA Portal at **https://sgma.water.ca.gov/portal/**



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SantaYnezWater.org

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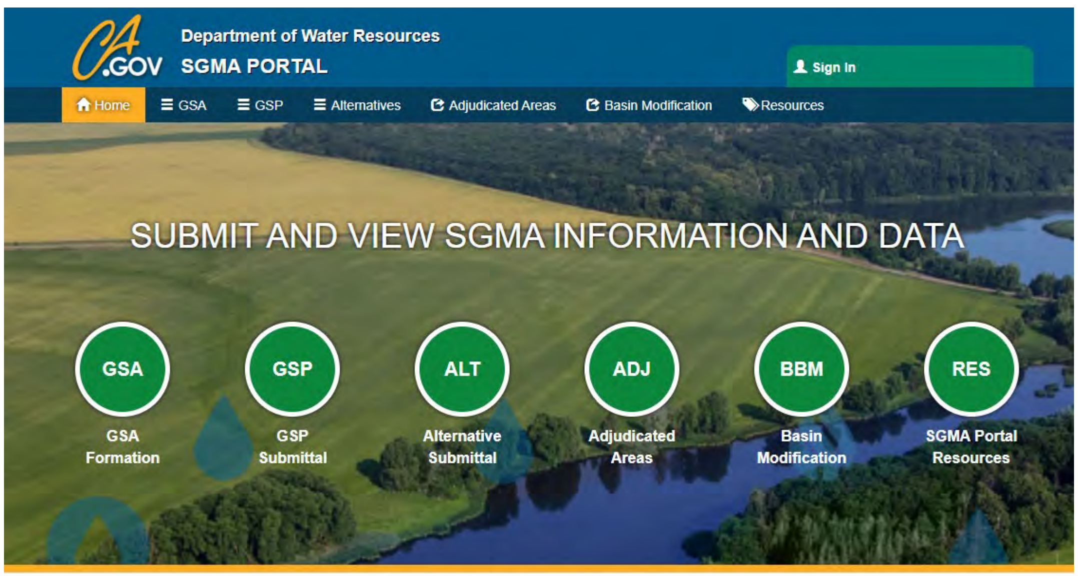
Período de Revisión y Comentario Público del DWR

Provee comentarios directamente al DWR por 60 días **en febrero-marzo 2022**

Vea la página web "Portal de la SGMA" para las fechas exactas.

¿Cómo ver un GSP presentado y/o presentar un comentario público:

Visite el Portal de la SGMA del DWR en **https://sgma.water.ca.gov/portal/**



Todos los tres GSPs están disponibles en línea SantaYnezWater.org

Audiencias Públicas GSA sobre GSPs

Visite SantaYnezWater.org
para ubicaciones de las reuniones en persona
e información referente a la participación remota

Lunes, 3 de enero de 2022 a las 10:00 a.m

GSP del Área de Gestión Central

Miércoles 5 de enero de 2022 a las 10:00 a.m.

GSP del Área de Gestión Occidental

Jueves 6 de enero de 2022 a las 6:30 p.m.

GSP del Área de Gestión Oriental

Una copia impresa estará disponible para revisión
en las siguientes bibliotecas públicas:
Solvang, Buellton, Lompoc, y Villa Vandenberg.

El gobierno local trabajando para ustedes y con ustedes

Para más información, por favor visitar SantaYnezWater.org
o llame al **(805) 693-1156 ext. 403**

El horario de las Audiencias Públicas y las Reuniones está localizado en SantaYnezWater.org

APPENDIX C

Three-Dimensional Geologic Model, Eastern Management Area of Santa Ynez River Valley Groundwater Basin

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TECHNICAL MEMORANDUM

Three-Dimensional Geologic Model

Eastern Management Area of Santa Ynez River Valley Groundwater Basin

To: Eastern Management Area GSA Committee
Santa Ynez River Valley Groundwater Basin

From: Nate Page, PG and Tim Nicely, PG, CHG

Attachments: Figures

Date: June 4, 2020

Introduction

This memorandum documents the development of a three-dimensional (3D) geologic model (model) of the groundwater basin within the Eastern Management Area (EMA) of the Santa Ynez River Valley Groundwater Basin (Basin or Santa Ynez Basin). This geologic model is being developed as part of a Groundwater Sustainability Plan (GSP) being prepared for the EMA.

The model's primary use is to illustrate the geologic and hydrogeologic data for Basin stakeholders, and to support the decision making process regarding future sustainable groundwater management actions and projects. Additional key benefits that the model provides include:

- A visual and graphical representation of the local geologic setting and distribution of principal aquifers and aquitards, thereby allowing improved understanding of groundwater conditions throughout the EMA.
- Support for characterization of groundwater level and water quality conditions.
- Enables the development of additional geologic cross sections, contour maps, change-in-storage graphs.
- Aids in the coordination of data with the Central and Western management areas (CMA and WMA) of the Santa Ynez Basin, and in the adjacent San Antonio Creek Groundwater Basin.
- Provides input data for the numerical groundwater flow model being developed in support of the EMA's GSP.

Selection of 3D Hydrogeologic Visualization Tool

GSI worked with the EMA GSA Agency staff to select an appropriate 3D hydrogeologic visualization tool to build the geologic model in coordination with the consultant team for the CMA and WMA. Leapfrog® Works (Leapfrog) and Ctech EVS® were both evaluated and Leapfrog was ultimately selected due to its advanced geologic modeling capabilities, broad data format/file type compatibility (both for import and export), ability to create and export MODFLOW ready grids, and its lower cost and flexible licensing scheme. Another important consideration in selecting Leapfrog is that the CMA and WMA are also using Leapfrog, which allows for streamlined coordination between the three management areas in the Basin. Leapfrog® provides a free desktop viewer and a web-based viewer enabling easy sharing of the geologic model between project personnel or GSA Agency staff.

Leapfrog interacts with the project Data Management System (DMS) through a one-way export routine from the DMS. Care is required to maintain consistency between the DMS and Leapfrog datasets and to avoid using outdated input data in Leapfrog. The geologic model is easily updated by reimporting updated input data or appending new input data. Datasets generated in Leapfrog can be exported and uploaded to the DMS as needed.

Data Used in Geologic Model

The types, sources, and formats of data collected, compiled, and reviewed for inclusion in the model are presented on Table 1. Note that the water level data included in the table can be incorporated into the model viewer at a later time.

Table 1. Summary of Available Data Used for Data Model

Data Type	Source	Coverage	Period of Record
Borehole lithology, including Oil and gas well geophysical logs	DWR, ID No. 1, SYRWCD, City, California Geologic Energy Management Division, USGS	131 boreholes within or adjacent to EMA	Current
Well Screen Intervals	DWR, ID1, SYRWCD, Cities, USGS NWIS	279 wells within EMA	Current
Digital Elevation Model (DEM) 10-meter resolution	National Elevation Dataset (NED), USGS EROS Data Center	Entire model domain	Current
Surficial Geology	Dibblee (1987a, 1987b, 1988a, 1988b, 1993a, 1993b, 1993c, 1994, 2005)	Entire EMA	
Geologic Cross Sections	Dibblee (4 Sections: 1993a, 1993b, 1993c, 1994), Fugro (1 Section: 2007), Hopkins (4 Sections: 2003)), USGS (3 Sections: 1951, 1968)	Within and surrounding EMA	
Water Level Data[1]	USGS NWIS (includes CASGEM and County data), USBR, City of Solvang, ID No. 1	Wells within and surrounding EMA	1905 to present

Note 1: Water level data and associated groundwater contour maps have not yet been incorporated into the model.

Geologic Model Construction

Leapfrog® Works uses an implicit 3D interpolation technology called Fast Radial Basis Function (FastRBF™) which allows scattered 3D data to be described by a single mathematical function and quickly rendered as a surface at any resolution (Seequent Ltd., 2020). Regional and local geologic information used for this project relied on the NAD83 State Plane California Zone V, feet coordinate system (2229 EPSG). Leapfrog does not perform coordinate system conversions/transformations, so all input to Leapfrog was pre-processed in GIS to the California State Plane Zone 5 coordinate system relative to North American Datum of 1983 in compliance with SGMA regulations. The ground surface elevation was provided by 10-meter resolution USGS National Elevation Dataset (NED) rasters that were mosaicked, re-projected and converted from meters to feet in GIS. A higher resolution elevation dataset has been compiled since the model was completed, which will be incorporated into the model prior to its use, as input to the numerical groundwater model. The nominal resolution of the geologic model is 50 ft^3, but is adaptive, meaning that the interpolation engine can either refine or degrade the resolution to match spatial variance in data density. The interpolation engine defines the geologic formations to a pre-determined cell size of approximately 25 feet per side.

The geologic units included in the model are listed in stratigraphic order in Table 2.

Table 2. Geologic Units Included in Model

Geologic Unit	Symbol	Water Bearing Unit
Alluvial Gravels	Qg	Yes
Recent Alluvium	Qa	Yes
Older Alluvium	Qoa	Yes
Paso Robles Formation	QTp	Yes
Careaga Sand	Tca	Yes
Sisquoc Formation	Tsq	No
Monterey Formation	Tm	No

The depths and configurations of the geologic units were entered into the model based on interpretation of the available geologic data (geologic maps, well logs, geologic cross sections, reports and down-hole geophysical logs). In coordination with the WMA and CMA's consultants, certain data sources were prioritized over others, which included surficial geologic mapping, primarily by Dibblee, and our own lithologic descriptions from the selected, high-quality water well logs. Interpretation of the deepest geologic unit contacts in the EMA, including the base of the Paso Robles Formation and the Careaga sandstone in the uplands area, were determined from down-hole geophysical logs from deep oil and gas wells. The depth and extents of the Santa Ynez River gravels were interpreted by both water well logs and localized geophysical data (cross sections).

Geologic unit contacts input to Leapfrog include tabular borehole lithology data and polylines digitized in GIS based on contacts at the ground surface between geologic units, as indicated on the Dibblee geologic quadrangles (1987a, 1987b, 1988a, 1988b, 1993a, 1993b, 1993c, 1994, and 2005). The GIS polylines were then imported into Leapfrog, snapped to the ground surface elevation, and converted to Leapfrog® 3D polylines.

Twelve geologic cross-sections are utilized: four from the Dibblee geologic maps (1993a, 1993b, 1993c, 1994), one from Fugro (2007), four from Hopkins (2003), and three from the USGS (1951 and 1968). These cross-sections were georeferenced and incorporated into the model. Contacts between the geologic units at depth were digitized on the vertical 'slice plane' of each geologic cross-section. The imported tabular borehole lithology and the three-dimensional (3D) polylines used to describe the ground surface, geologic contacts and the cross-sectional geologic contacts provided a control framework for the 3D geologic interpolation of the subsurface in Leapfrog. In cases where the tabular borehole lithology data conflicted with information presented on an adjacent geologic cross-section, the borehole data were prioritized[1]. Additional 3D geologic contact polylines were digitized as needed to guide the Leapfrog interpolation engine toward a modeling result that honors the available data and appears structurally correct based on professional judgement.

For continuity and consistency purposes, a number of meetings/phone calls were held between the consultant teams of all three Management areas to discuss how geologic units and contacts were defined based on well data and how geologic units were depicted in the model including the use of the same naming and color conventions employed to represent the various geologic units.

[1] Several adjustments were made to geologic contacts described on the geologic cross-sections (particularly at depth) based on borehole and oil well geophysical log data that may not have been available to the authors of the cross-sections. In general, these adjustments were minor.

Results

The model was presented at the February 27, 2020 meeting of the EMA GSA, as well as at EMA Agency Staff meetings. The images derived from model out-put and presented at the meetings are presented as Figures 1 through 4.

Figure 1 presents an overview of the model, showing the EMA portion of the Basin. The 3D image shows the outline of the EMA portion of Basin in black. The Santa Ynez River and smaller streams are depicted in light blue, roads in gray, and Lake Cachuma in dark blue overlain on the land surface topography. The five water-bearing geologic units (alluvial gravels, recent alluvium, older alluvium, Paso Robles Formation, and Careaga Sandstone) are seen occurring on the land surface within the outlines of the Basin. The non-water bearing units (Sisquoc Formation and Monterey Formation) are shown occurring on the land surface generally outside of the Basin. Also visible are the large-scale Dibblee and USGS geologic cross sections and scattered borehole lithology data that were used for reference.

Figure 2 is presented at the same orientation as Figure 1, but has been sliced along the long axis of the Basin, exposing the geologic formations in the subsurface. The base of the water-bearing geologic units is indicated as the base of the Careaga sandstone, shown in yellow.

Figure 3 is the same cross section as Figure 2, but presented at a different orientation.

Figure 4 presents a short axis slice through the Basin along the orientation of the Figueroa Mountain geologic cross section (Dibblee, 1993). This view demonstrates the relationship between the alluvial gravels and recent alluvium associated with the Santa Ynez River and the underlying Monterey Formation bedrock along the southern boundary of the EMA portion of the Basin.

We anticipate making further revisions to the model as more data become available through the duration of the GSP project.

References

Dibblee, T.W. JR. 1987a, 1987b, 1988a, 1988b, 1993a, 1993b, 1993c, 1994 and 2005. Several geologic maps and cross sections. Published by the California Division of Mines and Geology and Dibblee Geological Foundation.

Fugro West, Inc. 2007. Geophysical and Geotechnical Study Sewer Force Main Crossing Santa Ynez River Solvang, California. Fugro Job No. 3568.001. Prepared for Bennett/Staheli Engineers.

Hopkins Groundwater Consultant, Inc. 2003. Preliminary Hydrogeological Study, City of Solvang, Santa Ynez River Well Field Well Site Evaluation Project, Solvang, California. Prepared for the City of Solvang.

Seequent, Ltd. 2020. https://www.seequent.com/leapfrog-interpolation-basics/ Accessed March 6, 2020.

Upson, J.E. and H.G. Thomasson, Jr. 1951. Geology and Water Resources of the Santa Ynez River Basin, Santa Barbara County, California. US Geological Survey Water-Supply Paper 1107. Prepared in cooperation with Santa Barbara County.

Attachment

Figures 1 to 4

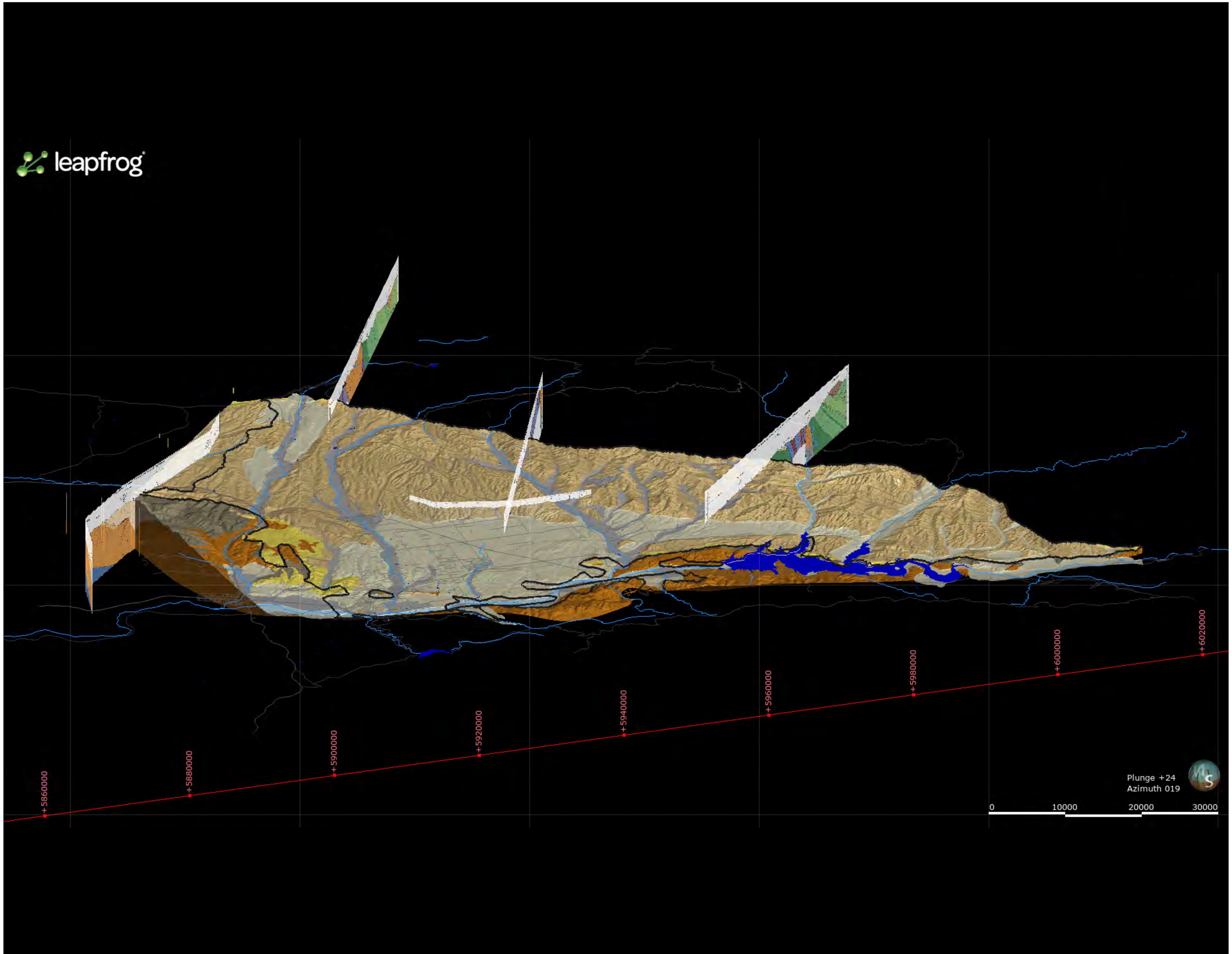

FIGURE 1

Overview Viewed from the South

Three-Dimensional Geologic Model
Eastern Management Area of
Santa Ynez River Valley Groundwater
Basin

LEGEND

- Alluvial Gravels
- Recent Alluvium
- Older Alluvium
- Paso Robles Formation
- Careaga Sand
- Sisquoc Formation
- Monterey Formation

GSI Water Solutions, Inc.

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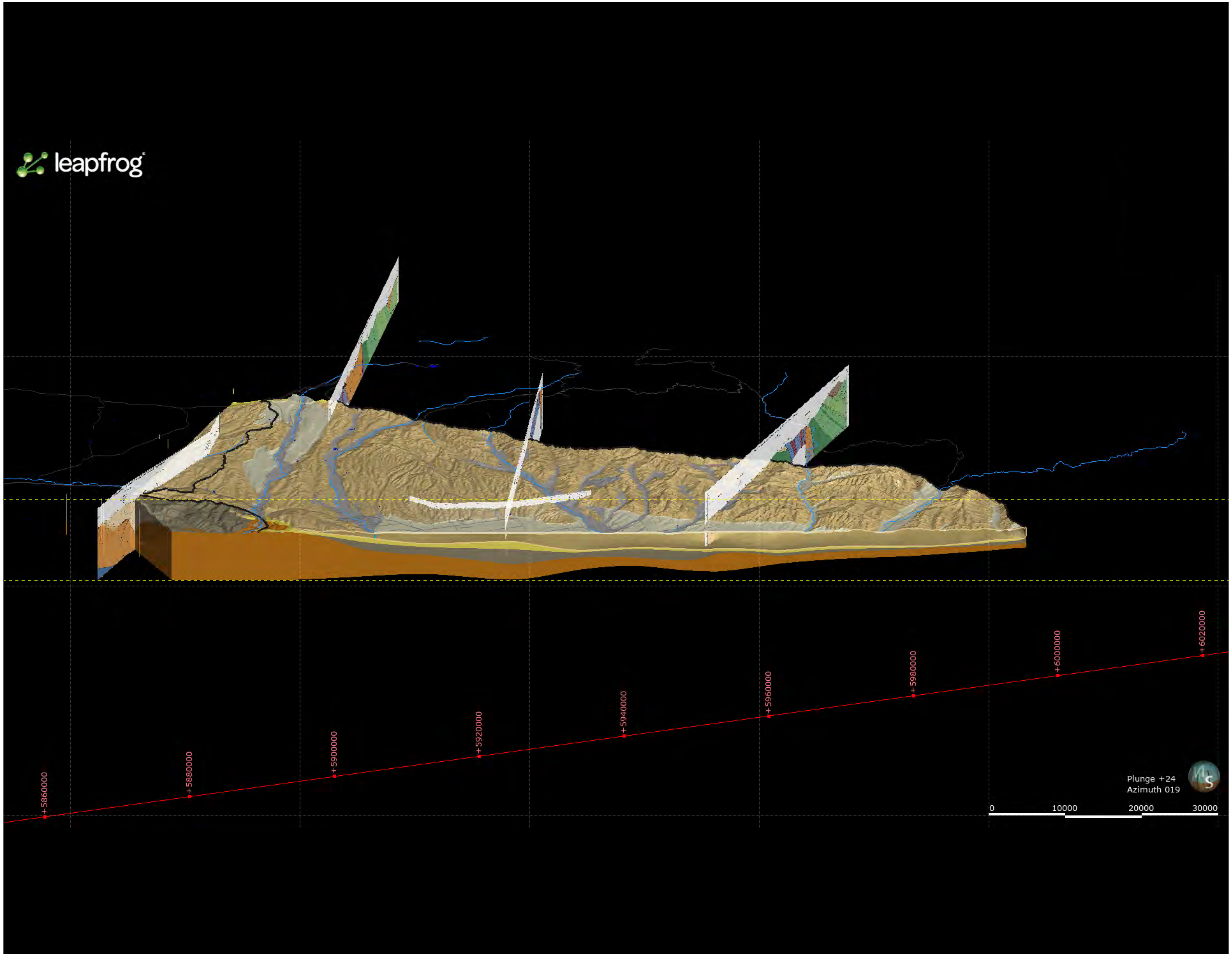

FIGURE 2

Long Axis Slice Viewed from the South

Three-Dimensional Geologic Model
Eastern Management Area of
Santa Ynez River Valley Groundwater Basin

LEGEND

- Alluvial Gravels
- Recent Alluvium
- Older Alluvium
- Paso Robles Formation
- Careaga Sand
- Sisquoc Formation
- Monterey Formation

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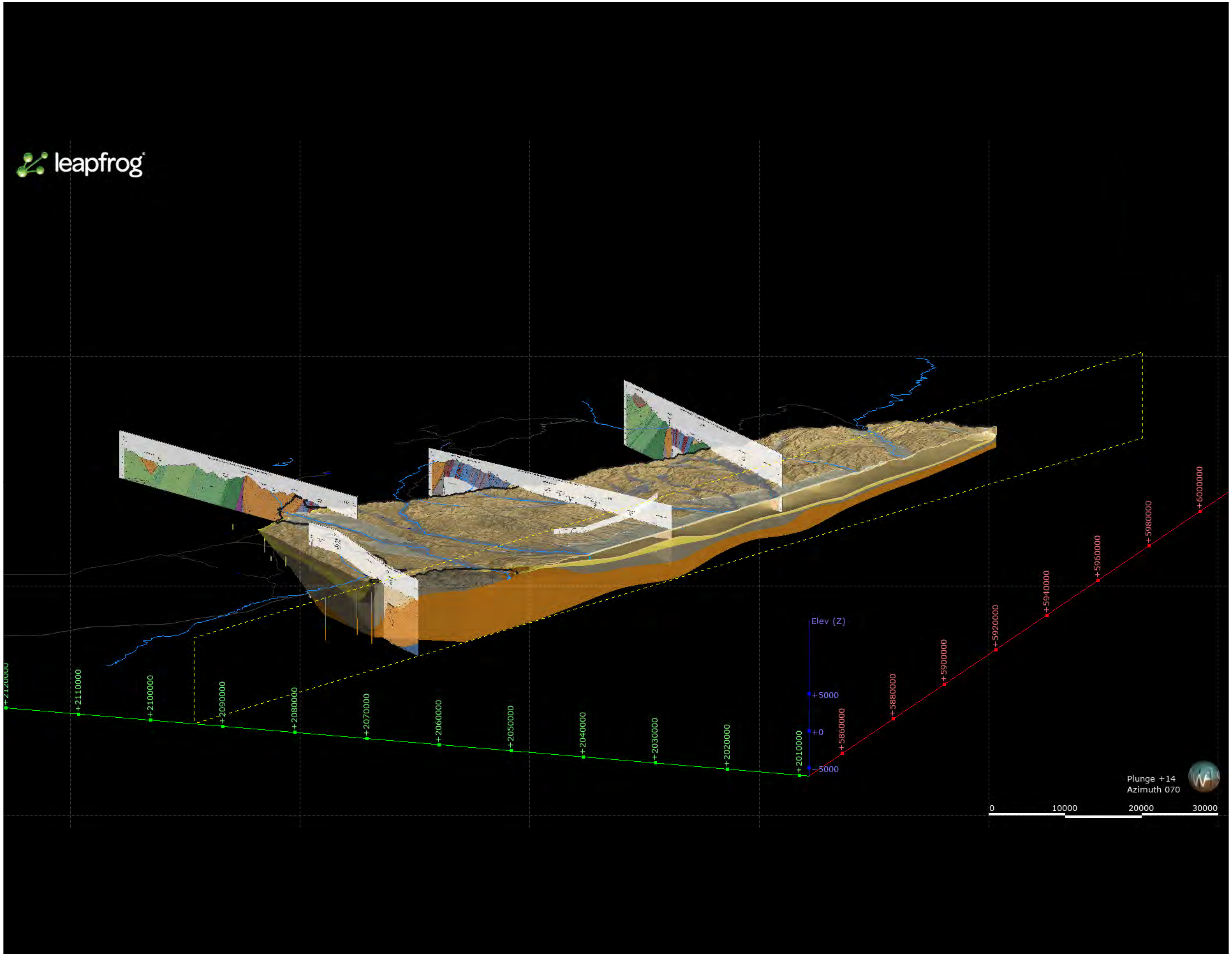

FIGURE 3

Long Axis Slice Viewed from the Southwest

Three-Dimensional Geologic Model
Eastern Management Area of
Santa Ynez River Valley Groundwater Basin

LEGEND

- Alluvial Gravels
- Recent Alluvium
- Older Alluvium
- Paso Robles Formation
- Careaga Sand
- Sisquoc Formation
- Monterey Formation

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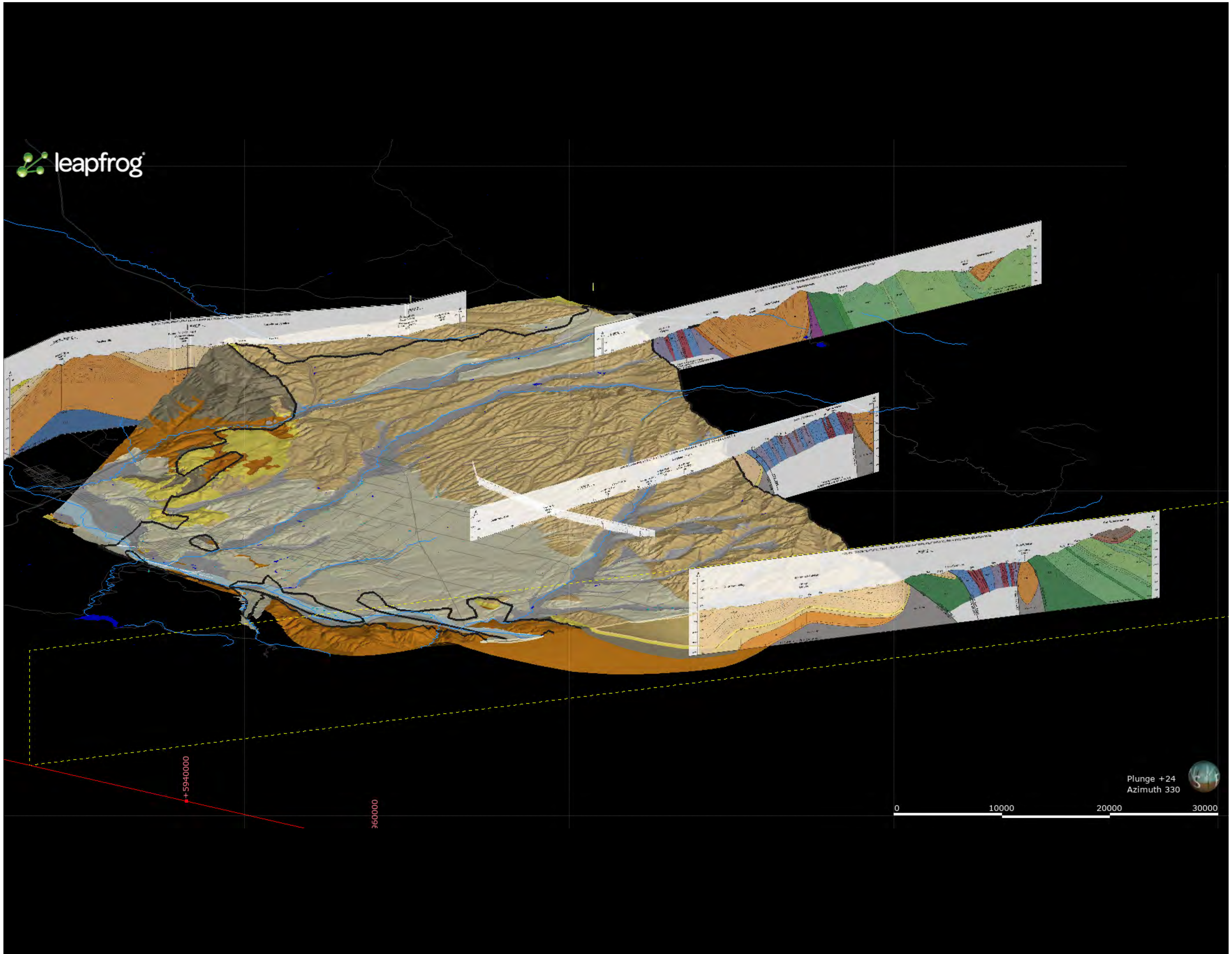
FIGURE 4

Short Axis Slice Viewed from the Southeast

Three-Dimensional Geologic Model
Eastern Management Area of
Santa Ynez River Valley Groundwater Basin



LEGEND

- Alluvial Gravels
- Recent Alluvium
- Older Alluvium
- Paso Robles Formation
- Careaga Sand
- Sisquoc Formation
- Monterey Formation

GSI Water Solutions, Inc.

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APPENDIX D

Representative Well Hydrographs

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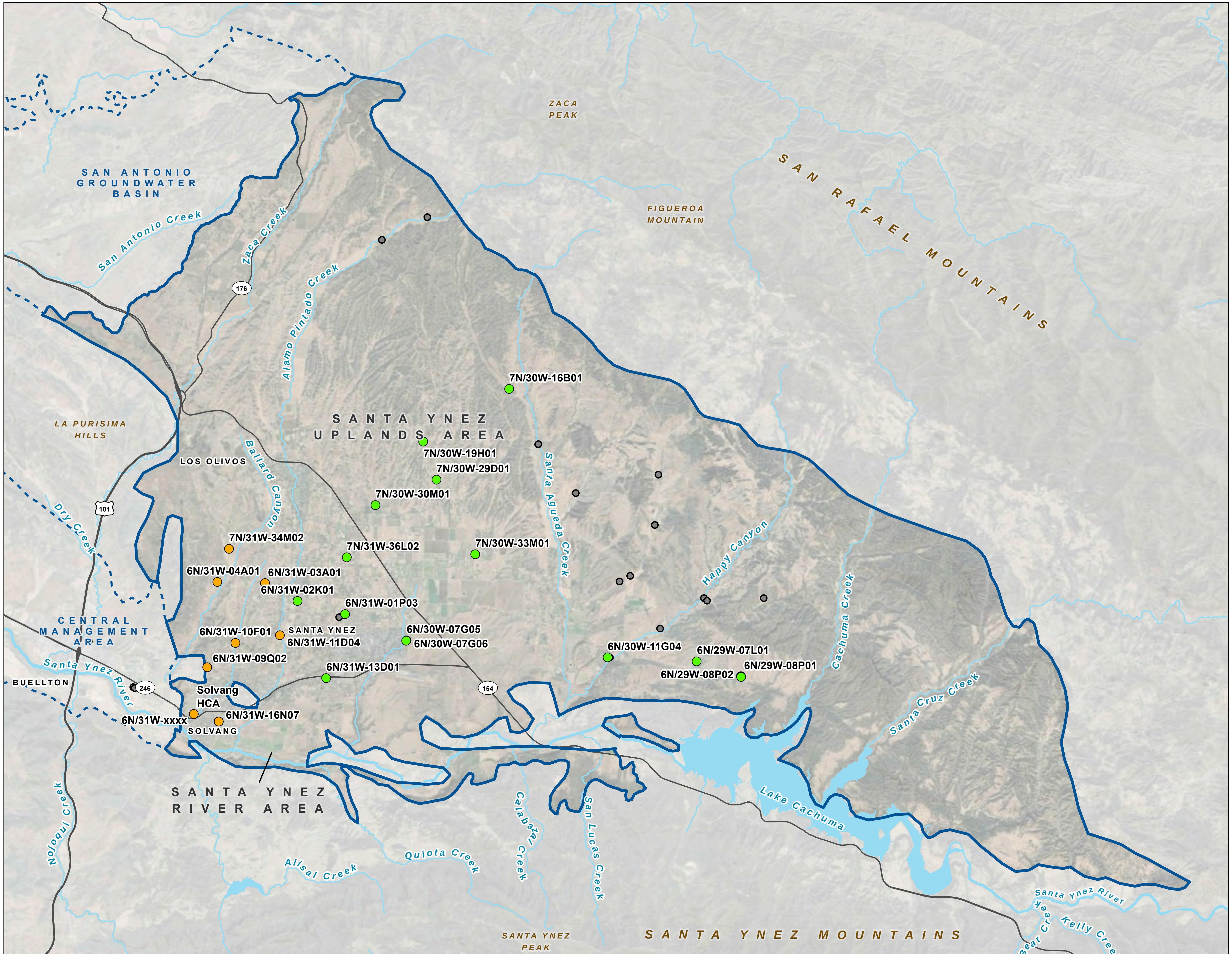
FIGURE D-1

Groundwater Level Monitoring Network

Groundwater Sustainability Plan
Eastern Management Area



LEGEND

Representative Well (by screened aquifer)

- Careaga Sand
- Paso Robles Formation

Other Wells

- Monitored by Santa Barbara County

All Other Features

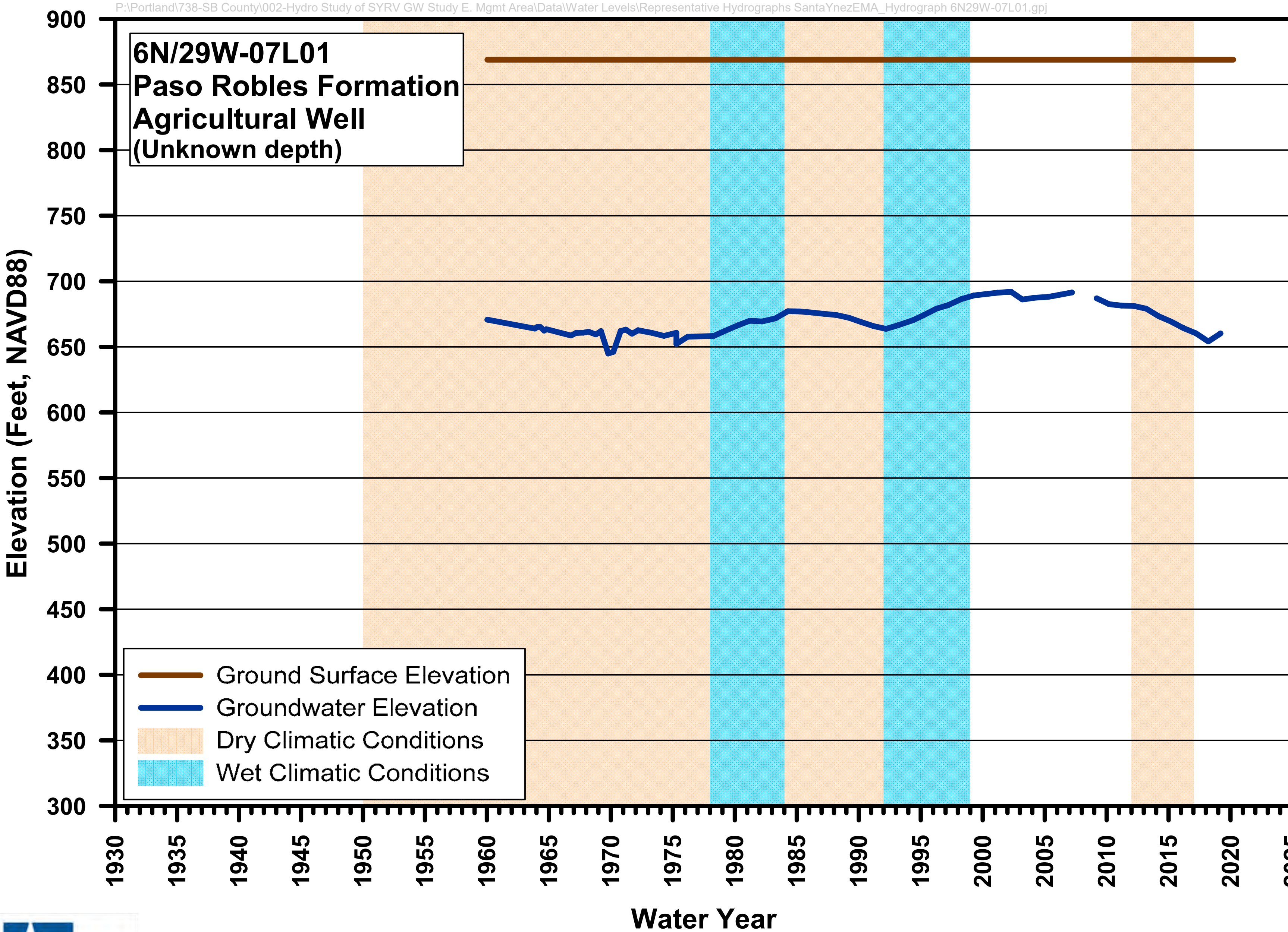
- Eastern Management Area Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

Date: June 11, 2021
Data Sources: ESRI, USGS, Maxar 2020

GSI Water Solutions, Inc.

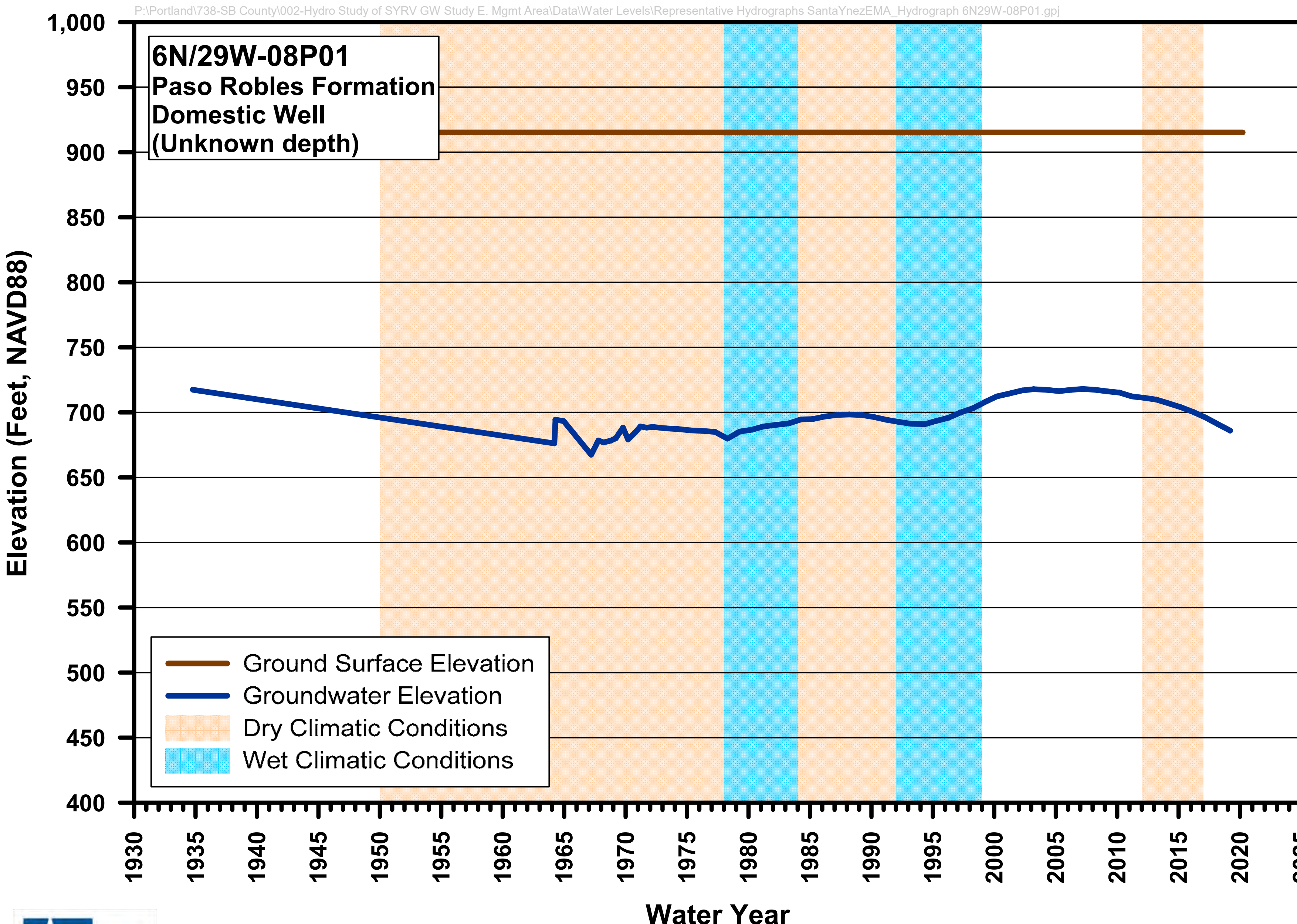


GSI Water Solutions, Inc.

FIGURE D-2

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



GSI Water Solutions, Inc.

FIGURE D-3

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

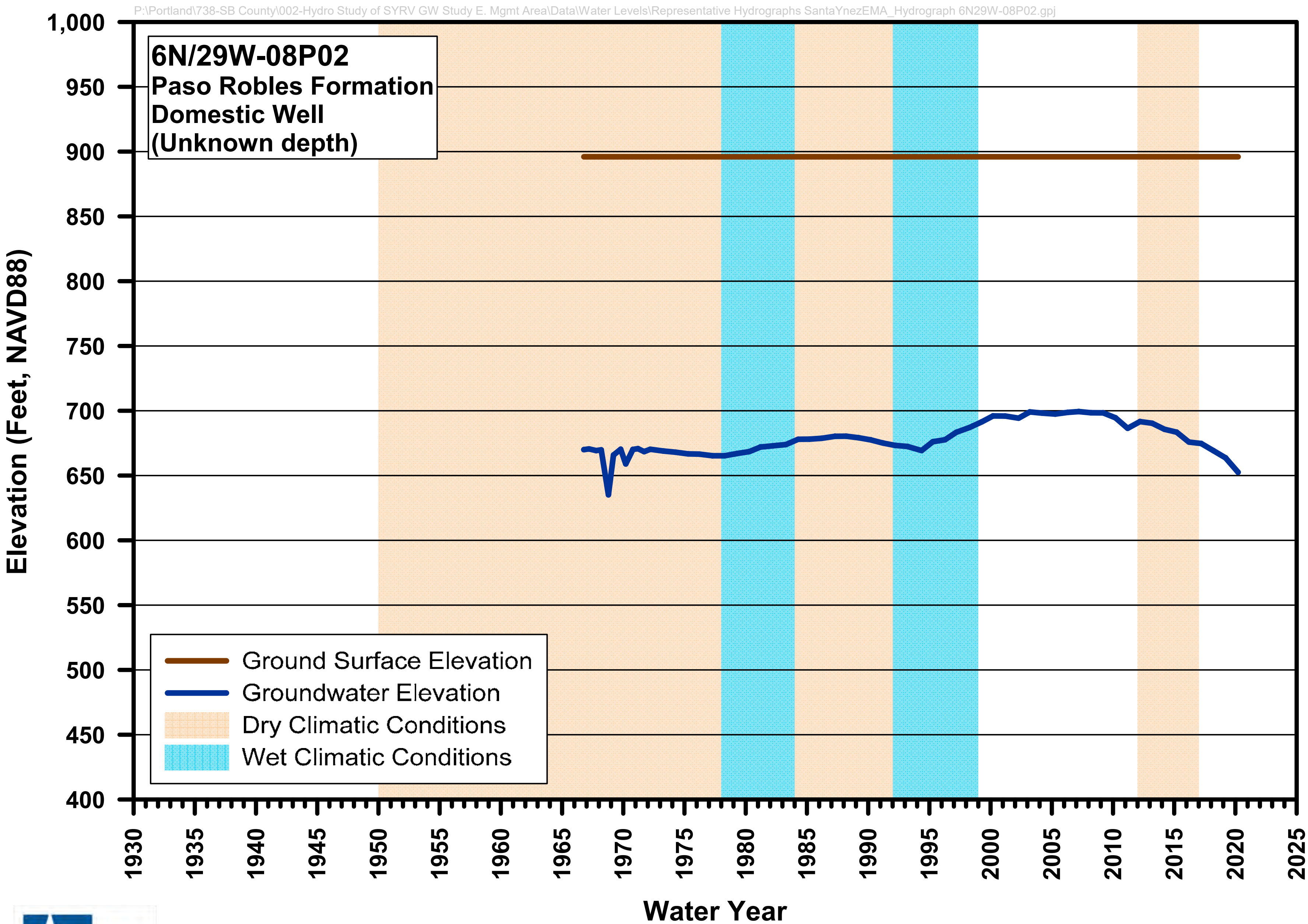


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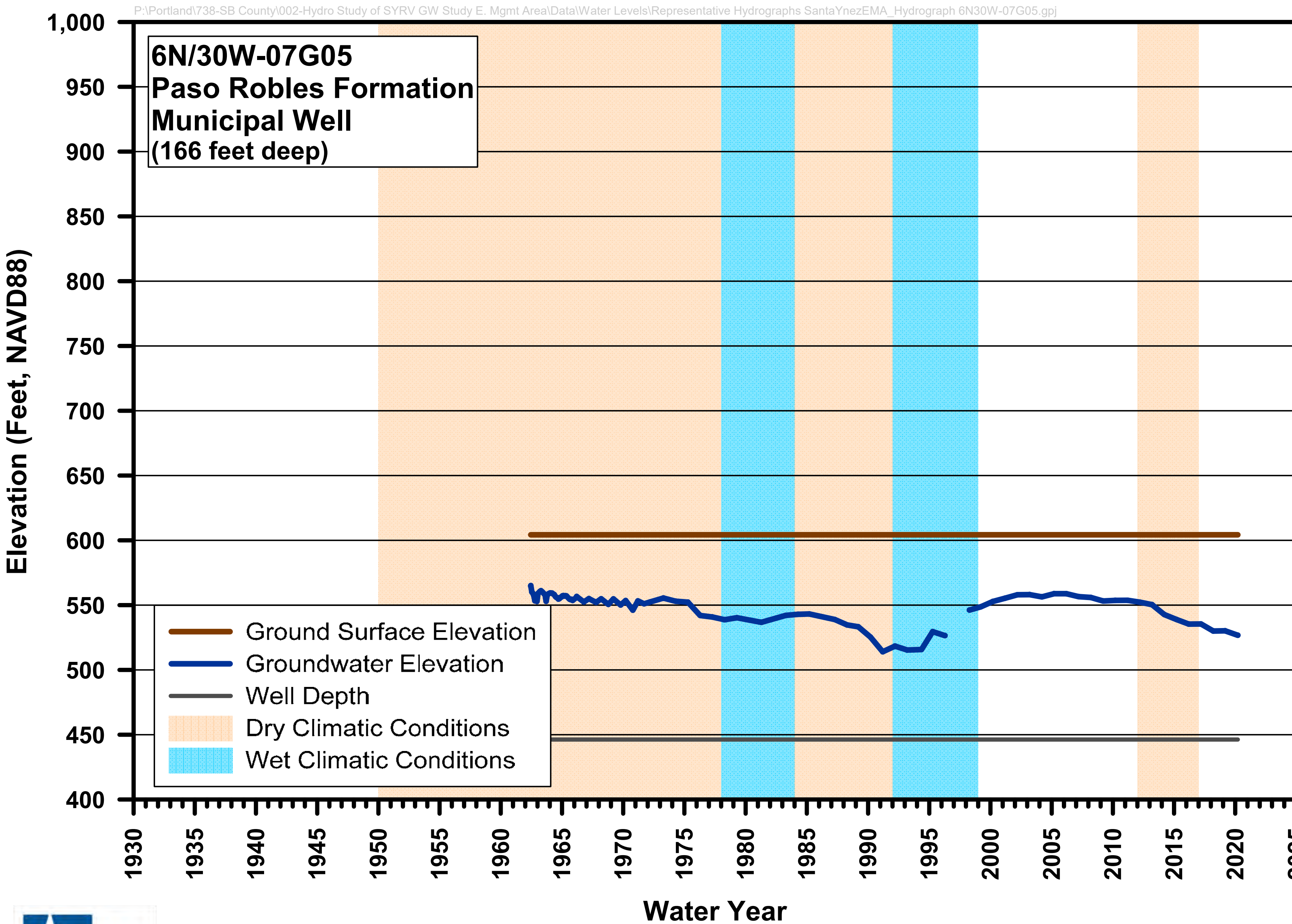
FIGURE D-4

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

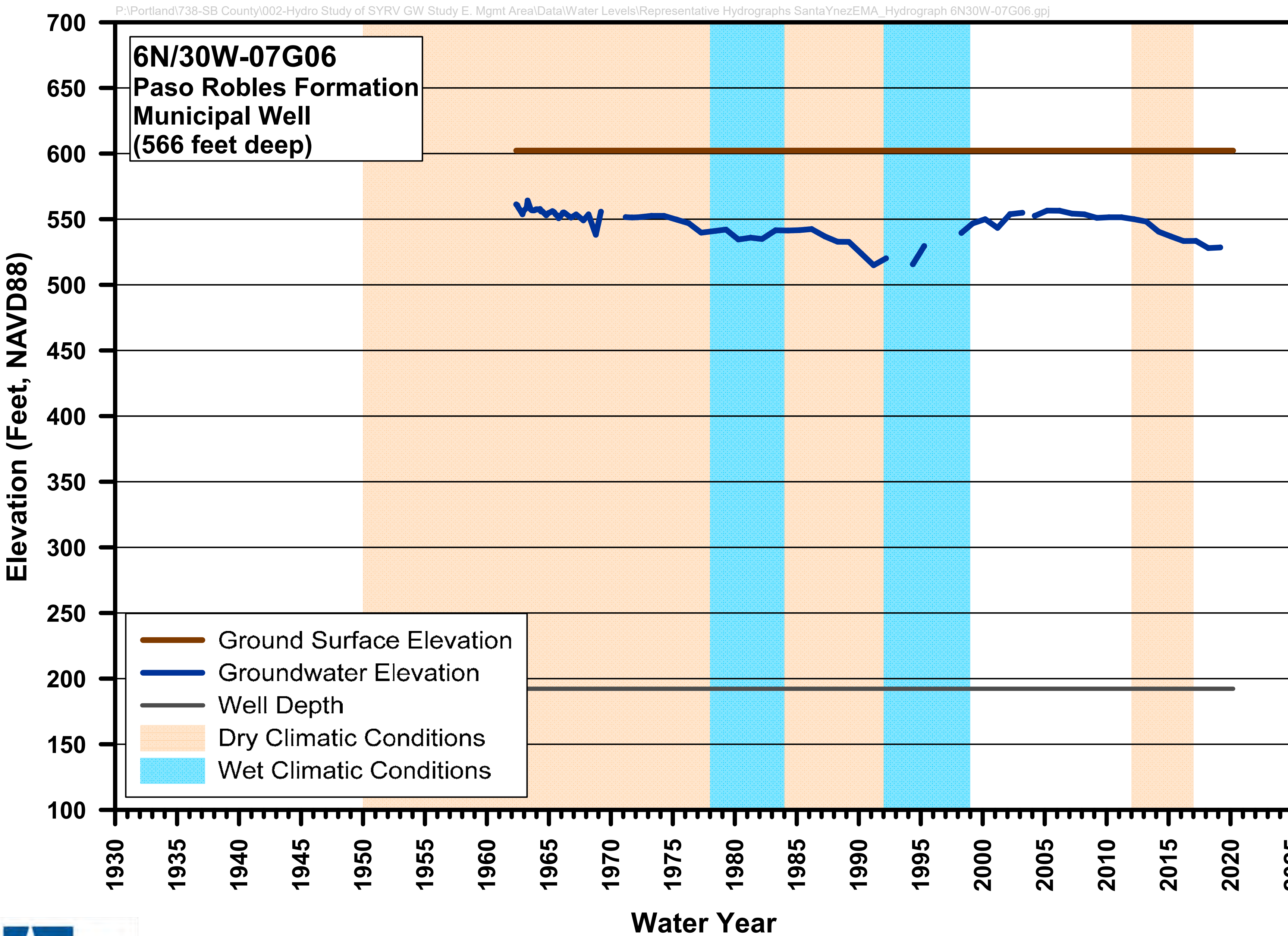


GSI Water Solutions, Inc.

FIGURE D-5

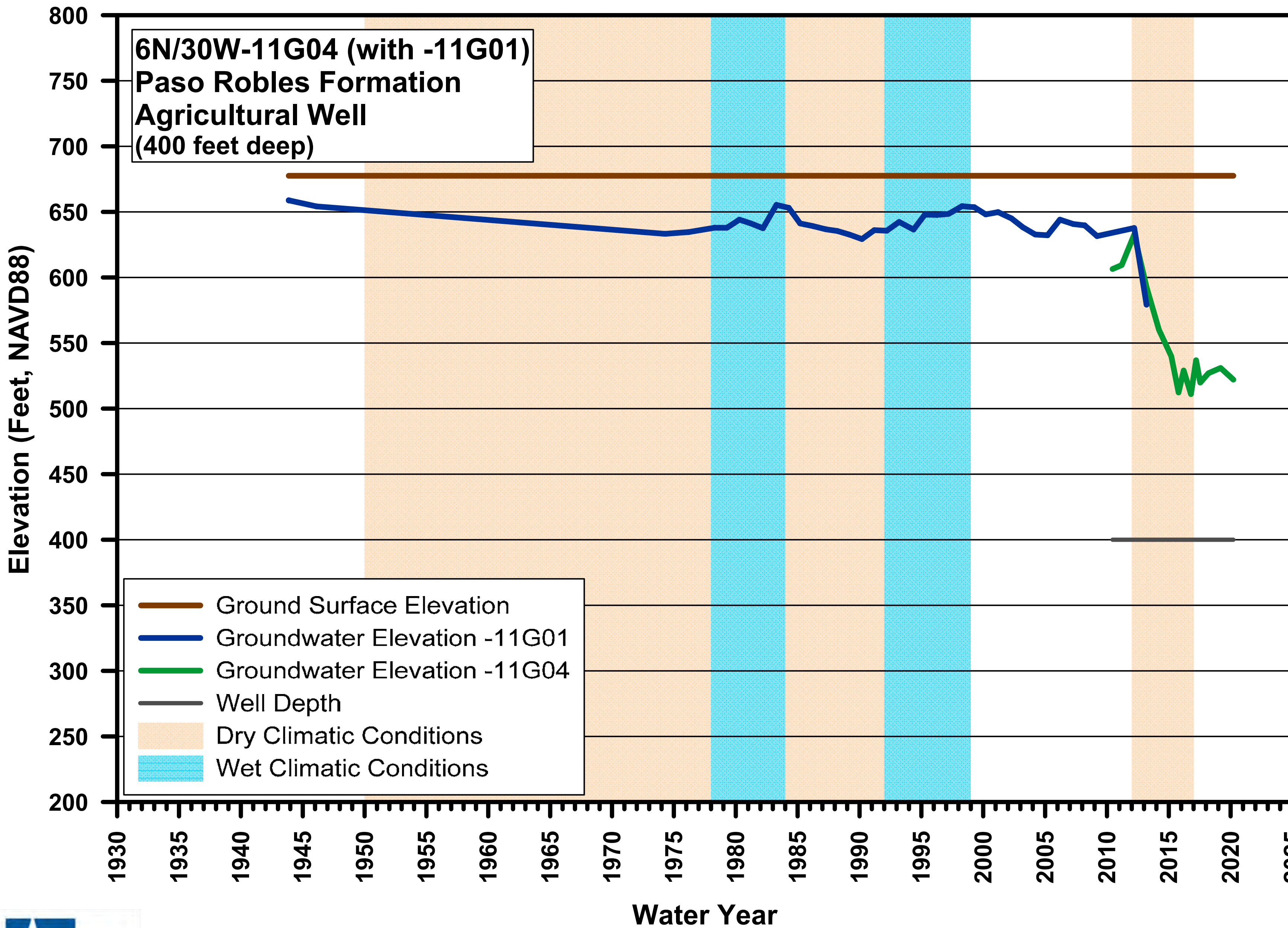
Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



GSI Water Solutions, Inc.

FIGURE D-6
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

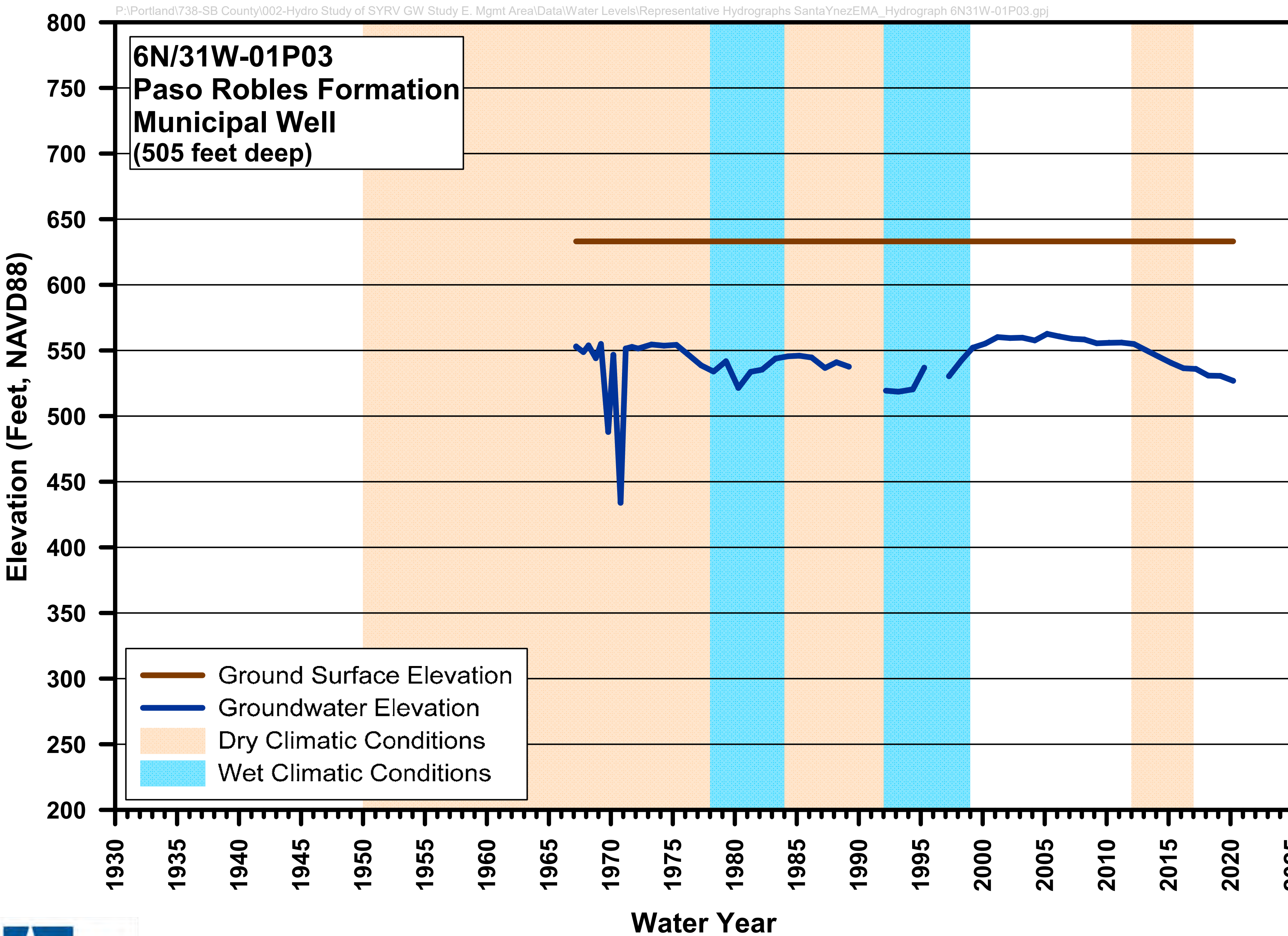


GSI Water Solutions, Inc.

FIGURE D-7

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



GSI Water Solutions, Inc.

FIGURE D-8

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

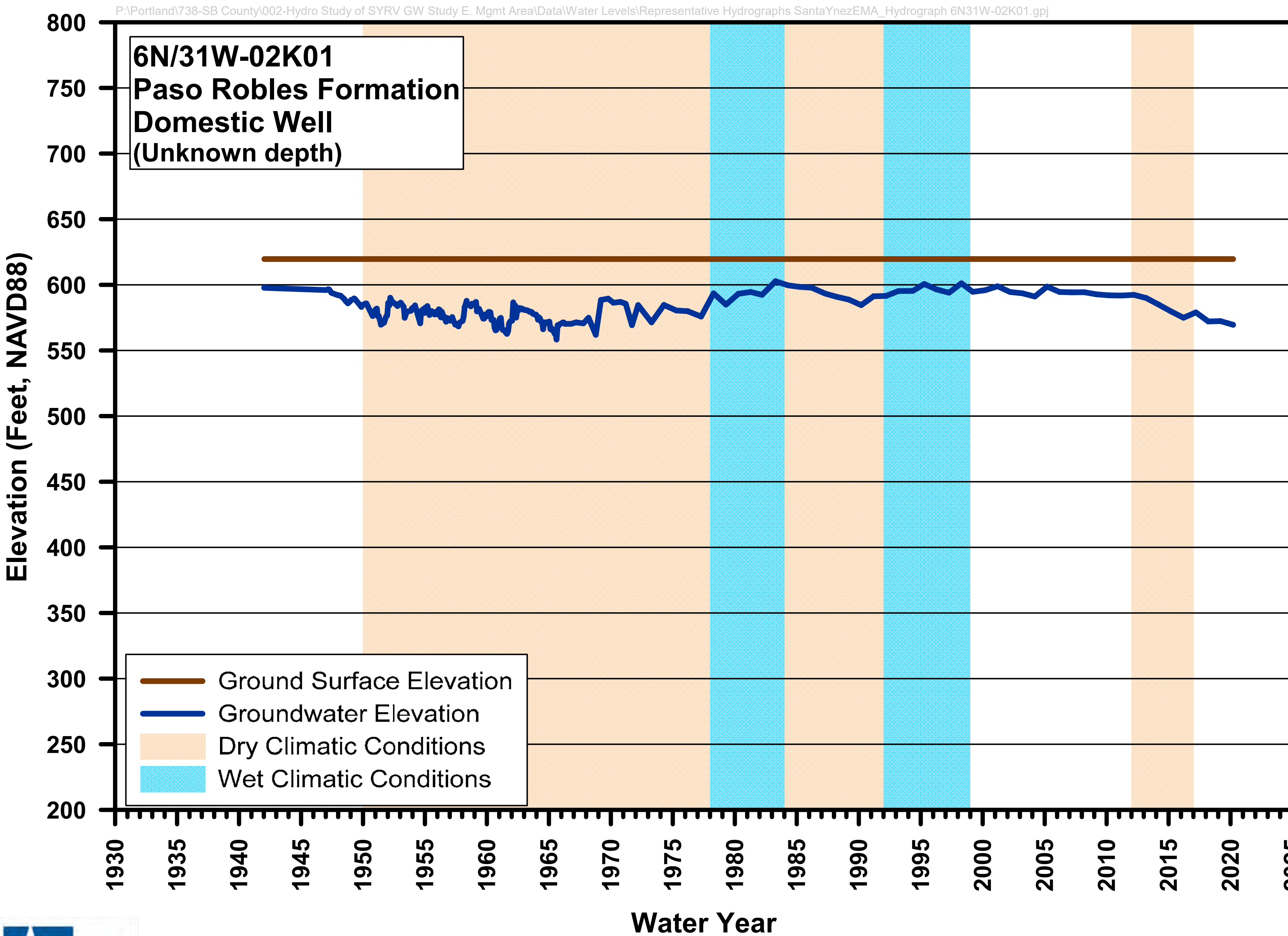


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FIGURE D-9

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

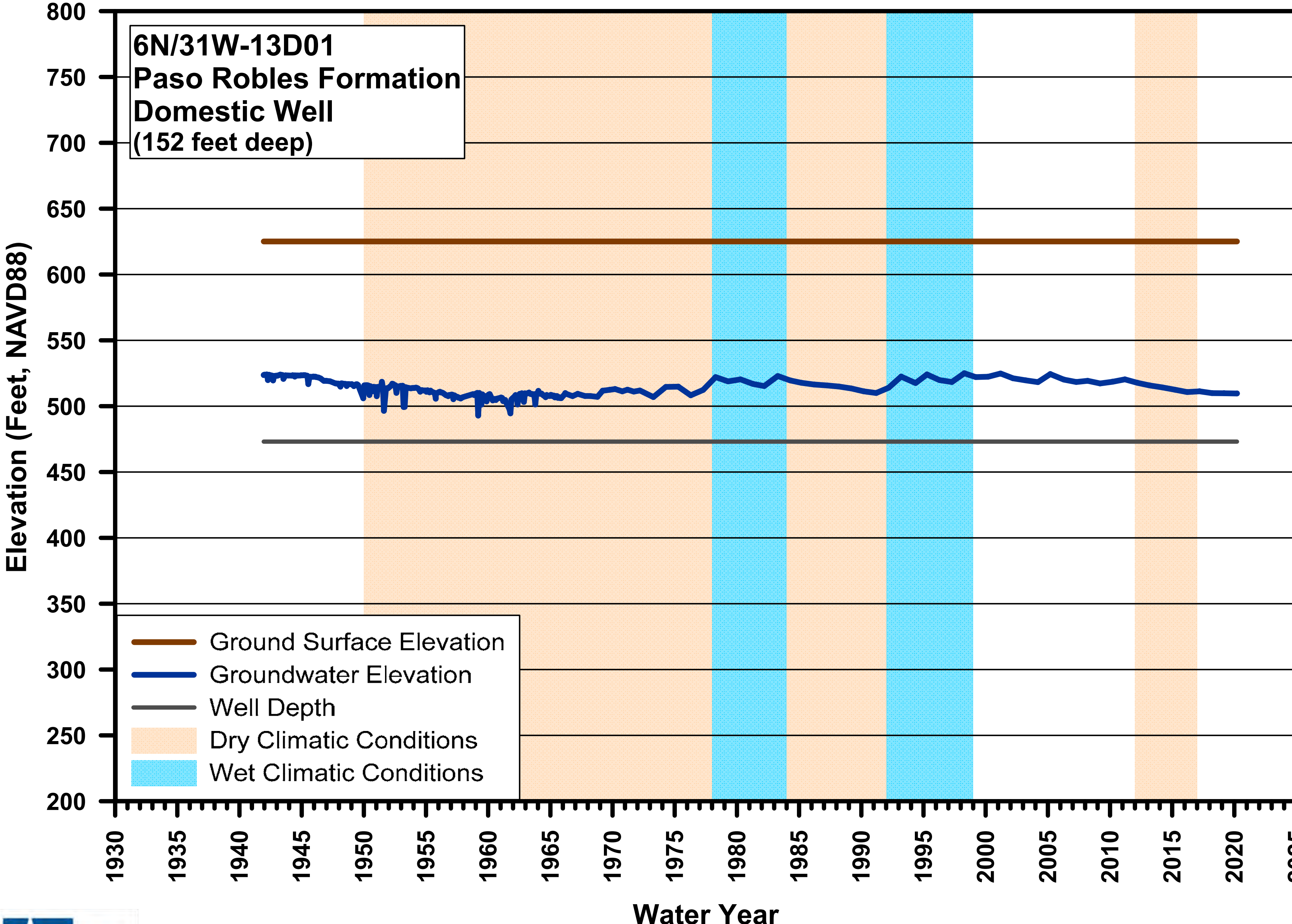

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FIGURE D-10

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

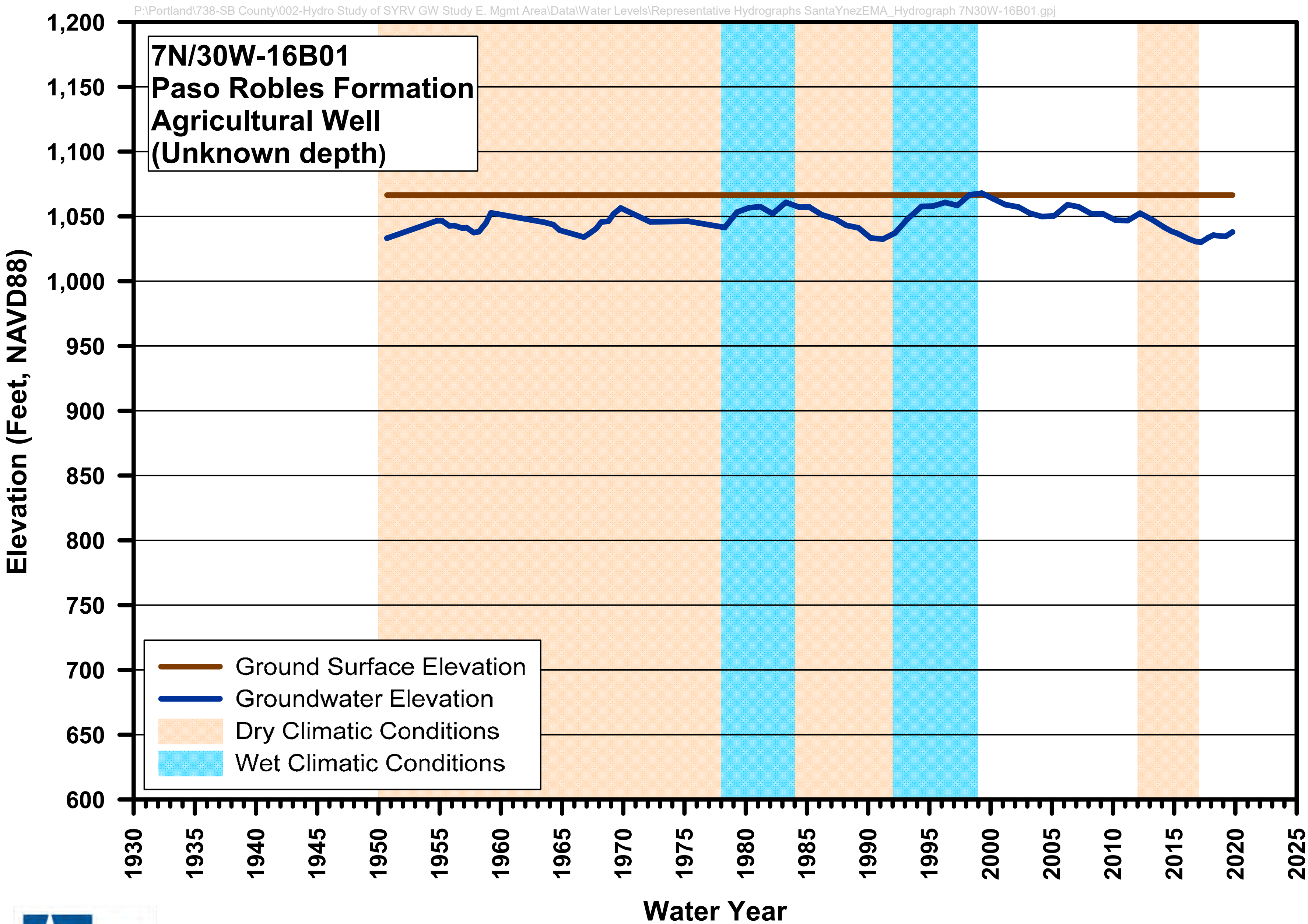

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FIGURE D-11
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

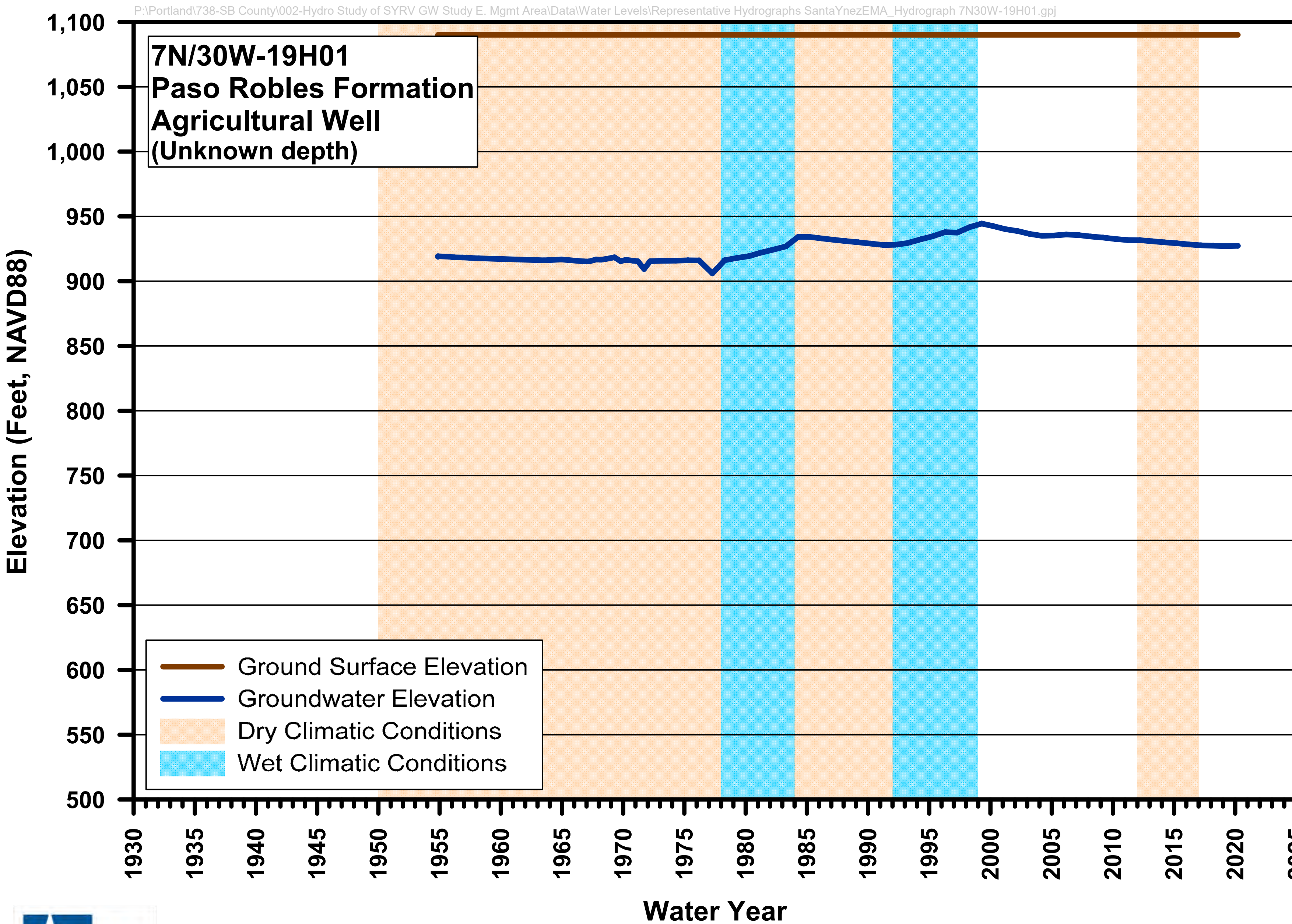

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FIGURE D-12
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

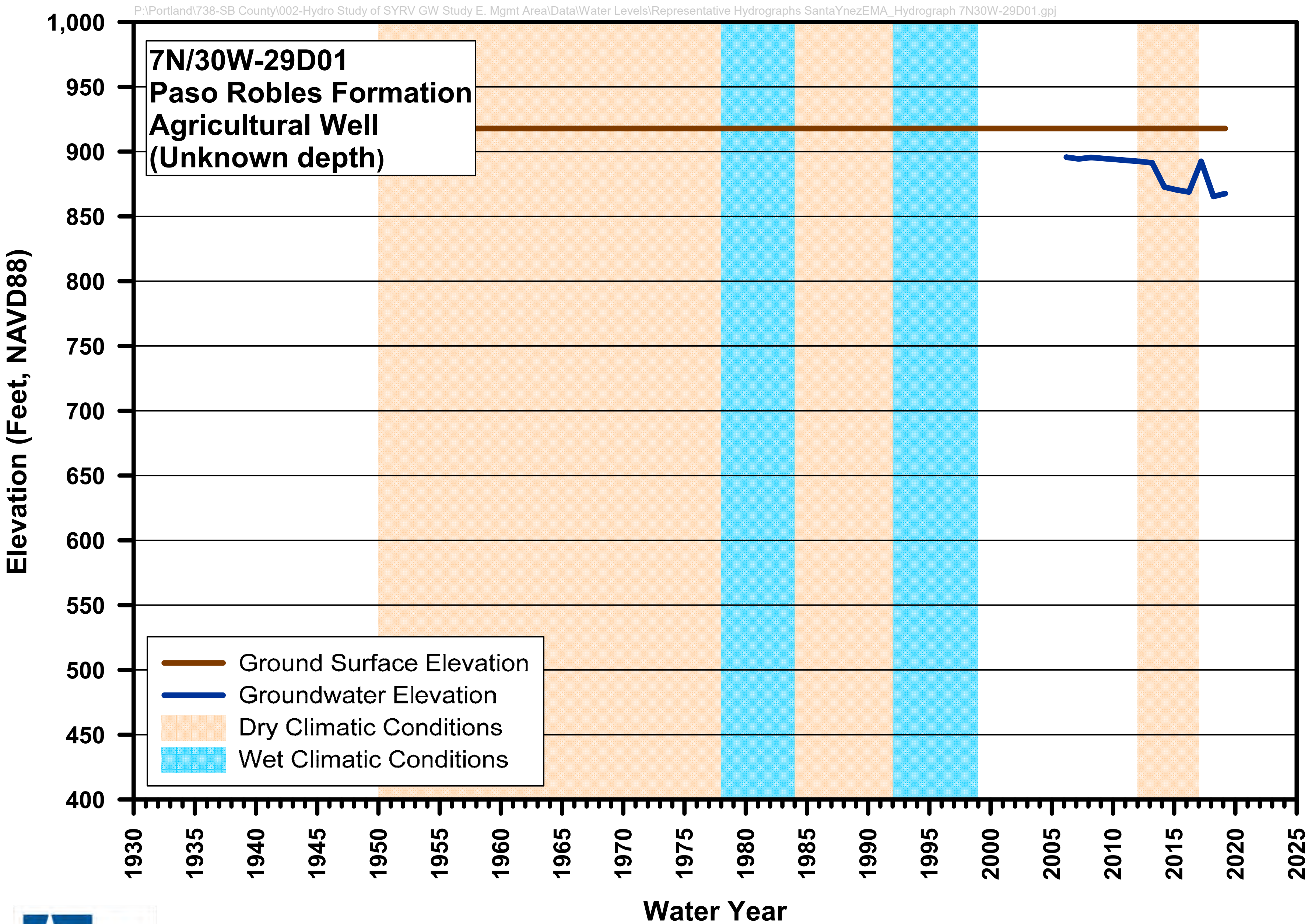

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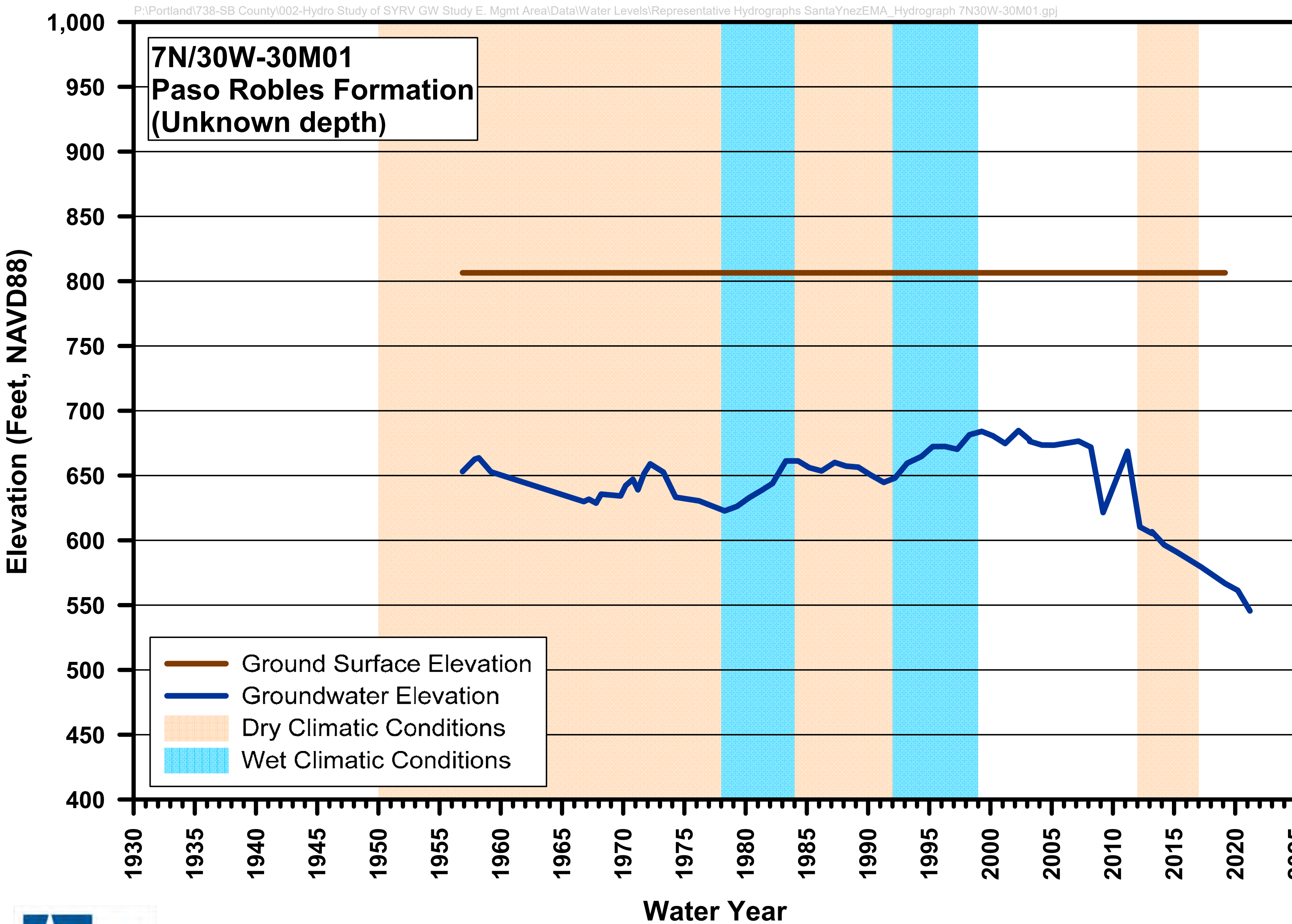
FIGURE D-13

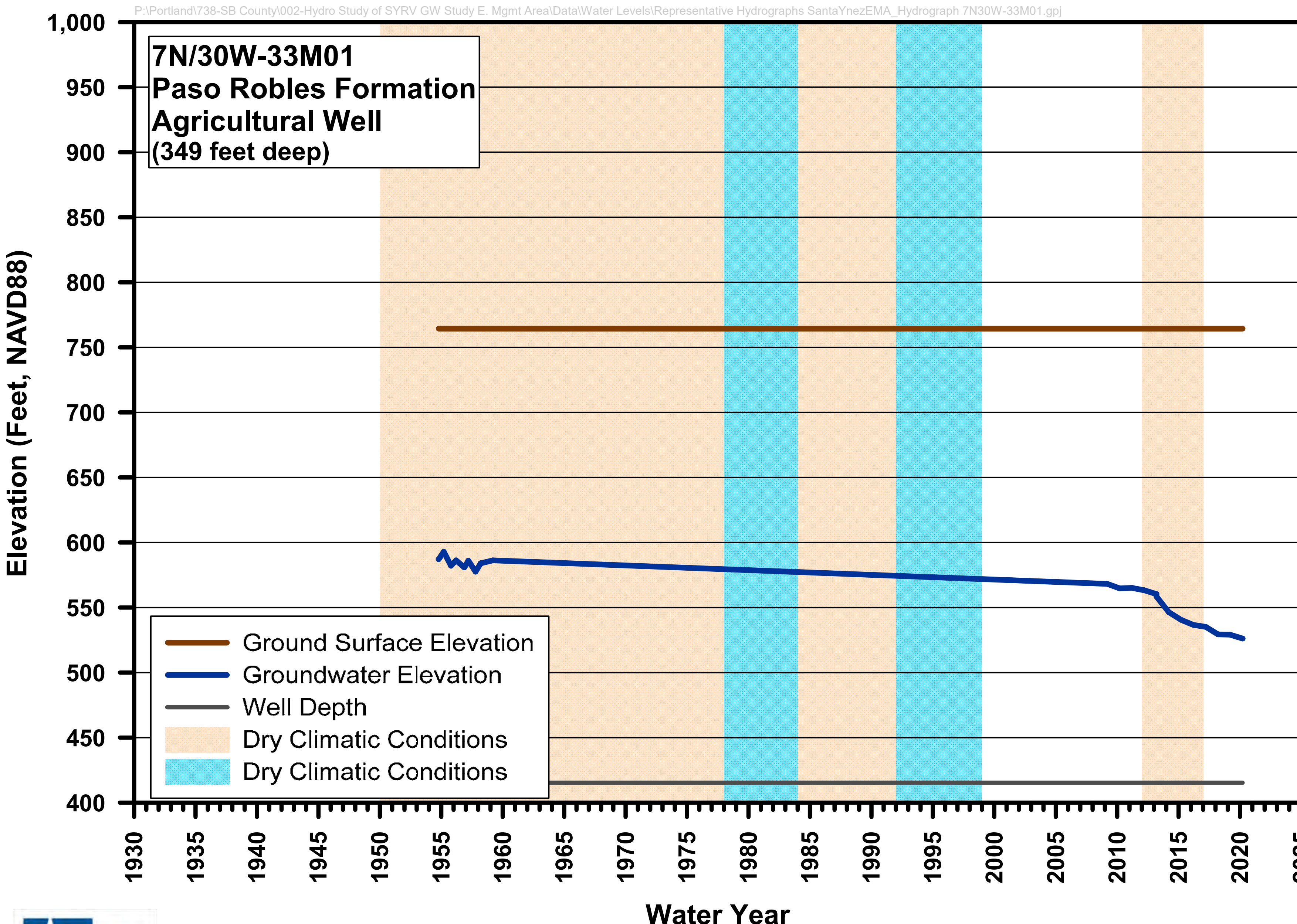
Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



GSI Water Solutions, Inc.

FIGURE D-14
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



GSI Water Solutions, Inc.

FIGURE D-15

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

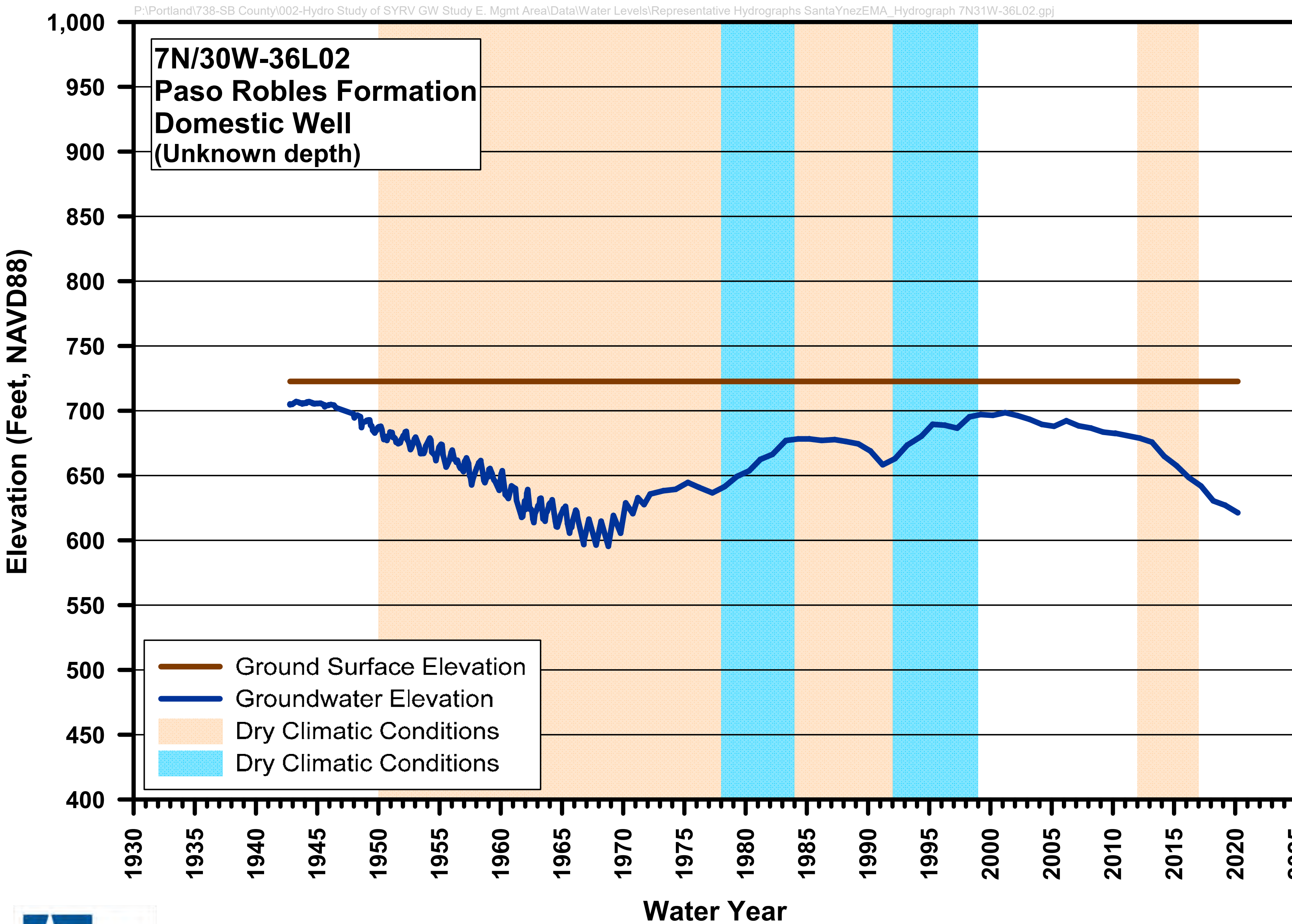


FIGURE D-16

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

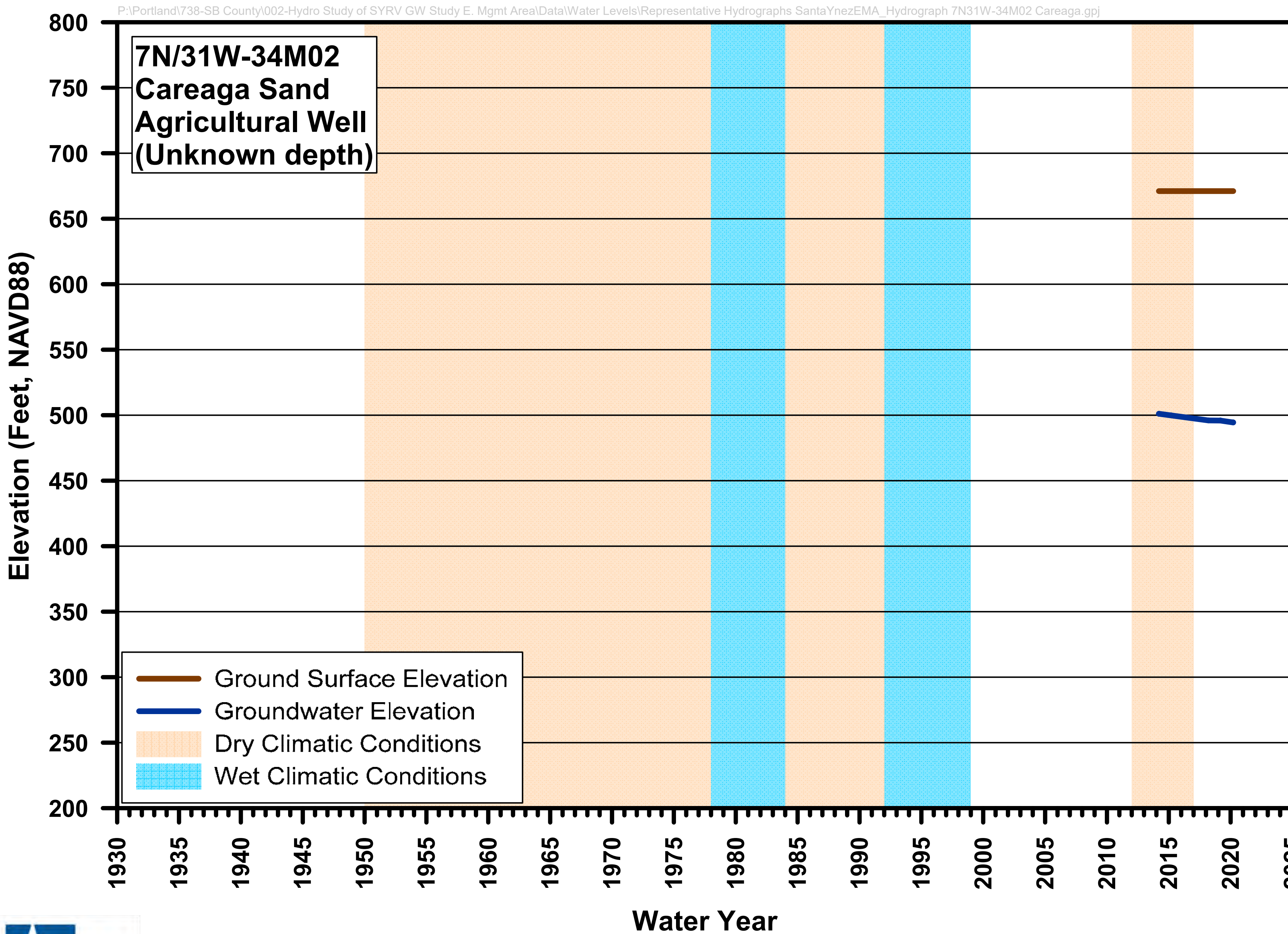


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FIGURE D-17

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

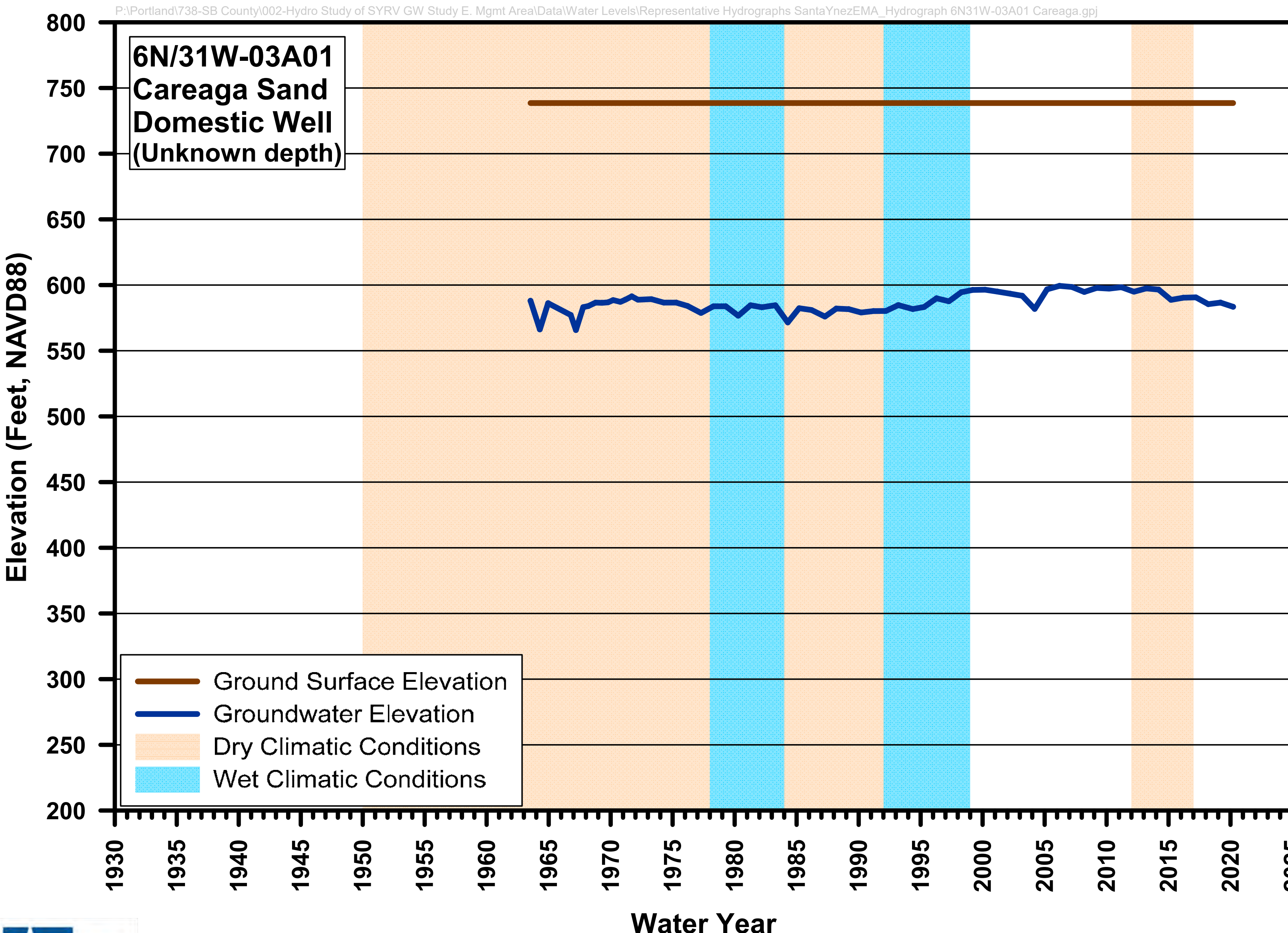

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FIGURE D-18
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

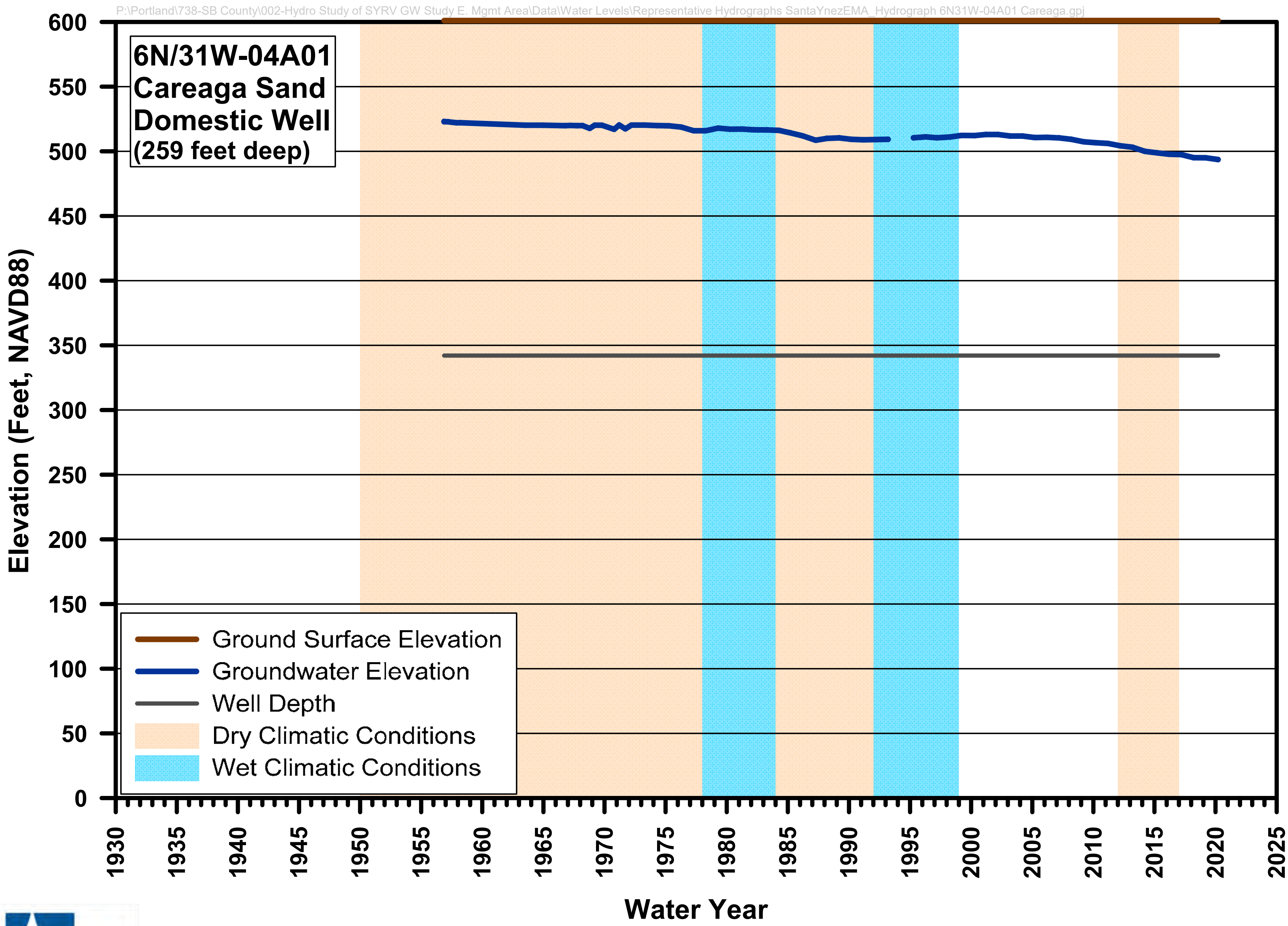

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FIGURE D-19

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

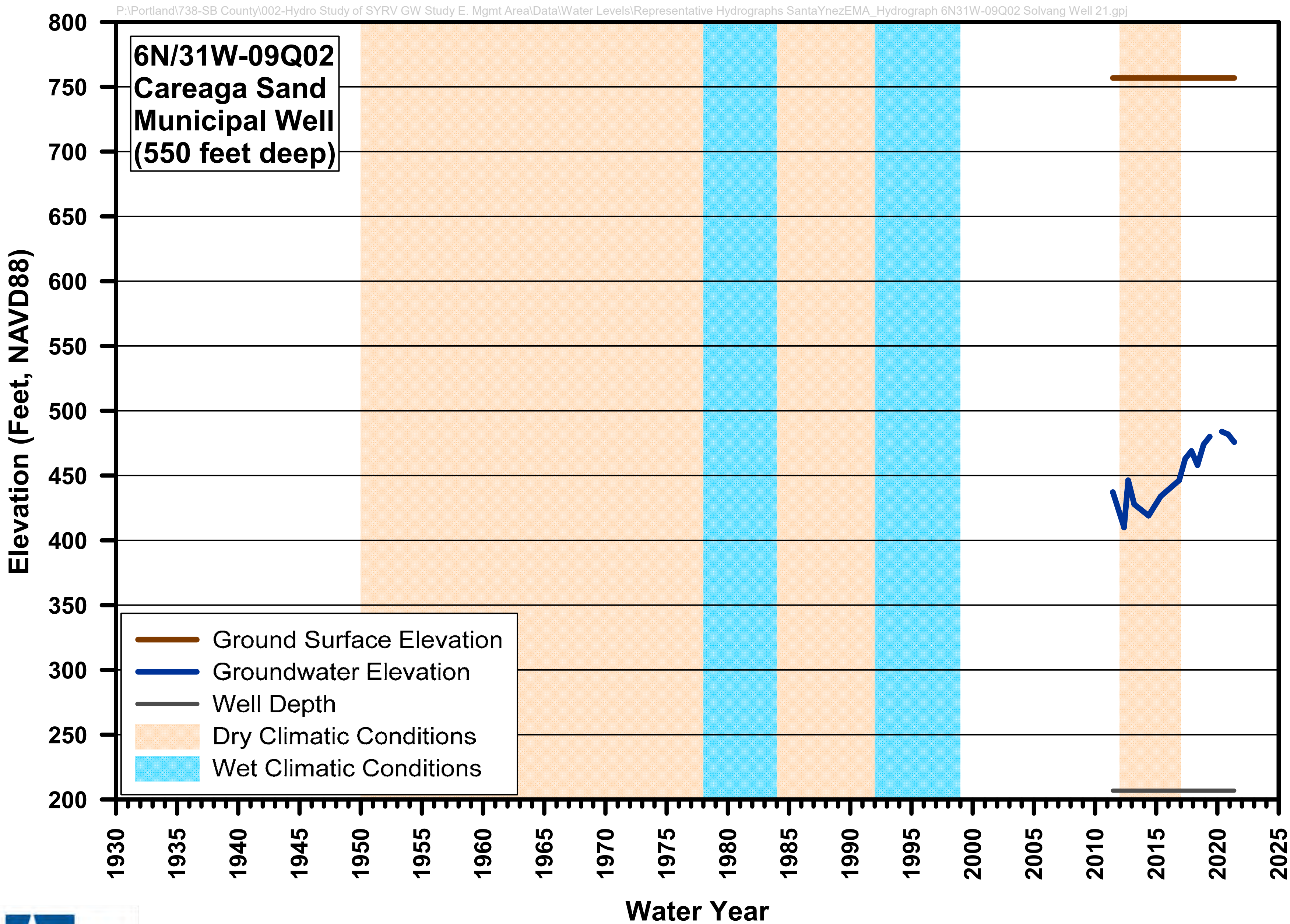

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FIGURE D-20

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

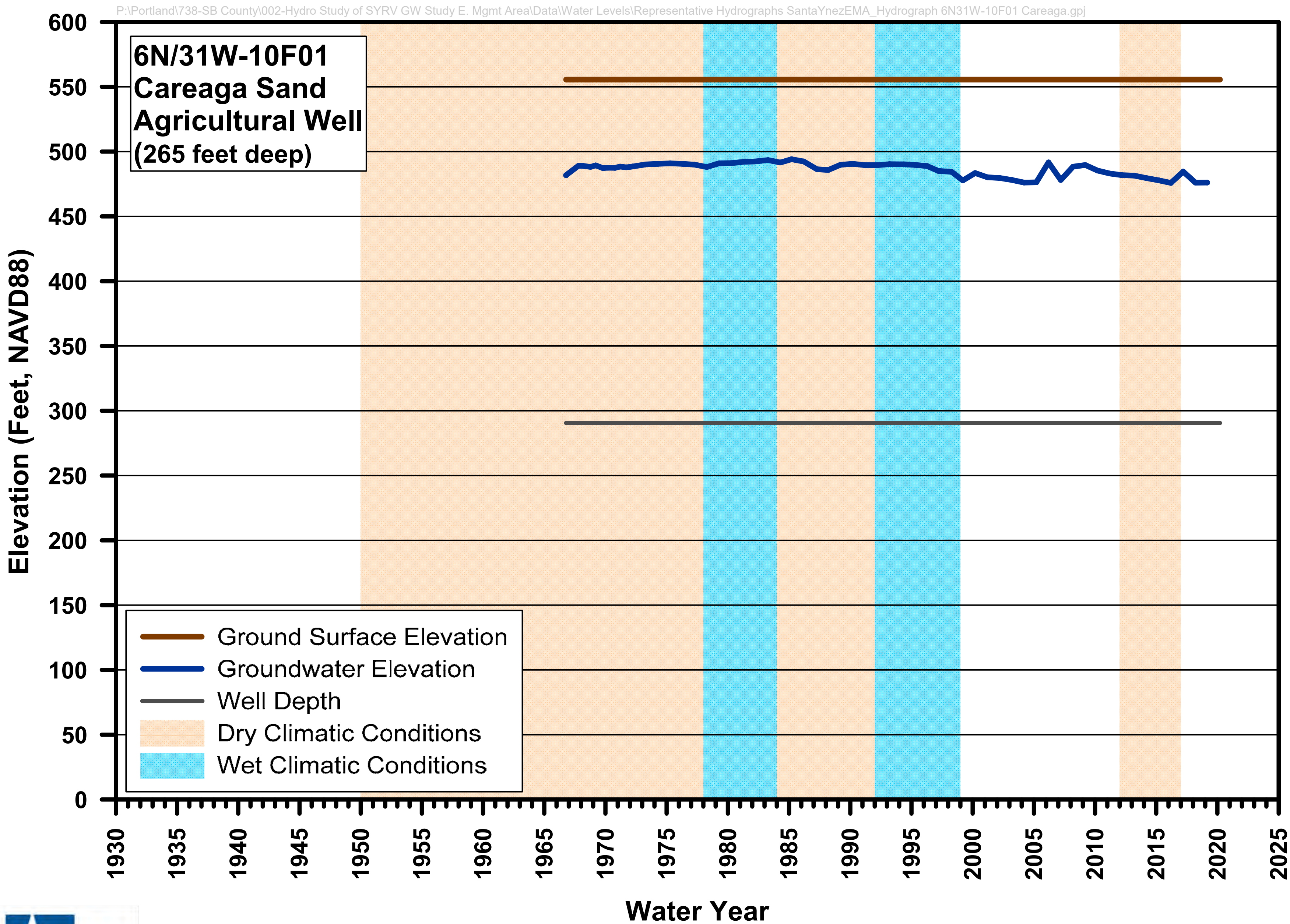

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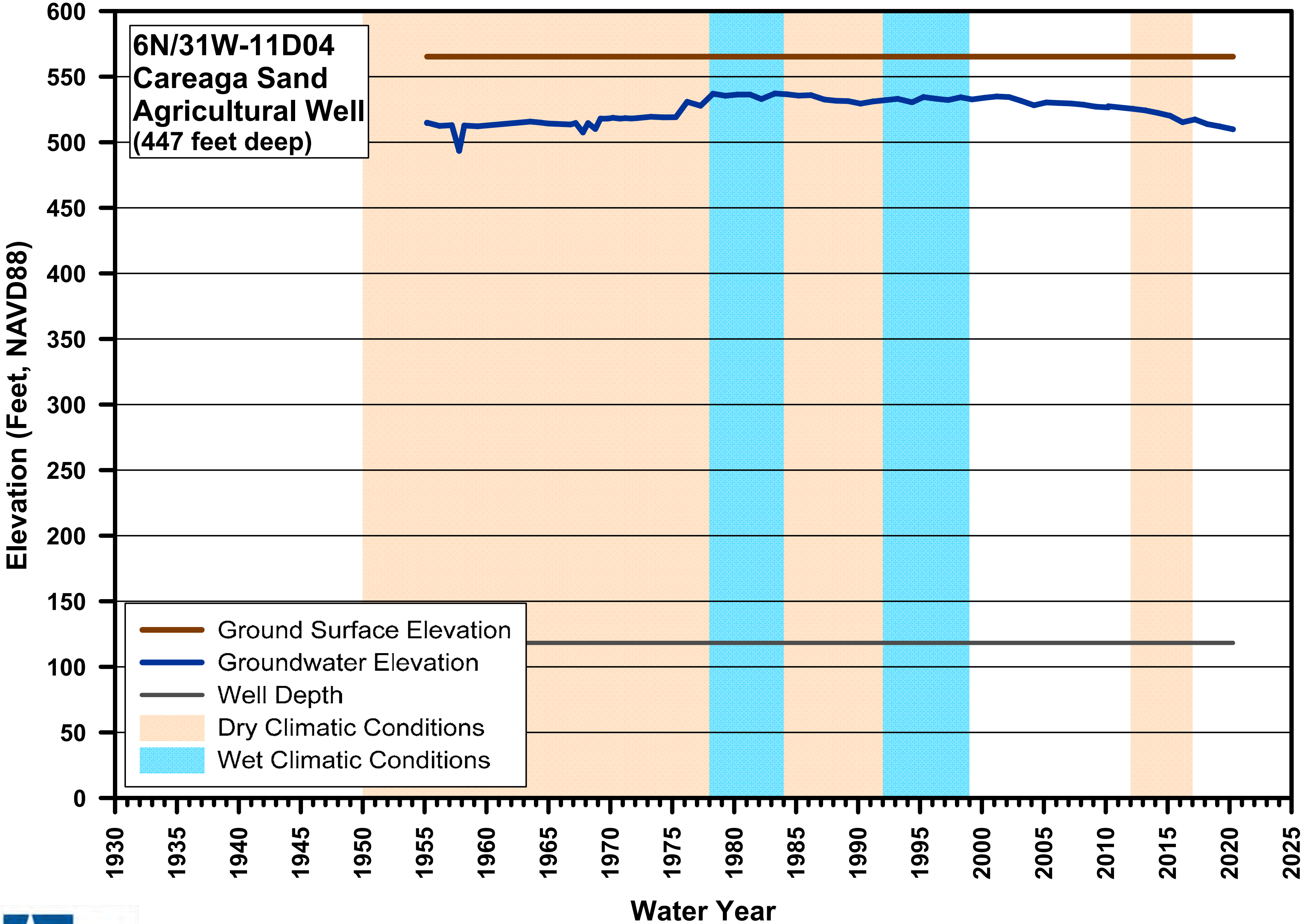
FIGURE D-21

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

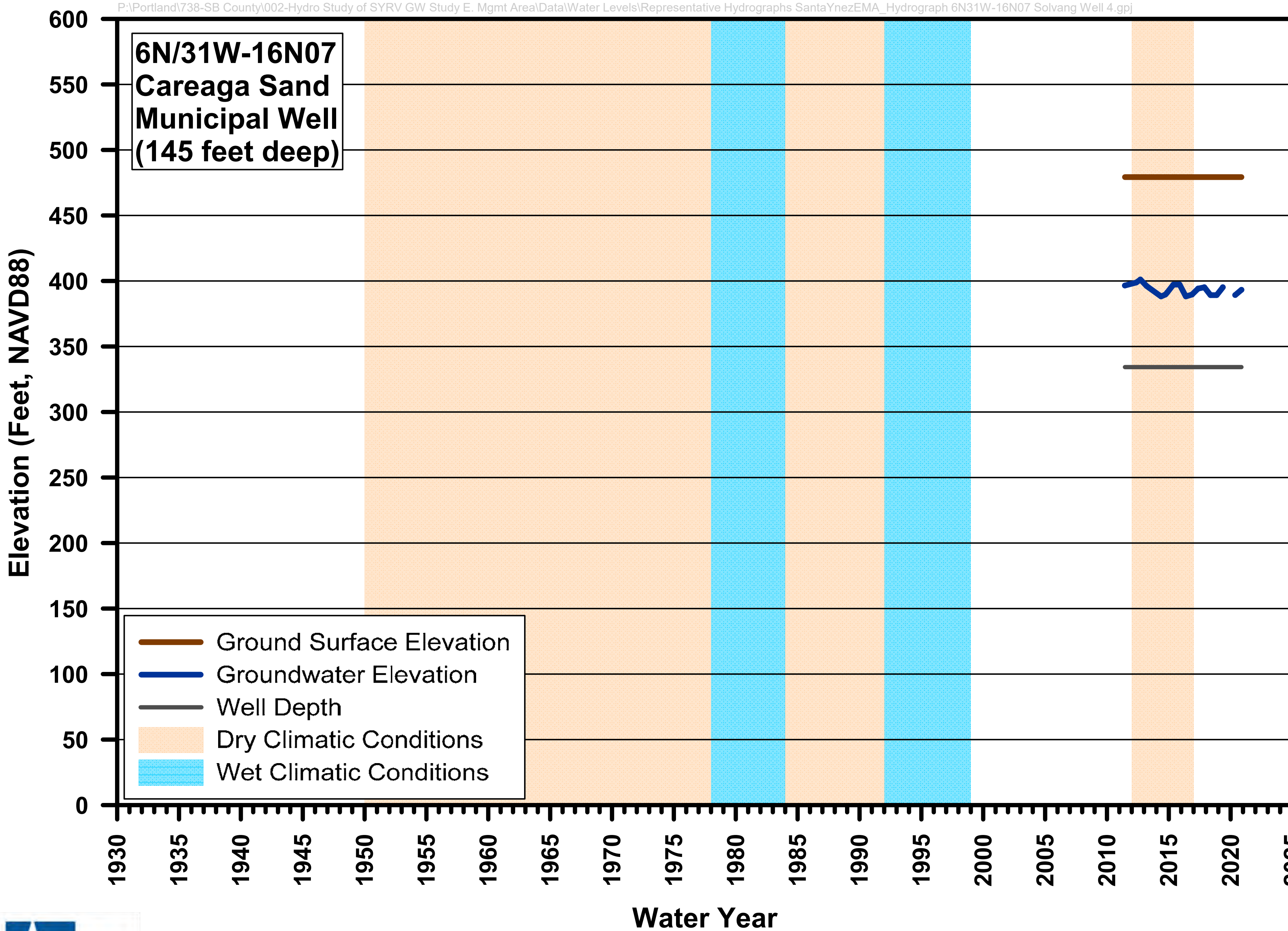


GSI Water Solutions, Inc.

FIGURE D-22

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



GSI Water Solutions, Inc.

FIGURE D-23

Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

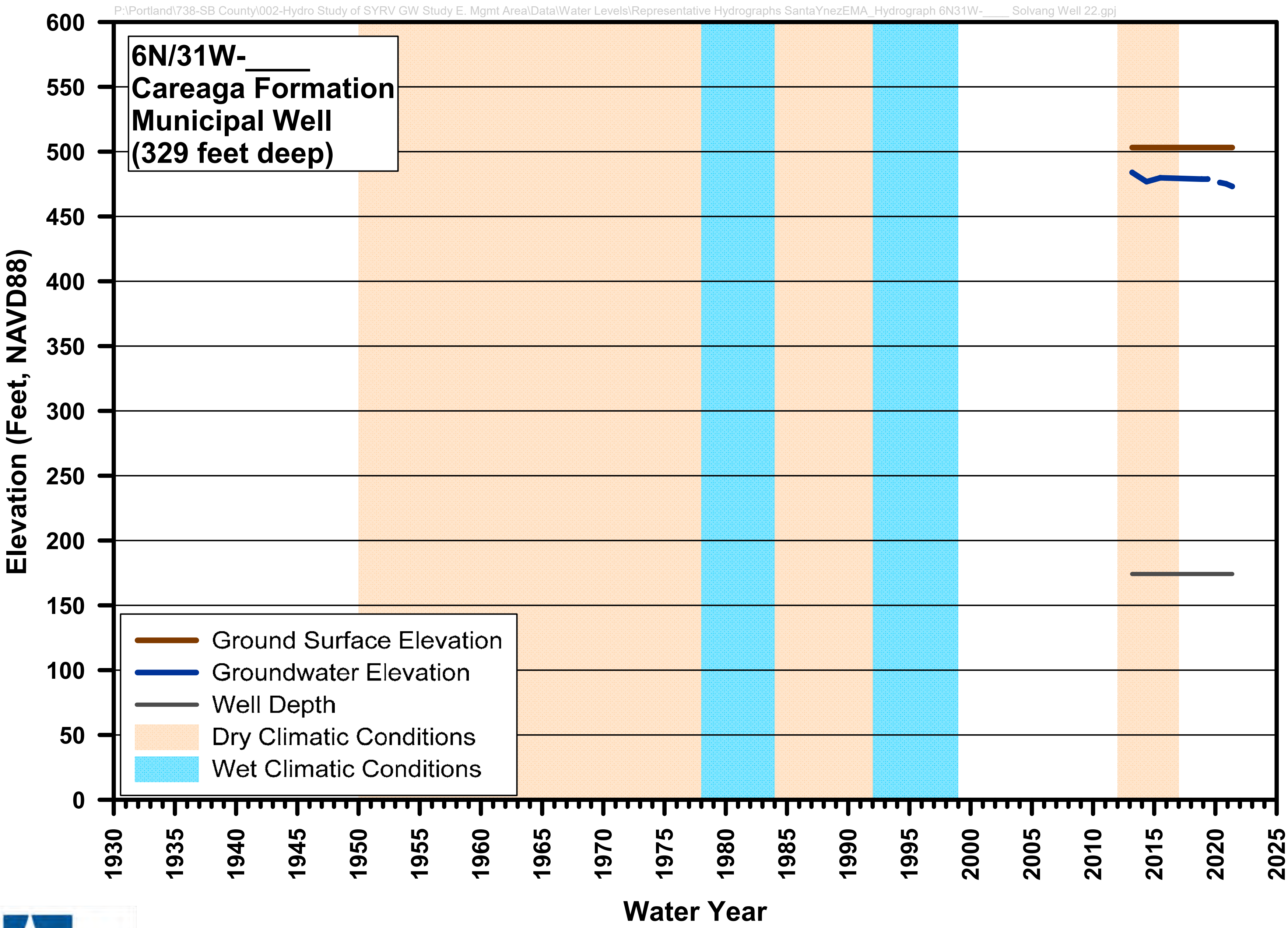


FIGURE D-24

Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

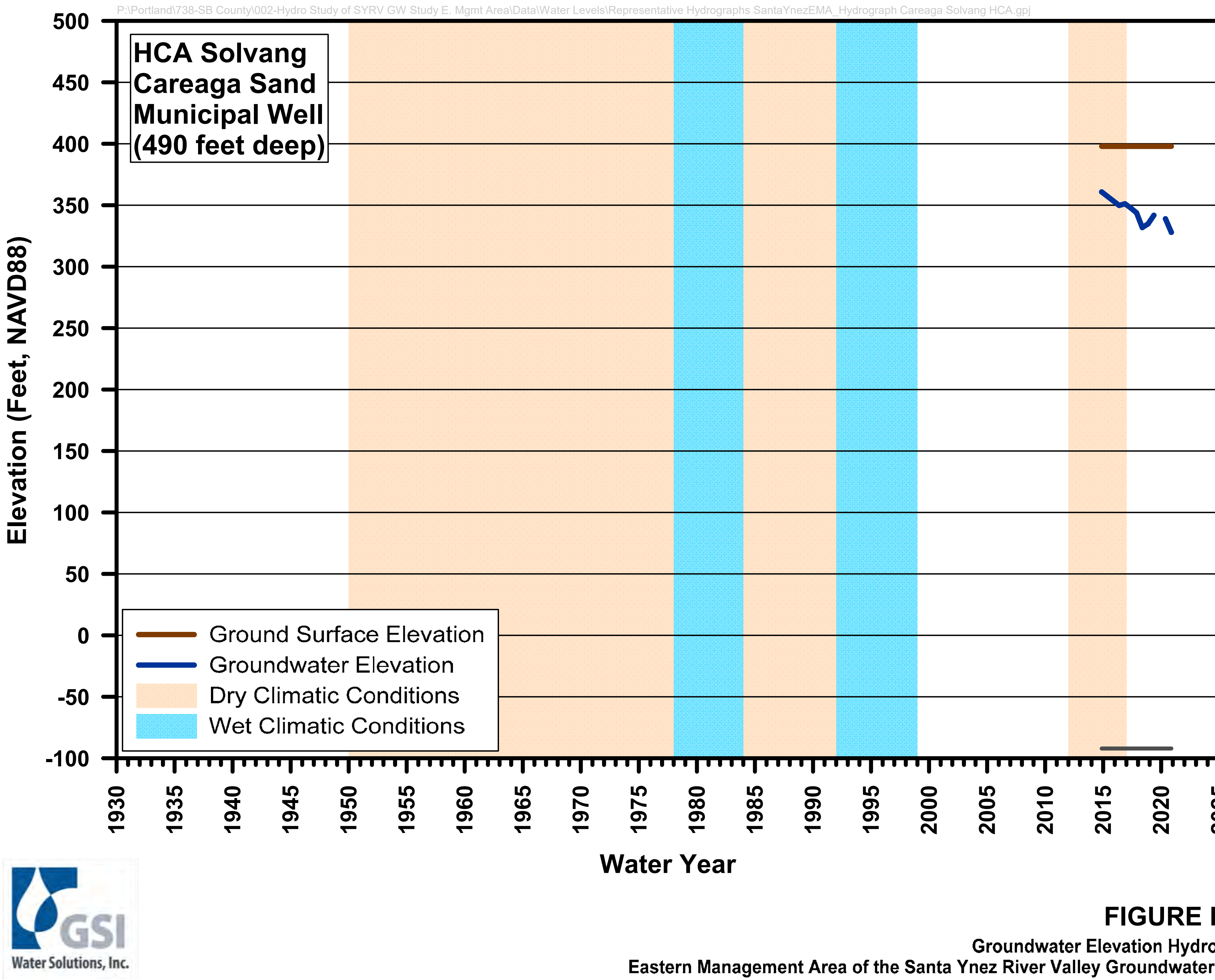


FIGURE D-25

Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

APPENDIX E

Land Subsidence Evaluation

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Technical Memorandum

To: Mr. Jeff Barry, GSI Water Solutions, Inc.

From: Michael Cornelius, PG
Joseph de Larios, PE, GE

c:

Date: May 27, 2021

Re: Preliminary Subsidence Evaluation
Santa Ynez River Valley Groundwater Basin - Eastern Management Area
Groundwater Sustainability Plan (GSP)
Santa Barbara County, California
GEI Project No. 1902081

As requested by GSI Water Solutions, Inc. (GSI), GEI Consultants, Inc. (GEI) performed a preliminary evaluation of potential subsidence within the Eastern Management Area (EMA) of the Santa Ynez River Valley Groundwater Basin. The groundwater basin in located in northwestern Santa Barbara County, California.

The purpose of the preliminary evaluation is to assess the range of possible long-term ground surface elevation changes related to withdrawal of groundwater from the basin. GEI's evaluation of possible long-term subsidence is based on limited information and is therefore a screening-level study for the purpose of assessing relative risk. GEI's scope of services for the preliminary evaluation, which is described in the contract scope document dated January 6, 2021, included:

- Reviewing information regarding land surface elevations and indications that subsidence has occurred in the past.
- Reviewing subsurface geologic information and groundwater level data provided by GSI to assess the general susceptibility of the EMA to experience subsidence as a result of lowering groundwater levels below historical levels.
- Developing stratigraphic profiles from well logs provided by GSI and estimating ranges of possible long-term subsidence that might be expected in the future, based on a simple one-dimensional settlement model, assumed soil parameters, and professional judgement.

This technical memorandum (TM) describes the background, approach, and results of the preliminary subsidence evaluation.

OVERVIEW

Historically, subsidence of land in California has typically been related to excessive groundwater pumping. In sedimentary aquifers, groundwater is pumped from the pore spaces between sand and gravel grains, causing a lowering of pore-water pressure and a corresponding increase in the effective stress in the aquifer. The increased stresses can induce elastic (reversable) and inelastic (permanent) settlement of the ground surface, depending on a number of factors (including the magnitude and duration of groundwater elevation decline). Fine-grained soil materials (e.g., clays) within the aquifer tend to be much more compressible than the coarser-grained materials (sands and gravels).

Consequently, the typical causes of land subsidence are related to compression of the finer-grained strata within a given aquifer.

The relationship between groundwater level decline-and-recovery and subsidence is complex. There are time-dependent and non-linear interactions between the various aspects of the aquifer system, such as the variable thicknesses of the soil strata within a given aquifer, time-dependent changes in effective stress (typically related to lowering and raising of groundwater levels), and variability in the rates and distribution of drainage from the different soil types found within the aquifer. If the magnitude and duration of groundwater elevation decline is limited, land subsidence may be elastic (reversable). Otherwise, some inelastic (permanent) subsidence could be induced.

A check of the U.S. Geological Survey (USGS) land subsidence website (USGS, 2021) indicates that the Santa Ynez River Valley Groundwater Basin Eastern Management Area (EMA) is not in a mapped area of ongoing USGS subsidence studies.

The draft Groundwater Sustainability Plan (GSP)prepared by GSI includes a summary of existing information for long-term changes in ground surface elevation within the groundwater basin (GSI, 2020). The available information regarding elevation changes within the basin is somewhat limited. A TRE Altamira monitoring station about 2 miles southeast of Los Olivos (Figure 3-36 of GSI, 2020) indicates about 0.07 feet of net settlement between July 2015 and October 2019.

The UNAVCO CGPS data reported for the EMA (Figure 3-37 of GSI, 2020) indicates that ground surface elevations are generally stable, with station SYNG-NA (located near the Santa Ynez airport, about 4 miles east of Solvang) indicating net settlement of less than about 0.1 feet between early 2016 and the end of 2020. The rate of subsidence at station SYNG-NA estimated to be about 4 mm per year (plus or minus about 1 mm per year). In the data that we reviewed, GEI did not find any reports indicating specific observations of ground deformation attributed to subsidence within the EMA.

PRELIMINARY EVALUATION OF SUBSIDENCE POTENTIAL

The subsurface geologic information and groundwater level data provided by GSI to GEI was reviewed and the general susceptibility of the EMA to experience subsidence as a result of lowering groundwater levels below historical levels was assessed. The selection of data, the approached used for the first-order estimates of subsidence, and the limitations and uncertainties of the subsidence estimates are discussed below.

> *§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: (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.*

GEI performed a screening-level, preliminary evaluation of the potential for ground surface subsidence within the basin. Our preliminary evaluation included developing stratigraphic profiles from well logs provided by GSI and estimating ranges of possible long-term subsidence that might be expected in the future. There is limited data on the historic groundwater levels across the EMA (GSI, 2020).

The hydrographs (groundwater elevation data plots) contained in the Groundwater Sustainability Plan (GSP) extend back several decades (GSI, 2020). Four groups of “representative” hydrographs are provided, one group for each of the geologic formations that are major groundwater sources (i.e., Paso Robles Formation, Careaga Sand, Santa Ynez River Alluvium, and Tributary Alluvium). The Representative Hydrographs for the Paso Robles Formation (figures 3-24 and 3-25 of GSI, 2020) show groundwater levels fluctuating (declining and recovering) over a period of decades. Depending on the hydrograph, the range of elevation changes is on the order of about 50 feet (records for 6N/29W-08P01 and 6N/30W-07G06 on Figure 3-24) to just over 110 feet (records for 7N/30W-35R01 and 7N/31W-36L02 on Figure 3-25). With the exception of 7N/30W-35R01, the plotted elevations for the most recent data are within the historical ranges for that location.

The groundwater elevations for the hydrographs representing Careaga Sand, Santa Ynez River Alluvium, and Tributary Alluvium are relatively consistent, with the range of groundwater elevation changes generally 20 feet or less. The exception is the record for 8N/31W-36H01, which is screened in the Tributary Alluvium. From 1989 to 2018, the reported high groundwater elevation was about 1,175 feet and the low elevation was about 1,125 feet (a range of about 50 feet).

The well logs for the specific hydrographs presented in the GSP were not available for our review. In addition, there is limited information on the geotechnical conditions within the EMA aquifers (i.e., no site-specific data on the geotechnical properties or engineering parameters).

We used the available "representative" hydrograph information and adjusted groundwater elevations to correspond to the estimated Ground Surface Elevation (GSE) for the specific well log. The hydrographs and well logs used for our evaluations are included in Attachment A. Locations analyzed:

Well ID	**Well No. 5A**	**Well No. 6**
Coordinates (estimated from information on the individual well log and Google Maps):	34.665, -120.116	34.65300, -120.11324
Estimated Ground Surface Elevation (GSE), feet (estimated from Google Maps):	810±	780±
Formation, In Well Screen Interval	Paso Robles Formation	Paso Robles Formation

Sources of Water Level Data Used in Evaluations*:	
7N/30W-35R01 (GSE 850±) Groundwater High Elev. 690 feet Groundwater Low Elev. 575 feet	7N/31W-36L02 (GSE 740±) Groundwater High Elev. 720 feet Groundwater Low Elev. 610 feet

*Figure 3-25 of GSI, 2020

To estimate possible ranges of past and ongoing ground surface settlement, GEI used assumed geotechnical parameters (e.g., unit weights, compressibility, stress history), professional judgement, and classical consolidation theory developed by Terzaghi (Holtz et al., 2011):

$$\delta_c = \frac{C_r}{1+e_0} H \log\left(\frac{\sigma'_{zc}}{\sigma'_{z0}}\right) + \frac{C_c}{1+e_0} H \log\left(\frac{\sigma'_{zf}}{\sigma'_{zc}}\right)$$

Where:

δ_c = the settlement due to consolidation in a given stratum.
C_c = the compression index.
Cr = the recompression index.
e_0 = the initial void ratio.
H = the height of the compressible soil stratum.
σ_{zf} = the final vertical stress.
σ_{z0} = the initial vertical stress.
σ_{zc} = the preconsolidation stress of the soil.

The stratigraphy, assumed parameters, and the above equation were used to develop simple, one-dimensional settlement models for each of the two sites. First-order estimates of the soil parameters were based on a range of possible values. The estimates from these models are considered first-order estimates and are subject to confirmation through additional investigations.

An important factor and key limitation in assessing the magnitude of potential settlement is the stress history within the soil column (including long-term groundwater levels prior to the available hydrographs). The sediments in the groundwater basin were assumed to be "unconsolidated" from a geologic perspective, but to be near-normally consolidated from a geotechnical perspective. The estimated ranges of possible consolidation settlement were based on model consolidation curves, which were in-turn based on assumed over-consolidation ratio (OCR) values ranging from 1.2 to 2.0 and Janbu's tangent modulus approach (Holtz et al. 2011).

Other key assumptions included:

- Soil layer discretization was based on the available well logs.
- Settlement of soil strata assumed to be predominantly coarse-grained (i.e., material retained on the No. 200 sieve) was considered to be negligible.
- All soil properties (unit weights, compressibility, etc.) were assumed based on soil types indicated on well logs.
- Individual soil layers assumed uniform.
- Layers indicated in the well logs as being clayey were assumed to have clay behavior (i.e., be compressible).
- No settlement assumed below the materials listed in the well logs.
- Unit weights were assumed to be constant, with clay assumed to be 120 pounds per cubic foot (pcf), sand unit weight assumed to be 125 pcf, and gravel unit weight assumed to be 140 pcf.
- All calculations estimate the ultimate consolidation settlement (time rate effects are not included; assumes groundwater levels do not recover).

The soil and groundwater conditions vary widely across the EMA basin. The models produced similar subsidence estimates for the two selected locations, with estimated potential subsidence on the order of ½ to 3 feet resulting from the changes in groundwater elevation reported in the hydrographs.

It should be noted that the well logs used in the evaluations include relatively thick sections of clayey materials (which would be expected to drain slowly) and that groundwater levels have fallen and recovered over the time period documented in the hydrographs. It is unlikely that the full amount of estimated subsidence would be observed unless groundwater elevations declined significantly and did not recover for an extended period. The available ground elevation data do not cover a time period comparable to the hydrograph information, making it difficult to compare the apparent rate of ground surface movement indicated in the GSP (GSI, 2020).

The estimated range of settlement assumes that the sediments in the EMA remain at or above the "normally consolidated" stress state (i.e., the current stresses on the soils are less than the maximum those soils have previously been subjected to over geologic time). If the present or future stresses on the soils exceed the maximum past pressure, the potential long-term subsidence could be several times the estimated range.

DISCUSSION AND CONCLUSIONS

As noted above, ground subsidence is a complex, time-dependent phenomenon. There is commonly significant time-lag between the lowering of groundwater levels and observed subsidence. Figures 1 and 2 include descriptions of the mechanisms, three-dimensional effects, and time-dependent aspects of ground subsidence.

It is important to note that while settlement of the ground surface may have adverse effects on constructed facilities, the relative impact is dependent on the specific facility and the magnitude of settlement (both total and differential). The greatest potential for damage is along linear surface features, including pipelines, canals, levees, railroad tracks, highways. While there is the potential for localized impacts at bridges or building foundations, it is likely that limited amounts of subsidence will not adversely affect the performance of surface improvements and infrastructure.

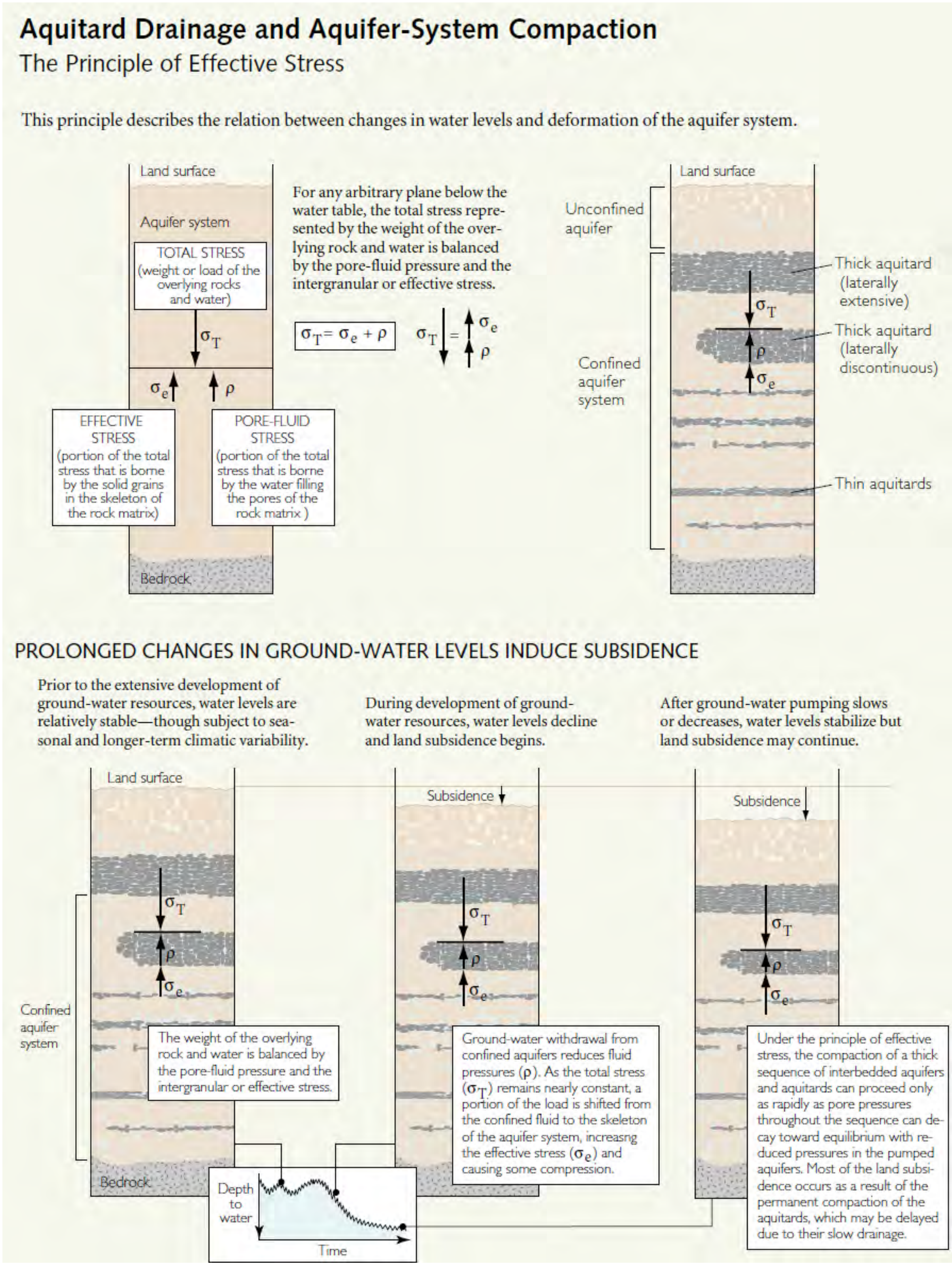

Figure 1: Schematic diagram of land subsidence due to groundwater withdrawal (from Galloway et al., 1999).

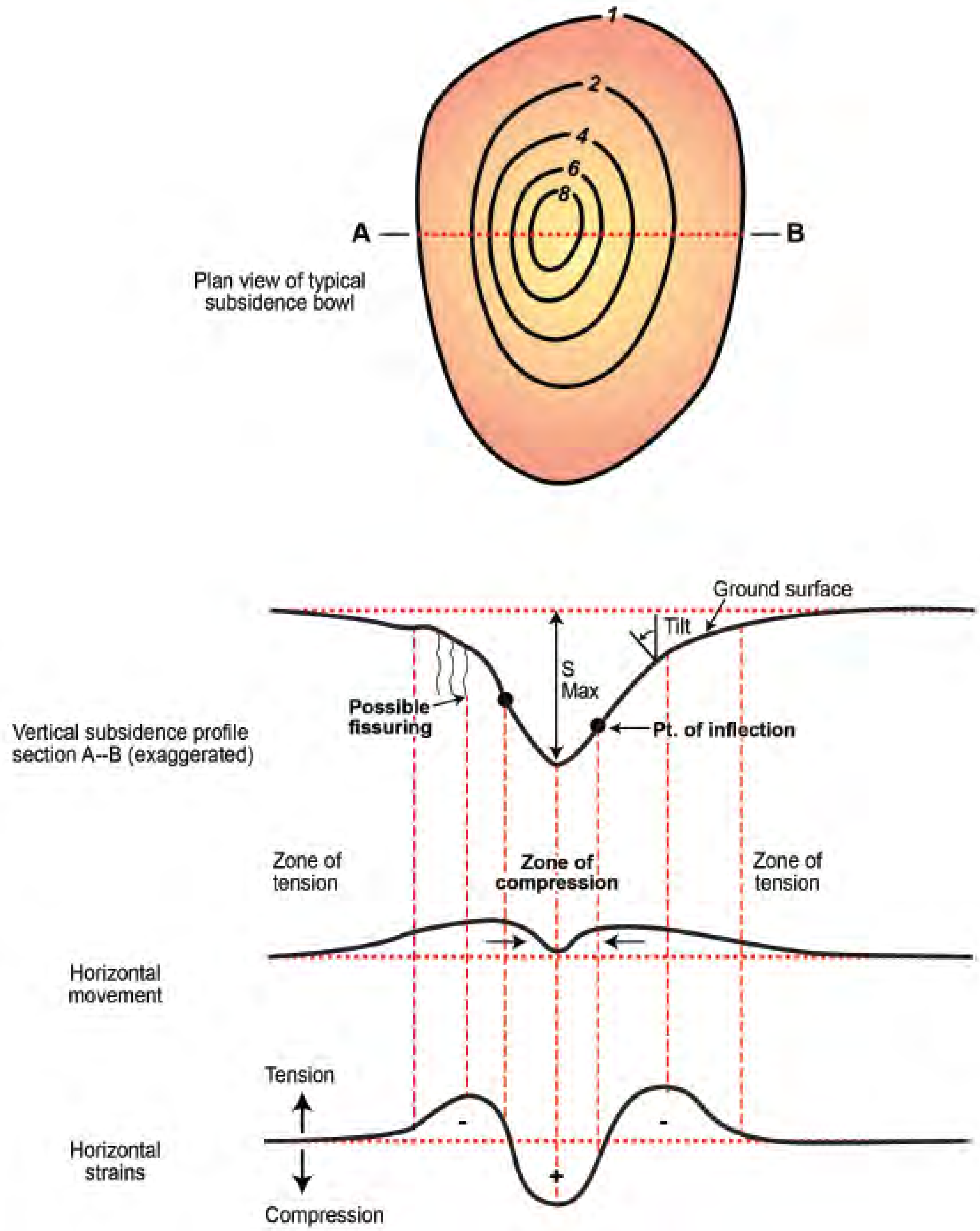

Figure 2: Schematic diagram of land-surface movements associated with subsidence bowls (from Lowe, 2012, modified from Viets and others, 1979). S max is maximum vertical subsidence.

Groundwater Management Perspective

From a groundwater management perspective, we are interested in the magnitude of subsidence that may take place as a result of removal of groundwater from the aquifer system. In California much of the land subsidence resulting from groundwater extraction has occurred in the San Joaquin Valley where the Corcoran Clay is present. As ground water levels in the aquifers beneath the Corcoran Clay are lowered, the water no longer provides the buoyancy to help support the above soil column, so the sediments may compress.

Consolidation of sediments typically takes a relatively long time, often tens of years before it becomes evident at the ground surface. Once the mechanism to initiate subsidence has been started, it may persist for years after groundwater levels have returned above e the threshold which triggered it. Also, compressed sediments cannot be "uncompressed" by adding water to the system. Even if groundwater levels are returned to the "original" elevation, subsidence may continue for some period of time (as the system comes to the new equilibrium).

In the EMA there has been no reported historical or anecdotal information regarding land subsidence as a result of groundwater extractions. There may be, and likely has been some subsidence as a result of groundwater extraction, but we are not aware of documented impacts to surface features. With observed groundwater declines of roughly 100 feet occurring within the EMA (e.g., at 7N/31W-36L02 between about 1943 and 1968, see Figure 3-25 of the GSP), some subsidence may have occurred prior to the initiation of SGMA, but there is not readily available information documenting that. We do not know how much movement has occurred, or how it relates to the maximum amount that may occur based on the geotechnical analysis based on the limited data available.

Recommendations

Future declines in groundwater levels may result in land subsidence, but we are not able to accurately estimate those with the available data. If subsidence is a threat to the groundwater basin, more rigorous investigation and analysis can be conducted to estimate the amount of compaction that has taken place to allow to estimate the maximum amount of compression that may be experienced at a specific location. In order to avoid the potential for additional subsidence from groundwater extraction, groundwater levels should be maintained at or above the historic lows.

During planning and defining of groundwater management goals for the EMA, the need for additional studies should be assessed. Studies could include performing reconnaissance or inspection of critical infrastructure and other facilities to assess whether signs of deformation or subsidence can be observed. If additional ground surface data becomes available, it may be beneficial to evaluate the estimated basin storage and compare it to the measured subsidence.

As a minimum, we recommend that the ground surface elevations within the groundwater basin be periodically surveyed and that apparent changes in elevation be assessed. If total and differential settlements across the basin are of concern, additional measures should be developed to fill data gaps and allow for more-detailed evaluation. If a more-detailed evaluation of potential subsidence is desired, a plan should be developed to investigate the geotechnical parameters and stress history within the aquifer materials, which could include in situ and laboratory testing of soil samples.

Limitations

In the performance of its professional services, GEI Consultants, Inc., its employees, and its agents comply with the standards of care and skill ordinarily exercised by members of our profession practicing in similar localities. The analyses, conclusions, and recommendations discussed in this memorandum are based on limited information about the sites evaluated. Subsurface conditions may vary from those assumed for the purposes of this study.

No warranty, either express or implied, is made or intended in connection with the services performed by us, or by the proposal for consulting or other services, or by the furnishing of oral or written reports or findings. In the event conclusions or recommendations based on information in this memorandum are made by others, such conclusions and recommendations are not our responsibility unless we have been given an opportunity to review and concur with such conclusions or recommendations in writing.

REFERENCES

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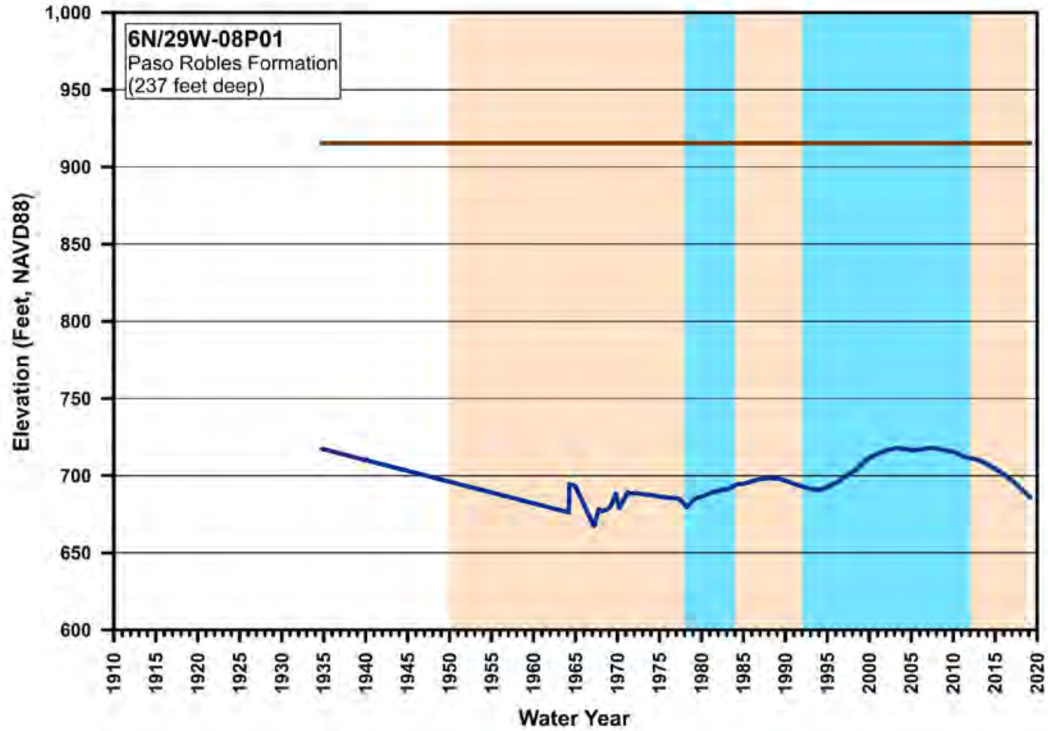
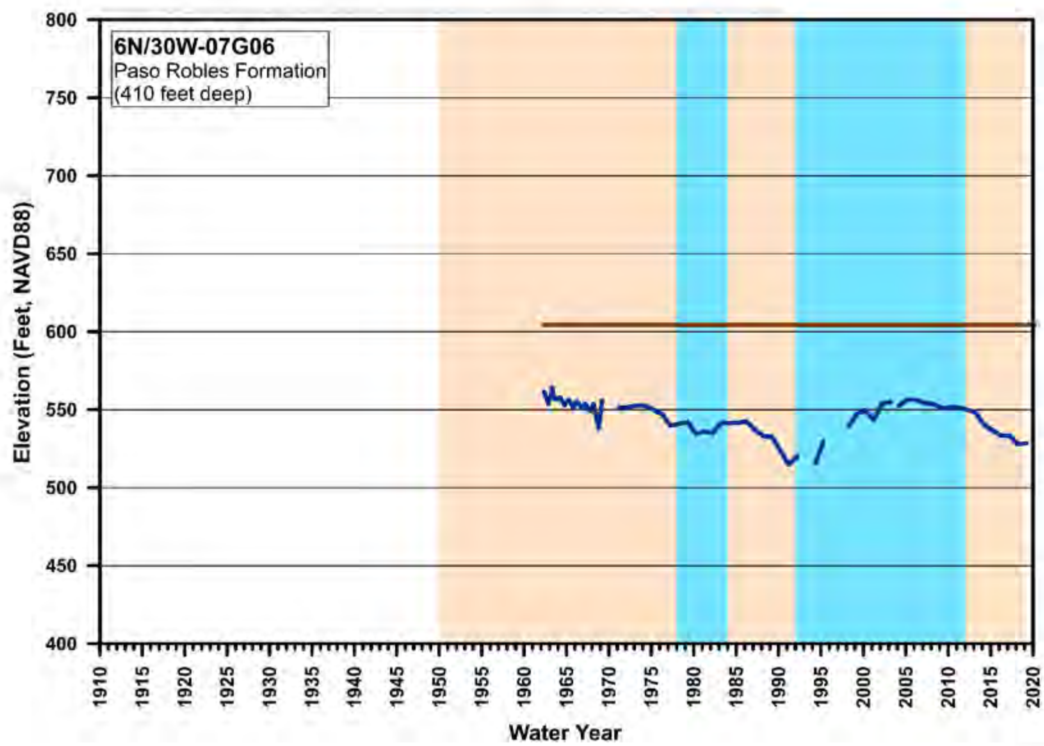
ATTACHMENT A

Hydrographs, Well Locations, and Stratigraphic Information Used in Analyses (well logs and excerpts from GSI Water Solutions, Inc., 2020)





LEGEND

- Ground Surface Elevation
- Groundwater Elevation
- Dry Climatic Cycle
- Wet Climatic Cycle

FIGURE 3-24

Representative Paso Robles Formation Hydrographs: Wells -08P01 and -07G06

Groundwater Sustainability Plan
Eastern Management Area

GSI Water Solutions, Inc.

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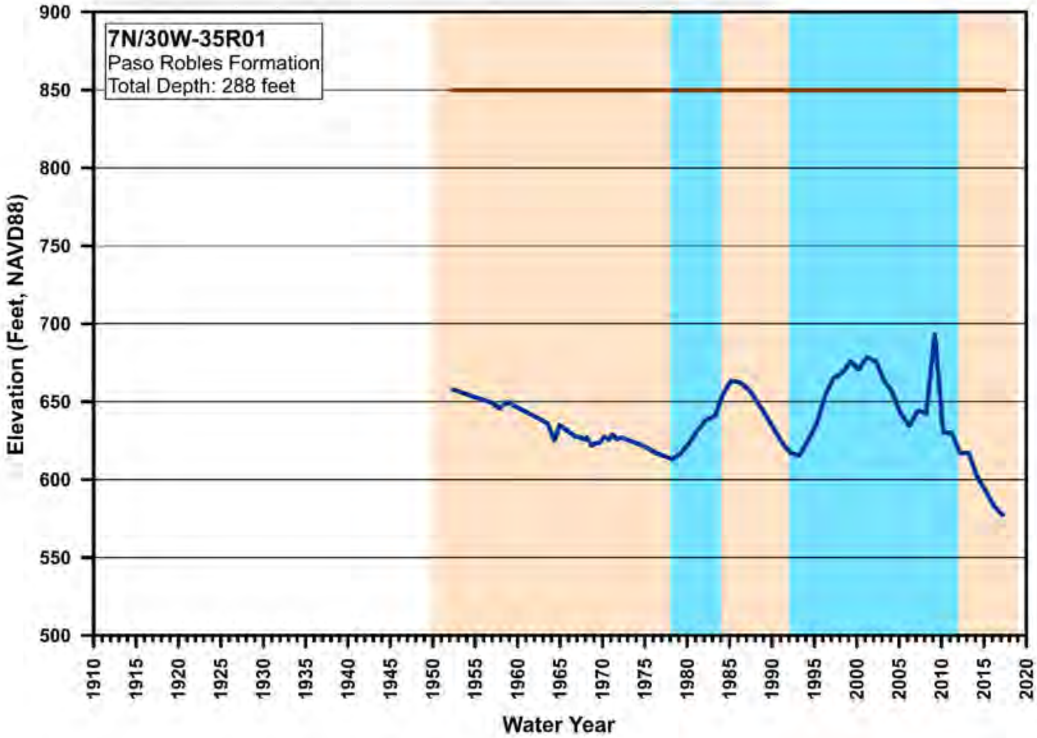
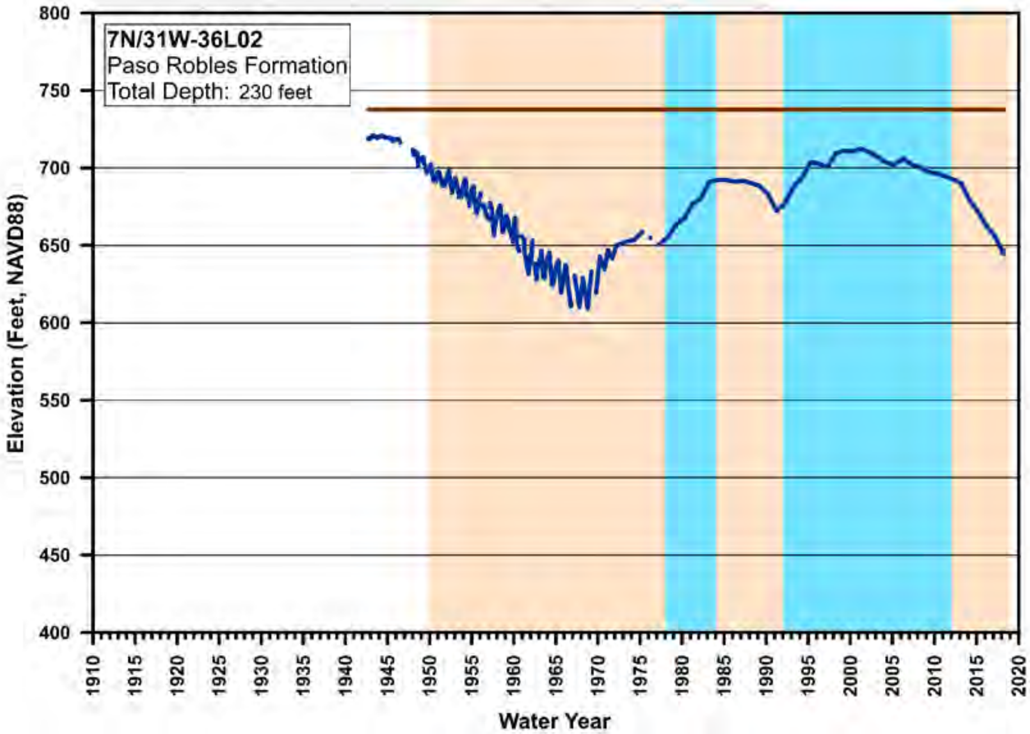




LEGEND

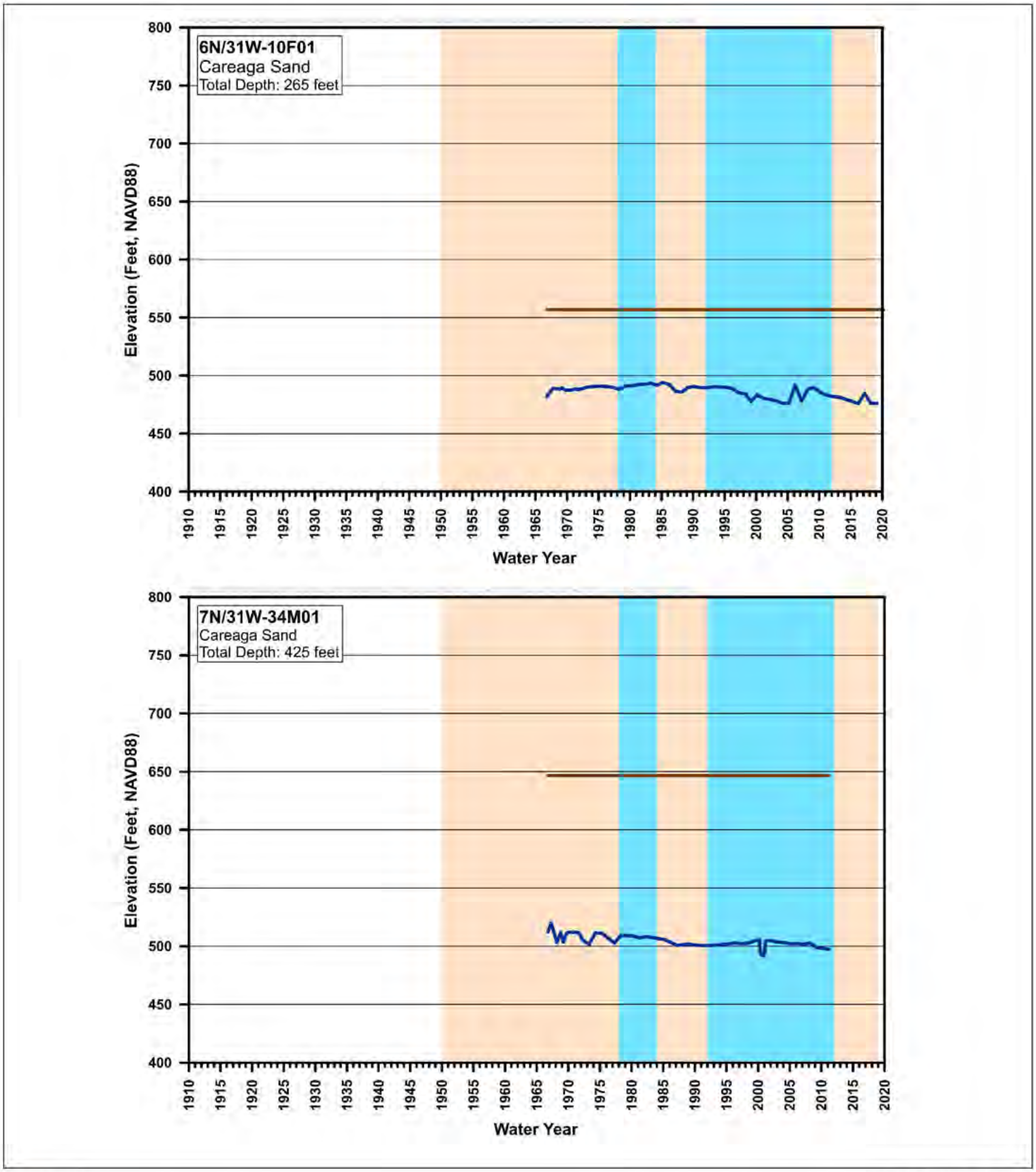
- Ground Surface Elevation
- Groundwater Elevation
- Dry Climatic Cycle
- Wet Climatic Cycle

FIGURE 3-25

Representative Paso Robles Formation Hydrographs: Wells -35R01 and -36L02

Groundwater Sustainability Plan
Eastern Management Area

GSI Water Solutions, Inc.



LEGEND

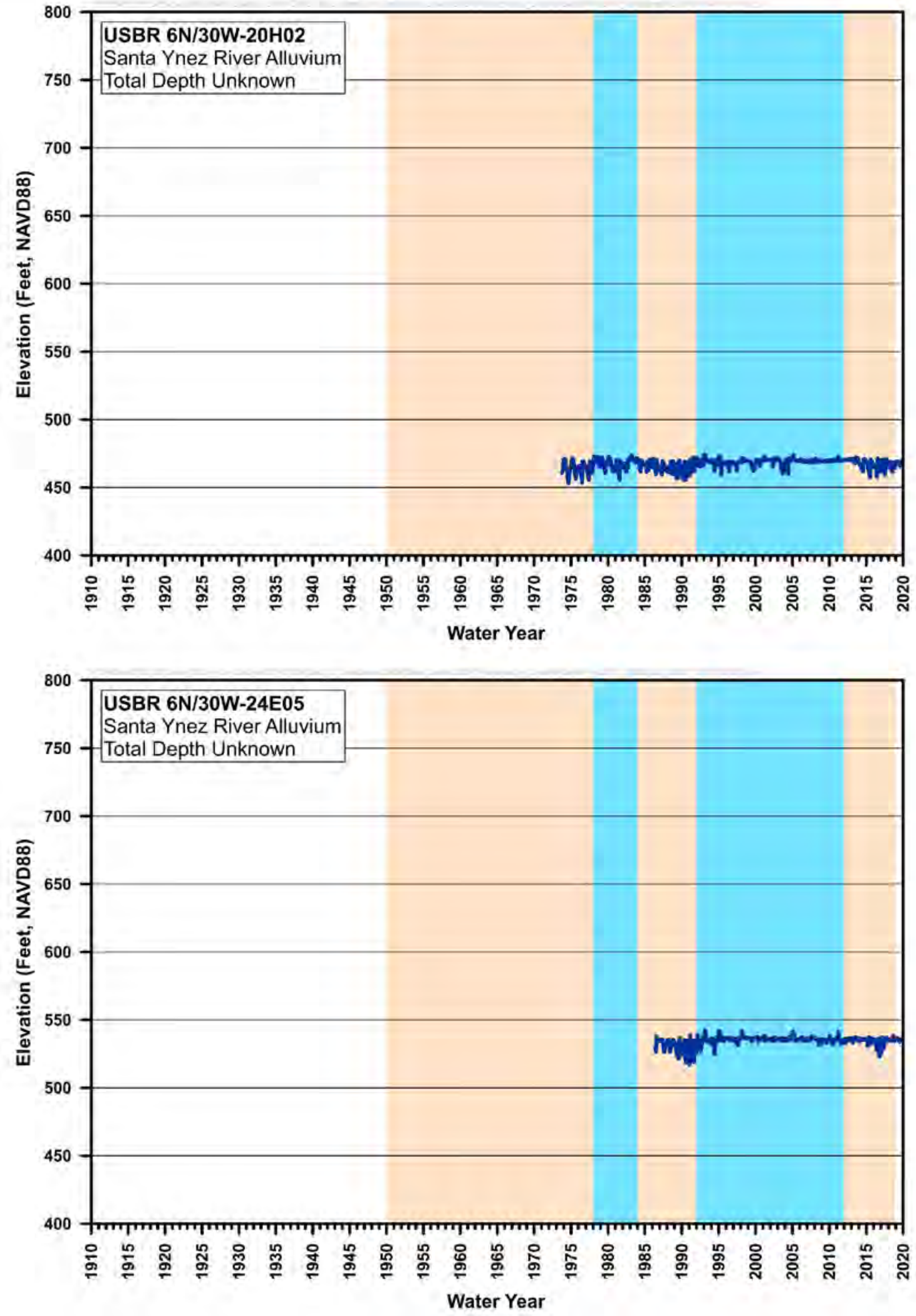
- Ground Surface Elevation
- Groundwater Elevation
- Dry Climatic Cycle
- Wet Climatic Cycle

FIGURE 3-26

Representative Careaga Sand Hydrographs: Wells -10F01 and -34M01

Groundwater Sustainability Plan
Eastern Management Area

GSI Water Solutions, Inc.



LEGEND

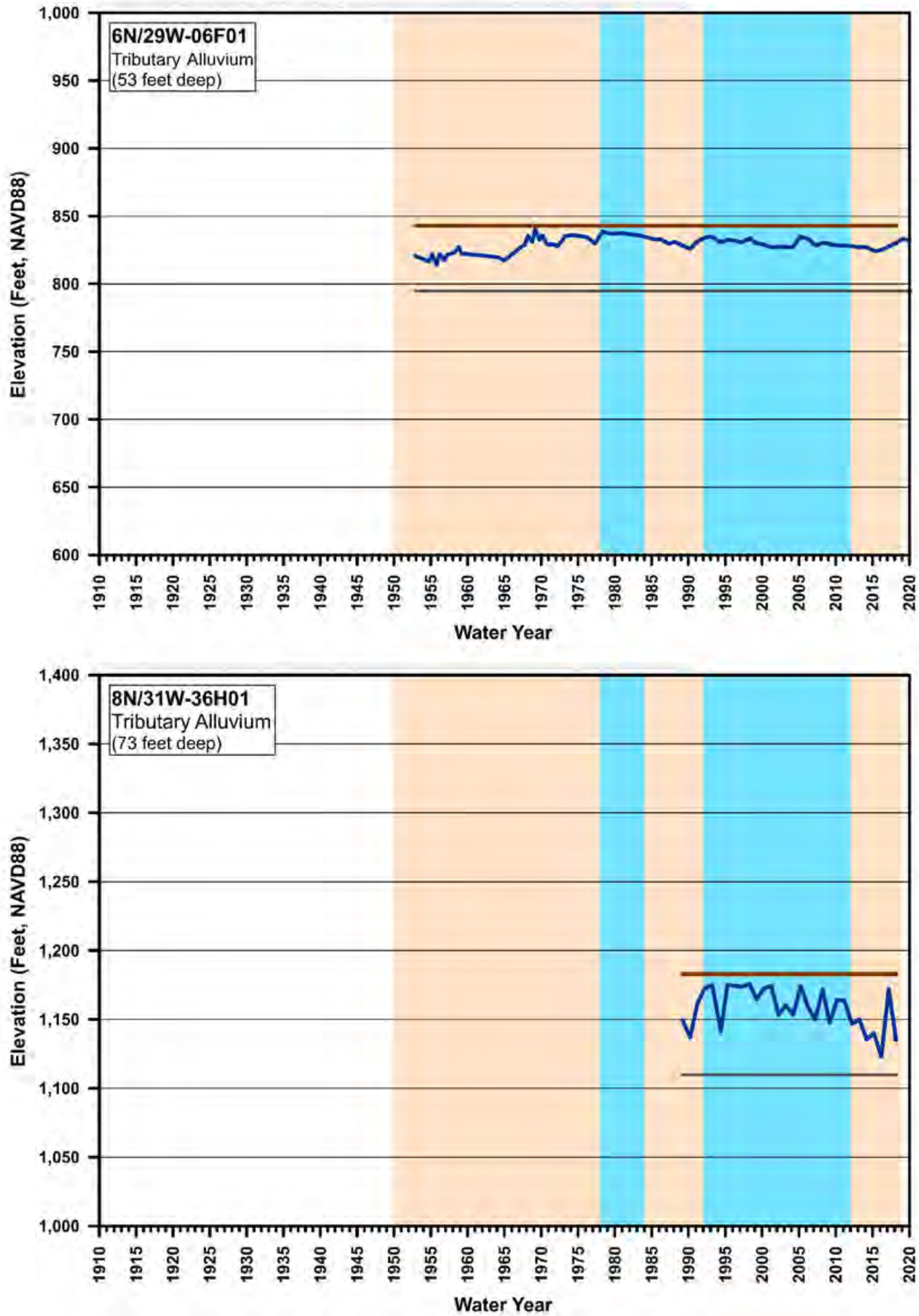
- Ground Surface Elevation
- Groundwater Elevation
- Dry Climatic Cycle
- Wet Climatic Cycle

FIGURE 3-27

Representative Santa Ynez River Alluvium Hydrographs: Wells –20H02 and -24E05

Groundwater Sustainability Plan
Eastern Management Area

GSI Water Solutions, Inc.



LEGEND

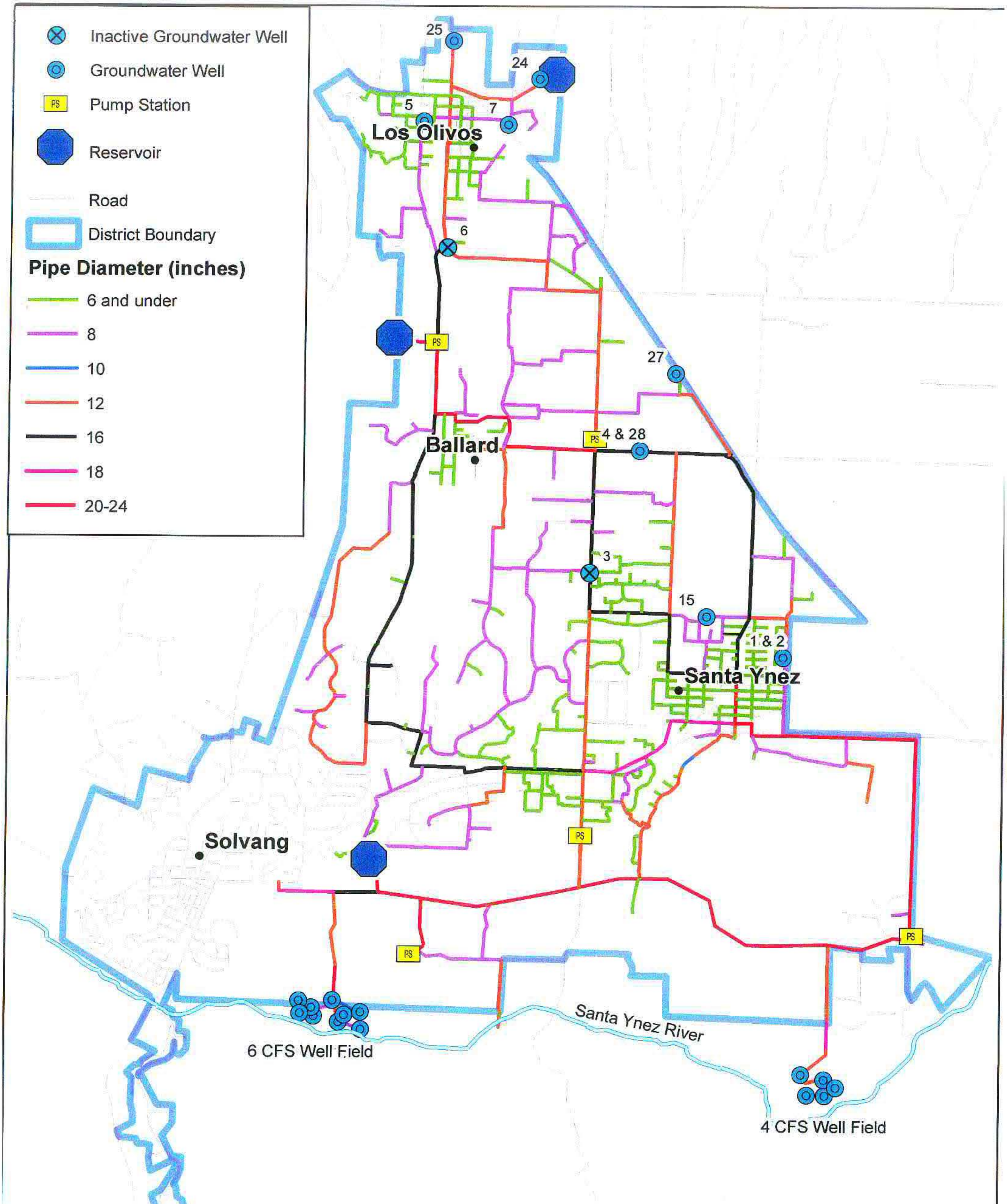
- Ground Surface Elevation
- Groundwater Elevation
- Dry Climatic Cycle
- Wet Climatic Cycle

FIGURE 3-28

Representative Tributary Alluvium Hydrographs: Wells –06F01 and –36H01

Groundwater Sustainability Plan
Eastern Management Area

GSI Water Solutions, Inc.



Notes:

1 inch = 4,000 feet

Santa Ynez River Water Conservation District, ID #1

Distribution System Pipe Diameter

N W E S

Date: 10/21/2013

Miles

0 0.5 1

DISTRICT WELL NO. 3

LOG OF WELL FOR
SANTA YNEZ RIVER WATER CONSERVATION DISTRICT
SANTA BARBARA COUNTY, CALIFORNIA

Drillers: J. Montesino
M. Eagle

July 25	0	to 2	2 Ft.	Top Soil
25	2	20	18	Yellow Sandy Clay & Rock
25	20	41	21	Yellow Sandy Clay
25	41	43	2	Hard Yellow Clay
25	43	70	27	Gravel & Boulders (Tight)
25	70	93	23	Loose Gravel
25	93	106	13	Yellow Clay & Gravel
25	106	132	26	Gravel & Clay (Very Tight)
25	132	137	5	Yellow Clay & Gravel
26	137	144	7	" " " "
26	144	161	17	Yellow Sandy Clay
26	161	204	43	Yellow Sandy Clay & Gravel
26	204	210	6	Gravel (Tight)
26	210	220	10	Yellow Sandy Clay & Gravel
26	220	237	17	Yellow Clay & Gravel (Hard)
26	237	242	5	Yellow Clay
26	242	261	19	Hard Grey Sandstone
26	261	276	15	Blackish Sandrock (Somewhat Softer)
26	276	316	40	Cemented Gravel with Clay Streaks
27	316	328	12	Yellow Clay & Gravel (Hard)
27	328	368	40	Yellow Clay
27	368	388	20	Yellow Clay, some Gravel
27	388	458	70	Yellow Clay
30	458	463	5	Gravel
30	463	479	16	Yellow Sandy Clay
30	479	485	6	Gravel
30	485	503	18	Yellow Sandy Clay & Gravel
30	503	569	66	Hard Brown Clay (Very Tight)
31	569	574	5	Yellow Clay
31	574	619	45	Hard Brown Clay (Very Tight)
Aug. 1	619	655	36	" " " " "
1	655	674	19	Soft Sandy Clay with Gravel
1	674	680	6	Brown Sandy Clay, very little Gravel
1	680	710	30	Brown Clay & Gravel
2	710	800	90	Very Hard Brown Clay (Tight)
3	800	877	77	Brown Clay with Gravel Streaks (Very Tight)
3	877	890	13	Brown Sandy Clay & Gravel (Water-Bearing)
4	890	895	5	Brown Sandy Clay & Gravel
8	895	920	25	Sandy Clay & Gravel
9	920	1006	86	Brown Sandy Clay & Gravel

WELL 5A

6-30-76

WATER WELL DRILLERS REPORT

WELL NO. 5A

1. Owner: Santa Ynez River Water Conservation District, Improvement District No. 1
   P. O. Box 157
   Santa Ynez, California 93460

2. Location of Well: T.7N., R.31W., SE 1/4 SW 1/4 Section 23 - Town of Los Olivos, Santa Barbara County (Refer to attached map)

3. Owner's Well No.: No. 5A

4. Type of Work: New Well

5. Proposed Use: Domestic and Irrigation

6. Drilling Method: Reverse Rotary

7. Filter Pack:

   a. Size: 50/50 mix of 8 x 16 and 6 x 12 Monterey sand.
   b. Diameter of Bore: 28 Inches
   c. Interval Packed: 0 - 1,300 Feet

8. Casing Installed:

   a. Material: Copper Bearing Steel
   b. Cased Interval:
      30-Inch Diameter (0.375 Inch Thick), 0-180 Feet
      16-Inch Diameter (0.375 Inch Thick), 0-1,300 Feet

9. Perforations:

   a. Type: 1/16-Inch R. Moss Louvered Fulflo
   b. Perforated Interval:
      16-Inch Diameter Casing, 650-1,300 Feet

10. Well Seal:

    a. Type: Minimum 2-Inch Thick Surface Sanitary Seal from 0-180 Feet
    b. Material: Grout, Class C Cement With Two Percent CaCl.

11. Water Levels:

a. Depth to First Water: Unknown
b. Standing Water Level After Completion - 227 Feet

12. Well Test:

Pump test performed under the direction of Stetson Engineers Inc.

a. Static Water Level - 277 Feet
b. Pumping Water Level - 344 Feet
c. Pumping Rate - 1,000 gpm
d. Pumping Period - 8 hours

13. Well Log:

Total Depth - 1,345 Feet; Completed Well Depth - 1,300 Feet

115 - 125	Round Gravel with some sand
125 - 135	Coarse gravel
135 - 145	Boulder, coarse gravel with clay
145 - 155	Boulder
155 - 165	Boulder with clay
165 - 180	Clay with gravel (coarse to round)
180 - 190	Coarse to round gravel with clay
190 - 200	Sand, gravel and clay
200 - 210	Light brown clay with trace of sand and gravel
210 - 220	Light brown clay with trace of sand and gravel
220 - 230	-
230 - 240	Coarse to round gravel with some clay
240 - 250	Boulders, coarse gravel with some clay
250 - 270	Coarse to round gravel with clay
270 - 280	Light brown clay
280 - 310	Yellow brown clay with some sand and gravel
310 - 320	Round gravel and trace of dark brown clay
320 - 330	Light brown clay
330 - 340	-
340 - 360	Yellow brown clay with gravel and some dark brown clay
360 - 370	Sand with gravel and light brown clay
370 - 380	Sand and clay
380 - 390	Coarse gravel with light brown clay
390 - 400	Yellow brown clay with coarse sand
400 - 410	Gravel with light brown clay
410 - 430	Light brown clay with gravel
430 - 460	Light brown clay
460 - 490	Sticky light brown clay with sand and gravel
490 - 520	Light brown clay
520 - 530	Yellow brown clay with trace of sand
530 - 550	Light brown clay with trace of gravel
550 - 580	Light brown clay
580 - 590	Gray clay

590 - 600	Gray and light brown clay
600 - 620	Light brown clay
620 - 630	Yellow brown clay
630 - 690	Light brown clay
690 - 700	Sticky clay
700 - 710	Yellow brown clay with trace of gravel
710 - 730	Yellow brown clay and sand
730 - 750	Boulder, sand and gravel with clay
750 - 760	Yellow brown clay
760 - 770	Yellow brown clay with some sandy clay
770 - 780	Light brown clay with sand and gravel
780 - 790	-
790 - 810	Light brown clay, trace of sand and yellow clay
810 - 820	Yellow brown clay and some sand
820 - 830	Light brown clay
830 - 840	-
840 - 855	Yellow clay with coarse sand
855 - 865	Gravel, sand, clay
865 - 875	Sand and clay
875 - 915	Gravel, sand and clay
915 - 925	Boulders
925 - 935	Sand, clay and gravel
935 - 955	Gravel, sand and clay
955 - 965	Yellow brown clay, sand and gravel
965 - 975	Yellow brown clay with trace of sand
975 - 995	Yellow brown clay, sand, trace of gravel
995 - 1025	Light brown clay
1025 - 1035	Light brown sand clay
1035 - 1045	Yellow brown sand clay
1045 - 1055	Yellow brown clay, gravel and sand
1055 - 1065	Dark brown clay
1065 - 1085	Dark brown clay (hard packed)
1085 - 1095	Yellow brown sandy clay
1095 - 1105	Brown clay (sandy and silty)
1105 - 1110	Sticky yellow brown clay with sand
1110 - 1115	Clean coarse to round sand with gravel and some clay
1115 - 1125	Yellow brown compact clay
1125 - 1135	Dark brown clay with trace of sand
1135 - 1145	Dark brown clay with compact gray-green clay
1145 - 1185	Clean gravel with round sand
1185 - 1195	Gravel, sand and some clay
1195 - 1215	Gray brown clay
1215 - 1225	Light brown sandy clay
1225 - 1235	Fine grained sand and some coarse sand and clay
1235 - 1245	Sand, gravel with clay
1245 - 1255	Light brown clay
1255 - 1275	Light brown clay with sand
1275 - 1285	Dark brown clay
1928 - 1295	Dark brown sandy clay with gray-green clay and fine sand

1295 - 1335	Gray-green, packed clay
1335 - 1345	Dark brown, sticky clay

14. Well Driller's Statement:

Well Driller:
B & W Drilling
P.O. Box 1309
Clovis, California 93613

Report Prepared by:

Stetson Engineers Inc.
2171 E. Francisco Blvd., Suite K
San Rafael, California 94901

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 04348

Notice of Intent No. 140154
Local Permit No. or Date

State Well No.
Other Well No.

(1) OWNER: Name Santa Ynez River Water
Address Conservation Dist. P O Box 157
City Santa Ynez, California Zip 93460

(2) LOCATION OF WELL (See instructions):
County Santa Barbara Owner's Well Number [redacted] #6
Well address if different from above
Township 7N Range 31W Section 26
Distance from cities, roads, railroads, fences, etc. at Intersection of Alamo Pintado Rd. and Roblar St., So. of Los Olivos, [redacted] Calif.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well [X] Deepening [ ]
Reconstruction [ ]
Reconditioning [ ]
Horizontal Well [ ]
Destruction [ ] (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic [ ]
Irrigation [ ]
Industrial [ ]
Test Well [ ]
Stock [ ]
Municipal [ ]
Other [ ]

(5) EQUIPMENT:
Rotary [ ] Reverse [X]
Cable [ ] Air [ ]
Other [ ] Bucket [ ]

(6) GRAVEL PACK:
Yes [ ] No [ ] Size 3/8 minus
Diameter of bore 26"
Packed from 0 to 885 ft.

(7) CASING INSTALLED:
Steel [X] Plastic [ ] Concrete [ ]

(8) PERFORATIONS: Moss Ful-Flo
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	200	30	.281	365	865	1/16" x
0	885	16	5/16			2-3/8"

(9) WELL SEAL:
Was surface sanitary seal provided? Yes [X] No [ ] If yes, to depth 200 ft.
Were strata sealed against pollution? Yes [ ] No [X] Interval ft.
Method of sealing neet cement - pressure grout

(10) WATER LEVELS:
Depth of first water, if known 153-1/2 ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes [X] No [ ] If yes, by whom? Beylik Drilling
Type of test Pump [ ] Bailer [ ] Air lift [ ]
Depth to water at start of test ft. At end of test ft.
Discharge 1450 gal/min after 65-1/2 hours Water temperature 72°
Chemical analysis made? Yes [ ] No [X] If yes, by whom?
Was electric log made? Yes [X] No [ ] If yes, attach copy to this report

(12) WELL LOG: Total depth 1320 ft. Depth of completed well 1320 ft.
from ft. to ft. Formation (Describe by color, character, size or material)

0-70 sand and gravel
70-90 brown caly clay
90-140 brown clay, and sand
140-170 brown clay, sand and bits of gravel
170-200 brown clay, gravel
200-210 hard white shale
210-250 brown clay, black & grey clay & sha
250-266 brown clay with little blk. & grey cla
266-290 sandstone, seashells, rock and clay
290-330 gravel and rock
330-370 clay
370-400 brittle sandstone and soft clay
400-440 sand, gravel and rock, some shells
440-470 gravel and rock, sandstone
470-500 sandy clay, rock & gravel, seashells
500-530 clay and gravel
530-545 rock and gravel
545-670 sandstone and brown & grey clay
670-720 grey clay and bits of sandstone
720-750 grey clay with little sand
750-800 grey clay and gravel
800-830 gravel and sandstone and clay
[redacted] 830-920 grey clay
920-990 sandy brown and grey clay
990-1030 gravel and rock, some clay
1030-1050 shale and clay
1050-1100 clay and sandstone
1100-1160 grey clay and little sandstone
1160-1180 brown clay and sandstone
1130-1200 brown clay
1200-1220 flakes of shale and brown clay
1220-1250 clay and gravel
1250-1280 clay
1280-1300 clay and sandstone conglomerate

Work started 9-6-77 19 Completed 10-2-77 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED John R. Beylik (Well Driller)
NAME BEYLIK DRILLING, INC.
(Person, firm, or corporation) (Typed or printed)
Address 591 S. Walnut St.
City La Habra, Calif Zip 90631
License No. 306291-C-57 & SC-61 Date of this report Oct 21, 1977

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 43816-950 7-76 50M QUAD OSP

SANTA YNEZ RIVER WATER CONSERVATION DISTRICT
IMPROVEMENT DISTRICT NO. 1

Water Well Drillers Log

Well #6 - Intersection of Alamo Pintado Road and Roblar Avenue, south of Los Olivos, California.

Completed 10-2-77 Beylik Drilling Inc.

Pilot Hole depth 1320 ft. Well completed 885 ft.

0-70	sand and gravel
70-90	brown clay
90-140	brown clay and sand
140-170	brown clay, sand and bits of gravel
170-200	brown clay, gravel
200-210	hard white shale
210-250	brown clay, black & grey clay & shale
250-266	brown clay with little blk. & grey clay
266-290	sandstone, seashells, rock and clay
290-330	gravel and rock
330-370	clay
370-400	brittle sandstone and soft clay
400-440	sand, gravel and rock, some shells
440-470	gravel and rock, sandstone
470-500	sandy clay, rock & gravel, seashells
500-530	clay and gravel
530-545	rock and gravel
545-670	sandstone and brown & grey clay
670-720	grey clay and bits of sandstone
720-750	grey clay with little sand
750-800	grey clay and gravel
800-830	gravel and sandstone and clay
830-920	grey clay
920-990	sandy brown and grey clay
990-1030	gravel and rock, some clay
1030-1050	shale and clay
1050-1100	clay and sandstone
1100-1160	grey clay and little sandstone
1160-1180	brown clay and sandstone
1180-1200	brown clay
1200-1220	flakes of shale and brown clay
1220-1250	clay and gravel
1250-1280	clay
1280-1300	clay and sandstone conglomerate

APPENDIX F

Santa Ynez River Basin Eastern Management Area Hydrologic Model Development, Calibration, and Predictive Simulations

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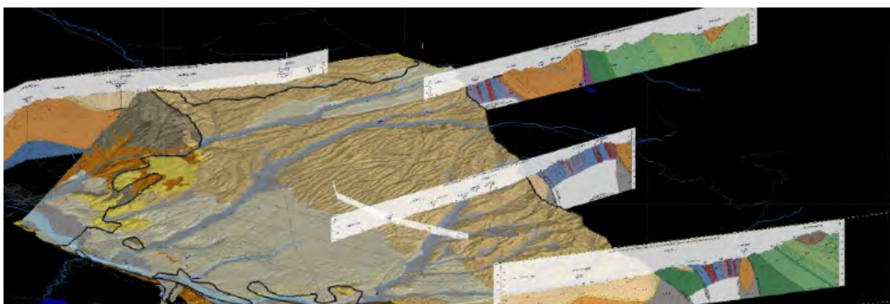
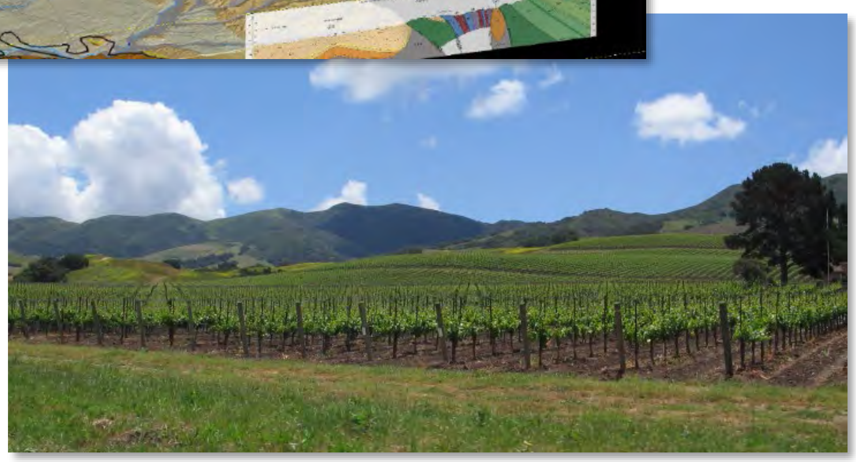
IRP Water
Consultants in water resources

Santa Ynez River Basin Eastern Management Area Hydrologic Model Development, Calibration, and Predictive Simulations

Santa Barbara County, California





Prepared for:

Santa Ynez River Basin Eastern Management Area Groundwater Sustainability Agency
Santa Ynez, California

August 2021
Project 738.002.004.002

Santa Ynez River Basin EMA Hydrologic Model for GSP Development: Calibration and Predictive Simulations

Santa Ynez River Valley Groundwater Basin EMA Hydrologic Model
Santa Barbara County, California

Prepared for:

Santa Ynez River Valley Groundwater Basin Eastern Management Area Groundwater Sustainability Agency
P.O. Box 719
Santa Ynez, California 93460

Prepared by:

IRP Water and GSI Water Solutions, Inc.

August 2021

____

Jim McCord, PhD, PE NM #15568
Principal Hydrogeologist, IRP Water

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Appendix

ABBREVIATIONS AND ACRONYMS

amsl	above mean sea level
Basin	Santa Ynez River Valley Groundwater Basin
CT	Critical Thresholds
DWR	California Department of Water Resources
EMA	Eastern Management Area
EMA GSA	Eastern Management Area Groundwater Sustainability Agency
ETc	Crop Evapotranspiration
FMP	Simulation code module in the USGS MODFLOW-OWHM designed to simulate land use-based water demands (FARM Management Package)
ft/d	feet per day
ft^2/d	square feet per day
GHB	General Head Boundary
GSAs	groundwater sustainability agencies
GSP	Groundwater Sustainability Plan
GUI	graphical user interface
GWV 7	Environmental Simulations Inc.'s Groundwater Vistas™ Version 7 simulation code GUI
HCM	hydrogeologic conceptual model
IWFM	California Department of Water Resources' Integrated Water Flow Model simulation code
K	hydraulic conductivity
fc	coarse fraction
Kh	horizontal hydraulic conductivity
Kv	vertical hydraulic conductivity
MO	Monitoring Objective
MODFLOW-USG	USGS Modular finite-difference family of numerical simulation codes to calculate groundwater and surface water interaction (USG = UnStructured Grid version)
NRMS	Normalized root mean square error
PRISM	Parameter-elevation Regressions on Independent Slopes Model
RMS	root mean square
SSR	sum of the square of the residuals
std dev	standard deviation
Ss	specific storage
Sy	specific yield
SWP	State Water Project
SYRWCD	Santa Ynez River Water Conservation District
SYRWCD ID No. 1	SYRWCD Improvement District No. 1
SYEMAHM	Santa Ynez Eastern Management Area Hydrologic Model
USGS	United States Geological Survey

1.0 INTRODUCTION

GSI Water Solutions, Inc. (GSI), has been retained by the Santa Ynez Basin Eastern Management Area Groundwater Sustainability Agency (EMA GSA) to prepare and document a groundwater flow model of the Santa Ynez River Valley Groundwater Basin Eastern Management Area (EMA or Basin) to aid local agencies in compliance with the Sustainable Groundwater Management Act of 2014 (SGMA). The groundwater flow model is a key requirement in the development of a Groundwater Sustainability Plan (GSP) for the study area. The EMA is located in Santa Barbara County on California's central coast (**Figure 1-1**).

This project is part of a cooperative effort among three Groundwater Sustainability Agencies (GSAs) in the Basin including the EMA GSA, a GSA for the Basin Central Management Area (CMA) known as the CMA GSA, and a GSA for the Western Management Area (WMA) known as the WMA GSA. The entire Basin and the boundaries of each of the GSAs are shown on **Figure 1-2**. The three GSAs coordinated the development of their respective GSPs such that they are consistent with no contradictions or conflicts. Although the EMA is the primary focus of this modeling study, the modeling effort overlaps with portions of the CMA hydrologic model developed by Stetson Engineers, Inc. (Stetson).

1.1 Background

SGMA required that the California Department of Water Resources (DWR) identify groundwater basins and subbasins in conditions of critical overdraft. As defined by DWR, overdraft occurs when the average annual amount of groundwater extraction exceeds the long-term average annual supply of water to the basin. Effects of overdraft can include land subsidence, groundwater depletion, and/or chronic lowering of groundwater levels. DWR Bulletin 118 defines critical overdraft as "when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts" (DWR, 2018).

Based on this criterion and a formal evaluation of groundwater basins across the state, the DWR found the EMA to be medium priority, not in critical overdraft. Livestock ranging and farming has long been the mainstay of the economy of the Santa Ynez Valley. Prior to the 1970, mixed vegetables and forage crops dominated the agricultural acreage. Beginning in the 1970s, vineyards were planted to launch a wine production industry in the Valley. The industry grew quickly, and Santa Ynez Valley wines have since gained broad recognition for quality. Most of the water demand associated with agricultural production is supplied by groundwater, although portions of the EMA receive surface water supplies diverted from the Santa Ynez River and associated alluvial groundwater system, as well as some imported water from the State Water Project (SWP). Nonetheless, in many years, especially during frequent drought cycles, agricultural water demand exceeds the surface water inflows, leading to the drilling of wells to develop the groundwater resources to fulfill that unmet demand. In fact, under recent historical conditions (since 2011), the average annual demand on groundwater resources exceeds the average existing recharge to the groundwater system. As shown in the water budget for the EMA (Section 3.3 of the GSP), over the 37-year period of record from WYs 1982 through 2018, the EMA groundwater basin appears to be resilient. The water budget results are consistent with long-term monitoring of groundwater levels across the study area, showing that groundwater levels are generally able to recover from the lowering experienced during drought periods when a multi-year wet cycle occurs. A summary of the water budget is provided in Section 2.6 of this document.

The Santa Ynez EMA Hydrologic Model (SYEMAHM) described in this report represents a key step in the process of developing a GSP per SGMA requirements (**Figure 1-3**). The SYEMAHM was developed for this project to provide a quantitative tool for evaluation of alternative water management scenarios considered for the GSP. Additional model development and calibration will occur throughout the implementation of the GSP as additional data are collected.

1.2 Model Objectives

The objectives of the current modeling effort were as follows:

- Prepare a preliminary three-dimensional numerical surface water/groundwater flow model of the EMA and portions of adjoining basins and management area. The model must be capable of representing inflows and outflows from the EMA out of and into the adjoining basins and simulating groundwater levels and storage in the Basin.
- Calibrate the surface water/groundwater flow model for the period of WYs 1982 through 2018, a period selected as representative based on historical precipitation records for the EMA (Section 3 of the GSP).
- Provide a 50-year Base Case Forecast from 2022 through 2072 assuming continuation of recent land use trends and continued “normal hydrology” conditions based on the historical period of record modified to account for climate change. This forecast was used to establish Critical Thresholds and Monitoring Objectives throughout the EMA.
- Provide Project and Management Forecasts from 2022 through 2072 employing the Base Case Forecast augmented to simulate various proactive Management Actions and Projects that may be implemented in the future to assure sustainability of the EMA groundwater resources. Such Management Actions and Projects may include items such as groundwater exchanges, land fallowing in sustained droughts to constrain demand, and managed aquifer recharge projects to enhance supply.

- Compare the Base Case and Project Forecast and evaluate which additional Projects and/or management actions may provide the best path to achieve sustainability by 2042 and thereafter.

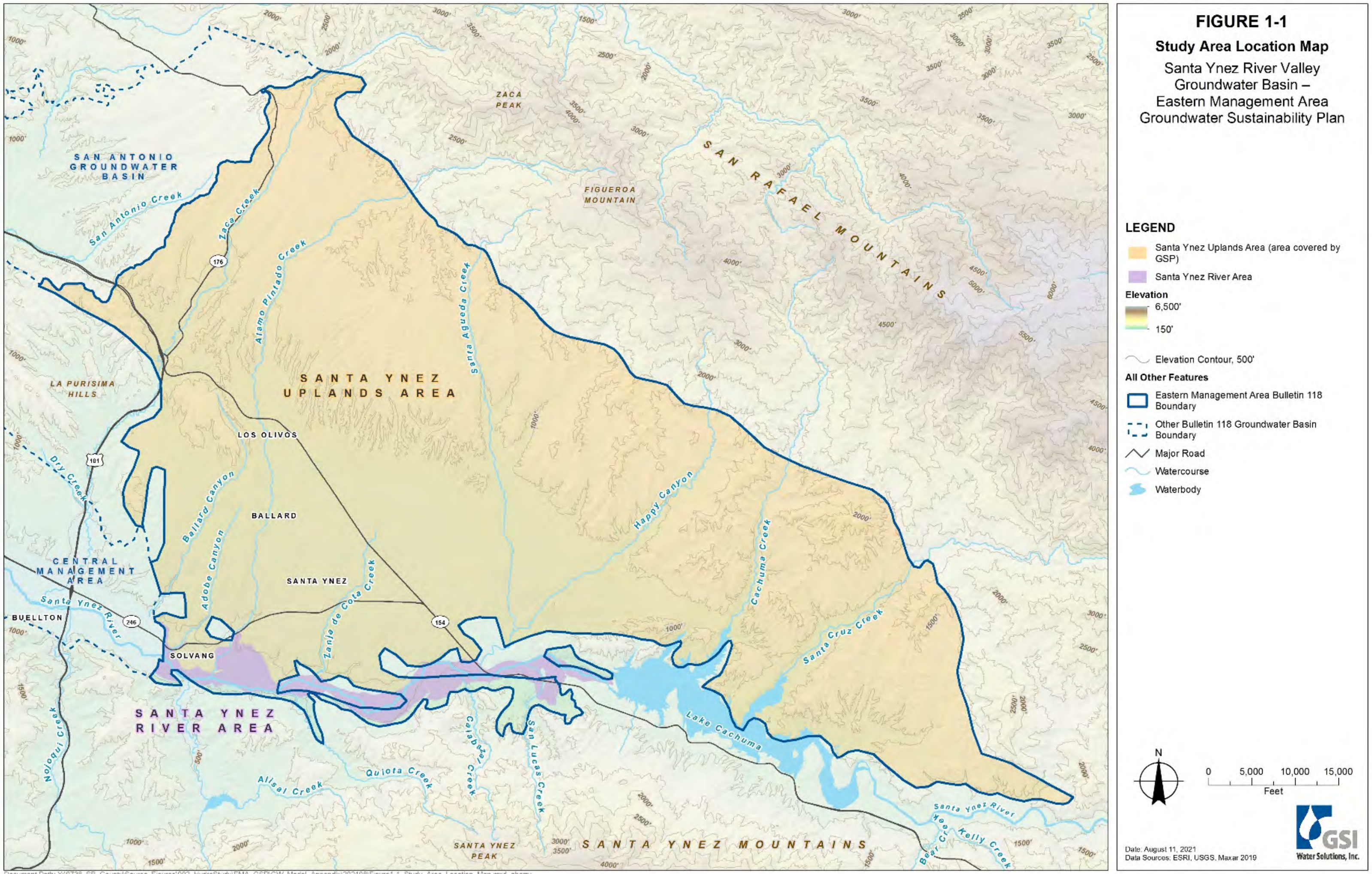

Figure 1-1. Study Area Location Map

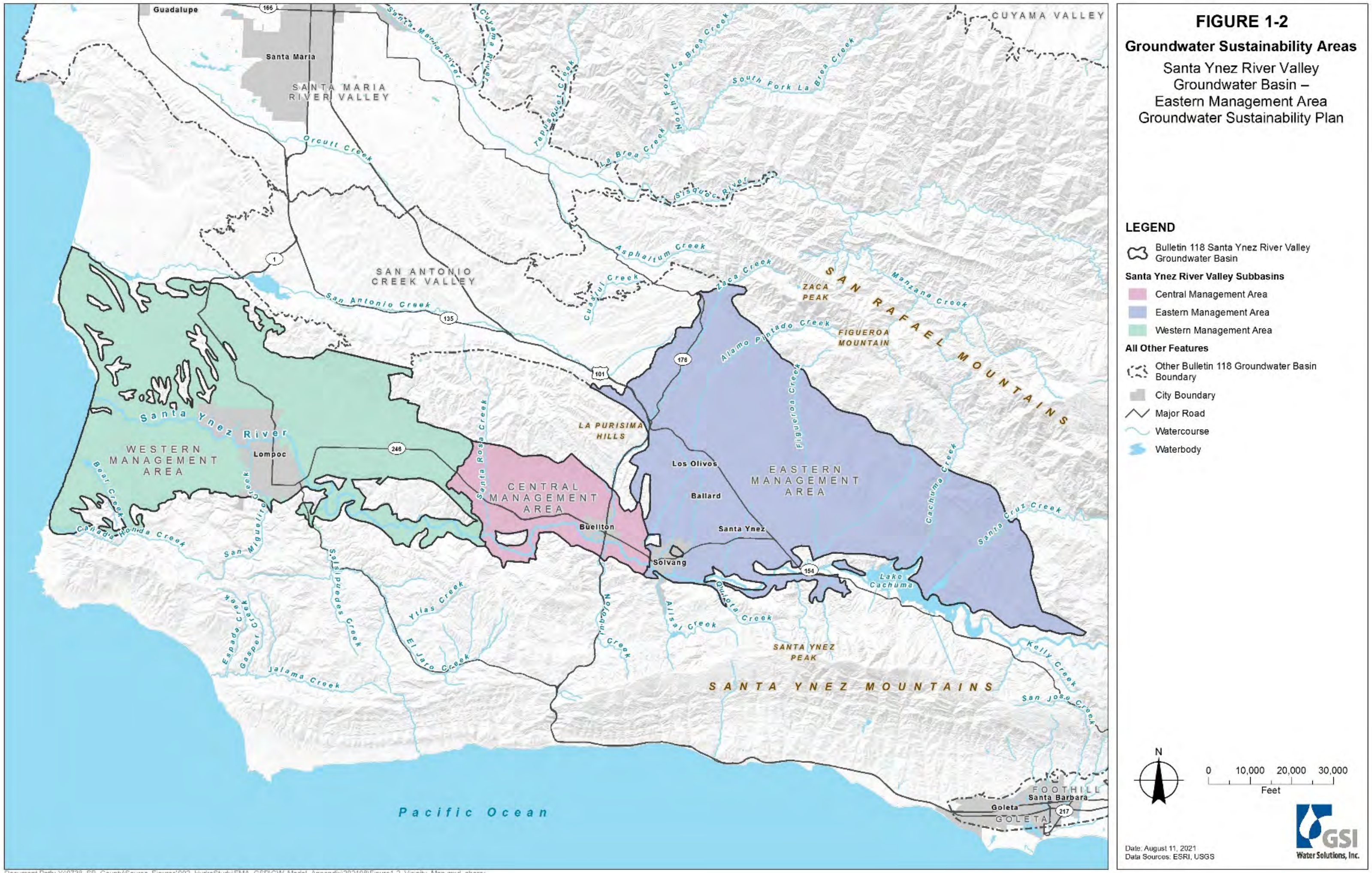

Figure 1-2. Santa Ynez River Basin showing EMA, CMA, and WMA

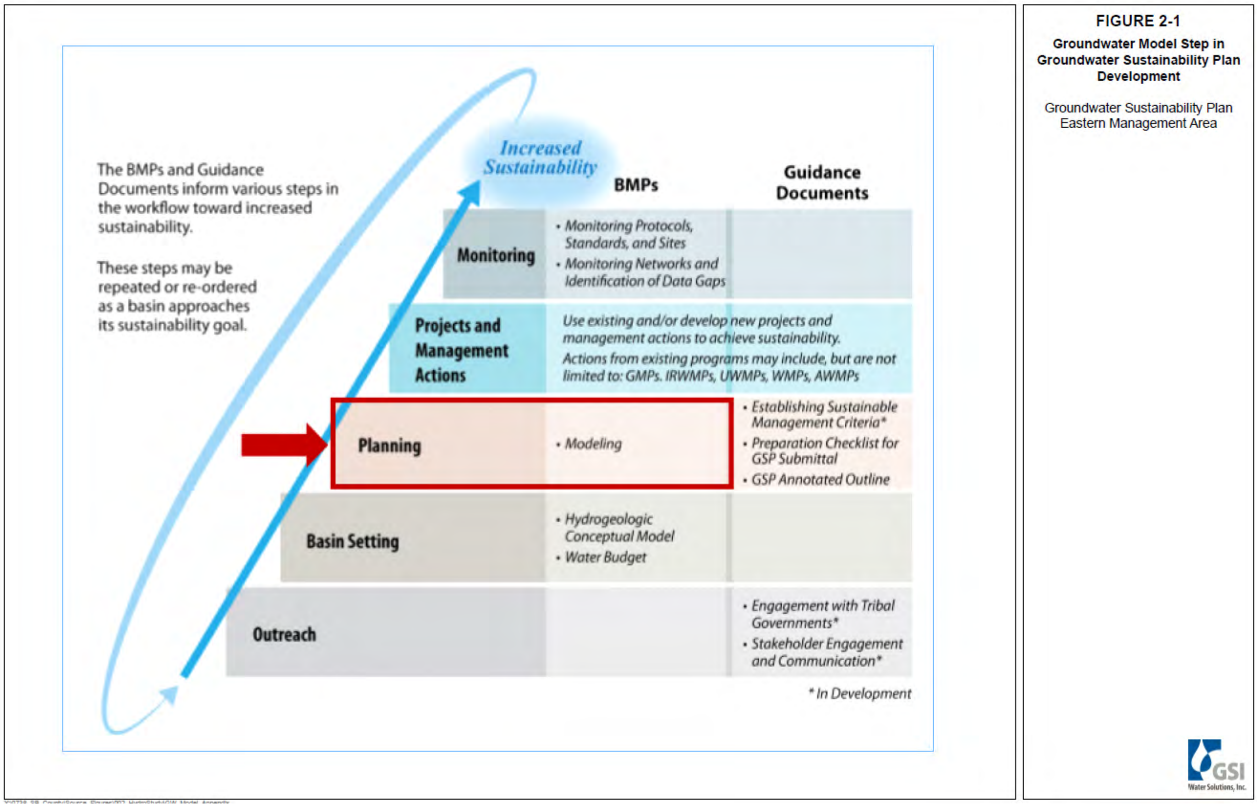

Figure 1 3. Groundwater Model as Third Step in Groundwater Sustainability Plan Development

2.0 HYDROGEOLOGIC CONCEPTUAL MODEL

A hydrogeologic conceptual model (HCM) is a simplified description of the groundwater flow system, frequently in the form of a block diagram or cross section with an accompanying narrative description of the function and interaction of the components that comprise the hydrogeologic system (Anderson and Woessner, 1992). The nature of the HCM determines the dimensions of the numerical model and the design of the grid, the distribution of the hydrogeologic properties, and the definition and distribution (over space and time) of external and internal stresses and boundary conditions (e.g., well pumping, irrigation returns flows, and other components). The purpose of the HCM is to establish an initial understanding of the groundwater system and organize the associated data and information so that the system can be analyzed more effectively. The HCM is Section 3.2 in the GSP. Key elements of the HCM are highlighted here to provide context and sufficient foundation for the numerical model development, without having to refer to Section 3.2 of the GSP.

This section also provides a summary of the inflows and outflows, and associated data sources, utilized as inputs for both the inventory annual water budget (GSP Section 3.3) and the numerical groundwater flow model.

Figure 2-1 presents a block diagram that schematically represents key aspects of the HCM for the SYEMAHM. Details related to this HCM for the project include (1) description of the model domain, (2) delineation of the hydrostratigraphic units within the model domain, (3) definition of sources and sinks and estimation of the water budget, and (4) narrative description of the flow system.

2.1 Basin Location and EMA Extent

The EMA is in the eastern portion of the Santa Ynez River Basin in Santa Barbara County, California **(Figure 1-2**). The defined boundaries of the EMA were developed by DWR as described in Bulletin 118, based on the areal extent of the principal aquifers that can yield reliable water supplies. As depicted in **Figure 2-1**, the Santa Ynez Valley EMA HCM study area encompasses the entire landscape and underlying geology from the mountains rimming the Basin (the San Rafael Mountains to the north and east and the Santa Ynez Mountains to the south) down to the Santa Ynez River that drains water from the valley. The diagram illustrates the HCM and its various components, including the basin topographic setting, the underlying geologic system and principal aquifers, generalized recharge and discharge areas for the aquifers, principal flow directions, water inflows and outflows. Important details related to each of these components of the HCM are presented in the following subsections.

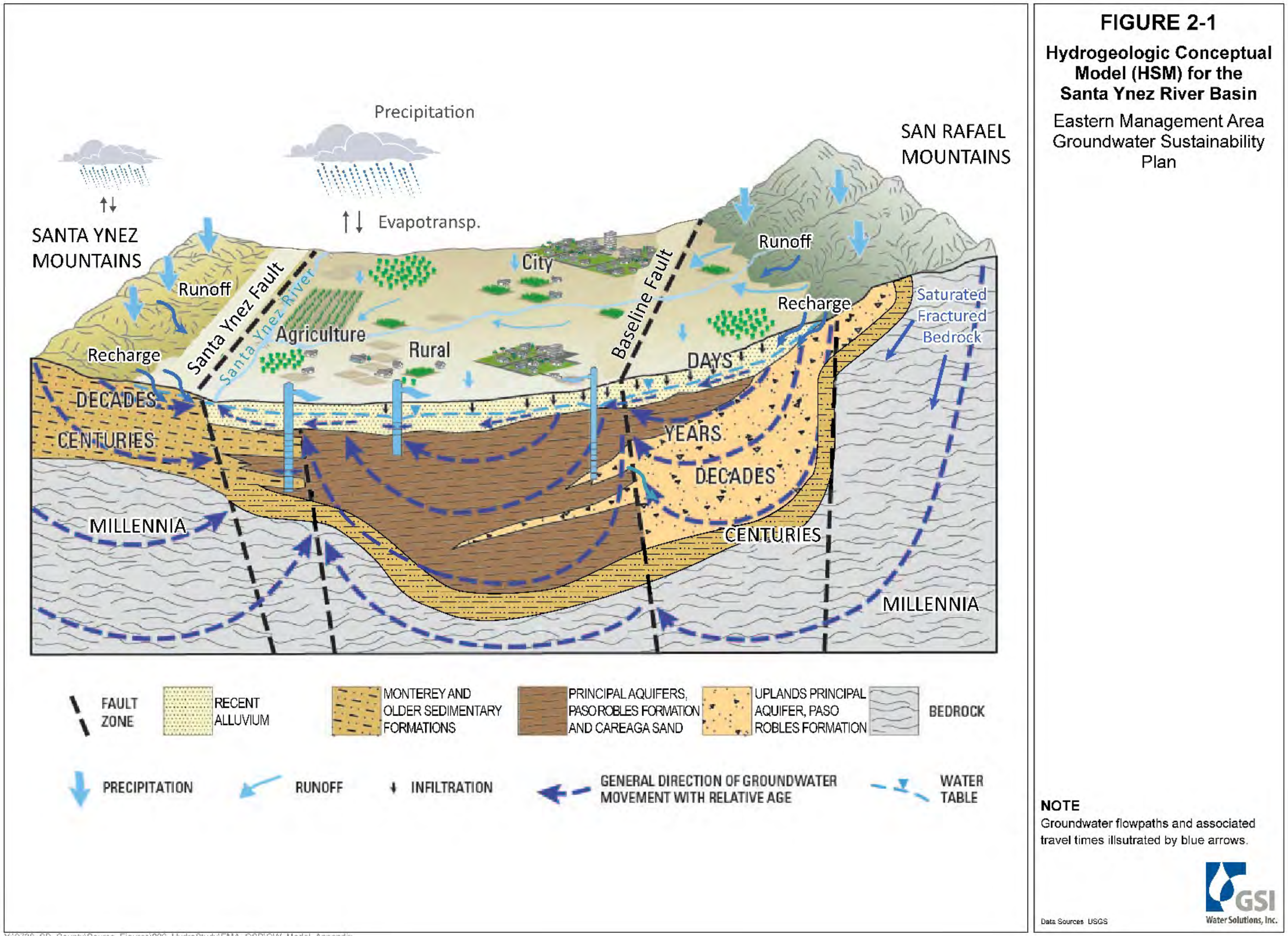

Figure 2-1. Hydrogeologic Conceptual Model for Eastern Management Area, Looking Down the Valley from East to West

Source: Nishikawa, 2013, Hydrologic and Geochemical Characterization of the Santa Rosa Plain Watershed, Sonoma County, California

The EMA covers an area of approximately 100,000 acres or about 150 square miles (sq. miles). While rugged mountain ranges bound the EMA to the south, north and northeast, the EMA is bordered on the northwest by the San Antonio Creek basin, and the CMA to the west. Groundwater supplies are produced from saturated and permeable geologic deposits underlying the land surface, which extend to depths more than 3,000 feet (ft) in the deepest portion of the Basin (see Section 2.3 below). The hydrostratigraphic column from top to bottom for these permeable sediments consist of (1) recent alluvium deposited along incised tributary channels, (2) older alluvium up to 300 ft thick blanketing most of the landscape across the southwest portion of the EMA, overlying the (3) Paso Robles Formation and Careaga Sand that supply most the groundwater produced in the EMA. Thus, the vertical extent of the groundwater model must include all of these geologic units, as well as the underlying lower-permeability formations (Sisquoc and Monterey Formations) and fractured bedrock. The freshwater hydrogeologic system, extending to a depth of about 3,000 ft below ground surface (bgs), is underlain by deeper confined saline groundwater below.

2.2 Topography

The San Rafael Mountains on the north-northeast side of the area rise to elevations from 4,000 to more than 6,000 ft above mean sea level (amsl), while the crest of the Santa Ynez Mountains to the south ranges between 3,000 ft to more than 4,000 ft amsl. The EMA generally spans the area from where the steep slopes of the San Rafael Mountains give way to a more gently sloping landscape that descends all the way to the Santa Ynez River. This area is often referred to as the Santa Ynez Uplands, the break in slope between the San Rafael Mountains and the Santa Ynez Uplands occurs at an elevation between 1,100 and 1,300 ft amsl. The river is located at the boundary between the EMA and the Santa Ynez Mountains to the south. The elevation of the riverbed below Lake Cachuma and Bradbury Dam is almost 600 ft amsl, and the elevation drops steadily as the river flows downstream to the west, past the communities of Santa Ynez and Solvang, reaching an approximate elevation of 300 ft amsl, where it leaves the EMA near Buellton.

2.3 Geology, Geologic Formations, and Hydrogeologic Properties

The HCM section of the GSP (Section 3.2) provides a detailed description of the geologic history of the study area, including geologic descriptions of each of the units that are found at the ground surface and extend beneath or underlie the area. A summary of the geology is presented here to provide context for describing the hydrologic properties of these formations, which is a key step for development of a quantitative model to simulate groundwater flow through these deposits. The GSP Section 3.2 provides greater detail. **Figure 2-2** provides a geologic surface map of the area, specifically presenting the geologic formations at the ground surface. This figure also shows section lines for the geologic profiles presented in **Figures 2-3** and **2-4** as well as the locations of geologic faults, which are important to consider as potential barriers to groundwater flow in the quantitative groundwater model. Several additional geologic sections are provided in Section 3.2 of the GSP. As can be seen in the cross sections, hydrogeologically the EMA can be described as a deep depression in the basement bedrock, with the Basin filled with relatively permeable deposits of sediments that have been eroded from the adjacent mountains. The lateral extent of these deposits defines the limits of the EMA Basin (DWR, 2018). Furthermore, these deposits represent the principal aquifer units, the Paso Robles Formation and the Careaga Sand, in the study area.

The hydrogeologic properties necessary for understanding and quantitatively modeling groundwater flow through geologic materials, and how they apply to the Santa Ynez EMA, are provided in the next subsections.

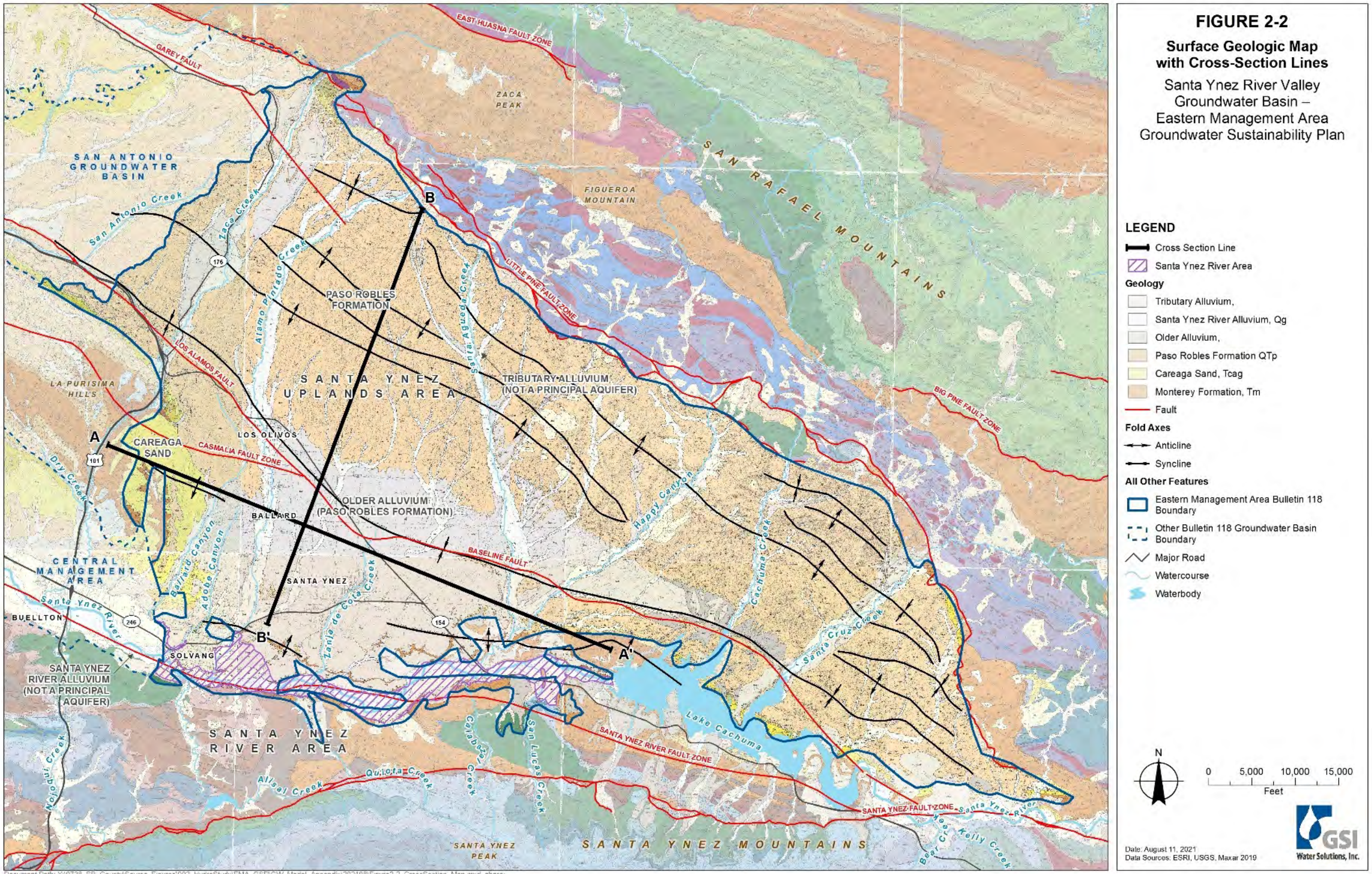

Figure 2-2. Surface Geologic Map with Cross-Section Lines

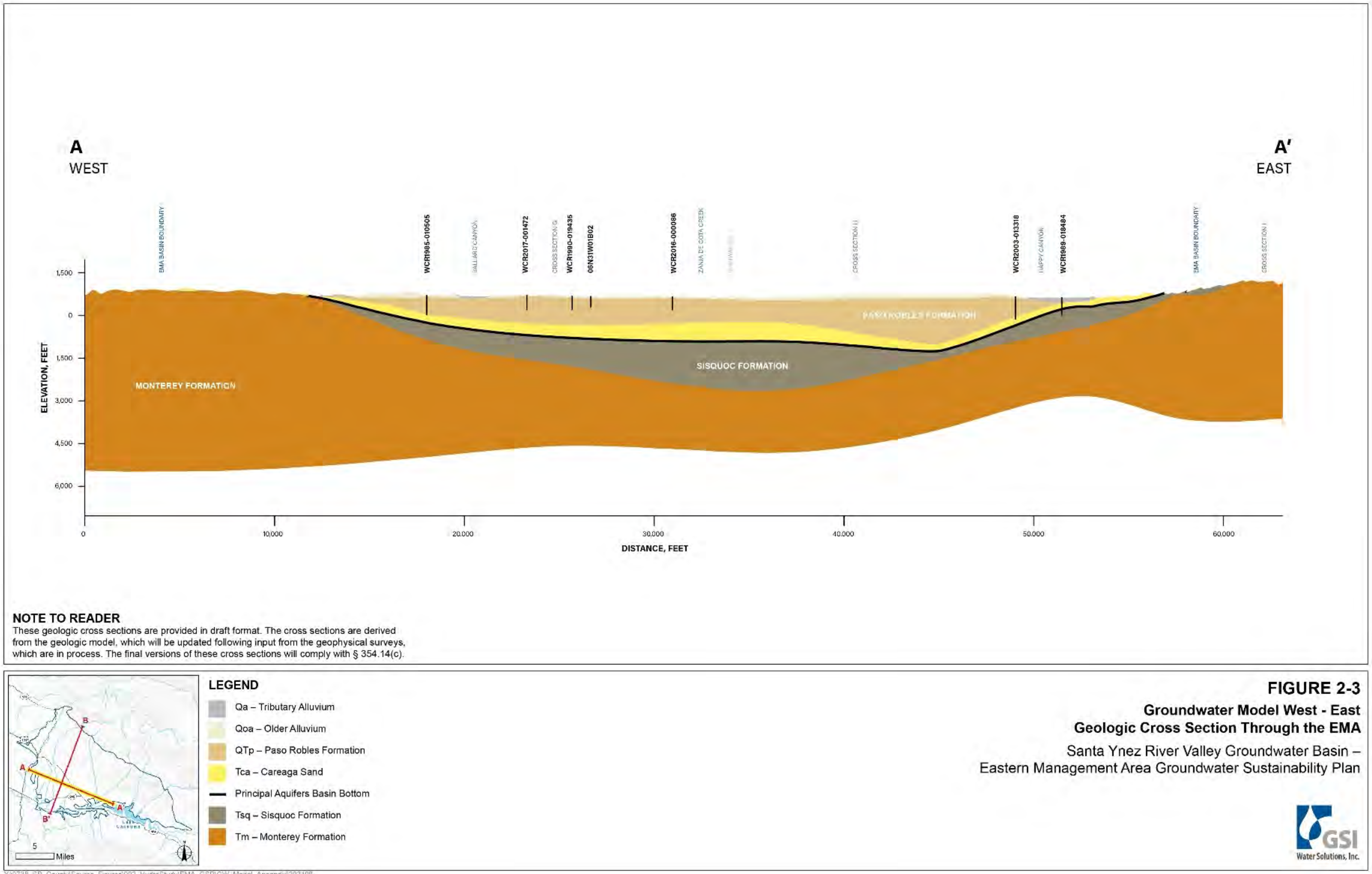

Figure 2-3. Groundwater Model West – East Geologic Cross Section through EMA

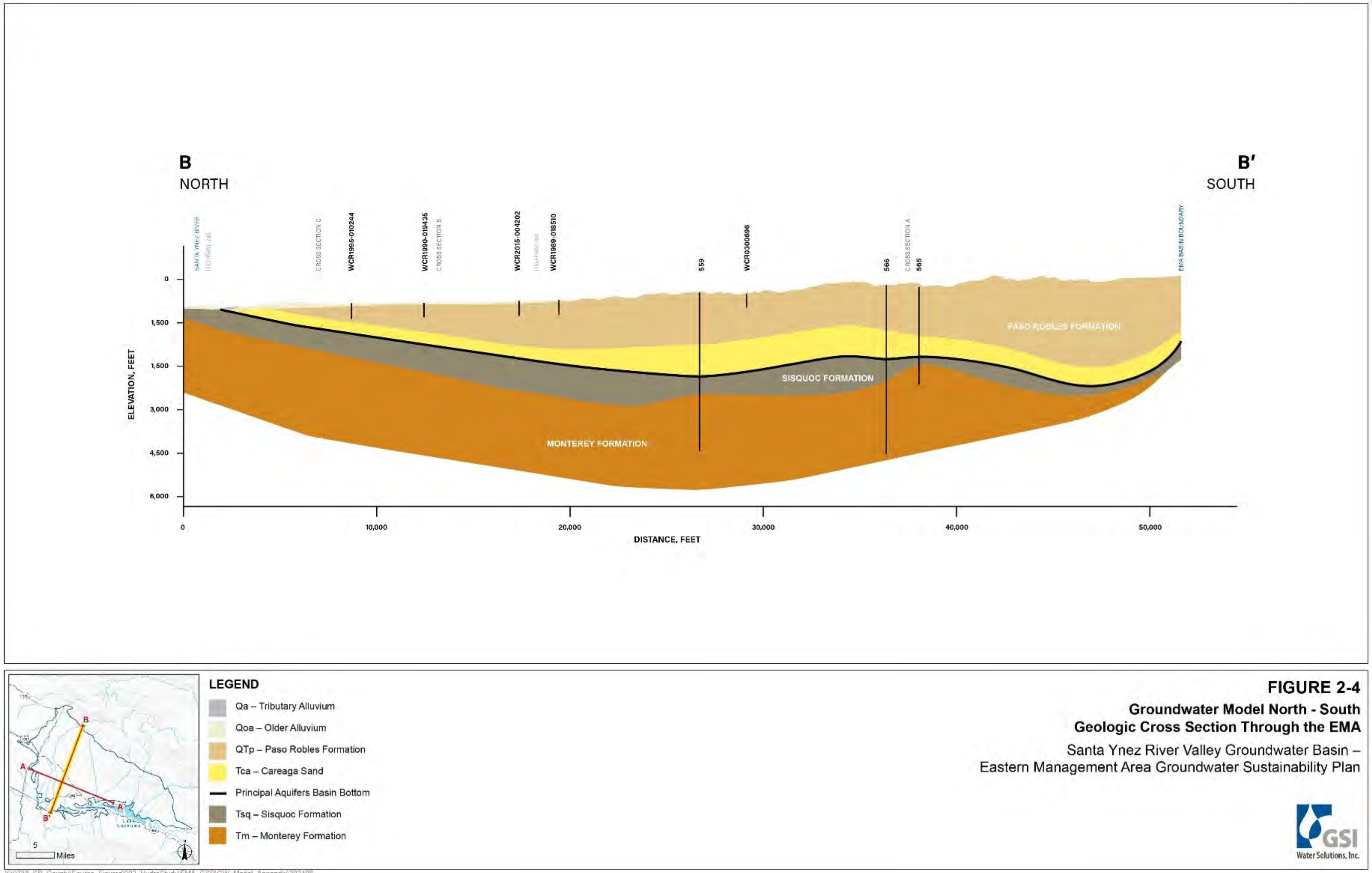

FIGURE 2-4
Groundwater Model North - South Geologic Cross Section Through the EMA
Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

Figure 2-4. Groundwater Model North - South Geologic Cross Section through EMA

2.3.1 Hydrologic Properties for Groundwater Flow

As described in Section 3.2 of the GSP, the following hydraulic properties of the media are necessary for understanding groundwater flow through the deposits and are needed as input to the groundwater model.

- Hydraulic conductivity: the rate of flow of water in gallons per day through a cross section of one square foot under a unit hydraulic gradient (ft per day).
- Transmissivity: the rate at which water is transmitted through a unit width of an aquifer under a unit hydraulic gradient (square ft per day). The transmissivity is commonly computed as the hydraulic conductivity times the saturated aquifer thickness
- Storativity: the volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head (water level). A more detailed description of the storativity and its three components is provided in the following section.
- Specific Capacity: the rate of discharge of a water well per unit of water level drawdown (gallons per minute per foot of drawdown)

For inputs required by the groundwater model, in addition to the hydraulic conductivity and storage characteristics described above, other key properties to consider are the thickness and areal extent of the geologic units. In other words, the hydraulic conductivity (also commonly referred to as the permeability) is a measure of how easily water can flow through the geologic media under a pressure gradient, i.e., the higher the value the more "permeable" the media. The storage characteristic, or storativity (S), is a dimensionless measure of the volume of water that will be drained from an aquifer with a reduction in hydraulic head (lowering of groundwater level). Storativity includes three components:

1. **The elastic component.** For a confined aquifer, storativity results only from the rock and fluid compressibilities, is referred to as the specific storage, S_s and is typically very small (ranging between 10^{-4}/foot of aquifer thickness for shallow unconsolidated deposits to as low as 10^{-6}/foot for deeply buried consolidated rocks). This S_s is elastic in the sense that the deposits will take water into storage as water levels rise in equivalent volume that they will release water from storage when the groundwater level falls the same amount.
2. **The inelastic component.** For a confined aquifer, when the reduction in groundwater levels is so extreme that it leads to consolidation of the solid matrix, water is released from pore storage as the porosity decreases. The inelastic release of water from storage typically results in land subsidence and is not reversible like the elastic storage. Land subsidence is discussed further below in Section 2.3.5.
3. For an unconfined aquifer, the effect of rock and fluid compressibilities is generally much smaller compared to the **specific yield** (Sy), which is defined as the volume of water that will drain under the force of gravity from unit bulk volume of the aquifer.

Again, as described above, the Storativity (sometime referred to as the Storage Coefficient) $S_,$ is the sum of the elastic storage S_s times the aquifer thickness plus the specific yield Sy.

2.3.2 Hydrogeologic Units and Properties

The hydraulic properties of the geologic formations that underlie the EMA were estimated based on published values (Upson and Thomasson, 1951; LaFreniere and French, 1968; Hoffman, 1996; Hopkins, 2003) and pumping test analyses for wells compiled for creation of this GSP. These data were supplemented by additional data found in well completion reports reviewed by GSI.

2.3.2.1 Permeable Units and Principal Aquifers

Aquifer testing data were compiled for wells completed within permeable geologic units in the study area, specifically the Paso Robles Formation, Careaga Sand, and Santa Ynez River Alluvium. The range of values of these hydrologic properties for each of the materials are presented in **Table 2-1** and **Figure 2-5** below. Another highly permeable geologic unit (but of only limited areal extent and thickness), the Tributary Alluvium, lacked supporting aquifer testing data. Section 3 of the GSP includes detailed descriptions of each of the units.

2.3.2.2 Aquitards

An aquitard can be defined as a geologic unit of low permeability and low storativity that does not generally yield significant volumes of water to a well. No areally extensive significant confining aquitard units are known to exist in the EMA. However, locally confined conditions may be observed in wells completed in the Paso Robles Formation, due to the significant heterogeneity in this unit (as described in Section 3.2 of the GSP) and as evidenced by the broad range of permeabilities exhibited in pumping test results. The heterogeneity of the Paso Robles Formation includes clayey layers and gravel lenses of varying thickness, that can be localized or of significant areal extent.

While no extensive aquitard units that extend across the Basin are encountered within the principal aquifers from the Paso Robles down to the Careaga Sand, at the base of the EMA principal aquifers, are the low-permeability basement rocks that underlie the entire Basin. The most important underlying basement unit is the Monterey Formation. Locally at the southern edge of the EMA Basin, this aquitard unit rises to near the ground surface and forms a low-permeability barrier between the EMA principal aquifers within the Santa Ynez Uplands and the Santa Ynez River gravels (see Section B-B′ on **Figure 2-4** above).

These are older low-permeability rocks beneath and surrounding the Basin. At the bounding mountain fronts on the north and south sides of the Basin, these low-permeability units are juxtaposed against from the Basin's more permeable deposits by several faults, including the Little Pine Fault Zone to the north and Santa Ynez River Fault zone to the south. The rocks that comprise the basement include the Sisquoc Formation; the Monterey Formation, Sandstone of Hurricane Deck (also known as the Temblor Sandstone); Vaqueros Sandstone; Sespe Formation; Espada Formation; and the Franciscan Assemblage. The most important bedrock unit within the EMA is the Miocene-age Monterey Formation (Tm/Tml on Figure 2-2). The Monterey Formation outcrops in the highlands surrounding the EMA, defines the base of the Basin, and lies stratigraphically below the Paso Robles and Careaga Sand. Regionally, the combined thickness of the low-permeability Sisquoc and Monterey Formations is up to 4,000 ft in the EMA and is often highly deformed.

Water wells completed in the Monterey and Sisquoc Formations (generally livestock or single-residence domestic wells) are occasionally productive if a sufficient thickness of highly deformed and brittle siliceous shale is encountered by the wellbore. More often, however, the Monterey shale produces groundwater to wells in very low quantities. Nonetheless, this aquitard unit is not completely impermeable nor totally lacking porosity to store groundwater; thus, it is included in the model as extremely low-permeability and low-storage saturated media beneath the base of the Careaga Sand.

2.3.2.8 Summary of Hydrologic Properties of Hydrogeologic Units in EMA

Table 2-1 shows the hydrologic properties for these formations based on the publicly available literature, and **Figure 2-5** provides a graphical depiction of the range of values of estimated hydraulic conductivity for the units. The chart in **Figure 2-5** is a cumulative probability distribution of the estimated values obtained from the literature and interpretation of available pumping test data. While these results should not be considered statistically significant (i.e., there are not many data points, especially for the Older Alluvium), presenting the data this way illustrates some key characteristics of the hydrogeologic units in the EMA:

- The Santa Ynez River alluvial deposits are significantly more permeable than all other units in the study area.
- The Older Alluvium / Terrace Deposits also exhibit a high permeability, though lower than the Santa Ynez River alluvium, with a relative narrow range between the minimum and maximum values.
- The Paso Robles Formation, on the other hand, exhibits an extremely wide range of permeabilities, from as little as 0.1 ft per day (ft/day) to as high as 100 ft/day.
- The Careaga Sand also exhibit a wide range of permeabilities, though less than in the Paso Robles Formation, from less than 1 ft/day to as high as 20 ft/day.

These ranges in estimated values of permeability for each hydrogeologic unit are used to constrain estimated values during model calibration (Section 4).

Table 2-1. Physical and Hydrogeologic Characteristics of Hydrogeologic Units

Principal Aquifer	Principal Location (Lateral Extent)	Vertical Extent (feet)	Hydraulic Conductivity (feet / day)	Storativity (unitless) Sc	Sy	Porosity (Vol/Vol)
Paso Robles Formation	Santa Ynez Uplands, outcropping across approximately 70% of EMA, except for along the river, tributary channels, and older alluvial terraces within 1- to 2-miles of river	0 to 3,500 Av. Thickness: 1,500	0.2 to 96 Average:18	1.0×10^{-2}	Paso Robles: 0.04	Paso Robles: 0.15
(includes Older Alluvium)	Draped atop Paso Robles Fm from terraces near river up to 1 to 2 miles upslope from river	Surface to 150 feet Av. Thickness: 60	70 to 280 Average: 136	6.0×10^{-4}	Older Alluvium: 0.1	Older Alluvium: 0.2
Careaga Sand	Deeply buried beneath Santa Ynez Uplands, rising to near-surface near and beneath Solvang	Below Paso Robles Formation and Santa Ynez River Alluvium 200 to 900 feet Av. Thickness: 800	0.8 to 20 Average: 7.5	8.0×10^{-4}	0.05	0.12
Santa Ynez River Alluvium	Santa Ynez River	Surface to 60 Av. Thickness: 42	100 to 600 Average: 260	4.2×10^{-4}	0.23	0.3
Tributary Alluvium	Along principal tributaries in Santa Ynez Uplands	Surface to 70 feet Av. Thickness: 35	100 to 500 (est.) Average: 200	3.5×10^{-4}	0.2 (estimated)	0.3

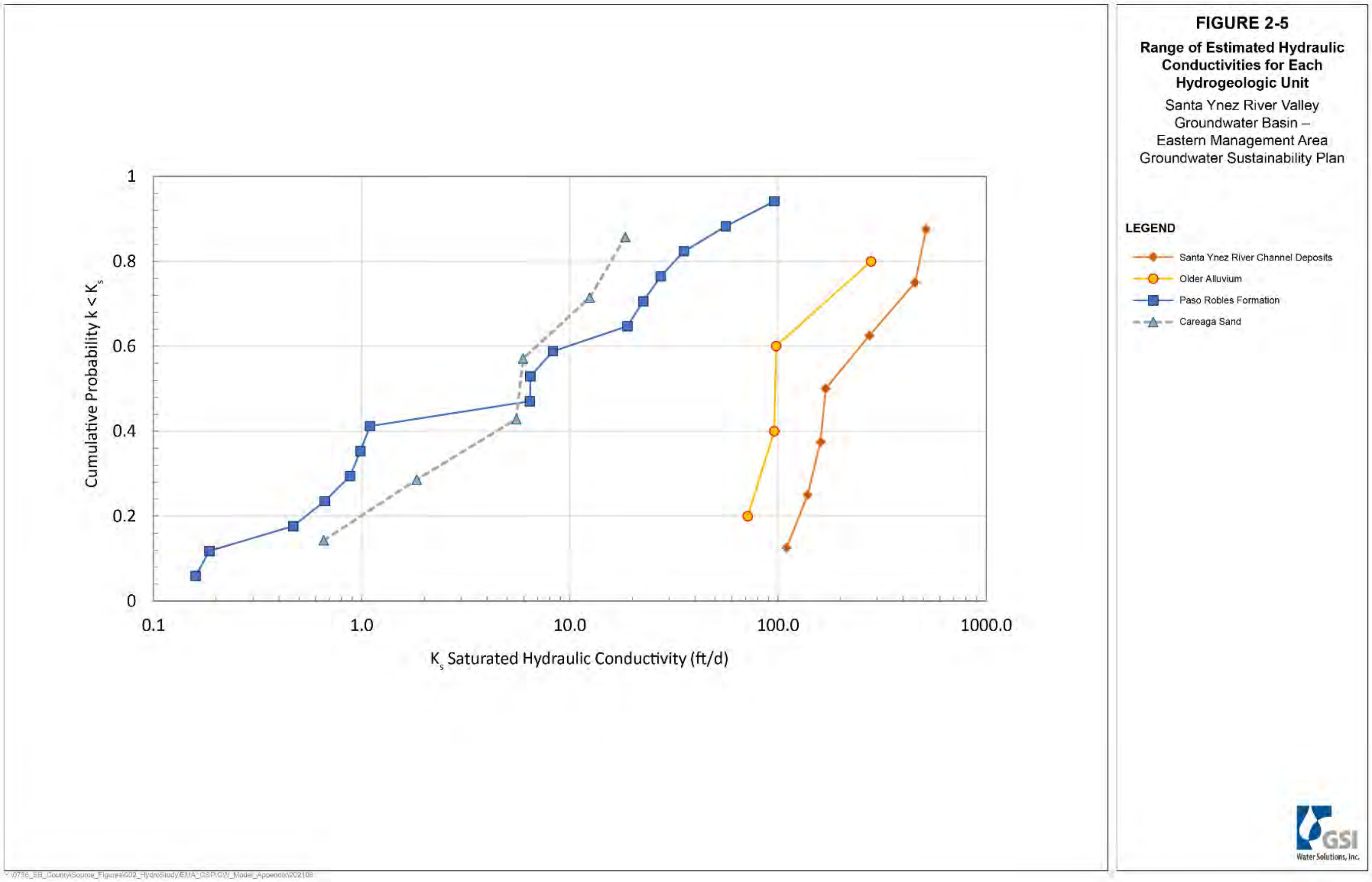

Figure 2.5. Cumulative Probability Distributions of Permeable Geologic Units in the EMA

2.3.3 Areal Extent of Hydrogeologic Units

The surface map (Figure 2-2) shows the occurrence of each of the geologic units at the ground surface, and the profiles (Figure 2-3 and 2-4) show their general configuration along west-to-east and north-to-south across the Basin. **Figures 2-6** and **2-7** present the areal extent and thickness of each of the key permeable units within the EMA. Noting the different thickness scales on the two figures, it is clear that the Recent Tributary Alluvium and the Older Alluvial Terraces are relatively thin compared to the Paso Robles Formation and Careaga Sand.

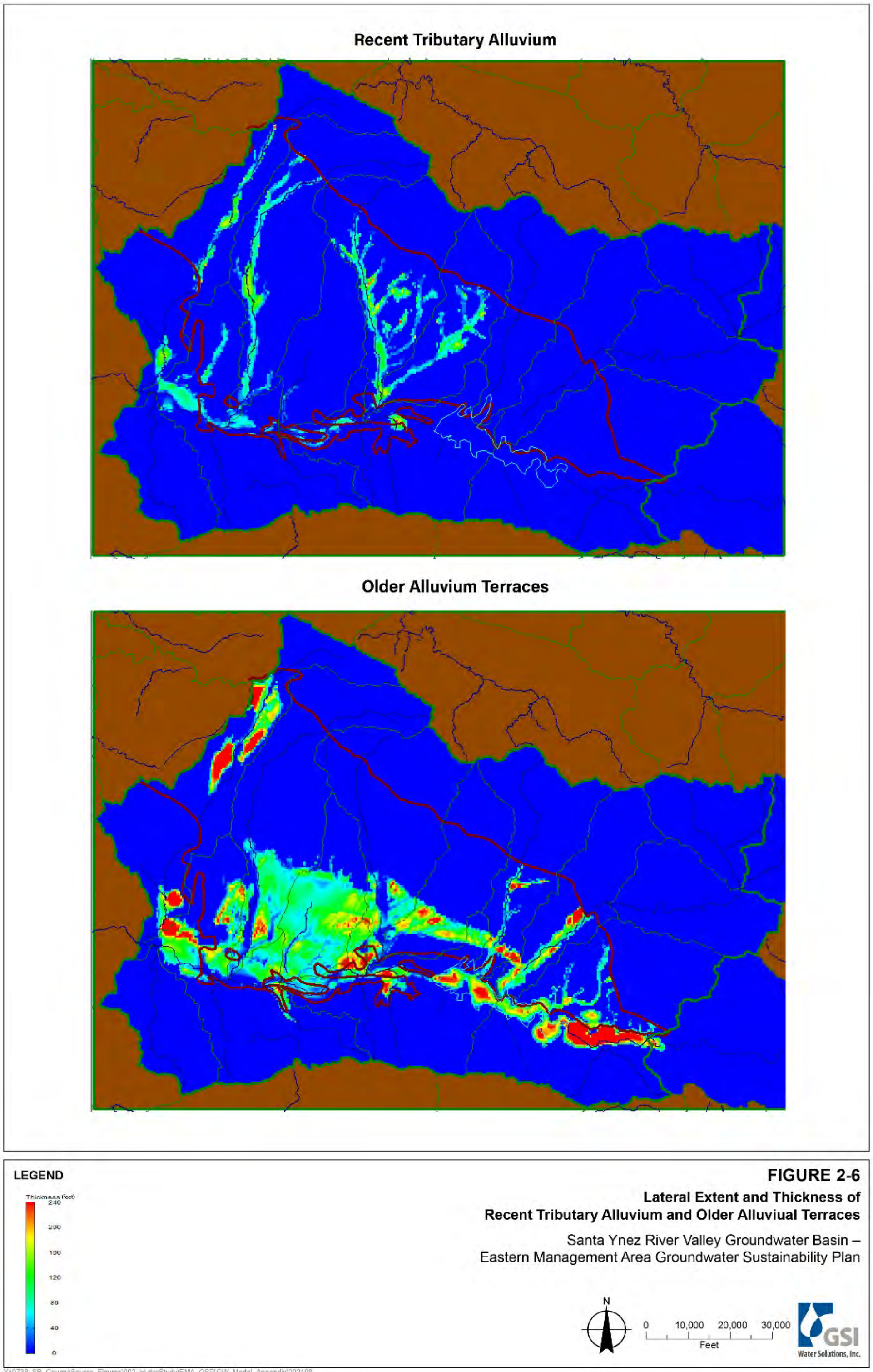

Figure 2-6. Lateral Extent and Thickness of Recent Tributary Alluvium and Older Alluvial Terraces

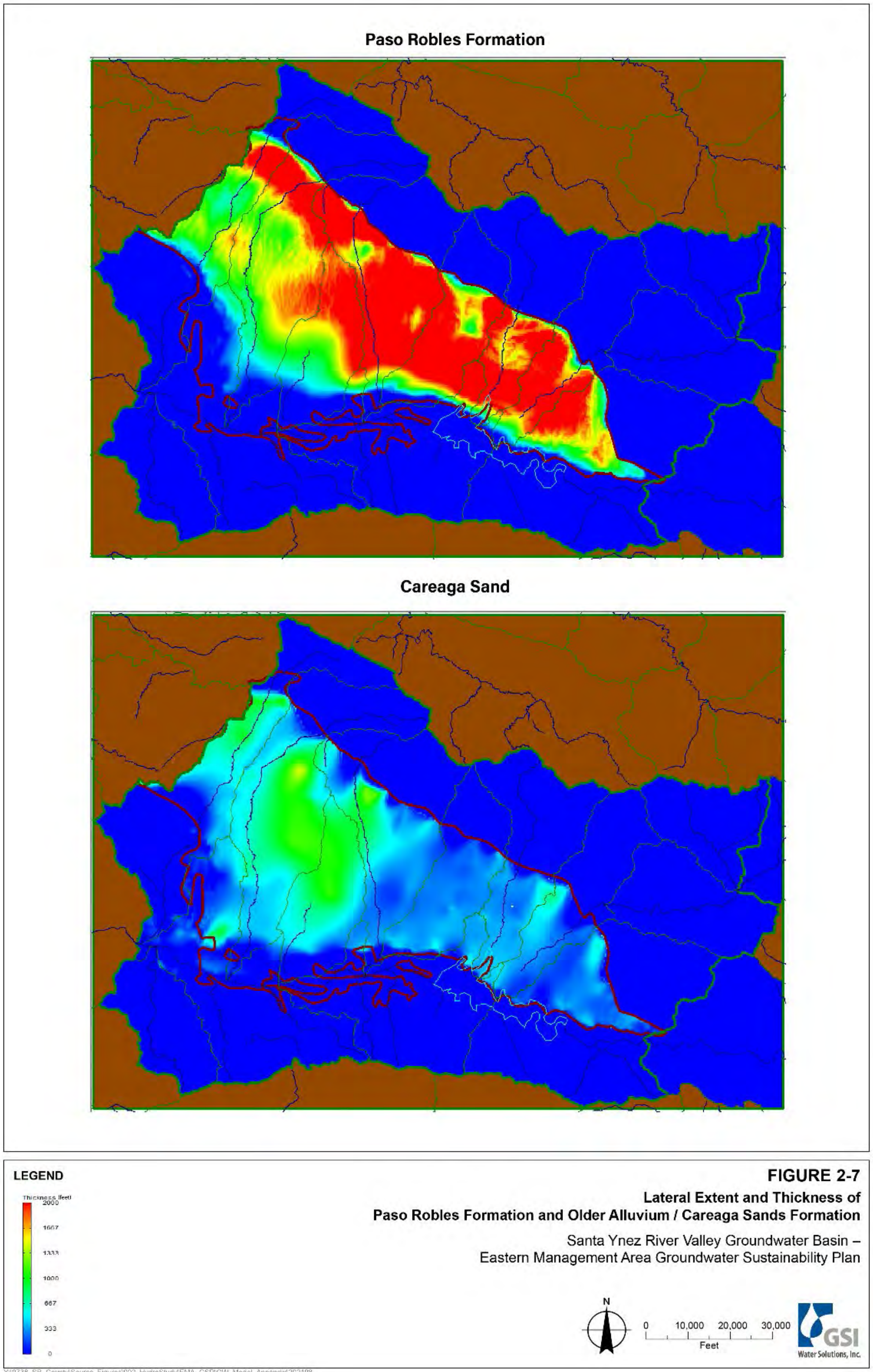

Figure 2-7. Lateral Extent and Thickness of Paso Robles Formation and Careaga Sand

2.3.4 *Unconfined and Confined Aquifers*

Groundwater encountered in wells drilled can be characterized as being under either confined or unconfined conditions, the differences between which are illustrated on **Figure 2-8**. As described by U.S. Geological Survey (USGS),[1] a confined aquifer is permeable geologic formation below the land surface that is saturated with water, with layers of low-permeability aquitard both above and below the aquifer, causing it to be under pressure so that when the aquifer is penetrated by a well, the water will rise above the top of the aquifer. An unconfined, or water table, aquifer is an aquifer whose upper water surface (water table) is at atmospheric pressure. In an unconfined aquifer, the water table is able to freely rise and fall in response to inflows (recharge) and outflows (e.g., pumping wells). Water-table aquifers are usually closer to the Earth's surface than confined aquifers are, and as such are impacted by drought conditions sooner than confined aquifers.

In the EMA, unconfined groundwater conditions are present in the Santa Ynez River Alluvium, Recent Alluvium, Older Alluvial Terraces, and upper portions of the Paso Robles Formation. Groundwater is encountered in confined conditions in the deeper parts of the Paso Robles Formation and over most of the Careaga Sand. Groundwater beneath the EMA and surrounding areas is typically found between depths from 30 to 250 ft below ground surface, depending on location and time. Contour maps of groundwater elevations measured in numerous wells across the EMA for the Paso Robles Formation and the Careaga Sand are presented on **Figures 2-9** and **2-10**, respectively.

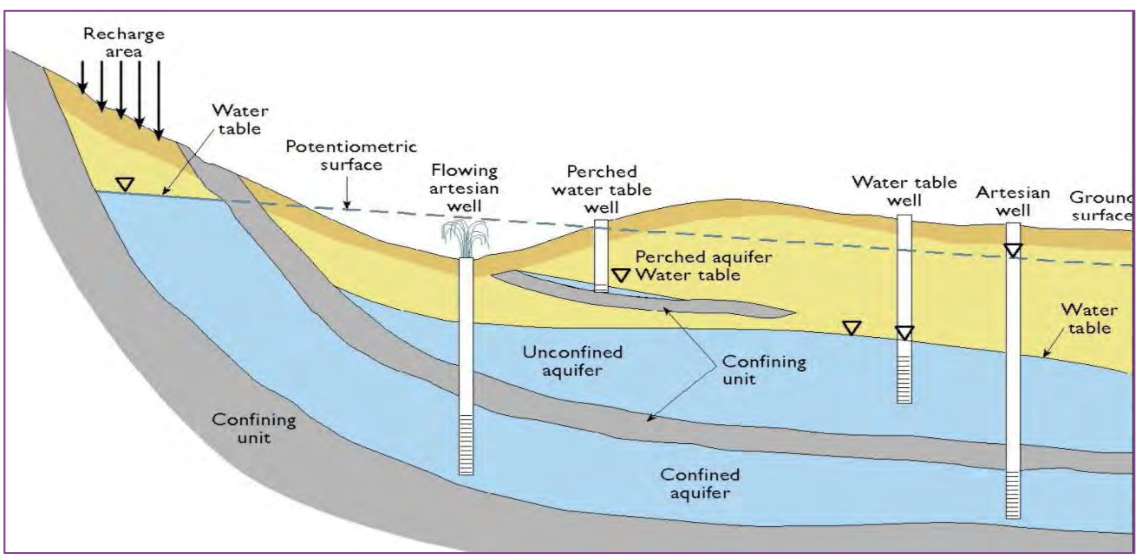

Figure 2-8. Schematic Diagram Illustrating Unconfined and Confined Aquifers

[1] https://www.usgs.gov/faqs/what-difference-between-a-confined-and-unconfined-water-table-aquifer?qt-news_science_products=0#qt-news_science_products

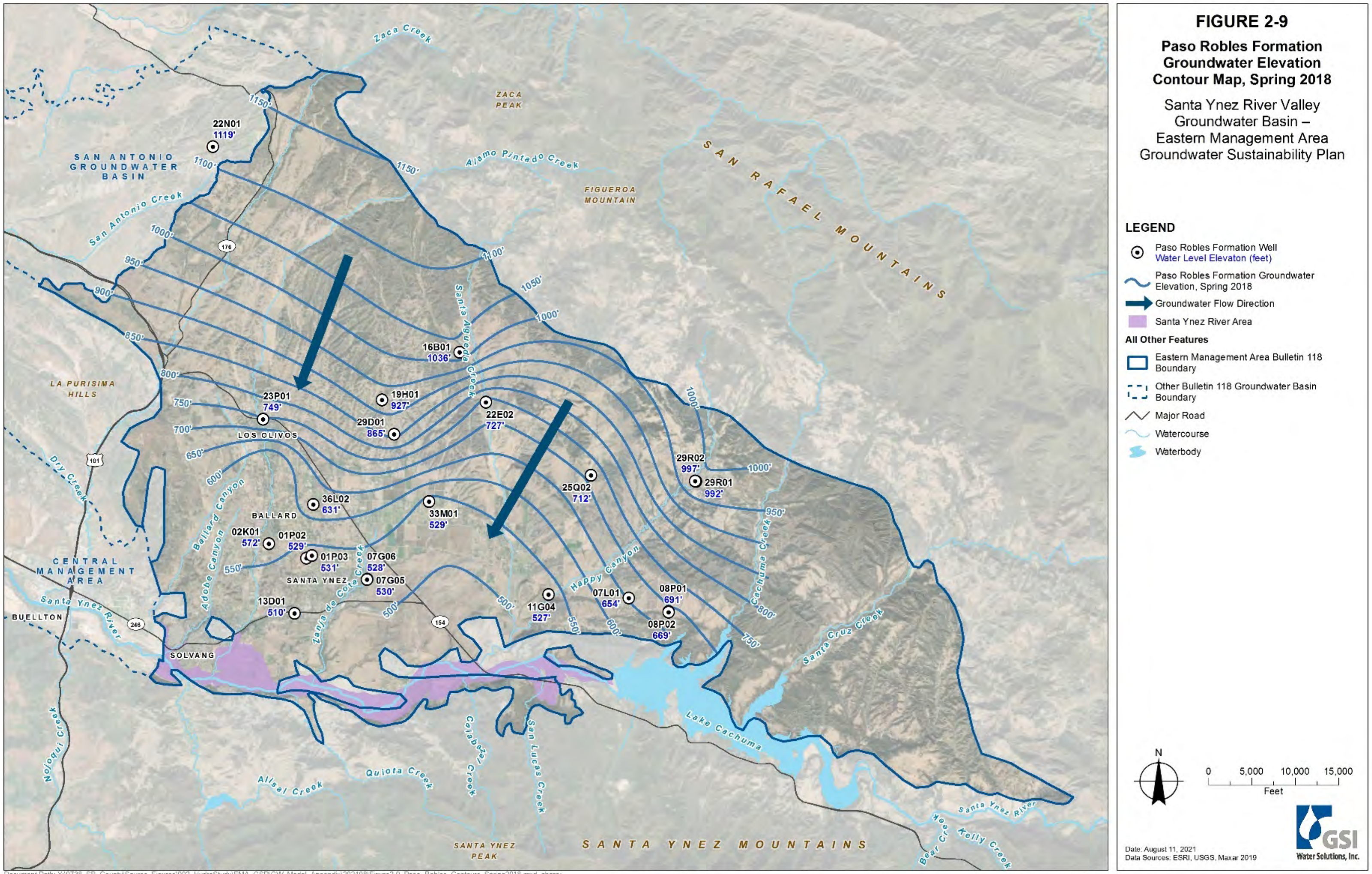

Figure 2-9. Groundwater Elevation in Paso Robles Formation, Spring 2018

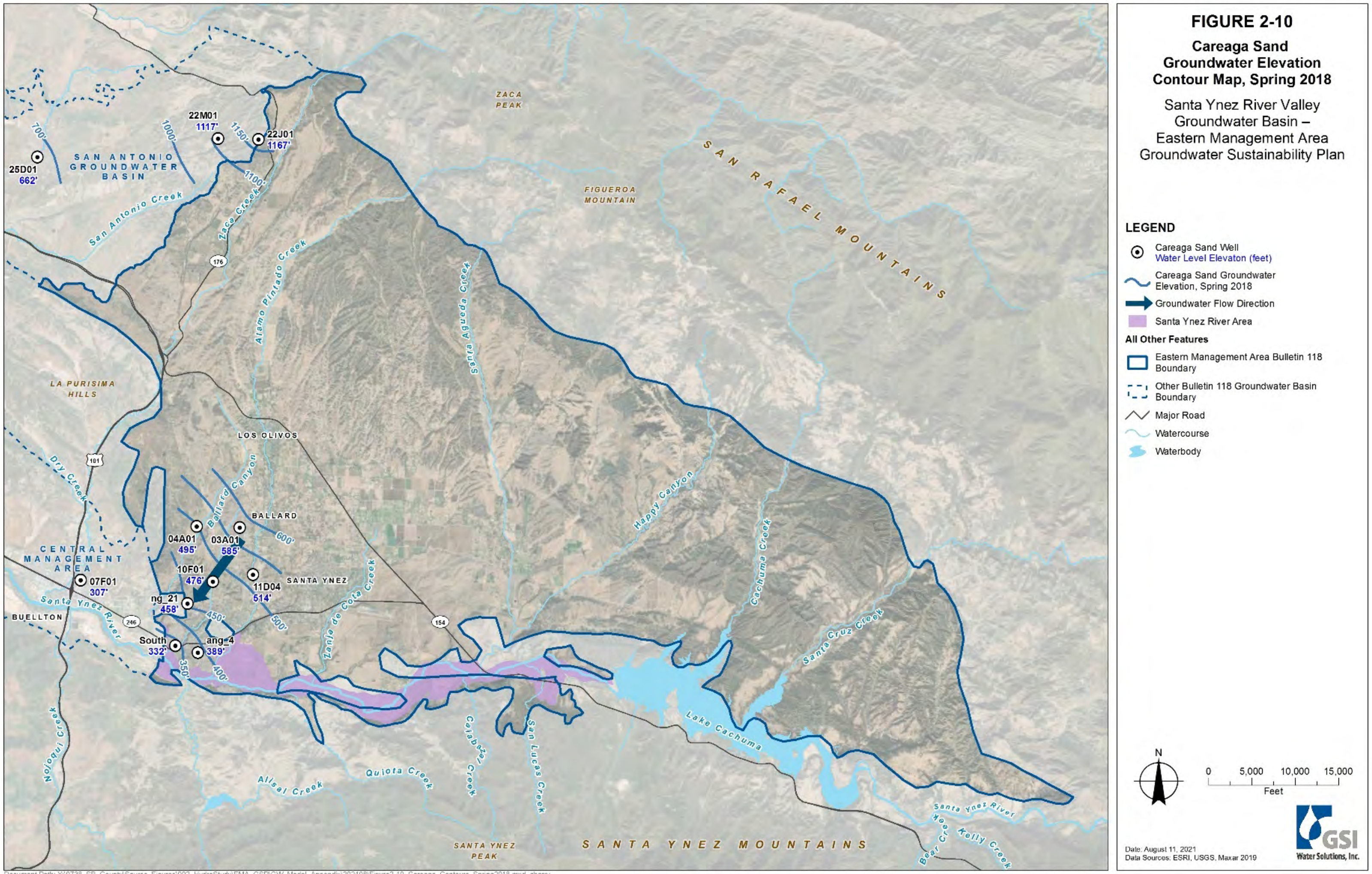

Figure 2-10. Groundwater Elevation in Careaga Sand, Spring 2018

When developing the regional water level contour maps for the Paso Robles Formation, care was taken to eliminate data from potential perched aquifers (**Figure 2-8**). Perched aquifers can exist locally within the Paso Robles Formation due to the previously described heterogeneity in textures and permeabilities, specifically the presence of laterally extensive clayey layers and lenses. The water level maps are intended to represent the regional groundwater flow conditions across the Basin. Thus, wells determined to be likely to be reflecting perched conditions were eliminated from consideration as water levels showing the regional groundwater flow in the Paso Robles Formation. The primary screening criteria were well logs describing drilling conditions, depth of well, and comparisons to water levels in the most nearby wells. Both of the water level maps (**Figures 2-9** and **2-10**) show a general groundwater flow direction from the high recharge zone in the mountainous area upslope from the EMA south and southwest toward the Santa Ynez River.

2.3.5 Land Subsidence

Land subsidence due to excessive groundwater withdrawals has affected large areas of California, notably in the San Joaquin Valley. For example, between 1926 and 1970, there was between 4 ft and 12 ft of cumulative subsidence across much of the Tulare Lake subbasin as described by the USGS (Faunt et al., 2016). Land subsidence due to excessive groundwater pumping results when fine-grained sediments (clays and silts) within an aquifer system consolidate (compress) when groundwater levels decline to historically low levels, reducing the buoyant effect of the stored groundwater, and increasing the effective vertical stress from the overlying sediments. This phenomenon was described above in the context of the groundwater storage coefficients, with subsidence associated with inelastic release of water from storage. Other areas in the state with notable groundwater pumping-induced subsidence include the Oxnard Plain, the Coachella Valley, and the Los Angeles Basin.

A variety of methods can be used to measure and monitor land subsidence. Airborne interferometric synthetic aperture radar (InSAR) is one widely used method. Regular InSAR surveys conducted over the same region can reveal areas of subsidence. Ground-based methods, such as continuous GPS (CGPS) measurements, campaign global positioning system (GPS) surveying, and spirit-leveling surveying are also employed to monitoring land subsidence, while in situ aquifer-system compaction can be measured by using borehole extensometers (Sneed and Brandt, 2015).

As described in Section 3.2.4 of the GSP, InSAR satellite monitoring of land subsidence in the area immediately surrounding the EMA over the 19-year period from 2001 through 2020 indicates that the measured rate of subsidence or uplift is within the range of measurement error, and thus is considered insignificant (NASA JPL, 2018).

2.4 Climate and Surface Water Hydrology

The preceding sections provide details on the geology, geologic units, and their hydrogeologic characteristics and properties. The presence of groundwater in the pore spaces of the geologic units results from infiltration of precipitation into the soils and eventually to the underlying geological formations, a process referred to as groundwater recharge. The following subsections describe the climate and precipitation regime for the study area, and the surface waters (Santa Ynez River and tributary streams), interconnected with the groundwater system in the EMA.

2.4.1 Climate and Precipitation

The climate in the EMA is semi-arid, characterized by hot, dry summers and cool moist winters, and is classified as Mediterranean steppe climate (Köppen climate classification [1936]). The wet season occurs from November through March with 80 percent of precipitation falling during this time frame (EPA, 2007). The EMA usually receives little to no rainfall in the summer months. Precipitation typically occurs from storms that move in from the west and northwest off the Pacific Ocean, and occasionally from storms from the southwest that contain warm sub-tropical moisture producing heavy rains especially during El Niño episodes.

The Los Alamos weather station provides the longest period of record of all weather stations within and near the EMA, with a period of between 1905 and 2018. Historical annual precipitation can vary significantly from year to year, as illustrated for the Los Alamos station (**Figure 2-11**), which has ranged from a low of 5.17 inches in 1924 to a maximum of 36.2 inches in 1998, and averages about 15.3 inches per year. Superimposed on this interannual variability is the strong seasonal variability mentioned above, illustrated in **Figure 2-12** as the monthly precipitation at the Santa Ynez gage for the period from 1982 through 1994. During this period, essentially all rain fell in the winter, with the maximum month reaching nearly 16 inches in January 1992. This results in an estimated average recharge into the groundwater of 2 inches per year, occurring principally in the winter.

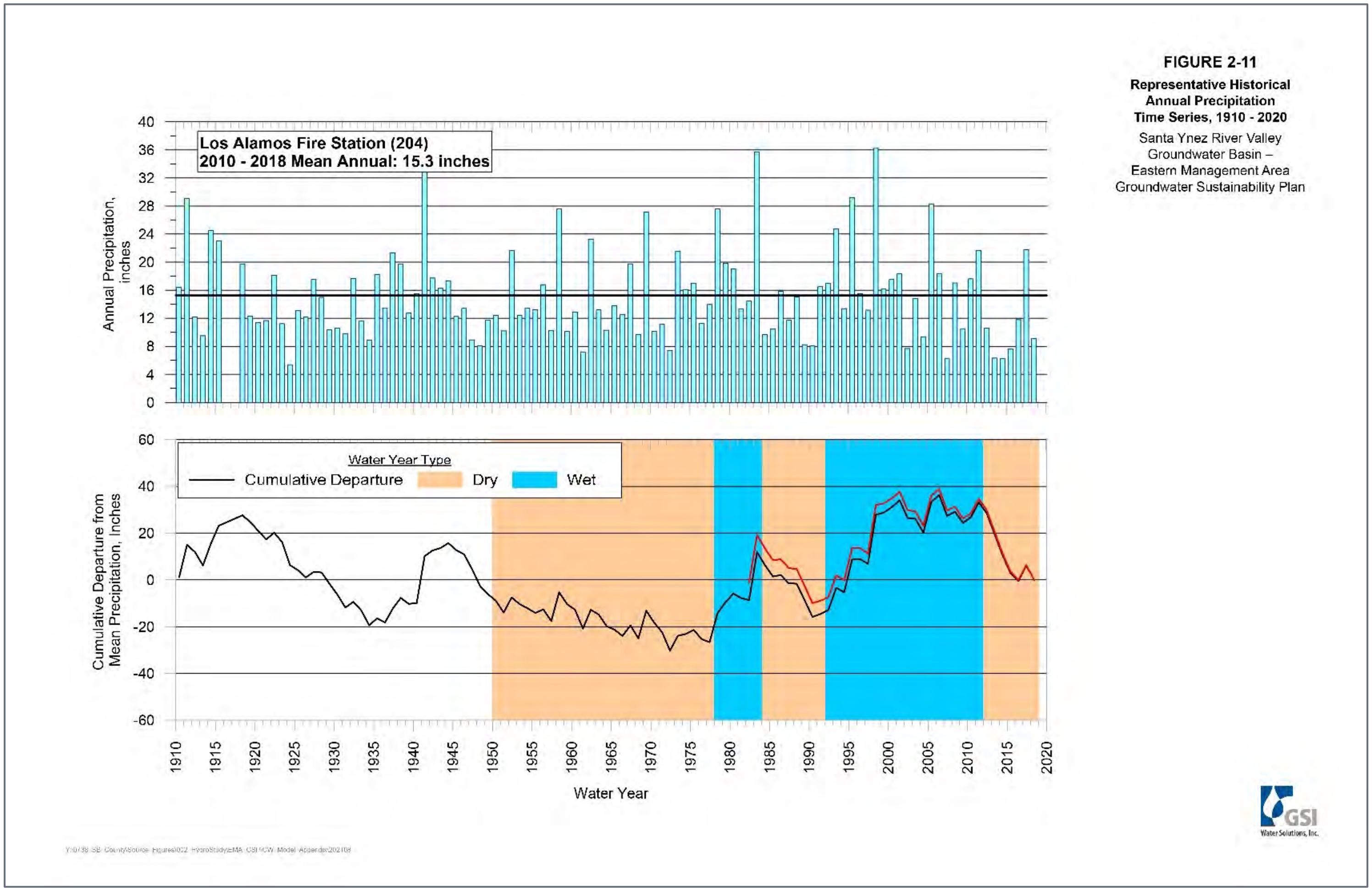

Figure 2-11. Historical Annual Precipitation, Los Alamos Gauge, 1910 through 2018

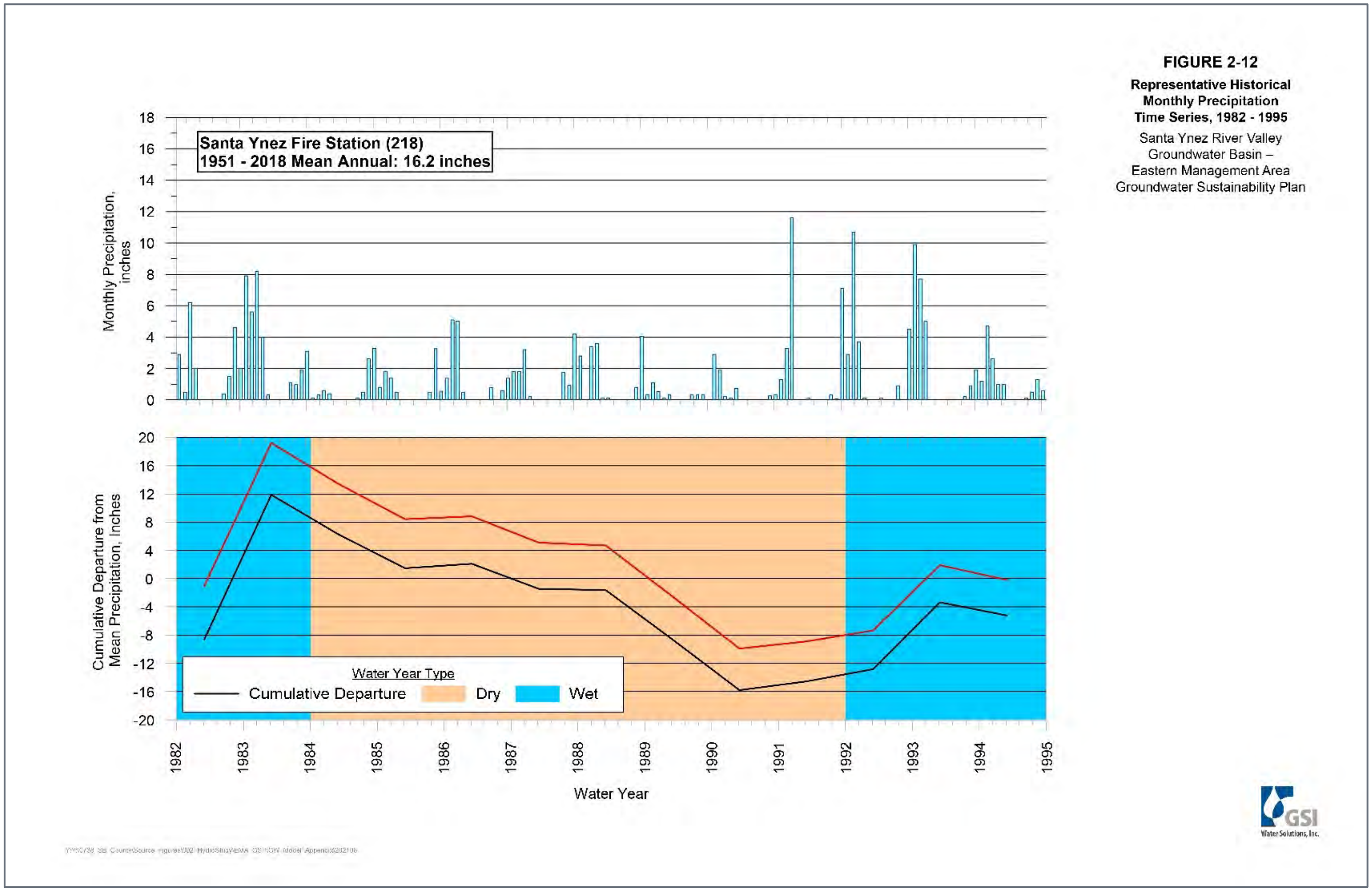

Figure 2-12. Historical Annual Precipitation, Santa Ynez Gauge, 1982 through 1994

The weather stations in the EMA provide point measurements of precipitation and other meteorological parameters over time (see GSI, 2020). Utilizing discrete point measurements of precipitation, the PRISM Climate Group of Oregon State University[2] developed gridded monthly precipitation maps covering the entire continental U.S., with values on a 1-kilometer spacing. Recently, the USGS (Flint et al., 2013) developed the Basin Characterization Model (BCM), which utilizes the PRISM climate data together with elevation and soil mapping data to develop a hydrologic water balance on a grid of 270 x 270-meter cells covering the entire state of California for the period from 1951 to 2019. The precipitation, groundwater recharge, evapotranspiration (ET), and runoff from the BCM were employed to help develop inputs and boundary conditions for the SYEMAHM, as described in Section 4.5 below. For example, **Figure 2-13** provides a map showing the distribution of average annual winter (December through March) precipitation, clearly illustrating the significant spatial variability in precipitation across the study area.

[2] Available at http://prism.oregonstate.edu

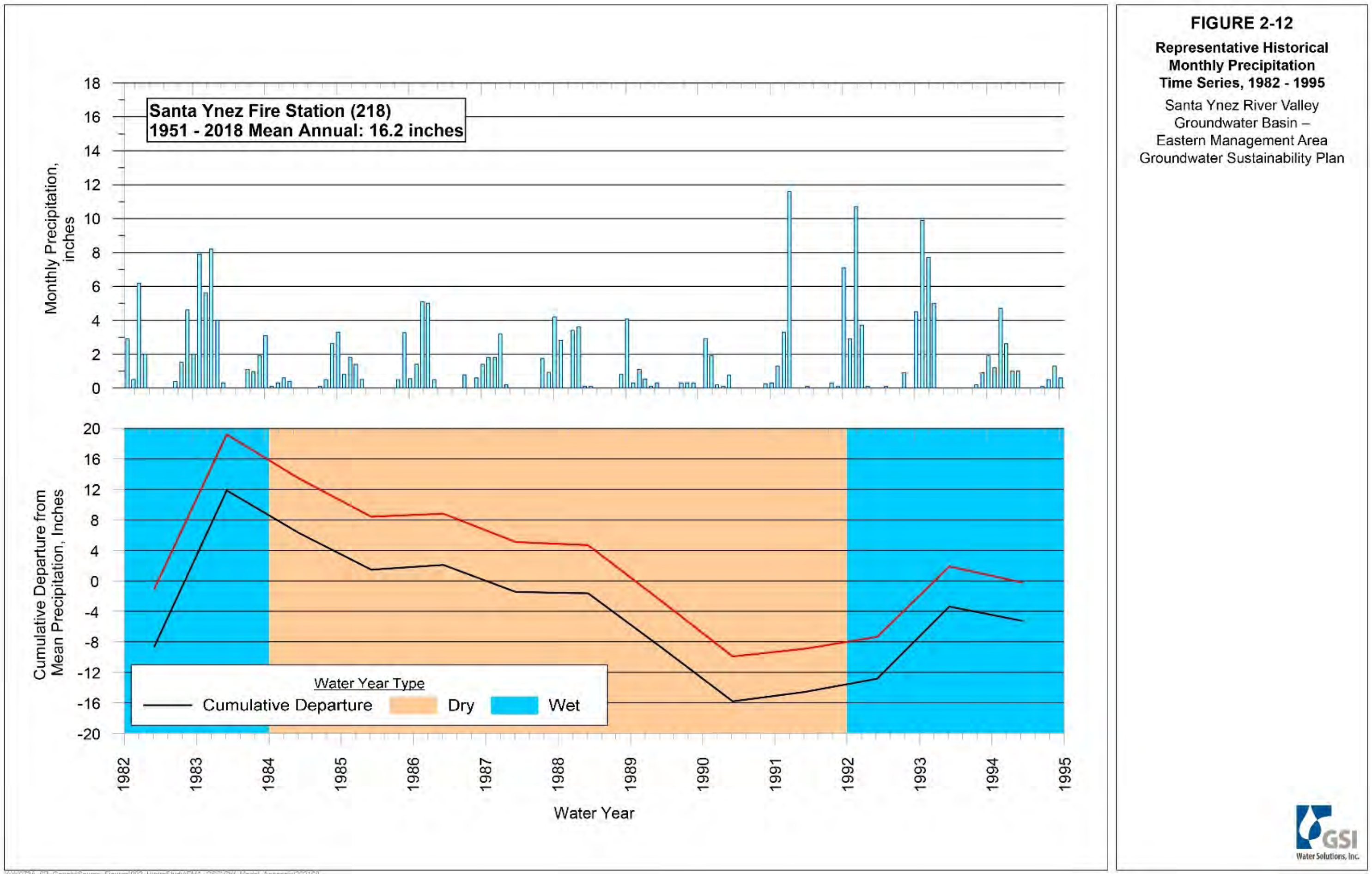

Figure 2-13. Average Winter Precipitation Across Model Domain from BCM (2001 through 2018)

2.4.2 Surface Water Occurrence

Surface water supplies potentially available in the watershed include the main stem and tributaries of the Santa Ynez River, and imported water from northern California through the State Water Project (SWP) via the Central Coast Water Authority (CCWA) pipeline. The sections below summarize the local surface water system interconnected with the groundwater system and imported water through the SWP and CCWA.

2.4.2.1 Interconnected Surface Water

If no groundwater pumping occurred in the EMA, the Santa Ynez River would be the ultimate natural groundwater drain for the hydrologic system, with groundwater discharging from the EMA principal aquifers contributing baseflow to the river and its major tributaries. When the precipitation intensity exceeds the soils' ability to absorb and infiltrate the water, surface water flow is generated as precipitation runs off the ground surface. This runoff will flow downslope until it encounters a stream channel, which conveys the flow to the Santa Ynez River through one of its tributaries.

While excellent gage records exist for the Santa Ynez River flows, data on tributary flows are generally lacking. To support development of the surface water operations model for the Cachuma Project, Stetson (2008) developed multi-regression equations to generate monthly stream flows for each of the major tributaries in the study area. In addition, the BCM data set provides gridded data on surface runoff generation. A comparison was made between these two independent data sets, and a good agreement was found for total annual runoff for the tributaries in the study area. **Figure 2-14** shows the time series of total annual runoff summed from the gridded BCM data to the tributaries that discharge to the Santa Ynez River. This figure clearly illustrates that the surface runoff generated in the EMA and its contributing watershed is strongly correlated to annual precipitation. It also shows that runoff varies significantly from year to year. The runoff to the tributaries north of the river that cross the EMA ranges from essentially zero in very dry years to greater than 60,000 acre-feet (AF) in very wet years. **Figure 2-15** shows the major tributaries to the Santa Ynez River in the EMA.

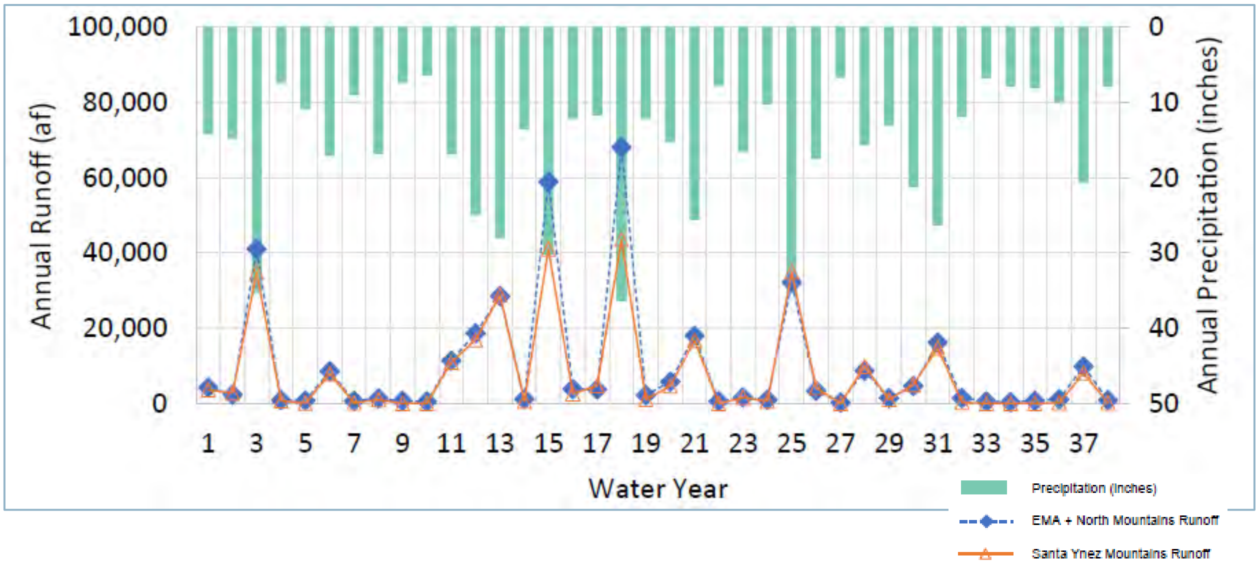

Figure 2-14. Annual Precipitation and Runoff in EMA Model Domain from BCM Data

As described in the HCM in Section 3.2 of the GSP, surface water streams interact with groundwater in two basic ways as illustrated in **Figure 2-16**:

- Discharge of groundwater through the stream bed to the surface water channel (**gaining stream condition**). This requires that the elevation of the phreatic surface (commonly referred as the water table) in the vicinity of the surface water stream be higher than the elevation of the surface water body surface.
- Infiltration and downward migration of surface water from the stream channel through the streambed into the underlying groundwater (**losing stream condition**). This condition requires the elevation of the water table in the vicinity of the surface water body to be lower than the elevation of the surface water body surface.

Most of the tributaries in north of the Santa Ynez River that cross the EMA have reaches with gaining conditions and other reaches with losing conditions. In addition to gaining and losing conditions for stream-aquifer interactions that occur in the Santa Ynez Uplands, the streams can also be classified as perennial (meaning there are always surface flows present) or intermittent (meaning surface water flows are present at times, and the channel is dry at other times).

According to the Nation Hydrography Dataset (USGS, 2020), the entire Santa Ynez River is defined as a perennial stream, as are several of its tributaries. Upstream of Bradbury Dam, perennial creeks include both Santa Cruz Creek and Cachuma Creek, which flow into Lake Cachuma. Below Bradbury Dam the other creeks classified as perennial include the following (in order from upstream to downstream): San Lucas Creek, Zanja de Cota Creek, Quiota Creek, and Alisal Creek. The entire lengths of three creeks are classified as intermittent: Happy Canyon Creek, Alamo Pintado Creek, and Ballard Canyon. The upstream portions of Santa Agueda Creek and Zaca Creek are perennial, while they become intermittent downstream. All of the tributaries north of the river that cross the EMA are explicitly included in the SYEMAHM, allowing for both gaining and losing conditions. **Figure 2-17** shows the estimated annual streambed percolation from the major northside tributary channels into the EMA groundwater system.

2.4.2.2 Imported SWP Water

Water from the State Water Project (SWP) is imported into the EMA using the Central Coast facilities of the SWP located west and crossing the southern edge of the EMA. Three water purveyors within the Santa Ynez Valley and one located partially in the EMA (and partially in the Lompoc Valley) have contracted for SWP water. Excluding drought buffers, their annual entitlements (in acre-feet [AF]) include the following: Santa Ynez River Water Conservation District, Improvement District No. 1 (ID No. 1) (500 AF); the City of Solvang (1,500 AF, contracted through ID No. 1); Buellton (578 AF); and Vandenberg Space Force Base[3] (5,500 AF, located partly in the Lompoc Valley). Some of the water from the SWP imported by ID No. 1 and the City of Solvang make it into the EMA groundwater system in two ways:

- As irrigation return flows, from that portion of imported SWP water utilized for crop irrigation.
- As onsite water treatment system (OWTS) domestic use return flow (percolation from septic tank leach fields) for households whose supply includes SWP water.

3 Vandenberg Space Force Base was formerly called the Vandenberg Air Force Base until a renaming ceremony in May 2021 (Associated Press, 2021).

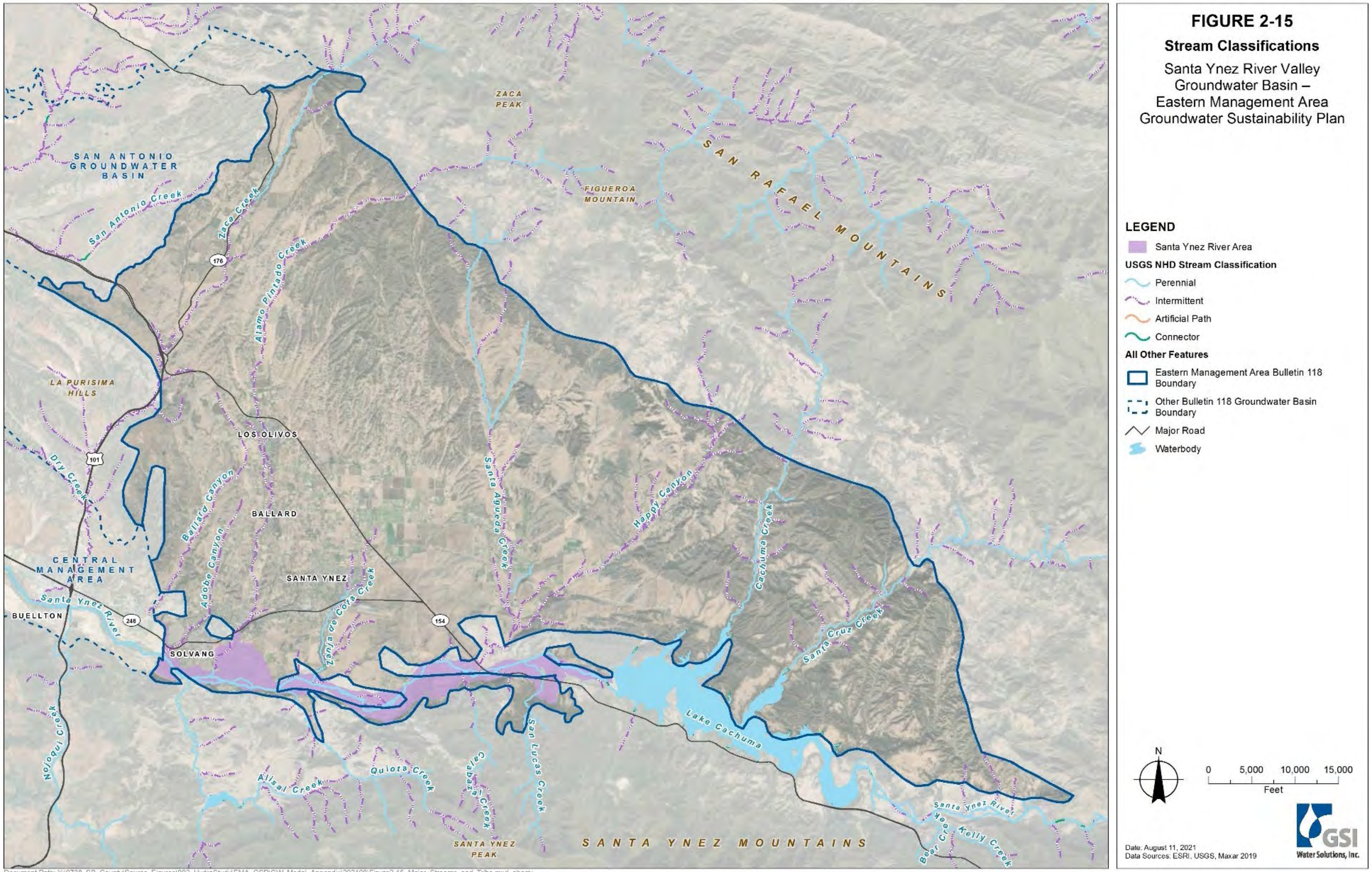

Figure 2-15. Stream Classifications

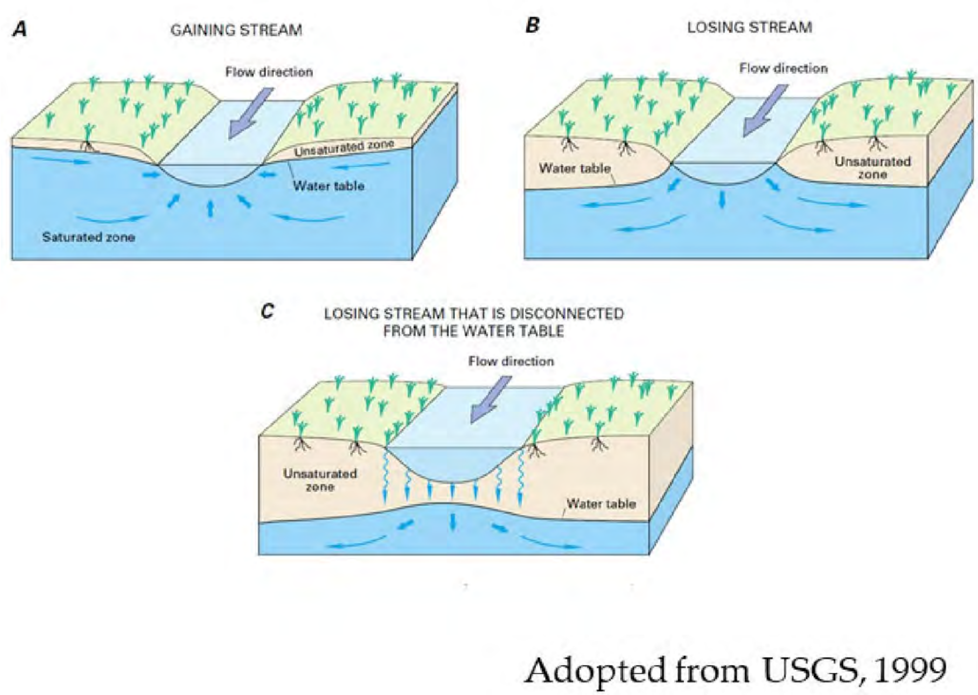

FIGURE 2-16

Gaining and Losing Streams

Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan

Figure 2-16. Gaining and Losing Streams

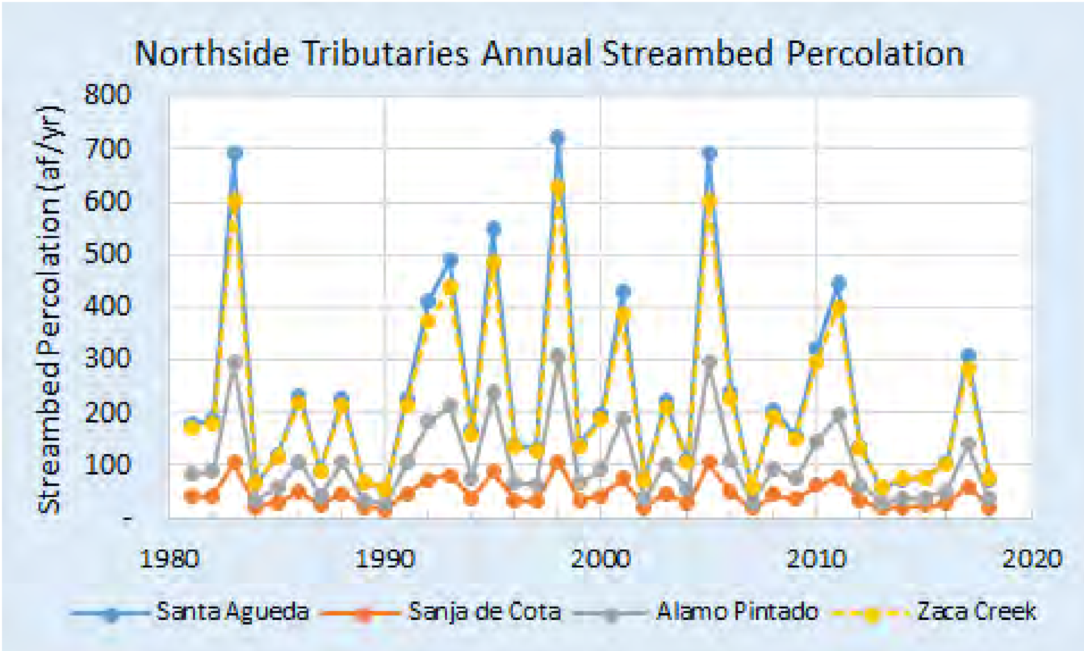

Figure 2-17. Annual Streambed Percolation from Northside Tributaries

2.5 Land Use Impacts on Hydrology and Water Budget

Land use in the EMA and surrounding areas includes extensive undeveloped areas as well as areas developed with agricultural crops, rural and subdivision residential dwellings, with smaller urbanized areas (The City of Solvang, and Santa Ynez, and Los Olivos).

2.5.1 Areal Natural Groundwater Recharge

Section 2.4.2.1 above describes how the tributaries that cross the EMA can recharge the aquifers when surface water runoff percolates into the streambed channel. In addition to this recharge concentrated along the stream channels, recharge can also occur in undeveloped areas across the EMA. The BCM data previously described also estimate this areal recharge. Like the BCM-computed runoff presented in **Figure 2-13**, the BCM recharge also varies spatially across the study area, as well as over time, depending on the wet season precipitation. **Figure 2-18a** presents the BCM-estimated monthly areal groundwater recharge across the EMA into the underlying groundwater system, while **Figure 2-18b** shows both the monthly BCM areal recharge as well as the monthly BCM runoff normalized by the monthly precipitation. These charts illustrate the strong seasonality in the monthly recharge.

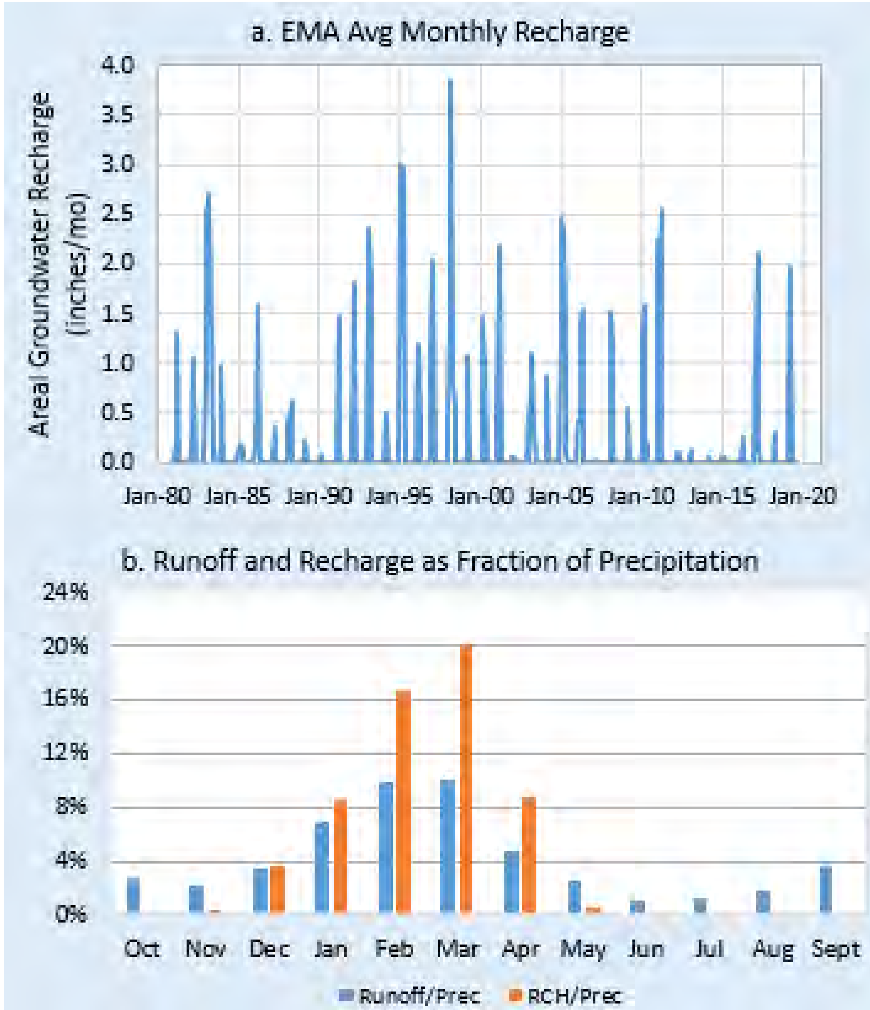

Figure 2-18. Monthly Areal Recharge from BCM Averaged over Entire EMA

2.5.2 Land Use, Groundwater Diversions, and Return Flows

Groundwater pumping is closely related to land use. Land use was evaluated using DWR land use maps for 1985 through 2006 (DWR, 2016) and annual CropScape maps from 2006 through 2016 (CropScape, 2016). These maps were provided in geographic information system (GIS) formats, allowing for aggregation of similar land uses (i.e., crop types) to simplify analysis.

The EMA covers an area of approximately 100,000 acres, or about 150 square miles. The total cropped acreage has grown slightly over the WYs 1982 through 2018 period of record. More significant than the overall increase in cropped acreage is the transition in crop type from an agricultural system dominated mixed vegetables, hay crops, and pasture for livestock forage in the early 1970s, to a crop mix that is now made up of approximately 50 percent wine grapes. **Figures 2-19** through **2-22** show the agricultural crop patterns across the EMA for the years 1985, 1996, 2014, and 2016, respectively. A detailed analysis of these land use patterns shows that the 1996 data differ considerably from the other years, inconsistent with a steady transition from the 1985 cropping patterns to the cropping patterns in 2014 and 2016. Based on that, the 1996 data are considered less reliable for use in assigning cropping patterns in the model.

Agricultural irrigation pumping, as well as irrigation return flows, are intricately linked to the land use and cropping patterns presented above. Annual pumping quantities are provided for the following: SYRWCD ID No. 1, the mutual water companies (MWCs) outside SYRWCD boundaries, the City of Solvang, and some of the water users that self-report to SYRWCD. Even more detail is provided for ID No. 1, which has reported pumped volumes provided by well on a monthly basis since 2008. However, for most of the irrigation pumpers located outside SYRWCD boundaries, pumped volumes were estimated based on the land use or cropped acreage data. This was accomplished using estimates of crop water use provided by SYRWCD.

2.5.2.1 Duty of Water and Irrigation Diversions

Ideally, historical use of irrigation water would be determined from records of diversions of irrigation water from the water source at the farm headgate. However, this is hardly ever the case. In fact, for the much of the irrigated agriculture in the EMA there is a notable absence of historical diversion records (except, as noted, for pumping records by ID No. 1 and the City of Solvang). In the absence of actual measurements of historical use, pumping rates need to be estimated based on acreage subject to the beneficial use and calculations of the duty-of-water based on crop type and climate data.

The concept of duty-of-water dates back to at least 1903, when U.S. Reclamation Service engineer Elwood Mead defined the duty-of-water as “the area of crop which can be matured with a given volume” (Mead, 1903). The 1917 edition of the Manual of the Reclamation Service used the more common definition, stating that “the duty of water is the quantity required for crop production on a given area, usually during a year or irrigation season. This may be expressed in acre-feet per acre, in acres per second-foot of continuous flow during the season, or in other units or combinations of these” (Davis and King, 1917). In California, AFY is the most commonly used unit for characterizing the duty-of-water.

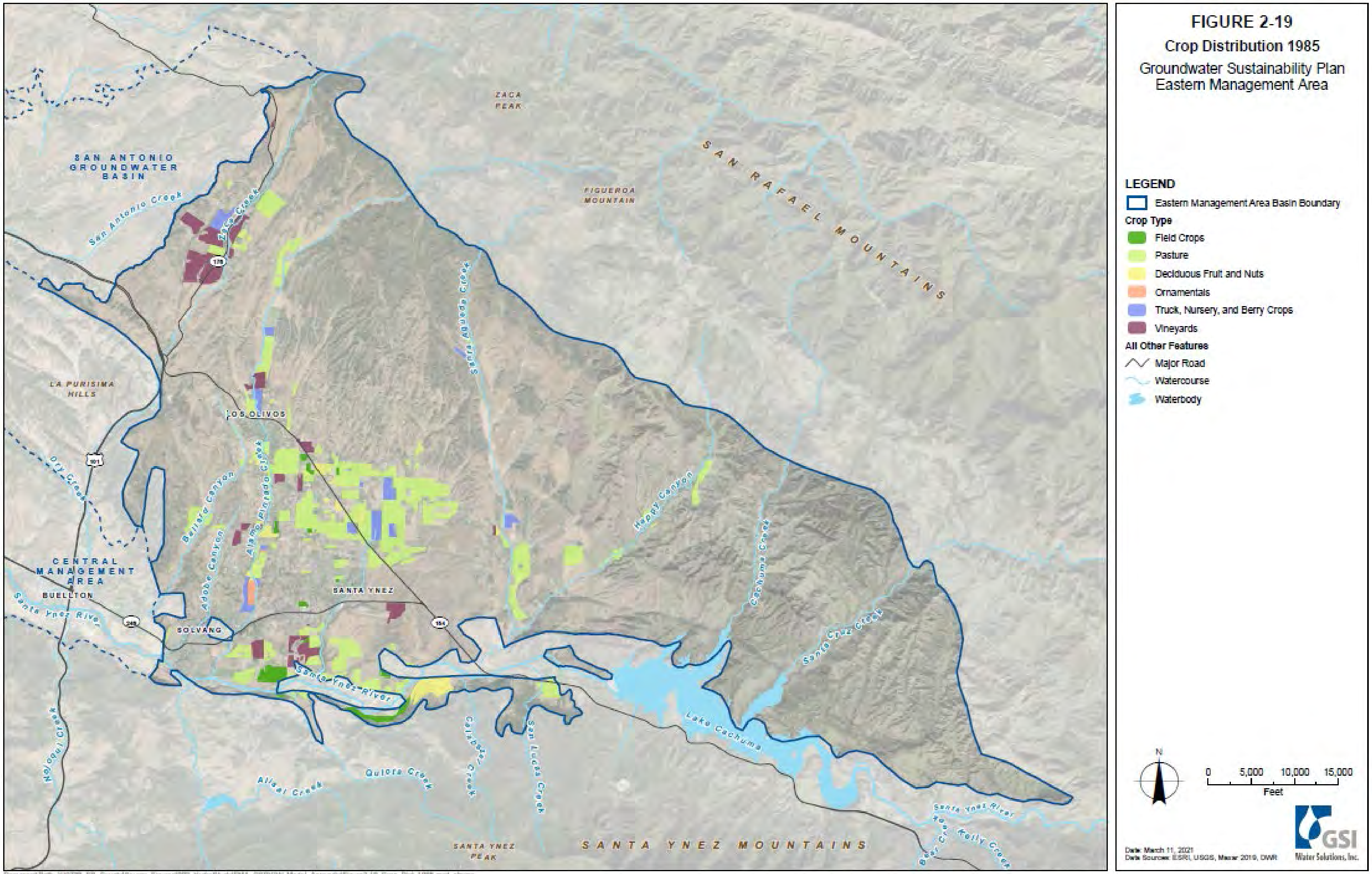

Figure 2-19. Crop Distribution 1985

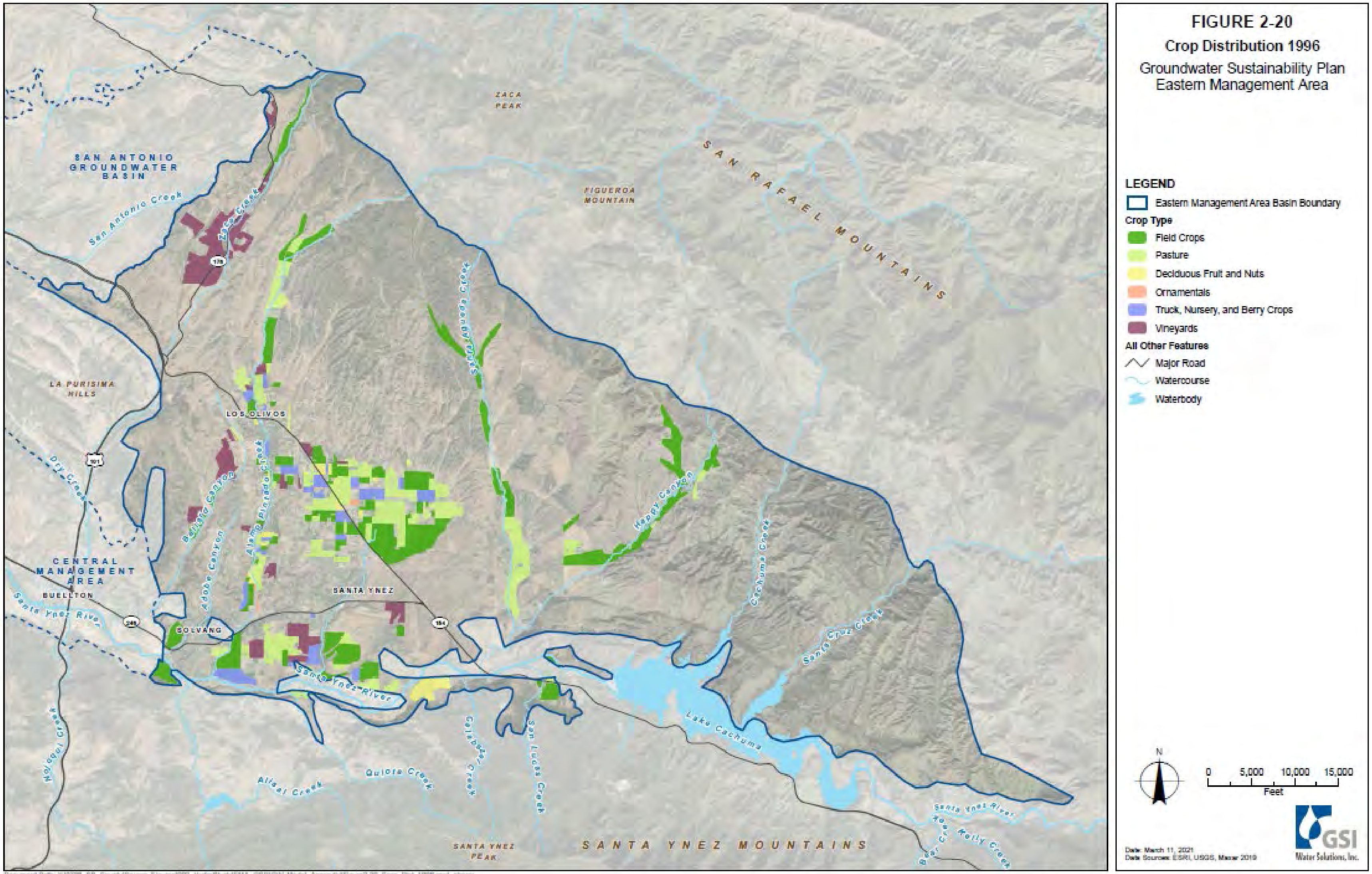

Figure 2-20. Crop Distribution 1996

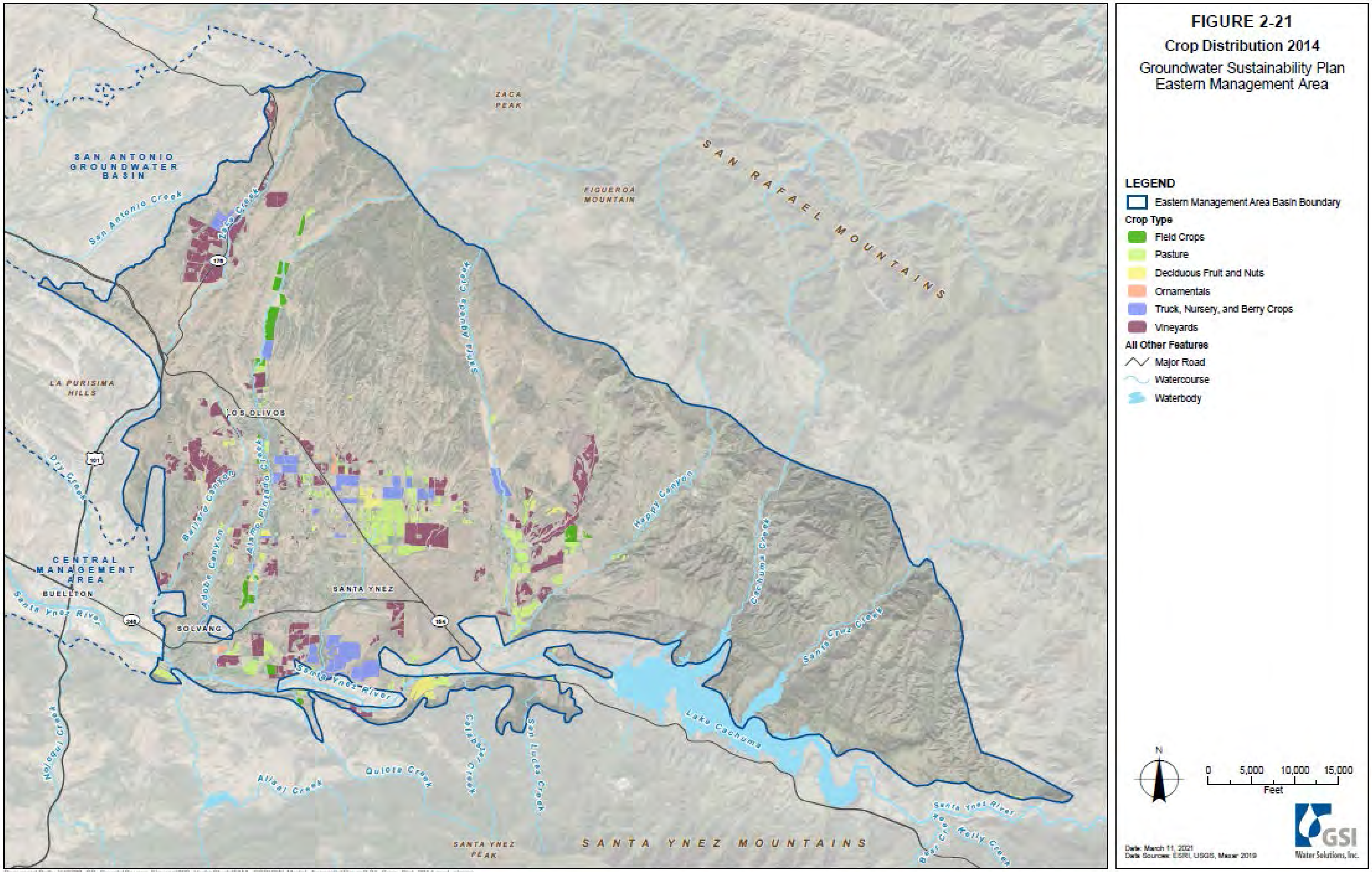

Figure 2-21. Crop Distribution 2014

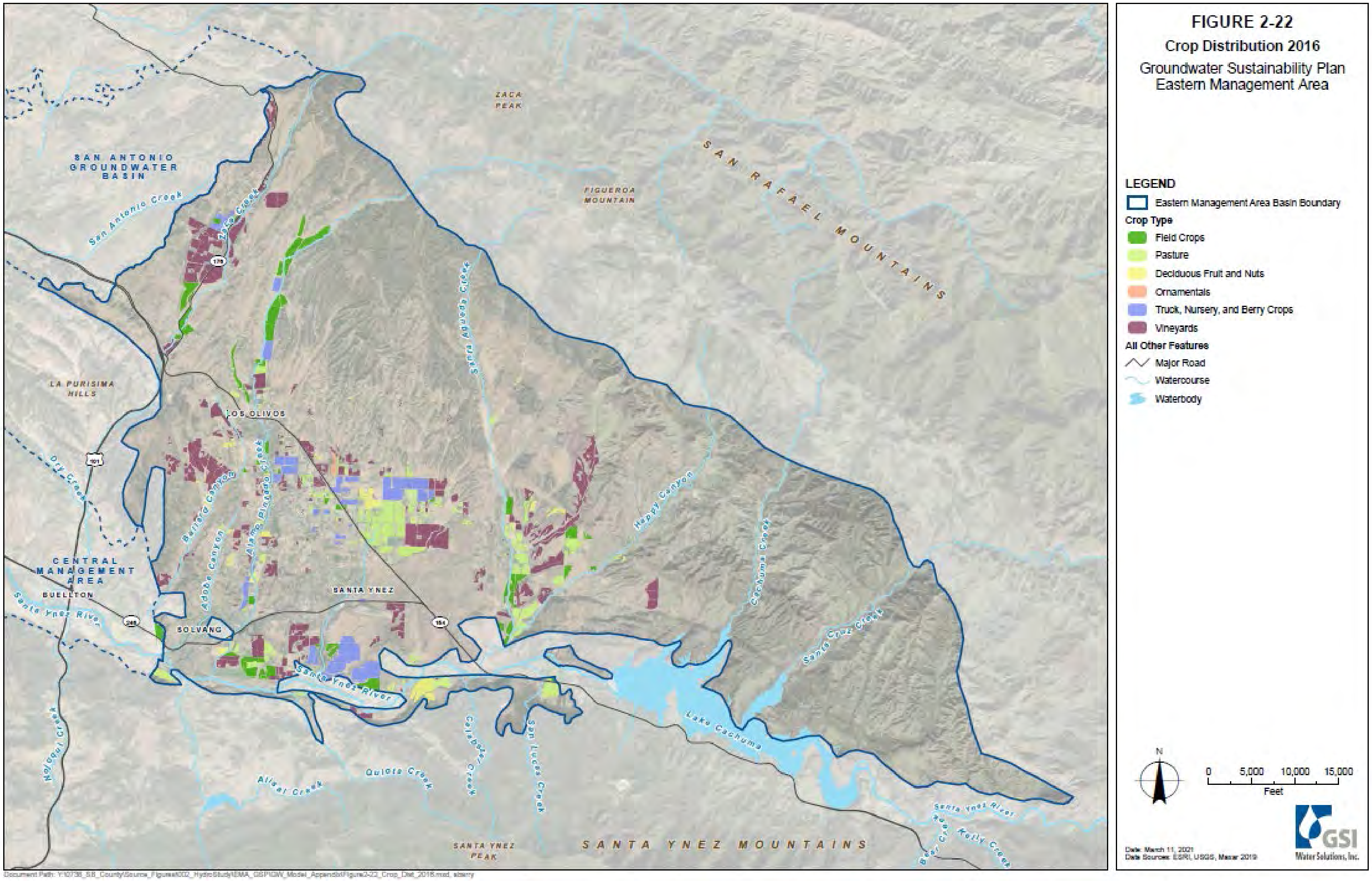

Figure 2-22. Crop Distribution 2016

The duty-of-water includes water consumed through crop ET, water that evaporates during the irrigation process, and return flows. Return flow is defined as the amount of water applied to the crop in excess of the crop ET demand that eventually returns to the hydrologic system, either as deep drainage and recharge to groundwater, or water that leaves the cropped field as surface flows. Skaggs et al. (2011) provide a succinct explanation of the duty-of-water, how it is estimated based on crop demand (ETc), and the relationships between effective rainfall (Re), crop irrigation requirement (CIR), and the farm diversion requirements (FDR) and irrigation efficiency (Eff), as illustrated in **Figure 2-23**.

ET, CIR & FDR Explained

$ET_c = K_c * ET_o$

ET_c = theoretical evapotranspiration, or water consumptively used by a crop

K_c = crop coefficient, dimensionless number multiplied by reference ET (or ET_o) to estimate a specific crop's theoretical ET (or ET_c)

ET_o = reference ET, usually grass, calculated from climatic data

$CIR = ET_c - Re$

Re = effective rainfall

FDR = CIR/Eff

Eff = on-farm irrigation efficiency, or water consumptively used by a crop / water applied or diverted at the farm gate

Figure 2-23. Relationship between Theoretical Evapotranspiration (ET), Consumptive Irrigation Requirement (CIR), and Farm Delivery Requirement (FDR)

Source: Skaggs et al. (2011)

The amounts of plant uptake of water from soil[4] are provided in FAO-56 (Allen et al., 1998) and the ASCE Standard Reference Method (Allen et al., 2005). With the crop type and required meteorological data, the ET demand can be computed. After accounting for effective precipitation (FAO-25, Dastane, 1978) and irrigation efficiency, the quantity of irrigation water to meet the ET demand can be estimated (the "FDR" in **Figure 2-23**).

Rather than estimating ET from climate data and accounting for effective precipitation and irrigation efficiency to compute the FDR, the authors recommended that irrigation pumping demand be estimated

[4] From Battany, 2019, An initial estimate of a water duty factor for field-grown CBD hemp in the Paso Robles area. The University of California working in cooperation with San Luis Obispo County and the USDA. April 22, 2019.

for EMA using crop-specific water use factors published by SYRWCD. **Table 2-2** presents the crop water use factors published by the SYRWCD. These water use factors are specifically used by most of the SYRWCD water users to report annual pumping volumes. The water use factors are multiplied by the cropped acreage to obtain the volume of water pumped. A potential shortcoming of this method is that it fails to recognize the effective rainfall component of the calculation, resulting in pumping estimates unaffected by whether it is a dry, average, or wet year.

Table 2-2. Water Duty Factors for Crop Groups

Crop Group	Annual Crop Demand (acre-feet per acre per year)
Deciduous Fruit and Nuts	2.14
Field Crops	1.05
Ornamentals	3.00
Pasture	3.50
Truck, Nursery, and Berry Crops	3.11
Vineyards[1]	1.60
Cannabis[2]	1.50

Notes

[1] The assigned water duty factors are based on SYRWCD's Groundwater Production Information and Instructions pamphlet (SYRWCD, 2010).

[2] From Battany, 2019, *An initial estimate of a water duty factor for field-grown CBD hemp in the Paso Robles area.* The University of California working in cooperation with San Luis Obispo County and the USDA. April 22, 2019.

2.5.2.2 Municipal and Community Systems, and Domestic Pumping

The urbanized areas of the City of Solvang and Santa Ynez are served by the Solvang municipal water system and ID No. 1 water supply system, respectively. For those areas, the pumped volumes are not necessarily intricately linked to the local land use, because the water supply may originate from a well located a large distance away from its point of use. Both Solvang and ID No. 1 provide monthly and annual pumping data, which were directly used in the model. The model also uses data from several local water systems operating within the SYRWCD boundaries (e.g., Skyline Park) that self-report pumping data to SYRWCD.

Incorporated mutual domestic water systems outside SYRWCD boundaries (e.g., Rancho Santa Ynez Estates) report annual diversions to the SWRCB. Rural domestic pumping estimates were obtained from land use data for those rural residences not served by any other water system and applying a standard per-capita demand of 0.5 acre-feet per year per unit (AFY/unit). Estimated annual groundwater pumping for all these uses (irrigation, rural domestic, and municipal-residential uses) were developed for the

SGMA groundwater budget for the EMA, and the same values were utilized as annual pumping demand in the SYEMAHM. A high-level summary of these values is presented in **Figure 2-24**.

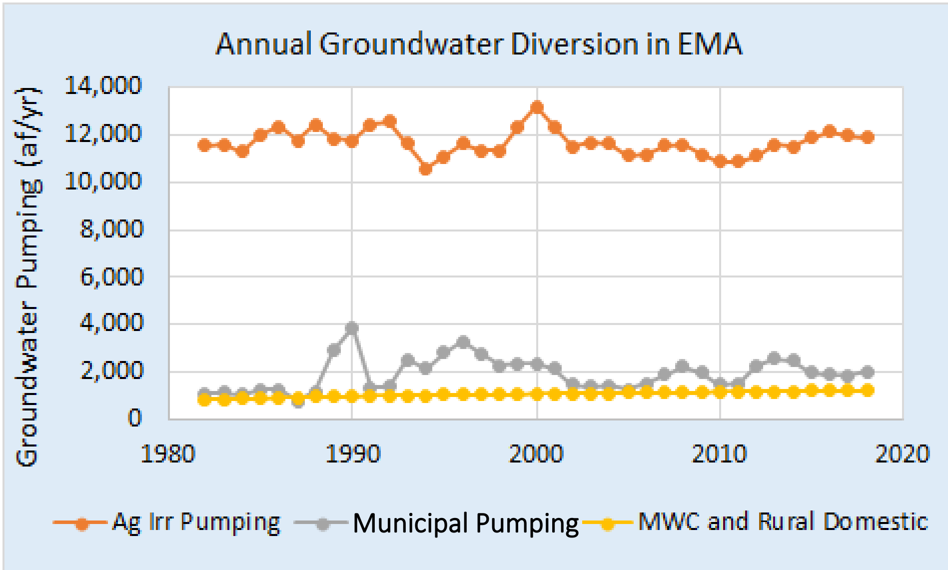

Figure 2-24. Estimated Annual Groundwater Pumping in the EMA

2.5.2.3 Return Flows

Return flows can be defined as that portion of water applied to a particular use that ultimately is returned to the hydrologic cycle as part of that use. The two most important return flows for the EMA groundwater system are agricultural irrigation return flows and residential domestic use return flows.

As noted above, part of the water applied for irrigation purposes is not consumed by crop ET. Part can run off a field as surface water runoff to the nearest low point. This runoff is commonly referred to as "tailwater" that eventually reaches a stream channel or can percolate down to the uppermost groundwater systems. In addition to that "off-farm" return flow, another part can percolate past the root zone within a cropped field, also to become irrigation return flow to the hydrologic system. As described in the water budget provided in Section 3 of the GSP, agricultural water use efficiency—and thus the agricultural irrigation return flow—varies by crop type. For example, vineyards typically irrigate by drip systems that have a very high irrigation efficiency, from 90 to 95 percent. This means very little return flow (less than 5 to 10 percent). The efficiency of drip systems can be compared to overhead sprinkler irrigated systems, which may operate at 60 percent efficiency or less (if operated in the hottest part of the day), and only part of the 40 percent inefficiency results in return flows (part is non-beneficial losses due to evaporation from the air and leaf surfaces). For this project the crop efficiencies presented in **Table 2-2** were used.

The return flow from agricultural irrigation is presented on **Figure 2-25** for the four discrete years with land use surveys in the EMA between 1985 and 2016.

Residential domestic use return flows are associated with rural residences not served by sanitary sewer systems. Those residences discharge their domestic wastewater to OWTS (also known as septic tank – leach field systems). For the EMA, the OWTS return flows are calculated as 50 percent of the residential / domestic water use in all areas not served by a centralized sanitary sewer system. The locations of the OWTS are presented on **Figure 2-26**.

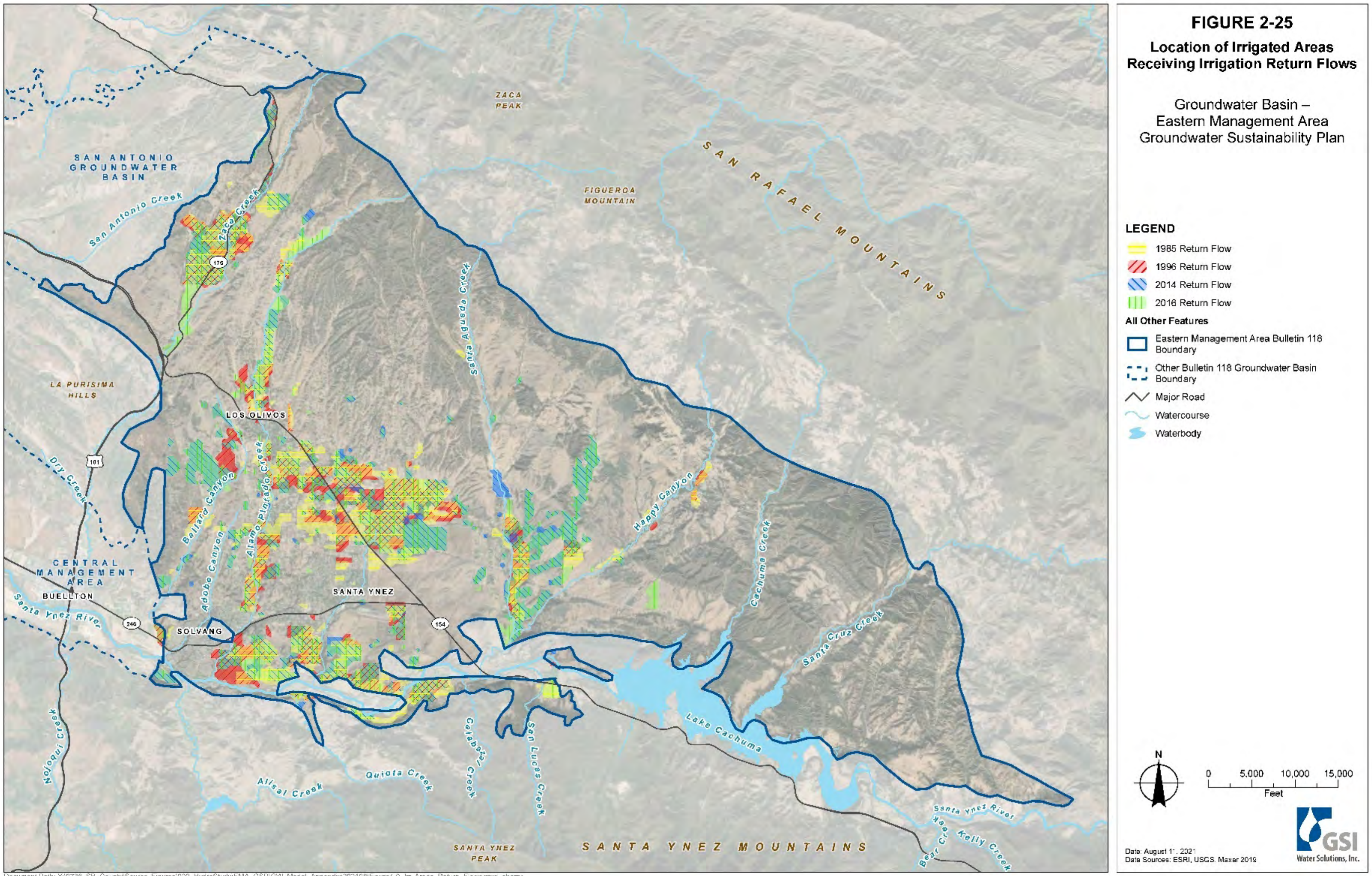

Figure 2-25. Location of Irrigated Areas Receiving Irrigation Return Flows

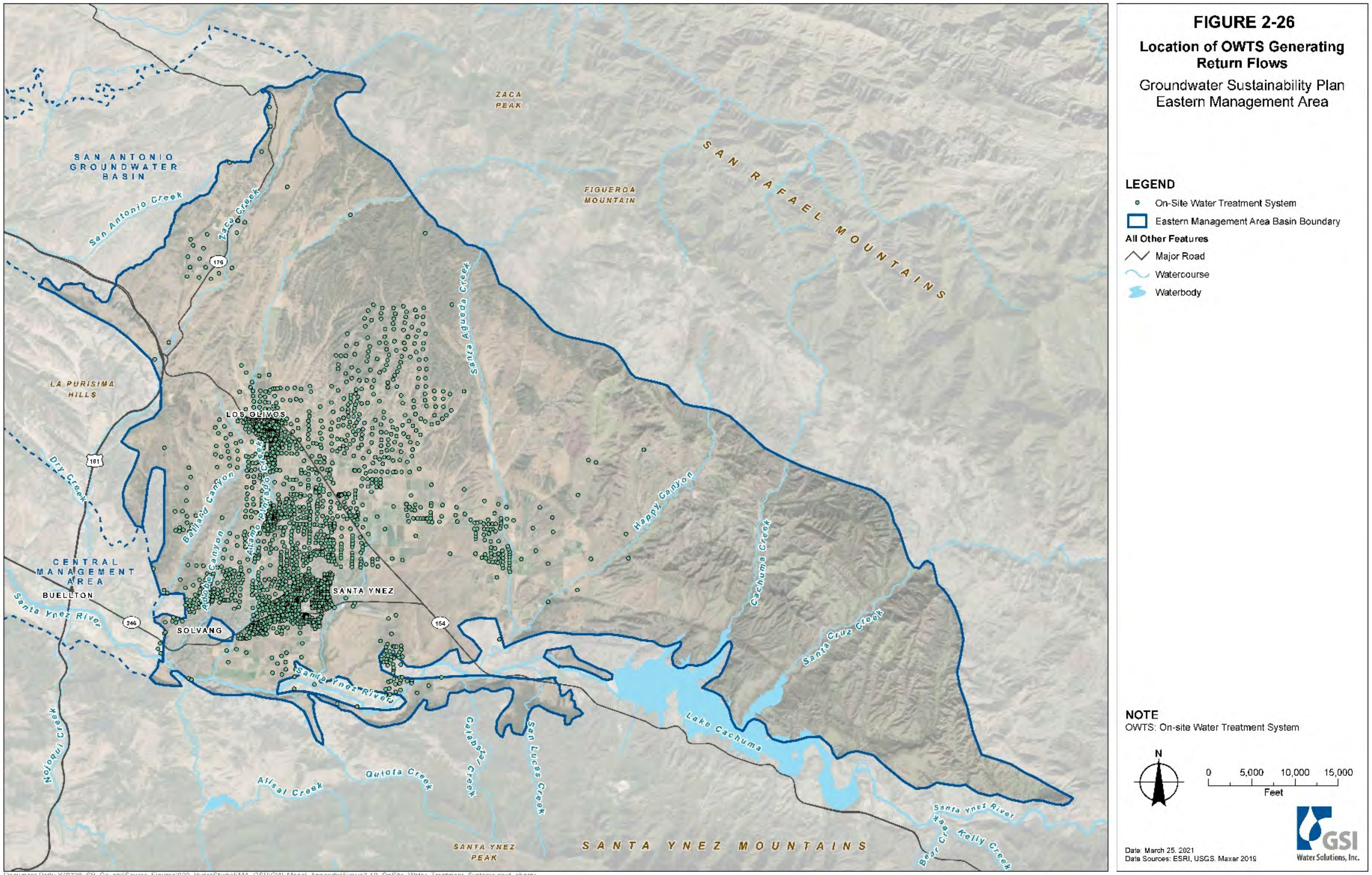

Figure 2-26. Location of OWTS Generating Return Flows

2.6 Basin Water Budget

The basin water budget describes the inflows to and outflows from the Basin hydrogeologic system. Inflows can occur from the hydraulic boundaries of the system, from various sources within the model domain such as recharge from precipitation, irrigation return flows, and exfiltration from the Santa Ynez River and its tributaries, while outflows occur at the EMA downstream boundaries, and within the domain from well pumping and groundwater discharge to surface water as baseflow.

Imbalances between inflows and outflows result in changes in groundwater storage, which can be observed directly through changing groundwater levels. For example, during sustained droughts, groundwater pumping generally exceeds inflows from natural groundwater recharge and streambed percolation, causing a drop in groundwater levels. Conversely during wet periods, high recharge from precipitation and streambed percolation can help groundwater levels recover.

Most of the major inflows to and outflows from the groundwater system are summarized above. A more detailed discussion of each inflow and outflow components is provided in the water budget technical report (GSI, 2021b). **Figure 2-27** shows the annual groundwater budget for the EMA, broken down into all key components, for the period from water years 1982 through 2018. The groundwater model employs these annual inflows and outflows of groundwater (Santa Ynez Uplands) and surface water (Santa Ynez River Area) as inputs to the model. For the model, these total annual values were distributed spatially across the EMA and broken into monthly values as described in **Section 4** below.

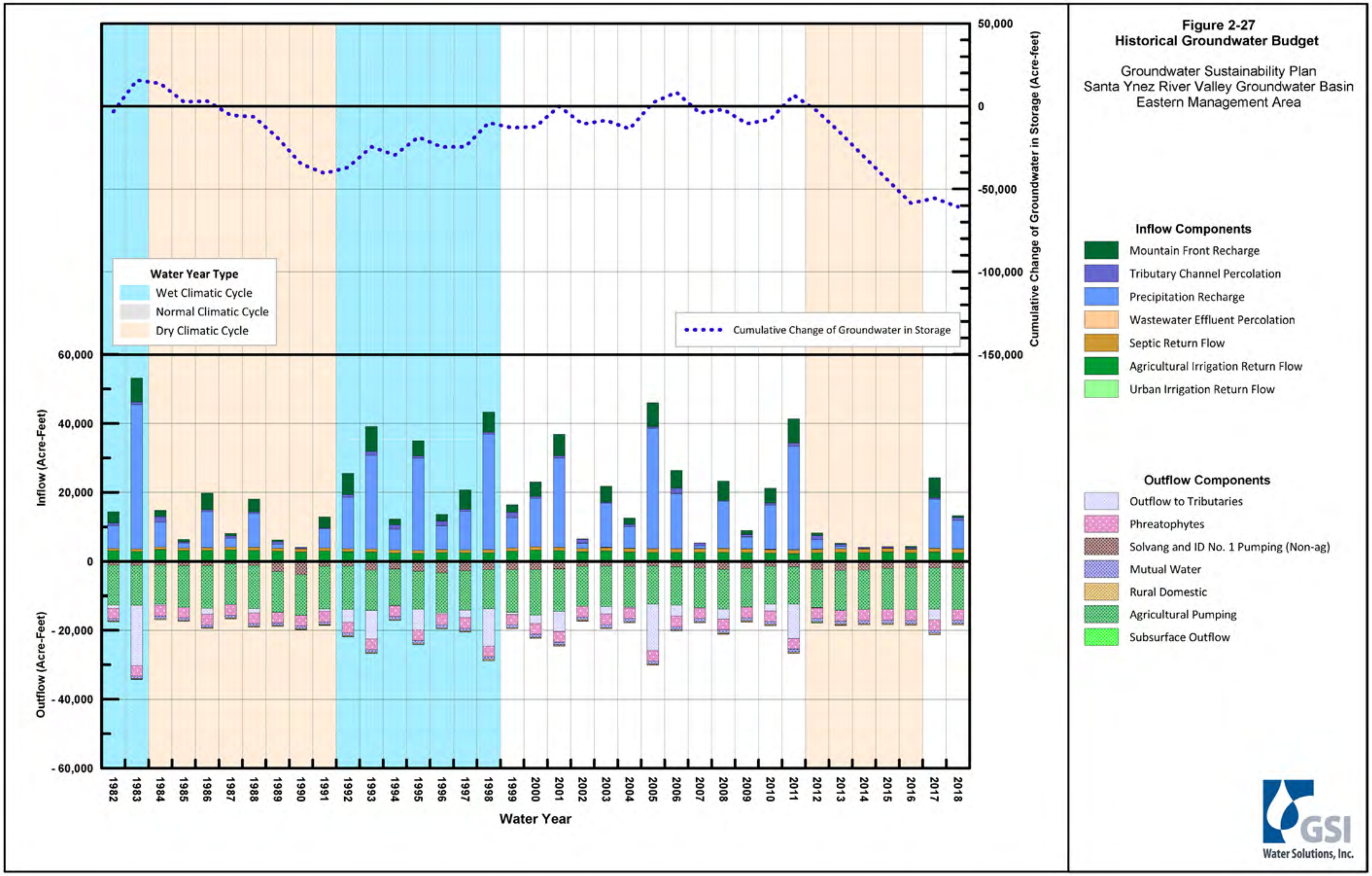

Figure 2-27. Historical Groundwater Budget (see Section 3.3 of GSP)

3.0 SIMULATION CODE

To meet the model objectives discussed in Section 1.2, the groundwater flow model code must meet the following criteria:

- Be able to simulate three-dimensional groundwater flow within the model domain
- Be well documented and verified against analytical solutions for specific flow scenarios
- Be accepted by regulatory agencies
- Be readily understandable and usable by others for simulation of future groundwater conditions
- Have a readily available technical support structure

SGMA regulations explicitly state that the GSP groundwater model must be developed using a public-domain code, which can include the DWR Integrated Water Flow Model or the USGS MODFLOW program. The groundwater flow model code MODFLOW-USG (Panday et al., 2014) is a version distinct from the well-known MODFLOW family of groundwater simulation codes. The MODFLOW-USG code was used to develop the EMA model.

MODFLOW is a modular, finite-difference computer code developed by the USGS to simulate three-dimensional groundwater flow (McDonald and Harbaugh, 1988). The use of the MODFLOW family of codes is well documented in technical literature and is a de facto standard for groundwater flow modeling worldwide.

Also considered for this project was MODFLOW-OWHM, a relatively new version of MODFLOW specifically developed to provide a flexible and robust approach to simulate conjunctive management of surface water and groundwater resources in an agricultural crop production setting (Boyce et al., 2016). OWHM was eliminated from consideration for this project due to the lack of an extensive surface water delivery network to supply the EMA's agricultural system, making the special capabilities of OWHM unnecessary for this case.

MODFLOW-UnStructured Grid (MF-USG) is a version of MODFLOW that implements several features that make it well suited for this study, including the following:

- Accommodating an unstructured grid allowing users to increase grid refinement, and model details in particular areas of interest

- The unstructured grid capability of MF-USG also accommodates simulating "pinch-outs" (thinning or tapering areas) in geologic formations within the model domain; this is particularly important for the Santa Ynez Valley EMA, where the principal aquifers within the EMA Basin all pinch out where the Basin abuts the San Rafael Mountains to the north and the Santa Ynez River Alluvium and Santa Ynez Mountains to the south.
- The Newton method for handling non-linearities in flow equations, which allows for a very efficient solution of the flow equation, including complexities such as unsaturated zone flow, which eliminates the cell draining and re-wetting problems of earlier versions of MODFLOW (Niswonger et al., 2011)
- Adaptive time stepping, which improves model convergence capabilities during period of steep changes in model stresses (e.g., a very wet month following a prolonged dry period)

3.1 Code Assumptions and Limitations

Certain model code assumptions and limitations must be considered when developing, applying, and interpreting a numerical model. Some key assumptions and limitations that may affect the site models are briefly discussed below.

Porous Media: The MODFLOW family of codes is limited to simulation of saturated and unsaturated flow in porous media. It does not simulate flow through discrete fractures, although the CLN (Connected Linear Network) module in MODFLOW-USG has been used to simulate karst (i.e., cave) networks in groundwater systems (Kresic and Panday, 2018).

Grid Size and Layer Lumping: Given the scale of the problem and the modeling objective to develop large-scale regional estimates of groundwater levels, as well as monthly and annual flows, each of the key geologic units are treated as single model layers in the profile view. In the plan view, model grid cells specified to be 4 acres in size within the EMA (417.42 ft on a side) and 16 acres in size for active parts of the model domain outside the EMA (for example, in the mountains that border the EMA). Grid cells of such size do not permit simulation of highly localized features, such as perched aquifers within upper portions of the Paso Robles Formation. To be able to explicitly simulate such features would require a model grid much more refined in both the plan and profiles views. For the objectives of this study, simulation of such details is unnecessary.

Stress Periods and Time Lumping: MODFLOW requires that temporally variable data be constant within each stress period. In MODFLOW modeling terminology, stresses refer to specified inflows (e.g., return flows) to and outflows (e.g., pumping) from the groundwater system. This results in some temporal averaging of data. For example, streamflow or municipal pumping may vary hourly or daily in response to demand, while an agricultural well field may pump nearly continuously for several months in a row. The averaging of transient stress into a consistent monthly stress period tends to smooth out the hydraulic impacts of the transient stresses.

3.2 Graphic Pre/Post-Processor

To facilitate the preparation and evaluation of each model simulation, GSI utilized the graphics pre/post processor GWVistas© Version 7 (GWV) by Environmental Simulations, Inc. (ESI, 2017). GWV is a Windows® program that utilizes a graphic user interface (GUI) to build and modify a database of model parameters. The model grid, hydraulic properties, and boundary conditions are input using the GUI, and then GWV creates the necessary MODFLOW data input files. The input files generated by GWV are generic (standard) files compatible with USGS MODFLOW-USG. GSI also utilized some in-house utilities, GIS tools, and Microsoft Excel® spreadsheets to generate standard MODFLOW data input files for selected simulations and for post-processing simulation results.

GWV was also utilized to post-process the model simulations. GWV can display the simulated head results as plan views and cross sections. In plan view, the contour intervals and labels specified by the user and dry cells are denoted by a different color. In cross section view, the water table surface is also plotted. Most outputs to the screen can be saved in several formats (e.g., DXF, WMF, PCX, SURFER) for utilization in other graphics programs.

4.0 MODEL DEVELOPMENT

The following sections describe the development of the numerical groundwater flow model for the SYEMAHM. The model construction was based on the HCM presented in Section 2.0, with each of the key features described in that section represented numerically in the SYEMAHM.

4.1 Model Domain / Grid

As described in Section 2.1, the SYEMAHM model domain is centered on the EMA and extends beyond the EMA several miles, to the limits of the surface water basins that contribute flows into the EMA. The model domain was extended beyond the EMA so that model boundary conditions are sufficiently far away from the area of interest in the EMA, and to eliminate the need to make assumptions on recharge from the mountainous areas that surround the EMA (termed Mountain Front Recharge) when defining model boundary conditions. The active model grid covers an area of approximately 271,950 acres, with the EMA located in the middle of the domain occupying slightly less than 100,000 acres. The model grid is oriented in alignment with the California State Plane Region 5 coordinate system of township / range / sections. The resulting SYEMAHM model grid consists of 112,917 active cells with uniform dimensions of 417.42 x 417.42 ft (4 acres) within the EMA area of interest and 834.84 x 834.84 ft in those portions of the domain outside the DWR-define EMA boundaries (**Figure 4-1**). The complete model grid consists of 135 rows, 188 columns, and 7 layers.

4.2 Model Layers

The purpose of model layers is to represent the hydraulic influence of stratigraphy at a scale appropriate to the model objectives (calculating regional groundwater levels and flows). One way to think of hydraulic influence is that it shows how finer-grained deposits present resistance to flow, both laterally and vertically. It is only through multiple model layers that the vertical resistance to flow can be simulated. It is understood that stratigraphic variations occur at scales that are both smaller and larger than that characterized for this model.

- The hydrostratigraphic variations that are of the same scale or larger than the numerical grid cell size—for example the scale of the Paso Robles Formation—are captured explicitly in model property variations.
- The hydrostratigraphic variations that are much smaller than the model cell size are not treated explicitly in the model, but rather their effect is incorporated into the model via appropriate assignment of large scale “effective” properties for the model cell.

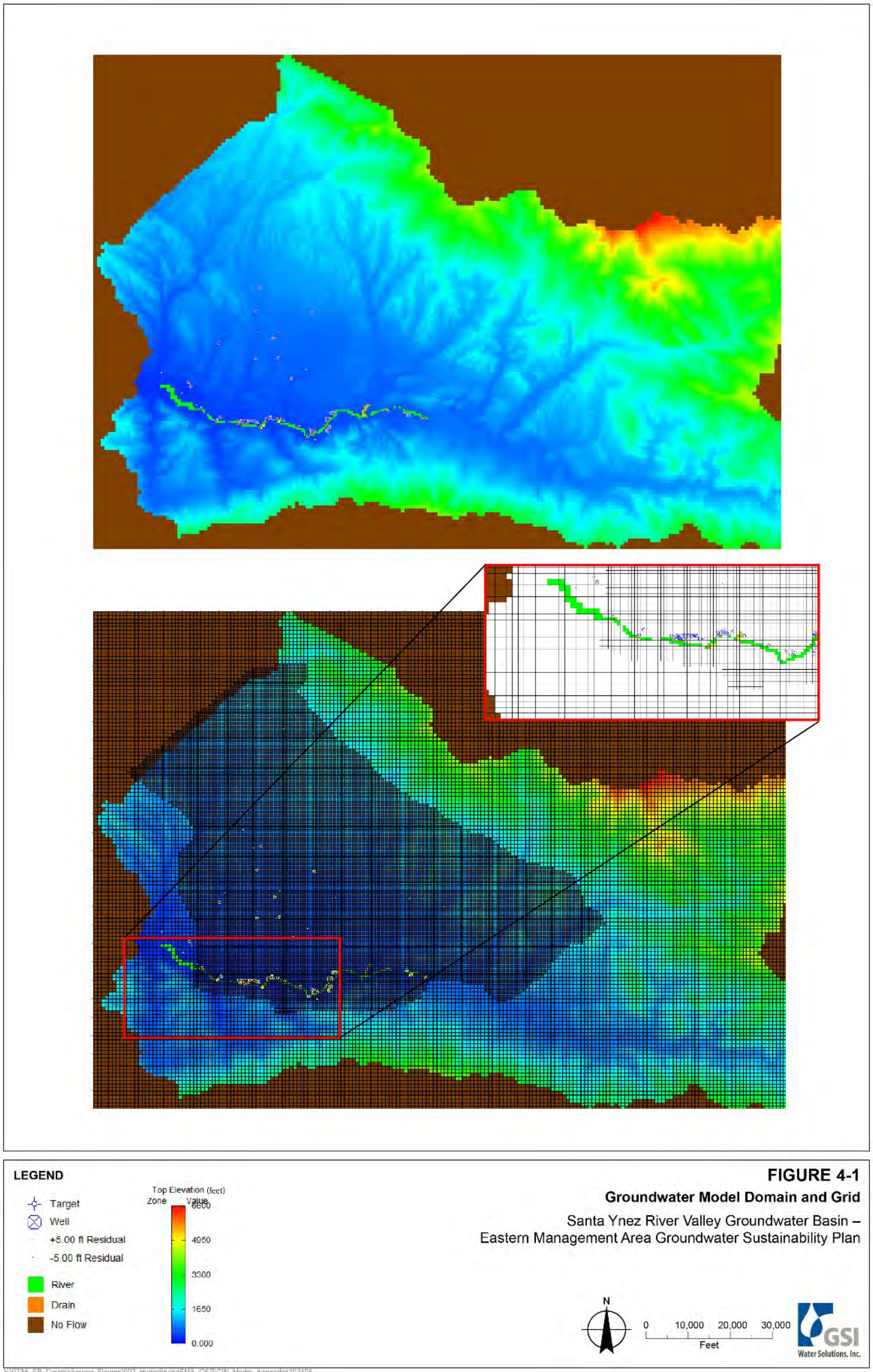

Figure 4-1. Groundwater Model Domain and Grid

- As an example, consider three 1-foot-thick clay layers that extend across a 50-foot-thick model cell that is otherwise made up of highly permeable sand. To capture the hydraulic effect of those thin clay layers in the 50-foot-thick cell requires calculating "effective" horizontal and vertical hydraulic conductivities, K_h and K_v, as a weighted average of the hydraulic conductivity of the clay and that of the coarser material. In this case, the widely recognized approach is to calculate the K_h as the layer-thickness weighted arithmetic average of the clay permeability and the sand permeability. For the K_v, one would employ the layer-thickness weighted harmonic average of the two; the harmonic average places much greater weight on the permeability of the finer-grained and clayey layers that create resistance to flow perpendicular to the layers.
- The ratio K_h / K_v is termed the hydraulic conductivity anisotropy ratio. For unconsolidated sedimentary deposits, that anisotropy ratio typically varies in the range between 4 to as high as 100 (horizontal conductivity is 4 to 100 times higher than the vertical conductivity for layered sedimentary units).
- For the EMA model, the authors are not attempting to simulate every coarse- and fine-grained layer, rather the approach is to take the large-scale effective property and simulate the vertical resistance to flow using this anisotropy concept.

The initial basis for the SYEMAHM model layering scheme was the defined principal aquifers and aquitards as discussed in Section 3.2 of the GSP and in Section 2.3 above. While a qualitative description of the hydrogeologic characteristics is provided in those references, the geometric configurations of the spatial extent and thicknesses of each of the units were developed from the Leapfrog® model described in the 3D geologic model report developed for this study (Appendix C of the GSP).

The Leapfrog model provided layer elevations and thicknesses through the EMA domain. One additional modification to the Leapfrog layering was made for the Paso Robles Formation. The Paso Robles Formation is more than 1,000 ft thick over most of the EMA area, and greater than 2,000 ft thick over approximately half the area. In addition, the Paso Robles Formation is the primary water source for more than 70 percent of the wells in the study area. Thus, for the SYEMAHM, that layer from the Leapfrog model was divided in two: 50 percent of the thickness into an Upper Paso Robles unit and 50 percent to a Lower Paso Robles unit. This change allows for simulation of water production wells to be completed in one or the other portion, or both the Upper and Lower units. This will also accommodate simulation of well deepening of old wells within the Paso Robles. Well deepening is a common practice in the EMA when the pumping rate declines in a previously productive well. The resulting model cross sections showing the model layering scheme are presented **Figures 4-2** and **4-3**; these cross sections can be compared with the Leapfrog model hydrogeologic sections presented previously as **Figures 2-3** and **2-4**.

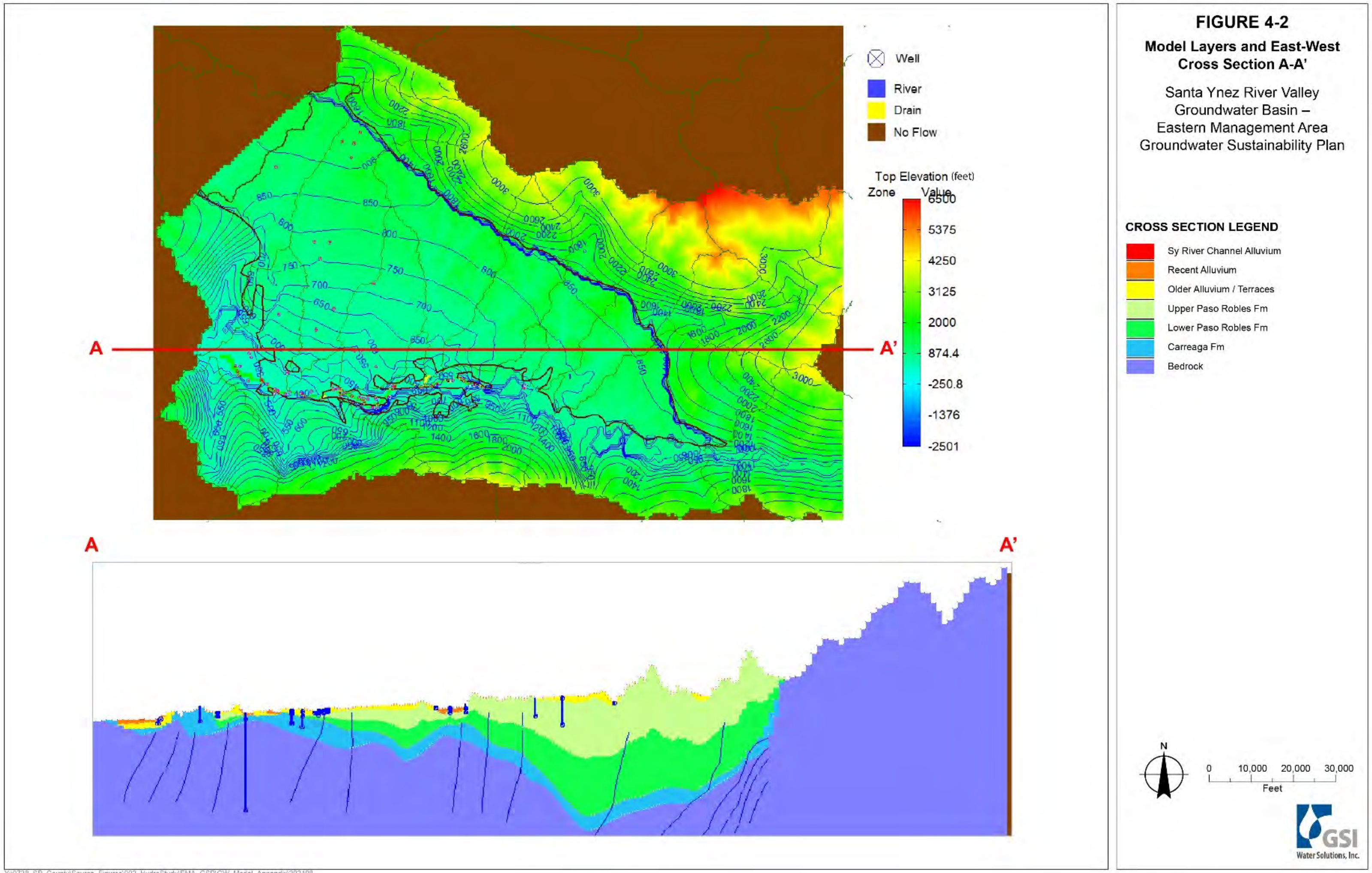

Figure 4-2. Model Layers and East-West Cross Section A-A'

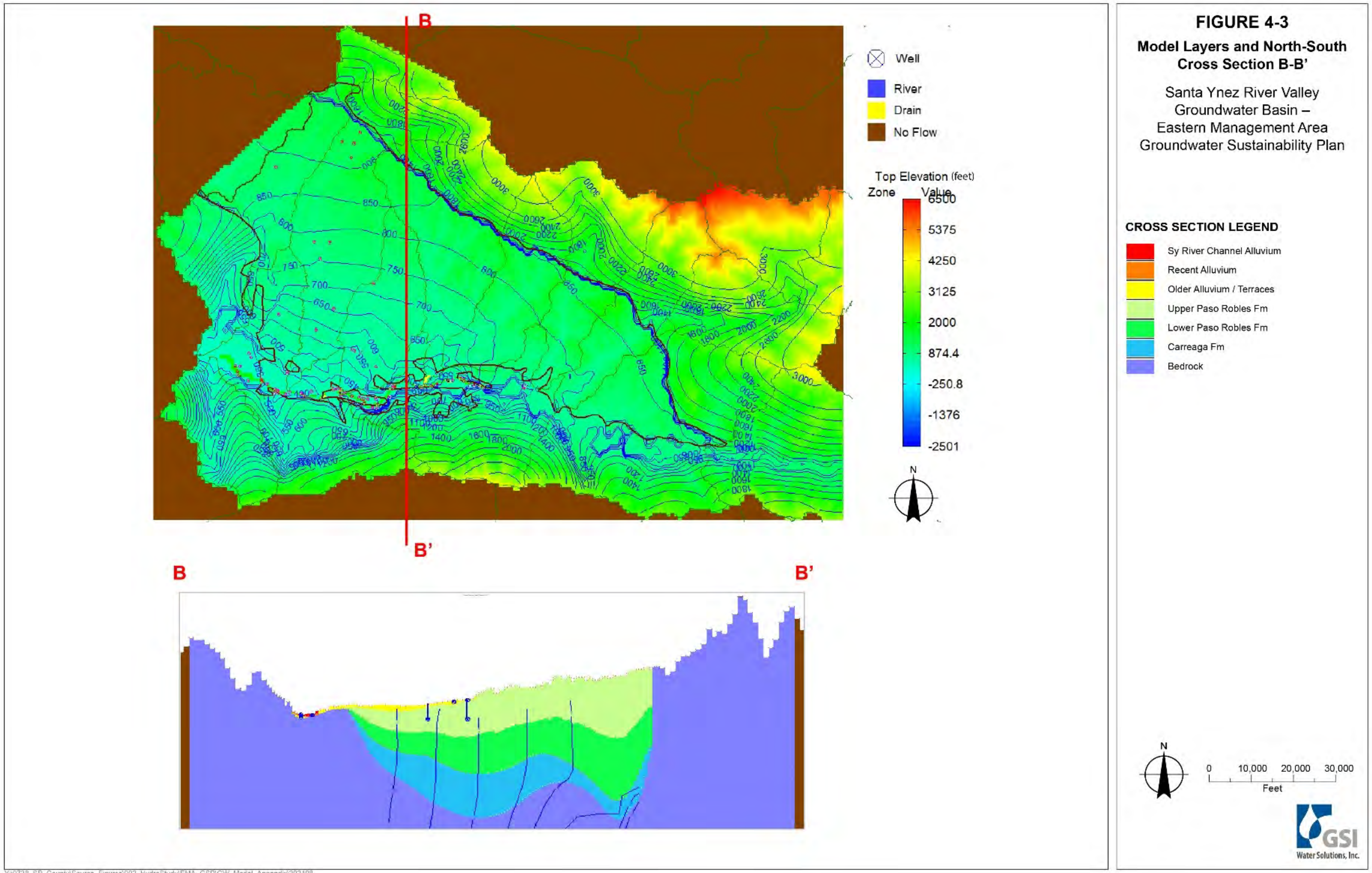

Figure 4-3. Model Layers and North-South Cross Section B-B'

4.3 Model Duration and Stress Periods

As illustrated in **Table 4-1**, the SYEMAHM presented in Section 3.3 of the GSP was developed based on historical hydrologic data for the period from water years 1981 through 2018, and the calibrated model subsequently was used to evaluate future scenarios for a 50-year period, as required by SGMA. The historical SYEMAHM simulates the period from 1981 through 2018 using 456 monthly stress periods. To develop an initial water level condition for the model simulation to begin in water year 1981, a steady-state model was developed that employed as the WYs 1981 through 1995 average values for the following:

- Groundwater recharge
- Santa Ynez River stage
- Tributary streambed percolation recharge
- Groundwater pumping

Using the steady-state groundwater levels[5] as a starting condition, the WYs 1981 through 1995 period was employed for the model calibration period. Once calibration was achieved with the WY 1981 through 1995 period, the model was run for the WYs 1996 through 2018 to verify that the calibration was adequate and bring the model up to date with current hydraulic conditions, as required under SGMA. Combining those two models provides the 38-year historical period model, simulating the period from WYs 1981 through 2018.

As noted, subsequently the model was applied as a future forecasting tool to evaluate future conditions. To understand how future management actions would affect sustainability of the EMA groundwater resources, first a future Baseline model was developed. The Baseline model basically assumes that water management will proceed unchanged into the future while water demands grow in the future based on demographic and agricultural water use projections. After the Baseline model is established, the impact of future management actions is then evaluated by rerunning the Baseline forecast model, but this time with new management actions imposed. An example management action that could be simulated with the model would be a project to capture and recharge tributary flood waters.

[5] The steady-state initial heads were developed by running the model using average stresses (e.g., average recharge, average pumping) for a long period (20 years or more)

Table 4-1. Simulations Periods for the SYEMAHM

Historical Model (WY1981 - WY2018)		Forecast Model (WY2022 - WY2072)
Calibration Period (WY1981 - WY 1995)	Verification Period (WY1996 - WY2018)	1. Baseline: Without Management Actions 2. With Management Actions Alternatives

4.4 Model Hydraulic Parameters

The initial hydraulic properties assigned to the SYEMAHM were based on the average values for each hydrogeologic unit as presented in **Table 2-1** and **Figure 2-5**. Those initial average values were adjusted during model calibration to improve the fit between model predictions and available groundwater monitoring data. The property value adjustments were constrained to lie within the ranges in **Table 2-1** and **Figure 2-5**. The final hydraulic properties (i.e., hydraulic conductivity, K_h and K_v, unconfined storage, S_y, and confined storage S_c; see Section 2.3.1) obtained as a result of the calibration process are summarized in **Section 5, Model Calibration**.

4.5 Model Boundary Conditions

Significant hydraulic boundaries (sources and sinks) within the model domain that must be considered in the EMA numerical model include the inflows and outflows from surrounding subbasins, inflows and outflows of surface water, return flows from irrigated agriculture and OWTS, natural groundwater recharge, and groundwater pumping. These boundaries are discussed in the following subsections.

4.5.1 Deep Percolation / Areal Groundwater Recharge

One of the most important inflows to the groundwater system occurs due to deep percolation of precipitation. When precipitation falls on the ground surface, part of that water will infiltrate into the soils and part will run off the surface when the near-surface soils become saturated and/or when the rainfall intensity exceeds the soil's infiltration capacity. Infiltrated water within the plant root zone can subsequently be removed from the soil profile by plant uptake and ET as described above. Once the infiltrated water percolates to depths beyond the rooting zone, it will become groundwater recharge, eventually accreting to the uppermost groundwater table it encounters.

As noted above in Section 2.4.1, the precipitation, groundwater recharge, ET, and runoff from the BCM (Flint et al., 2013) were employed to help develop inputs and boundary conditions for the SYEMAHM. The BCM utilizes the PRISM climate data together with elevation and soil mapping data to develop a hydrologic water balance on a grid of 270 x 270 m (approximately 16-acre) land parcels covering the entire state of California for the period from 1951 to 2019. For the SYEMAHM, the monthly BCM precipitation data were compared to monthly total precipitation for all weather stations located across a region slightly larger than the EMA. The overall annual values and long-term values were quite close, with the BCM annual total exhibiting an approximate 2 percent overestimation bias. The monthly values at the individual station locations, however, could exhibit larger errors. The authors employed a simple conditional simulation approach to correct for the monthly errors. For each weather station i located at (x_i, y_i) for each monthly time t, the authors define the monthly precipitation error P_{error} for that station as the following:

$$P_{error}(x_i, y_i, t) = P_{BCM}(x_i, y_i, t) - P_{station,i}(t) \quad (4.1)$$

Then, for each time step, the precipitation error point values $P_{error,i}(t)$ are gridded over the entire model domain to the SYEMAHM cells to yield a continuous field of $P_{error}(x,y,t)$. That continuous precipitation error field is then subtracted from the original BCM data, finally yielding a continuous precipitation field adjusted to exactly match all weather station data each month, $P_{corr}(x,y,t)$. **Figure 4-4** illustrates how this procedure is applied to the model domain around the EMA for the month of January 1981. The top image shows the raw BCM precipitation data for the model domain. The middle image shows the gridded precipitation error for that month, where one can see that both the Solvang and San Marcos Pass precipitation gages recorded considerably more precipitation than the raw BCM data at those locations. The bottom image shows the "corrected" BCM precipitation, and again one can see the corrected precipitation field with somewhat higher precipitation at the locations of the two stations with large errors for that month.

Note that the BCM precipitation was not used directly in the model, rather the BCM recharge was utilized, and the raw BCM areal recharge was adjusted by scaling it by the precipitation ratio:

$$RCH_{adjusted}(x, y, t) = RCH_{BCM}(x, y, t) * \frac{P_{corr}(x,y,t)}{P_{BCM}(x,y,t)} \quad (4.2)$$

Figure 4-5 illustrates how the recharge can significantly vary over space and time, showing the adjusted BCM rechange for the months of January, February, and March 1981 for the large model domain including the EMA.

Figure 4-6 illustrates how the runoff can significantly vary over space and time in relation to precipitation and recharge.

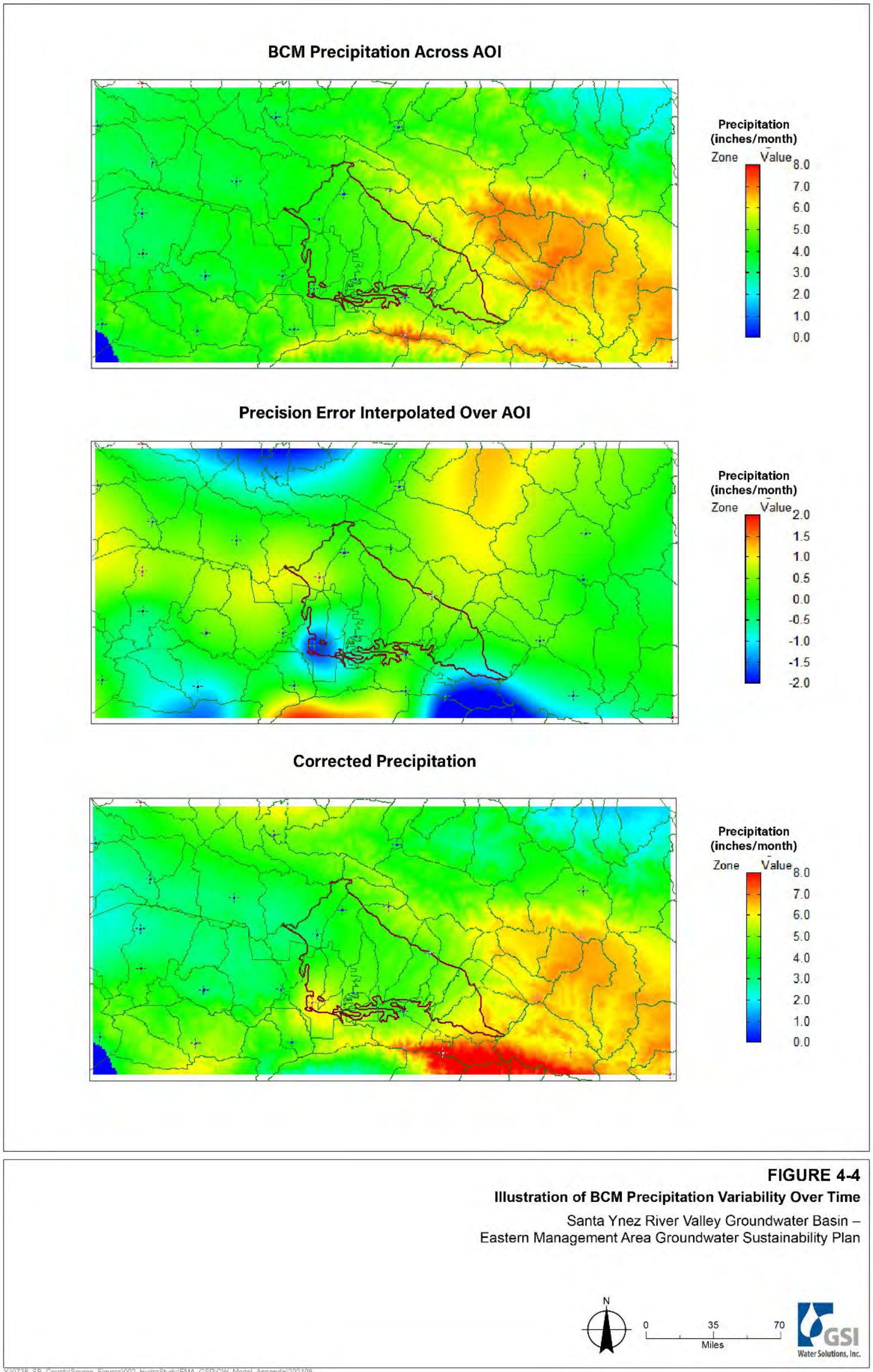

Figure 4-4. Illustration of Precipitation Variability over Time

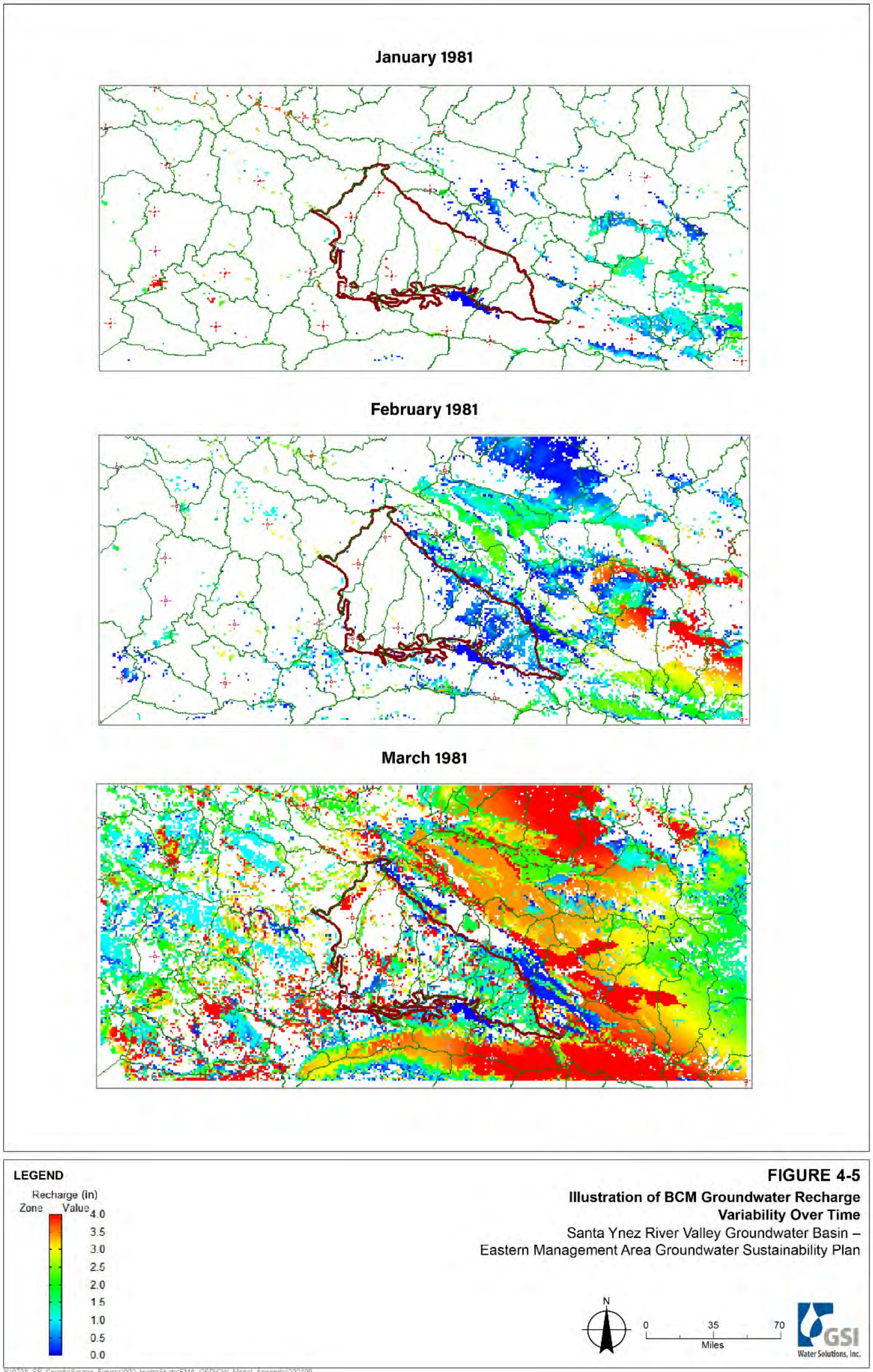

Figure 4-5. Illustration of BCM Groundwater Recharge Variability over Time

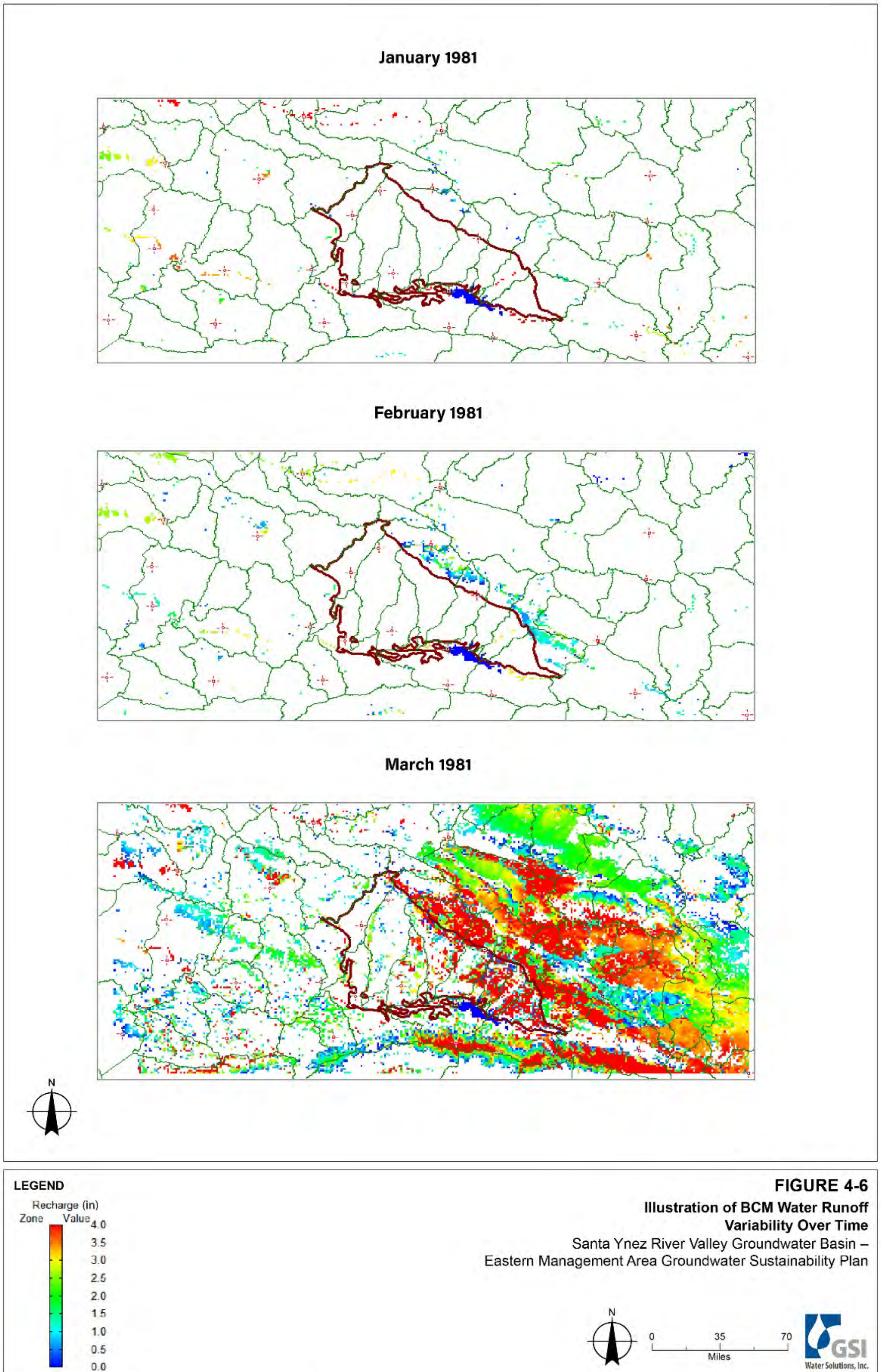

Figure 4-6. Illustration of BCM Water Runoff Variability Over Time

4.5.2 Localized Boundary Conditions

The Santa Ynez River, the major tributaries to the Santa Ynez River (e.g., Alamo Pintado Creek), general head boundaries, faults, well pumping, and return flows are boundary conditions that are applied at discreet locations across the Basin. **Figure 4-7** shows where river, tributaries, faults, and general head boundaries are located; their application is described in the following subsections.

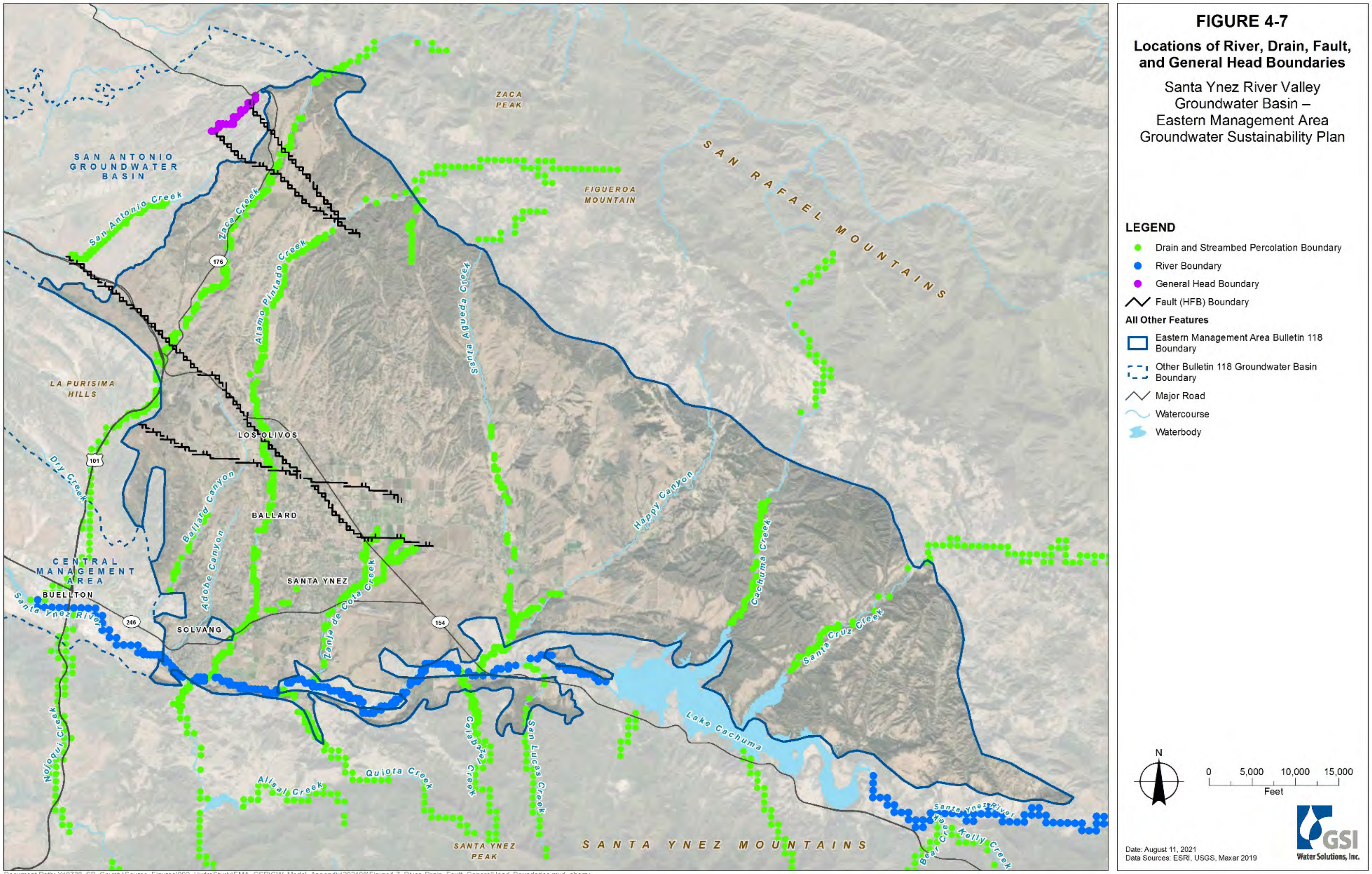

Figure 4-7. Locations of River, Drain, Fault, and General Head Boundaries

4.5.2.1 River Boundaries

The MODFLOW River (RIV) package was utilized to simulate the Santa Ynez River within the model domain. The streams were developed as a series of RIV reaches, where each stream reach is composed on many model cells. The RIV package is a head dependent boundary and will allow water to enter groundwater via seepage (losing stream) or exit groundwater (gaining stream) based on river stage (head) and a streambed conductance term:

River Conductance = KLW/M in ft^2/d, where:

K is the hydraulic conductivity of the streambed sediments (estimated to range between 20 to 50 ft/d),

L is the length of the river reach within the model cell (variable polyline length in ft, calculated by GIS),

W is the river width (estimated to vary between 30 and 60 ft), and

M is the thickness of the riverbed materials (assumed to be 1 ft).

The river streambed elevation was estimated using the high-resolution digital elevation model (DEM) data within the model domain, with adjustments applied to ensure that the elevation of the streambed monotonically decreases in the downstream flow direction. The river stage (water surface elevation) was based on Cachuma Reservoir releases and gaged flows at the Solvang gage.

4.5.2.2 Tributary Channels

The tributary channels were simulated to percolate recharge into the streambed during periods of significant runoff, while simultaneously allowing groundwater discharge to the stream channel when groundwater levels rise above the streambed elevation. The annual streambed percolation quantities presented in Section 2.4.2.1 were applied in the streambed cells using shallow injection wells during the months when surface flows were occurring. Groundwater baseflow discharge into the tributary channels was simulated using the MODFLOW Drain (DRN) package. The DRN package is a head-dependent boundary condition that only simulates discharge to the DRN channel whenever the groundwater rises above the streambed elevation. Similar to the RIV package, the rate of baseflow discharge to the streambed is governed by a conductance term:

Drain Conductance = KLW/M in ft^2/d, where:

K is the hydraulic conductivity of the sediments (assumed to be 10 ft/d),

L is the length of the tributary channel within the model cells (variable polyline length, calculated by GIS),

W is the width of the drain (estimated to range between 5 and 20 ft), and

M is the thickness of the channel bed (assumed to be 1 foot).

Baseflow discharging to the stream (collected by the drains) is explicitly tracked and accounted for in the model water budget.

4.5.4 Groundwater Extraction

Groundwater extraction wells pumped to supply municipal, industrial, and agricultural demand were simulated using the MODFLOW-USG CLN (Connected Linear Network) package. Similar to the MODFLOW MNW (Multi Node Well) package, the CLN package is a powerful enhancement to the original MODFLOW well package in that it allows for simulation of wells screened across multiple model layers (aquifers). Thus, the CLN package will calculate inflows from each model layer within the screened interval as well as the calculating flow within the well casing, including flows from one layer to another when the well is not being pumped. In addition, the CLN package will automatically pump from deeper intervals as shallower aquifers become dewatered until the pumping level in the well approaches a specified elevation (such as a pump elevation setting).

As discussed in Sections 2.5.2, in some cases, actual pumping values were provided by well, and in other cases, well pumping was estimated based on cropped acreage and crop water use factors provided by SYRWCD.

4.5.4.1 Specified Pumping Wells

For SYRWCD ID No. 1, the MWCs outside SYRWCD boundaries, City of Solvang, and for some of the water users that self-report to SYRWCD, annual pumping quantities are provided. Even more detail is provided for ID No. 1, which has reported pumped volumes by well on a monthly basis since 2008. The SYEMAHM uses those reported values and well locations directly for model input. The locations of the wells are presented on **Figure 4-8**.

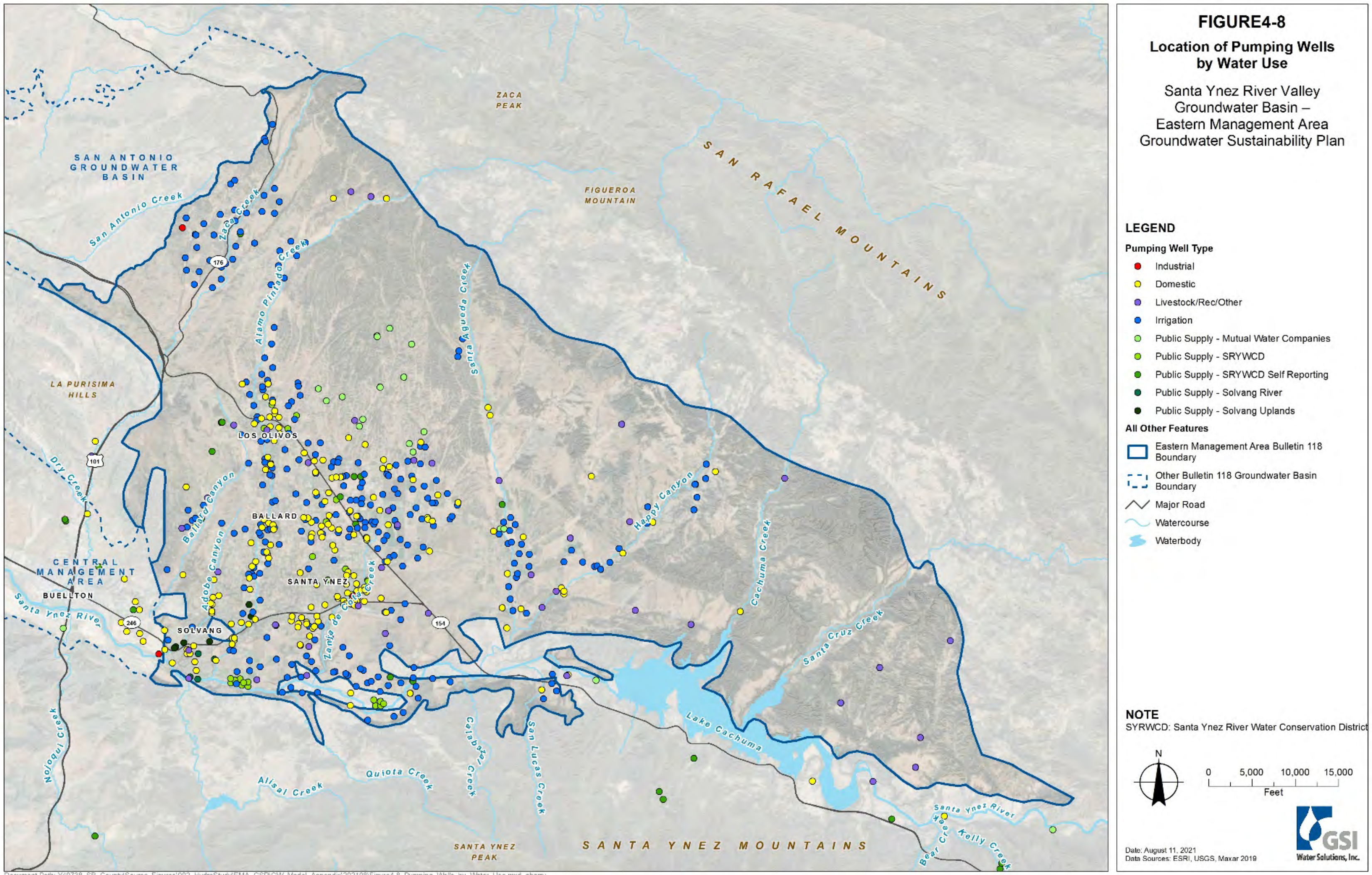

Figure 4-8. Location of Pumping Wells by Water Use

4.5.4.2 Agricultural Irrigation Wells – Annual Quantities

As discussed in Section 2.5.2, agricultural pumping data are typically not recorded throughout most of the EMA. As such, agricultural pumping volumes had to be estimated based on available cropped acreage data and the SYRWCD crop water use factors. A two-step procedure was employed to distribute the total volume of water pumped for agricultural irrigation to individual wells across the study area.

1. The USGS's National Water Information System (NWIS) database was queried to obtain all available data for the EMA area of interest. That database includes a field that defines the well use. All the wells identified as "Irrigation" in the well use field were plotted atop the land use maps (**Figures 2-19** through **2-22**). All of those NWIS "irrigation" wells located within the cropped areas were assigned to be irrigation wells in the model, and all of those wells outside the cropped areas were eliminated from consideration as important irrigation supply sources for the principal cropped areas. After applying these selection filters, this resulted in only 69 irrigation wells from the NWIS database located within nearly 12,000 cropped acres.

2. Assuming that the average irrigation well is actively pumping 9 months per year and dividing the volume of water pumped annually by the number of wells (69) yields an average pumping rate per well of nearly 4,000 gpm. This is significantly higher than the 700 to 800 gpm pumping capacity typical for a highly productive well completed in the Paso Robles Formation.

3. Recognizing that many more than 69 irrigation wells exist in the EMA,[6] the authors estimated the total number of additional irrigation wells that should be added to the model and distributed across the cropped areas. Making the same assumption that the average irrigation well is actively pumping 9 months per year, the total number of wells needed to irrigate the total cropped area is estimated by dividing the volume of water pumped annually by an average pumping rate per well of 800 gpm. This calculation yielded a total number of 294 irrigation wells.

4. With no location data available for the 225 additional hypothetical wells (294 irrigation wells – 69 wells from the NWIS database), a GIS point-area-fill tool was utilized to distribute these hypothetical wells approximately uniformly across the cropped areas that are devoid of the 69 NWIS irrigation wells. Because only a limited number of years of reliable data exist, the authors used the 1985 land use survey data for 1981 through 1996 and the 2016 land use for 1997 through 2018.

6. number of wells located within the irrigated areas that are identified as Irrigation sources in the NWIS database

4.5.4.1 Agricultural Irrigation Wells – Monthly Pumping

The preceding subsection describes how the annual irrigation pumping demands were distributed spatially to irrigation wells located across the cropped areas within the EMA. To better capture the seasonal variability and peak pumping demands, the annual pumping rates were downscaled in time based the monthly crop water demand pattern. The monthly demand pattern was developed based on the monthly BCM ET and Precipitation values, and applying the Consumptive Irrigation Demand (CIR) calculations presented in **Figure 2-23**, which is calculated as the crop ET demand minus the effective precipitation, which can be applied on a monthly basis for month *I*; thus the monthly CIR_i:

$$CIR_i = ETc_i - Peff_i \qquad (4.3)$$

In this case, the authors already have the annual pumping demand value provided by the SYRWCD water use factors but can use the monthly CIR_i pattern to distribute those annual values by month. This is accomplished by determining the fraction of total annual CIR that occurs in each month for each water year:

$$\%CIR_{i,WY} = \frac{CIR_{i,WY}}{CIR_{total,WY}} \qquad (4.4)$$

This fraction is then multiplied by the annual irrigation pumping for water year to obtain the monthly pumping for month i. **Figure 4-9** shows the monthly irrigation pumping pattern over the 38-year historical period simulated.

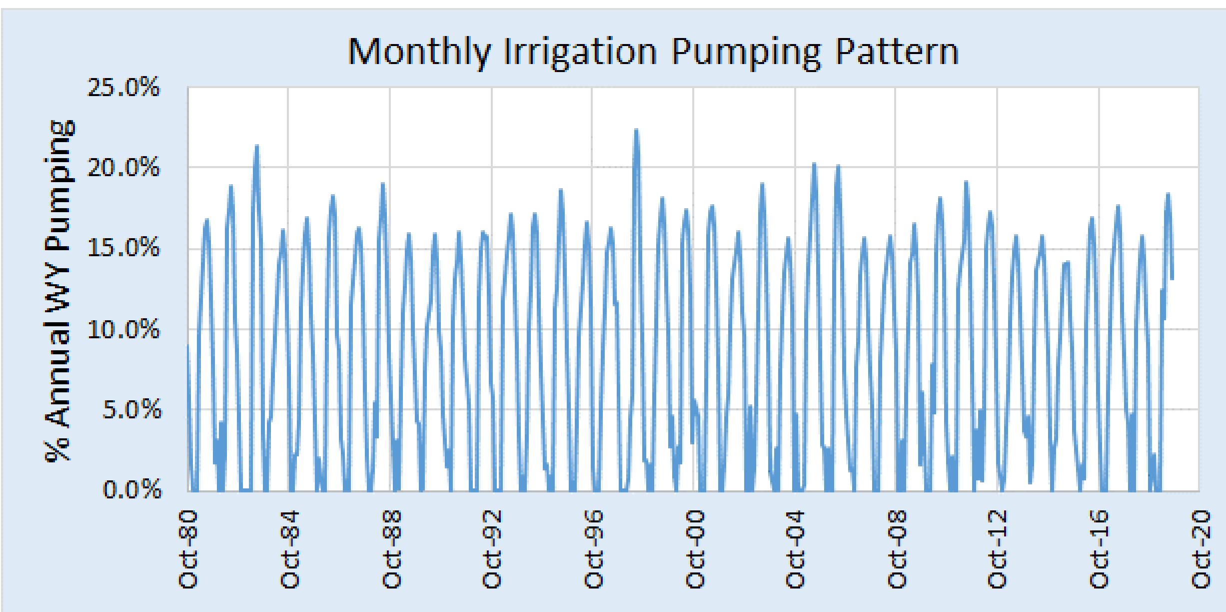

Figure 4-9. Monthly Irrigation Pumping Pattern Developed from BCM ET and Precipitation Data

4.5.5 General Head Boundaries

The MODFLOW General Head Boundary (GHB) package was utilized to simulate the far northwest boundary of the EMA domain. For the SYEMAHM, these GHBs were developed based on historical water level observations in wells located in the upper San Antonio Creek basin that are less than 1/2 mile from the EMA boundary. The GHB heads at the ends of each reach were interpolated on a monthly basis from the available hydrograph data.

The GHB conductance term, which governs how much water can flow through the GHB, was calculated as the following:

GHB Conductance = KLW/M in square feet per day (ft^2/d), where:

- K is the hydraulic conductivity of the sediments (assumed to be 25 ft/d),
- L is the GHB length or distance to the head value (assumed to be 1,320 feet),
- W is the GHB width (assumed to be 1,320 feet), and
- M is the saturated thickness of GHB layer (varied based on saturated thickness or permeable sediments).

5.0 MODEL CALIBRATION

Calibration of a groundwater flow model is a process through which the model is demonstrated to be capable of simulating the field-measured heads and flows. For the EMA, field-measured heads and flows consist primarily of levels in observation wells; in model calibration such observations are often referred to as Calibration Targets. Flow targets included in the model were baseflows to the EMA tributaries for the months without precipitation.

Calibration is accomplished by determining a reasonable set of model parameters, boundary conditions, and stresses that produce simulated heads and fluxes that match field measurements within a pre-established range of error.

- Model parameters include all the hydrogeologic properties presented in Section 2.4 (e.g., permeability and storage properties for each unit, as well as their spatial extent and thicknesses)
- Boundary conditions include the no-flow boundaries around the model perimeter, the recharge distributed over the land surface, and the Santa Ynez River and tributary channel drain and percolation conditions
- The stresses include the groundwater pumping and return flows associated with human uses of water in the Basin

Because of the multiplicity of parameters involved in the calibration process, a unique solution (e.g., one unique set of parameters) cannot be achieved. In fact, there may be a few combinations of parameters and boundary conditions that can fit the target data equally well. Thus, expert judgement and consistency with the hydrogeologic conceptual model must be employed as additional criteria to help narrow the solution to one that demonstrably and robustly represents the system being modeled. A brief discussion of the calibration of the groundwater flow model for the EMA is presented in the following subsections.

5.1 Model Calibration Criteria

The quantitative fit of the model to observed water level measurements is conducted through statistical analysis of the residuals, meaning the difference between observed and simulated water levels (or heads) at specified observation locations. In the case of transient calibration, simulated and observed water levels are compared over time. The residual for Well *X* for time *t* is calculated as the observed head value H_{obs} minus the simulated value H_{model}:

$$H_{residual} = H_{obs} - H_{model}$$

thus, a positive residual indicates that the simulated head value is less than the observed value, and vice versa. The principal statistical measures of the residuals of all data points combined include the following:

- the mean of the residuals
- the mean of the absolute value of the residuals
- the standard deviation of the residuals
- the sum of the square of the residuals (SSR)
- the root mean square (RMS) error of the residuals
- the min and max of the residuals
- the range of the observed values
- normalized root mean square error (NRMS) between the model and data for N observations is computed:

$$\mathrm{NRMS} = \frac{\sqrt{\dfrac{\sum(H_{obs} - H_{model})^2}{N}}}{\left(H_{obs,max} - H_{obs,min}\right)}$$

- in the language of statistics, the NRMS is the residual standard deviation divided by the range in observed values

There is no industry standard for determining when a numerical model is adequately calibrated. However, a commonly used criterion for acceptable calibration is a normalized RMS error, or NRMS, of less than 10 percent (Anderson et al., 2015). In addition, a plot of observed compared with computed head values should track close to a 45-degree line and generally fall within one standard deviation of the mean error.

A common qualitative (visual) measure of goodness of fit in numerical modeling is a comparison of the observed and simulated values using hydrographs for individual wells. In addition, a map view plot of the average residuals may be used to help identify targets or areas where the residual values are largest. Clusters or patterns of gradation of positive or negative residuals may suggest areas where model parameters need to be adjusted further.

5.2 Water Year 1981-2018 Transient Model Calibration

The transient SYEMAHM simulated the historical period from October 1980 through September 2018. A two-step model calibration process was employed:

1. First, a preliminary manual calibration step was employed. Initially the model was set up and run with the average hydraulic properties for each hydrogeologic unit (see Table 2-1). A comparison of observed versus modeled heads for this initial model yielded an NRMS greater than 20 percent, well above the 10 percent that is considered an upper limit for this measure of model calibration. A notable error was the inability of the model to simulate the high groundwater levels observed in the upland areas of the EMA. This indicates that the permeability of the Paso Robles Formation over large areas of the uplands is lower than the average value presented in Table 2-1. Based on this and other observations of poor model fit, lower permeability zones were developed for the Paso Robles Formation extending across the upland area. In addition to this change, the Baseline Fault and other mapped faults in the Basin were simulated as low-permeability barriers using the MODFLOW HFB (Horizontal Flow Barrier) module. With these changes, model fit greatly improved, with higher water levels simulated across the uplands and the NRMS dropping below 8 percent.

2. After the preliminary manual calibration, the Parameter Estimation code (PEST), was applied to refine the manual calibration. PEST employs a least-squared fit method to zero in on an optimal solution (Doherty, 2010), running the model dozens of times, evaluating the fit, automatically adjusting the parameters, and repeating the process iteratively until the fit can no longer be improved. After application of PEST to the SYEMAHM, model fit improved again, with the final calibrated-model NRMS less than 3 percent.

Relevant results for the calibrated model are presented in **Figures 5-1** through **5-5** and **Tables 5-1** and **5-2.**

- **Figure 5-1** presents a scatterplot of the simulated compared with observed values. The simulated values plot closely to the 1:1 line. **Table 5-1** presents the final values for the model calibration-fitting measures obtained through the model calibration process.

- **Figure 5.2** shows the final permeability distribution for the upper half of the Paso Robles Formation, clearly illustrating the large area of low hydraulic conductivity across the Santa Ynez Uplands needed to calibrate the high heads measured in the observation wells in that region. The hydraulic conductivity over this zone is in the lower 20 percent of reported values for the Paso Robles Formation (Section 2.3), suggesting a relatively higher fraction of low-permeability material than average plus a high degree of compartmentalization of those sediments due to heterogeneity and faulting and folding. **Table 5-2** presents the final values for the model hydraulic parameters (permeability and storage) obtained through the model calibration process.

- **Figure 5-3a** shows the simulated heads in the Paso Robles Formation for the final calibrated value and **Figure 5-3b** shows the simulated heads in the Careaga Sand for the final calibrated value.

- **Figures 5-4** and **5-5** presents hydrographs of modeled compared with observed water levels for individual observation wells across the Basin.

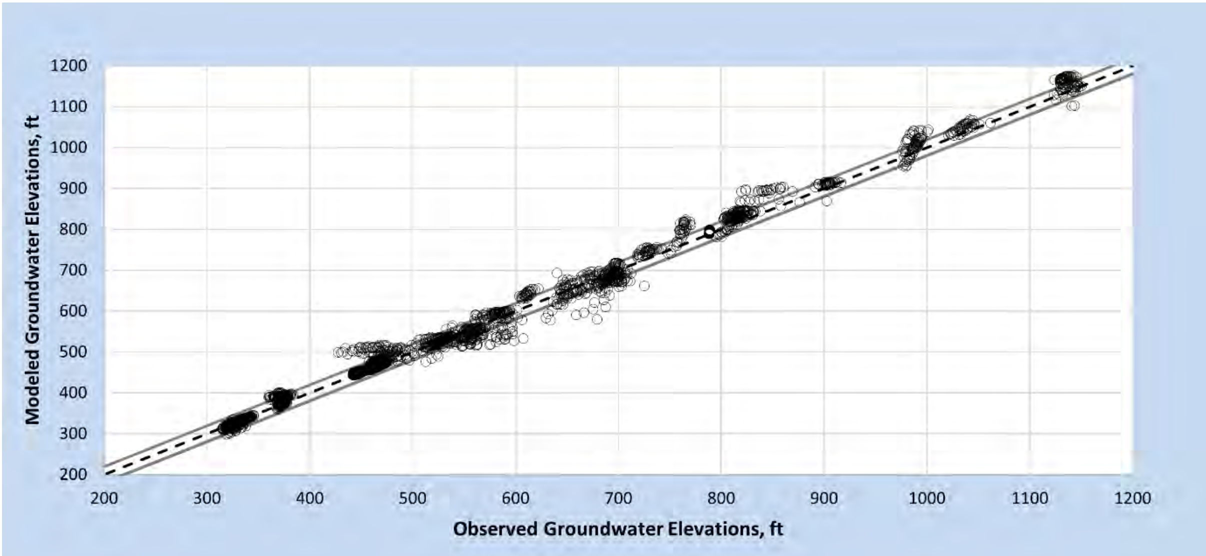

Figure 5-1. Scatterplot of Modeled Compared with Observed Groundwater Elevations for 50 Wells across the EMA

Table 5-1. Key Model Calibration Measures from Final PEST Calibration

All Wells	
Mean Residual	4.33
St Dev Residual	13.4
Data Range	944
Normalized RMS	1.4%
Min Observed	298.3
Max Observed	1242.2
Data Count	4656

Table 5-2. Calibrated Hydraulic Property Values for Hydrogeologic Units in SYEMAHM

PEST5b Fitted Values	Hydraulic Conductivity (ft/d)		Storativity	
Model Unit	Kh (horizontal)	Kv (vertical)	Ss	Sy
SY River Alluvium	600	150	$1.0x10^{-5}$	0.24
Tributary Alluvium	150	75	$1.0x10^{-5}$	0.2
Older Alluvium, Terraces	9.9 - 11.2	9.0 - 10.0	$1.0x10^{-5}$	0.08
Upper Paso Robles	0.11 - 8.9	0.1 - 4.5	$1.05x10^{-5}$	0.06 - 0.1248
Lower Paso Robles	0.11 - 3.50	0.1 - 1.75	$1.08x10^{-5}$	0.0314 - 0.06
Careaga Sands	0.65 - 2.0	0.3 - 1.0	$5.37x10^{-6}$	0.1
Bedrock	0.01 - 0.05	0.01 - 0.05	$1.36x10^{-5}$	0.001 - 0.005

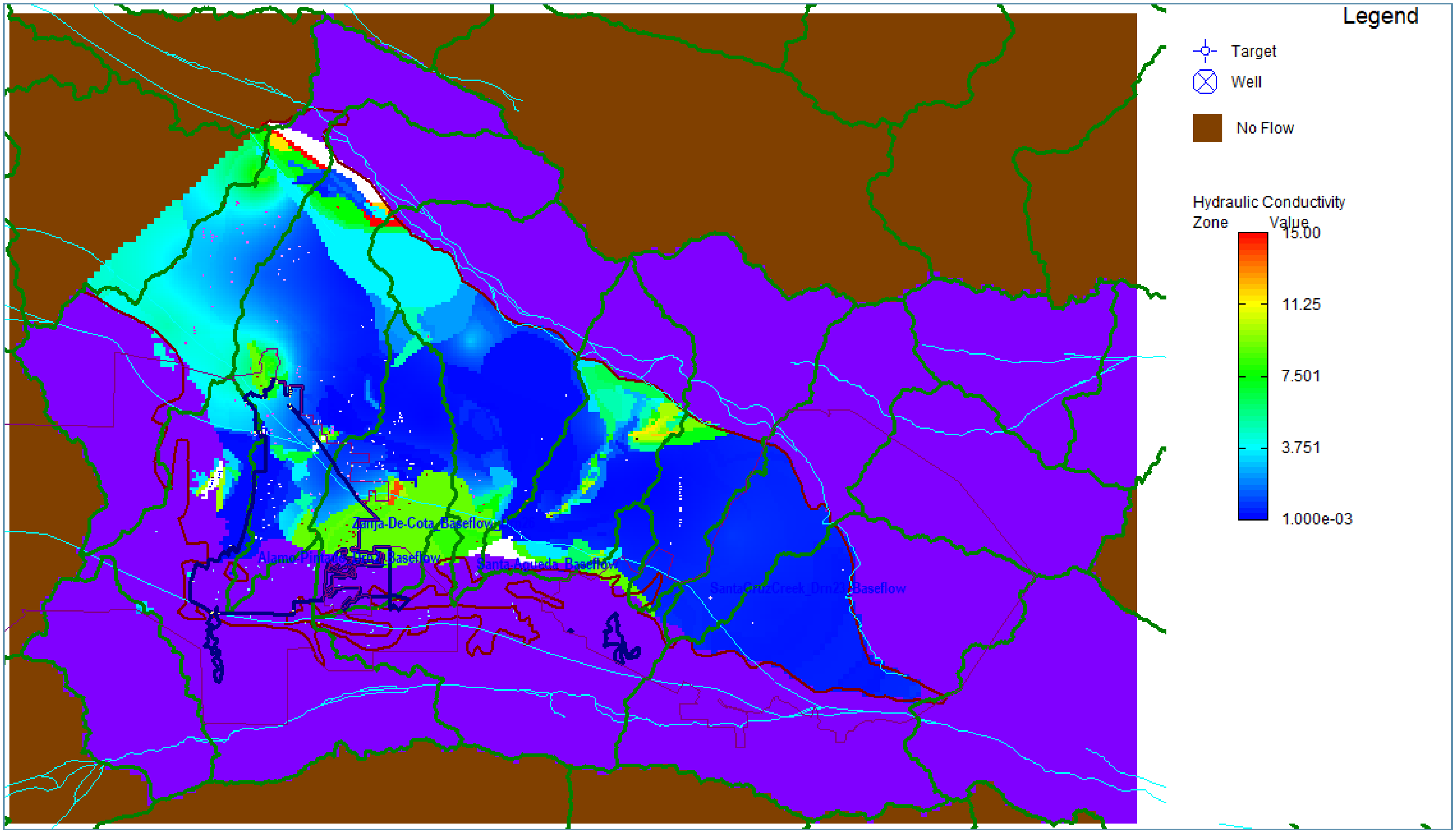

Figure 5-2. Calibrated Hydraulic Conductivity (ft/day) Distribution for Upper Half of Paso Robles Formation

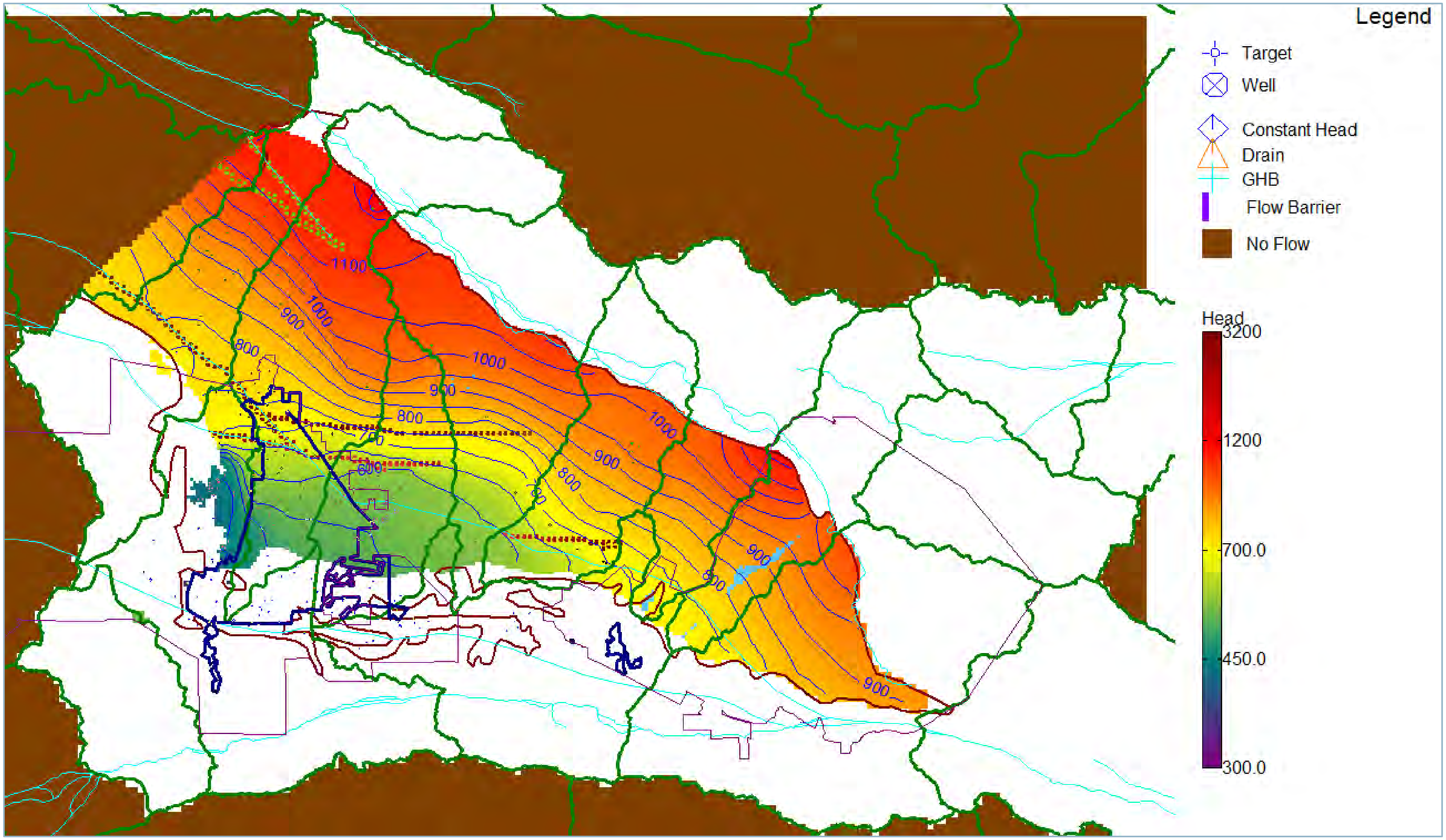

Figure 5-3a. Final Paso Robles Formation Simulated Groundwater Levels in September 2018 for Calibrated SYEMAHM

Note: White area represents layer pinch out zones

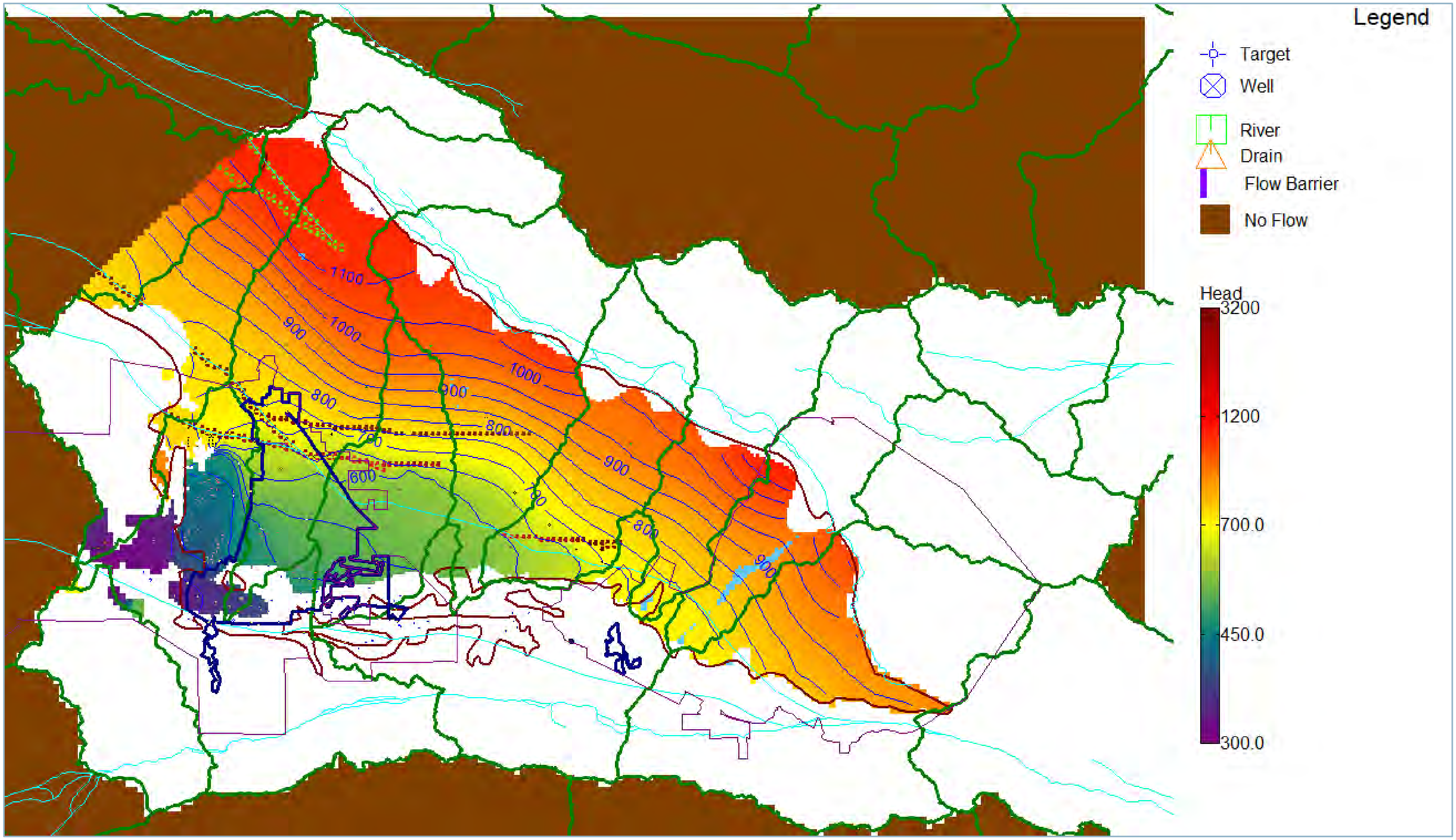

Figure 5-3b. Final Careaga Sand Simulated Groundwater Levels in September 2018 for Calibrated SYEMAHM

Note: White area represents layer pinch out zones

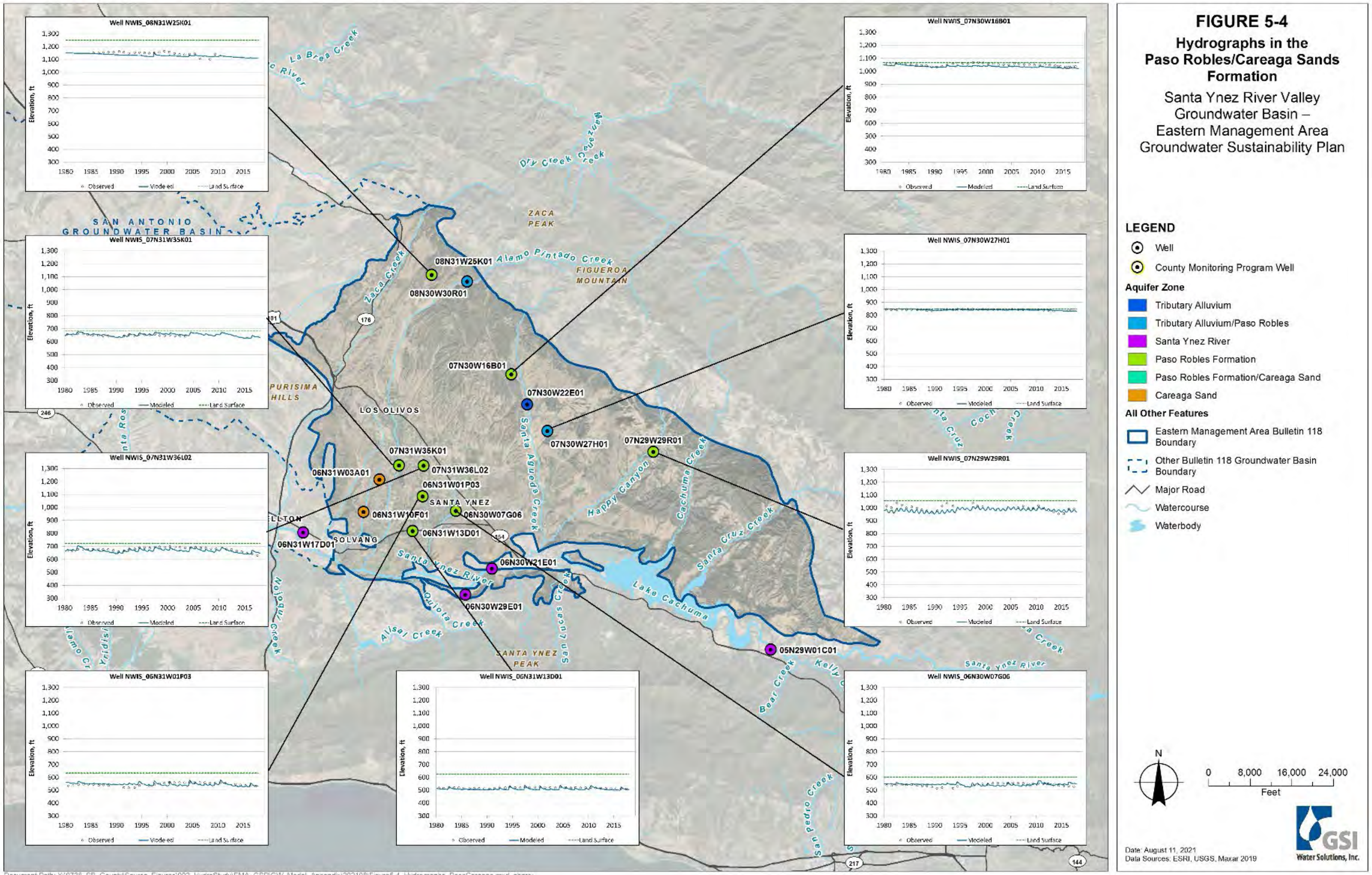

Figure 5-4. Hydrographs in the Paso Robles Formation

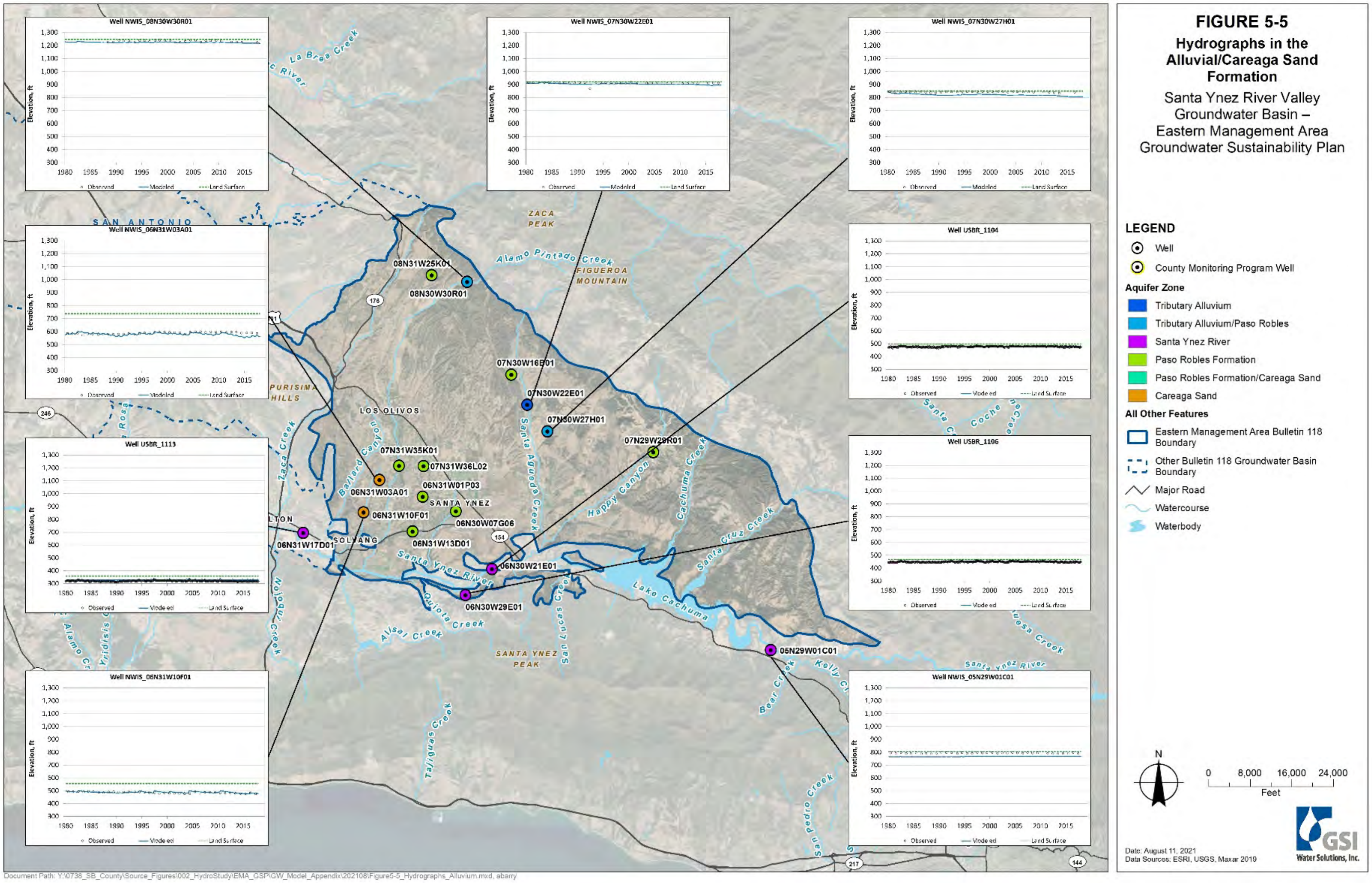

Figure 5-5. Hydrographs in the Alluvial/Careaga Sand Formation

5.3 Water Years 1981 through 2018 Water Balance Calculations

The calibrated transient SYEMAHM was used to estimate the groundwater flows that occur between the EMA and the adjoining subbasins. **Figure 5-6** presents a map of water budget zones subject to detailed water budget analysis with the model. To accomplish this water accounting within and between different water accounting zones in the model domain, the USGS ZONEBUDG-USG post-processing program was used in conjunction with other open source and GSI-developed in-house tools to generate water budgets for each zone. The zonal water budgets include all inflows and outflows within the zone, as well as the transfers between adjacent zones. The following subsections present water balances for the EMA itself, as well as for each adjoining subbasin, and net flows between the EMA can be extracted from these results.

The simulated groundwater flow directions indicate that the groundwater flow divide between the upper Happy Canyon watershed and the Cachuma Creek watershed to the east closely follows the surface water flow divide. This suggests that the vast majority of natural recharge and runoff inflows to this area are captured in Lake Cachuma. These waters are subject to historical water rights administration by the State Water Resources Control Board and long-established Lake Cachuma (also known as Cachuma Reservoir) operating rules, and more recently impacted by constraints imposed from the 2020 Biological Opinion (NMFS, 2000). These waters are thus outside the purview of regulation under SGMA. For this reason, the EMA Basin as defined by DWR Bulletin 118 (DWR, 2018) is broken into two subbasins for water budget purposes:

(i) EMA Above Cachuma: the watersheds whose surface water and groundwater discharges are captured in Lake Cachuma, specifically comprising the Cachuma Creek and Santa Cruz Creek watersheds.

(ii) EMA Below Cachuma: the watersheds that occupy the majority of the EMA, whose natural mountain front recharge, areal precipitation recharge, runoff, and streambed percolation all contribute to the principal aquifers in the EMA that supply the overlying landowners and water users; this is the area from (and including) Happy Canyon watershed on the east extending westward to and including the Zaca Creek watershed.

5.3.1 Santa Ynez River Basin EMA, Contributing Area Below Cachuma

Figure 5.7 provides a time series of the water budget, component by component, over the WY 1981 through 2018 historical period, for the zone comprising the EMA region hydrologically downstream of Lake Cachuma. The shows that, for the EMA, there is an overall long-term trend of declining groundwater storage in the Basin.

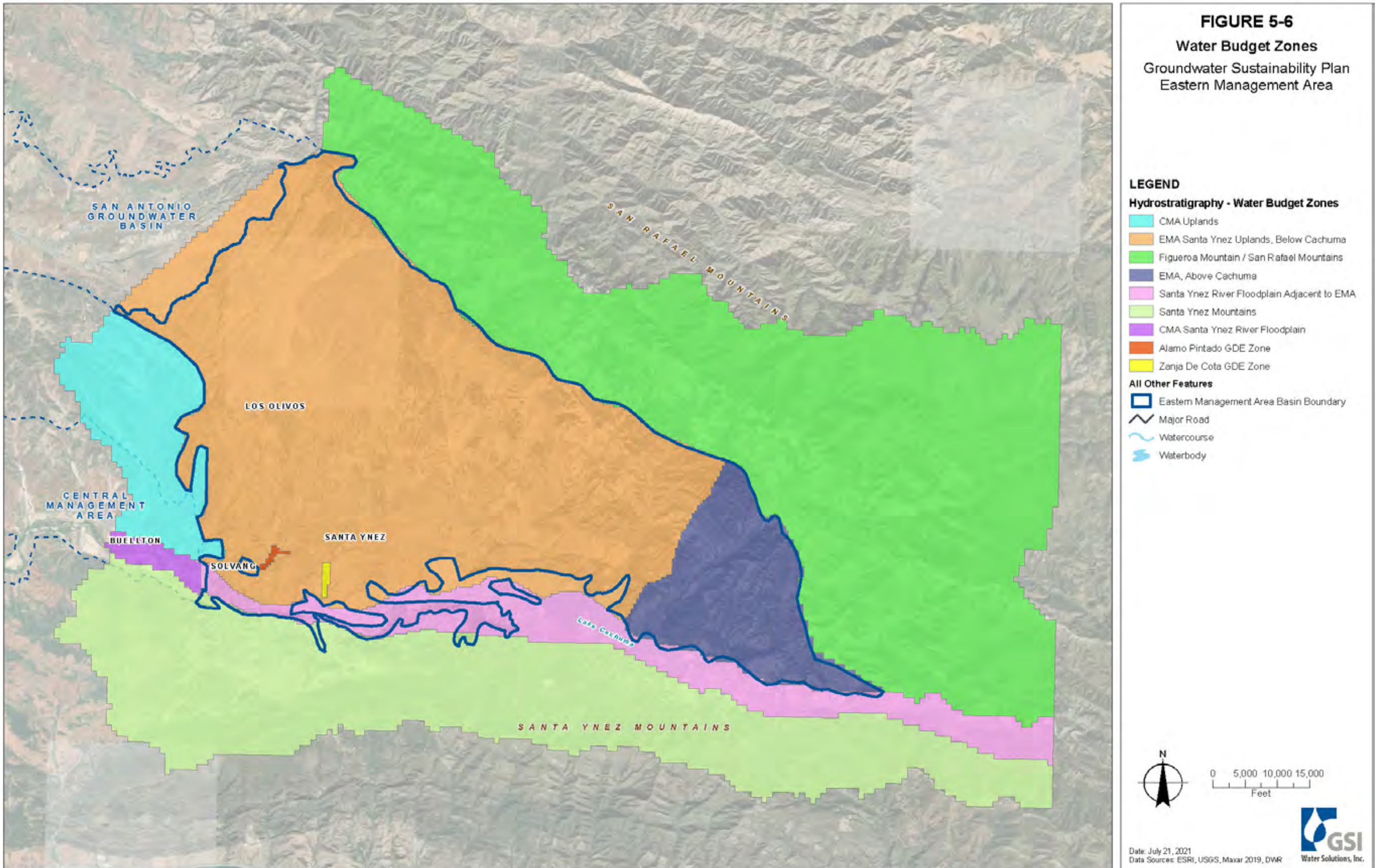

Figure 5-6. Water Budget Zones

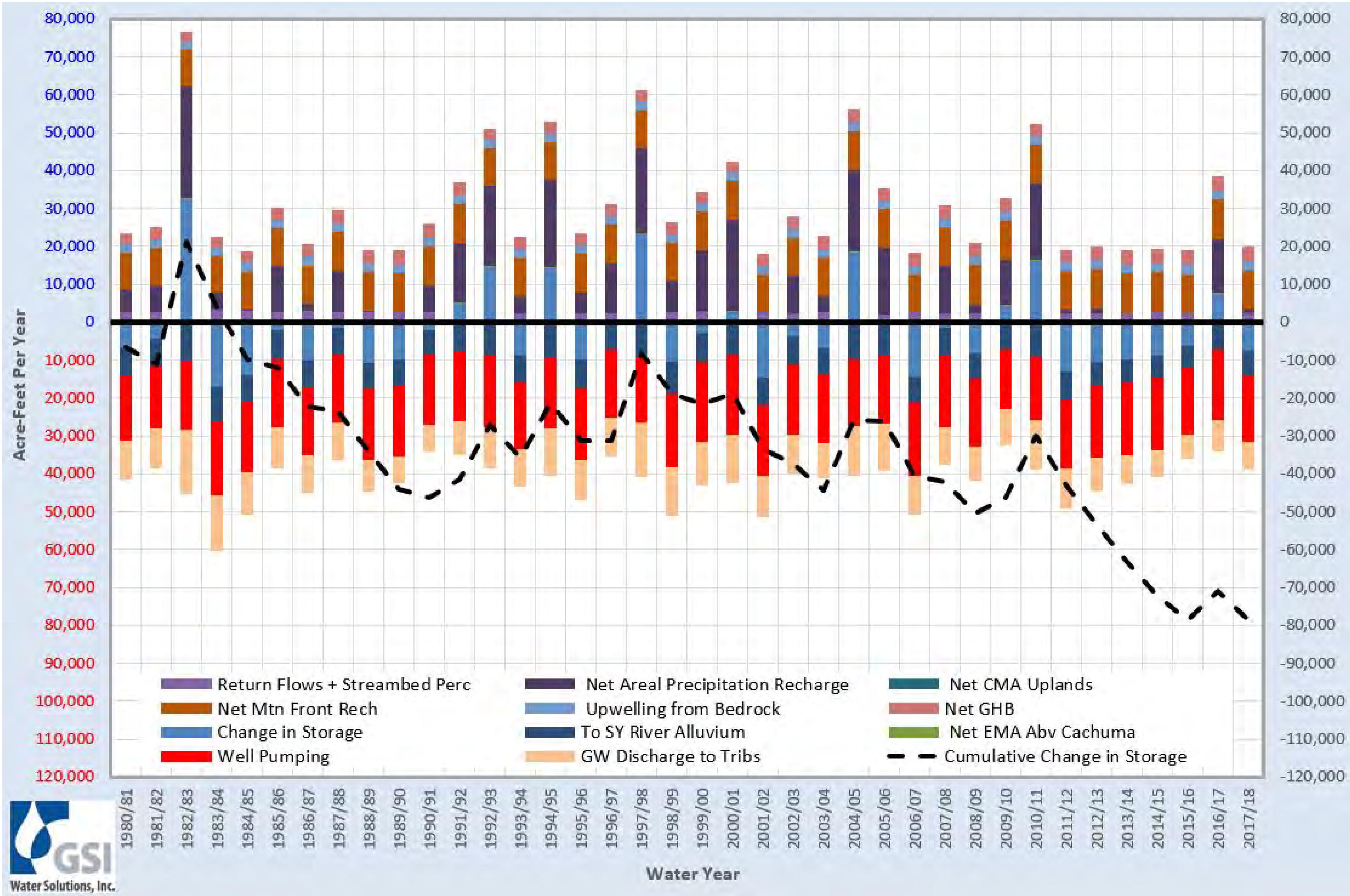

Figure 5-7. Water Budget Time Series for EMA below Cachuma Reservoir

In general, there appears to be a consistent pattern of the following:

- Annual groundwater outflows due to pumping
- Groundwater discharge as baseflow to the tributary streams in their upper reaches
- Generally steady inflows from irrigation and OWTS return flows, mountain front recharge, and areal precipitation recharge

In most years, however, the pumping demand appears to exceed the overall inflows, groundwater is mined from storage, and groundwater levels decline. These generally steady trends are punctuated by wetter years and sequences of wet years in which the natural recharge components increase significantly, groundwater levels rise, and groundwater storage recovers. Nonetheless, over the long term, the overall trend is downward, with a cumulative storage loss on the order of 72,000 AF for the 37-year period from WYs 1982 through 2018, for an average long-term loss of approximately 1,945 AFY. The observed trends in cumulative storage and overall decline are consistent, albeit approximately 20 percent higher, with the annual inventory water budget presented in Section 3.3 of the GSP, which calculated a storage loss of 62,110 AF for that same period (averaging 1,830 AFY).

6.0 PRELIMINARY SENSITIVITY ANALYSIS

A sensitivity analysis was conducted to evaluate the sensitivity of the model to changes in three key input parameter groups:

1. The estimated hydraulic conductivity for the Paso Robles and Careaga Formations, as these formations represent the principal water supply aquifers in the EMA

2. The estimated hydraulic conductivity for the Monterey Formation and crystalline bedrock complex that underlie the EMA principal aquifer

3. Monthly agricultural pumping quantities, assuming crop demand factors are 25 percent too low

4. Agricultural return flow factors, assuming the baseline model values are 25 percent too low

The first two parameter groups investigated will help identify potential hydrogeologic characterization priorities, and the last two will shed light on whether additional characterization of crop ET processes and irrigation demand are needed to better quantify the impacts of agricultural water management action in the future.

The sensitivity analysis was accomplished by modifying the input values over their plausible range and rerunning the model. The sensitivity model run results were compared to the Historical Calibration model result to evaluate the change in model goodness-of-fit measures, as well as the overall change in groundwater storage, due to the change in the sensitivity parameters. **Table 6-1** summarizes the parameters varied for the sensitivity analyses and the range of variation for each parameter compared to the best-fit calibrated value. Also shown are the resulting average and standard deviation model error and normalized RMS, as well as the model-computed change in groundwater storage.

Table 6-1. Sensitivity Parameters and Associated Changes to Model Performance Measures

Sensitivity Analyses With Historical Calibration Model							
Sensitivity Run ID	Model Parameter	Run Description	Avg Error (ft)	Std Dev Error (ft)	Normalized RMS	Average Change in GW Storage (AFY)	Percent Change from Baseline Change-in-Storage
#	Historical Baseline Model	NA	4.33	13.40	1.40%	1,945	NA
1	Kh Paso minimum multiplier	Kmin=0.75*Kbaseline	4.67	13.61	1.44%	1,597	-17.88%
2	Kh Paso maximum multiplier	Kmax=1.25*Kbaseline	4.09	13.57	1.44%	2,317	19.14%
3	Kh Careaga minimum multiplier	Kmin=0.75*Kbaseline	4.05	12.97	1.37%	1,811	-6.89%
4	Kh Careaga maximum multiplier	Kmax=1.25*Kbaseline	4.58	14.10	1.50%	2,174	11.77%
5	Crop Pumping Factors	1.25	5.77	14.82	1.57%	2,809	44.42%
6	Crop Return Flow Factors	1.25	4.12	13.35	1.41%	1,950	0.26%

Notes
AFY = acre-feet per year ft = feet NA = not applicable RMS = root mean square

Reviewing these results, it is evident that, over the range of variation of the sensitivity parameters investigated, the following apply:

- The 25 percent increase in the irrigated agricultural pumping factor led to the largest change to the model fit measures, as well as to the change in storage compared to the baseline historical model.
- The 25 percent increase crop return flow factor, on the other hand, led to a very small changes in model behavior compared to the historical baseline.
- Given that the hydraulic conductivity is shown to vary over orders of magnitude (Figure 2-5), the range of variation in the conductivities from 75 to 125 percent of their baseline values should be considered quite modest. Over this range, it is demonstrated that:
    - The goodness-of-fit calibration measures vary only slightly, and in fact it appears that, by these measures, the case with the Careaga Sand reduce to 75 percent of its baseline value may lead to a slight improvement in the calibration.
    - The change in storage, on the other hand, is quite sensitive to the changes in hydraulic conductivity, even over this narrow range. The difference from the baseline model change in storage is from -18 percent (less than baseline) to +19 percent (more than baseline) when the Paso Robles Formation conductivity is 75 percent of the baseline value to 125 percent of the baseline value, respectively. And for the Careaga Sand, the difference from the baseline model change in storage is from -7 percent (less than baseline) to +12 percent (more than baseline) for the lower and higher values, respectively.

These results emphasize the importance of obtaining accurate values for actual well pumping, as in the case of this model they were largely estimated, and a 25 percent change in that irrigated pumping estimate led to a 44.4 percent change in the annual depletion in groundwater storage

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7.0 PREDICTIVE SIMULATIONS

SGMA guidance is clear on requirements for a future forecast model; see the sidebar below. As required, the calibrated groundwater flow model was modified to develop two 50-year transient predictive simulations for 2022 through 2072:

1) a *Baseline forecast* to evaluate the potential undesirable impacts from maintaining the recent land use under "representative hydrology" conditions and slow demand growth based on the demographic and agricultural trends in the EMA (i.e., the status quo). The baseline includes consideration of climate change factors.

2) a *Projects and Management Actions (PAMA) forecast* to evaluate potential impacts of implementing alternative land uses, water management actions, and infrastructure projects to achieve groundwater sustainability

> **Projected Water Budget Assessment §354.18(c)(3)**
>
> The projected water budget accounting is used to quantify the estimated future *baseline conditions* of supply, demand, and aquifer response to GSP implementation. It is also required to evaluate and identify the level of uncertainty in the estimate, and to include historical water budget information to estimate future baseline conditions concerning hydrology, water demand and surface water supply reliability over the 50-year planning and implementation horizon. Methods used to estimate the projected water budget include the following three requirements:
>
> - Use 50 years of historical precipitation, evapotranspiration, and stream flow information as the future baseline hydrology conditions, while taking into consideration uncertainties associated with the estimated climate change and sea level rise projections.
> - Use the most recent land use, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demands, while taking into account future water demand uncertainty associated with projected changes in local land use planning, population growth, and climate.
> - Use the most recent water supply information as the baseline condition for estimating future surface water supply, while applying the historical surface water supply reliability identified in §354.18(c)(2) and taking into consideration the projected changes in local land use planning, population growth, and climate.

As noted, the Baseline model will include both the historical hydrology and water supply component, which can be reflected by historical hydrology, and demographic / agricultural trends that will impact how historical demands will evolve in the future.

It is important to emphasize that the forecast models were developed to evaluate the impact of implementing management actions. The net impact of the Projects and Management Actions forecast will be quantified as the difference in water levels and water budgets between the Baseline and Project and Management Actions forecasts.

7.1 Baseline Climate / Hydrology Series

Both forecast models consist of 600 monthly stress periods starting with October 2022 and ending with September 2072. As the authors do not have 2021 and 2022 hydrologic conditions available, the models start with the 2019 simulated heads. The forecast models assume that the climate and hydrologic drivers for the 38-year historical period from October 1980 through September 2018 will repeat itself starting in October 2022. To achieve the 50-year forecast requirement, a 12-year series was added.

The final 12-year series was developed from selected sequences of years from within the original 38-year period. That 12-year sequence was chosen to meet two criteria: (1) that the final net cumulative precipitation departure for the 50-year sequence is very close to zero, and (2) that an additional dry period is included to balance the very wet period between years 11 and 30 (2033 through 2052). Following these two criteria ensured that the selected Baseline climate captures representative historical conditions, including sustained wet periods as well as droughts, and is not biased to an overly pessimistic or overly optimistic (from a natural water supply perspective) future forecast. To honor and factor in data from the 70-year precipitation record from the Santa Ynez gage (1950 through 2020), the recharge for each year of the selected record adjusted based on the precipitation ratio $PR_{38,70}$ is as follows:

$$PR_{38,70}(p) = \frac{P_{70}(p)}{P_{38}(p)} \qquad (7.1)$$

Where $P_{70}(p)$ is the annual precipitation from the 70-year period of record at the exceedance probability p, and $P_{38}(p)$ from the 38-year precipitation at the same exceedance probability p.

Figure 7-1 shows the hydrology sequence selected for the future forecast models, with labels indicating the hydrologic water years used to develop the 50-year record.

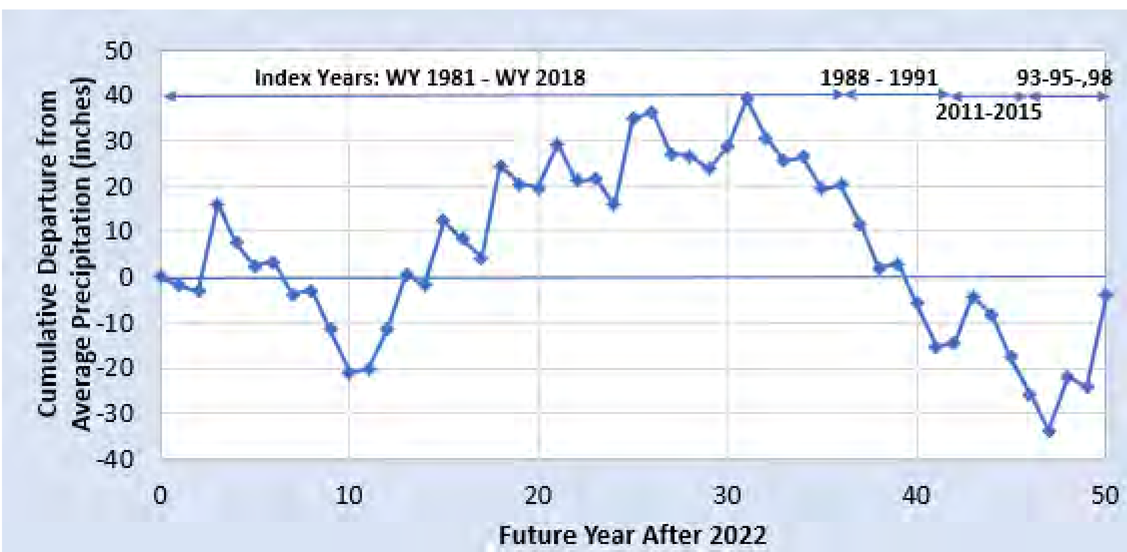

Figure 7-1. Selected Representative Future Driving Hydrology 50-Year Series

Per SGMA future forecast requirements, the Baseline hydrology must include consideration of climate change impacts. To meet this requirement, the authors employed the climate change factors developed from the Variable Infiltration Capacity (VIC) model as recommended and provided by DWR. The VIC factors were developed from application of the VIC land surface model driven by various General Circulation climate change models. The VIC factors provided by DWR relate to ET, precipitation, and surface flows that can be applied to the historical hydrology to approximate the impacts of climate change; those factors are denoted here by the symbols CCF_{ET}, CCF_P, and CCF_{SF}, respectively. To utilize these factors in the model, groundwater pumping was scaled by the ratio CCF_{ET}/CCF_P, natural groundwater recharge was scaled by the ratio CCF_P/CCF_{ET}, and the surface flows were scaled by CCF_{SF}. As described in the next subsection, groundwater pumping was also adjusted (increased) based on demographic and agricultural trends in the study area.

Separate forecast model runs were performed with and without the climate change factors, allowing the authors to effectively isolate the impacts due to climate change from the impacts from projected demographic and agricultural trends (discussed below in Section 7.2). An additional advantage of selecting the same 38-year series as was used for the historical model is that it allows a comparison between the Baseline forecast and historical model to isolate the effects of climate change and demographic change under the "status quo" management conditions.

7.2 Demographic / Agricultural Trends

In addition to climate change impacts on water supplies, the future baseline will be impacted by trends in population growth and changes in agricultural acreage and crop types. An analysis of past trends and rationale for future projects related to water uses are provided in Section 3.3 of the GSP, Water Budget, and thus selected trends are only summarized here.

7.2.1 Baseline Forecast Land Use

A review of historical land use shows that major cropping acreage patterns have changed over the historical period. These values are based on estimates of planted acreages and crop-specific water duty factors specified by SYRWCD (SYRWCD, 2010). Between 1996 and 2018, a total of 1,678 acres of irrigated acreage were added within the EMA area outside of the SYRWCD boundaries. As of 2018, a total of 1,828 acres of vineyards had been planted. The expansion of vineyard acreage has slowed considerably in recent years, compared to the rapid growth that occurred between during the late 1990s and early 2000s. Between 1996 and 2014, vineyards were growing at an average rate of approximately 3.7 percent per year; however, since 2014 this has moderated to near zero growth. Based on the available data, only "field crops" exhibited an upward trend in recent years, rising at 4.5 percent per year. Projected into the future, this rate would add 28 acres of field crops on average per year. Likewise, pasture has been declining recently, losing more than 20 acres per year on average.

Overall, the summation of the individual cropping changes result in a projected increase in irrigated acreage outside of SYRWCD from 4,241 acres in 2018 to 5,259 acres in 2042, at an annual growth rate of approximately 0.8 percent per year. Between 2042 and 2072, the total irrigated acreage is projected to increase further relative to 2018, to 6,598 acres at the same average annual growth rate. A complete discussion of the projected changes to agricultural acreage and associated water demands is included in Section 3.

7.2.2 Baseline Forecast Municipal Pumping

Municipal water demand is satisfied in part by groundwater pumping from the Santa Ynez Uplands and the Santa Ynez River area for municipal, industrial, and agricultural uses, including urban landscape irrigation. The City of Solvang provides water for municipal and potable uses, while ID No. 1 provides water for municipal, industrial, and agricultural uses.

Municipal pumping for non-agricultural purposes from both these municipal suppliers and the several mutual water companies and other small community water systems were projected to increase in proportion to the projected population growth. The City of Solvang anticipates a population increase of approximately 1 percent per year while ID No. 1 and the unincorporated areas of the EMA (including Los Olivos, Ballard, the Santa Ynez Reservation for the Santa Ynez Band of Chumash Indians [Chumash Reservation], and other areas) are not expected to increase in population through 2042 and 2072. Overall, the net effects of the increased population in the City of Solvang and unchanged populations within the other areas are a net increase in water use. This net change has also been assigned to the mutual water companies and rural domestic users.

Municipal and industrial pumping within the Santa Ynez Uplands is expected to increase by 5 percent by 2042 and by 11 percent by 2072 compared to the historical period. This component of the water budget was applied to the projected growth of municipal and industrial demand; mutual and rural demands (outflow components); and Chumash Wastewater Treatment Plant effluent flow, septic return flow, and urban irrigation return flows (inflow components).

7.2.3 Baseline Forecast Hypothetical Irrigation Pumping

In addition to the effects of climate change on pumping for agricultural irrigation, overall cropped acreage is expected to grow slowly, and the mix of crop types is expected to evolve. Specifically, it is anticipated that some of the current pasture, forage crop, and commodity row crops planted will be reduced and replaced by more high-value crops, such as grapes, berries, and cannabis. The land use trends and projected changes in pumping used for the model input are described in detail with Section 3.3 of the GSP.

Table 7-4. Summary of Historical and Projected Irrigated Agricultural Acreage, Outside of Santa Ynez River Water Conservation District

(Values in acres)

Crop Group	Recent Trend	1996	2014	2016	2018	2042 (Projected)	2072 (Projected)
Deciduous Fruit and Nuts	Modest increase	37	93	93	74	130	199
Field Crops	Rising (+ 4.5% / year)	267	273	812	1,090	1,752	2,581
Ornamentals	Unchanged	5	29	21	3	14	28
Pasture	Declining	1,350	839	858	747	500	500
Truck, Nursery, and Berry Crops	Declining	141	714	675	498	300	300
Vineyards	Very modest increase	944	1,804	1,932	1,828	1,900	1,990
Cannabis	Large increase expected	0	0	0	0	500	1,000
	Total	**2,743**	**3,752**	**4,390**	**4,241**	**5,096**	**6,598**
				Change Since 2018		**+ 856**	**+2,357**
				Annual Increase		**+ 36**	**+ 45**
				Annual Change, Percent		**+ 0.77 %**	**+ 0.82 %**

7.3 Baseline Forecast Simulation Results

The Baseline forecast simulation groundwater mass balance data were used to estimate the change in groundwater storage in the EMA on an annual basis for the 50-year forecast simulation period. As mentioned in Section 7.1, two separate forecasts model runs (with and without VIC climate change factors) were performed to observe the simulated effects of climate change on groundwater storage. **Figure 7-2** shows the predicted cumulative change in storage curves for the 50-year forecast with and without climate change. Including climate change factors and under the Baseline forecast assumptions described above, there could be an estimated annual average groundwater storage depletion of about 1,220 AFY of, and as much as 61,000 AF of cumulative storage depletion from the Santa Ynez Uplands portion of the EMA. Excluding climate change factors, the model suggests an estimated annual average of about 740 AFY of groundwater storage depletion, and as much as 37,000 AF of cumulative storage depletion from the Santa Ynez Uplands. Notably, this projected deficit is somewhat less than the deficit estimated as part of the historical water budget, described in Section 3.3 of the GSP.

Even with climate change included, the projected deficit of 1,220 AFY on average is somewhat less than the historical period deficit of 1,860 AFY. The hydrology associated with the projected modeling period was balanced over the 50-year period, which generally reflects the long-term hydrology. The historical period concluded with a severe drought, which increased the average deficit during that period. The reduction in agricultural pumpage is projected to occur during the transition to crops that are less water-intensive.

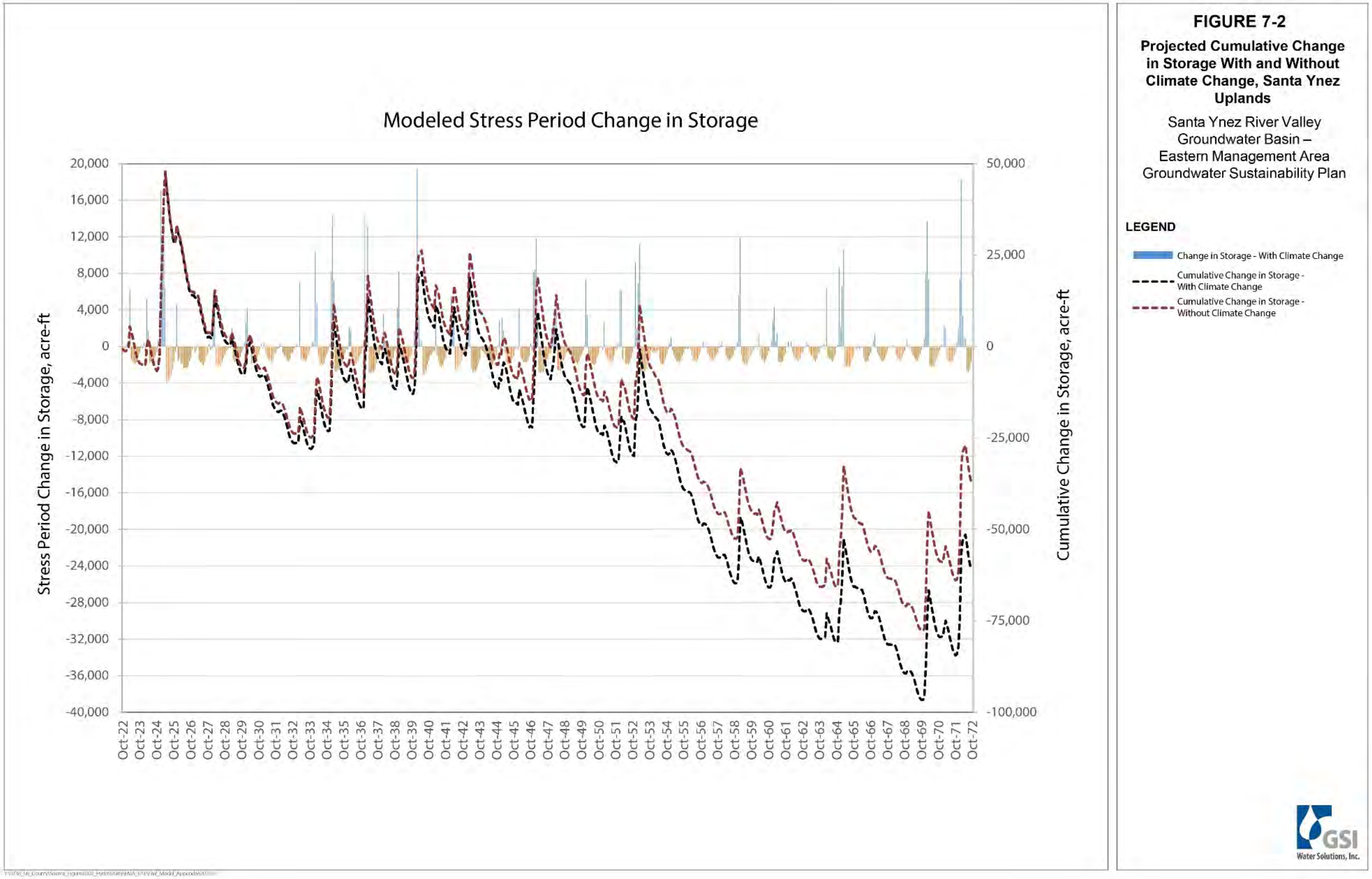

Figure 7-2. Projected Cumulative Change in Storage With and Without Climate Change, Santa Ynez Uplands

A time series of the Santa Ynez Uplands water budget with each inflow and outflow component for the 50-year forecast simulation period (with climate change) is presented as **Figure 7-3**. Predicted cumulative change in storage for both forecast simulations are shown, although the individual inflow and outflow components pertain only to the simulation that includes the climate change factors. Similar to the historical water budget, **Figure 7-3** indicates a consistent pattern of groundwater outflows annually due to pumping and groundwater discharge as base flow to tributary streams. Inflows are made up mostly of mountain front recharge and areal precipitation recharge but vary widely from year to year and are generally exceeded by the total outflows. Groundwater pumping demands show very slight increases over time, while groundwater discharge appears to decrease slightly over time as water levels in the Basin decline.

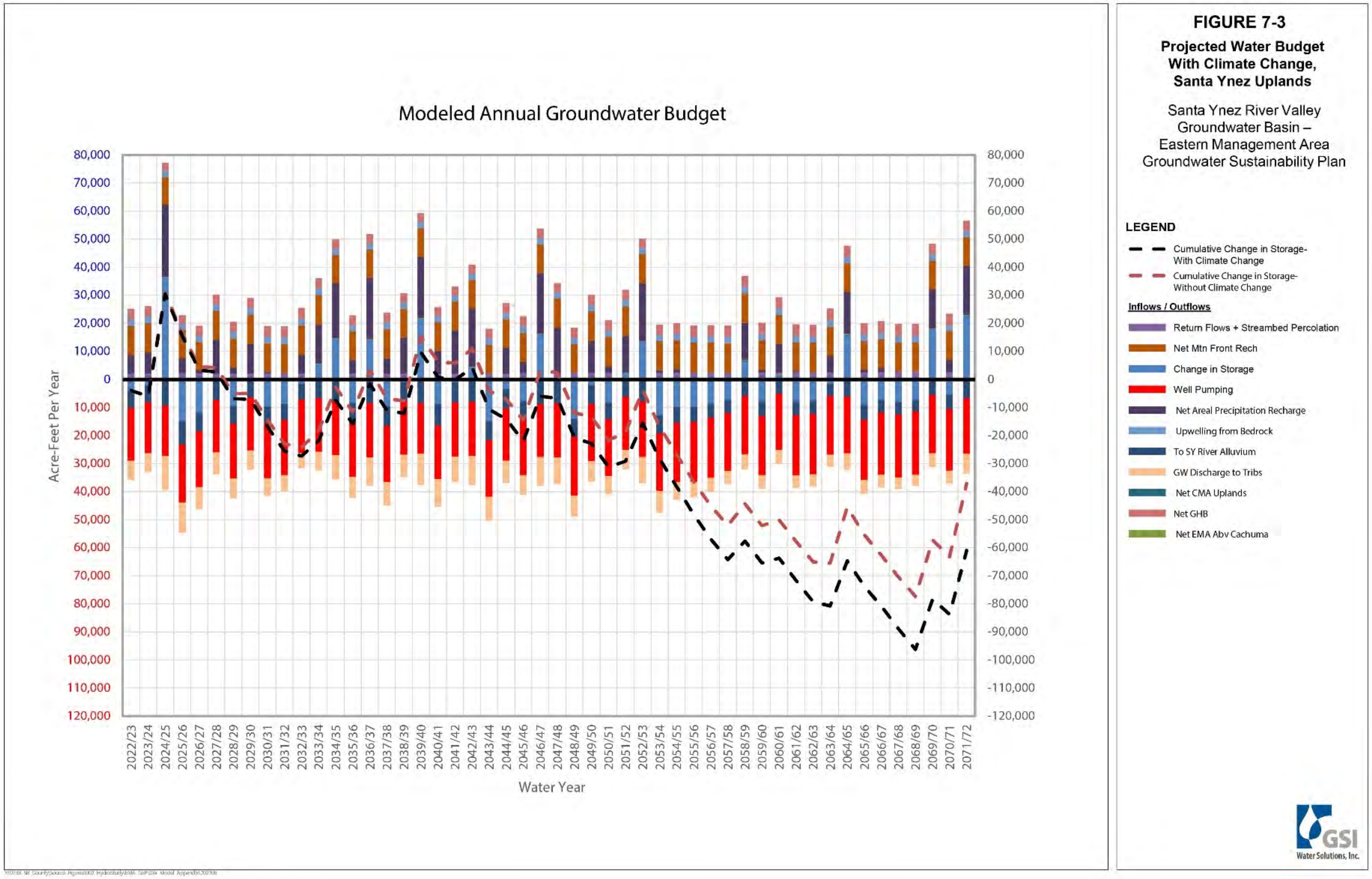

Figure 7-3. Projected Water Budget With Climate Change, Santa Ynez Uplands

7.4 Forecast Project and Management Actions Simulations

The Baseline forecast simulations present estimated expected land use and cropping trends into the future, with no changes in overall management, nor implementation of any water savings nor water supply augmentation projects. Those Baseline forecasts show continuing aquifer storage depletion, at an average rate that is slightly less that experienced over the past four decades (decreasing from 1,830 AFY for the 38-year historical period to 1,220 AFY for the Baseline forecast with climate change). A number of management actions are being considered by the GSA to bring the Basin into sustainability by 2040. Potential projects and management actions (PAMAs) considered include projects that increase water supply and reduce demand.

Multiple PAMA forecast simulations may be created by modifying the Baseline forecast to account for and simulate the PAMAs. Although no PAMA forecast simulations have been performed yet, the model is sufficiently calibrated and prepared for modifications upon implementation of PAMAs by the GSA.

8.0 DATA LIMITATIONS

The data utilized for construction and calibration of the SYEMAHM were provided by various private parties, public agencies, and extractions from existing numerical models of the area as summarized in Section 3 of the GSP. The data used for compilation of the HCM presented in that section were also utilized as input into the numerical model.

Much of the hydrologic data used to construct and calibrate the SYEMAHM are based on estimates or inferred from multiple data sources. For example, the location, construction, and pumping history of most of the irrigation wells in the SYEMAHM domain are unknown. Hence hypothetical irrigation well locations were assumed to be distributed with relatively uniform spacing across those portions of the model domain dominated by irrigated agricultural land uses. The hypothetical irrigation wells were also assumed to have completion intervals and frequencies similar to that of a small subset of wells with known constructions, principally in the Paso Robles Formation.

9.0 SUMMARY OF MODEL RELIABLITY

As noted by DWR in its best management practice for modeling (DWR, 2016),

> Models provide insight into the complex system behavior and can assist in developing conceptual understanding. Models provide an important framework that brings together conceptual understanding, data, and science in a hydrologically and geologically consistent manner. In addition, models can estimate and reasonably bound future groundwater conditions, support

decision-making about monitoring networks and management actions, and allow the exploration of alternative management approaches. However, there should be no expectation that a single "true" model exists. All models and model results will have some level of uncertainty. Models can provide decision makers an estimate of the predictive uncertainty that exists in model forecasts. By gaining a sense of the magnitude of the uncertainty in model predictions, decision makers can better accommodate the reality that all model results are imperfect forecasts and actual basin responses to management actions will vary from those predicted by modeling.

The SYEMAHM is an approximation of existing conditions beneath and in the vicinity of the Santa Ynez River Basin's Eastern Management Area. It covers a large area with dynamic hydrologic conditions that have significant changes over the simulation period. As such, the model can approximate, but not completely reproduce, all observations across the entire area under all conditions. The SYEMAHM can reliably predict groundwater elevations in response to various hydrologic conditions within the calibration period based on the available data. An estimate of the predictive uncertainty that exists in model forecasts was provided. By gaining a sense of the magnitude of the uncertainty in model predictions, decision makers can better accommodate the reality that all model results are imperfect forecasts and actual *Basin* responses to management actions will vary from those predicted by modeling.

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Appendix F.1
Observed and Modeled Representative Well Hydrographs

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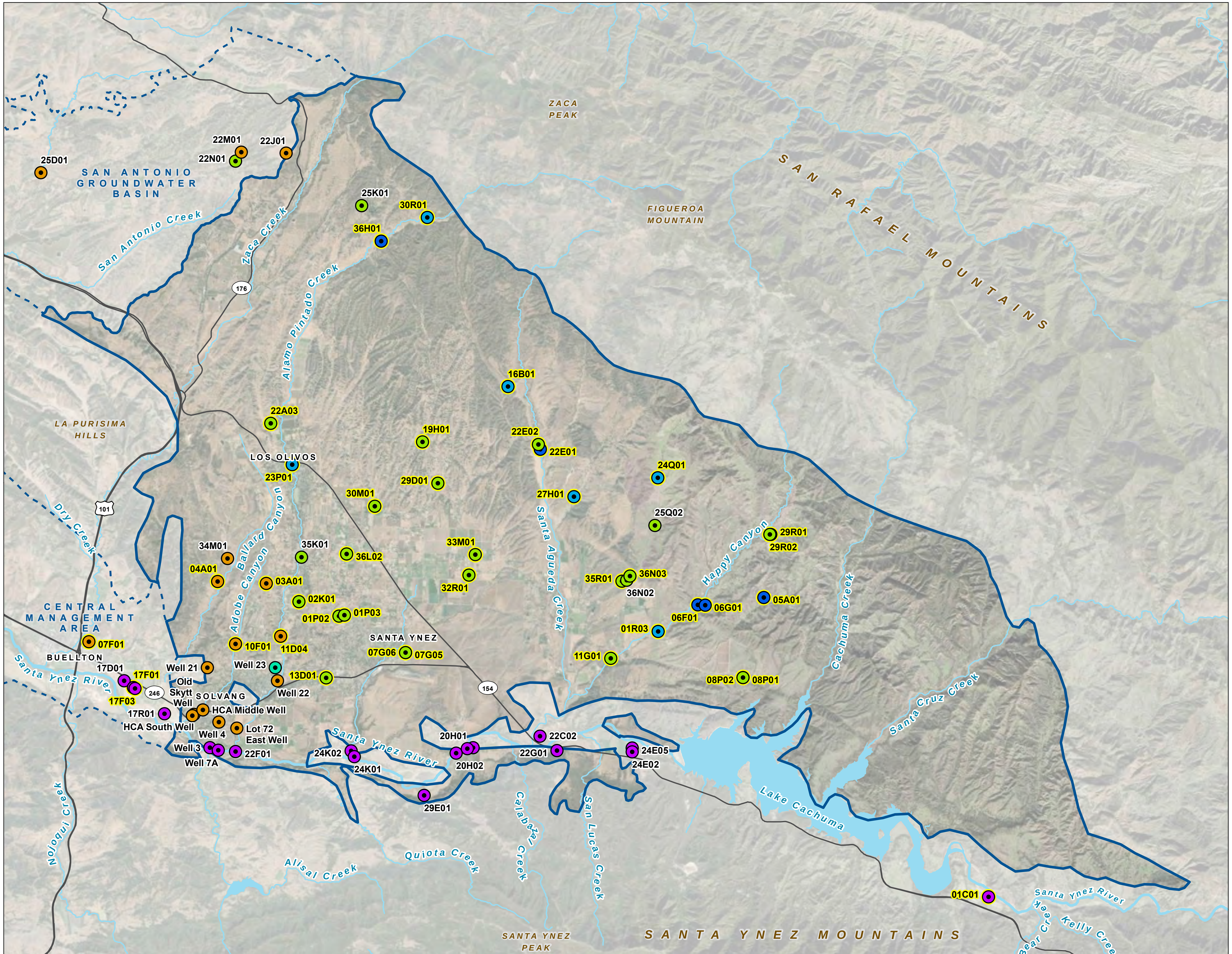
FIGURE F.1-1

Location of Representative Wells Used in Groundwater Model Calibration

Groundwater Sustainability Plan
Eastern Management Area



LEGEND

- Well
- County Monitoring Program Well
- Eastern Management Area Basin Boundary

Aquifer Zone

- Tributary Alluvium
- Tributary Alluvium/Paso Robles Formation
- Santa Ynez River Alluvium
- Paso Robles Formation
- Paso Robles Formation/Careaga Sand
- Careaga Sand

All Other Features

- Major Road
- Watercourse
- Waterbody

Date: March 11, 2021
Data Sources: ESRI, USGS, Maxar 2019

GSI Water Solutions, Inc.

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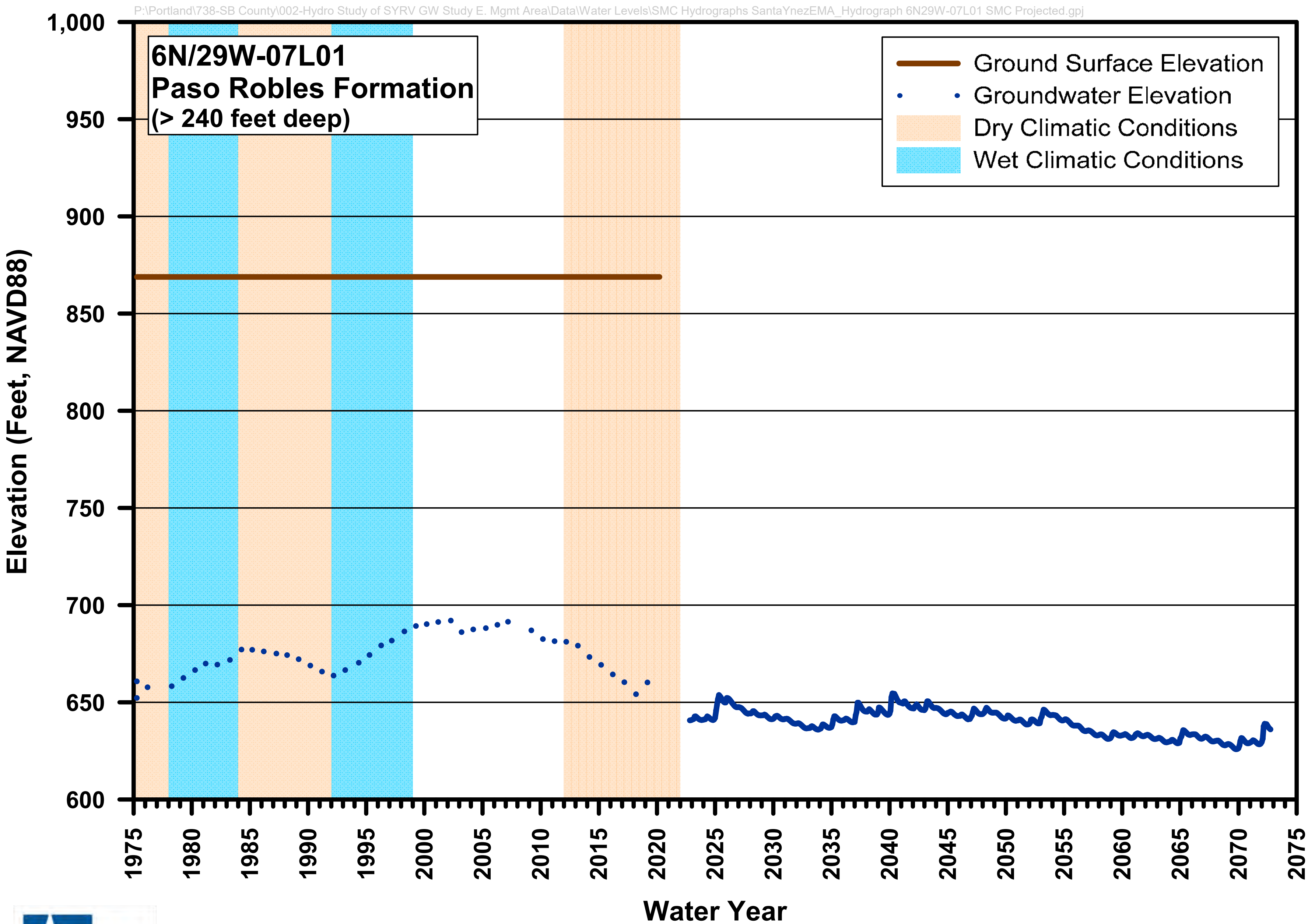

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FIGURE F.1-2
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

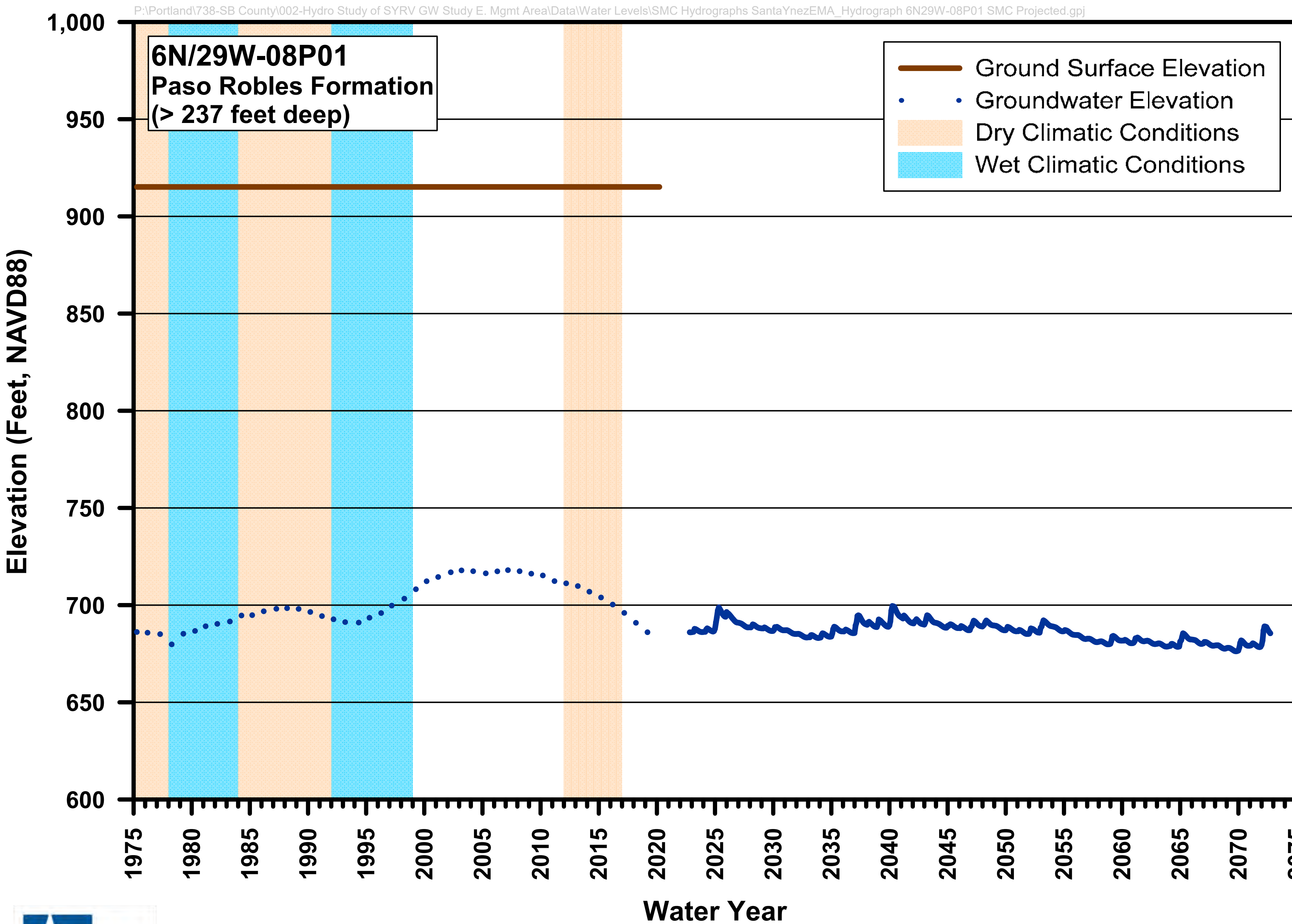

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FIGURE F.1-3
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

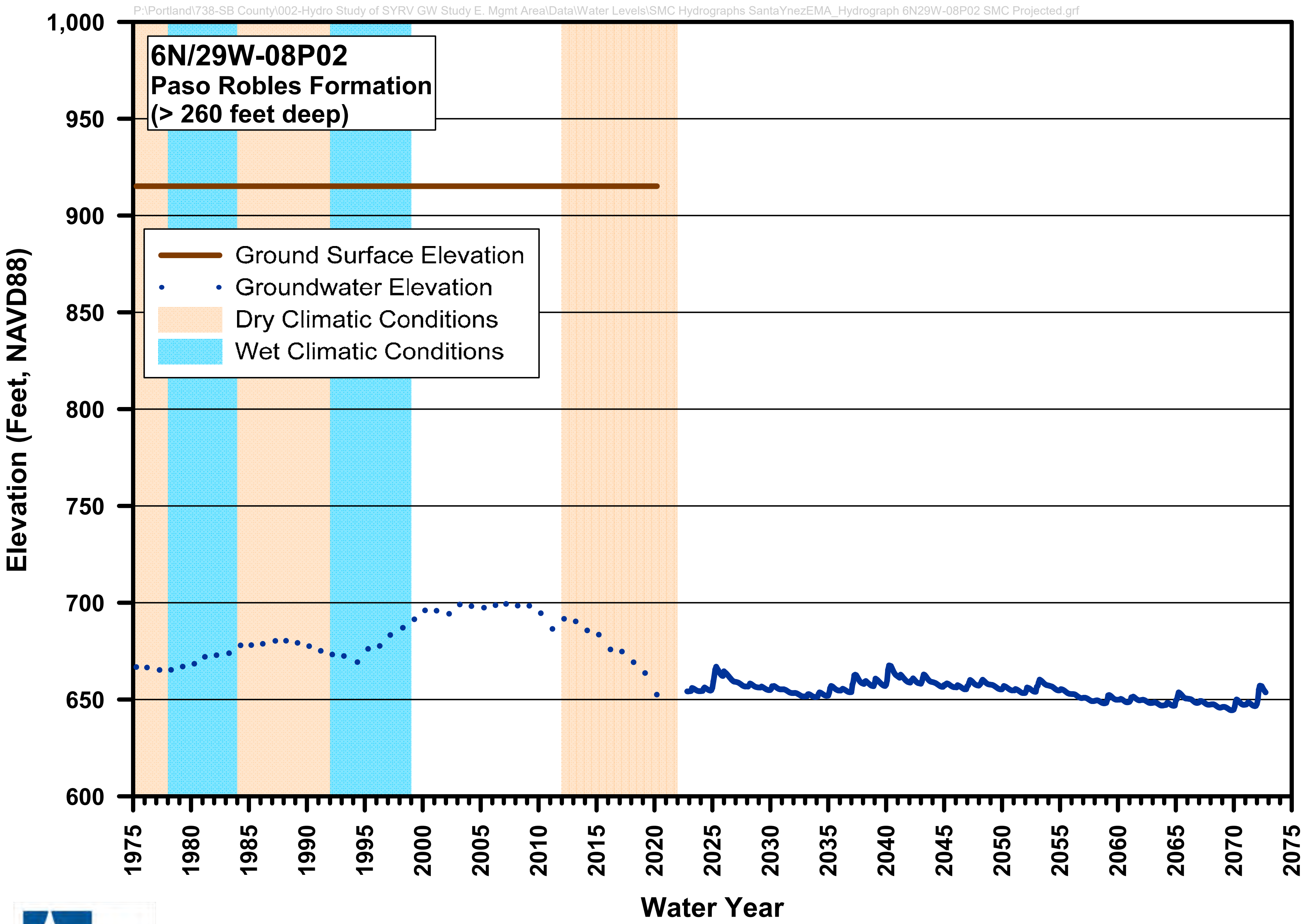

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FIGURE F.1-4
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

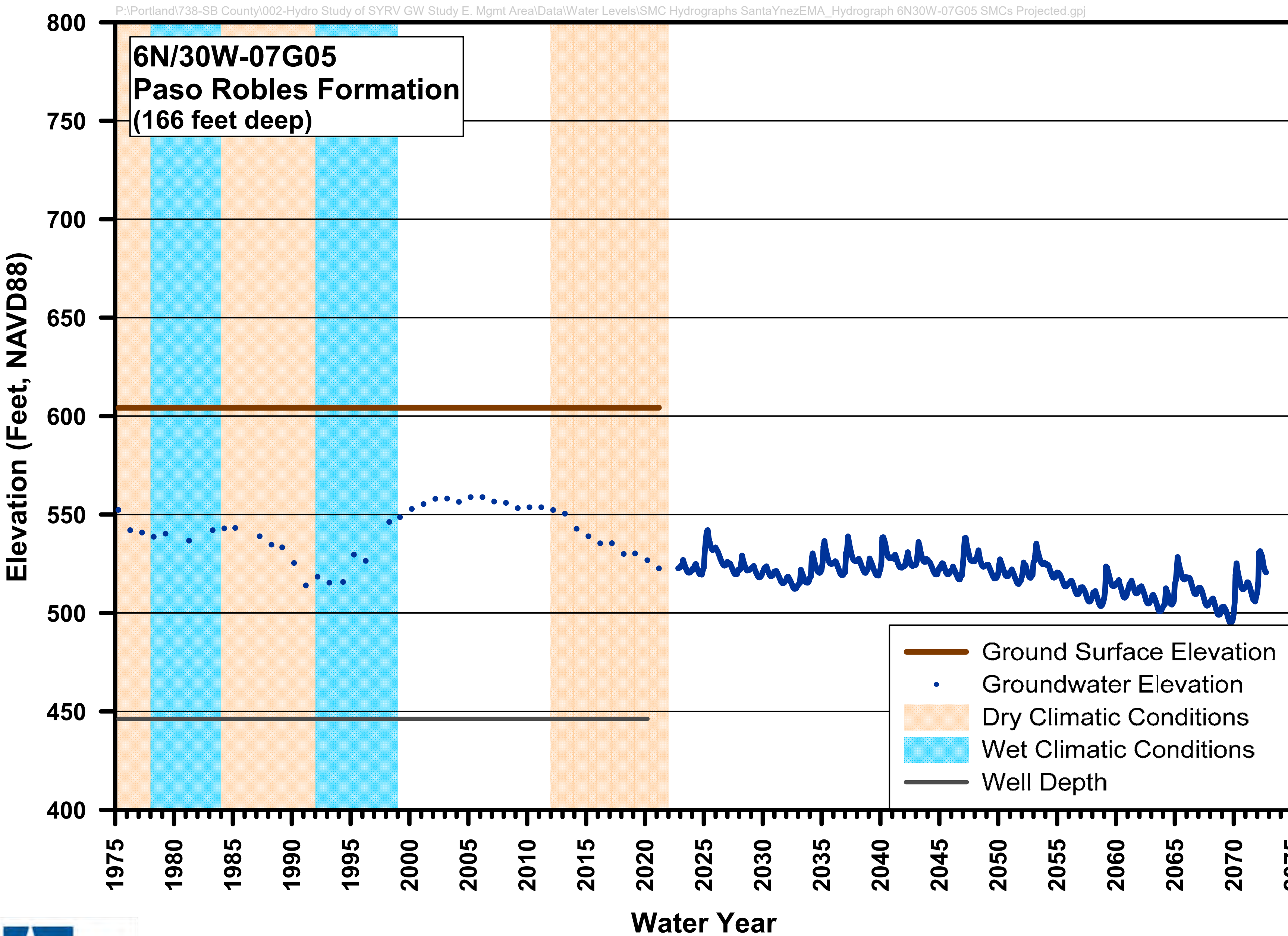

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FIGURE F.1-5
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

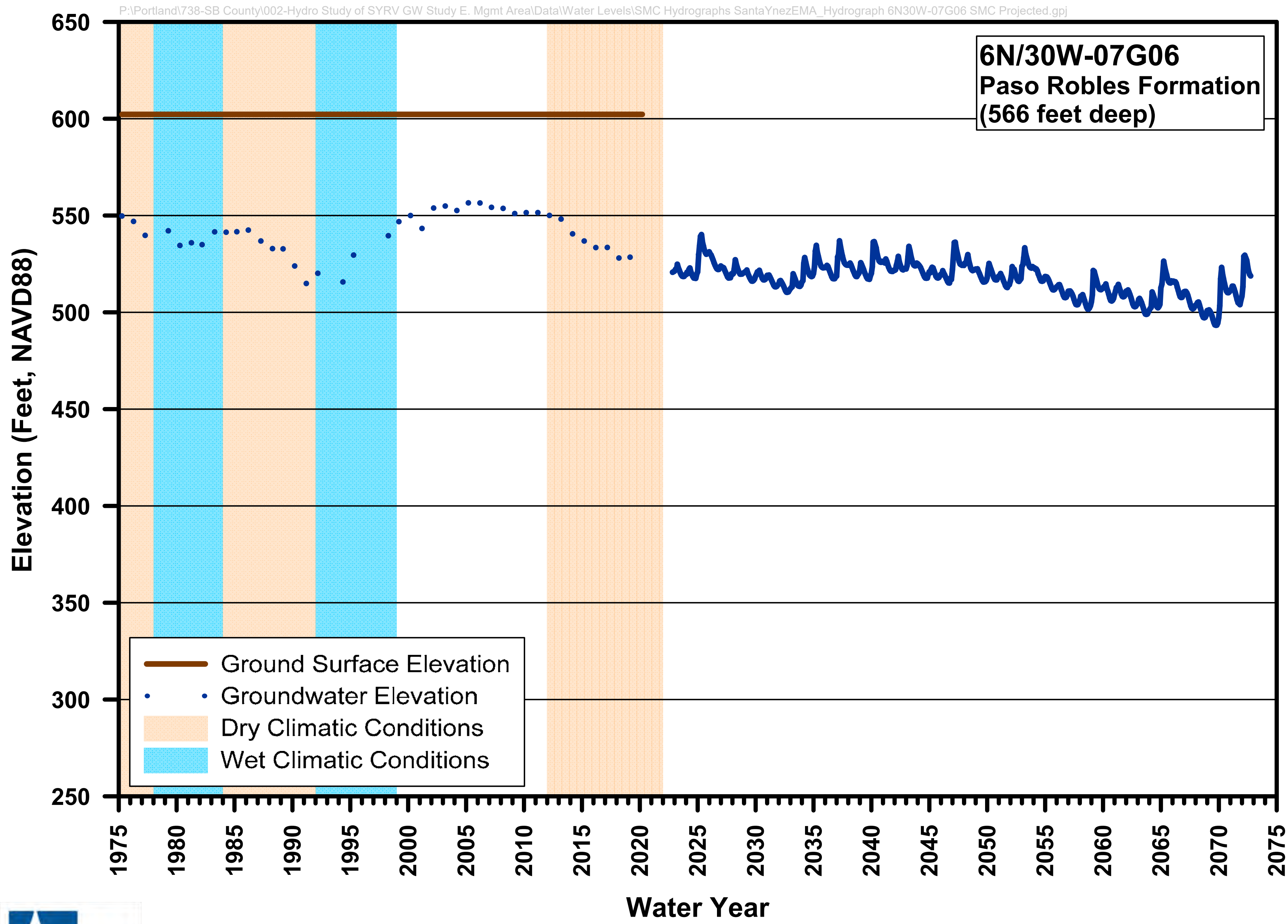

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FIGURE F.1-6
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

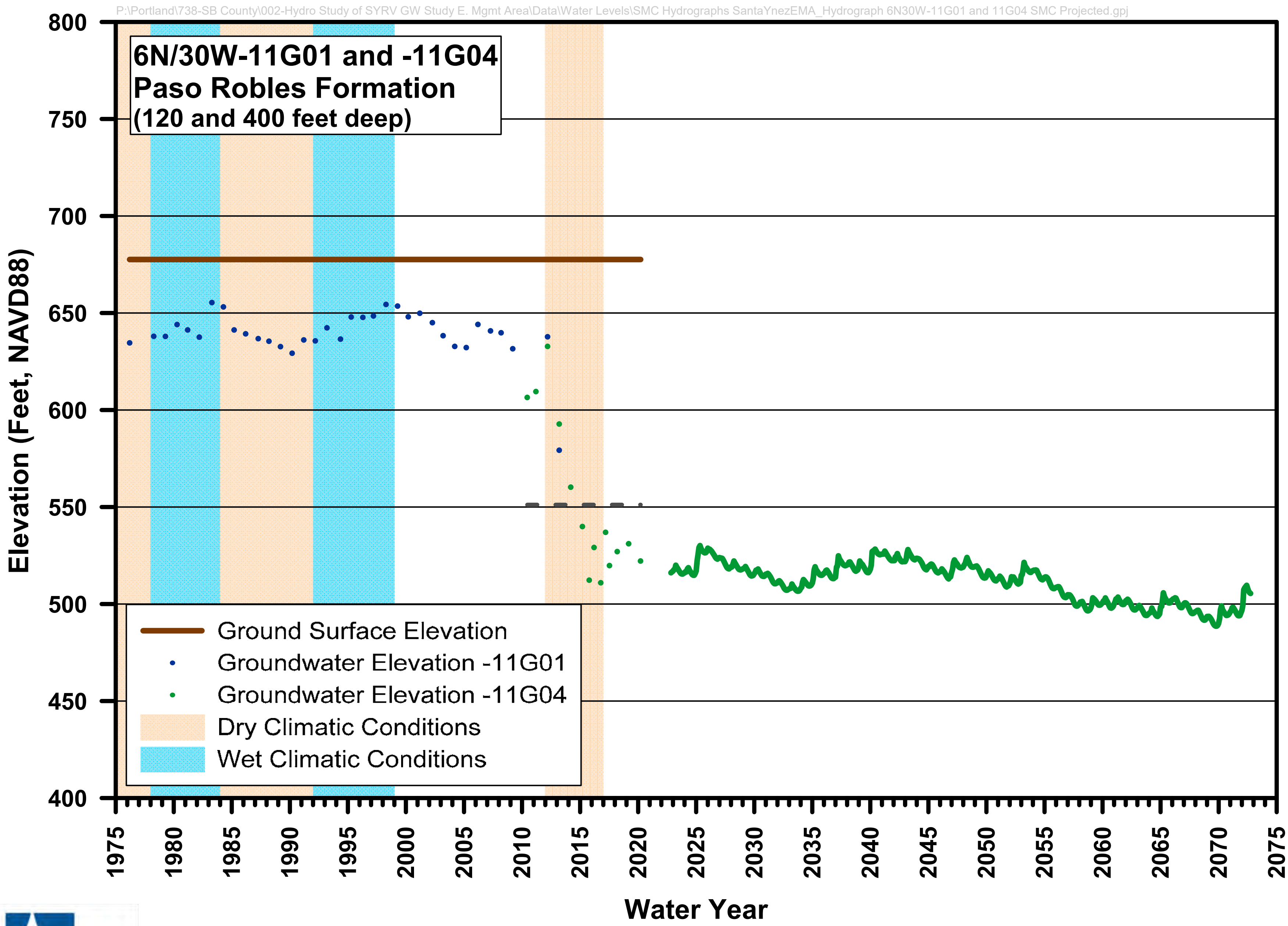

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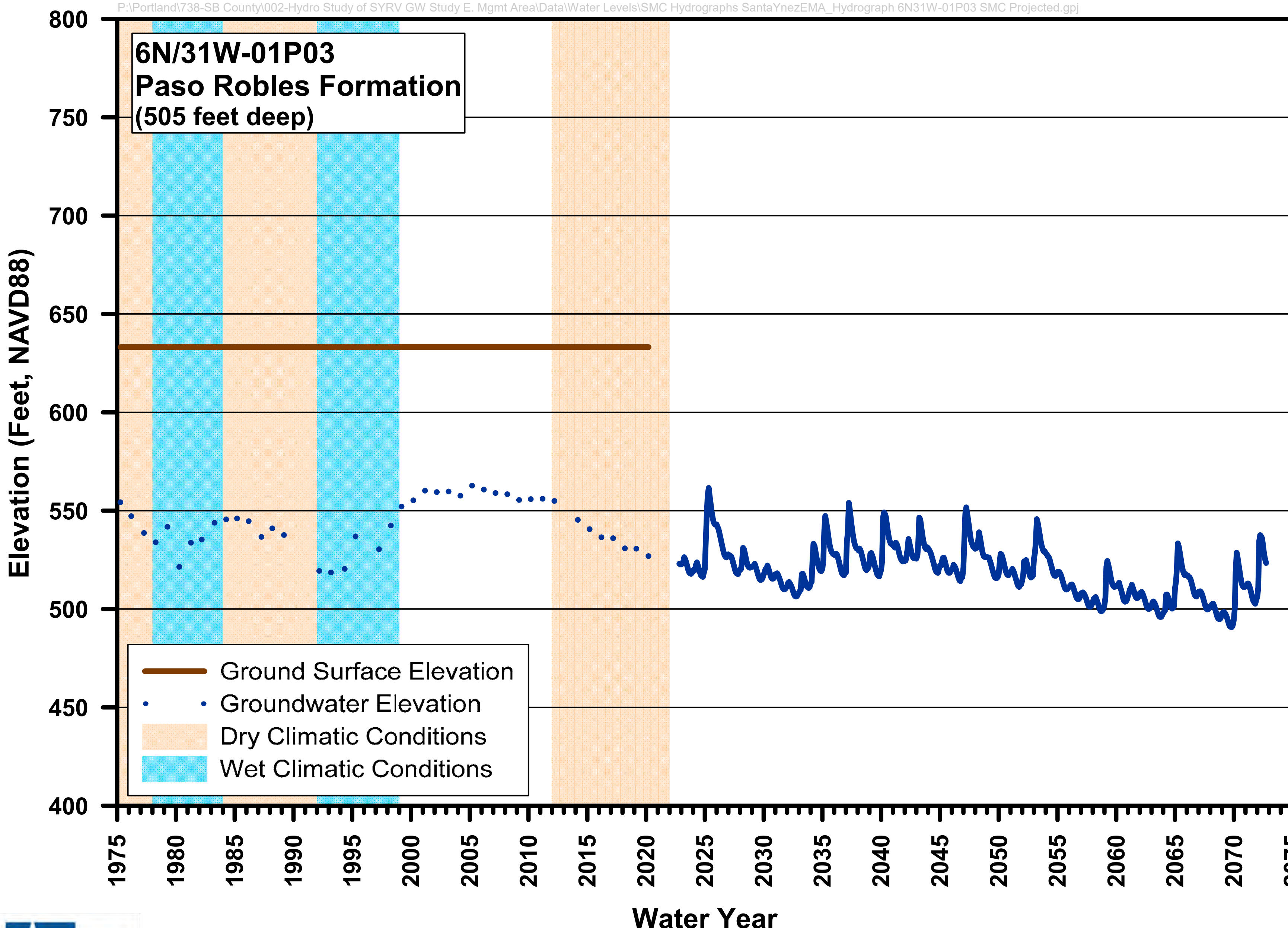
FIGURE F.1-7
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



GSI Water Solutions, Inc.

FIGURE F.1-8
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

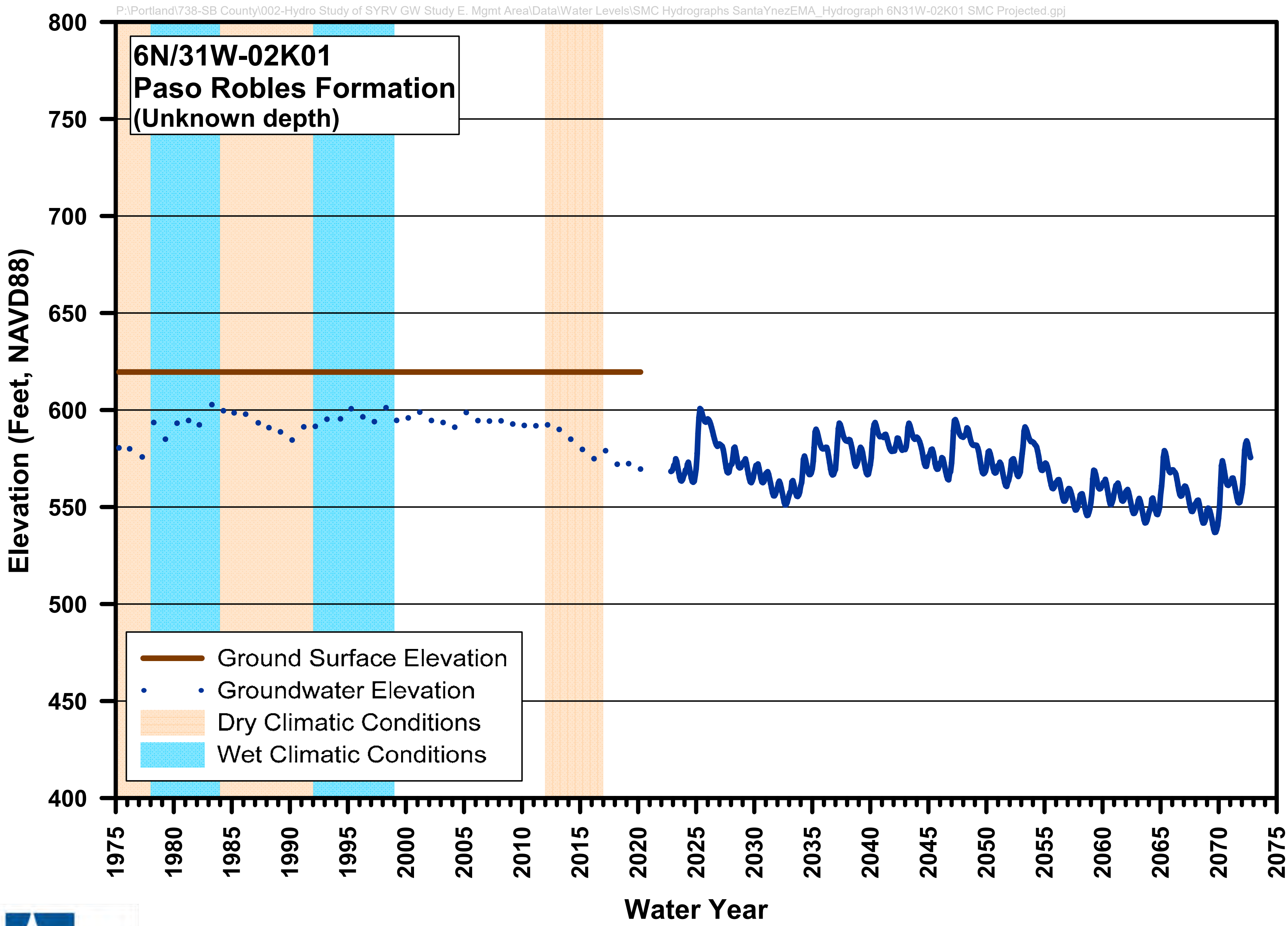


FIGURE F.1-9

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

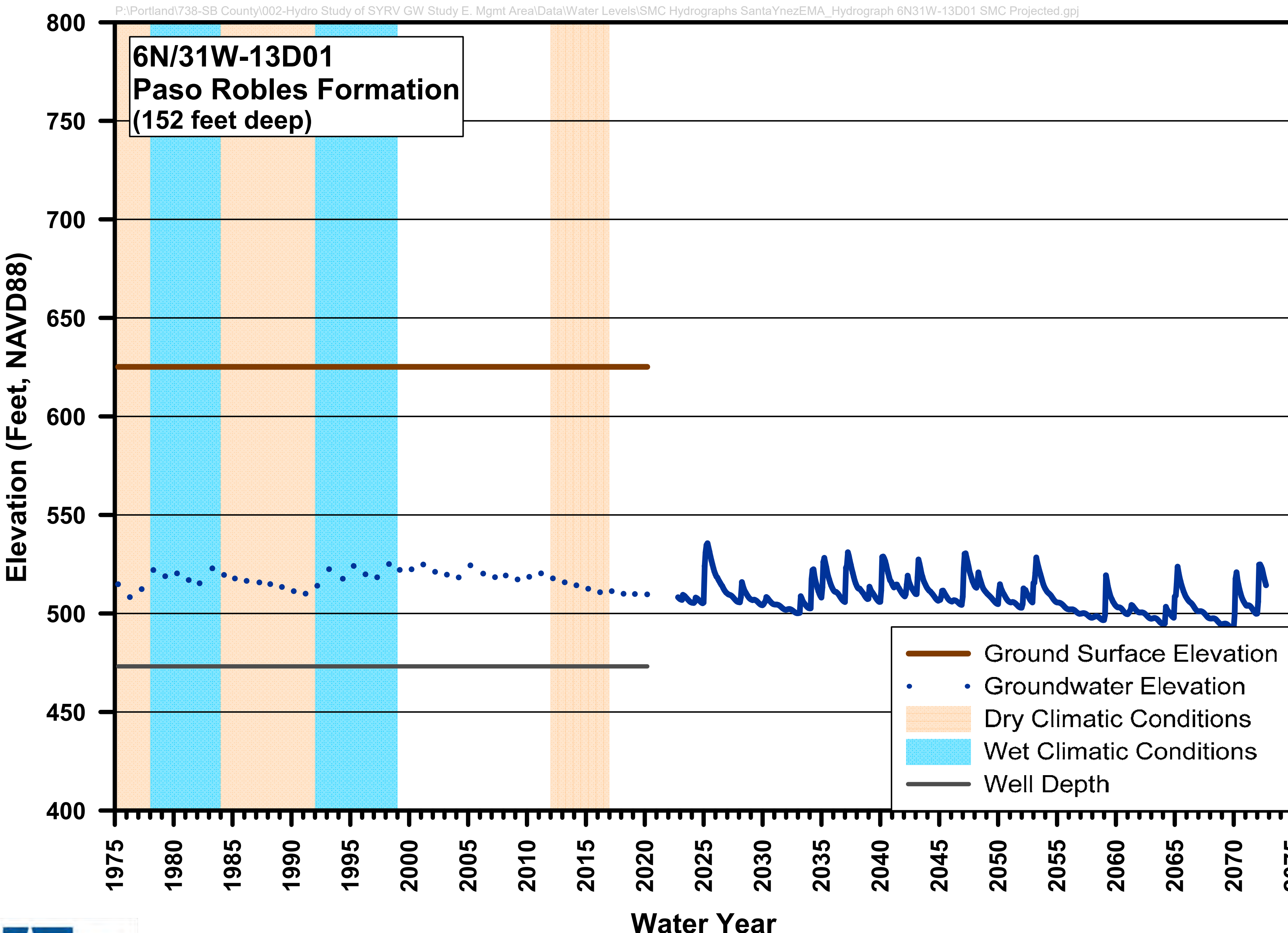


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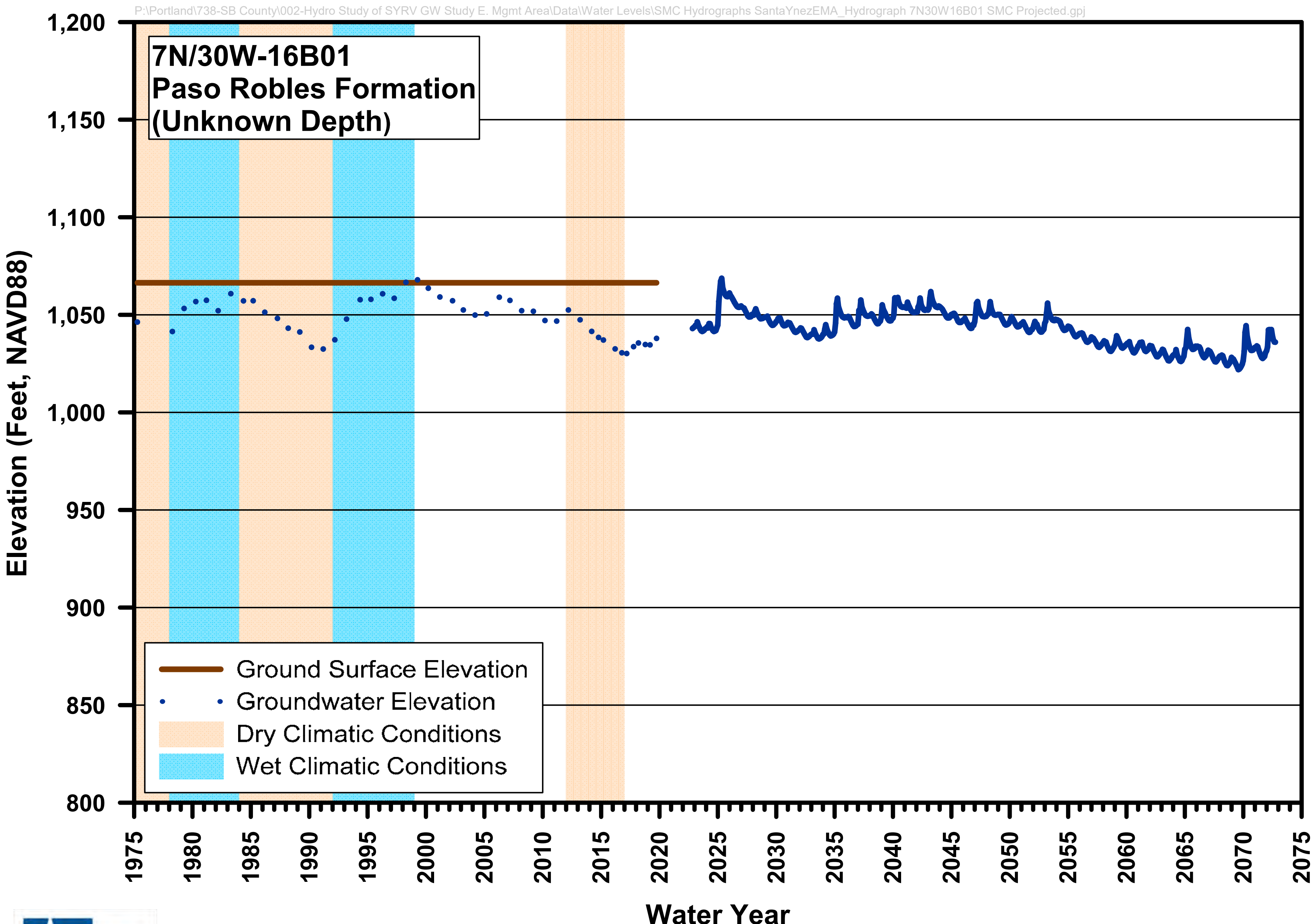
FIGURE F.1-10

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



GSI Water Solutions, Inc.

FIGURE F.1-11
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

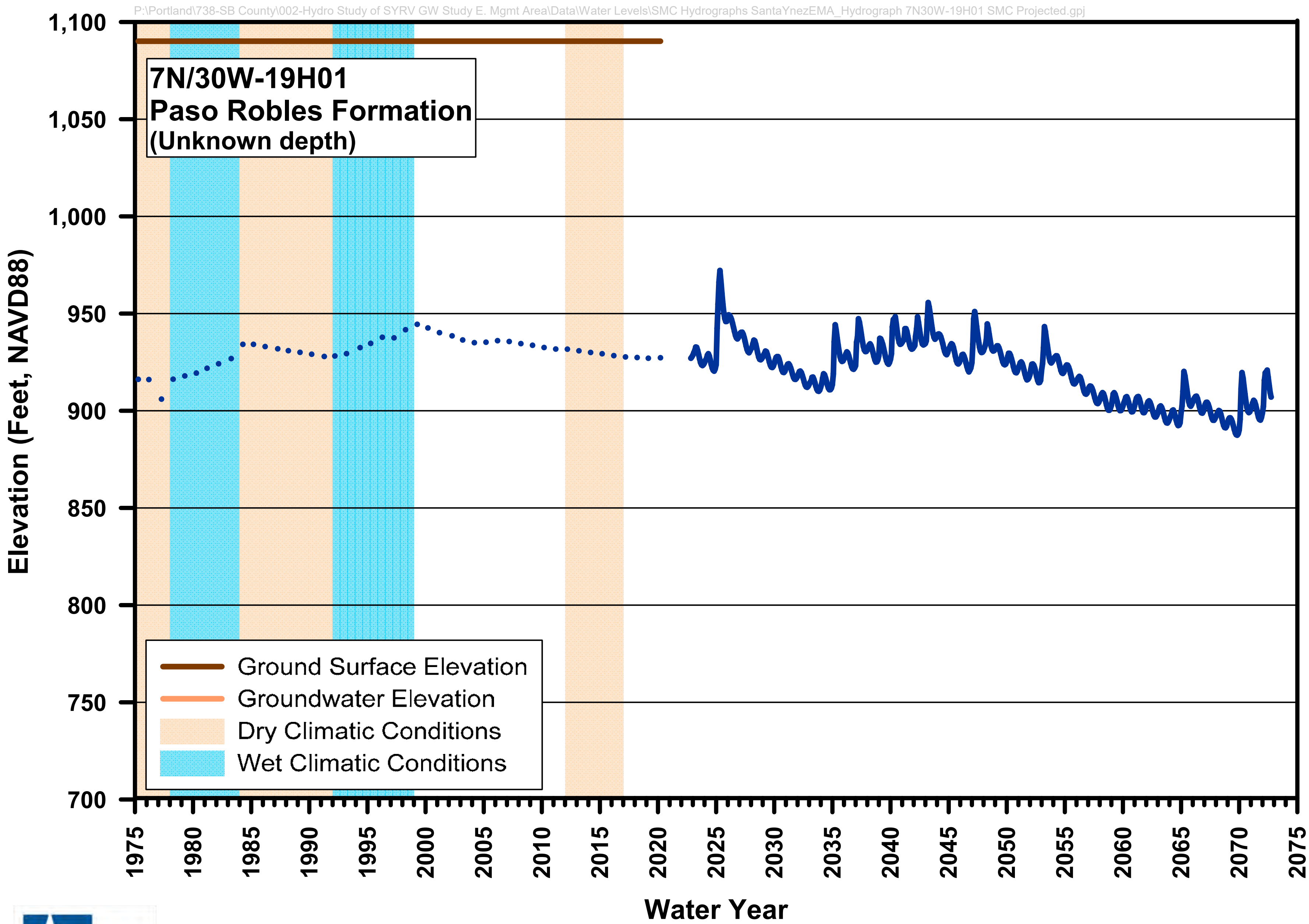


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FIGURE F.1-12
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

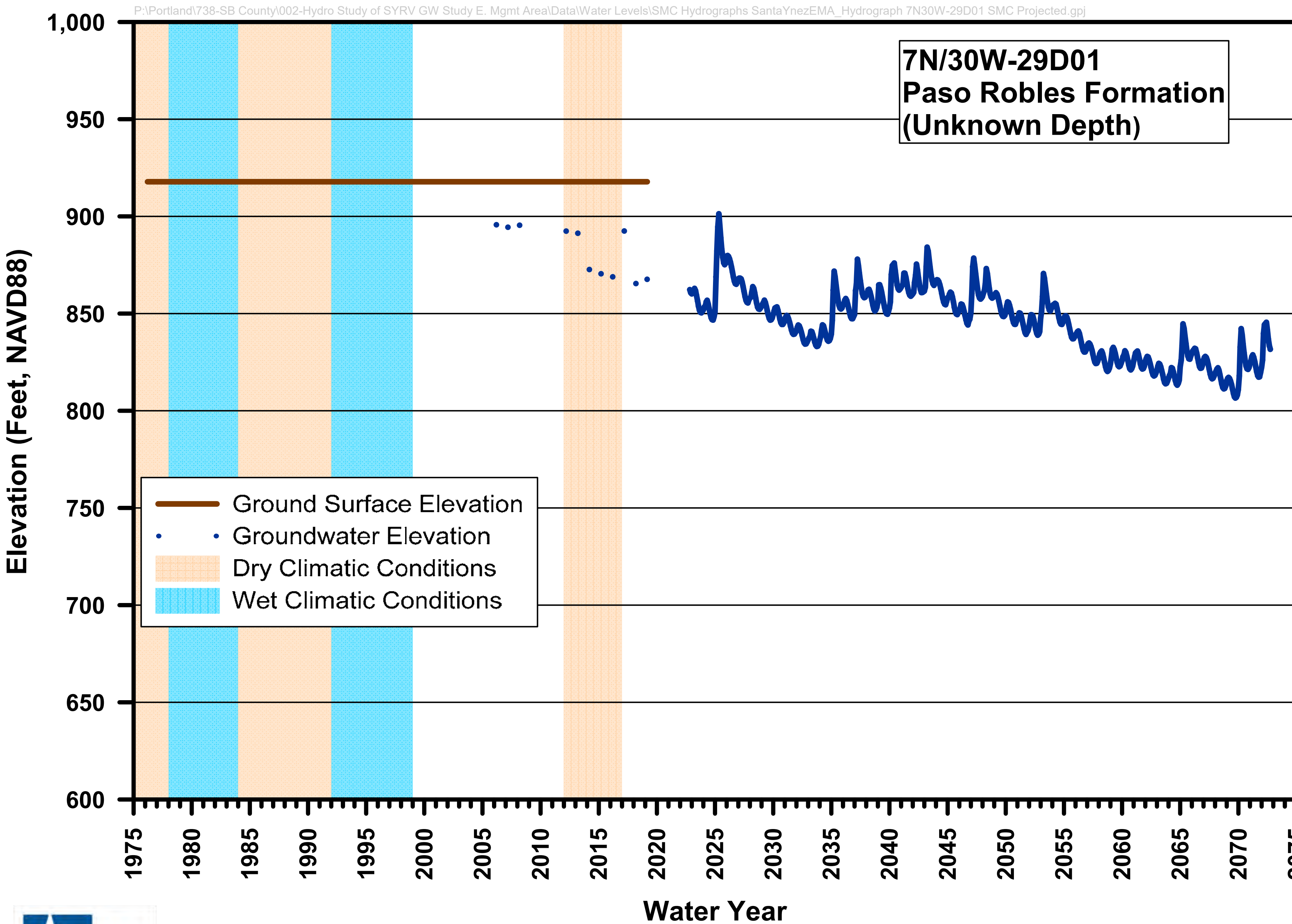

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FIGURE F.1-13
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

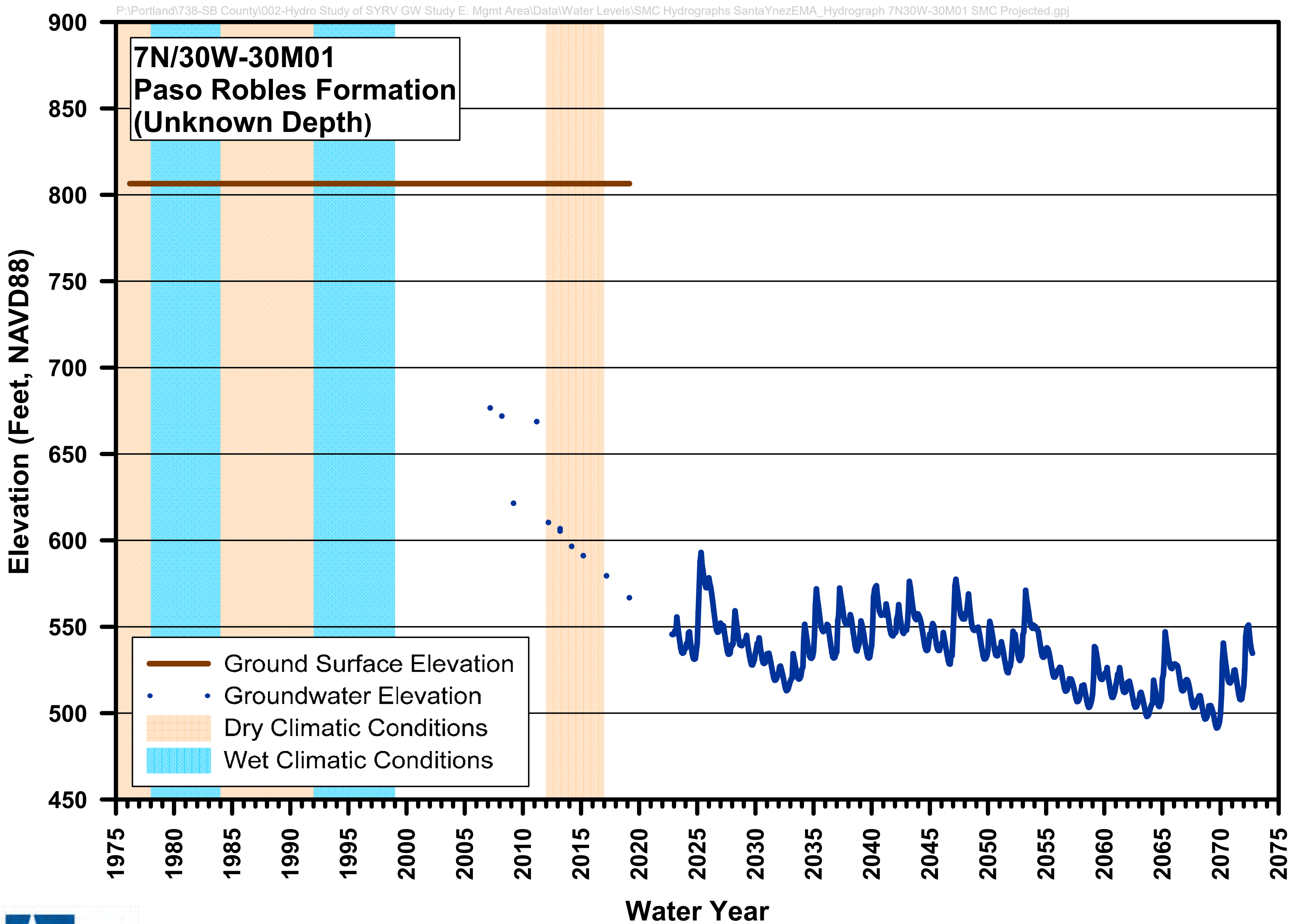

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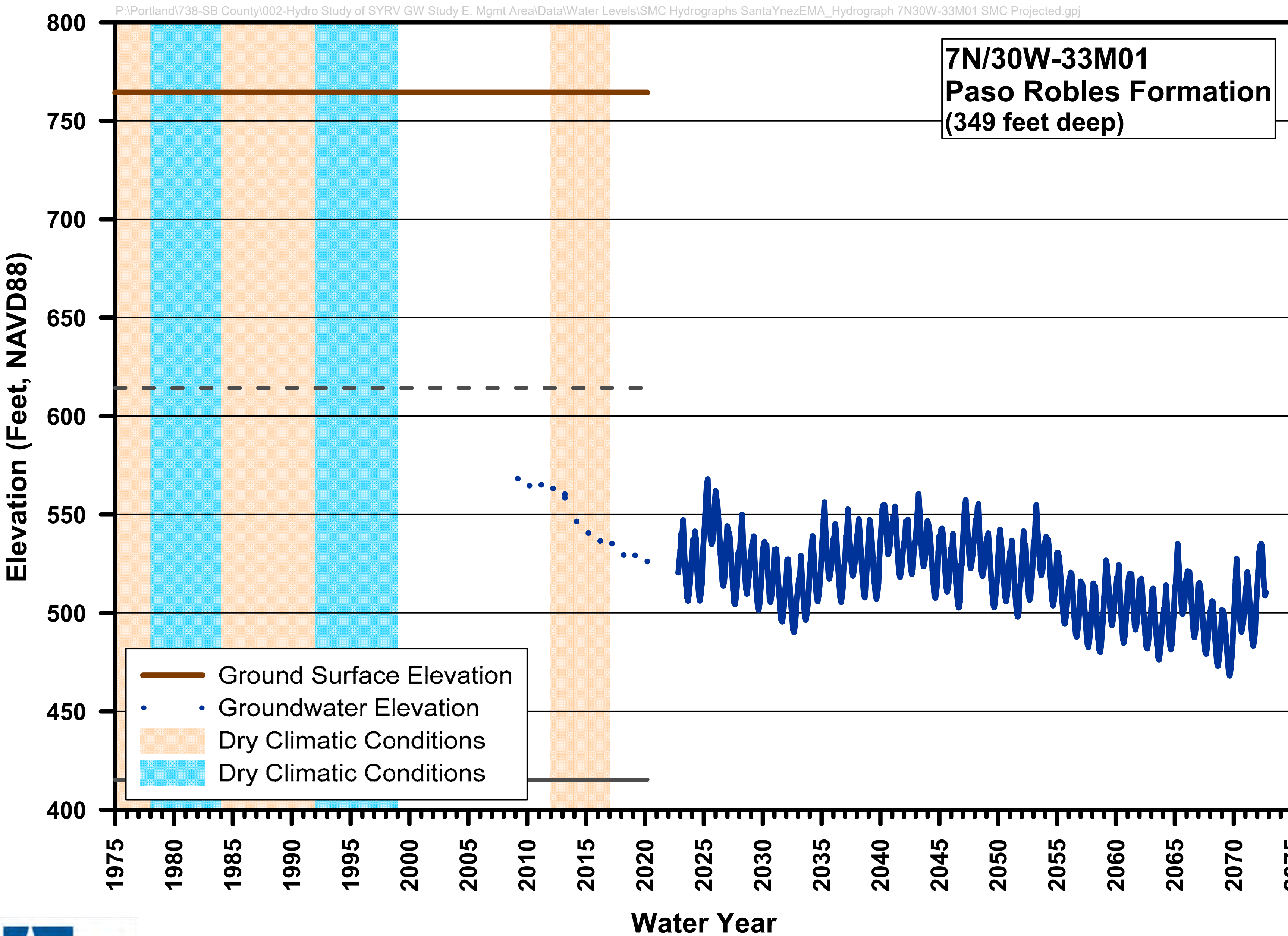
FIGURE F.1-14
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



GSI Water Solutions, Inc.

FIGURE F.1-15
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

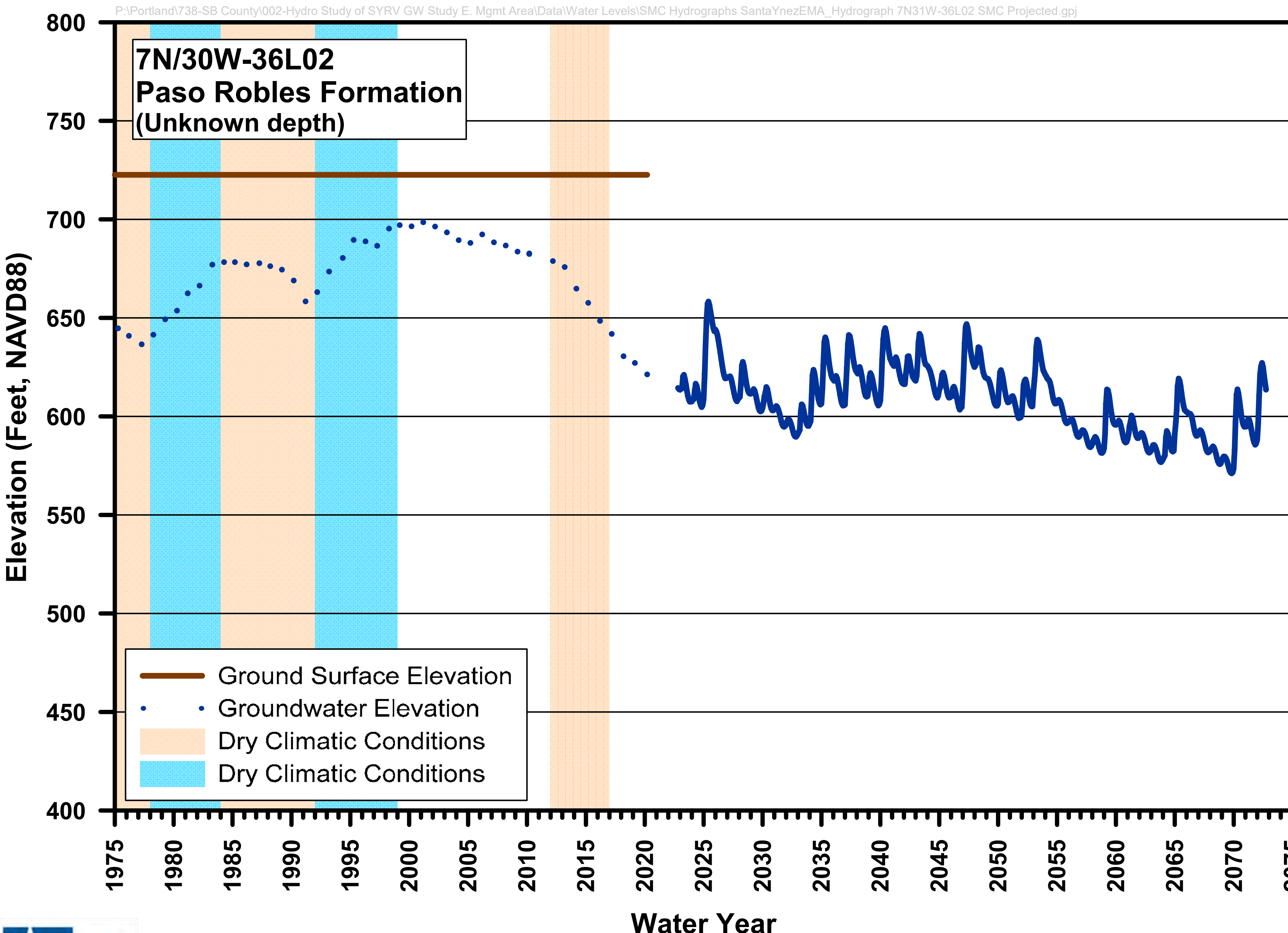


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FIGURE F.1-16
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

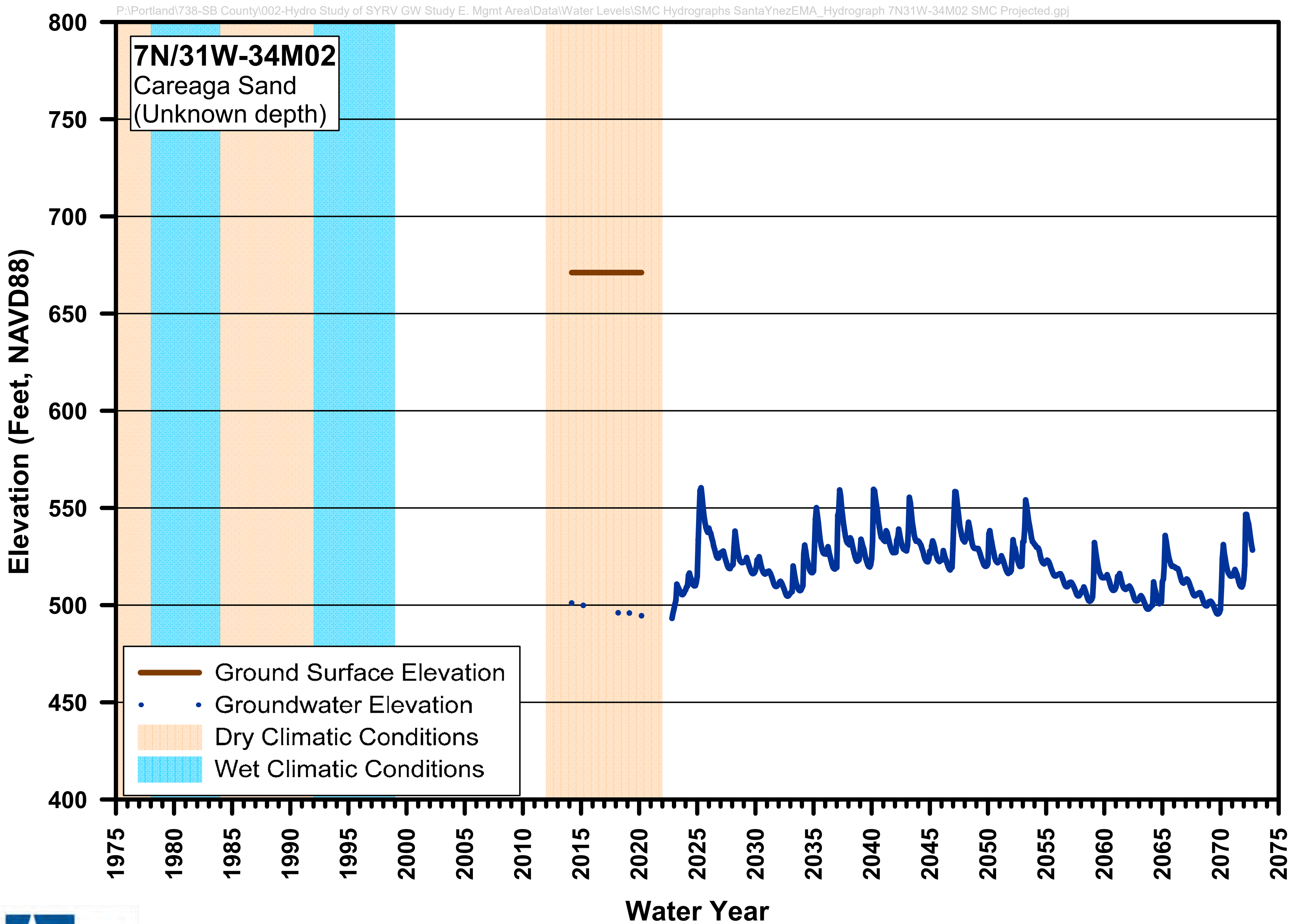

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FIGURE F.1-17
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

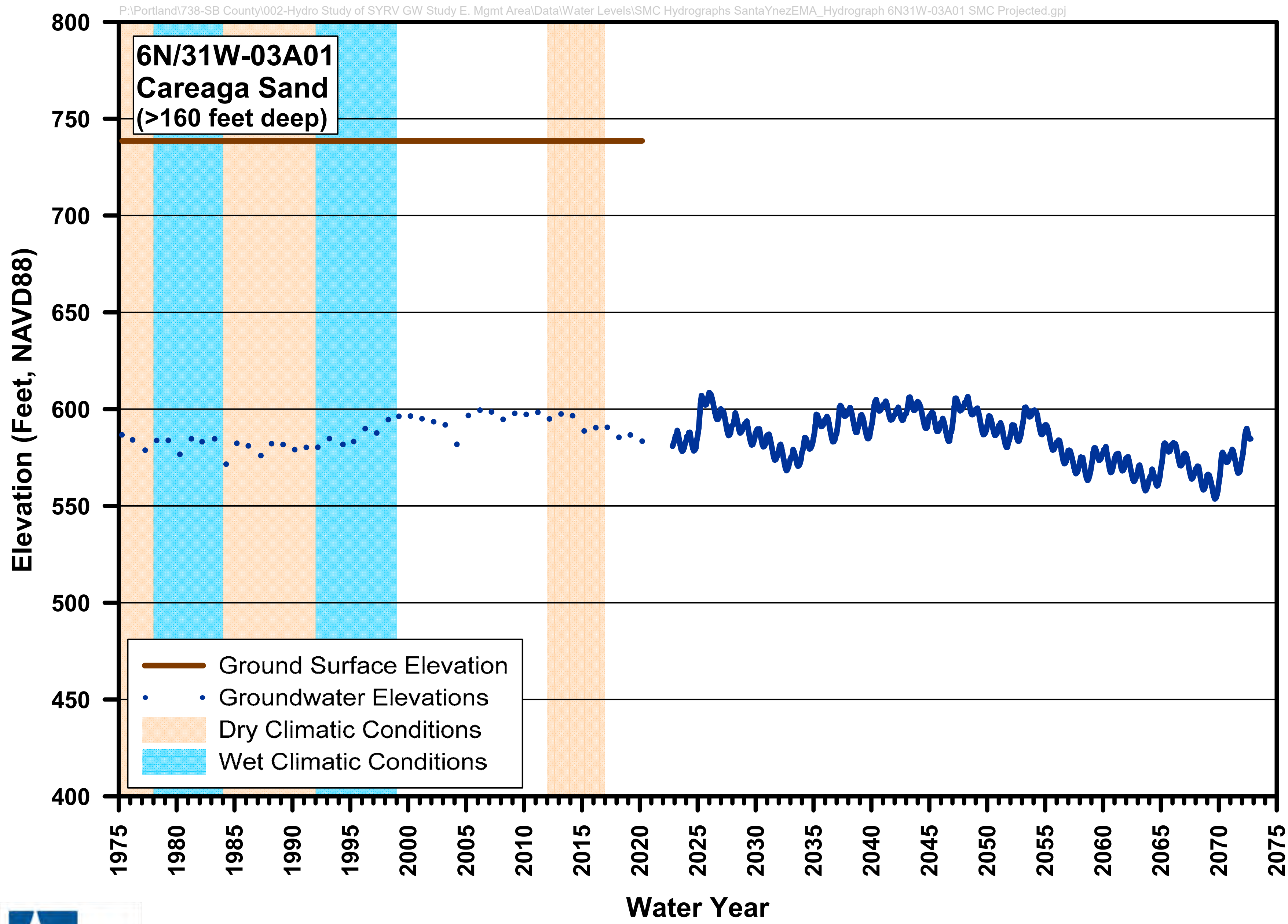

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FIGURE F.1-18
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

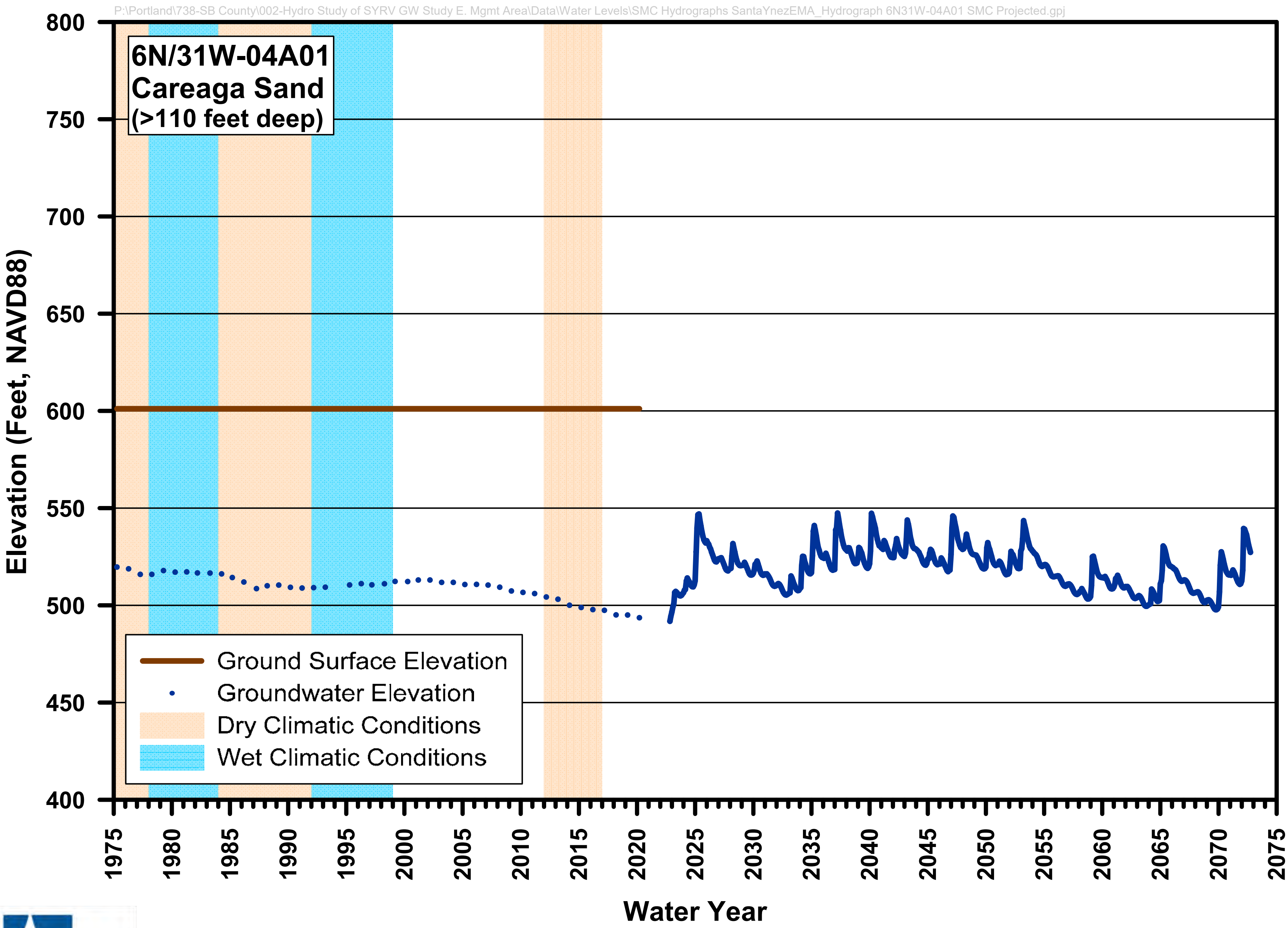

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FIGURE F.1-19
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

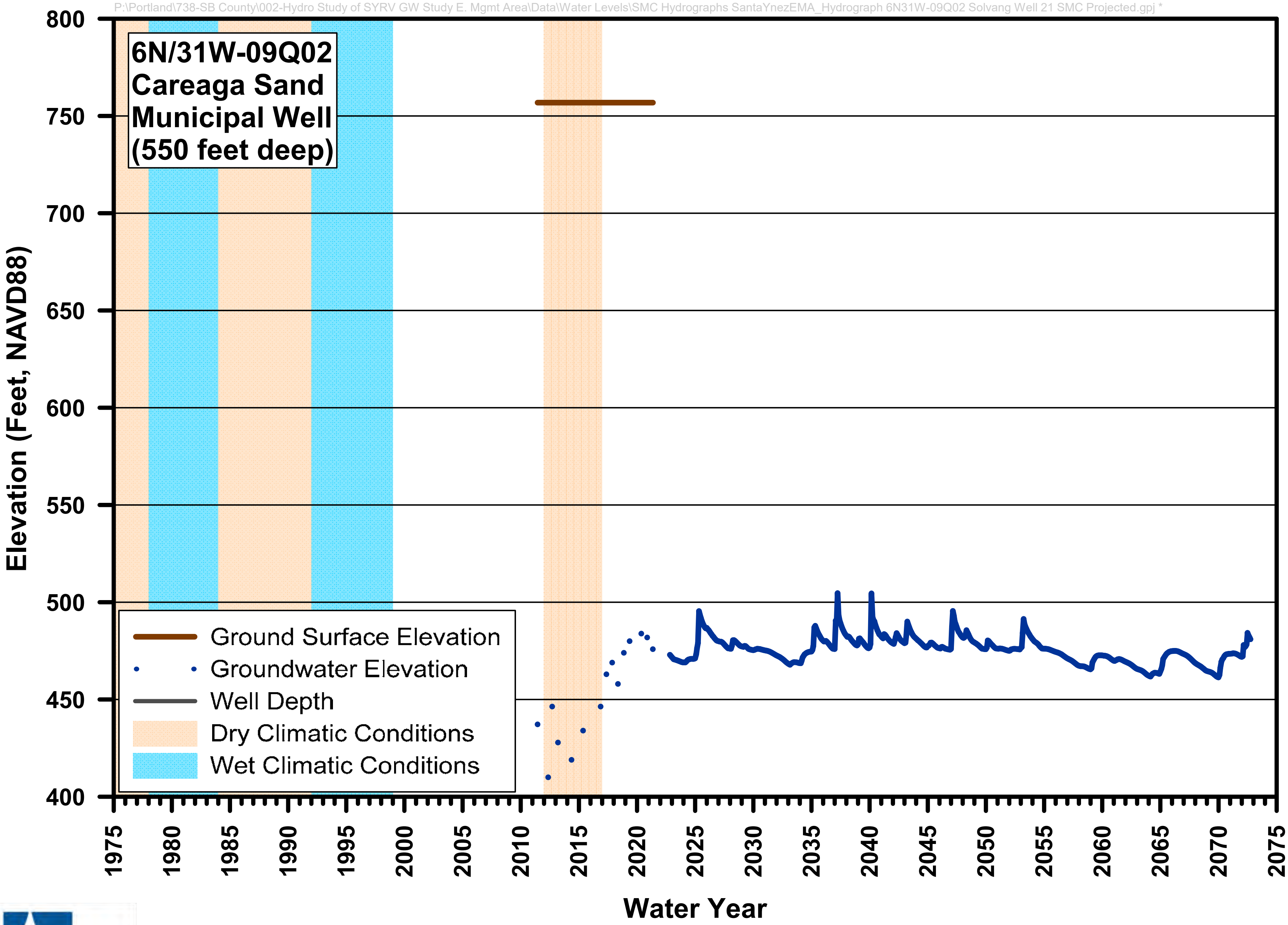

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FIGURE F.1-20

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

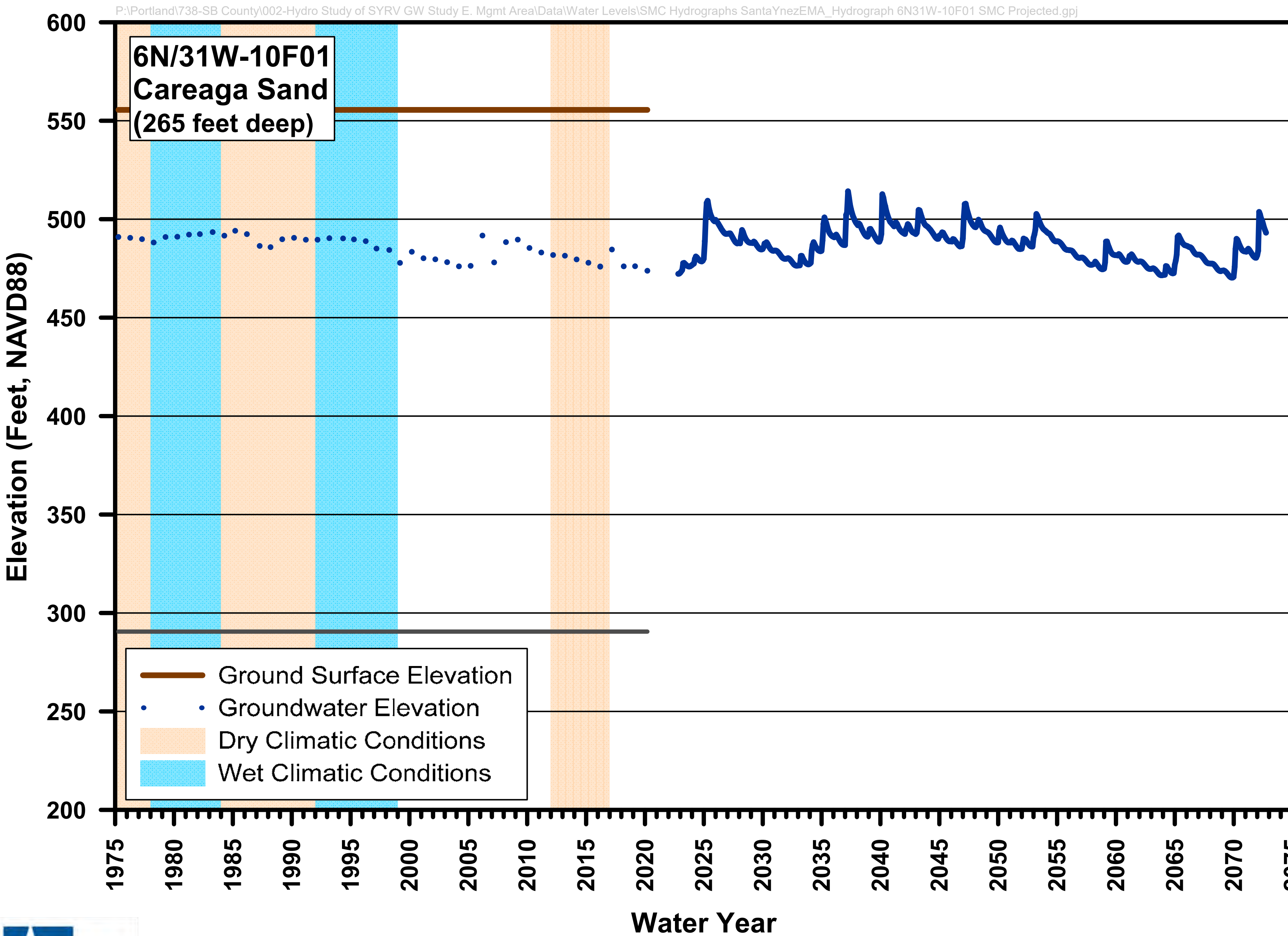

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FIGURE F.1-21

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

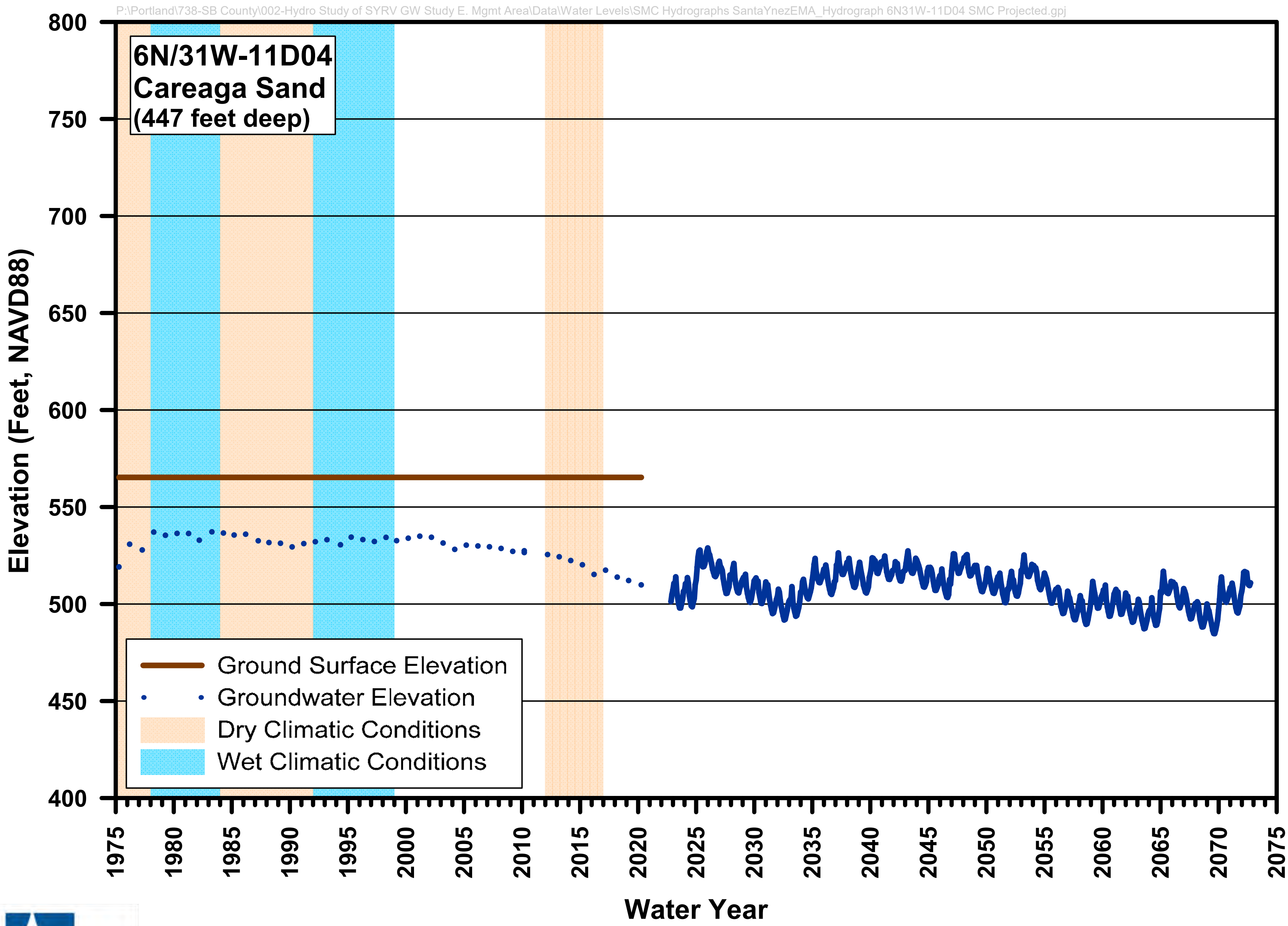

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FIGURE F.1-22
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

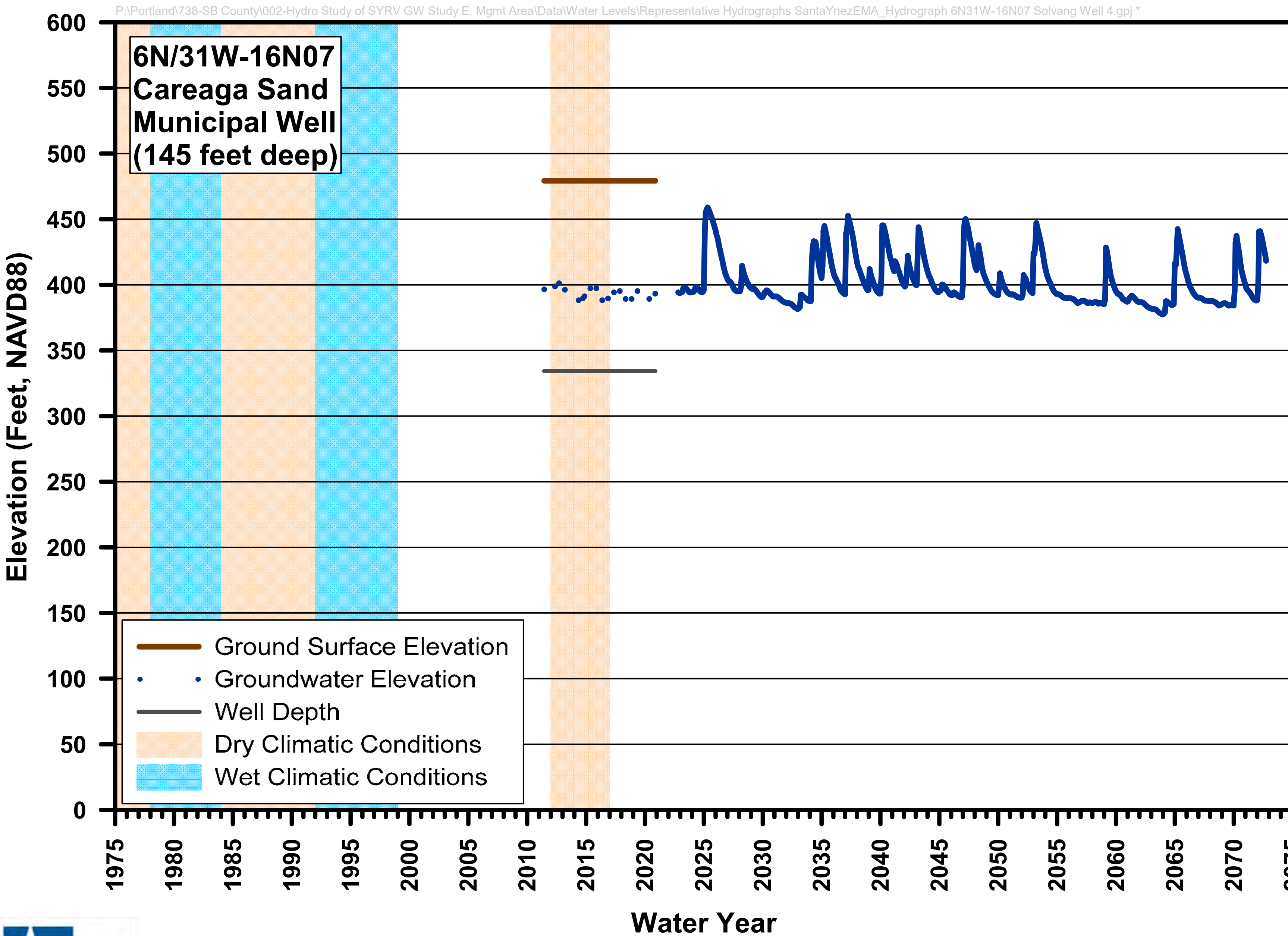

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FIGURE F.1-23
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

APPENDIX G

Excerpts from the Proposed General Waste Discharge Requirements for Discharges from Irrigated Land and California Regulations Related to Drinking Water

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Excerpt from the State of California, California Regional Water Quality Control Board, Central Coast Region Proposed General Waste Discharge Requirements for Discharges from Irrigated Land, Order No. R3-2021-0040, April XX, 2021, Order

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Management Practice Implementation and Assessment

8. Dischargers must implement management practices and assessment, as necessary, to improve and protect water quality, protect beneficial uses, achieve compliance with applicable water quality objectives, achieve the numeric targets, numeric interim quantifiable milestones, and numeric limits established in this Order. Management practices implementation and assessment must be documented in the appropriate section of the Farm Plan (e.g., irrigation and nutrient management practices and assessment must be documented in the INMP section of the Farm Plan). Dischargers must report on management practice implementation and assessment in the ACF, as described in the MRP.

CEQA Mitigation Measure Implementation, Monitoring, and Reporting

9. Impacts and mitigation measures identified in CEQA Mitigation Monitoring and Reporting Program are set forth in the Final Environmental Impact Report (FEIR) at Appendix D, which is incorporated by reference. Mitigation measures identified in the FEIR for this Order and required to be implemented as described in Appendix D, will substantially reduce environmental effects of the project. The mitigation measures included in this Order have eliminated or substantially lessened all significant effects on the environment, where feasible. Where noted, some of the mitigation measures are within the responsibility and jurisdiction of other public agencies. Such mitigation measures can and should be adopted, as applicable, by those other agencies.

10. Dischargers must report on mitigation measure implementation electronically in the Annual Compliance Form (ACF), as described in the MRP. Draft mitigation monitoring and reporting is available for review in the FEIR.

Part 2, Section C.1. Groundwater Protection

1. Dischargers may not be subject to all provisions of **Part 2, Section C.1** if they are members in good standing with the third-party alternative compliance pathway program included within **Part 2, Section C.2**.

Phasing

2. Ranches are assigned the Groundwater Phase Area of the groundwater basin where the ranch is located based on the relative level of water quality and beneficial use impairment and risk to water quality. All ranches are assigned a Groundwater Phase Area of 1, 2, or 3. Groundwater Phase 1 areas represent greater water quality impairment and higher risk to water quality relative to Groundwater Phase 2 and 3 areas.

3. The requirements and implementation schedules for groundwater protection are based on the groundwater phase areas, listed in **Table C.1-1** and shown on the maps in **Figure C.1-1**.

4. In the event that a ranch spans multiple Groundwater Phase areas, the ranch will be assigned the earlier phase. For example, a ranch that spans both Groundwater Phase 1 and Groundwater Phase 2 areas will be assigned to Groundwater Phase 1.

5. The Groundwater Phase Area assigned to each ranch will be displayed on the ranch eNOI in GeoTracker.

Irrigation and Nutrient Management Plan

6. Dischargers must develop and implement an Irrigation and Nutrient Management Plan (INMP) that addresses both groundwater and surface water. This section applies to the groundwater related INMP requirements and the surface water related INMP requirements are contained within **Part 2, Section C.3** of this Order. The INMP is a section of the Farm Plan and must be maintained in the Farm Plan and submitted to the Central Coast Water Board upon request. Summary information from the INMP must be submitted in the INMP Summary report. At a minimum, the elements of the INMP related to groundwater protection must include:

    a. Monitoring and recordkeeping necessary to submit complete and accurate reports, including the ACF, Total Nitrogen Applied (TNA) report, and INMP Summary report.
    b. Planning and management practice implementation and assessment that results in compliance with the fertilizer nitrogen application limits in **Table C.1-2** and the nitrogen discharge targets and limits in **Table C.1-3**.
    c. Descriptions of all irrigation, nutrient, and salinity management practices implemented and assessed on the ranch.
    d. When INMP certification is required, e.g., as a follow-up action or as a consequence for not meeting the quantifiable milestones and time schedules below, the INMP certification shall include the following:

    The person signing this Irrigation and Nitrogen Management Plan (INMP) certifies, under penalty of law, that the INMP was prepared under his/her direction and supervision, that the information and data reported is to the best of his/her knowledge and belief, true, accurate, and complete, and that he/she is aware that there are penalties for knowingly submitting false information. The qualified professional signing the INMP may rely on the information and data provided by the Discharger and is not required to independently verify the information and data.

The qualified professional signing the INMP below further certifies that he/she used sound irrigation and nitrogen management planning practices to develop irrigation and nitrogen application recommendations and that the recommendations are informed by applicable training to minimize nitrogen loss to surface water and groundwater. The qualified professional signing the INMP is not responsible for any damages, loss, or liability arising from subsequent implementation of the INMP by the Discharger in a manner that is inconsistent with the INMP's recommendations for nitrogen application. This certification does not create any liability or claims for environmental violations.

Qualified professional certification:
"I, ____________________, certify this INMP in accordance with the statement above."

___________________________ (Signature)

The discharger additionally agrees as follows:

"I, ____________________, Discharger, have provided information and data to the certifier above that is, to the best of my knowledge and belief, true, accurate, and complete, that I understand that the certifier may rely on the information and data provided by me and is not required to independently verify the information and data, and that I further understand that the certifier is not responsible for any damages, loss, or liability arising from subsequent implementation of the INMP by me in a manner that is inconsistent with the INMP's recommendations for nitrogen application. I further understand that the certification does not create any liability for claims for environmental violations."

Quantifiable Milestones and Time Schedules

7. As shown in **Table C.1-2**, the fertilizer nitrogen application limits go into effect during the second year of the this Order (December 31, 2023).

8. As shown in **Table C.1-3**, the nitrogen discharge targets go in to effect during the second year of this Order (December 31, 2023) and nitrogen discharge limits go in to effect during the fifth year of this Order (December 31, 2027).

Fertilizer Nitrogen Application Limits

9. Dischargers must not apply fertilizer nitrogen (**A_{FER}**) at rates greater than the limits in **Table C.1-2.** Compliance with fertilizer nitrogen application limits is assessed for each specific crop reported in the TNA report or INMP Summary report.

Nitrogen Discharge Targets and Limits

10. This Order requires Dischargers to submit information on nitrogen applied (**A**) and nitrogen removed (**R**). This Order also establishes nitrogen discharge targets and limits based on the calculation of nitrogen applied minus nitrogen removed (**A-R**) using the formulas below. Nitrogen must not be discharged at rates greater than the targets and limits in **Table C.1-3**. Compliance with nitrogen discharge targets and limits is assessed annually for the entire ranch in the INMP Summary report through one of the **three compliance pathways** shown below. Compliance with all pathways is not required.

Compliance Pathway 1:

$$A_{FER} + (C \times A_{COMP}) + (O \times A_{ORG}) + A_{IRR} - R = \text{Nitrogen Discharge}$$

OR

Compliance Pathway 2:

$$A_{FER} + (C \times A_{COMP}) + (O \times A_{ORG}) = R$$

OR

Compliance Pathway 3:

$$A_{FER} + (C \times A_{COMP}) + (O \times A_{ORG}) - R = \text{Nitrogen Discharge}$$

In all formulas, $R = R_{HARV} + R_{SEQ} + R_{SCAVENGE} + R_{TREAT} + R_{OTHER}$

a. **A_{FER}** is the amount of fertilizer nitrogen applied in pounds per acre.
b. **C** is the compost discount factor used to represent the amount of compost nitrogen mineralized during the year that the compost was applied.
c. **A_{COMP}** is the total amount of compost nitrogen applied in pounds per acre.
d. **O** is the organic fertilizer discount factor used to represent the amount of nitrogen mineralized during the first 12 weeks in the year it was applied.
e. **A_{ORG}** is the total amount of organic fertilizer or amendment nitrogen applied in pounds per acre.

f. $\mathbf{A_{IRR}}$ is the amount of nitrogen applied in the irrigation water estimated from the volume required for crop evapotranspiration (ET) in pounds per acre.
g. **R** is the amount of nitrogen removed from the field through harvest, sequestration, or other removal methods, in pounds per acre.
h. $\mathbf{R_{HARV}}$ is the amount of nitrogen removed from the field through harvest or other removal of crop material.
i. $\mathbf{R_{SEQ}}$ is the amount of nitrogen removed from the field through sequestration in woody materials of permanent or semi-permanent crops.
j. $\mathbf{R_{SCAVENGE}}$ is the amount of nitrogen removed from the field through nitrogen scavenging cover crops and/or nitrogen scavenging high carbon amendments during the wet/rainy season.
k. $\mathbf{R_{TREAT}}$ is the amount of nitrogen removed from the ranch through a quantifiable treatment method (e.g., bioreactor).
l. $\mathbf{R_{OTHER}}$ is the amount of nitrogen removed from the ranch through other methods not previously quantified.

11. The Central Coast Water Board encourages the use of irrigation water nitrogen as a method of reducing the amount of fertilizer nitrogen applied to crops. The use of irrigation water nitrogen is typically referred to as "pump and fertilize" and is incentivized through compliance pathway 2 and 3 in **Table C.1-3**. The amount of irrigation water nitrogen is not used in the compliance calculation in these compliance pathways. The amount of irrigation water nitrogen must be reported regardless of the compliance pathway.

12. The Central Coast Water Board encourages the use of compost to improve soil health, nutrient and carbon sequestration, and water holding capacity consistent with the state's Healthy Soils Initiative. All compost nitrogen ($\mathbf{A_{COMP}}$) applied to the ranch must be reported in the TNA report or INMP Summary report; however, the use of compost is incentivized through the option for Dischargers to use a compost "discount" factor (**C**). Dischargers may use the compost discount factor provided by the Central Coast Water Board in the MRP or may determine their own discount factor. The discounted compost nitrogen must, at a minimum, represent the amount of compost mineralized during the year the compost was applied to the ranch. If the Discharger uses their own compost discount factor, they must maintain records of the method used to determine the compost discount factor in the Farm Plan, and these records must be submitted to the Central Coast Water Board upon request.

13. The Central Coast Water Board encourages the use of organic fertilizers and amendments to improve soil health, nutrient and carbon sequestration, and water holding capacity consistent with the state's Healthy Soils Initiative. All organic fertilizer and amendment nitrogen ($\mathbf{A_{ORG}}$) applied to the ranch must be reported in the TNA report or INMP Summary report; however, the use of organic fertilizers and amendments is incentivized through the option for Dischargers to

use an organic fertilizer “discount” factor (**O**). Dischargers may use the organic fertilizer discount factor associated with the products C:N ratio, provided by the Central Coast Water Board in the MRP. The discounted organic fertilizer nitrogen must, at a minimum, represent the amount of organic fertilizer mineralized during the first 12 weeks the organic fertilizer was applied to the ranch. The Discharger must maintain records of the organic products used and their associated C:N ratios in the Farm Plan, and these records must be submitted to the Central Coast Water Board upon request. The following products are not eligible to receive an organic fertilizer discount: a) products with no organic compounds (long chain carbon) molecules, such as conventional fertilizer, slow release fertilizers, b) products that do not depend on microbial mineralization to release nitrogen to mineral form to make it available for crop uptake, c) products without C:N ratio information available, and d) organic liquid fertilizers that are in the liquid and/or emulsified form.

14. The amount of **crop material** removed through harvest or other methods (**R_{HARV}**) must be calculated using the formula described below. Dischargers must either use the crop-specific conversion coefficient values found in the MRP or develop their own conversion coefficient values following the approved method in the MRP. If Dischargers develop their own conversion coefficient, they must maintain information on the method used in the Farm Plan, and these records must be submitted to the Central Coast Water Board upon request.

    R_{HARV} = Conversion Coefficient x Material Removed

    a. The **Conversion Coefficient** is a crop-specific coefficient used to convert from units of material removed per acre to units of nitrogen removed per acre.
    b. **Material Removed** is the amount of nitrogen-containing material removed from the field, in units of pounds per acre.

15. The amount of nitrogen removed through **sequestration** in woody material of permanent or semi-permanent crops (**R_{SEQ}**) must be estimated by the Discharger. Dischargers must maintain records detailing how they estimated the amount of nitrogen sequestered in their permanent crops. These records must be maintained in the Farm Plan and submitted to the Central Coast Water Board upon request.

16. The Central Coast Water Board encourages Dischargers to implement best management practices that reduce nitrogen leaching in the wet/rainy season. Dischargers may claim a nitrogen scavenging credit (**$R_{SCAVENGE}$**) provided by the Central Coast Water Board in the MRP, one time per year for each ranch acre where nitrogen scavenging cover crops or nitrogen scavenging high carbon amendments are utilized during the wet/rainy season. The total acres receiving

the nitrogen scavenging credit may not exceed the ranch acres. Dischargers electing to claim the nitrogen scavenging credit must ensure that their cover crop and/or high carbon amendment best management practice meets the definitions of a nitrogen scavenging cover crop and/or nitrogen scavenging high carbon amendment, as noted in the MRP and Definitions. Substantiating records for this credit must be maintained in the Farm Plan and submitted to the Central Coast Water Board upon request.

17. The Central Coast Water Board encourages Dischargers to develop and implement innovative methods for removing nitrogen from the environment to improve water quality. Dischargers may use treatment methods (e.g., bioreactors) to remove nitrogen from groundwater or surface water and may count this towards their nitrogen removal (**R**) value if they are able to quantify the amount of nitrogen removed from ranch discharge to groundwater or surface water. This quantified removal through treatment or other innovative methods must be reported as $\mathbf{R}_{\mathbf{TREAT}}$. Dischargers electing to account for this nitrogen removal must monitor the volume and concentration of water entering and exiting their treatment system and calculate the amount of nitrogen removed. These records must be maintained in the Farm Plan and submitted to the Central Coast Water Board upon request.

18. If Dischargers remove additional nitrogen through means other than removing crop material ($\mathbf{R}_{\mathbf{HARV}}$), sequestration ($\mathbf{R}_{\mathbf{SEQ}}$), scavenging credit ($\mathbf{R}_{\mathbf{SCAVENGE}}$), or treatment methods ($\mathbf{R}_{\mathbf{TREAT}}$), they must quantify and report this additional removal as $\mathbf{R}_{\mathbf{OTHER}}$. Dischargers must maintain records detailing how they calculated $\mathbf{R}_{\mathbf{OTHER}}$. These records must be maintained in the Farm Plan and submitted to the Central Coast Water Board upon request.

19. The discharge of nitrogen in excess of the nitrogen discharge **targets** in **Table C.1-3** may result in additional requirements, including obtaining additional education, INMP certification by a qualified professional, implementing additional or improved management practices, and increased monitoring and/or reporting.

20. The discharge of nitrogen in excess of the nitrogen discharge **limits** in **Table C.1-3** may result in additional requirements, including obtaining additional education, INMP certification by a qualified professional, implementing additional or improved management practices, increased monitoring and reporting, and/or progressive enforcement actions.

21. Dischargers who apply more fertilizer nitrogen ($\mathbf{A}_{\mathbf{FER}}$) than the fertilizer nitrogen application limits in **Table C.1-2** to any specific crop **and** who are able to demonstrate compliance with the **final** nitrogen discharge limits, as shown in **Table C.1-3**, are exempt from the fertilizer nitrogen application limit.

22. Dischargers who can quantifiably demonstrate that their ranches pose no threat to surface water quality or groundwater quality may submit a technical report to the Executive Officer for review. If approved, the Discharger is not required to conduct the nitrogen application (**A**) or removal (**R**) monitoring and reporting or to submit the INMP Summary report, regardless of what Groundwater Phase area the ranch is in. The technical report must demonstrate that nitrogen applied at the ranch does not percolate below the root zone in an amount that could degrade groundwater and does not migrate to surface water through discharges, including drainage, runoff, or sediment erosion. Dischargers must provide the Executive Officer with annual updates to confirm that the exemption is still applicable. Failure to provide sufficient annual updates confirming that the exemption is still applicable will result in an immediate reinstatement of the requirement to submit the INMP Summary report for applicable Dischargers. Dischargers electing to use this approach are still eligible to participate in the third-party alternative compliance pathway for groundwater protection.

23. Dischargers who can quantifiably demonstrate that their ranch is achieving the **final** nitrogen discharge limits , as shown in **Table C.1-3,** are not required to submit the nitrogen removal (**R**) reporting in the INMP Summary report, regardless of what Groundwater Phase area the ranch is in. Example situations where this may apply include participation in an approved third-party program that certifies that the Discharger is meeting the final discharge limit and will continue to do so for the duration of the Discharger’s participation in the approved third-party program, or by submitting a technical report, subject to Executive Officer review, that quantifies the amount of nitrogen discharge based on the volume and nitrogen concentration of all discharges from the ranch. In these situations, confirmation of membership in the approved third-party program or Executive Officer approval of a submitted technical report constitute compliance with the nitrogen removed (**R**) reporting requirement in the INMP Summary report. This exemption only applies to removal (**R**) in the INMP Summary report; all other requirements, including the TNA report, still apply as described in this Order. Dischargers must provide the Executive Officer with annual updates to confirm that the exemption is still applicable. Failure to provide sufficient annual updates confirming that the exemption is still applicable will result in an immediate reinstatement of the requirement to submit the nitrogen removal (R) reporting information in the INMP Summary report for applicable Dischargers. Dischargers electing to use this approach are still eligible to participate in the third-party alternative compliance pathway for groundwater protection.

24. Dischargers, groups of dischargers or commodity groups who can quantify the amount of nitrogen discharged from their ranch or for specific crops or via specific management practices by directly monitoring it at the points of discharge can propose an alternative monitoring methodology to comply with the nitrogen

discharge targets and limits, in lieu of using the A-R compliance formulas. Example situations where this may apply includes greenhouse, nursery, container production or intensive crop production where irrigation and drain water is captured and allows for direct monitoring of discharges. For these types of situations, it may be easier to monitor nitrogen discharge than to calculate the amount of nitrogen removed at harvest for each one of the many different crops and plants being grown. Dischargers must submit a request to the Executive Officer with a technical report of the methodology proposed to quantify nitrogen discharges. The methodology must include enough information to quantify the amount of nitrogen discharged and confirm compliance with the nitrogen discharge targets and limits, as shown in **Table C.1-3 or Table C.2-2** (for Dischargers participating in the Third-Party Alternative Compliance Pathway Program for Groundwater Protection described in **Part 2, Section C.2)**. Acceptable methodologies must include direct measurements of the volume and nitrogen concentration of the water discharged from each ranch per acre and year. Executive Officer approval of the method(s) must be granted before the discharger begins reporting nitrogen discharge based on the proposed methodology. Dischargers who obtain Executive Officer approval to directly monitor their nitrogen discharge from their ranches will not be required to submit nitrogen removal (R) reporting in the INMP Summary report. Dischargers electing to use this approach are still eligible to participate in the third-party alternative compliance pathway program for groundwater protection.

25. The initial 2027 nitrogen discharge limits, as shown in **Table C.1-3** will be re-evaluated based on Discharger reported nitrogen applied and removed data, new science, and management practice implementation and assessment before becoming effective.

Monitoring and Reporting

26. Dischargers must report on management practice implementation and assessment electronically in the **ACF**, as described in the MRP.

27. Dischargers must record and report total nitrogen applied to all crops grown on the ranch, electronically in the TNA report form, as described in the MRP.

28. Dischargers must track and record the following elements of the INMP Summary report that are not included in the TNA report: total nitrogen removed from the ranch and information on irrigation water application and discharge volumes. Dischargers must submit this information electronically in the INMP Summary report form as described in the MRP.

29. The INMP Summary report contains the same nitrogen application information as the TNA report, plus additional information related to nitrogen removed and irrigation management. **Therefore, the INMP Summary report satisfies the**

TNA report requirement and an additional TNA report is not required to be submitted when the INMP Summary report is submitted to the Central Coast Water Board.

30. Dischargers must conduct **irrigation well monitoring and reporting prior to the start of groundwater quality trend monitoring and reporting**, either individually or as part of a third-party effort, as described in the MRP.

31. Dischargers must conduct **on-farm domestic well monitoring and reporting**, either individually or as part of a third-party effort, as described in the MRP.

32. Dischargers must conduct **groundwater quality trend monitoring and reporting**, either individually or as part of a third-party effort, as described in the MRP. This requirement applies to all Dischargers enrolled in this Order, regardless of how many wells are currently present on their ranch.

    a. Dischargers who elect to perform groundwater quality trend monitoring and reporting as part of a **third-party** effort must form or join a third-party. The third-party must submit a work plan for Executive Officer review by the dates and covering the areas specified in the MRP unless it is associated with the Third-Party Alternative Compliance Pathway for Groundwater Protection described in **Part 2, Section C.2**. The work plan must be approved by the Executive Officer prior to implementation. Once approved by the Executive Officer, the work plan must be implemented.
    b. Dischargers who elect to perform groundwater quality trend monitoring and reporting individually must submit a work plan for Executive Officer review, by the date specified in the MRP, based on their ranch location. The work plan must be approved by the Executive Office prior to implementation. The work plan must describe how the ranch-level groundwater quality trend monitoring program will evaluate groundwater quality trends over time and assess the impacts of agricultural discharges on groundwater quality. Once approved by the Executive Officer, the work plan must be implemented. Dischargers without a well on their property may comply with individual ranch-level groundwater quality trend monitoring and reporting requirements by implementing one of the options specified in the MRP.

33. When required by the Executive Officer based on groundwater quality data or significant and repeated exceedance of the nitrogen discharge targets or limits, Dischargers must complete **ranch-level groundwater discharge monitoring and reporting**, either individually or as part of a third-party effort as described in the MRP. Water Board staff will coordinate with Dischargers prior to the Executive Officer invoking this requirement to determine if non-compliance is the result of unforeseen or uncontrollable circumstances and to provide the Discharger with 90-day advanced notice of the forthcoming requirement. When ranch-level groundwater discharge monitoring and reporting is required, a work

plan, including a SAP and QAPP, must be submitted for Executive Officer review prior to implementation. Once approved by the Executive Officer, the work plan must be implemented. Ranch-level groundwater discharge monitoring may be discontinued with the approval of the Executive Officer when the Discharger comes into compliance with the nitrogen discharge targets or limits, or the discharge has otherwise ceased.

Part 2, Section C.2. Third-Party Alternative Compliance Pathway for Groundwater Protection

1. Dischargers that are members in good standing in the third-party alternative compliance pathway program are subject to the provisions of this **Part 2, Section C.2**, unless otherwise stated. For purposes of this section, such Dischargers are referred to as "participating Dischargers."

   Participating dischargers:

   a. Are not subject to fertilizer nitrogen application limits in **Table C.1-2**, which are enforceable by the Central Coast Water Board.
   b. Are not subject to nitrogen discharge limits in **Table C.1-3**, which are enforceable by the Central Coast Water Board.
   c. Are subject to targets, which if exceeded result in consequences outlined in this **Part 2, Section C.2**.
   d. Are not subject to ranch-level groundwater discharge monitoring and reporting.
   e. Are generally provided more time to achieve fertilizer nitrogen application targets and nitrogen discharge targets, relative to non-participating dischargers.

2. Prior to the initiation of the work plan process outlined below and in the MRP for this third-party alternative compliance pathway program, entities wishing to implement the third-party alternative compliance pathway program described in this **Part 2, Section C.2** must submit a third-party alternative compliance pathway program proposal consistent with the third-party program requirements outlined in **Part 2, Section A** of this Order, as well as the request for proposal process and associated third-party program expectations document forthcoming after Order adoption. For purposes of this section, the entity approved to implement the third-party alternative compliance pathway is referred to as the approved third-party alternative compliance pathway program administrator.

3. Participating Dischargers must develop and implement an Irrigation and Nutrient Management Plan (INMP) that addresses groundwater. The INMP is a section of the Farm Plan and must be maintained in the Farm Plan and submitted to the Central Coast Water Board upon request. Summary information from the INMP must be submitted in the INMP Summary report. At a minimum, the elements of

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§64310. Reduction of Fees for Public Water Systems Serving Disadvantaged Community.

(a) A public water system must pay the full amount of the annual fee unless it requests and receives from the State Board a determination that its annual fees are reduced because it is a community water system that serves a disadvantaged community in which case the fee to be paid is the amount for a disadvantaged community as shown in Table 64305-A.

(b) To qualify for the reduction provided for in subsection (a), a public water system must certify, and provide documentation to the State Board upon request, that it serves a disadvantaged community.

§64315. Payment of Fees

(a) Each fee required by this chapter shall be paid to the State Board within forty five (45) calendar days of the date of the invoice, except that this date may be extended by the State Board for good cause, which shall be determined at the State Board's sole discretion.

CHAPTER 15. DOMESTIC WATER QUALITY AND MONITORING REGULATIONS

Article 1. Definitions

§64400. Acute Risk.

"Acute risk" means the potential for a contaminant or disinfectant residual to cause acute health effects, i.e., death, damage or illness, as a result of a single period of exposure of a duration measured in seconds, minutes, hours, or days.

§64400.05. Combined Distribution System.

"Combined distribution system" means the interconnected distribution system consisting of the distribution systems of wholesale systems and of the consecutive systems that receive finished water.

§64400.10. Community Water System.

"Community water system" means a public water system which serves at least 15 service connections used by yearlong residents or regularly serves at least 25 yearlong residents.

§64400.20. Compliance Cycle.

"Compliance cycle" means the nine-year calendar year cycle during which public water systems shall monitor. Each compliance cycle consists of three three-year compliance periods. The first calendar year cycle began January 1, 1993 and ends December 31, 2001; the second begins January 1, 2002 and ends December 31, 2010; the third begins January 1, 2011 and ends December 31, 2019.

§64400.25. Compliance Period.
"Compliance period" means a three-year calendar year period within a compliance cycle. Within the first compliance cycle, the first compliance period runs from January 1, 1993 to December 31, 1995; the second from January 1, 1996 to December 31, 1998; the third from January 1, 1999 to December 31, 2001.

§64400.28. Confluent Growth.
"Confluent growth" means a continuous bacterial growth covering the entire filtration area of a membrane filter, or a portion thereof, in which bacterial colonies are not discrete.

§64400.29. Consecutive System.
"Consecutive system" means a public water system that receives some or all of its finished water from one or more wholesale systems. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

§64400.30. Customer.
"Customer" means a service connection to which water is delivered by a community water system or a person that receives water from a nontransient-noncommunity water system for more than six months of the year.

§64400.32. Detected.
"Detected" means at or above the detection limit for purposes of reporting (DLR).

§64400.34. Detection Limit for Purposes of Reporting (DLR).
"Detection limit for purposes of reporting (DLR)" means the designated minimum level at or above which any analytical finding of a contaminant in drinking water resulting from monitoring required under this chapter shall be reported to the State Board.

§64400.36. Dual Sample Set.
"Dual sample set" means a set of two samples collected at the same time and same location, with one sample analyzed for TTHM and the other sample analyzed for HAA5.

§64400.38. Enhanced Coagulation.
"Enhanced coagulation" means the addition of sufficient coagulant for improved removal of disinfection byproduct precursors by conventional filtration treatment.

§64400.40. Enhanced Softening.
"Enhanced softening" means the improved removal of disinfection byproduct precursors by precipitative softening.

§64400.41. Finished Water.
"Finished water" means the water that is introduced into the distribution system of a public water system and is intended for distribution and consumption without further treatment, except as treatment necessary to maintain water quality in the distribution system (e.g., booster disinfection, addition of corrosion control chemicals).

§64400.42. Fluoridation.
"Fluoridation" means the addition of fluoride to drinking water to achieve an optimal level, pursuant to Section 64433.2, that protects and maintains dental health.

§64400.45. GAC10.
"GAC10" means granular activated carbon filter beds with an empty-bed contact time of 10 minutes based on average daily flow and a carbon reactivation frequency of once every 180 days, except that the reactivation frequency for GAC10 used as a best available technology for compliance with the TTHM and HAA5 MCLs monitored pursuant to section 64534.2(d) shall be once every 120 days.

§64400.46. GAC20.
"GAC20" means granular activated carbon filter beds with an empty-bed contact time of 20 minutes based on average daily flow and a carbon reactivation frequency of once every 240 days.

§64400.47. Haloacetic Acids (Five) or HAA5.
"Haloacetic acids (five)" or "HAA5" means the sum of the concentrations in milligrams per liter (mg/L) of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid), rounded to two significant figures after addition.

§64400.50. Initial Compliance Period.
"Initial compliance period" means the first full three-year compliance period which began January 1, 1993, for existing systems. For new systems, the "initial compliance period" means the period in which the State Board grants the permit.

§64400.60. Initial Finding.
"Initial finding" means the first laboratory result from a water source showing the presence of an organic chemical listed in §64444, Table 64444-A.

§64400.65. IOC.
"IOC" means inorganic chemical.

§64400.66. Locational Running Annual Average or LRAA.
"Locational running annual average" or "LRAA" means the average of sample analytical results for samples taken at a particular monitoring location during the previous four calendar quarters.

§64400.67. Maximum Residual Disinfectant Level or MRDL.
"Maximum residual disinfectant level" or "MRDL" means a level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap.

§64400.70. MCL.
"MCL" means maximum contaminant level.

§64400.80. Nontransient-noncommunity Water System.
"Nontransient-noncommunity water system" means a public water system that is not a community water system and that regularly serves at least the same 25 persons over 6 months per year.

§64400.90. Operational Evaluation Levels or OEL.
"Operational evaluation level" or "OEL" means the sum of the two previous quarters' TTHM results plus twice the current quarter's TTHM result, divided by 4 to determine an average; or the sum of the two previous quarters' HAA5 results plus twice the current quarter's HAA5 result, divided by 4 to determine an average.

§64401. Repeat Compliance Period.
"Repeat compliance period" means any subsequent compliance period after the initial compliance period.

§64401.10. Repeat Sample.
"Repeat sample" means a required sample collected following a total coliform-positive sample.

§64401.20. Replacement Sample.
"Replacement sample" means a sample collected to replace an invalidated sample.

§64401.30. Routine Sample.
"Routine sample" means a bacteriological sample the water supplier is required to collect on a regular basis, or one which the supplier is required to collect for a system not in compliance with Sections 64650 through 64666 when treated water turbidity exceeds 1 nephelometric turbidity unit (NTU), pursuant to §64423(b).

§64401.40. Sanitary Survey.
"Sanitary survey" means an on-site review of a public water system for the purpose of evaluating the adequacy of the water source, facilities, equipment, operation and maintenance for producing and distributing safe drinking water.

§64401.50. Significant Rise in Bacterial Count.
"Significant rise in bacterial count" means an increase in coliform bacteria, as determined in §64426, when associated with a suspected waterborne illness or disruption of physical works or operating procedures.

§64401.55. SOC.
"SOC" means synthetic organic chemical.

§64401.60. Standby Source.
"Standby source" means a source which is used only for emergency purposes pursuant to §64414.

§64401.65. SUVA.
"SUVA" means Specific Ultraviolet Absorption at 254 nanometers (nm), an indicator of the humic content of a water. It is calculated by dividing a sample's ultraviolet absorption at a wavelength of 254 nm (UV_{254}) (in m^{-1}) by its concentration of dissolved organic carbon (DOC) (in mg/L).

§64401.70. System with a Single Service Connection.
"System with a single service connection" means a system which supplies drinking water to consumers via a single service line.

§64401.71. Tier 1 Public Notice.
"Tier 1 public notice" means a public notice issued in response to the events listed in subsection 64463.1(a) and in the manner specified in subsections 64463.1(b) and (c).

§64401.72. Tier 2 Public Notice.
"Tier 2 public notice" means a public notice issued in response to the events listed in section 64463.4(a) and in the manner specified in subsections 64463.4(b) and (c).

§64401.73. Tier 3 Public Notice.
"Tier 3 public notice" means a public notice issued in response to the events listed in section 64463.7(a) and in the manner specified in subsections 64463.7(b), and (c) or (d).

§64401.75. Too Numerous to Count.
"Too numerous to count" means that the total number of bacterial colonies exceeds 200 on a 47-mm diameter membrane filter used for coliform detection.

§64401.80. Total Coliform-positive.
"Total coliform-positive" means a sample result in which the presence of total coliforms has been demonstrated.

§64401.82. Total Organic Carbon or TOC.
"Total organic carbon" or "TOC" means total organic carbon reported in units of milligrams per liter (mg/L), as measured using heat, oxygen, ultraviolet irradiation, chemical oxidants, or combinations of these oxidants that convert organic carbon to carbon dioxide, rounded to two significant figures.

§64401.85. Transient-noncommunity Water System.
"Transient-noncommunity water system" means a public water system that is not a community water system or a nontransient-noncommunity water system.

§64401.90. Treatment.
"Treatment" means physical, biological, or chemical processes, including blending, designed to affect water quality parameters to render the water acceptable for domestic use.

§64401.92. Total Trihalomethanes or TTHM.
"Total Trihalomethanes" or "TTHM" means the sum of the concentrations in milligrams per liter (mg/L) of the trihalomethane compounds (bromodichloromethane, bromoform, chloroform, and dibromochloromethane), rounded to two significant figures after addition.

§64401.95. VOC.
"VOC" means volatile organic chemical.

§64402. Vulnerable System.
"Vulnerable system" means a water system which has any water source which in the judgment of the State Board, has a risk of containing an organic contaminant, based on an assessment as set forth in §64445(d)(1).

§64402.10. Water Source.
"Water source" means an individual groundwater source or an individual surface water intake. Sources which have not been designated as standby sources shall be deemed to be water sources.

§64402.20. Water Supplier.
"Water supplier", "person operating a public water system" or "supplier of water" means any person who owns or operates a public water system. These terms will be used interchangeably in this chapter.

(a) "Wholesale water supplier," or "wholesaler" means any person who treats water on behalf of one or more public water systems for the purpose of rendering it safe for human consumption.

(b) "Retail water supplier," or "retailer" means

(1) Any person who owns or operates any distribution facilities and any related collection, treatment, or storage facilities under the control of the operator of the public water system which are used primarily in connection with the public water system; or

(2) Any person who owns or operates any collection or pretreatment storage facilities not under the control of the operator of the public water system which are used primarily in connection with the public water system.

§64402.30. Wholesale System.

"Wholesale system" means a public water system that treats source water as necessary to produce finished water and then delivers some or all of that finished water to another public water system. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

Article 2. General Requirements

§64412. Determination of Persons Served.

(a) The number of persons served by a community water system shall be determined by the water system using one of the following methods:

(1) Utilizing the most recent United States census data, or more recent special census data certified by the California Department of Finance, for the service area served by the water system;

(2) Multiplying the number of service connections served by the water system by 3.3 to determine the total population served;

(3) Determining the total number of dwelling units or efficiency dwelling units as defined in the Uniform Building Code (Title 24, California Code of Regulations), the number of mobile home park spaces and the number of individual business, commercial, industrial and institutional billing units served by the water system and multiplying this total by 2.8 to arrive at the total population served by the system.

(b) Each community water system shall report to the State Board annually the number of persons and the number of service connections served by the system using the procedures set forth in subsection (a).

§64413.1. Classification of Water Treatment Facilities.

(a) Each water treatment facility shall be classified pursuant to Table 64413.1-A based on the calculation of total points for the facility using the factors specified in subsection (b).

Table 64413.1-A.
Water Treatment Facility Class Designations

Total Points	*Class*
Less than 20	T1
20 through 39	T2
40 through 59	T3
60 through 79	T4
80 or more	T5

(b) The calculation of total points for each water treatment facility shall be the sum of the points derived in each of paragraphs (1) through (13). If a treatment facility treats more than one source, the source with the highest average concentration of each contaminant shall be used to determine the point value in paragraphs (2) through (5).

(1) For water source, the points are determined pursuant to Table 64413.1-B.

Table 64413.1-B.
Points for Source Water Used by the Facility

Type of source water used by the facility	*Points*
Groundwater and/or purchased treated water meeting primary and secondary drinking water standards, as defined in § 116275 of the Health and Safety Code	2
Water that includes any surface water or groundwater under the direct influence of surface water	5

(2) For influent microbiological water quality, points shall be determined by using the median of all total coliform analyses completed in the previous 24 months pursuant to Table 64413.1-C:

Table 64413.1-C.
Influent Water Microbiological Quality Points

Median Coliform Density *Most Probable Number Index (MPN)*	*Points*
less than 1 per 100 mL	0
1 through 100 per 100 mL	2
greater than 100 through 1,000 per 100 mL	4
greater than 1,000 through 10,000 per 100 mL	6
greater than 10,000 per 100 mL	8

(3) For facilities treating surface water or groundwater under the direct influence of surface water, points for influent water turbidity shall be determined pursuant to Table 64413.1-D on the basis of the previous 24 months of data, except that if turbidity data is missing for one or more of the months, the points given for turbidity shall be 5. The maximum influent turbidity sustained for at least one hour according to an on-line turbidimeter shall be used unless such data is not available, in which case, the maximum influent turbidity identified by grab sample shall be used. For facilities that have not been in operation for 24 months, the available data shall be used. For facilities whose permit specifies measures to ensure that influent turbidity will not exceed a specified level, the points corresponding to that level shall be assigned.

Table 64413.1-D.
Influent Water Turbidity Points

Maximum Influent Turbidity Level Nephelometric Turbidity Units (NTU)	*Points*
Less than 15	0
15 through 100	2
Greater than 100	5

(4) The points for influent water perchlorate, nitrate, or nitrite levels shall be determined by an average of the three most recent sample results, pursuant to Table 64413.1-E.

Table 64413.1-E.
Influent Water Perchlorate, Nitrate, and Nitrite Points

Perchlorate, Nitrate, and Nitrite Data Average	*Points*
Less than or equal to the maximum contaminant level (MCL), as specified in Table 64431-A	0
For each contaminant greater than its MCL	5

(5) The points for other influent water contaminants with primary MCLs shall be a sum of the points for each of the inorganic contaminants (Table 64431-A), organic contaminants (Table 64444-A) and radionuclides (Tables 64442 and 64443). The points for each contaminant shall be based on an average of the three most recent sample results, pursuant to Table 64413.1-F. If monitoring for a contaminant has been waived pursuant to sections 64432(m) or (n), 64432.2(c), or 64445(d), the points shall be zero for that contaminant.

Table 64413.1-F.
Influent Water Chemical and Radiological Contaminant Points

Contaminant Data Average	*Points*
Less than or equal to the MCL	0
Greater than the MCL	2
5 Times the MCL or greater	5

(6) The total points for surface water filtration treatment shall be the sum of the points of those treatment processes utilized by the facility for compliance with section 64652, pursuant to Table 64413.1-G.

Table 64413.1-G.
Points for Surface Water Filtration Treatment

Treatment	*Points*
Conventional, direct, or inline	15
Diatomaceous earth	12
Slow sand, membrane, cartridge, or bag filter	8
Backwash recycled as part of process	5

(7) The points for each treatment process utilized by the facility and not included in paragraph (6) that is used to reduce the concentration of one or more contaminants for which a primary MCL exists, pursuant to Table 64431-A, Table 64444-A, and Tables 64442 and 64443, shall be 10. Blending shall only be counted as a treatment process if one of the blended sources exceeds a primary MCL.

(8) The points for each treatment process not included in paragraphs (6), or (7) that is used to reduce the concentration of one or more contaminants for which a secondary MCL exists, pursuant to Tables 64449-A and 64449-B, shall be 3. Blending shall only be counted as a treatment process if one of the blended sources exceeds a secondary MCL.

(9) The points for each treatment process not included in paragraphs (6), (7), or (8) that is used for corrosion control or fluoridation shall be 3.

(10) The total points for disinfection treatment shall be the sum of the points for those treatment processes utilized by the facility for compliance with section 64654(a), pursuant to Table 64413.1-H.

Table 64413.1-H.
Points for Disinfection Treatment

Treatment Process	*Points*
Ozone	10
Chlorine and/or chloramine	10
Chlorine dioxide	10
Ultraviolet (UV)	7

(11) The points for disinfection/oxidation treatment not included in paragraphs (6), (7), (8), or (10) shall be a sum of the points for all the treatment processes used at the facility pursuant to Table 64413.1-I.

Table 64413.1-I.
Points for Disinfection/Oxidation Treatment without Inactivation Credit

Treatment Process	*Points*
Ozone	5
Chlorine and/or chloramine	5
Chlorine dioxide	5
Ultraviolet (UV)	3
Other oxidants	5

(12) The points for any other treatment process that alters the physical or chemical characteristics of the drinking water and that was not included in paragraphs (6), (7), (8), (9), (10), or (11) shall be 3.

(13) The points for facility flow shall be 2 per million gallons per day or fraction thereof of maximum permitted treatment facility capacity, up to a maximum of 50 points; except that for facilities utilizing only blending, the points shall be based on the flow from the contaminated source and the dilution flow required to meet the MCL(s) specified in Tables 64431-A, 64444-A, 64449-A, 64449-B, and Tables 64442 and 64443.

§64413.3. Classification of Distribution Systems.

(a) The distribution system for each community and nontransient- noncommunity water system shall be classified pursuant to Table 64413.3-A unless modified pursuant to subsection(b). For a wholesaler, the population served shall include the customers served by its retailers.

Table 64413.3-A.
Distribution System Classifications

Population Served	*Class*
1,000 or less	D1
1,001 through 10,000	D2
10,001 through 50,000	D3
50,001 through 5 million	D4
Greater than 5 million	D5

(b) The class determined pursuant to (a) shall be upgraded by one level if the population served is 5 million or less and the sum of all the points from paragraphs (1) through (6) exceeds 20.

(1) The points for pressure zones shall be zero for up to three zones, 4 for four to ten zones, or 6 for more than ten zones.

(2) The points for disinfectants used shall be zero if no disinfectant is applied in the distribution system and no more than one type of disinfectant residual is entering the distribution system. The points shall be 5 if a single disinfectant or ammonia is applied in the distribution system. The points shall be 8 if there are multiple disinfectants in the system.

(3) The points based on the largest single pump in the system for which the distribution operator is responsible shall be 4 for up to fifty horsepower, or 6 for fifty or more horsepower.

(4) The points for distribution storage reservoirs in the system shall be 4 for one to five reservoirs, or 6 for greater than five.

(5) The points for one or more existing uncovered distribution reservoirs shall be 10.

(6) The points to be added if any of the distribution system customers are also served by a non-potable water distribution system shall be 6. This does not apply to wholesalers if the only customers receiving non-potable water are served by its retailers.

§64413.5. Treatment Facility Staff Certification Requirements.

(a) Each water supplier shall designate at least one chief operator that meets the requirements specified in §63765 for each water treatment facility utilized by the water system.

(b) Each water supplier shall designate at least one shift operator that meets the requirements specified in §63765 for each water treatment facility utilized by the water system for each operating shift.

(c) Except as provided in (d), a chief operator or shift operator shall be on-site at all times that the facility is operating.

(d) If the water supplier's operations plan, submitted and approved pursuant to §64661, demonstrates an equal degree of operational oversight and reliability with either unmanned operation or operation under reduced operator certification requirements, the chief operator or shift operator is not required to be on-site, but shall be able to be contacted within one hour.

(e) If there is no change in the treatment facility and the employed shift and/or chief operators, the water supplier shall be in compliance until January 1, 2003 with the shift and operator certification requirements that were in effect on December 31, 2000. If the water system employs a new shift and/or chief operator, that operator shall meet the certification requirements pursuant to §63765(a).

§64413.7. Distribution System Staff Certification Requirements.

(a) Each water supplier shall designate at least one chief operator that meets the requirements specified in §63770 for each distribution system utilized by the water system.

(b) Each water supplier shall designate at least one shift operator that meets the requirements specified in §63770 for each distribution system utilized by the water system for each operating shift.

(c) The chief operator or shift operator shall be on-site or able to be contacted within one hour.

§64414. Standby Sources.

(a) A source which has been designated "standby" shall be monitored a minimum of once every compliance cycle for all inorganic, organic, and radiological MCLs, unless a waiver has been granted by the State Board pursuant to Section 64432(m) or (n) for inorganics, Section 64432.2(c) for asbestos, or Section 64445(d) for organics.

(b) A standby source which has previous monitoring results indicating nitrate or nitrite levels equal to or greater than 50 percent of the MCL shall collect and analyze a sample for nitrate and nitrite annually. In addition, upon activation of such a source, a sample shall be collected, analyzed for these chemicals and the analytical results reported to the State Board within 24 hours of activation.

(c) A standby source shall be used only for short-term emergencies of five consecutive days or less, and for less than a total of fifteen calendar days a year.

(d) Within 3 days after the short-term emergency use of a standby source, the water supplier shall notify the State Board. The notification shall include information on the reason for and duration of the use.

(e) The status of a designated standby source shall not be changed to that of a regular source of drinking water supply, unless the source meets all existing drinking water standards and approval is obtained from the State Board in advance.

(f) A standby source for which perchlorate has been previously detected shall have a sample collected and analyzed for perchlorate annually. Additionally, upon activation of such a source, a sample shall be collected and analyzed for perchlorate, and the analytical result shall be reported to the State Board within 48 hours of activation.

§64415. Laboratory and Personnel.

(a) Except as provided in subsection (b), required analyses shall be performed by laboratories certified by the State Board to perform such analyses pursuant to Article 3, commencing with section 100825, of Chapter 4 of Part 1 of Division 101, Health and Safety Code. Unless directed otherwise by the State Board, analyses shall be made in accordance with U.S. EPA approved methods as prescribed at 40 Code of Federal Regulations parts 141.21 through 141.42, 141.66, and 141.89.

(b) Sample collection, and field tests including color, odor, turbidity, pH, temperature, and disinfectant residual shall be performed by personnel trained to perform such sample collections and/or tests by:

(1) The State Board;

(2) A laboratory certified pursuant to subsection (a); or

(3) An operator, certified by the State Board pursuant to section 106875(a) or (b) of the Health and Safety Code and trained by an entity in paragraph (1) or (2) to perform such sample collections and/or tests.

§64416. Sampling Plan for all Monitoring Except Bacteriological.

(a) Each public water system serving contiguous areas totaling more than 10,000 service connections shall submit a plan to the State Board for monitoring the quality of water.

(1) This plan shall be supported by analytical, hydrological and geological data, and may be developed in cooperation with other agencies or water suppliers.

(2) Constituents to be addressed in the plan shall include inorganic chemicals, organic chemicals, trihalomethanes, radioactivity, general minerals and general physical parameters.

(3) Sampling of certain wells on a rotating basis may be included in the plan if the water supplier is able to demonstrate with analytical, hydrological and geological data that those wells are producing similar quality water from the same aquifer.

(4) The water supplier shall submit an updated plan to the State Board at least once every ten years or at any time the plan no longer ensures representative monitoring of the system.

Article 2.5. Point-of-Use Treatment

§64417. Definitions.

"Point-of-use treatment device" or "POU" means a treatment device applied to a single tap for the purpose of reducing contaminant levels in drinking water at that tap.

§64418. General Provisions.

(a) Except for a proposed new community water system that does not have a domestic water supply permit, a public water system that meets the requirements of Health and Safety Code section 116380(a) may be permitted to use POUs in lieu of centralized treatment for the purpose of complying with one or more maximum contaminant levels or action levels in this Title, other than for microbial contaminants, volatile organic chemicals, organic chemicals that pose an inhalation risk, or radon, and as allowed under the state and federal Safe Drinking Water Acts, if:

(1) the public water system meets the requirements of this Article and any applicable statutory requirements;

(2) the public water system has:

(A) applied for funding from any federal, state, or local agency to correct the system's violations, and

(B) demonstrated to the State Board that centralized treatment for achieving compliance is not immediately economically feasible, as defined in section 64418.1;

(3) the public water system has applied for a permit or permit amendment to use POUs. The duration of the permit or permit amendment issued will be in accordance with Health and Safety Code section 116552;

(4) for a community water system, following a public hearing, the State Board determines pursuant to section 64418.6 that there is no substantial community opposition;

(5) the public water system has a State Board-approved:

(A) POU Treatment Strategy, as defined in section 64418.3,

(B) POU Operations and Maintenance Program, as defined in section 64418.4, and

(C) POU Monitoring Program, as defined in section 64418.5; and

(6) the public water system ensures that each building and each dwelling unit connected to the public water system has a POU installed pursuant to this Article.

(b) With State Board approval and without having to meet the requirement of paragraph (a)(6), a public water system may utilize POUs in lieu of centralized treatment for the purpose of reducing contaminant levels, other than microbial contaminants, volatile organic chemicals, or radon, to levels at or below one or more of the maximum contaminant levels or action levels in this Title, in the water it supplies to some or all of the persons it serves, but the public water system will not be deemed in compliance without meeting the requirement of paragraph (a)(6). A public water system's application for a permit to utilize POUs pursuant to this subsection may include a request that one or more of the requirements of this article be amended or eliminated to address the public water system's specific utilization, and such request may be granted or denied by the State Board.

(c) Funding for centralized treatment is available when funding for centralized treatment, from any source, is received by, or otherwise placed under control of, the public water system.

(d) As used in this article, the estimated cost for both centralized treatment and POU treatment shall be the complete life cycle cost for a similar period of time.

§64418.1. Immediate Economic Feasibility of Centralized Treatment.

(a) To specifically meet the requirements of subparagraph 64418(a)(2)(B), a community water system, when comparing the costs of centralized treatment to the use of POU treatment, shall submit to the State Board information demonstrating that the:

(1) estimated annual cost of centralized treatment, per household, is more than one percent (1%) of the median household income (MHI) of the customers served by the community water system; and

(2) (A) if the community's annual MHI is equal to or less than the statewide annual MHI, the estimated annual cost of centralized treatment, per household, plus the median annual water bill from the most recent 12 months per household is more than 1.5 percent (1.5%) of the annual MHI of the customers served by the community water system, or

(B) if the community's annual MHI is greater than the statewide annual MHI, the estimated annual cost of centralized treatment, per household, plus the median annual water bill from the most recent 12 months per household is more than two percent (2%) of the annual MHI of the customers served by the community water system.

(b) A noncommunity water system shall submit to the State Board documents that demonstrate that centralized treatment is not immediately economically feasible.

§64418.2. POU Requirements.

(a) Each POU must:

(1) be independently certified in accordance with an American National Standard Institute (ANSI) standard that is applicable to the specific type of proposed POU and that adequately addresses a California drinking water standard; or

(2) be approved by the State Board upon determination that the proposed POU unit design, construction, treatment performance, and field or pilot test results can reliably produce water in compliance with California drinking water standards under local expected influent water quality and flow conditions;

(3) be owned, controlled, operated, and maintained by the public water system and/or a person(s) under contract with the public water system, to ensure proper operation, maintenance, monitoring, and compliance with this Article and applicable drinking water standards;

(4) be equipped with a mechanical warning (e.g. alarm, light, etc.) that alerts users when a unit needs maintenance or is no longer operating in a manner that assures the unit is producing effluent meeting state and federal drinking water standards, unless the device is equipped with an automatic shut-off mechanism that prevents the flow of water under such circumstances; and

(5) be equipped with a totalizing flow meter if:

(A) the POU's treatment efficiency or capacity is volume limited; or

(B) if requested by the State Board following a determination that information about the quantity of water treated by the POU is necessary to assess POU efficiency.

(b) Except as provided in subsection (c), pilot testing shall be performed by the public water system, and/or a person(s) under contract with the public water system, on each proposed type of POU to establish its use limitations and operations and maintenance criteria, as well as verification that it will produce effluent that meets drinking water standards under local expected influent water quality and flow conditions. Pilot testing shall include the following steps:

(1) Prior to performing pilot testing, a pilot testing protocol shall be submitted to the State Board for review. The pilot testing protocol must be adequate to demonstrate that water treated by the POU will meet drinking water standards;

(2) Pilot testing for a POU shall be conducted in the manner and for the time period specified by the most current pilot testing protocol for that POU approved under section 64418.2(b)(1), and shall be conducted for no less than two months; and

(3) After completion of the pilot testing, the public water system shall submit a report to the State Board describing the results and findings of the pilot testing.

(c) The State Board may exempt a public water system from the pilot testing requirements in section 64418.2(b), or permit a reduced level of pilot testing required pursuant to subsection (b), if:

(1) the public water system demonstrates to the State Board that the POUs proposed for use have been tested, by the public water system or another person, under equivalent water quality and flow conditions; and

(2) the limitations, criteria, and effluent verification in subsection (b) can be ascertained and have been reported to the State Board.

§64418.3. POU Treatment Strategy.

(a) Prior to installing POUs, and as part of its permit application to use POU in lieu of centralized treatment, a public water system shall submit to the State Board a POU Treatment Strategy sufficient to reliably reduce levels of the contaminants listed in section 64418(a) and comply with drinking water standards. The POU Treatment Strategy shall include the following:

(1) A description of the compliance issues for which POUs are being proposed to address and how the use of POUs will achieve compliance;

(2) A description of how the public water system will determine the type, number, and location of POUs to ensure a sufficient number of devices are installed for human consumption at each building and each dwelling unit connected to the public water system;

(3) The public water system's authority to require customers to accept POUs in lieu of centralized treatment and to take an action, such as discontinuing service, if a customer fails to accept POUs;

(4) The basis for the POU selection(s);

(5) The qualifications and identification of the person(s) responsible for POU installation, operation, maintenance, and water quality sampling and analyses;

(6) A Customer Education Program that includes information about the POU, how the devices work, required maintenance and monitoring, and the need for the person(s) responsible for the POU, as defined in paragraph (a)(5) of this section, to have access to the device to perform required maintenance and monitoring. The Customer Education Program shall be designed to reach all customers and shall be implemented prior to and following installation of POUs;

(7) The authority, ordinances, and/or access agreements adequate to allow the public water system's representatives access to customers' premises for POU installation, maintenance, and water quality monitoring, as well as the surveys necessary to meet paragraph (a)(2);

(8) Identification of applicable local regulatory requirements;

(9) A Consumer Notification Protocol designed to timely inform consumers, in the appropriate language(s), in the event that an installed POU fails to produce water that meets drinking water standards. The Consumer Notification Protocol shall include:

(A) an example of a notice that includes the requirements of Article 18 of this Title, and

(B) a plan for providing an alternative water supply that meets drinking water standards, consistent with section 64551.100 of this Title, in a quantity sufficient for daily household ingestion needs, to customers served by each installed POU not meeting drinking water standards. An alternative water supply shall be provided according to the following timeline;

1. as soon as possible, but no later than 24 hours following the receipt of results of confirmation samples indicating an MCL exceedance for nitrate, nitrite, nitrate plus nitrite, or perchlorate, or

2. as soon as possible, but no later than 7 days following the receipt of results of confirmation samples indicating an MCL exceedance for contaminants other than nitrate, nitrite, nitrate plus nitrite, or perchlorate;

(10) A Customer Notification Protocol for routine notifications that includes examples of notices, to be provided no less frequently than quarterly, in the appropriate language(s) to inform each customer and consumer:

(A) that only the taps for which POUs are installed provide water meeting drinking water standards, and

(B) regarding the mechanical warning or shut-off mechanism required pursuant to paragraph 64418.2(a)(5), including a telephone number that connects the customer or consumer to water system personnel or recording system that shall be accessible by water system personnel 24 hours a day, seven days a week, for the purpose of providing the customer or consumer a reliable means of notifying personnel when the mechanical warning or shut-off mechanism is activated;

(11) The proposed schedules for:

(A) the distribution of public hearing information pursuant to section 64418.6,

(B) the public hearing required pursuant to section 64418.6,

(C) the distribution to customers of POU acceptance surveys pursuant to section 64418.6,

(D) POU installation, and

(E) the construction of centralized treatment; and

(12) An estimate of the percent of all customers within the public water system's service area who are expected to voluntarily allow installation of POU devices, as well as a description of how the public water system will address customers who do not.

(b) A public water system shall comply with the most current State Board-approved version of its POU Treatment Strategy at all times.

§64418.4. POU Operations and Maintenance (O&M) Program.

(a) Prior to installing POUs, and as part of its permit application to use POU in lieu of centralized treatment, a public water system shall submit to the State Board a POU Operations and Maintenance Program (O&M Program) sufficient to reliably reduce levels of the contaminants listed in section 64418(a) and comply with drinking water standards. The O&M Program shall include the following:

(1) An installation protocol that, at a minimum, describes locations and assurances that POUs will be accessible for operation and maintenance;

(2) The type and frequency of maintenance, at intervals specified by the manufacturer and determined by pilot testing, whichever is shorter, that ensures POUs produce effluent that meets drinking water standards;

(3) The number and type of auxiliary POUs and parts necessary to ensure continuous effective treatment;

(4) Replacement schedules for critical components and POUs necessary to ensure continuous effective treatment;

(5) The qualifications and identification of the person(s) responsible for POU installation, operation, and maintenance; and

(6) POU waste-handling and disposal procedures sufficient to ensure that wastes generated by the POU and the POU itself are properly and safely disposed of in accordance with federal, state and local requirements.

(b) To ensure a POU is properly operating and has not been bypassed, POUs shall be inspected by the public water system no less often than every twelve months and when a POU's effluent is monitored pursuant to section 64418.5.

(c) Based on the on-going operation and maintenance of installed POUs, a public water system shall revise its POU O&M Program as necessary to ensure continuous effective treatment and that POUs produce effluent that meets drinking water standards. Revised POU O&M Programs shall be submitted to the State Board for review and may not be implemented without State Board approval, confirming that the revised POU O&M Program meets the requirements of this section.

(d) A public water system shall maintain a copy of, and at all times implement the most current State Board-approved version of its POU O&M Program.

§64418.5. POU Monitoring Program.

(a) Prior to installing POUs, and as part of its permit application to use POU in lieu of centralized treatment, a public water system shall submit to the State Board a POU Monitoring Program sufficient to ensure that water treated by the proposed POU consistently meet drinking water standards. The POU Monitoring Program shall include the following:

(1) source water monitoring – quarterly, with samples collected during the same month (first, second, or third) of each calendar quarter;

(2) POU effluent – initially, with samples collected as soon as possible but no later than 72 hours after a device is installed; and

(3) POU effluent – on-going following the monitoring in paragraph (a)(2), annually, with one twelfth of all units sampled monthly on a rotating basis. After completion of one year of monitoring, a public water system may alternatively monitor one quarter of all units each calendar quarter provided that monitoring results do not exceed 75 percent (75%) of a contaminant's MCL, and the water system submits a revised monitoring plan to the State Board. Water systems shall resume monthly monitoring if results exceed 75 percent (75%) of a contaminant's MCL.

(b) For a contaminant other than nitrate, nitrite, nitrate plus nitrite, or perchlorate, after no less than one year of monitoring conducted pursuant to subsection (a), a public water system may reduce the number of POU units monitored to no less than one third of all installed units per year such that all installed units are monitored no less frequently than once every three years, if all the results of the on-going monitoring conducted pursuant to paragraph (a)(3) do not exceed 75 percent (75%) of a contaminant's MCL, and the public water system submits a revised monitoring plan to the State Board.

(c) In accordance with subsections 64432.8(b) and 64445.2(b) of this Title, the State Board may require additional monitoring for the contaminant of concern or other contaminants, including microbial contaminants, if monitoring results indicate a potential health risk associated with the contaminant, POU technology, or a public water system's compliance with this Article.

(d) The public water system shall revise its POU Monitoring Program as necessary to ensure continuous effective treatment based on the on-going operation and maintenance of installed POUs or additional monitoring required pursuant to subsection (c). Revised POU Monitoring Programs shall be submitted to the State Board for review and may not be implemented without State Board approval confirming that the revised POU Monitoring Program meets the requirements of this section.

(e) The public water system shall maintain a copy of and implement the most current State Board-approved version of its POU Monitoring Program prepared pursuant to this section.

(f) If a POU effluent sample result exceeds an MCL for a contaminant other than nitrate, nitrite, nitrate plus nitrite, or perchlorate, the public water system shall:

(1) implement the public notification and alternative water procedures identified in its most recent State Board-approved POU Treatment Strategy; and

(2) collect a confirmation sample within seven days of notification of the exceedance. If the confirmation sample, or the average of the original and confirmation sample, exceeds the MCL, notify the State Board within 48 hours of the result, complete corrective actions as soon as possible but within one month of receipt of the result, and increase the monitoring frequency, as requested by the State Board to assess the effectiveness of the corrective actions.

(g) If a POU effluent sample result exceeds an MCL for nitrate, nitrite, nitrate plus nitrite, or perchlorate:

(1) implement the public notification and alternative water procedures identified in its most recent State Board-approved POU Treatment Strategy; and

(2) collect a confirmation sample within 72 hours of notification of the exceedance. If the confirmation sample, or the average of the original and confirmation sample, exceeds the MCL, notify the State Board within 24 hours of the result, continue to provide alternative water until the corrective actions have been confirmed to be effective, complete corrective actions as soon as possible but within one month of receipt of the result, and increase the monitoring frequency, as requested by the State Board to assess the effectiveness of the corrective actions.

§64418.6. Public Hearing and Acceptance.

(a) A community water system shall conduct a customer survey and participate in, and provide information for, a public hearing held by the State Board. At least 30 days prior to placing information into a public repository per paragraph (a)(2), the public water system shall submit a Public Acceptance Protocol to the State Board for review. The

Public Acceptance Protocol must satisfy the following requirements in order to receive State Board approval:

(1) Prior to conducting a customer survey, a community water system shall participate in and provide information for a public hearing that, at a minimum, disseminates the following to those in its service area:

(A) a description of the public water system's POU Treatment Strategy,

(B) a description of the adverse health effects, as specified in the appendices to section 64465, associated with the contaminant(s) of concern,

(C) a copy of those portions of the POU Operation and Maintenance Program and Monitoring Program that necessitates customer involvement,

(D) the estimate of any anticipated increase in water bills that may result from utilization of POUs, and

(E) the supporting documentation, assumptions, and calculations used to determine any anticipated increase in water bills proposed to be presented at the public hearing.

(2) At least 30 days prior to the public hearing, the community water system shall place the information to be presented at the public hearing into a publicly accessible repository and notify the State Board and those in its service area of the date, time, and location of the public hearing, as well as the location and hours of operation of the repository. If the public water system serves multi-unit residential dwellings including, but not limited to, apartments and residential institutions, whether sub-metered or not, the public water system shall provide notice to each resident of such residential dwellings.

(3) Following the public hearing, the community water system shall deliver a survey to each of its customers. The survey shall be delivered in a manner designed to reach each customer and in the language appropriate for communication with the customers. The survey shall consist of the following two choices:

(A) "I vote FOR the use of Point-of-Use treatment devices.", and

(B) "I vote AGAINST the use of Point-of-Use treatment devices."

(b) The community water system shall at all times comply with the most recent Public Acceptance Protocol approved by the State Board pursuant to this section.

(c) Use of POU treatment devices in lieu of centralized treatment shall be considered to have no substantial community opposition if:

(1) the sum of the number of non-voting customers and the number of customers voting against POUs, is less than half of the total customers; and

(2) no more than 25 percent of the total number of customers voted against POUs.

§64418.7. Recordkeeping and Reporting.

(a) A public water system shall maintain the following records for at least ten years and provide the records to the State Board, as specified in subsection (b) or upon request:

(1) results of all water quality monitoring conducted pursuant to this Article;

(2) the location and type of each installed POU;

(3) the date and type of maintenance and repairs performed; and

(4) verbal and written customer complaints received and the resulting corrective actions and/or responses.

(b) A public water system shall report to the State Board, at the frequency noted, the following:

(1) monthly – treated water quality monitoring results;

(2) quarterly – source water monitoring results and any investigations and/or corrective action(s) taken to ensure POUs meet the requirements of this Article including, but not limited to, POU maintenance, customer complaints, inspection results, and manufacturer notices pertaining to proper operation of devices.

(c) The reports required pursuant to subsection (b) shall be submitted to the State Board within ten days following the end of the applicable reporting period.

§64418.8. Compliance.

(a) A public water system using POUs in lieu of centralized treatment shall be in violation of an MCL if:

(1) for all POUs combined, during a 12-month interval, more than five percent (5%) of the results of the effluent monitoring conducted pursuant to section 64418.5 exceed an MCL;

(2) for a POU, the effluent fails to meet the MCL, which is determined in accordance with the applicable compliance determination requirements in this Title. Depending on the contaminant and concentration detected, compliance determination may be based on the result of a single sample, an initial sample averaged with one or two confirmation sample(s), or an average of four quarterly or six monthly samples; or

(3) a building or dwelling unit served by the water system does not have a POU installed pursuant to this Article.

Article 2.7. Point-of-Entry Treatment

§64419. Definitions.

"Point-of-entry treatment device" or "POE" means a treatment device applied to the drinking water entering a house or building for the purpose of reducing contaminant levels in the drinking water distributed throughout the house or building. Notwithstanding the foregoing, where all the water supplied by a public water system for human consumption is treated by the public water system via a single device or facility, regardless of location of the device or facility, the public water system shall be considered to have centralized treatment.

§64420. General Provisions.

(a) Except for a proposed new community water system that does not have a domestic water supply permit, a public water systems that meets the requirements of Health and Safety Code section 116380(a) may be permitted to use POEs in lieu of centralized treatment for the purpose of complying with one or more maximum contaminant levels, action levels, or treatment techniques in this Title and as allowed under the state and federal State Drinking Water Acts, if:

(1) the public water system meets the requirements of this Article and any applicable statutory requirements;

(2) the public water system has:

(A) applied for funding from any federal, state, or local agency to correct the system's violations, and

(B) demonstrated to the State Board that centralized treatment for achieving compliance is not immediately economically feasible, as defined in section 64420.1;

(3) the public water system has applied for a permit or permit amendment to use POEs. The duration of the permit or permit amendment issued will be in accordance with Health and Safety Code section 116552;

(4) for a community water system, following a public hearing, the State Board determines pursuant to section 64420.6 that there is no substantial community opposition;

(5) the public water system has a State Board-approved:

(A) POE Treatment Strategy, as defined in section 64420.3,

(B) POE Operations and Maintenance Program, as defined in section 64420.4, and

(C) POE Monitoring Program, as defined in section 64420.5; and

(6) the public water system ensures that each building connected to the public water system has a POE installed pursuant to this Article.

(b) With State Board approval and without having to meet the requirement of paragraph (a)(6), a public water system may utilize POEs in lieu of centralized treatment for the purpose of reducing contaminant levels to levels at or below one or more of the maximum contaminant levels, action levels, or treatment techniques in this Title, in the water it supplies to some or all of the persons it serves, but the public water system will not be deemed in compliance without meeting the requirement of paragraph (a)(6). A public water system's application for a permit to utilize POEs pursuant to this subsection may include a request that one or more of the requirements of this article be amended or eliminated to address the public water system's specific utilization, and such request may be granted or denied by the State Board.

(c) Funding for centralized treatment is available when funding for centralized treatment, from any source, is received by, or otherwise placed under control of, the public water system.

(d) As used in this article, the estimated cost for both centralized treatment and POE treatment shall be the complete life cycle cost for a similar period of time.

§64420.1. Immediate Economic Feasibility of Centralized Treatment.

(a) To specifically meet the requirements of subparagraph 64420 (a)(2)(B), a community water system, when comparing the costs of centralized treatment to the use of POE treatment, shall submit to the State Board information demonstrating that the:

(1) estimated annual cost of centralized treatment, per household, is more than one percent (1%) of the median household income (MHI) of the customers served by the community water system; and

(2) (A) if the community's annual MHI is equal to or less than the statewide annual MHI, the estimated annual cost of centralized treatment, per household, plus the median annual water bill from the most recent 12 months per household is more than 1.5 percent (1.5%) of the annual MHI of the customers served by the community water system, or

(B) if the community's annual MHI is greater than the statewide annual MHI, the estimated annual cost of centralized treatment, per household, plus the median annual water bill from the most recent 12 months per household is more than two percent (2%) of the annual MHI of the customers served by the community water system.

(b) A noncommunity water system shall submit to the State Board documents that demonstrate that centralized treatment is not immediately economically feasible.

§64420.2. POE Requirements.

(a) Each POE must:

(1) be independently certified in accordance with an American National Standard Institute (ANSI) standard that is applicable to the specific type of proposed POE and that adequately addresses a California drinking water standard; or

(2) be approved by the State Board upon determination that the proposed POE unit design, construction, treatment performance, and available field or pilot test results can reliably produce water in compliance with California drinking water standards under local expected influent water quality and flow conditions;

(3) be owned, controlled, operated, and maintained by the public water system and/or a person(s) under contract with the public water system, to ensure proper operation, maintenance, monitoring, and compliance with this Article and applicable drinking water standards;

(4) be equipped with a mechanical warning (e.g. alarm, light, etc.) that alerts users when a unit needs maintenance or is no longer operating in a manner that assures the unit is producing effluent meeting state and federal drinking water standards, unless the device is equipped with an automatic shut-off mechanism that prevents the flow of water under such circumstances; and

(5) be equipped with a totalizing flow meter.

(b) Except as provided in subsection (c), pilot testing shall be performed by the public water system, and/or a person(s) under contract with the public water system, on each proposed type of POE to establish its use limitations and operations and maintenance criteria, as well as verification that it will produce effluent that meets drinking water standards under local expected influent water quality and flow conditions. Pilot testing shall include the following steps:

(1) Prior to performing pilot testing, a pilot testing protocol shall be submitted to the State Board for review. The pilot testing protocol must be adequate to demonstrate that water treated by the POE will meet drinking water standards;

(2) Pilot testing for a POE shall be conducted in the manner and for the time period specified by the most current pilot testing protocol for that POE approved under section 64420.2(b)(1), and shall be conducted for no less than two months; and

(3) After completion of the pilot testing, the public water system shall submit a report to the State Board describing the results and findings of the pilot testing.

(c)The State Board may exempt a public water system from the pilot testing requirements in section 64420.2(b), or permit a reduced level of pilot testing required pursuant to subsection (b), if:

(1) the public water system demonstrates to the State Board that the POEs proposed for use have been tested, by the public water system or another person, under equivalent water quality and flow conditions; and

(2) the limitations, criteria, and effluent verification in subsection (b) can be ascertained and have been reported to the State Board.

§64420.3. POE Treatment Strategy.

(a) Prior to installing POEs, and as part of its permit application to use POE in lieu of centralized treatment, a public water system shall submit to the State Board a POE Treatment Strategy sufficient to reliably reduce levels of contaminants and comply with drinking water standards. The POE Treatment Strategy shall include each of the following:

(1) A description of the compliance issues for which POEs are being proposed to address and how the use of POEs will achieve compliance;

(2) A description of how the public water system will determine the type, number, and location of POEs to ensure POEs serve, in their entirety, each building connected to the public water system;

(3) The public water system's authority to require customers to accept POEs in lieu of centralized treatment and to take an action, such as discontinuing service, if a customer fails to accept POEs, or disconnects or modifies a POE installed pursuant to this Article;

(4) The basis for the POE selection(s);

(5) The qualifications and identification of the person(s) responsible for POE installation, operation, maintenance, and water quality sampling and analyses;

(6) A Customer Education Program that includes information about the POE, how the devices work, required maintenance and monitoring, and the need for the person(s) responsible for the POE, as defined in paragraph (a)(5) of this section, to have access to the device to perform required maintenance and monitoring. The Customer Education

Program shall be designed to reach all customers and shall be implemented prior to and following installation of POEs;

(7) The authority, ordinances, and/or access agreements adequate to allow the public water system's representatives access to customers' premises for POE installation, maintenance, and water quality monitoring, as well as the surveys necessary to meet paragraph (a)(2);

(8) Identification of applicable local regulatory requirements;

(9) A Consumer Notification Protocol designed to timely inform consumers, in the appropriate language(s), in the event that an installed POE fails to produce water that meets drinking water standards. The Consumer Notification Protocol shall include:

(A) an example of a notice that includes the requirements of Article 18 of this Title, and

(B) a plan for providing an alternative water supply that meets drinking water standards, consistent with section 64551.100 of this Title, in a quantity sufficient for daily household ingestion needs, to customers served by each installed POE not meeting drinking water standards. An alternative water supply shall be provided according to the following timeline;

1. as soon as possible, but no later than 24 hours following the receipt of results of confirmation samples indicating an MCL exceedance for nitrate, nitrite, nitrate plus nitrite, or perchlorate, or

2. as soon as possible, but no later than 7 days following the receipt of results of confirmation samples indicating an MCL exceedance for contaminants other than nitrate, nitrite, nitrate plus nitrite, or perchlorate;

(10) A Customer Notification Protocol for routine notifications that includes examples of notices, to be provided no less frequently than quarterly, in the appropriate language(s) to inform each customer:

(A) which water supplies are not treated by the POEs, and

(B) regarding the mechanical warning or shut-off mechanism required pursuant to paragraph 64420.2(a)(5), including a telephone number that connects the customer to water system personnel or recording system that shall be accessible by water system personnel 24 hours a day, seven days a week, for the purpose of providing the customer a reliable means of notifying personnel when the mechanical warning or shut-off mechanism is activated;

(11) The proposed schedules for:

(A) the distribution of public hearing information pursuant to section 64420.6,

(B) the public hearing required pursuant to section 64420.6,

(C) the distribution to customers of POE acceptance surveys pursuant to section 64420.6,

(D) POE installation, and

(E) the construction of centralized treatment;

(12) An estimate of the percent of all customers within the public water system's service area who are expected to voluntarily allow installation of POE devices, as well as a description of how the public water system will address customers who do not; and

(13) The means for ensuring that the rights and responsibilities of the customer, with respect to an installed POE, convey with title upon the sale or transfer of property to which the POE is attached.

(b) A public water system shall comply with the most current State Board-approved version of its POE Treatment Strategy at all times.

§64420.4. POE Operations and Maintenance (O&M) Program.

(a) Prior to installing POEs, and as part of its permit application to use POE in lieu of centralized treatment, a public water system shall submit to the State Board a POE Operations and Maintenance (O&M) Program sufficient to reliably reduce levels of contaminants and comply with drinking water standards. The POE O&M Program shall include the following:

(1) An installation protocol that, at a minimum, describes locations and assurances that POEs will be accessible for operation and maintenance;

(2) The type and frequency of maintenance, at intervals specified by the manufacturer and determined by pilot testing, whichever is shorter, that ensures POEs produce effluent that meets drinking water standards;

(3) The number and type of auxiliary POEs and parts necessary to ensure continuous effective treatment;

(4) Replacement schedules for critical components and POEs necessary to ensure continuous effective treatment;

(5) The qualifications and identification of the person(s) responsible for POE installation, operation, and maintenance; and

(6) POE waste-handling and disposal procedures sufficient to ensure that wastes generated by the POE and the POE itself are properly and safely disposed of in accordance with federal, state and local requirements.

(b) To ensure a POE is properly operating and has not been bypassed, POEs shall be inspected by the public water system no less often than every twelve months and when a POE's effluent is monitored pursuant to section 64420.5.

(c) Based on the on-going operation and maintenance of installed POEs, a public water system shall revise its POE O&M Program as necessary to ensure continuous effective treatment and that POEs produce effluent that meets drinking water standards. Revised POE O&M Programs shall be submitted to the State Board for review and may not be implemented without State Board approval confirming that the revised POE O&M Program meets the requirements of this section.

(d) A public water system shall maintain a copy of and implement the most current State Board-approved version of its POE O&M Program.

§64420.5. POE Monitoring Program.

(a) Prior to installing POEs, and as part of its permit application to use POE in lieu of centralized treatment, a public water system shall submit to the State Board a POE Monitoring Program sufficient to ensure that water treated by the proposed POE consistently meet drinking water standards. The POE Monitoring Program shall include the following:

(1) source water monitoring – quarterly, with samples collected during the same month (first, second, or third) of each calendar quarter;

(2) POE effluent – initially, with samples collected as soon as possible but no later than 72 hours after a device is installed; and

(3) POE effluent, on-going following the monitoring in paragraph (a)(2), annually, with one twelfth of all units sampled monthly on a rotating basis. After completion of one year of monitoring, a public water system may alternatively monitor one quarter of all units each calendar quarter provided that monitoring results do not exceed 75 percent (75%) of a contaminant's MCL, and the water system submits a revised monitoring plan to the State Board. Water systems shall resume monthly monitoring if results exceed 75 percent (75%) of a contaminant's MCL.

(b) For a contaminant other than nitrate, nitrite, nitrate plus nitrite, or perchlorate, after no less than one year of monitoring conducted pursuant to subsection (a), a public water system may reduce the number of POE units monitored to no fewer than one third of all installed units per year such that all installed devices are sampled no less frequently than once every three years, if all the results of the on-going monitoring conducted pursuant to paragraph (a)(3) do not exceed 75 percent (75%) of a contaminant's MCL, and the public water system submits a revised monitoring plan to the State Board.

(c) The State Board may require additional monitoring for the contaminant of concern or other contaminants, including microbial contaminants, if monitoring results indicate a potential health risk associated with the contaminant, POE technology, or a public water system's compliance with this Article.

(d) The public water system shall revise its POE Monitoring Program as necessary to ensure continuous effective treatment based on the on-going operation and maintenance of installed POEs or additional monitoring required pursuant to subsection (c). Revised POE Monitoring Programs shall be submitted to the State Board for review and may not be implemented without State Board approval confirming that the revised POE Monitoring Program meets the requirements of this section.

(e) The public water system shall maintain a copy of and implement the most current State Board-approved version of its POE Monitoring Program prepared pursuant to this section.

(f) If a POE effluent sample result exceeds an MCL for a contaminant other than nitrate, nitrite, nitrate plus nitrite, or perchlorate, the public water system shall:

(1) implement the public notification and alternative water procedures identified in its most current State Board-approved POE Treatment Strategy; and

(2) collect a confirmation sample within seven days of notification of the exceedance. If the confirmation sample, or the average of the original and confirmation sample, exceeds the MCL, notify the State Board within 48 hours of the result, complete corrective actions as soon as possible but within one month of receipt of the result, and increase the monitoring frequency, as requested by the State Board to assess the effectiveness of the corrective actions.

(g) If a POE effluent sample result exceeds an MCL for nitrate, nitrite, nitrate plus nitrite, or perchlorate;

(1) implement the public notification and alternative water procedures identified in its most current State Board-approved POE Treatment Strategy; and

(2) collect a confirmation sample within 72 hours of notification of the exceedance. If the confirmation sample, or the average of the original and confirmation sample, exceeds the MCL, notify the State Board within 24 hours of the result, continue to provide alternative water until the corrective actions have been confirmed to be effective, complete corrective actions as soon as possible but within one month of receipt of the result, and increase the monitoring frequency as requested by the State Board to assess the effectiveness of the corrective actions.

§64420.6. Public Hearing and Acceptance.

(a) A community water system shall conduct a customer survey and participate in, and provide information for, a public hearing held by the State Board. At least 30 days prior to placing information into a public repository per subsection (a)(2), the public water system shall submit a Public Acceptance Protocol, to the State Board for review. The Public Acceptance Protocol must satisfy the following requirements in order to receive State Board approval:

(1) Prior to conducting a customer survey, a community water system shall participate in and provide information for a public hearing that, at a minimum, disseminates the following to those in its service area:

(A) a description of the public water system's POE Treatment Strategy,

(B) the adverse health effects, as specified in the appendices to section 64465, associated with the contaminant(s) of concern,

(C) POE Operation and Maintenance Program and Monitoring Program information that necessitates customer involvement,

(D) the estimate of any anticipated increase in water bills that may result from utilization of POEs, and

(E) the supporting documentation, assumptions, and calculations used to determine any anticipated increase in water bills proposed to be presented at the public hearing.

(2) At least 30 days prior to the public hearing, the community water system shall place the information to be presented at the public hearing into a publicly accessible repository and notify the State Board and those in its service area of the date, time, and location of the public hearing, as well as the location and hours of operation of the repository. If the public water system serves multi-unit residential dwellings including, but not limited to, apartments and residential institutions, whether sub-metered or not, the public water system shall provide notice to each resident of such residential dwellings.

(3) Following the public hearing, the community water system shall deliver a survey to each of its customers. The survey shall be delivered in a manner designed to reach each customer and in the language appropriate for communication with the customers. The survey shall consist of the following two choices:

(A) "I vote FOR the use of Point-of-Entry treatment devices.", and

(B) "I vote AGAINST the use of Point-of-Entry treatment devices."

(b) The community water system shall at all times comply with the most recent Public Acceptance Protocol approved by the State Board pursuant to this section.

(c) Use of POE treatment devices in lieu of centralized treatment shall be considered to have no substantial community opposition if:

(1) the sum of the number of non-voting customers and the number of customers voting against POEs, is less than half of the total customers; and

(2) no more than 25 percent of the total number of customers voted against POEs.

§64420.7. Recordkeeping and Reporting.

(a) A public water system shall maintain the following records for at least ten years and provide the records to the State Board, as specified in subsection (b) or upon request:

(1) results of all water quality monitoring conducted pursuant to this Article;

(2) the location and type of each installed POE;

(3) the date and type of maintenance and repairs performed; and

(4) verbal and written customer complaints received and the resulting corrective actions and/or responses.

(b) A public water system shall report to the State Board, at the frequency noted, the following:

(1) monthly – treated water quality monitoring results;

(2) quarterly – source water monitoring results and any investigations and/or corrective action(s) taken to ensure POEs meet the requirements of this Article including, but not limited to, POE maintenance, customer complaints, inspection results, and manufacturer notices pertaining to proper operation of devices.

(c) The reports required pursuant to subsection (b) shall be submitted to the State Board within ten days following the applicable reporting period.

§64420.8. Compliance.

(a) A public water system using POEs in lieu of centralized treatment shall be in violation of an MCL if:

(1) for all POEs combined, during a 12-month interval, more than five percent (5%) of the results of the effluent monitoring conducted pursuant to section 64420.5 exceed an MCL;

(2) for a POE, the effluent fails to meet the MCL, which is determined in accordance with the applicable compliance determination requirements in this Title. Depending on the contaminant and concentration detected, compliance determination may be based on the result of a single sample, an initial sample averaged with one or two confirmation sample(s), or an average of four quarterly or six monthly samples; or

(3) a building or dwelling unit served by the water system does not have a POE installed pursuant to this Article.

Article 3. Primary Standards--Bacteriological Quality

§64421. General Requirements.

(a) Each water supplier shall:

(1) Develop a routine sample siting plan as required in section 64422;

(2) Collect routine, repeat and replacement samples as required in Sections 64423, 64424, and 64425;

(3) Have all samples analyzed by laboratories approved to perform those analyses by the State Board and report results as required in section 64423.1;

(4) Notify the State Board when there is an increase in coliform bacteria in bacteriological samples as required in section 64426; and

(5) Comply with the Maximum Contaminant Level as required in section 64426.1.

(b) Water suppliers shall perform additional bacteriological monitoring as follows:

(1) After construction or repair of wells;

(2) After main installation or repair;

(3) After construction, repair, or maintenance of storage facilities; and

(4) After any system pressure loss to less than five psi. Samples collected shall represent the water quality in the affected portions of the system.

§64422. Routine Sample Siting Plan.

(a) By September 1, 1992, each water supplier shall develop and submit to the State Board a siting plan for the routine collection of samples for total coliform analysis, subject to the following:

(1) The sample sites chosen shall be representative of water throughout the distribution system including all pressure zones, and areas supplied by each water source and distribution reservoir.

(2) The water supplier may rotate sampling among the sample sites if the total number of sites needed to comply with (a)(1) above exceeds the number of samples

required according to Table 64423-A. The rotation plan shall be described in the sample siting plan.

(b) If personnel other than certified operators will be performing field tests and/or collecting samples, the sample siting plan shall include a declaration that such personnel have been trained, pursuant to Section 64415 (b).

(c) The supplier shall submit an updated plan to the State Board at least once every ten years and at any time the plan no longer ensures representative monitoring of the system.

§64423. Routine Sampling.

(a) Each water supplier shall collect routine bacteriological water samples as follows:

(1) The minimum number of samples for community water systems shall be based on the known population served or the total number of service connections, whichever results in the greater number of samples, as shown in Table 64423-A. A community water system using groundwater which serves 25-1000 persons may request from the State Board a reduction in monitoring frequency. The minimum reduced frequency shall not be less than one sample per quarter.

(2) The minimum number of samples for nontransient-noncommunity water systems shall be based on the known population served as shown in Table 64423-A during those months when the system is operating. A nontransient-noncommunity water system using groundwater which serves 25-1000 persons may request from the State Board a reduction in monitoring frequency if it has not violated the requirements in this article during the past twelve months. The minimum reduced frequency shall not be less than one sample per quarter.

(3) The minimum number of samples for transient-noncommunity water systems using groundwater and serving 1000 or fewer persons a month shall be one in each calendar quarter during which the system provides water to the public.

(4) The minimum number of samples for transient-noncommunity water systems using groundwater and serving more than 1000 persons during any month shall be based on the known population served as shown in Table 64423-A, except that the water supplier may request from the State Board a reduction in monitoring for any month the system serves 1000 persons or fewer. The minimum reduced frequency shall not be less than one sample in each calendar quarter during which the system provides water to the public.

(5) The minimum number of samples for transient-noncommunity water systems using approved surface water shall be based on the population served as shown in Table 64423-A. A system using groundwater under the direct influence of surface water shall begin monitoring at this frequency by the end of the sixth month after the State Board has designated the source to be approved surface water.

(6) A public water system shall collect samples at regular time intervals throughout the month, except that a system using groundwater which serves 4,900

persons or fewer may collect all required samples on a single day if they are taken from different sites.

(b) In addition to the minimum sampling requirements, all water suppliers using approved surface water which do not practice treatment in compliance with Sections 64650 through 64666, shall collect a minimum of one sample before or at the first service connection each day during which the turbidity level of the water delivered to the system exceeds 1 NTU. The sample shall be collected within 24 hours of the exceedance and shall be analyzed for total coliforms. If the water supplier is unable to collect and/or analyze the sample within the 24-hour time period because of extenuating circumstances beyond its control, the supplier shall notify the State Board within the 24-hour time period and may request an extension. Sample results shall be included in determining compliance with the MCL for total coliforms in Section 64426.1.

(c) If any routine, repeat, or replacement sample is total coliform-positive, then the water supplier shall collect repeat samples in accordance with Section 64424 and comply with the reporting requirements specified in Sections 64426 and 64426.1.

Table 64423-A
Minimum Number of Routine Total Coliform Samples

Monthly Population Served	*Service Connections*	*Minimum Number of Samples*
25 to 1000	15 to 400	1 per month
1,001 to 2,500	401 to 890	2 per month
2,501 to 3,300	891 to 1,180	3 per month
3,301 to 4,100	1,181 to 1,460	4 per month
4,101 to 4,900	1,461 to 1,750	5 per month
4,901 to 5,800	1,751 to 2,100	6 per month
5,801 to 6,700	2,101 to 2,400	7 per month
6,701 to 7,600	2,401 to 2,700	2 per week
7,601 to 12,900	2,701 to 4,600	3 per week
12,901 to 17,200	4,601 to 6,100	4 per week
17,201 to 21,500	6,101 to 7,700	5 per week
21,501 to 25,000	7,701 to 8,900	6 per week
25,001 to 33,000	8,901 to 11,800	8 per week
33,001 to 41,000	11,801 to 14,600	10 per week
41,001 to 50,000	14,601 to 17,900	12 per week
50,001 to 59,000	17,901 to 21,100	15 per week
59,001 to 70,000	21,101 to 25,000	18 per week
70,001 to 83,000	25,001 to 29,600	20 per week
83,001 to 96,000	29,601 to 34,300	23 per week
96,001 to 130,000	34,301 to 46,400	25 per week
130,001 to 220,000	46,401 to 78,600	30 per week
220,001 to 320,000	78,601 to 114,300	38 per week
320,001 to 450,000	114,301 to 160,700	50 per week
450,001 to 600,000	160,701 to 214,300	55 per week
600,001 to 780,000	214,301 to 278,600	60 per week
780,001 to 970,000	278,601 to 346,400	70 per week
970,001 to 1,230,000	346,401 to 439,300	75 per week
1,230,001 to 1,520,000	439,301 to 542,900	85 per week
1,520,001 to 1,850,000	542,901 to 660,700	90 per week
1,850,001 to 2,270,000	660,701 to 810,700	98 per week
2,270,001 to 3,020,000	810,701 to 1,078,600	105 per week
3,020,001 to 3,960,000	1,078,601 to 1,414,300	110 per week
3,960,001 or more	1,414,301 or more	120 per week

§64423.1. Sample Analysis and Reporting of Results.

(a) The water supplier shall designate (label) each sample as routine, repeat, replacement, or "other" pursuant to Section 64421(b), and have each sample analyzed for total coliforms. The supplier also shall require the laboratory to analyze the same sample for fecal coliforms or Escherichia coli (*E. coli*) whenever the presence of total coliforms is indicated. As a minimum, the analytical results shall be reported in terms of the presence or absence of total or fecal coliforms, or *E. coli* in the sample, whichever is appropriate.

(b) The water supplier shall require the laboratory to notify the supplier within 24 hours, whenever the presence of total coliforms, fecal coliforms or *E. coli* is demonstrated in a sample or a sample is invalidated due to interference problems, pursuant to Section 64425(b), and shall ensure that a contact person is available to receive these analytical results 24-hours a day. The water supplier shall also require the laboratory to immediately notify the State Board of any positive bacteriological results if the laboratory cannot make direct contact with the designated contact person within 24 hours.

(c) Analytical results of all required samples collected for a system in a calendar month shall be reported to the State Board not later than the tenth day of the following month, as follows:

(1) The water supplier shall submit a monthly summary of the bacteriological monitoring results to the State Board.

(2) For systems serving fewer than 10,000 service connections or 33,000 persons, the water supplier shall require the laboratory to submit copies of all required bacteriological monitoring results directly to the State Board.

(3) For systems serving more than 10,000 service connections, or 33,000 persons, the water supplier shall require the laboratory to submit copies of bacteriological monitoring results for all positive routine samples and all repeat samples directly to the State Board.

(d) Laboratory reports shall be retained by the water supplier for a period of at least five years and shall be made available to the State Board upon request.

§64424. Repeat Sampling.

(a) If a routine sample is total coliform-positive, the water supplier shall collect a repeat sample set as described in paragraph (1) within 24 hours of being notified of the positive result. The repeat samples shall all be collected within the same 24 hour time period. A single service connection system may request that the State Board allow the collection of the repeat sample set over a four-day period.

(1) For a water supplier that normally collects more than one routine sample a month, a repeat sample set shall be at least three samples for each total coliform-positive sample. For a water supplier that normally collects one or fewer samples per month, a repeat sample set shall be at least four samples for each total coliform-positive sample.

(2) If the water supplier is unable to collect the samples within the 24-hour time period specified in subsection (a) or deliver the samples to the laboratory within 24 hours after collection because of circumstances beyond its control, the water supplier shall notify the State Board within 24 hours. The State Board will then determine how much time the supplier will have to collect the repeat samples.

(b) When collecting the repeat sample set, the water supplier shall collect at least one repeat sample from the sampling tap where the original total coliform-positive sample was taken. Other repeat samples shall be collected within five service connections upstream or downstream of the original site. At least one sample shall be from upstream and one from downstream unless there is no upstream and/or downstream service connection.

(c) If one or more samples in the repeat sample set is total coliform-positive, the water supplier shall collect and have analyzed an additional set of repeat samples as specified in subsections (a) and (b). The supplier shall repeat this process until either no coliforms are detected in one complete repeat sample set or the supplier determines that the MCL for total coliforms specified in Section 64426.1 has been exceeded and notifies the State Board.

(d) If a public water system for which fewer than five routine samples/month are collected has one or more total coliform-positive samples, the water supplier shall collect at least five routine samples the following month. If the supplier stops supplying water during the month after the total coliform-positive(s), at least five samples shall be collected during the first month the system resumes operation. A water supplier may request the State Board waive the requirement to collect at least five routine samples the following month, but a waiver will not be granted solely on the basis that all repeat samples are total coliform-negative. To request a waiver, one of the following conditions shall be met:

(1) The State Board conducts a site visit before the end of the next month the system provides water to the public to determine whether additional monitoring and/or corrective action is necessary to protect public health.

(2) The State Board determines why the sample was total coliform-positive and establishes that the system has corrected the problem or will correct the problem before the end of the next month the system serves water to the public. If a waiver is granted, a system shall collect at least one routine sample before the end of the next month it serves water to the public and use it to determine compliance with Section 64426.1.

§64425. Sample Invalidation.

(a) A water supplier may request the State Board to invalidate a sample for which a total coliform-positive result has been reported if the supplier demonstrates:

(1) All repeat sample(s) collected at the same tap as the original total coliform-positive sample also are total coliform- positive and all repeat samples collected within five service connections of the original tap are not total coliform-positive; or

(2) The laboratory did not follow the prescribed analytical methods pursuant to Section 64415(a), based on a review of laboratory documentation by the State Board. The supplier shall submit to the State Board a written request for invalidation along with the laboratory documentation, the supplier's sample collection records and any observations noted during sample collection and delivery. The water supplier shall require the laboratory to provide the supplier with documentation which shall include, but not be limited to:

(A) A letter from the director of the laboratory having generated the data, confirming the invalidation request by reason of laboratory accident or error;

(B) Complete sample identification, laboratory sample log number (if used), date and time of collection, date and time of receipt by the laboratory, date and time of analysis for the sample(s) in question;

(C) Complete description of the accident or error alleged to have invalidated the result(s);

(D) Copies of all analytical, operating, and quality assurance records pertaining to the incident in question; and

(E) Any observations noted by laboratory personnel when receiving and analyzing the sample(s) in question.

(b) Whenever any total coliform sample result indicative of the absence of total coliforms has been declared invalid by the laboratory due to interference problems as specified at 40 Code Federal Regulations, Section 141.21(c)(2), the supplier shall collect a replacement sample from the same location as the original sample within 24 hours of being notified of the interference problem, and have it analyzed for the presence of total coliforms. The supplier shall continue to re-sample at the original site within 24 hours and have the samples analyzed until a valid result is obtained.

§64426. Significant Rise in Bacterial Count.

(a) Any of the following criteria shall indicate a possible significant rise in bacterial count:

(1) A system collecting at least 40 samples per month has a total coliform-positive routine sample followed by two total coliform-positive repeat samples in the repeat sample set;

(2) A system has a sample which is positive for fecal coliform or *E. coli*; or

(3) A system fails the total coliform Maximum Contaminant Level (MCL) as defined in Section 64426.1.

(b) When the coliform levels specified in subsection (a) are reached or exceeded, the water supplier shall:

(1) Contact the State Board by the end of the day on which the system is notified of the test result or the system determines that it has exceeded the MCL, unless the notification or determination occurs after the State Board office is closed, in which case the supplier shall notify the State Board within 24 hours; and

(2) Submit to the State Board information on the current status of physical works and operating procedures which may have caused the elevated bacteriological findings, or any information on community illness suspected of being waterborne. This shall include, but not be limited to:

(A) Current operating procedures that are or could potentially be related to the increase in bacterial count;

(B) Any interruptions in the treatment process;

(C) System pressure loss to less than 5 psi;

(D) Vandalism and/or unauthorized access to facilities;

(E) Physical evidence indicating bacteriological contamination of facilities;

(F) Analytical results of any additional samples collected, including source samples;

(G) Community illness suspected of being waterborne; and

(H) Records of the investigation and any action taken.

(c) Upon receiving notification from the State Board of a significant rise in bacterial count, the water supplier shall implement the emergency notification plan required by Section 116460, Health and Safety Code.

§64426.1. Total Coliform Maximum Contaminant Level (MCL).

(a) Results of all samples collected in a calendar month pursuant to Sections 64423, 64424, and 64425 that are not invalidated by the State Board or the laboratory shall be included in determining compliance with the total coliform MCL. Special purpose samples such as those listed in section 64421(b) and samples collected by the water supplier during special investigations shall not be used to determine compliance with the total coliform MCL.

(b) A public water system is in violation of the total coliform MCL when any of the following occurs:

(1) For a public water system which collects at least 40 samples per month, more than 5.0 percent of the samples collected during any month are total coliform-positive; or

(2) For a public water system which collects fewer than 40 samples per month, more than one sample collected during any month is total coliform-positive; or

(3) Any repeat sample is fecal coliform-positive or E. coli-positive; or

(4) Any repeat sample following a fecal coliform-positive or E. coli-positive routine sample is total coliform-positive.

(c) If a public water system is not in compliance with paragraphs (b)(1) through (4), during any month in which it supplies water to the public, the water supplier shall notify the State Board by the end of the business day on which this is determined, unless the determination occurs after the State Board office is closed, in which case the supplier shall notify the State Board within 24 hours of the determination. The water supplier shall also notify the consumers served by the water system. A Tier 2 Public Notice shall be given for violations of paragraph (b)(1) or (2), pursuant to section 64463.4. A Tier 1 Public Notice shall be given for violations of paragraph (b)(3) or (4), pursuant to section 64463.1.

§64426.5. Variance from Total Coliform Maximum Contaminant Level.

A water system may apply to the State Board for a variance from the total coliform MCL in section 64426.1(b)(1) or (2). To be eligible for a variance, the water system shall demonstrate that it meets the following criteria:

(a) During the thirty days prior to application for a variance, water entering the distribution system has:

(1) Been free from fecal coliform or E. coli occurrence based on at least daily sampling;

(2) Contained less than one total coliform per hundred milliliters of water in at least ninety-five percent of all samples based on at least daily sampling;

(3) Complied with the turbidity requirements of section 64653, if approved surface water; and

(4) Maintained a continuous disinfection residual of at least 0.2 mg/L at the entry point(s) to the distribution system;

(b) The system has had no waterborne microbial disease outbreak, pursuant to section 64651.91, while operated in its present configuration;

(c) The system maintains contact at least twice a week with the State Board and local health departments to assess illness possibly attributable to microbial occurrence in the public drinking water system;

(d) The system has analyzed, on a monthly basis, at least the number of samples required pursuant to the approved sample siting plan and has not had an E. coli-positive compliance sample within the last six months, unless the system demonstrates to the State Board that the occurrence is not due to contamination entering the distribution system;

(e) The system has undergone a sanitary survey conducted by the State Board within the past twelve months;

(f) The system maintains a cross-connection control program in accordance with sections 7583 through 7605, title 17 of the California Code of Regulations;

(g) The system agrees to submit a biofilm control plan to the State Board within twelve months of the granting of the first request for a variance;

(h) The system monitors general distribution system bacterial quality by conducting heterotrophic bacteria plate counts on at least a weekly basis at a minimum of ten percent of the number of total coliform sites specified in the approved sample siting plan (preferably using the methods in section 9215(a), 18th edition of Standard Methods for the Examination of Water and Wastewater, 1992, American Public Health Association, et. al); and

(i) The system conducts daily monitoring at distribution system total coliform monitoring sites approved by the State Board and maintains a detectable disinfectant residual at a minimum of ninety-five percent of those points and a heterotrophic plate count of less than 500 colonies per mL at sites without a disinfectant residual.

(j) No water system shall be eligible for a variance or exemption from the MCL for total coliforms unless it demonstrates that the violation of the total coliform MCL is due to a persistent growth of total coliforms in the distribution system pursuant to section 64426.5, rather than to fecal or pathogenic contamination, a treatment lapse or deficiency, or a problem in the operation or maintenance of the distribution system.

§64427. Sanitary Survey.

Systems which collect less than five routine samples per month shall be subject to an initial sanitary survey by the Department by June 29, 1994 for community water systems and June 29, 1999 for nontransient-noncommunity and transient-noncommunity water systems. Sanitary surveys shall be repeated every five years.

Article 3.5. Ground Water Rule

§64430. Requirements.

A public water system that uses ground water shall comply with the following provisions of 40 Code of Federal Regulations as they appear in the Ground Water Rule published in 71 Federal Register 65574 (November 8, 2006) and amended in 71 Federal Register 67427 (November 21, 2006) and 74 Federal Register 30953 (June 29, 2009), which are hereby incorporated by reference: Sections 141.21(d)(3), 141.28(a), 141.153(h)(6),

Appendix A to Subpart O (Consumer Confidence Reports), 141.202(a)(8), 141.203(a)(4), Appendices A and B to Subpart Q (Public Notification), and 141.400 through 141.405, except that in:

(a) sections 141.402(a)(1)(ii), (a)(2), (a)(2)(ii), (a)(4), (a)(4)(ii)(A), (a)(5)(i), and (a)(5)(ii), the phrase "§141.21(a)" is replaced by "22 California Code of Regulations sections 64422 and 64423",

(b) sections 141.402(a)(1)(ii) and 141.405(b)(4), the phrase "§141.21(c)" is replaced by "22 California Code of Regulations section 64425", and

(c) section 141.402(a)(2)(iii), the phrase "§141.21(b)" is replaced by "22 California Code of Regulations section 64424".

[Note: The text reflecting the above section is provided in Addendum A of this book.]

Article 4. Primary Standards--Inorganic Chemicals

§64431. Maximum Contaminant Levels--Inorganic Chemicals.

Public water systems shall comply with the primary MCLs in table 64431-A as specified in this article.

Table 64431-A
Maximum Contaminant Levels
Inorganic Chemicals

Chemical	*Maximum Contaminant Level, mg/L*
Aluminum	1.
Antimony	0.006
Arsenic	0.010
Asbestos	7 MFL*
Barium	1.
Beryllium	0.004
Cadmium	0.005
Chromium	0.05
Cyanide	0.15
Fluoride	2.0
Mercury	0.002
Nickel	0.1
Nitrate (as nitrogen)	10.
Nitrate+Nitrite (sum as nitrogen)	10.
Nitrite (as nitrogen)	1.
Perchlorate	0.006
Selenium	0.05
Thallium	0.002

* MFL=million fibers per liter; MCL for fibers exceeding 10 µm in length.

§64432. Monitoring and Compliance--Inorganic Chemicals.

(a) All public water systems shall monitor to determine compliance with the nitrate and nitrite MCLs in table 64431-A, pursuant to subsections (d) through (f) and Section 64432.1. All community and nontransient-noncommunity water systems shall monitor to determine compliance with the perchlorate MCL, pursuant to subsections (d), (e), and (l), and section 64432.3. All community and nontransient-noncommunity water systems shall also monitor to determine compliance with the other MCLs in table 64431-A, pursuant to subsections (b) through (n) and, for asbestos, section 64432.2. Monitoring shall be conducted in the year designated by the State Board of each compliance period beginning with the compliance period starting January 1, 1993.

(b) Unless directed otherwise by the State Board, each community and nontransient-noncommunity water system shall initiate monitoring for an inorganic chemical within six months following the effective date of the regulation establishing the MCL for the chemical and the addition of the chemical to table 64431-A. If otherwise performed in accordance with this section, groundwater monitoring for an inorganic chemical performed no more than two years prior to the effective date of the regulation establishing the MCL may be used to satisfy the requirement for initiating monitoring within six months following such effective date.

(c) Unless more frequent monitoring is required pursuant to this Chapter, the frequency of monitoring for the inorganic chemicals listed in table 64431-A, except for asbestos, nitrate/nitrite, and perchlorate, shall be as follows:

(1) Each compliance period, all community and nontransient-noncommunity systems using groundwater shall monitor once during the year designated by the State Board. The State Board will designate the year based on historical monitoring frequency and laboratory capacity. All community and nontransient-noncommunity systems using approved surface water shall monitor annually. All systems monitoring at distribution entry points which have combined surface and groundwater sources shall monitor annually.

(2) Quarterly samples shall be collected and analyzed for any chemical if analyses of such samples indicate a continuous or persistent trend toward higher levels of that chemical, based on an evaluation of previous data.

(d) For the purposes of sections 64432, 64432.1, 64432.2, and 64432.3, detection shall be defined by the detection limits for purposes of reporting (DLRs) in table 64432-A.

Table 64432-A
Detection Limits for Purposes of Reporting (DLRs) for Regulated Inorganic Chemicals

Chemical	*Detection Limit for Purposes of Reporting (DLR) (mg/L)*
Aluminum	0.05
Antimony	0.006
Arsenic	0.002
Asbestos	0.2 MFL>10um*
Barium	0.1
Beryllium	0.001
Cadmium	0.001
Chromium	0.01
Cyanide	0.1
Fluoride	0.1
Mercury	0.001
Nickel	0.01
Nitrate (as nitrogen)	0.4
Nitrite (as nitrogen)	0.4
Perchlorate	0.004
Selenium	0.005
Thallium	0.001

* MFL=million fibers per liter; DLR for fibers exceeding 10 um in length.

(e) Samples shall be collected from each water source or a supplier may collect a minimum of one sample at every entry point to the distribution system which is representative of each source after treatment. The system shall collect each sample at the same sampling site, unless a change is approved by the State Board.

(f) A water system may request approval from the State Board to composite samples from up to five sampling sites, provided that the number of sites to be composited is less than the ratio of the MCL to the DLR. Approval will be based on a review of three years of historical data, well construction and aquifer information for groundwater, and intake location, similarity of sources, and watershed characteristics for surface water. Compositing shall be done in the laboratory.

(1) Systems serving more than 3,300 persons shall composite only from sampling sites within a single system. Systems serving 3,300 persons or less may composite among different systems up to the 5-sample limit.

(2) If any inorganic chemical is detected in the composite sample at a level equal to or greater than one fifth of the MCL, a follow-up sample shall be analyzed within 14 days from each sampling site included in the composite for the contaminants

which exceeded the one-fifth-MCL level. If available, duplicates of the original sample taken from each sampling site used in the composite may be used instead of resampling; the analytical results shall be reported within 14 days. The water supplier may collect up to two additional samples each from one or more of the sources to confirm the result(s).

(3) Compliance for each site shall be determined on the basis of the individual follow-up samples, or on the average of the follow-up and confirmation sample(s) if the supplier collects confirmation sample(s) for each detection.

(g) If the level of any inorganic chemical, except for nitrate, nitrite, nitrate plus nitrite, or perchlorate, exceeds the MCL, the water supplier shall do one of the following:

(1) Inform the State Board within 48 hours and monitor quarterly beginning in the next quarter after the exceedance occurred; or

(2) Inform the State Board within seven days from the receipt of the analysis and, as confirmation, collect one additional sample within 14 days from receipt of the analysis. If the average of the two samples collected exceeds the MCL, this information shall be reported to the State Board within 48 hours and the water supplier shall monitor quarterly beginning in the next quarter after the exceedance occurred.

(h) If the concentration of an inorganic chemical exceeds ten times the MCL, within 48 hours of receipt of the result the water supplier shall notify the State Board and resample as confirmation. The water supplier shall notify the State Board of the result(s) of the confirmation sample(s) within 24 hours of receipt of the confirmation result(s).

(1) If the average concentration of the original and confirmation sample(s) is less than or equal to ten times the MCL, the water supplier shall monitor quarterly beginning in the quarter following the quarter in which the exceedance occurred.

(2) If the average concentration of the original and confirmation sample(s) exceeds ten times the MCL, the water supplier shall, if directed by the State Board;

(A) Immediately discontinue use of the contaminated water source; and

(B) Not return the source to service without written approval from the State Board.

(i) Compliance with the MCLs shall be determined by a running annual average; if any one sample would cause the annual average to exceed the MCL, the system is immediately in violation. If a system takes more than one sample in a quarter, the average of all the results for that quarter shall be used when calculating the running annual average. If a system fails to complete four consecutive quarters of monitoring, the running annual average shall be based on an average of the available data.

(j) If a system using groundwater has collected a minimum of two quarterly samples or a system using approved surface water has collected a minimum of four quarterly samples and the sample results have been below the MCL, the system may apply to the State Board for a reduction in monitoring frequency.

(k) Water quality data collected prior to January 1, 1990, and/or data collected in a manner inconsistent with this section shall not be used in the determination of compliance with the monitoring requirements for inorganic chemicals.

(l) Water quality data collected in compliance with the monitoring requirements of this section by a wholesaler providing water to a public water system shall be acceptable for use by that system for compliance with the monitoring requirements of this section.

(m) A water system may apply to the State Board for a waiver from the monitoring frequencies specified in subsection (c)(1), if the system has conducted at least three rounds of monitoring (three periods for groundwater sources or three years for approved surface water sources) and all previous analytical results are less than the MCL. The water system shall specify the basis for its request. If granted a waiver, a system shall collect a minimum of one sample per source while the waiver is in effect and the term of the waiver shall not exceed one compliance cycle (i.e., nine years).

(n) A water system may be eligible for a waiver from the monitoring frequencies for cyanide specified in subsection (c)(1) without any prior monitoring if it is able to document that it is not vulnerable to cyanide contamination pursuant to the requirements in §64445(d)(1) or (d)(2).

(o) Transient-noncommunity water systems shall monitor for the inorganic chemicals in table 64431-A as follows:

(1) All sources shall be monitored at least once for fluoride; and

(2) Surface water sources for parks and other facilities with an average daily population use of more than 1,000 people and/or which are determined to be subject to potential contamination based on a sanitary survey shall be monitored at the same frequency as community water systems.

§64432.1. Monitoring and Compliance--Nitrate and Nitrite.

(a) To determine compliance with the MCL for nitrate in Table 64431-A, all public water systems using groundwater and transient-noncommunity systems using approved surface water shall monitor annually, and all community and nontransient-noncommunity systems using approved surface water shall monitor quarterly.

(1) The water supplier shall require the laboratory to notify the supplier within 24 hours whenever the level of nitrate in a single sample exceeds the MCL, and shall ensure that a contact person is available to receive such analytical results 24-hours a day. The water supplier shall also require the laboratory to immediately notify the State Board of any acute nitrate MCL exceedance if the laboratory cannot make direct contact with the designated contact person within 24 hours. Within 24 hours of notification, the water supplier shall:

(A) Collect another sample, and

(B) Analyze the new sample; if the average of the two nitrate sample results exceeds the MCL, report the result to the State Board within 24 hours. If the average does not exceed the MCL, inform the State Board of the results within seven days from the receipt of the original analysis.

(C) If a system is unable to resample within 24 hours, it shall notify the consumers by issuing a Tier 1 Public Notice pursuant to section 64463.1 and shall collect and analyze a confirmation sample within two weeks of notification of the results of the first sample.

(2) For public water systems using groundwater, the repeat monitoring frequency shall be quarterly for at least one year following any one sample in which the concentration is greater than or equal to 50 percent of the MCL. After four consecutive quarterly samples are less than the MCL, a system may request that the State Board reduce monitoring frequency to annual sampling.

(3) For public water systems using approved surface water, the repeat monitoring frequency shall be quarterly following any one sample in which the concentration is greater than or equal to 50 percent of the MCL. After four consecutive quarterly samples are less than 50 percent of the MCL, a system may request that the State Board reduce monitoring frequency to annual sampling. A system using approved surface water shall return to quarterly monitoring if any one sample is greater than or equal to 50 percent of the MCL.

(4) After any round of quarterly sampling is completed, each community and nontransient-noncommunity system which initiates annual monitoring shall take subsequent samples during the quarter which previously resulted in the highest analytical results.

(b) All public water systems shall monitor to determine compliance with the MCL for nitrite in Table 64431-A, by taking one sample at each sampling site during the compliance period beginning January 1, 1993.

(1) If the level of nitrite in a single sample is greater than the MCL, the water supplier shall proceed as for nitrate in accordance with paragraph (a)(1) of this section.

(2) The repeat monitoring frequency for systems with an analytical result for nitrite that is greater than or equal to 50 percent of the MCL shall be quarterly monitoring for at least one year. After four consecutive quarterly samples are less than the MCL, a system may request that the State Board reduce monitoring frequency to annual sampling, collecting subsequent samples during the quarter which previously resulted in the highest analytical results.

(3) The repeat monitoring frequency for systems with an analytical result for nitrite that is less than 50 percent of the MCL shall be one sample during each compliance period (every three years).

(c) All public water systems shall determine compliance with the MCL for nitrate plus nitrite in Table 64431-A. If the level exceeds the MCL, the water supplier shall proceed as for nitrate in accordance with paragraphs (a)(1) through (a)(4) of this section.

§64432.2. Monitoring and Compliance - Asbestos.

(a) All community and nontransient-noncommunity water systems are required to monitor to determine compliance with the MCL for asbestos in Table 64431-A during the year designated by the State Board of the first compliance period of each nine-year compliance cycle, beginning in the compliance period starting January 1, 1993. The State Board will designate the year based on historical monitoring frequency and laboratory capacity.

(1) If a groundwater system is vulnerable to asbestos contamination solely in its source water, it shall collect one sample at every entry point to the distribution system which is representative of each water source after treatment and proceed in accordance with Subsections 64432(c)(2) through (e) and Subsections 64432(g) through (l).

(2) All approved surface water systems shall be designated vulnerable to asbestos contamination in their source waters. If a surface water system is vulnerable solely in its source water, it shall proceed as in paragraph (1) above.

(3) If a system is vulnerable to asbestos contamination due to leaching of asbestos-cement pipe, with or without vulnerability to asbestos contamination in its source water, it shall take one sample at a tap served by asbestos-cement pipe under conditions where asbestos contamination is most likely to occur.

(b) If the level of asbestos exceeds the MCL in Table 64431-A, the supplier shall report to the State Board within 48 hours and monitor quarterly beginning in the next quarter after the violation occurred. A system may request that the State Board reduce monitoring frequency to one sample every compliance cycle, pursuant to §64432(j).

(c) If a system is not vulnerable either to asbestos contamination in its source water or due to leaching of asbestos-cement pipe, it may apply to the State Board for a waiver of the monitoring requirements in paragraphs (a)(1) through (3) of this section. The State Board will determine the vulnerability of groundwater sources on the basis of historical monitoring data and possible influence of serpentine formations. Vulnerability due to leaching of asbestos-cement pipe will be determined by the State Board on the basis of the presence of such pipe in the distribution system and evaluation of the corrosivity of the water. The period of the waiver shall be three years.

§64432.3. Monitoring and Compliance - Perchlorate.

(a) For initial monitoring for the perchlorate MCL, each community and nontransient-noncommunity water system shall collect two samples at each source in a year, five to seven months apart. At least one of the samples shall be collected during the period from May 1 through September 30 (vulnerable time), unless the State Board specifies a different vulnerable time for the water system due to seasonal conditions related to use, manufacture and/or weather.

(b) Data collected since January 3, 2001, that is in conformance with subsection (a) may be used to comply with the initial monitoring requirement.

(c) After meeting the initial monitoring requirements in subsection (a) and if no perchlorate is detected, during each compliance period each water system:

(1) Using groundwater, shall monitor once during the year designated by the State Board;

(2) Using approved surface water, shall monitor annually; and

(3) Monitoring at distribution entry points that have combined surface and groundwater sources, shall monitor annually; if perchlorate is detected in the water from the combined sources, the water system shall sample each source individually to determine which is contaminated.

(d) The water supplier shall require the laboratory to notify the supplier within 48 hours of the result whenever the level of perchlorate in a single sample exceeds the MCL, and shall ensure that a contact person is available to receive such analytical results 24-hours a day. The water supplier shall also require the laboratory to immediately notify the State Board of any perchlorate MCL exceedance if the laboratory cannot make direct contact with the designated contact person within 48 hours. Within 48 hours of notification of the result, the water supplier shall:

(1) Collect and analyze a confirmation sample, and

(2) If the average of the two perchlorate sample results exceeds the MCL, report the result to the State Board within 48 hours. If the average does not exceed the MCL, inform the State Board of the results within seven days from the receipt of the original analytical result.

(3) If a system is unable to resample within 48 hours, it shall issue a Tier 1 notice to the consumers in accordance with sections 64463 and 64463.1 and shall collect and analyze a confirmation sample within two weeks of notification of the results of the first sample.

(e) A water system shall monitor quarterly any source in which perchlorate has been detected. After four consecutive quarterly samples indicate that perchlorate is not present at or above the DLR, a system may request that the State Board reduce monitoring to the frequencies specified in paragraphs (c)(1) through (3).

(f) A water system serving less than 10,000 persons may apply to the State Board for a variance from the perchlorate MCL if it can demonstrate that the estimated annualized cost per household for treatment to comply with the MCL exceeds 1% of the median household income in the community within which the customers served by the water system reside.

§64432.8. Sampling of Treated Water Sources.

(a) Each water supplier utilizing treatment to comply with one or more MCL(s) in Table 64431-A shall collect monthly samples of the treated water at a site prior to the distribution system and analyze for the chemical(s) for which treatment is being applied. If the treated water exceeds an MCL, other than a nitrate, nitrite, nitrate plus nitrite, or perchlorate MCL, within 48 hours of receipt of the result the water supplier shall resample the treated water to confirm the result and report the initial result to the State Board. The result of the analysis of the confirmation sample shall be reported to the State Board within 24 hours of receipt of the confirmation result. For nitrate, nitrite, nitrate plus nitrite, or perchlorate treated water monitoring, the water supplier shall comply with the requirements of section 64432.1(a)(1) for nitrate, section 64432.1(b)(1) for nitrite, section 64432.1(c) for nitrate plus nitrite, and section 64432.3(d) for perchlorate.

(b) The State Board may require more frequent monitoring based on an evaluation of the treatment process used, the treatment effectiveness and efficiency, and the concentration of the inorganic chemical in the water source.

Article 4.1. Fluoridation

§64433. System Requirements and Exemptions.

(a) Any public water system with 10,000 service connections or more that does not have a fluoridation system shall install such a system pursuant to the requirements in this article if the State Board identifies a source of sufficient funds not excluded by Health and Safety Code section 116415 to cover capital and any associated costs necessary to install such a system. Installation shall be completed within two years of the date the funds are received by the water system; the water system may apply to the State Board for an extension of the deadline. Following installation, if the State Board identifies a source of sufficient funds not excluded by Health and Safety Code section 116415 to cover the noncapital operations and maintenance costs for the period of a year or more, the system shall fluoridate within three months of receiving the funds and shall continue fluoridating so long as such funds are received.

(b) Any public water system with 10,000 service connections or more that has a fluoridation system but ceased fluoridating prior to December 31, 1995 shall fluoridate the drinking water if its fluoridation system is determined to be capable of fluoridating the drinking water in compliance with §64433.2, based on a State Board review, and the State Board identifies a source of sufficient funds not excluded by Health and Safety Code section 116415 to cover the noncapital operations and maintenance costs for the period of a year or more. Such a system shall fluoridate within one month of receiving the funds and shall continue fluoridating so long as such funds are received.

(c) Any public water system required to install a fluoridation system pursuant to subsection (a) or required to fluoridate pursuant to subsection (b) shall annually submit an estimate of anticipated fluoridation operations and maintenance costs for the next fiscal year (July 1 through June 30) to the State Board by the January 1 preceding that fiscal year.

(d) Any public water system with 10,000 service connections or more that has naturally-occurring fluoride and cannot demonstrate that it maintains an average annual fluoride level that is equal to or greater than the low level specified in the temperature-appropriate "control range" in Table 64433.2-A shall be subject to subsections (a) and (b).

(e) Any public water system which achieves 10,000 service connections or more subsequent to July 1, 1996, that does not have a fluoridation system, or that has naturally-occurring fluoride and meets the criteria in subsection (d) shall provide an estimate to the State Board of capital and any associated costs necessary to install a fluoridation system within one year of achieving at least 10,000 service connections:

(f) Any public water system with 10,000 service connections or more shall be exempted from fluoridation in either of the following cases:

(1) The water system does not receive sufficient funds from a source identified by the State Board and not excluded by Health and Safety Code section 116415 to cover the capital and associated costs needed to install a fluoridation system; or

(2) The water system received sufficient capital funds from a source identified by the State Board and not excluded by Health and Safety Code section 116415 and subsequently installed a fluoridation system or the water system meets the criteria in subsection (b), and the water system did not receive sufficient funds from a source identified by the State Board and not excluded by Health and Safety Code section 116415 to cover the noncapital operation and maintenance costs to fluoridate. The water system shall be exempted for any fiscal year (July 1 through June 30) for which it does not receive the funds for noncapital operation and maintenance costs.

§64433.2. Optimal Fluoride Levels.

Any public water system that is fluoridating shall comply with the temperature-appropriate fluoride levels in Table 64433.2-A. The system shall determine, and submit to the State Board, its annual average of maximum daily air temperatures based on the five calendar years immediately preceding the current calendar year.

Table 64433.2-A
Optimal Fluoride Levels

Annual average of maximum daily air temperatures, degrees		*Optimal fluoride level, mg/L*	*Control Range, mg/L*	
Fahrenheit	Celsius		Low	High
50.0 to 53.7	10.0 to 12.0	1.2	1.1	1.7
53.8 to 58.3	12.1 to 14.6	1.1	1.0	1.6
58.4 to 63.8	14.7 to 17.7	1.0	0.9	1.5
63.9 to 70.6	17.8 to 21.4	0.9	0.8	1.4
70.7 to 79.2	21.5 to 26.2	0.8	0.7	1.3
79.3 to 90.5	26.3 to 32.5	0.7	0.6	1.2

§64433.3. Monitoring and Compliance--Fluoride Levels.

(a) If a water system has a single fluoridation system which treats all the water distributed to consumers, the supplier shall collect a daily sample for fluoride analysis, pursuant to §64415(b), either in the distribution system or at the entry point. If a water system does not fluoridate all its water and/or has more than one fluoridation system, the supplier shall collect one sample daily in the distribution system and rotate the sample sites in order to be representative of the water throughout the distribution system according to a monitoring plan the State Board has determined to be representative. For water systems fluoridating as of January 1, 1997, the plan shall be submitted by July 1, 1998. For all others, the plan shall be submitted prior to initiating fluoridation treatment. A water system shall monitor only when it is operating its fluoridation system.

(b) If more than 20 percent of the daily fluoride samples collected in a month by a water system pursuant to subsection (a) fall outside the control range of optimal levels as determined by temperature for that system pursuant to §64433.2, the system shall be out of compliance with §64433.2.

(c) At least once a month, any water supplier with an operating fluoridation system shall divide one sample and have one portion analyzed for fluoride by water system personnel and the other portion analyzed pursuant to §64415(a).

(d) Any water system with an operating fluoridation system shall sample the raw source waters annually and analyze for fluoride pursuant to §64415(a); samples collected pursuant to §64432(c)(1) may be used toward satisfying this requirement. All raw source water samples collected under this subsection are subject to compliance with the fluoride MCL in Table 64431-A.

(e) If any sample result obtained pursuant to subsection (a) does not fall within the temperature-appropriate fluoride level control range in Table 64433.2-A, the water supplier shall take action as detailed in the water system's approved fluoridation system operations contingency plan as specified in §64433.8.

§64433.5. Fluoridation System.
Each fluoridation system installed or modified after January 1, 1997, shall meet the following criteria, as a minimum:

(a) Operate only when a flow of water is detected. If the water system serves less than 200 service connections, a secondary flow-based control device shall be provided as back-up protection;

(b) Provide flow measuring and recording equipment for the fluoride addition;

(c) Provide design and reliability features to maintain the level of fluoride within the temperature-appropriate control range 95 per cent of the time;

(d) Provide for containment of spills; and

(e) Provide alarm features for fluoride chemical feed and fluoride spills.

§64433.7. Recordkeeping, Reporting, and Notification for Water Systems Fluoridating.

(a) By the tenth day of each month following the month being reported, each water supplier fluoridating its water supply shall send operational reports to the State Board which include the following:

(1) The fluoride compounds used and the calculated fluoride dose in mg/L;

(2) Information on any interruptions in the fluoridation treatment which may have occurred during the month including the duration of the interruptions, an explanation of causes, and what corrective actions were taken to insure that fluoridation treatment was resumed in a timely manner;

(3) The results of the daily monitoring for fluoride in the water distribution system, reported in terms of daily results, and ranges and the number of samples collected; and

(4) The results of monthly split sample(s) analyzed pursuant to §64433.3(c).

(b) For water systems that fluoridated the previous fiscal year (July 1 through June 30), the water supplier shall report the operations and maintenance costs for that year to the State Board by August 1.

(c) Whenever a water system initiates fluoridation, suspends fluoridation for more than ninety days, or reinitiates fluoridation after a suspension of more than ninety days, the water supplier shall notify the consumers, local health departments, pharmacists, dentists, and physicians in the area served by the water system, regarding the status of the fluoridation treatment. If a water system with more than one fluoridation system suspends the use of one or more of its fluoridation systems, but the level of fluoride being served to the consumers is in conformance with Table 64433.2-A, no notification shall be required.

(d) If a fluoride overfeed exceeding 10.0 mg/L occurs, the water system shall notify the State Board by the end of the business day of the occurrence or within 24 hours if the State Board office is closed.

(e) If the level of fluoride in the distribution system is found to be less than the control range in Table 64433.2-A in two or more samples in a month, the water system shall notify the State Board within three business days of the second occurrence. If the level of fluoride in the distribution system is found to be 0.1 mg/L or more above the control range up to 10.0 mg/L, the water supplier shall notify the State Board within three business days of the occurrence.

§64433.8. Fluoridation System Operations Contingency Plan.

(a) Water systems fluoridating as of July 1, 1996 shall submit a fluoridation system operations contingency plan by July 1, 1998. All other water systems shall submit the plan at least three months before initiating fluoridation treatment. All fluoridating water systems shall operate in accordance with a fluoridation system operations contingency plan determined by the State Board to include the elements in subsection (b).

(b) A fluoridation system operation contingency plan shall include, but not be limited to, the following elements:

(1) Actions to be implemented by the water supplier in the event that the fluoride level in a distribution system sample is found to be less than the control range in Table 64433.2-A, 0.1 mg/L above the control range up to a fluoride level of 2.0 mg/L, from 2.1 to a level of 4.0 mg/L, from 4.1 to a level of 10.0 mg/L, or above a level of 10.0 mg/L.

(2) The procedure for shutting down the fluoridation equipment if there is a fluoride overfeed and the need to do so is identified by the State Board and/or the water supplier;

(3) The procedure for investigating the cause of an underfeed or overfeed;

(4) A list of water system, county health department, and State Board personnel with day and evening phone numbers to be notified by the end of the business day of the occurrence or within 24 hours if the State Board office is closed in the event of an overfeed exceeding 10.0 mg/L; and

(5) The procedure for notifying the public if instructed to do so by the State Board in the event of a fluoride underfeed extending for more than three months or a fluoride overfeed exceeding 10.0 mg/L.

§64434. Water System Priority Funding Schedule.

Public water systems with 10,000 service connections or more that are not fluoridating as of July 1, 1996, shall install fluoridation systems and initiate fluoridation according to the order established in Table 64434-A, as the water systems receive funds from sources identified by the State Board, pursuant to Health and Safety Code section 116415.

Table 64434-A
Water System Priority Funding Schedule

System No.	*System Name*	*Priority*
3710010	Helix Water District	1
5610017	Ventura, City of	2
4110013	Daly City, City of	3
3710006	Escondido, City of	4
4210011	Santa Maria, City of	5
3410009	Fair Oaks Water District	6
1910083	Manhattan Beach, City of	7
3710025	Sweetwater Authority	8
4210010	Santa Barbara, City of	9
0910001	El Dorado Irrigation District	10
3410006	Citrus Heights Water District	11
4410010	Santa Cruz, City of	12
3610039	San Bernardino, City of	13
3310009	Eastern Municipal Water District	14
3710037	Padre Dam Municipal Water District	15
1910067	Los Angeles, City of	16
2810003	Napa, City of	17
3710020	San Diego, City of	18
3710034	Otay Water District	19
3310031	Riverside, City of	20
1910173	Whittier, City of	21
3410020	Sacramento, City of	22
1910139	California American Water Company - San Marino	23
3710021	San Dieguito Water District	24
3610024	Hesperia Water District	25
1910179	Burbank, City of	26
2710004	California American Water Company - Monterey	27
3310049	Western Municipal Water District	28
3010073	Moulton Niguel Water District	29
3010101	Santa Margarita Water District	30
1910239	Lakewood, City of	31
2110003	North Marin Water District	32
3010037	Yorba Linda Water District	33
3710015	Poway, City of	34
3110025	Placer County Water Agency	35

System No.	*System Name*	*Priority*
5010010	Modesto, City of	36
1910126	Pomona, City of	37
3410004	Carmichael Water District	38
1910043	Glendale, City of	39
3610018	Cucamonga Community Water District	40
3910011	Tracy, City of	41
1910234	Walnut Valley Water District	42
3910012	Stockton, City of	43
1910146	Santa Monica, City of	44
3710027	Vista Irrigation District	45
3010018	La Habra, City of	46
1910009	Valley County Water District	47
3310012	Elsinore Valley Municipal Water District	48
1910051	Inglewood, City of	49
3710005	Carlsbad Municipal Water District	50
4210004	Goleta Water District	51
1910213	Torrance, City of	52
1910152	South Gate, City of	53
1910155	Southern California Water Company - Southwest	54
1510017	Indian Wells Valley Water District	55
1910039	San Gabriel Valley Water Company - El Monte	56
1610003	Hanford, City of	57
3310037	Corona, City of	58
3010062	Garden Grove, City of	59
3610003	Apple Valley Ranchos Water Community	60
3610036	Chino Hills, City of	61
3010064	Westminster, City of	62
4310011	San Jose Water Company	63
3610012	Chino, City of	64
3910004	Lodi, City of	65
5610007	Oxnard, City of	66
1910019	Cerritos, City of	67
1910205	Suburban Water Systems - San Jose Hills	68
1910059	Suburban Water Systems - La Mirada	69
1910092	Monterey Park, City of	70
1910174	Suburban Water Systems - Whittier	71
1910026	Compton, City of	72
1910124	Pasadena, City of	73
3310022	Lake Hemet Municipal Water District	74
1910142	Southern California Water Company - San Dimas	75
4510005	Redding, City of	76

System No.	*System Name*	*Priority*
3610037	Redlands, City of	77
3910005	Manteca, City of	78
3710014	Oceanside, City of	79
3610038	Rialto, City of	80
4310022	Great Oaks Water Company	81
4310014	Sunnyvale, City of	82
3310021	Jurupa Community Services District	83
3410001	Arcade- Town & County	84
3610052	Victor Valley Water District	85
3010023	Newport Beach, City of	86
3610064	East Valley Water District	87
1910225	Las Virgenes Municipal Water District	88
3710001	California American Water Company - Coronado	89
3610034	Ontario, City of	90
3910001	California Water Service Company - Stockton	91
1910033	Dominguez Water Agency	92
5410015	Tulare, City of	93
5710006	Woodland, City of	94
3710029	Olivenhain Municipal Water District	95
1910003	Arcadia, City of	96
1910008	Azusa Valley Water Company	97
4410011	Watsonville, City of	98
3010003	Buena Park, City of	99
4310005	Milpitas, City of	100
1910017	Santa Clarita Water Company	101
1910240	Valencia Water Company	102
3610004	West San Bernardino Water District	103
0910002	South Tahoe Public Utilities District	104
5610059	Southern California Water Company - Simi Valley	105
3010027	Orange, City of	106
5410010	Porterville, City of	107
4410017	Soquel Creek Water District	108
4110023	San Bruno, City of	109
1910001	Alhambra, City of	110
3010022	Southern California Water Company-West Orange County	111
3010091	Los Alisos Water District	112
3610050	Upland, City of	113
3410024	Northridge Water District	114
1010003	Clovis, City of	115
3010004	Mesa Consolidated Water District	116
3610041	San Gabriel Valley Water Company - Fontana	117

NOTE: This publication is meant to be an aid to the staff of the State Board's Division of Drinking Water and cannot be relied upon by the regulated community as the State of California's representation of the law. The published codes are the only official representation of the law. Refer to the published codes—in this case, 17 CCR and 22 CCR—whenever specific citations are required. Statutes related to the State Board's drinking water-related activities are in the Health & Safety Code, the Water Code, and other codes.

System No.	*System Name*	*Priority*
3410010	Citizens Utilities Company of California - Suburban	118
3010038	Santa Ana, City of	119
3010092	Irvine Ranch Water District	120
1910211	Park Water Company - Bellflower	121
3010010	Fullerton, City of	122
4310007	Mountain View, City of	123
3010036	San Clemente, City of	124
3010079	El Toro Water District	125
5610020	Thousand Oaks, City of	126
3610029	Monte Vista Water District	127
1910004	Southern California Water Company - Artesia	128
4210016	Southern California Water Company - Orcutt	129
4110008	California Water Service Company - San Mateo	130
1310038	Rancho California Water District	131
3410017	Citizens Utilities Company of California - Parkway	132
1910024	Southern California Water Company - Claremont	133
1910044	Glendora, City of	134
3010001	Anaheim, City of	135
5710001	Davis, City of	136
1910134	California Water Service Company-Hermosa/Redondo	137
1010007	Fresno, City of	138
1910102	Palmdale Water District	139
4310012	Santa Clara, City of	140
2710010	California Water Service Company - Salinas	141
4910006	Petaluma, City of	142
1910036	California Water Service Company - East Los Angeles	143
3410013	Citizens Utilities Company of California - Lincoln Oaks	144
3310001	Coachella Valley Water District	145
5010019	Turlock, City of	146
5410016	California Water Service Company - Visalia	147
5610023	Waterworks District 8-Simi Valley	148
0410002	California Water Service Company - Chico	149
1910104	California Water Service Company - Palos Verdes	150
3410015	Southern California Water Company - Corodva	151
4910009	Santa Rosa, City of	152
1910194	Rowland Water District	153
1510003	California Water Service Company - Bakersfield	154
5610040	California American Water Company - Village District	155
3310005	Desert Water Agency	156
0110003	California Water Service Company - Livermore	157
3010046	Tustin, City of	158

System No.	*System Name*	*Priority*
4310001	California Water Service Company - Los Altos Suburban	159
4110007	California Water Service Company - San Carlos	160
1910070	Los Angeles, County Water Works District 4&34- Lancaster	161
1510031	Bakersfield, City of	162
4110009	California Water Service Company - South San Francisco	163
3010053	Huntington Beach, City of	164
4110006	California Water Service Company - Bear Gulch	165
1910034	Downey, City of	166
4110022	Redwood City	167

Article 5. Radioactivity

§64442. MCLs and Monitoring - Gross Alpha Particle Activity, Radium-226, Radium-228, and Uranium

(a) Each community and nontransient-noncommunity water system (system) shall comply with the primary MCLs in Table 64442 in the drinking water supplied to the public and use the DLRs for reporting monitoring results:

Table 64442
Radionuclide Maximum Contaminant Levels (MCLs)
and Detection Levels for Purposes of Reporting (DLRs)

Radionuclide	*MCL*	*DLR*
Radium-226	5 pCi/L (combined radium-226 & -228)	1 pCi/L
Radium–228		1 pCi/L
Gross Alpha particle activity (excluding radon and uranium)	15 pCi/L	3 pCi/L
Uranium	20 pCi/L	1 pCi/L

(b) Each system shall monitor to determine compliance with the MCLs in table 64442, as follows:

(1) Monitor at each water source, or every entry point to the distribution system that is representative of all sources being used under normal operating conditions; conduct all monitoring at the same sample site(s) unless a change is approved by the State Board, based on a review of the system and its historical water quality data;

(2) For quarterly monitoring, monitor during the same month (first, second or third) of each quarter during each quarter monitored;

(3) By December 31, 2007, complete initial monitoring that consists of four consecutive quarterly samples at each sampling site for each radionuclide in table 64442, except that nontransient-noncommunity water systems shall not be required to monitor radium-228 as a separate analyte, but shall monitor for compliance with the combined

radium MCL using the analytical method described in Prescribed Procedures for Measurement of Radioactivity in Drinking Water, Section 6, Alpha-emitting Radium Isotopes in Drinking Water, Method 903.0 (EPA/600/4-80-032, August 1980):

(A) Data collected for a sampling site between January 1, 2001, and December 31, 2004, may be used to satisfy the initial monitoring requirement, subject to the State Board's approval based on whether the analytical methods, DLRs, sampling sites, and the frequency of monitoring used were consistent with this article.

(B) For gross alpha particle activity, uranium, radium-226 and radium-228, the State Board may waive the final two quarters of initial monitoring at a sampling site if the results from the previous two quarters are below the DLR(s) and the sources are not known to be vulnerable to contamination.

(c) Any new system or new source for an existing system shall begin monitoring pursuant to Subsection (b) within the first quarter after initiating water service to the public.

(d) After initial monitoring, each system shall monitor for each radionuclide at each sampling site at a frequency determined by the monitoring result(s) [single sample result or average of sample results if more than one sample collected] from the most recent compliance period as follows:

(1) For nontransient-noncommunity water systems, the results for the total radium analyses shall be averaged.

(2) For community water systems, the results of radium-226 and radium-228 analyses shall be added and the average calculated.

(3) The values used for the radionuclide MCLs and DLRs shall be as specified in Table 64442.

(4) If the single sample result or average is:

A. Below the DLR, the system shall collect and analyze at least one sample every nine years (3 compliance periods).

B. At or above the DLR, but at or below ½ the MCL, the system shall collect and analyze at least one sample every six years.

C. Above ½ the MCL, but not above the MCL, the system shall collect and analyze at least one sample every three years.

(e) A system that monitors quarterly may composite up to four consecutive samples from a single sampling site if analysis is done within a year of the first sample's collection. If the result of the composited sample is greater than ½ the MCL, at least one additional quarterly sample shall be analyzed to evaluate the range and trend of results over time before allowing the system to reduce the monitoring frequency.

(f) A gross alpha particle activity measurement may be substituted for other measurements by adding the 95% confidence interval (1.65σ, where σ is the standard deviation of the net counting rate of the sample) to it; and if,

(1) For uranium and radium measurements (after initial radium-228 monitoring has been completed), the gross alpha measurement does not exceed 5 pCi/L; or

(2) For radium measurements (after initial radium-228 monitoring has been completed), the result obtained from subtracting the uranium measurement from the gross alpha measurement does not exceed 5 pCi/L.

(g) If any sample result is greater than an MCL:

(1) For a system monitoring less than quarterly, quarterly samples shall be collected and analyzed to determine compliance, pursuant to subsection (h);

(2) For a system that already has four consecutive quarterly results, compliance shall be determined pursuant to subsection (h).

(3) The system shall monitor quarterly until the results of four consecutive quarterly sample results do not exceed the MCL.

(h) A system with one or more sample results greater than an MCL shall determine compliance with the MCL as follows:

(1) At each sampling site, based on the analytical results for that site. Any confirmation sample result shall be averaged with the initial result.

(2) Using all monitoring results collected under this section during the previous 12 months, even if more than the minimum required number of samples was collected.

(3) By a running annual average of four consecutive quarters of sampling results. Averages shall be rounded to the same number of significant figures as the MCL for which compliance is being determined.

(A) If any sample result will cause the annual average at any sample site to exceed the MCL, the system shall be out of compliance immediately upon receiving the result;

(B) If a system has not analyzed the required number of samples, compliance shall be determined by the average of the samples collected at the site during the most recent 12 months; and

(C) If a sample result is less than the DLR in table 64442, zero shall be used to calculate the annual average, unless a gross alpha particle activity is being used in lieu of radium-226, total radium, and/or uranium. In that case, if the gross alpha particle activity result is less than the DLR, ½ the DLR shall be used to calculate the annual average.

(4) If compositing is allowed at a sampling site, by the results of a composite of four consecutive quarterly samples.

(5) If the system can provide documentation that a sample was subject to sampling or analytical errors, the State Board may invalidate the result based on its review of the documentation, the sampling result, and the historical sampling data.

(6) Each system shall ensure that the laboratory analyzing its samples collected for compliance with this article calculates and reports the sample-specific Minimum Detectable Activity at the 95% confidence level (MDA_{95}) along with the sample results. The MDA_{95} shall not exceed the DLR and shall be calculated as described in ANSI

N42.23 Measurement and Associated Instrumentation Quality Assurance for Radiobioassay Laboratories, Appendix A.7.6 (September 10, 1995).

§64443. MCLs and Monitoring - Beta Particle and Photon Radioactivity

(a) Each community and nontransient-noncommunity water system (system) shall comply with the primary MCLs in table 64443 and use the DLRs for reporting monitoring results:

Table 64443
Radionuclide Maximum Contaminant Levels (MCLs)
and Detection Levels for Purposes of Reporting (DLRs)

Radionuclide	*MCL*	*DLR*
Beta/photon emitters	4 millirem/year annual dose equivalent to the total body or any internal organ	Gross Beta particle activity: 4 pCi/L
Strontium-90	8 pCi/L (= 4 millirem/yr dose to bone marrow)	2 pCi/L
Tritium	20,000 pCi/L (= 4 millirem/yr dose to total body)	1,000 pCi/L

(b) Each system designated by the State Board as vulnerable to contamination by nuclear facilities and/or a determination of vulnerability by a Source Water Assessment, as defined in section 63000.84, shall monitor to determine compliance with the MCLs in table 64443, as follows:

(1) Beginning within one quarter after being notified by the State Board that the system is vulnerable, quarterly for beta/photon emitters and annually for tritium and strontium-90 at each water source, or every entry point to the distribution system that is representative of all sources being used under normal operating conditions, and shall conduct all monitoring at the same sample site(s) unless a change is approved by the State Board, based on a review of the system and its historical water quality data;

(2) For quarterly monitoring, during the same month (first, second or third) of each quarter during each quarter monitored; and

(3) If the gross beta particle activity minus the naturally-occurring potassium-40 beta particle activity at a sampling site has a running annual average less than or equal to 50 pCi/L (screening level), reduce monitoring to a single sample for beta/photon emitters, tritium and strontium-90 once every three years (compliance monitoring period).

(c) Each system designated by the State Board as utilizing waters contaminated by effluents from nuclear facilities on the basis of analytical data and/or a Source Water Assessment, shall:

(1) Beginning within one quarter after being notified by the State Board of the above designation, monitor on an ongoing basis pursuant to subparagraphs (A) through (C) at each sampling site:

(A) For beta/photon emitters, quarterly by analyzing three monthly samples and averaging the results or by analyzing a composite of three monthly samples;

(B) For iodine-131, quarterly by analyzing a composite of five consecutive daily samples, unless the State Board has directed the system to do more frequent monitoring based on a detection of iodine-131 in the sampled water; and

(C) For strontium-90 and tritium, annually by analyzing four quarterly samples and averaging the results or by analyzing a composite of four quarterly samples.

(2) If the gross beta particle activity minus the naturally-occurring potassium-40 beta particle activity at a sampling site has a running annual average (computed quarterly) less than or equal to 15 pCi/L (screening level), reduce the frequency of monitoring to a single sample for beta/photon emitters, iodine-131, strontium-90 and tritium once every three years (compliance monitoring period).

(d) If the gross beta particle activity minus the naturally-occurring potassium-40 beta particle activity exceeds a system's screening level pursuant to Subsection (b)(3) or (c)(2):

(1) The sample shall be analyzed to identify the primary radionuclides present and the doses shall be calculated and summed to determine compliance with the MCL for beta particle/photon radioactivity; and

(2) Except for strontium-90 and tritium for which the MCLs provide the average annual concentrations assumed to produce a total body or organ dose equivalent to 4 millirem/year, the concentration of manmade radionuclides shall be calculated using the 168 hour data list in "Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure," NBS (National Bureau of Standards) Handbook 69 as amended August 1963, U.S. Department of Commerce. (See Title 40, Code of Federal Regulations, section 141.66(d)(2).)

(e) If a system analyzes for naturally-occurring potassium-40 beta particle activity from the same or equivalent samples used for the gross beta particle activity analysis, the potassium-40 beta particle activity shall be calculated by multiplying elemental potassium concentrations (in mg/L) by a factor of 0.82 pCi/mg.

(f) A system required to monitor under this section may use environmental surveillance data (collected by the nuclear facility to detect any radionuclide contamination) in lieu of monitoring, subject to the State Board's determination that the data is applicable to the system based on a review of the data and the hydrogeology of the area. In the event that there is a release of radioactivity or radioactive contaminants from the nuclear facility, a system using environmental surveillance data shall begin the monitoring in paragraph (b)(1) or (c)(1)(A) through (C), whichever is most applicable.

(g) If a sample result is greater than an MCL:

(1) Compliance shall be determined as follows:

(A) At each sampling site, based on the analytical results for that site. Any confirmation sample result shall be averaged with the initial result.

(B) Using all monitoring results collected under this article during the previous 12 months, even if more than the minimum required number of samples was collected.

(C) By a running annual average of four consecutive quarters of sampling results where quarterly monitoring is required, or by an annual sample when applicable for tritium and strontium-90. Averages shall be rounded to the same number of significant figures as the MCL for which compliance is being determined.

1. If any sample result will cause the annual average at any sample site to exceed the MCL, the system shall be out of compliance immediately after being notified of the result;

2. If a system has not analyzed the required number of samples, compliance shall be determined by the average of the samples collected at the site during the most recent 12 months; and

3. If a sample result is less than the DLR in 64443, zero shall be used to calculate the annual average.

(D) If the system can provide documentation that a sample was subject to sampling or analytical errors, the State Board may invalidate the result based on its review of the documentation, the sampling result, and the historical sampling data.

(E) Each system shall ensure that the laboratory analyzing its samples collected for compliance with this article calculates and reports the sample-specific Minimum Detectable Activity at the 95% confidence level (MDA_{95}) along with the sample results. The MDA_{95} shall not exceed the DLR and is calculated as described in ANSI N42.23 Measurement and Associated Instrumentation Quality Assurance for Radiobioassay Laboratories, Appendix A.7.6 (September 10, 1995). (See Title 40, Code of Federal Regulations, section 141.66(d)(2).)

(2) If a sample has a gross beta/photon radioactivity level greater than the MCL:

(A) A system shall monitor monthly beginning the month after receiving a result greater than the MCL and continue monthly monitoring until an average of three consecutive monthly sample results does not exceed the MCL ;

(B) The system shall then monitor quarterly until the average of four consecutive quarterly sample results does not exceed the MCL; and

(C) Subsequently, the system shall conduct the monitoring in paragraph (b)(1) or (c)(1)(A) through (C), whichever is most applicable.

Article 5.5. Primary Standards -- Organic Chemicals

§64444. Maximum Contaminant Levels – Organic Chemicals.

The MCLs for the primary drinking water chemicals shown in table 64444-A shall not be exceeded in the water supplied to the public.

Table 64444-A
Maximum Contaminant Levels
Organic Chemicals

Chemical	*Maximum Contaminant Level, mg/L*
(a) Volatile Organic Chemicals (VOCs)	
Benzene	0.001
Carbon Tetrachloride	0.0005
1,2-Dichlorobenzene	0.6
1,4-Dichlorobenzene	0.005
1,1-Dichloroethane	0.005
1,2-Dichloroethane	0.0005
1,1-Dichloroethylene	0.006
cis-1,2-Dichloroethylene	0.006
trans-1,2-Dichloroethylene	0.01
Dichloromethane	0.005
1,2-Dichloropropane	0.005
1,3-Dichloropropene	0.0005
Ethylbenzene	0.3
Methyl-*tert*-butyl ether	0.013
Monochlorobenzene	0.07
Styrene	0.1
1,1,2,2-Tetrachloroethane	0.001
Tetrachloroethylene	0.005
Toluene	0.15
1,2,4-Trichlorobenzene	0.005
1,1,1-Trichloroethane	0.200
1,1,2-Trichloroethane	0.005
Trichloroethylene	0.005
Trichlorofluoromethane	0.15
1,1,2-Trichloro-1,2,2-Trifluoroethane	1.2
Vinyl Chloride	0.0005
Xylenes	1.750*

Table 64444-A (continued)
Maximum Contaminant Levels
Organic Chemicals

Chemical	*Maximum Contaminant Level, mg/L*
(b) Synthetic Organic Chemicals (SOCs)	
Alachlor	0.002
Atrazine	0.001
Bentazon	0.018
Benzo(a)pyrene	0.0002
Carbofuran	0.018
Chlordane	0.0001
2,4-D	0.07
Dalapon	0.2
Dibromochloropropane	0.0002
Di(2-ethylhexyl)adipate	0.4
Di(2-ethylhexyl)phthalate	0.004
Dinoseb	0.007
Diquat	0.02
Endothall	0.1
Endrin	0.002
Ethylene Dibromide	0.00005
Glyphosate	0.7
Heptachlor	0.00001
Heptachlor Epoxide	0.00001
Hexachlorobenzene	0.001
Hexachlorocyclopentadiene	0.05
Lindane	0.0002
Methoxychlor	0.03
Molinate	0.02
Oxamyl	0.05
Pentachlorophenol	0.001
Picloram	0.5
Polychlorinated Biphenyls	0.0005
Simazine	0.004
Thiobencarb	0.07
Toxaphene	0.003
1,2,3-Trichloropropane	0.000005
2,3,7,8-TCDD (Dioxin)	3×10^{-8}
2,4,5-TP (Silvex)	0.05

*MCL is for either a single isomer or the sum of the isomers.

§64445. Initial Sampling - Organic Chemicals.

(a) Each community and nontransient-noncommunity water system shall collect four quarterly samples during the year designated by the State Board of each compliance period beginning with the compliance period starting January 1, 1993, from each water source at a site prior to any treatment and test for all applicable organic chemicals listed in table 64444-A. The State Board will designate the year based on historical monitoring frequency and laboratory capacity. For surface sources, the samples shall be taken at each water intake. For groundwater sources, the samples shall be taken at each well head. Where multiple intakes or wells draw from the same water supply, the State Board will consider sampling of representative sources as a means of complying with this section. Selection of representative sources shall be based on evidence which includes a hydrogeological survey and sampling results. Wells shall be allowed to flow for a minimum of 15 minutes before sampling to insure that the samples reflect the water quality of the source. In place of water source samples, a supplier may collect samples at sites located at the entry points to the distribution system. The samples shall be representative of each source after treatment. The system shall collect each sample at the same sampling site, unless a change is approved by the State Board.

(b) For any organic chemical added to table 64444-A, the water system shall initiate the quarterly monitoring for that chemical in January of the calendar year after the effective date of the MCL.

(c) A water system may request approval from the State Board to composite samples from up to five sampling sites, provided that the number of the sites to be composited is less than the ratio of the MCL to the DLR in §64445.1. Approval will be based on a review of three years of historical data, well construction and aquifer information for groundwater, and intake location, similarity of sources, and watershed characteristics for surface water. Compositing shall be done in the laboratory and analyses shall be conducted within 14 days of sample collection.

(1) Systems serving more than 3,300 persons shall composite only from sampling sites within a single system. Systems serving 3,300 persons or less may composite among different systems up to the 5-sample limit.

(2) If any organic chemical is detected in the composite sample, a follow-up sample shall be analyzed within 14 days from each sampling site included in the composite for the contaminants which were detected. The water supplier shall report the results to the State Board within 14 days of the follow-up sample collection. If available, duplicates of the original sample taken from each sampling site used in the composite may be used instead of resampling.

(d) A water system may apply to the State Board for a monitoring waiver for one or more of the organic chemicals on table 64444-A in accordance with the following:

(1) A source may be eligible for a waiver if it can be documented that the chemical has not been previously used, manufactured, transported, stored, or disposed of within the watershed or zone of influence and therefore, that the source can be designated nonvulnerable.

(2) If previous use of the chemical locally is unknown or the chemical is known to have been used previously and the source cannot be designated nonvulnerable pursuant to Paragraph (d)(1), it may still be eligible for a waiver based on a review related to susceptibility to contamination. The application to the State Board for a waiver based on susceptibility shall include the following:

(A) previous monitoring results;

(B) user population characteristics;

(C) proximity to sources of contamination;

(D) surrounding land uses;

(E) degree of protection of the water source;

(F) environmental persistence and transport of the chemical in water, soil and air;

(G) elevated nitrate levels at the water supply source; and

(H) historical system operation and maintenance data including previous State Board inspection results.

(3) To apply for a monitoring waiver for VOCs, the water system shall have completed the initial four quarters of monitoring pursuant to subsection (a) or three consecutive years of monitoring with no VOCs detected. If granted a waiver for VOC monitoring, a system using groundwater shall collect a minimum of one sample from every sampling site every six years and a system using surface water shall not be required to monitor for the term of the waiver. The term of a VOC waiver shall not exceed three years.

(4) To obtain a monitoring waiver for one or more of the SOCs, the water system may apply before doing the initial round of monitoring or shall have completed three consecutive years of annual monitoring with no detection of the SOC(s) listed. If the system is granted a waiver for monitoring for one or more SOC(s), no monitoring for the waived SOC(s) shall be required for the term of the waiver, which shall not exceed three years.

(e) For water sources designated by a water supplier as standby sources, the water supplier shall sample each source for any organic chemical added to table 64444-A once within the three-year period beginning in January of the calendar year after the effective date of the MCL.

(f) Water quality data collected prior to January 1, 1988, for VOCs, or January 1, 1990, for SOCs, and/or data collected in a manner inconsistent with this section shall not be used in the determination of compliance with the monitoring requirements for organic chemicals.

(g) MTBE data (i.e., a single sample) collected in a manner consistent with this section after January 1, 1998 in which no MTBE is detected, along with a designation of nonvulnerability pursuant to subsection (d), may be used to satisfy the initial monitoring requirements in subsection (a). If the requirements are satisfied in this way by a water system, the system shall begin annual monitoring pursuant to section 64445.1(b)(1).

(h) Water quality data collected in compliance with the monitoring requirements of this section by a wholesaler agency providing water to a public water system shall be acceptable for use by that system for compliance with the monitoring requirements of this section.

(i) Results obtained from groundwater monitoring performed for an organic chemical in accordance with this section and not more than two calendar years prior to the effective date of a regulation establishing the MCL for that organic chemical may be substituted to partially satisfy the initial monitoring requirements required by this section for that organic chemical. Requests to substitute groundwater monitoring results shall be made in accordance with the following:

1. Requests shall be made in writing by the water system to the State Board; and

2. If the State Board approves the request then results from a given calendar quarter will only be eligible to substitute for a single required initial monitoring result during that same quarter of initial monitoring. (e.g. the second quarter of 2016 may be substituted for the second quarter of 2018).

3. No more than three of the four quarterly samples as required by section 64445(a) or (b) may be substituted.

§64445.1. Repeat Monitoring and Compliance – Organic Chemicals.

(a) For the purposes of this article, detection shall be defined by the detection limits for purposes of reporting (DLRs) in table 64445.1-A:

Table 64445.1-A
Detection Limits for Purposes of Reporting (DLRs)
for Regulated Organic Chemicals

Chemical	*Detection Limit for Purposes of Reporting (DLR)(mg/L)*
(a) All VOCs, except as listed.	0.0005
Methyl-*tert*-butyl ether	0.003
Trichlorofluoromethane	0.005

Chemical	*Detection Limit for Purposes of Reporting (DLR)(mg/L)*
1,1,2-Trichloro-1,2,2-Trifluoroethane	0.01
(b) SOCs	
Alachlor	0.001
Atrazine	0.0005
Bentazon	0.002
Benzo(a)pyrene	0.0001
Carbofuran	0.005
Chlordane	0.0001
2,4-D	0.01
Dalapon	0.01
Dibromochloropropane (DBCP)	0.00001
Di(2-ethylhexyl)adipate	0.005
Di(2-ethylhexyl)phthalate	0.003
Dinoseb	0.002
Diquat	0.004
Endothall	0.045
Endrin	0.0001
Ethylene dibromide (EDB)	0.00002
Glyphosate	0.025
Heptachlor	0.00001
Heptachlor epoxide	0.00001
Hexachlorobenzene	0.0005
Hexachlorocyclopentadiene	0.001
Lindane	0.0002
Methoxychlor	0.01
Molinate	0.002
Oxamyl	0.02
Pentachlorophenol	0.0002
Picloram	0.001
Polychlorinated biphenyls (PCBs) (as decachlorobiphenyl)	0.0005
Simazine	0.001
Thiobencarb	0.001
Toxaphene	0.001
1,2,3-Trichloropropane	0.000005
2,3,7,8-TCDD (Dioxin)	5×10^{-9}
2,4,5-TP (Silvex)	0.001

(b) When organic chemicals are not detected pursuant to table 64445.1-A.

(1) A water system which has not detected any of the VOCs on table 64444-A during the initial four quarters of monitoring, shall collect and analyze one sample annually. After a minimum of three years of annual sampling with no detection of a VOC in table 64444-A, a system using groundwater may reduce the monitoring frequency to one sample during each compliance period. A system using surface water shall continue monitoring annually.

(2) A system serving more than 3,300 persons which has not detected an SOC on table 64444-A during the initial four quarters of monitoring shall collect a minimum of two quarterly samples for that SOC in one year during the year designated by the State Board of each subsequent compliance period. The year will be designated on the basis of historical monitoring frequency and laboratory capacity.

(3) A system serving 3,300 persons or less which has not detected an SOC on table 64444-A during the initial four quarters of monitoring shall collect a minimum of one sample for that SOC during the year designated by the State Board of each subsequent compliance period. The year will be designated on the basis of historical monitoring frequency and laboratory capacity.

(c) When organic chemicals are detected pursuant to table 64445.1-A.

(1) Prior to proceeding with the requirements of paragraphs (2) through (7), the water supplier may first confirm the analytical result, as follows: Within seven days from the notification of an initial finding from a laboratory reporting the presence of one or more organic chemicals in a water sample, the water supplier shall collect one or two additional sample(s) to confirm the initial finding. Confirmation of the initial finding shall be shown by the presence of the organic chemical in either the first or second additional sample, and the detected level of the contaminant for compliance purposes shall be the average of the initial and confirmation sample(s). The initial finding shall be disregarded if two additional samples do not show the presence of the organic chemical.

(2) If one or both of the related organic chemicals heptachlor and heptachlor epoxide are detected, subsequent monitoring shall analyze for both chemicals until there has been no detection of either chemical for one compliance period.

(3) A groundwater sampling site at which one or more of the following chemicals has been detected shall be monitored quarterly for vinyl chloride: trichloroethylene, tetrachloroethylene, 1,2-dichloroethane, 1,1,1-trichloroethane, cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, or 1,1-dichloroethylene. If vinyl chloride is not detected in the first quarterly sample, the sampling site shall be monitored once for vinyl chloride during each compliance period.

(4) If the detected level of organic chemicals for any sampling site does not exceed any shown in table 64444-A, the water source shall be resampled every three months and the samples analyzed for the detected chemicals. After one year of sampling an approved surface water system or two quarters of sampling a groundwater system, the State Board will consider allowing the water supplier to reduce the sampling to once per

year upon request, based on a review of previous sampling data. Systems shall monitor during the quarter(s) which previously yielded the highest analytical results.

(5) If the detected level of an organic chemical for any sampling site exceeds that listed in table 64444-A, the water supplier shall report this information to the State Board within 48 hours of receipt of the result. Unless use of the contaminated source is discontinued, the water supplier shall resample the contaminated source and compliance shall be determined as follows:

(A) Water systems serving more than 3,300 persons shall sample monthly for six months and shall submit the results to the State Board as specified in section 64469. If the average concentration of the initial finding, confirmation sample(s), and six subsequent monthly samples does not exceed the MCL shown in table 64444-A the water supplier may reduce the sampling frequency to once every three months. If the running annual average or the average concentration of the initial finding, confirmation sample(s), and six subsequent monthly samples exceeds the MCL shown in table 64444-A, the water system shall be deemed to be in violation of section 64444.

(B) Water systems serving 3,300 persons or less shall sample quarterly for a minimum of one year and shall submit the results to the State Board as specified in section 64469. If the running annual average concentration does not exceed the MCL in table 64444-A, the water supplier may reduce the sampling frequency to once every year during the quarter that previously yielded the highest analytical result. Quarterly monitoring shall resume if any reduced frequency sample result exceeds the MCL. If the running annual average concentration exceeds the MCL in table 64444-A, the water system shall be deemed to be in violation of section 64444.

(C) If any sample would cause the running annual average to exceed the MCL, the water system is immediately in violation. If a system takes more than one sample in a quarter, the average of all the results for that quarter shall be used when calculating the running annual average. If a system fails to complete four consecutive quarters of monitoring, the running annual average shall be based on an average of the available data.

(6) If any resample, other than those taken in accordance with paragraph (5), of a water sampling site shows that the concentration of any organic chemical exceeds a MCL shown in table 64444-A, the water supplier shall proceed in accordance with paragraphs (1) and (4), or paragraph (5).

(7) If an organic chemical is detected and the concentration exceeds ten times the MCL, the water supplier shall notify the State Board within 48 hours of the receipt of the results and the contaminated site shall be resampled within 48 hours to confirm the result. The water supplier shall notify the State Board of the result of the confirmation sample(s) within 24 hours of the receipt of the confirmation result(s).

(A) If the average concentration of the original and confirmation sample(s) is less than or equal to ten times the MCL, the water supplier shall proceed in accordance with paragraph (5).

(B) If the average concentration of the original and confirmation samples exceeds ten times the MCL, use of the contaminated water source shall immediately be discontinued, if directed by the State Board. Such a water source shall not be returned to service without written approval from the State Board.

§64445.2. Sampling of Treated Water Sources.

(a) Each water supplier utilizing treatment to comply with any MCL for an organic chemical listed in table 64444-A shall collect monthly samples of the treated water at a site prior to the distribution system. If the treated water exceeds the MCL, the water supplier shall resample the treated water to confirm the result and report the result to the State Board within 48 hours of the confirmation.

(b) The State Board will consider requiring more frequent monitoring based on an evaluation of (1) the treatment process used, (2) the treatment effectiveness and efficiency, and (3) the concentration of the organic chemical in the water source.

Article 12. Best available technologies (BAT)

§64447. Best Available Technologies (BAT) – Microbiological Contaminants.

The technologies identified by the State Board as the best available technology, treatment techniques, or other means available for achieving compliance with the total coliform MCL are as follows:

(a) Protection of wells from coliform contamination by appropriate placement and construction;

(b) Maintenance of a disinfectant residual throughout the distribution system;

(c) Proper maintenance of the distribution system; and

(d) Filtration and/or disinfection of approved surface water, in compliance with Section 64650, or disinfection of groundwater.

§64447.2. Best Available Technologies (BAT) - Inorganic chemicals.

The technologies listed in table 64447.2-A are the best available technology, treatment techniques, or other means available for achieving compliance with the MCLs in table 64431-A for inorganic chemicals.

Table 64447.2-A
Best Available Technologies (BAT)
Inorganic Chemicals

Chemical	*Best Available Technologies (BATs)*
Aluminum	10
Antimony	2, 7
Arsenic	1, 2, 5, 6, 7, 9, 13
Asbestos	2, 3, 8
Barium	5, 6, 7, 9
Beryllium	1, 2, 5, 6, 7
Cadmium	2, 5, 6, 7
Chromium	2, 5, 6[a], 7
Cyanide	5, 7, 11
Fluoride	1
Mercury	2[b], 4, 6[b], 7[b]
Nickel	5, 6, 7
Nitrate	5, 7, 9
Nitrite	5, 7
Perchlorate	5,12
Selenium	1, 2[c], 6, 7, 9
Thallium	1, 5

[a]BAT for chromium III (trivalent chromium) only.
[b]BAT only if influent mercury concentrations <10 μg/L.
[c]BAT for selenium IV only.

Key to BATs in table 64447.2:
1 = Activated Alumina
2 = Coagulation/Filtration (not BAT for systems < 500 service connections)
3 = Direct and Diatomite Filtration
4 = Granular Activated Carbon
5 = Ion Exchange
6 = Lime Softening (not BAT for systems < 500 service connections)
7 = Reverse Osmosis
8 = Corrosion Control
9 = Electrodialysis
10 = Optimizing treatment and reducing aluminum added
11 = Chlorine oxidation
12 = Biological fluidized bed reactor
13 = Oxidation/Filtration

§64447.3. Best Available Technologies (BAT) - Radionuclides.

The technologies listed in tables 64447.3-A, B and C are the best available technology, treatment technologies, or other means available for achieving compliance with the MCLs for radionuclides in tables 64442 and 64443.

Table 64447.3-A
Best Available Technologies (BATs)
Radionuclides

Radionuclide	*Best Available Technology*
Combined radium-226 and radium-228	Ion exchange, reverse osmosis, lime softening
Uranium	Ion exchange, reverse osmosis, lime softening, coagulation/filtration
Gross alpha particle activity	Reverse osmosis
Beta particle and photon radioactivity	Ion exchange, reverse osmosis

Table 64447.3-B
Best Available Technologies (BATs) and Limitations for Small Water Systems
Radionuclides

Unit Technologies	*Limitations (see footnotes)*	*Operator Skill Level Required*	*Raw Water Quality Range and Considerations*
1. Ion exchange	(a)	Intermediate	All ground waters; competing anion concentrations may affect regeneration frequency
2. Point of use, ion exchange	(b)	Basic	All ground waters; competing anion concentrations may affect regeneration frequency
3. Reverse osmosis	(c)	Advanced	Surface waters usually require pre-filtration
4. Point of use, reverse osmosis	(b)	Basic	Surface waters usually require pre-filtration
5. Lime softening	(d)	Advanced	All waters

6. Green sand filtration	(e)	Basic	All ground waters; competing anion concentrations may affect regeneration frequency
7. Co-precipitation with barium sulfate	(f)	Intermediate to advanced	Ground waters with suitable quality
8. Electrodialysis/electrodialysis reversal	(g)	Basic to intermediate	All ground waters
9. Pre-formed hydrous manganese oxide filtration	(h)	Intermediate	All ground waters
10. Activated alumina	(a), (i)	Advanced	All ground waters; competing anion concentrations may affect regeneration frequency
11. Enhanced coagulation/filtration	(j)	Advanced	Can treat a wide range of water qualities

Limitation Footnotes:

[a] The regeneration solution contains high concentrations of the contaminant ions, which could result in disposal issues.
[b] When point of use devices are used for compliance, programs for long-term operation, maintenance, and monitoring shall be provided by systems to ensure proper performance.
[c] Reject water disposal may be an issue.
[d] The combination of variable source water quality and the complexity of the water chemistry involved may make this technology too complex for small systems.
[e] Removal efficiencies can vary depending on water quality.
[f] Since the process requires static mixing, detention basins, and filtration, this technology is most applicable to systems with sufficiently high sulfate levels that already have a suitable filtration treatment train in place.
[g] Applies to ionized radionuclides only.
[h] This technology is most applicable to small systems with filtration already in place.
[i] Chemical handling during regeneration and pH adjustment may be too difficult for small systems without an operator trained in these procedures.
[j] This would involve modification to a coagulation/filtration process already in place.

Table 64447.3-C
Best Available Technologies (BATs) for Small Water Systems by System Size
Radionuclides

	Compliance Technologies for System Size Categories Based On Population Served		
	25-500	*501-3,300*	*3,301 - 10,000*
Contaminant	*Unit Technologies (Numbers Correspond to Table 64447.3-B)*		
Combined radium-226 and radium-228	1, 2 ,3, 4, 5, 6, 7, 8, 9	1, 2 ,3, 4, 5, 6, 7, 8, 9	1, 2 ,3, 4, 5, 6, 7, 8, 9
Gross alpha particle activity	3, 4	3, 4	3, 4
Beta particle activity and photon radioactivity	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4
Uranium	1, 2, 4, 10, 11	1, 2, 3, 4, 5, 10, 11	1, 2, 3, 4, 5, 10, 11

§64447.4. Best Available Technologies (BATs) - Organic Chemicals.
The technologies listed in table 64447.4-A are the best available technology, treatment technologies, or other means available for achieving compliance with the MCLs in table 64444-A for organic chemicals.

Table 64447.4-A
Best Available Technologies (BATs)
Organic Chemicals

Chemical	*Best Available Technologies*		
	Granular Activated Carbon	Packed Tower Aeration	Oxidation
(a) Volatile Organic Chemicals (VOCs)			
Benzene	X	X	
Carbon Tetrachloride	X	X	
1,2-Dichlorobenzene	X	X	
1,4-Dichlorobenzene	X	X	
1,1-Dichloroethane	X	X	
1,2-Dichloroethane	X	X	

Chemical	*Best Available Technologies*		
	Granular Activated Carbon	Packed Tower Aeration	Oxidation
1,1-Dichloroethylene	X	X	
cis-1,2-Dichloroethylene	X	X	
trans-1,2-Dichloroethylene	X	X	
Dichloromethane		X	
1,2-Dichloropropane	X	X	
1,3-Dichloropropene	X	X	
Ethylbenzene	X	X	
Methyl-*tert*-butyl ether		X	
Monochlorobenzene	X	X	
Styrene	X	X	
1,1,2,2-Tetrachloroethane	X	X	
Tetrachloroethylene	X	X	
Toluene	X	X	
1,2,4-Trichlorobenzene	X	X	
1,1,1-Trichloroethane	X	X	
1,1,2-Trichloroethane	X	X	
Trichlorofluoromethane	X	X	
Trichlorotrifluoroethane	X	X	
Trichloroethylene	X	X	
Vinyl Chloride		X	
Xylenes	X	X	
(b) Synthetic Organic Chemicals (SOCs)			
Alachlor	X	X	
Atrazine	X		
Bentazon		X	
Benzo(a)pyrene	X		
Carbofuran	X		
Chlordane	X		
2,4-D	X		
Dalapon	X		
Di(2-ethylhexyl)adipate	X	X	
Dinoseb	X		
Diquat	X		
1,2-Dibromo-3-chloropropane	X	X	
Di(2-ethylhexyl)phthalate	X		
Endothall	X		
Endrin	X		
Ethylene Dibromide	X	X	

Chemical	*Best Available Technologies*		
	Granular Activated Carbon	Packed Tower Aeration	Oxidation
Glyphosate			X
Heptachlor	X		
Heptachlor epoxide	X		
Hexachlorobenzene	X		
Hexachlorocyclopentadiene	X	X	
Lindane	X		
Methoxychlor	X		
Molinate	X		
Oxamyl	X		
Picloram	X		
Pentachlorophenol	X		
Polychlorinated Biphenyls	X		
Simazine	X		
Thiobencarb	X		
Toxaphene	X	X	
1,2,3-Trichloropropane	X		
2,3,7,8-TCDD (Dioxin)	X		
2,4,5-TP (Silvex)	X		

Article 14. Treatment Techniques

§64448. Treatment Technique Requirements.

(a) A public water system which uses acrylamide and/or epichlorohydrin in drinking water treatment shall certify annually in writing to the State Board that the combination of dose and monomer does not exceed the following levels:

(1) Acrylamide: 0.05% monomer in polyacrylamide dosed at 1 mg/L, or equivalent.

(2) Epichlorohydrin: 0.01% residual of epichlorohydrin dosed at 20 mg/L, or equivalent.

Article 16. Secondary Drinking Water Standards

§64449. Secondary Maximum Contaminant Levels and Compliance.

(a) The secondary MCLs shown in Tables 64449-A and 64449-B shall not be exceeded in the water supplied to the public by community water systems.

Table 64449-A
Secondary Maximum Contaminant Levels
"Consumer Acceptance Contaminant Levels"

Constituents	*Maximum Contaminant Levels/Units*
Aluminum	0.2 mg/L
Color	15 Units
Copper	1.0 mg/L
Foaming Agents (MBAS)	0.5 mg/L
Iron	0.3 mg/L
Manganese	0.05 mg/L
Methyl-*tert*-butyl ether (MTBE)	0.005 mg/L
Odor—Threshold	3 Units
Silver	0.1 mg/L
Thiobencarb	0.001 mg/L
Turbidity	5 Units
Zinc	5.0 mg/L

Table 64449-B
Secondary Maximum Contaminant Levels
"Consumer Acceptance Contaminant Level Ranges"

	Maximum Contaminant Level Ranges		
Constituent, Units	*Recommended*	*Upper*	*Short Term*
Total Dissolved Solids, mg/L or	500	1,000	1,500
Specific Conductance, µS/cm	900	1,600	2,200
Chloride, mg/L	250	500	600
Sulfate, mg/L	250	500	600

(b) Each community water system shall monitor its groundwater sources or distribution system entry points representative of the effluent of source treatment every three years and its approved surface water sources or distribution system entry points representative of the effluent of source treatment annually for the following:

(1) Secondary MCLs listed in Tables 64449-A and 64449-B; and

(2) Bicarbonate, carbonate, and hydroxide alkalinity, calcium, magnesium, sodium, pH, and total hardness.

(c) If the level of any constituent in Table 64449-A exceeds an MCL, the community water system shall proceed as follows:

(1) If monitoring quarterly, determine compliance by a running annual average of four quarterly samples;

(2) If monitoring less than quarterly, initiate quarterly monitoring and determine compliance on the basis of an average of the initial sample and the next three consecutive quarterly samples collected;

(3) If a violation has occurred (average of four consecutive quarterly samples exceeds an MCL), inform the State Board when reporting pursuant to Section 64469;

(4) After one year of quarterly monitoring during which all the results are below the MCL and the results do not indicate any trend toward exceeding the MCL, the system may request the State Board to allow a reduced monitoring frequency.

(d) For the constituents shown on Table 64449-B, no fixed consumer acceptance contaminant level has been established.

(1) Constituent concentrations lower than the Recommended contaminant level are desirable for a higher degree of consumer acceptance.

(2) Constituent concentrations ranging to the Upper contaminant level are acceptable if it is neither reasonable nor feasible to provide more suitable waters.

(3) Constituent concentrations ranging to the short term contaminant levelare acceptable only for existing community water systems on a temporary basis pending construction of treatment facilities or development of acceptable new water sources.

(e) New services from community water systems serving water which carries constituent concentrations between the Upper and Short Term contaminant levels shall be approved only:

(1) If adequate progress is being demonstrated toward providing water of improved mineral quality.

(2) For other compelling reasons approved by the State Board.

(f) A community water system may apply to the State Board for a waiver from the monitoring frequencies specified in subsection (b), if the system has conducted at least three rounds of monitoring (three periods for groundwater sources or three years for approved surface water sources) and these analytical results are less than the MCLs. The water system shall specify the basis for its request. A system with a waiver shall collect a minimum of one sample per source while the waiver is in effect and the term of the waiver shall not exceed one compliance cycle (i.e., nine years).

(g) Nontransient-noncommunity and transient-noncommunity water systems shall monitor their sources or distribution system entry points representative of the effluent of source treatment for bicarbonate, carbonate, and hydroxide alkalinity, calcium, iron, magnesium, manganese, pH, specific conductance, sodium, and total hardness at least once. In addition, nontransient-noncommunity water systems shall monitor for the constituents in Tables 64449-A and B at least once.

§64449.2. Waivers for Secondary MCL Compliance.

(a) If the average of four consecutive quarters of sample results for a constituent that does not have a primary MCL is not greater than three times the secondary MCL or greater than the State Notification Level, an existing community water system is eligible to apply for a nine-year waiver of a secondary MCL in Table 64449-A, for the following:

(1) An existing source; or

(2) A new source that is being added to the existing water system, as long as:

(A) The source is not being added to expand system capacity for further development; and

(B) The concentration of the constituent of concern in the new source would not cause the average value of the constituent's concentration at any point in the water delivered by the system to increase by more than 20%.

(b) To apply for a waiver of a secondary MCL, the community water system shall conduct and submit a study to the State Board within one year of violating the MCL that includes the following:

(1) The water system complaint log, maintained pursuant to section 64470(a), along with any other evidence of customer dissatisfaction, such as a log of calls to the county health department;

(2) An engineering report, prepared by an engineer registered in California with experience in drinking water treatment, that evaluates all reasonable alternatives and costs for bringing the water system into MCL compliance and includes a recommendation for the most cost-effective and feasible approach;

(3) The results of a customer survey distributed to all the water system's billed customers that has first been approved by the State Board based on whether it includes:

(A) Estimated costs to individual customers of the most cost-effective alternatives presented in the engineering report that are acceptable to the State Board based on its review of their effectiveness and feasibility;

(B) The query: "Are you willing to pay for *(identify constituent)* reduction treatment?";

(C) The query: "Do you prefer to avoid the cost of treatment and live with the current water quality situation?"

(D) The statement: "If you do not respond to this survey, (*insert system name*) will assume that you are in support of the reduction treatment recommended by the engineering report."

(4) A brief report (agenda, list of attendees, and transcript) of a public meeting held by the water system to which customers were invited, and at which both the tabulated results of the customer survey and the engineering report were presented with a request for input from the public.

(c) A community water system may apply for a waiver for iron and/or manganese if, in addition to meeting the requirements in Subsection (b), an average of four consecutive quarter results for the source has not exceeded a State Notification Level for iron and/or manganese. In addition, the system shall include sequestering, as follows:

(1) As one of the alternatives evaluated in the Engineering Report;

(2) In the customer survey as a query: "Are you willing to pay for iron and/or manganese sequestering treatment?"

(d) Unless 50% or more of the billed customers respond to the survey, the community water system shall conduct another survey pursuant to Subsections (b) or (c) within three months from the date of the survey by sending the survey out to either all the customers again, or only the customers that did not respond to the survey. The water system shall not be eligible for a waiver until it achieves at least a 50% response rate on the survey.

(e) If the customer survey indicates that the percentage of billed customers that voted for constituent reduction treatment and the number of billed customers that did not respond to the survey at all exceeds 50% of the total number of billed customers, the community water system shall install treatment, except as provided in Subsection (f), within three years from the date the system completed the customer survey, pursuant to a schedule established by the State Board.

(f) For iron and/or manganese MCL waiver applications, if the percentage of survey respondents that voted for constituent reduction treatment plus the percentage of survey respondents that voted for sequestering exceeds the percentage that voted to avoid the cost and maintain the current water quality situation, the community water system shall implement either constituent reduction treatment or sequestering, on the basis of which was associated with the higher percentage result. If the highest percentage result is for sequestering, the system shall submit a sequestering implementation and assessment plan to the State Board that includes:

(1) A description of the pilot testing or other type of evaluation performed to determine the most effective sequestering agent for use in the system's water;

(2) The sequestering agent feed rate and the equipment to be used to insure that the rate is maintained for each source;

(3) An operations plan; and

(4) The projected cost of sequestering including capital, operations and maintenance costs.

(g) To apply for renewal of a waiver for a subsequent nine years, the system shall request approval from the State Board at least six months prior to the end of the current waiver period. The renewal request shall include all monitoring and treatment operations data for the constituent for which the waiver had been granted and any related customer complaints submitted to the water system. Based on its review of the data and customer complaints, the State Board may require the water system to conduct another customer survey pursuant to this section before making a determination on the waiver renewal.

§64449.4. Use of Sources that Exceed a Secondary MCL and Do Not Have a Waiver.
A source that exceeds one or more of the secondary MCLs in Table 64449-A and does not have a waiver may be used only if the source meets the requirements in Section 64414, and the community water system:

(a) Meters the source's monthly production and submits the results to the State Board by the 10th day of the next month;

(b) Counts any part of a day as a full day for purposes of determining compliance with Section 64414(c);

(c) As a minimum, conducts public notification by including information on the source's use (dates, constituent levels, and reasons) in the Consumer Confidence Report (Sections 64480 through 64483);

(d) Provides public notice prior to use of the source by electronic media, publication in a local newspaper, and/or information in the customer billing, if the situation is such that the water system can anticipate the use of the source (e.g., to perform water system maintenance); and

(e) Takes corrective measures such as flushing after the source is used to minimize any residual levels of the constituent in the water distribution system.

§64449.5. Distribution System Physical Water Quality.
(a) The water supplier shall determine the physical water quality in the distribution system. This determination shall be based on one or more of the following:

(1) Main flushing operations and flushing records.

(2) Consumer complaint records showing location, nature and duration of the physical water quality problem.

(3) Other pertinent data relative to physical water quality in the distribution system.

(b) If the State Board determines that a water system does not have sufficient data on physical water quality in the distribution system to make the determination required in paragraph (a), the water supplier shall collect samples for the following general physical analyses: color, odor, and turbidity. Samples shall be collected from representative points in the distribution system:

(1) For community water systems with 200 to 1,000 service connections: one sample per month.

(2) For community water systems with greater than 1,000 service connections: one sample for every four bacteriological samples required per month.

(3) For community water systems with less than 200 service connections: as established by the local health officer or the State Board.

(c) Odor samples required as a part of general physical analyses may be examined in the field as per Section 64415(b).

(d) The distribution system water of public water systems shall be free from significant amounts of particulate matter.

Article 18. Notification of Water Consumers and the State Board

§64463. General Public Notification Requirements.

(a) Each public (community, nontransient-noncommunity and transient-noncommunity) water system shall give public notice to persons served by the water system pursuant to this article.

(b) Each water system required to give public notice shall submit the notice to the State Board, in English, for approval prior to distribution or posting, unless otherwise directed by the State Board.

(c) Each wholesaler shall give public notice to the owner or operator of each of its retailer systems. A retailer is responsible for providing public notice to the persons it serves. If the retailer arranges for the wholesaler to provide the notification, the retailer shall notify the State Board prior to the notice being given.

(d) Each water system that has a violation of any of the regulatory requirements specified in section 64463.1(a), 64463.4(a), or 64463.7(a) in a portion of the distribution system that is physically or hydraulically isolated from other parts of the distribution system may limit distribution of the notice to only persons served by that portion of the system that is out of compliance, if the State Board has granted written approval on the basis of a review of the water system and the data leading to the violation or occurrence for which notice is being given.

(e) Each water system shall give new customers public notice of any acute violation as specified in section 64463.1(a) that occurred within the previous thirty days, any continuing violation, the existence of a variance or exemption, and/or any other ongoing occurrence that the State Board has determined poses a potential risk of adverse effects on human health [based on a review of estimated exposures and toxicological data associated with the contaminant(s)] and requires a public notice. Notice to new customers shall be given as follows:

(1) Community water systems shall give a copy of the most recent public notice prior to or at the time service begins; and

(2) Noncommunity water systems shall post the most recent public notice in conspicuous locations for as long as the violation, variance, exemption, or other occurrence continues.

§64463.1. Tier 1 Public Notice.

(a) A water system shall give public notice pursuant to this section and section 64465 if any of the following occurs:

(1) Violation of the total coliform MCL when:

(A) Fecal coliform or *E. coli* are present in the distribution system; or

(B) When any repeat sample tests positive for coliform and the water system fails to test for fecal coliforms or *E. coli* in the repeat sample;

(2) Violation of the MCL for nitrate, nitrite, or total nitrate and nitrite, or when the water system fails to take a confirmation sample within 24 hours of the system's receipt of the first sample showing an exceedance of the nitrate or nitrite MCL;

(3) Violation of a Chapter 17 treatment technique requirement resulting from a single exceedance of a maximum allowable turbidity level if:

(A) The State Board determines after consultation with the water system and a review of the data that a Tier 1 public notice is required; or

(B) The consultation between the State Board and the water system does not take place within 24 hours after the water system learns of the violation;

(4) Occurrence of a waterborne microbial disease outbreak, as defined in section 64651.91, or other waterborne emergency, a failure or significant interruption in water treatment processes, a natural disaster that disrupts the water supply or distribution system, or a chemical spill or unexpected loading of possible pathogens into the source water that has the potential for adverse effects on human health as a result of short-term exposure;

(5) Other violation or occurrence that has the potential for adverse effects on human health as a result of short-term exposure, as determined by the State Board based on a review of all available toxicological and analytical data;

(6) Violation of the MCL for perchlorate or when a system is unable to resample within 48 hours of the system's receipt of the first sample showing an exceedance of the perchlorate MCL as specified in section 64432.3(d)(3);

(7) For chlorite:

(A) Violation of the MCL for chlorite;

(B) When a system fails to take the required sample(s) within the distribution system, on the day following an exceedance of the MCL at the entrance to the distribution system; or

(C) When a system fails to take a confirmation sample pursuant to section 64534.2(b)(4); or

(8) Violation of the MRDL for chlorine dioxide; or when a system fails to take the required sample(s) within the distribution system, on the day following an exceedance of the MRDL at the entrance to the distribution system.

(b) As soon as possible within 24 hours after learning of any of the violations in subsection (a) or being notified by the State Board that it has determined there is a potential for adverse effects on human health [pursuant to paragraph (a)(4), (5), or (6)], the water system shall:

(1) Give public notice pursuant to this section;

(2) Initiate consultation with the State Board within the same timeframe; and

(3) Comply with any additional public notice requirements that are determined by the consultation to be necessary to protect public health.

(c) A water system shall deliver the public notice in a manner designed to reach residential, transient, and nontransient users of the water system and shall use, as a minimum, one of the following forms:

(1) Radio or television;

(2) Posting in conspicuous locations throughout the area served by the water system;

(3) Hand delivery to persons served by the water system; or

(4) Other method approved by the State Board, based on the method's ability to inform water system users.

§64463.4. Tier 2 Public Notice.

(a) A water system shall give public notice pursuant to this section if any of the following occurs:

(1) Any violation of the MCL, MRDL, and treatment technique requirements, except:

(A) Where a Tier 1 public notice is required under section 64463.1; or

(B) Where the State Board determines that a Tier 1 public notice is required, based on potential health impacts and persistence of the violations;

(2) All violations of the monitoring and testing procedure requirements in sections 64421 through 64426.1, article 3 (Primary Standards – Bacteriological Quality), for which the State Board determines that a Tier 2 rather than a Tier 3 public notice is required, based on potential health impacts and persistence of the violations;

(3) Other violations of the monitoring and testing procedure requirements in this chapter, and chapters 15.5, 17 and 17.5, for which the State Board determines that a Tier 2 rather than a Tier 3 public notice is required, based on potential health impacts and persistence of the violations; or

(4) Failure to comply with the terms and conditions of any variance or exemption in place.

(b) A water system shall give the notice as soon as possible within 30 days after it learns of a violation or occurrence specified in subsection (a), except that the water system may request an extension of up to 60 days for providing the notice. This extension would be subject to the State Board's written approval based on the violation or occurrence having been resolved and the State Board's determination that public health and welfare would in no way be adversely affected. In addition, the water system shall:

(1) Maintain posted notices in place for as long as the violation or occurrence continues, but in no case less than seven days;

(2) Repeat the notice every three months as long as the violation or occurrence continues. Subject to the State Board's written approval based on its determination that public health would in no way be adversely affected, the water system may be allowed to notice less frequently but in no case less than once per year. No allowance for reduced frequency of notice shall be given in the case of a total coliform MCL violation or violation of a Chapter 17 treatment technique requirement; and

(3) For turbidity violations pursuant to sections 64652.5(c)(2) and 64653(c), (d) and (f), as applicable, a water system shall consult with the State Board as soon as possible within 24 hours after the water system learns of the violation to determine whether a Tier 1 public notice is required. If consultation does not take place within 24 hours, the water system shall give Tier 1 public notice within 48 hours after learning of the violation.

(c) A water system shall deliver the notice, in a manner designed to reach persons served, within the required time period as follows:

(1) Unless otherwise directed by the State Board in writing based on its assessment of the violation or occurrence and the potential for adverse effects on public health and welfare, community water systems shall give public notice by;

(A) Mail or direct delivery to each customer receiving a bill including those that provide their drinking water to others (e.g., schools or school systems, apartment building owners, or large private employers), and other service connections to which water is delivered by the water system; and

(B) Use of one or more of the following methods to reach persons not likely to be reached by a mailing or direct delivery (renters, university students, nursing home patients, prison inmates, etc.):

1. Publication in a local newspaper;

2. Posting in conspicuous public places served by the water system, or on the Internet; or

3. Delivery to community organizations.

(2) Unless otherwise directed by the State Board in writing based on its assessment of the violation or occurrence and the potential for adverse effects on public health and welfare, noncommunity water systems shall give the public notice by:

(A) Posting in conspicuous locations throughout the area served by the water system; and

(B) Using one or more of the following methods to reach persons not likely to be reached by a public posting:

1. Publication in a local newspaper or newsletter distributed to customers;

2. E-mail message to employees or students;

3. Posting on the Internet or intranet; or

4. Direct delivery to each customer.

§64463.7. Tier 3 Public Notice.

(a) Each water system shall give public notice pursuant to this section if any of the following occurs:

(1) Monitoring violations;

(2) Failure to comply with a testing procedure, except where a Tier 1 public notice is required pursuant to section 64463.1 or the State Board determines that a Tier 2 public notice is required pursuant to section 64463.4; or

(3) Operation under a variance or exemption.

(b) Each water system shall give the public notice within one year after it learns of the violation or begins operating under a variance or exemption.

(1) The water system shall repeat the public notice annually for as long as the violation, variance, exemption, or other occurrence continues.

(2) Posted public notices shall remain in place for as long as the violation, variance, exemption, or other occurrence continues, but in no case less than seven days.

(3) Instead of individual Tier 3 public notices, a water system may use an annual report detailing all violations and occurrences for the previous twelve months, as long as the water system meets the frequency requirements specified in this subsection.

(c) Each water system shall deliver the notice in a manner designed to reach persons served within the required time period, as follows:

(1) Unless otherwise directed by the State Board in writing based on its assessment of the violation or occurrence and the potential for adverse effects on public health and welfare, community water systems shall give public notice by

(A) Mail or direct delivery to each customer receiving a bill including those that provide their drinking water to others (e.g., schools or school systems, apartment building owners, or large private employers), and other service connections to which water is delivered by the water system; and

(B) Use of one or more of the following methods to reach persons not likely to be reached by a mailing or direct delivery (renters, university students, nursing home patients, prison inmates, etc.):

1. Publication in a local newspaper;

2. Posting in conspicuous public places served by the water system, or on the Internet; or

3. Delivery to community organizations.

(2) Unless otherwise directed by the State Board in writing based on its assessment of the violation or occurrence and the potential for adverse effects on public health and welfare, noncommunity water systems shall give the public notice by:

(A) Posting in conspicuous locations throughout the area served by the water system; and

(B) Using one or more of the following methods to reach persons not likely to be reached by a posting:

1. Publication in a local newspaper or newsletter distributed to customers;
2. E-mail message to employees or students;
3. Posting on the Internet or intranet; or
4. Direct delivery to each customer.

(d) Community and nontransient-noncommunity water systems may use the Consumer Confidence Report pursuant to sections 64480 through 64483, to meet the initial and repeat Tier 3 public notice requirements in subsection 64463.7(b), as long as the Report meets the following:

(1) Is given no later than one year after the water system learns of the violation or occurrence;

(2) Includes the content specified in section 64465; and

(3) Is distributed pursuant to paragraph (b)(1) and (2) or subsection (c).

§64465. Public Notice Content and Format.

(a) Each public notice given pursuant to this article, except Tier 3 public notices for variances and exemptions pursuant to subsection (b), shall contain the following:

(1) A description of the violation or occurrence, including the contaminant(s) of concern, and (as applicable) the contaminant level(s);

(2) The date(s) of the violation or occurrence;

(3) Any potential adverse health effects from the violation or occurrence, including the appropriate standard health effects language from appendices 64465-A through G;

(4) The population at risk, including subpopulations particularly vulnerable if exposed to the contaminant in drinking water;

(5) Whether alternative water supplies should be used;

(6) What actions consumers should take, including when they should seek medical help, if known;

(7) What the water system is doing to correct the violation or occurrence;

(8) When the water system expects to return to compliance or resolve the occurrence;

(9) The name, business address, and phone number of the water system owner, operator, or designee of the water system as a source of additional information concerning the public notice;

(10) A statement to encourage the public notice recipient to distribute the public notice to other persons served, using the following standard language: "Please share this information with all the other people who drink this water, especially those who may not have received this public notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this public notice in a public place or distributing copies by hand or mail."; and

(11) For a water system with a monitoring and testing procedure violation, this language shall be included: "We are required to monitor your drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not your drinking water meets health standards. During [*compliance period dates*], we *['did not monitor or test'* or *'did not complete all monitoring or testing']* for *[contaminant(s)]*, and therefore, cannot be sure of the quality of your drinking water during that time."

(b) A Tier 3 public notice for a water system operating under a variance or exemption shall include the elements in this subsection. If a water system has violated its variance or exemption conditions, the public notice shall also include the elements in subsection (a).

(1) An explanation of the reasons for the variance or exemption;

(2) The date on which the variance or exemption was issued;

(3) A brief status report on the steps the water system is taking to install treatment, find alternative sources of water, or otherwise comply with the terms and schedules of the variance or exemption; and

(4) A notice of any opportunity for public input in the review of the variance or exemption.

(c) A public water system providing notice pursuant to this article shall comply with the following multilingual-related requirements:

(1) For a Tier 1 public notice:

(A) The notice shall be provided in English, Spanish, and the language spoken by any non-English-speaking group exceeding 10 percent of the persons served by the public water system, and the notice shall include a telephone number or address where such individuals may contact the public water system for assistance; and

(B) If any non-English-speaking group exceeds 1,000 persons served by the public water system, but does not exceed 10 percent served, the notice shall include information in the appropriate language(s) regarding the importance of the notice, and the telephone number or address where such individuals may contact the public water system to obtain a translated copy of the notice from the public water system or assistance in the appropriate language;

(2) For a Tier 2 or Tier 3 public notice:

(A) The notice shall contain information in Spanish regarding the importance of the notice, or contain a telephone number or address where Spanish-speaking residents may contact the public water system to obtain a translated copy of the notice or assistance in Spanish; and

(B) When a non-English speaking group other than Spanish-speaking exceeds 1,000 residents or 10 percent of the residents served by the public water system, the notice shall include:

1. Information in the appropriate language(s) regarding the importance of the notice; or

2. A telephone number or address where such residents may contact the public water system to obtain a translated copy of the notice or assistance in the appropriate language; and

(3) For a public water system subject to the Dymally-Alatorre Bilingual Services Act, Chapter 17.5, Division 7, of the Government Code (commencing with section 7290), meeting the requirements of this Article may not ensure compliance with the Dymally-Alatorre Bilingual Services Act.

(d) Each public notice given pursuant to this article shall:

(1) Be displayed such that it catches people's attention when printed or posted and be formatted in such a way that the message in the public notice can be understood at the eighth-grade level;

(2) Not contain technical language beyond an eighth-grade level or print smaller than 12 point; and

(3) Not contain language that minimizes or contradicts the information being given in the public notice.

Appendix 64465-A. Health Effects Language
Microbiological Contaminants.

Contaminant	***Health Effects Language***
Total Coliform	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.
Fecal coliform/*E. coli*	Fecal coliforms and *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
Turbidity	Turbidity has no health effects. However, high levels of turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

Appendix 64465-B. Health Effects Language
Surface Water Treatment

Contaminant	***Health Effects Language***
Giardia lamblia Viruses Heterotrophic plate count bacteria *Legionella* *Cryptosporidium*	Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

Appendix 64465-C. Health Effects Language
Radioactive Contaminants.

Contaminant	***Health Effects Language***
Gross Beta particle activity	Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer.
Strontium-90	Some people who drink water containing strontium-90 in excess of the MCL over many years may have an increased risk of getting cancer.
Tritium	Some people who drink water containing tritium in excess of the MCL over many years may have an increased risk of getting cancer.
Gross Alpha particle activity	Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.
Combined Radium 226/228	Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer.
Total Radium (for nontransient noncommunity water systems)	Some people who drink water containing radium 223, 224, or 226 in excess of the MCL over many years may have an increased risk of getting cancer.
Uranium	Some people who drink water containing uranium in excess of the MCL over many years may have kidney problems or an increased risk of getting cancer.

Appendix 64465-D. Health Effects Language
Inorganic Contaminants.

Contaminant	*Health Effects Language*
Aluminum	Some people who drink water containing aluminum in excess of the MCL over many years may experience short-term gastrointestinal tract effects**.**
Antimony	Some people who drink water containing antimony in excess of the MCL over many years may experience increases in blood cholesterol and decreases in blood sugar.
Arsenic	Some people who drink water containing arsenic in excess of the MCL over many years may experience skin damage or circulatory system problems, and may have an increased risk of getting cancer.
Asbestos	Some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps.
Barium	Some people who drink water containing barium in excess of the MCL over many years may experience an increase in blood pressure.
Beryllium	Some people who drink water containing beryllium in excess of the MCL over many years may develop intestinal lesions.
Cadmium	Some people who drink water containing cadmium in excess of the MCL over many years may experience kidney damage.
Chromium	Some people who use water containing chromium in excess of the MCL over many years may experience allergic dermatitis.
Copper	Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time may experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years may suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor.
Cyanide	Some people who drink water containing cyanide in excess of the MCL over many years may experience nerve damage or thyroid problems.
Fluoride	*For the Consumer Confidence Report:* Some people who drink water containing fluoride in excess of the federal MCL of 4 mg/L over many years may get bone disease, including pain and tenderness of the bones. Children who drink water containing fluoride in excess of the state MCL of 2 mg/L may get mottled teeth. *For a Public Notice:* This is an alert about your drinking water and a cosmetic dental problem that might affect children under nine years of age. At low levels, fluoride can help prevent cavities, but children drinking water containing more than 2 milligrams per liter (mg/L) of fluoride may develop cosmetic discoloration of their permanent teeth (dental fluorosis). The drinking water provided by your community water system [*name*] has a fluoride concentration of [*insert value*] mg/L. Dental fluorosis may result in a brown staining and/or pitting of the permanent teeth. This problem occurs only in developing teeth, before they erupt from

	the gums. Children under nine should be provided with alternative sources of drinking water or water that has been treated to remove the fluoride to avoid the possibility of staining and pitting of their permanent teeth. You may also want to contact your dentist about proper use by young children of fluoride-containing products. Older children and adults may safely drink the water. Drinking water containing more than 4 mg/L of fluoride can increase your risk of developing bone disease. For more information, please call [*water system contact name*] of [*water system name*] at [*phone number*]. Some home water treatment units are also available to remove fluoride from drinking water. To learn more about available home water treatment units, you may call the State Board's Residential Water Treatment Device Registration Unit at (916) 449-5600.
Lead	Infants and children who drink water containing lead in excess of the action level may experience delays in their physical or mental development. Children may show slight deficits in attention span and learning abilities. Adults who drink this water over many years may develop kidney problems or high blood pressure.
Mercury	Some people who drink water containing mercury in excess of the MCL over many years may experience mental disturbances, or impaired physical coordination, speech and hearing.
Nickel	Some people who drink water containing nickel in excess of the MCL over many years may experience liver and heart effects.
Nitrate	Infants below the age of six months who drink water containing nitrate in excess of the MCL may quickly become seriously ill and, if untreated, may die because high nitrate levels can interfere with the capacity of the infant's blood to carry oxygen. Symptoms include shortness of breath and blueness of the skin. High nitrate levels may also affect the oxygen-carrying ability of the blood of pregnant women.
Nitrite	Infants below the age of six months who drink water containing nitrite in excess of the MCL may become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blueness of the skin.
Perchlorate	Perchlorate has been shown to interfere with uptake of iodide by the thyroid gland, and to thereby reduce the production of thyroid hormones, leading to adverse effects associated with inadequate hormone levels. Thyroid hormones are needed for normal prenatal growth and development of the fetus, as well as for normal growth and development in the infant and child. In adults, thyroid hormones are needed for normal metabolism and mental function.
Selenium	Selenium is an essential nutrient. However, some people who drink water containing selenium in excess of the MCL over many years may experience hair or fingernail losses, numbness in fingers or toes, or circulation system problems.

Thallium	Some people who drink water containing thallium in excess of the MCL over many years may experience hair loss, changes in their blood, or kidney, intestinal, or liver problems.

Appendix 64465-E. Health Effects Language Volatile Organic Contaminants.

Contaminant	***Health Effects Language***
Benzene	Some people who use water containing benzene in excess of the MCL over many years may experience anemia or a decrease in blood platelets, and may have an increased risk of getting cancer.
Carbon Tetrachloride	Some people who use water containing carbon tetrachloride in excess of the MCL over many years may experience liver problems and may have an increased risk of getting cancer.
1,2-Dichlorobenzene	Some people who drink water containing 1,2-dichlorobenzene in excess of the MCL over many years may experience liver, kidney, or circulatory system problems.
1,4-Dichlorobenzene	Some people who use water containing 1,4-dichlorobenzene in excess of the MCL over many years may experience anemia, liver, kidney, or spleen damage, or changes in their blood.
1,1-Dichloroethane	Some people who use water containing 1,1-dichloroethane in excess of the MCL over many years may experience nervous system or respiratory problems.
1,2-Dichloroethane	Some people who use water containing 1,2-dichloroethane in excess of the MCL over many years may have an increased risk of getting cancer.
1,1-Dichloroethylene	Some people who use water containing 1,1-dichloroethylene in excess of the MCL over many years may experience liver problems.
cis-1,2-Dichloroethylene	Some people who use water containing cis-1,2-dichloroethylene in excess of the MCL over many years may experience liver problems.
trans-1,2-Dichloroethylene	Some people who drink water containing trans-1,2-dichloroethylene in excess of the MCL over many years may experience liver problems.
Dichloromethane	Some people who drink water containing dichloromethane in excess of the MCL over many years may experience liver problems and may have an increased risk of getting cancer.
1,2-Dichloropropane	Some people who use water containing 1,2-dichloropropane in excess of the MCL over many years may have an increased risk of getting cancer.
1,3-Dichloropropene	Some people who use water containing 1,3-dichloropropene in excess of the MCL over many years may have an increased risk of getting cancer.
Ethylbenzene	Some people who use water containing ethylbenzene in excess of the MCL over many years may experience liver or kidney problems.

Methyl-tert-butyl ether	Some people who use water containing methyl-tert-butyl ether in excess of the MCL over many years may have an increased risk of getting cancer.
Monochlorobenzene	Some people who use water containing monochlorobenzene in excess of the MCL over many years may experience liver or kidney problems.
Styrene	Some people who drink water containing styrene in excess of the MCL over many years may experience liver, kidney, or circulatory system problems.
1,1,2,2-Tetrachloroethane	Some people who drink water containing 1,1,2,2-tetrachloroethane in excess of the MCL over many years may experience liver or nervous system problems.
Tetrachloroethylene	Some people who use water containing tetrachloroethylene in excess of the MCL over many years may experience liver problems, and may have an increased risk of getting cancer.
1,2,4-Trichlorobenzene	Some people who use water containing 1,2,4-trichlorobenzene in excess of the MCL over many years may experience adrenal gland changes.
1,1,1,-Trichloroethane	Some people who use water containing 1,1,1-trichloroethane in excess of the MCL over many years may experience liver, nervous system, or circulatory system problems.
1,1,2-Trichloroethane	Some people who use water containing 1,1,2- trichloroethane in excess of the MCL over many years may experience liver, kidney, or immune system problems.
Trichloroethylene (TCE)	Some people who use water containing trichloroethylene in excess of the MCL over many years may experience liver problems and may have an increased risk of getting cancer.
Toluene	Some people who use water containing toluene in excess of the MCL over many years may experience nervous system, kidney, or liver problems.
Trichlorofluoro-methane	Some people who use water containing trichlorofluoromethane in excess of the MCL over many years may experience liver problems.
1,1,2-Trichloro-1,2,2-trifluoroethane	Some people who use water containing 1,1,2-trichloro-1,2,2-tri~~ch~~fluoroethane in excess of the MCL over many years may experience liver problems.
Vinyl Chloride	Some people who use water containing vinyl chloride in excess of the MCL over many years may have an increased risk of getting cancer.
Xylenes	Some people who use water containing xylenes in excess of the MCL over many years may experience nervous system damage.

Appendix 64465-F. Health Effects Language
Synthetic Organic Contaminants.

Contaminant	***Health Effects Language***
2,4-D	Some people who use water containing the weed killer 2,4-D in excess of the MCL over many years may experience kidney, liver, or adrenal gland problems.
2,4,5-TP (Silvex)	Some people who drink water containing Silvex in excess of the MCL over many years may experience liver problems.
Alachlor	Some people who use water containing alachlor in excess of the MCL over many years may experience eye, liver, kidney, or spleen problems, or experience anemia, and may have an increased risk of getting cancer.
Atrazine	Some people who use water containing atrazine in excess of the MCL over many years may experience cardiovascular system problems or reproductive difficulties.
Bentazon	Some people who drink water containing bentazon in excess of the MCL over many years may experience prostate and gastrointestinal effects.
Benzo(a)pyrene [PAH]	Some people who use water containing benzo(a)pyrene in excess of the MCL over many years may experience reproductive difficulties and may have an increased risk of getting cancer.
Carbofuran	Some people who use water containing carbofuran in excess of the MCL over many years may experience problems with their blood, or nervous or reproductive system problems.
Chlordane	Some people who use water containing chlordane in excess of the MCL over many years may experience liver or nervous system problems, and may have an increased risk of getting cancer.
Dalapon	Some people who drink water containing dalapon in excess of the MCL over many years may experience minor kidney changes.
Dibromochloro-propane (DBCP)	Some people who use water containing DBCP in excess of the MCL over many years may experience reproductive difficulties and may have an increased risk of getting cancer.
Di (2-ethylhexyl) adipate	Some people who drink water containing di(2-ethylhexyl) adipate in excess of the MCL over many years may experience weight loss, liver enlargement, or possible reproductive difficulties.
Di (2-ethylhexyl) phthalate	Some people who use water containing di(2-ethylhexyl) phthalate well in excess of the MCL over many years may experience liver problems or reproductive difficulties, and may have an increased risk of getting cancer.
Dinoseb	Some people who drink water containing dinoseb in excess of the MCL over many years may experience reproductive difficulties.
Dioxin (2,3,7,8-TCDD)	Some people who use water containing dioxin in excess of the MCL over many years may experience reproductive difficulties and may have an increased risk of getting cancer.

Diquat	Some people who drink water containing diquat in excess of the MCL over many years may get cataracts.
Endothall	Some people who drink water containing endothall in excess of the MCL over many years may experience stomach or intestinal problems.
Endrin	Some people who drink water containing endrin in excess of the MCL over many years may experience liver problems.
Ethylene dibromide (EDB)	Some people who use water containing ethylene dibromide in excess of the MCL over many years may experience liver, stomach, reproductive system, or kidney problems, and may have an increased risk of getting cancer.
Glyphosate	Some people who drink water containing glyphosate in excess of the MCL over many years may experience kidney problems or reproductive difficulties.
Heptachlor	Some people who use water containing heptachlor in excess of the MCL over many years may experience liver damage and may have an increased risk of getting cancer.
Heptachlor epoxide	Some people who use water containing heptachlor epoxide in excess of the MCL over many years may experience liver damage, and may have an increased risk of getting cancer.
Hexachlorobenzene	Some people who drink water containing hexachlorobenzene in excess of the MCL over many years may experience liver or kidney problems, or adverse reproductive effects, and may have an increased risk of getting cancer.
Hexachlorocyclo-pentadiene	Some people who use water containing hexachlorocyclopentadiene in excess of the MCL over many years may experience kidney or stomach problems.
Lindane	Some people who drink water containing lindane in excess of the MCL over many years may experience kidney or liver problems.
Methoxychlor	Some people who drink water containing methoxychlor in excess of the MCL over many years may experience reproductive difficulties.
Molinate (Ordram)	Some people who use water containing molinate in excess of the MCL over many years may experience reproductive effects.
Oxamyl [Vydate]	Some people who drink water containing oxamyl in excess of the MCL over many years may experience slight nervous system effects.
PCBs [Polychlorinated biphenyls]	Some people who drink water containing PCBs in excess of the MCL over many years may experience changes in their skin, thymus gland problems, immune deficiencies, or reproductive or nervous system difficulties, and may have an increased risk of getting cancer.
Pentachlorophenol	Some people who use water containing pentachlorophenol in excess of the MCL over many years may experience liver or kidney problems, and may have an increased risk of getting cancer.
Picloram	Some people who drink water containing picloram in excess of the MCL over many years may experience liver problems.

Simazine	Some people who use water containing simazine in excess of the MCL over many years may experience blood problems.
Thiobencarb	Some people who use water containing thiobencarb in excess of the MCL over many years may experience body weight and blood effects.
Toxaphene	Some people who use water containing toxaphene in excess of the MCL over many years may experience kidney, liver, or thyroid problems, and may have an increased risk of getting cancer.
1,2,3-Trichloropropane	Some people who drink water containing 1,2,3-trichloropropane in excess of the MCL over many years may have an increased risk of getting cancer.

Appendix 64465-G. Health Effects Language
Disinfection Byproducts, Byproduct Precursors, and Disinfectant Residuals

Contaminant	***Health Effects Language***
TTHMs [Total Trihalomethanes]	Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience liver, kidney, or central nervous system problems, and may have an increased risk of getting cancer.
Haloacetic Acids	Some people who drink water containing halocetic acids in excess of the MCL over many years may have an increased risk of getting cancer.
Bromate	Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer.
Chloramines	Some people who use water containing chloramines well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chloramines well in excess of the MRDL could experience stomach discomfort or anemia.
Chlorine	Some people who use water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chlorine well in excess of the MRDL could experience stomach discomfort.
Chlorite	Some infants and young children who drink water containing chlorite in excess of the MCL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorite in excess of the MCL. Some people may experience anemia.
Chlorine dioxide (2 consecutive daily samples at the entry point to the distribution system that are greater than the MRDL)	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia. *Add for public notification only:* The chlorine dioxide violations reported today are the result of exceedances at the treatment facility

	only, not within the distribution system that delivers water to consumers. Continued compliance with chlorine dioxide levels within the distribution system minimizes the potential risk of these violations to consumers.
Chlorine dioxide (one or more distribution system samples are above the MRDL)	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia. *Add for public notification only:* The chlorine dioxide violations reported today include exceedances of the State standard within the distribution system that delivers water to consumers. These violations may harm human health based on short-term exposures. Certain groups, including fetuses, infants, and young children, may be especially susceptible to nervous system effects from excessive chlorine dioxide exposure.
Control of DBP precursors (TOC)	Total organic carbon (TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection byproducts. These byproducts include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer.

Appendix 64465-H. Health Effects Language
Other Treatment Techniques

Contaminant	***Health Effects Language***
Acrylamide	Some people who drink water containing high levels of acrylamide over a long period of time may experience nervous system or blood problems, and may have an increased risk of getting cancer.
Epichlorohydrin	Some people who drink water containing high levels of epichlorohydrin over a long period of time may experience stomach problems, and may have an increased risk of getting cancer.

§64466. Special Notice for Unregulated Contaminant Monitoring Results.

Water systems required to monitor pursuant to section 64450 (Unregulated Chemicals – Monitoring) and/or Federal Register 64(180), p 50556-50620, September 17, 1999, shall notify persons served by the water system of the availability of the results, as follows:

(a) No later than 12 months after the results are known;

(b) Pursuant to sections 64463.7(c) and (d)(1) and (3); and

(c) Include a contact and telephone number where information on the results may be obtained.

Article 19. Records, Reporting and Recordkeeping

§64469. Reporting Requirements.

(a) Analytical results of all sample analyses completed in a calendar month shall be reported to the State Board no later than the tenth day of the following month.

(b) Analytical results of all sample analyses completed by water wholesalers in a calendar month shall be reported to retail customers and the State Board no later than the tenth day of the following month.

(c) Analytical results shall be reported to the State Board electronically using the Electronic Deliverable Format as defined in The Electronic Deliverable Format [EDF] Version 1.2i Guidelines & Restrictions dated April 2001 and Data Dictionary dated April 2001.

(d) Within 10 days of giving initial or repeat public notice pursuant to Article 18 of this Chapter, except for notice given under section 64463.7(d), each water system shall submit a certification to the State Board that it has done so, along with a representative copy of each type of public notice given.

§64470. Recordkeeping.

(a) A water supplier shall maintain records on all water quality and system water outage complaints received, both verbal and written, and corrective action taken. These records shall be retained for a period of five years for State Board review.

(b) A water supplier shall retain, on or at a convenient location near the water utility premises, records as indicated below:

(1) Records of microbiological analyses and turbidity analyses from at least the most recent five years and chemical analyses from at least the most recent 10 years. Actual laboratory reports may be kept, or data may be transferred to tabular summaries, provided the following information is included:

(A) The date, place, and time of sampling; and identification of the person who collected the sample;

(B) Identification of the sample as a routine sample, check sample, raw or finished water or other special sample;

(C) Date of report;

(D) Name of the laboratory and either the person responsible for performing the analysis or the laboratory director;

(E) The analytical technique or method used; and

(F) The results of the analysis.

(2) Records and resultant corrective actions shall be kept not less than three years following the final action taken to correct a particular violation;

(3) Copies of any written reports, summaries, or communications relating to sanitary surveys of the system conducted by the water supplier, a private consultant or any local, state or federal agency, for not less than 10 years following completion of the sanitary survey involved;

(4) Variances or exemptions granted to the system, for not less than five years following the expiration of such variance or exemption;

(5) Copies of any Tier 1, Tier 2, and Tier 3 public notices, for not less than three years; and

(6) Copies of monitoring plans developed pursuant to sections 64416, 64422, and 64534.8 for the same period of time as the records of analyses taken under the plan are required to be kept pursuant to paragraph (1).

Article 20. Consumer Confidence Report

§64480. Applicability and Distribution.

(a) Except as provided in subsection (b), each community and nontransient-noncommunity (NTNC) water system shall prepare and deliver the first Consumer Confidence Report by July 1, 2001, and subsequent reports by July 1 annually thereafter. The first Consumer Confidence Report shall contain data collected during, or prior to, calendar year 2000, as prescribed by section 64481(d)(1). Each Consumer Confidence Report thereafter shall contain data collected during, or prior to, the previous calendar year.

(b) A new community or NTNC water system shall deliver its first Consumer Confidence Report by July 1 of the year after its first full calendar year in operation and subsequent reports by July 1 annually thereafter.

(c) A community or NTNC water system that sells water to another community or NTNC water system shall deliver the applicable information required in section 64481 to the purchasing system by no later than April 1 of each year or on a date mutually agreed upon by the seller and the purchaser, and specifically included in a contract between the parties.

§64481. Content of the Consumer Confidence Report.

(a) A Consumer Confidence Report shall contain information on the source of the water delivered, including:

(1) The type of water delivered by the water system (e.g., surface water, ground water) and the commonly used name (if any) and location of the body (or bodies) of water; and

(2) If a source water assessment has been completed, notification that the assessment is available, how to obtain it, the date it was completed or last updated, and a

brief summary of the system's vulnerability to potential sources of contamination, using language provided by the State Board if the State Board conducted the assessment.

(b) For any of the following terms used in the Consumer Confidence Report, the water system shall provide the specified language below:

(1) Regulatory Action Level: "The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow."

(2) Maximum Contaminant Level or MCL: "The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste, and appearance of drinking water."

(3) Maximum Contaminant Level Goal or MCLG: "The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency."

(4) Public Health Goal or PHG: "The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency."

(5) Primary Drinking Water Standard or PDWS: "MCLs, MRDLs, and treatment techniques for contaminants that affect health, along with their monitoring and reporting requirements."

(6) Treatment technique: "A required process intended to reduce the level of a contaminant in drinking water."

(7) Variances and exemptions: "State Board permission to exceed an MCL or not comply with a treatment technique under certain conditions."

(8) Maximum residual disinfectant level or MRDL: "The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants."

(9) Maximum residual disinfectant level goal or MRDLG: "The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants."

(c) If any of the following are detected, information for each pursuant to subsection (d) shall be included in the Consumer Confidence Report:

(1) Contaminants subject to an MCL, regulatory action level, MRDL, or treatment technique (regulated contaminants), as specified in sections 64426.1, 64431, 64442, 64443, 64444, 64448, 64449, 64533, 64533.5, 64536, 64536.2, 64653 and 64678;

(2) Contaminants specified in 40 Code of Federal Regulations part 141.40 (7-1-2007 edition) for which monitoring is required (unregulated contaminants);

(3) Microbial contaminants detected as provided under subsection (e); and

(4) Sodium and hardness.

(d) For contaminants identified in subsection (c), the water system shall include in the Consumer Confidence Report one table or several adjacent tables that have been developed pursuant to this subsection. Any additional monitoring results that a water system chooses to include in its Consumer Confidence Report shall be displayed separately.

(1) The data in the table(s) shall be derived from data collected to comply with U.S. Environmental Protection Agency (USEPA) and State Board monitoring and analytical requirements during calendar year 2000 for the first Consumer Confidence Report and subsequent calendar years thereafter. Where a system is allowed to monitor for regulated contaminants less often than once a year, the table(s) shall include the date and results of the most recent sampling and the Consumer Confidence Report shall include a brief statement indicating that the data presented in the table(s) are from the most recent testing done in accordance with the regulations. No data older than 9 years need be included.

(2) For detected regulated contaminants referenced in subsection (c)(1), the table(s) shall include:

(A) The MCL expressed as a number equal to or greater than 1.0;

(B) For a primary MCL, the public health goal (PHG) in the same units as the MCL; or if no PHG has been set for the contaminant, the table shall include the USEPA maximum contaminant level goal in the same units as the MCL;

(C) For a detected contaminant that does not have an MCL, the table(s) shall indicate whether there is a treatment technique or specify the regulatory action level or MRDL (and MRDLG) applicable to that contaminant, and the Consumer Confidence Report shall include the appropriate language specified in subsection (b);

(D) For detected contaminants subject to an MCL, except turbidity and total coliforms, the sample result(s) collected at compliance monitoring sampling points shall be reported in the same units as the MCL as follows:

1. When compliance is determined by the results of a single sample, an initial sample averaged with one or two confirmation sample(s), or an average of four quarterly or six monthly samples, results shall be reported as follows:

A. For a single sampling point, or multiple sampling points for which data is being individually listed on the Consumer Confidence Report: the sample result and, if more than one sample was collected, the average and range of the sample results;

B. For multiple sampling points, each of which has been sampled only once and for which data is being summarized together on the Consumer Confidence Report: the average and range of the sample results. If the waters from the sampling points are entering the distribution system at the same point, a flow-weighted average may be reported; and

C. For multiple sampling points, one or more of which has been sampled more than once and for which data is being summarized together on the Consumer Confidence Report: the average of the individual sampling point averages and range of all the sample results. If the waters from the sampling points are entering the distribution system at the same point, a flow-weighted average may be reported.

2. When compliance with the MCL is determined by calculating a running annual average of all samples taken at a monitoring location:

A. The highest running annual average of the monitoring location and the range of sample results or, if monitoring locations are summarized together for the Consumer Confidence Report, the highest running annual average of any of the monitoring locations and the range of sample results from all the monitoring locations; and

B. For TTHM and HAA5 monitored pursuant to section 64534.2(d): the highest locational running annual average (LRAA) for TTHM and HAA5 and the range of individual sample results for all monitoring locations. If more than one location exceeds the TTHM or HAA5 MCL, include the LRAA for all locations that exceed the MCL.

3. When compliance with the MCL is determined on a system-wide basis by calculating a running annual average of all monitoring location averages: the highest running annual average and the range of sample results from all the sampling points.

4. When compliance with the MCL is determined on the basis of monitoring after treatment installed to remove a contaminant: the average level detected in the water entering the distribution system and the range of sample results; and

5. If an MCL compliance determination was made in the year for which sample results are being reported and that determination was based on an average of results from both the previous and reporting years, then the compliance determination average shall be reported, but the range shall be based only on results from the year for which data is being reported.

(E) For turbidity:

1. When it is reported pursuant to the requirements of section 64652.5 (filtration avoidance): the highest value; and

2. When it is reported pursuant to section 64653 (filtration): the highest single measurement based on compliance reporting and the lowest monthly percentage of samples meeting the turbidity limits specified in section 64653 for the filtration technology being used;

(F) For lead and copper: the 90th percentile value of the most recent round of sampling, the number of sites sampled, and the number of sampling sites exceeding the action level;

(G) For total coliform:

1. The highest monthly number of positive samples for systems collecting fewer than 40 samples per month; or

2. The highest monthly percentage of positive samples for systems collecting at least 40 samples per month.

(H) For fecal coliform or *E. coli*: the total number of positive samples during the year; and

(I) The likely source(s) of any detected contaminants having an MCL, MRDL, regulatory action level, or treatment technique. If the water system lacks specific information on the likely source, the table(s) shall include one or more of the typical sources for that contaminant listed in appendix 64481-A or 64481-B that are most applicable to the system.

(3) The table(s) shall clearly identify any data indicating violations of MCLs, regulatory action levels, MRDLs, or treatment techniques and the Consumer Confidence Report shall give information on each violation including the length of the violation, potential adverse health effects (PDWS only), and actions taken by the system to address the violation. To describe the potential health effects, the system shall use the relevant language pursuant to appendices 64465-A through H; and

(4) For detected unregulated contaminants for which monitoring is required (except *Cryptosporidium*), the table(s) shall contain the average and range at which the contaminant was detected.

(e) If the system has performed any monitoring for *Cryptosporidium* that indicates that *Cryptosporidium* may be present in the source water or the finished water, the Consumer Confidence Report shall include a summary of the monitoring results and an explanation of their significance.

(f) If the system has performed any monitoring for radon that indicates that radon is present in the finished water, the Consumer Confidence Report shall include the monitoring results and an explanation of their significance.

(g) For the year covered by the report, the Consumer Confidence Report shall note any violations of paragraphs (1) through (7) and give related information, including any potential adverse health effects, and the steps the system has taken to correct the violation.

(1) Monitoring and reporting of compliance data.

(2) Filtration, disinfection, and recycled provisions prescribed by sections 64652, 64652.5, 64653, 64653.5(b), or 64654. For systems that have failed to install adequate filtration or disinfection equipment or processes, or have had a failure of such equipment or processes that constitutes a violation, the Consumer Confidence Report shall include the health effects language pursuant to appendix 64465-B as part of the explanation of potential adverse health effects.

(3) One or more actions prescribed by the lead and copper requirements in sections 64673, 64674, 64683 through 64686, and 64688. To address potential adverse health effects, the Consumer Confidence Report shall include the applicable language pursuant to appendix 64465-D for lead, copper, or both.

(4) Treatment technique requirements for Acrylamide and Epichlorohydrin in section 64448; to address potential adverse health effects, the Consumer Confidence Report shall include the relevant language from appendix 64465-H.

(5) Recordkeeping of compliance data.

(6) Special monitoring requirements prescribed by section 64449(b)(2) and (g).

(7) Terms of a variance, an exemption, or an administrative or judicial order.

(h) If a system is operating under the terms of a variance or an exemption issued under section 116430 or 116425 of the Health and Safety Code, the Consumer Confidence Report shall contain:

(1) An explanation of the reasons for the variance or exemption;

(2) The date on which the variance or exemption was issued;

(3) A brief status report on the steps the system is taking to install treatment, find alternative sources of water, or otherwise comply with the terms and schedules of the variance or exemption; and

(4) A notice of any opportunity for public input in the review, or renewal, of the variance or exemption.

(i) A Consumer Confidence Report shall contain the language in paragraphs (1) through (4).

(1) "The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity."

(2) "Contaminants that may be present in source water include:

Microbial contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

Inorganic contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

Pesticides and herbicides, that may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.

Organic chemical contaminants, including synthetic and volatile organic chemicals, that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, agricultural application, and septic systems.

Radioactive contaminants, that can be naturally-occurring or be the result of oil and gas production and mining activities."

(3) "In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (USEPA) and the State Water Resources Control Board (State Board) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. State Board regulations also establish limits for contaminants in bottled water that provide the same protection for public health."

(4) "Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the USEPA's Safe Drinking Water Hotline (1-800-426-4791)."

(j) A Consumer Confidence Report shall prominently display the following language: "Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791)."

(k) A Consumer Confidence Report shall include the telephone number of the owner, operator, or designee of the water system as a source of additional information concerning the report.

(l) A Consumer Confidence Report shall contain information in Spanish regarding the importance of the report or contain a telephone number or address where Spanish-speaking residents may contact the system to obtain a translated copy of the report or assistance in Spanish. For each non-English speaking group other than Spanish-speaking that exceeds 1,000 residents or 10% of the residents in a community, the Consumer Confidence Report shall contain information in the appropriate language(s) regarding the importance of the report or contain a telephone number or address where such residents may contact the system to obtain a translated copy of the report or assistance in the appropriate language.

(m) A Consumer Confidence Report shall include information (e.g., time and place of regularly scheduled board meetings) about opportunities for public participation in decisions that may affect the quality of the water.

Appendix 64481-A.
Typical Origins of Contaminants with Primary MCLs, MRDLs Regulatory Action Levels, and Treatment Techniques

Contaminant	*Major origins in drinking water*

Microbiological

Total coliform bacteria	Naturally present in the environment
Fecal coliform and *E. coli*	Human and animal fecal waste
Turbidity	Soil runoff

Surface water treatment

Giardia lamblia	Naturally present in the environment
Viruses	
Heterotrophic plate count bacteria	
Legionella	
Cryptosporidium	

Radioactive

Gross Beta particle activity	Decay of natural and man-made deposits
Strontium-90	Decay of natural and man-made deposits
Tritium	Decay of natural and man-made deposits
Gross Alpha particle activity	Erosion of natural deposits
Combined Radium 226/228	Erosion of natural deposits
Total Radium (for nontransient noncommunity water systems)	Erosion of natural deposits
Uranium	Erosion of natural deposits

Inorganic

Aluminum	Erosion of natural deposits; residue from some surface water treatment processes
Antimony	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
Arsenic	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Asbestos	Internal corrosion of asbestos cement water mains; erosion of natural deposits
Barium	Discharges of oil drilling wastes and from metal refineries; erosion of natural deposits

Beryllium	Discharge from metal refineries, coal-burning factories, and electrical, aerospace, and defense industries
Cadmium	Internal corrosion of galvanized pipes; erosion of natural deposits; discharge from electroplating and industrial chemical factories, and metal refineries; runoff from waste batteries and paints
Chromium	Discharge from steel and pulp mills and chrome plating; erosion of natural deposits
Copper	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Cyanide	Discharge from steel/metal, plastic and fertilizer factories
Fluoride	Erosion of natural deposits; water additive that promotes strong teeth; discharge from fertilizer and aluminum factories
Lead	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits
Mercury	Erosion of natural deposits; discharge from refineries and factories; runoff from landfills and cropland
Nickel	Erosion of natural deposits; discharge from metal factories
Nitrate	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Nitrite	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Perchlorate	Perchlorate is an inorganic chemical used in solid rocket propellant, fireworks, explosives, flares, matches, and a variety of industries. It usually gets into drinking water as a result of environmental contamination from historic aerospace or other industrial operations that used or use, store, or dispose of perchlorate and its salts.
Selenium	Discharge from petroleum, glass, and metal refineries; erosion of natural deposits; discharge

	from mines and chemical manufacturers; runoff from livestock lots (feed additive)
Thallium	Leaching from ore-processing sites; discharge from electronics, glass, and drug factories

Synthetic organic

2,4-D	Runoff from herbicide used on row crops, range land, lawns, and aquatic weeds
2,4,5-TP (Silvex)	Residue of banned herbicide
Acrylamide	Added to water during sewage/wastewater treatment
Alachlor	Runoff from herbicide used on row crops
Atrazine	Runoff from herbicide used on row crops and along railroad and highway right-of-ways
Bentazon	Runoff/leaching from herbicide used on beans, peppers, corn, peanuts, rice, and ornamental grasses
Benzo(a)pyrene [PAH]	Leaching from linings of water storage tanks and distribution mains
Carbofuran	Leaching of soil fumigant used on rice and alfalfa, and grape vineyards
Chlordane	Residue of banned insecticide
Dalapon	Runoff from herbicide used on right-of-ways, and crops and landscape maintenance
Dibromochloropropane (DBCP)	Banned nematocide that may still be present in soils due to runoff/leaching from former use on soybeans, cotton, vineyards, tomatoes, and tree fruit
Di(2-ethylhexyl) adipate	Discharge from chemical factories
Di(2-ethylhexyl) phthalate	Discharge from rubber and chemical factories; inert ingredient in pesticides
Dinoseb	Runoff from herbicide used on soybeans, vegetables, and fruits
Dioxin [2,3,7,8-TCDD]	Emissions from waste incineration and other combustion; discharge from chemical factories
Diquat	Runoff from herbicide use for terrestrial and aquatic weeds
Endothall	Runoff from herbicide use for terrestrial and aquatic weeds; defoliant
Endrin	Residue of banned insecticide and rodenticide
Epichlorohydrin	Discharge from industrial chemical factories; impurity of some water treatment chemicals
Ethylene dibromide (EDB)	Discharge from petroleum refineries; underground gas tank leaks; banned nematocide that may still be present

	in soils due to runoff and leaching from grain and fruit crops
Glyphosate	Runoff from herbicide use
Heptachlor	Residue of banned insecticide
Heptachlor epoxide	Breakdown of heptachlor
Hexachlorobenzene	Discharge from metal refineries and agricultural chemical factories; byproduct of chlorination reactions in wastewater
Hexachlorocyclopentadiene	Discharge from chemical factories
Lindane	Runoff/leaching from insecticide used on cattle, lumber, and gardens
Methoxychlor	Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, and livestock
Molinate [Ordram]	Runoff/leaching from herbicide used on rice
Oxamyl [Vydate]	Runoff/leaching from insecticide used on field crops, fruits and ornamentals, especially apples, potatoes, and tomatoes
Pentachlorophenol	Discharge from wood preserving factories, cotton and other insecticidal/herbicidal uses
Picloram	Herbicide runoff
Polychlorinated biphenyls [PCBs]	Runoff from landfills; discharge of waste chemicals
Simazine	Herbicide runoff
Thiobencarb	Runoff/leaching from herbicide used on rice
Toxaphene	Runoff/leaching from insecticide used on cotton and cattle
1,2,3-Trichloropropane	Discharge from industrial and agricultural chemical factories; leaching from hazardous waste sites; used as cleaning and maintenance solvent, paint and varnish remover, and cleaning and degreasing agent; byproduct during the production of other compounds and pesticides.

Volatile organic

Benzene	Discharge from plastics, dyes and nylon factories; leaching from gas storage tanks and landfills
Carbon tetrachloride	Discharge from chemical plants and other industrial activities
1,2-Dichlorobenzene	Discharge from industrial chemical factories
1,4-Dichlorobenzene	Discharge from industrial chemical factories

1,1-Dichloroethane	Extraction and degreasing solvent; used in manufacture of pharmaceuticals, stone, clay and glass products; fumigant
1,2-Dichloroethane	Discharge from industrial chemical factories
1,1-Dichloroethylene	Discharge from industrial chemical factories
cis-1,2-Dichloroethylen	Discharge from industrial chemical factories; major biodegradation byproduct of TCE and PCE groundwater contamination
trans-1,2-Dichloroethylene	Discharge from industrial chemical factories; minor biodegradation byproduct of TCE and PCE groundwater contamination
Dichloromethane	Discharge from pharmaceutical and chemical factories; insecticide
1,2-Dichloropropane	Discharge from industrial chemical factories; primary component of some fumigants
1,3-Dichloropropene	Runoff/leaching from nematocide used on croplands
Ethylbenzene	Discharge from petroleum refineries; industrial chemical factories
Methyl-tert-butyl ether (MTBE)	Leaking underground storage tanks; discharge from petroleum and chemical factories
Monochlorobenzene	Discharge from industrial and agricultural chemical factories and drycleaning facilities
Styrene	Discharge from rubber and plastic factories; leaching from landfills
1,1,2,2-Tetrachloroethane	Discharge from industrial and agricultural chemical factories; solvent used in production of TCE, pesticides, varnish and lacquers
Tetrachloroethylene (PCE)	Discharge from factories, dry cleaners, and auto shops (metal degreaser)
1,2,4-Trichlorobenzene	Discharge from textile-finishing factories
1,1,1-Trichloroethan	Discharge from metal degreasing sites and other factories; manufacture of food wrappings
1,1,2-Trichloroethan	Discharge from industrial chemical factories
Trichloroethylene (TCE)	Discharge from metal degreasing sites and other factories
Toluene	Discharge from petroleum and chemical factories; underground gas tank leaks
Trichlorofluoromethane	Discharge from industrial factories; degreasing solvent; propellant and refrigerant
1,1,2-Trichloro-1,2,2-Trifluoroethane	Discharge from metal degreasing sites and other factories; drycleaning solvent; refrigerant

Vinyl chloride	Leaching from PVC piping; discharge from plastics factories; biodegradation byproduct of TCE and PCE groundwater contamination
Xylenes	Discharge from petroleum and chemical factories; fuel solvent

Disinfection Byproducts, Disinfection Byproduct Precursors, and Disinfectant Residuals

Total trihalomethanes (TTHM)	Byproduct of drinking water disinfection
Haloacetic acids (five) (HAA5)	Byproduct of drinking water disinfection
Bromate	Byproduct of drinking water disinfection
Chloramines	Drinking water disinfectant added for treatment
Chlorine	Drinking water disinfectant added for treatment
Chlorite	Byproduct of drinking water disinfection
Chlorine dioxide	Drinking water disinfectant added for treatment
Control of disinfection byproduct precursors (Total Organic Carbon)	Various natural and manmade sources

Appendix 64481-B.
Typical Origins of Contaminants with Secondary MCLs

Contaminant	*Major origins in drinking water*
Aluminum	Erosion of natural deposits; residual from some surface water treatment processes
Color	Naturally-occurring organic materials
Copper	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Foaming Agents (MBAS)	Municipal and industrial waste discharges
Iron	Leaching from natural deposits; industrial wastes
Manganese	Leaching from natural deposits
Methyl-tert-butyl ether (MTBE)	Leaking underground storage tanks; discharge from petroleum and chemical factories;
Odor---Threshold	Naturally-occurring organic materials
Silver	Industrial discharges
Thiobencarb	Runoff/leaching from rice herbicide
Turbidity	Soil runoff

Zinc	Runoff/leaching from natural deposits; industrial wastes
Total dissolved solids	Runoff/leaching from natural deposits
Specific Conductance	Substances that form ions when in water; seawater influence
Chloride	Runoff/leaching from natural deposits; seawater influence
Sulfate	Runoff/leaching from natural deposits; industrial wastes

§64482. Required Additional Health Information.

(a) A system that detects arsenic at levels above 0.005 mg/L, but below or equal to the MCL, shall include the following in its Consumer Confidence Report: "While your drinking water meets the federal and state standard for arsenic, it does contain low levels of arsenic. The arsenic standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. The U.S. Environmental Protection Agency continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems."

(b) A system that detects nitrate at levels above 5 mg/L (as nitrogen), but below the MCL, shall include the following in its Consumer Confidence Report: "Nitrate in drinking water at levels above 10 mg/L is a health risk for infants of less than six months of age. Such nitrate levels in drinking water can interfere with the capacity of the infant's blood to carry oxygen, resulting in a serious illness; symptoms include shortness of breath and blueness of the skin. Nitrate levels above 10 mg/L may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. If you are caring for an infant, or you are pregnant, you should ask advice from your health care provider. If a system cannot demonstrate to the State Board with at least five years of the most current monitoring data that its nitrate levels are stable, it shall also add the following language to the preceding statement on nitrate: "Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity."

(c) A system that detects lead above the action level in more than 5%, and up to and including 10%, of sites sampled, shall include the following in its Consumer Confidence Report: "Infants and young children are typically more vulnerable to lead in drinking water than the general population. It is possible that lead levels at your home may be higher than at other homes in the community as a result of materials used in your home's plumbing. If you are concerned about elevated lead levels in your home's water, you may wish to have your water tested and/or flush your tap for 30 seconds to 2 minutes before using tap water. Additional information is available from the USEPA Safe Drinking Water Hotline (1-800-426-4791)."

§64483. Consumer Confidence Report Delivery and Recordkeeping.

(a) Each water system shall mail or directly deliver one copy of the Consumer Confidence Report to each customer.

(b) The system shall make a good faith effort to reach consumers who are served by the water system but are not bill-paying customers, such as renters or workers, using a mix of methods appropriate to the particular system such as: Posting the Consumer Confidence Reports on the Internet; mailing to postal patrons in metropolitan areas; advertising the availability of the Consumer Confidence Report in the news media; publication in a local newspaper; posting in public places such as cafeterias or lunch rooms of public buildings; delivery of multiple copies for distribution by single-biller customers such as apartment buildings or large private employers; and delivery to community organizations.

(c) No later than the date the water system is required to distribute the Consumer Confidence Report to its customers, each water system shall mail a copy of the report to the State Board, followed within 3 months by a certification that the report has been distributed to customers, and that the information is correct and consistent with the compliance monitoring data previously submitted to the State Board.

(d) No later than the date the water system is required to distribute the Consumer Confidence Report to its customers, each privately-owned water system shall mail a copy of the report to the California Public Utilities Commission.

(e) Each water system shall make its Consumer Confidence Report available to the public upon request.

(f) Each water system serving 100,000 or more persons shall post its current year's Consumer Confidence Report on a publicly-accessible site on the Internet.

(g) Each water system shall retain copies of its Consumer Confidence Reports for no less than 3 years.

CHAPTER 15.5 DISINFECTANT RESIDUALS, DISINFECTION BYPRODUCTS, AND DISINFECTION BYPRODUCT PRECURSORS

Article 1. General Requirements and Definitions

§64530. Applicability of this Chapter.

(a) Community water systems and nontransient noncommunity water systems that treat their water with a chemical disinfectant in any part of the treatment process or which provide water that contains a chemical disinfectant shall comply with the requirements of

APPENDIX H

DMS User Manual, Santa Ynez Subbasin
Eastern Management Area

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DMS USER MANUAL

Santa Ynez Subbasin Eastern Management Area
Data Management System (DMS)

Version 2.0

Updated June 2021

Developed by GEI Consultants, Inc.

Developed for Santa Ynez Subbasin Eastern Management Area

CONTENTS

FIGURES

TABLES

ABBREVIATIONS AND ACRONYMS

CGS	California Geological Survey
DMS	Data management system
DWR	California Department of Water Resources
EMA	Eastern Management Area
GAMA	Groundwater Ambient Monitoring and Assessment
GEI	GEI Consultants, Inc.
GIS	Geographic Information System
GL	Groundwater levels
GSP	Groundwater Sustainability Plan
InSAR	Interferometric Synthetic Aperture Radar
ISW	Interconnected surface water
LS	Land subsidence
KML	Keyhole markup language
NASA	National Aeronautics and Space Administration
OSWCR	Online System for Well Completion Reports
PDF	Portable document format
SGMA	Sustainable Groundwater Management Act
SAGBI	Soil Agricultural Groundwater Banking Index
SMC	Sustainable Management Criteria
TDS	Total dissolved solids
USGS	U.S. Geological Survey
WQ	Water quality

1. Getting Started

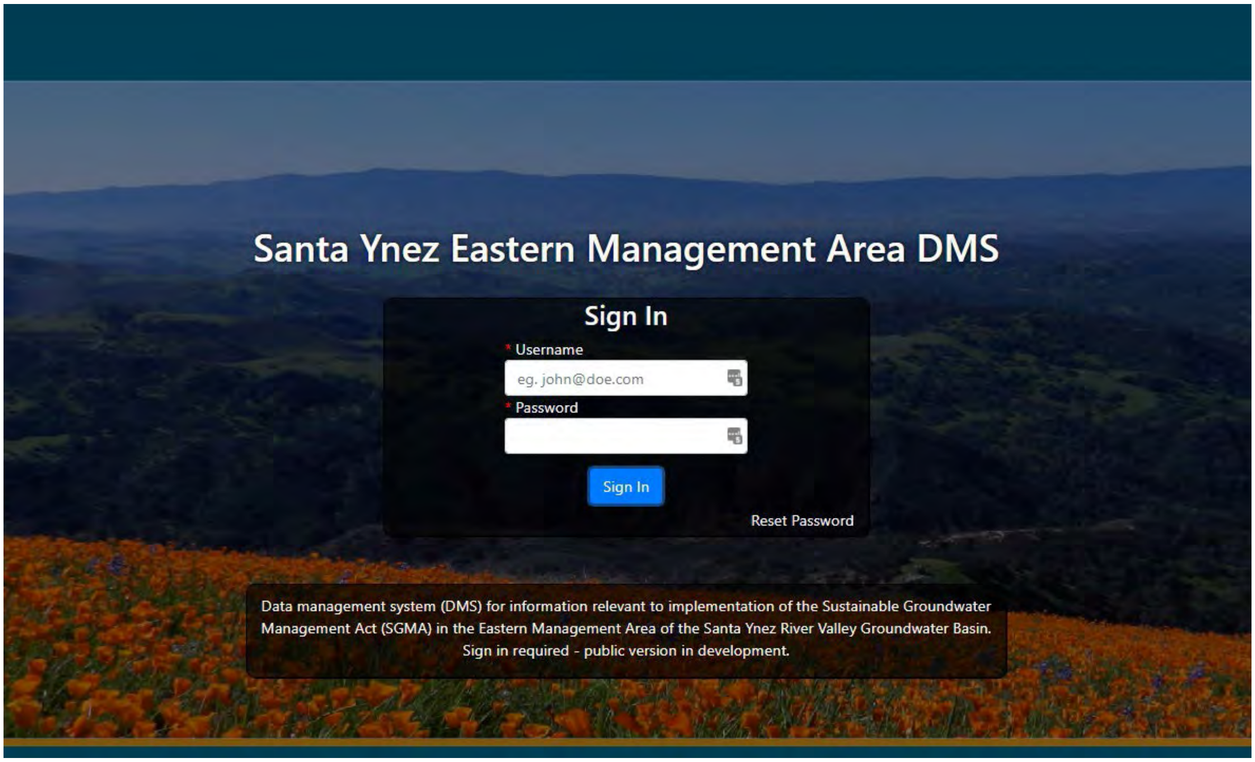
The Santa Ynez Subbasin Eastern Management Area (EMA) Data Management System (DMS) is designed to meet the requirements of the Sustainable Groundwater Management Act (SGMA). This User Manual provides instructions to use the features available to data managers.

1.1. Logging In

To log in, follow the steps below.

1. In a web browser, visit https://dms.geiconsultants.com/ema/. *The login page appears* (**Figure 1**).
2. In the Email field, enter your email address.
3. In the Password field, enter the password assigned by GEI and emailed to you.
   NOTE: If you need help resetting your password, email a request to dmshelp@geiconsultants.com.
4. Click the Sign In button. *The welcome screen appears.*

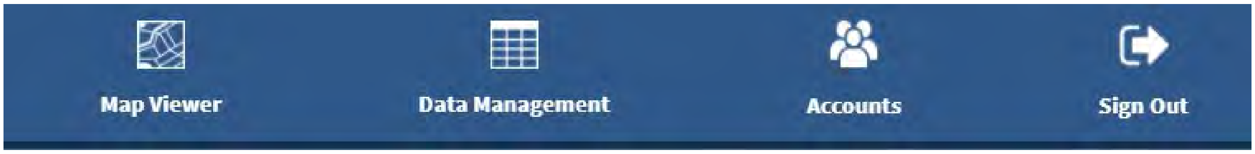
FIGURE 1. LOGIN PAGE



1.2. Viewing Data

The blue navigation bar along the top of the application is the primary method to view data in the DMS. Once logged in, you will see up to four icons in the navigation bar (**Figure 2**).

FIGURE 2. NAVIGATION BAR



- **Map Viewer**: Displays data stored in the DMS on an interactive map (see **Section 2**)
- **Data Management**: Displays the data stored in the DMS on interactive tables (see **Section 3**)
- **Accounts**: Displays a table of users with access to the DMS (see **Section 4**)
- **Sign Out**: Logs user out of the current DMS session

NOTE: Most users do not have the Accounts tool available in their navigation bar. This feature is reserved for Administrative Users.

1.3. Exploring Further

This User Guide provides detailed instructions on how to use each of the tools in the DMS interface. The DMS is a very powerful application with a range of functions from simple to complex. Because each user has a specific need for the DMS and will use it for their own purposes, you do not need to read this entire manual before using the system. The User Manual is primarily a reference for when you have questions. Use the Table of Contents to navigate to your specific topics of interest.

If you have questions, please email DMS Help at the email below.

NEED HELP?

Send an email to:
dmshelp@geiconsultants.com

2. Using the Map Viewer

This section describes how to use the map viewer to display data and how to use the map tools. The primary purpose of the map viewer is to VIEW data – not to import new data or create reports. Actions such as importing and reporting are done with the Data Management tables and tools (see **Section 3**).

2.1. Viewing Data on the Map

To view DMS data on a geographical map, follow the steps below.

1. Along the top of the application in the navigation bar, click Map Viewer (highlighted, **Figure 3**). *The DMS map viewer appears* (**Figure 4**).
2. Use the left-side navigation panel (highlighted, **Figure 4**) to choose a data type you want to see on the map.

FIGURE 3. MAP VIEWER ICON ON THE NAVIGATION BAR

FIGURE 4. DMS MAP VIEWER

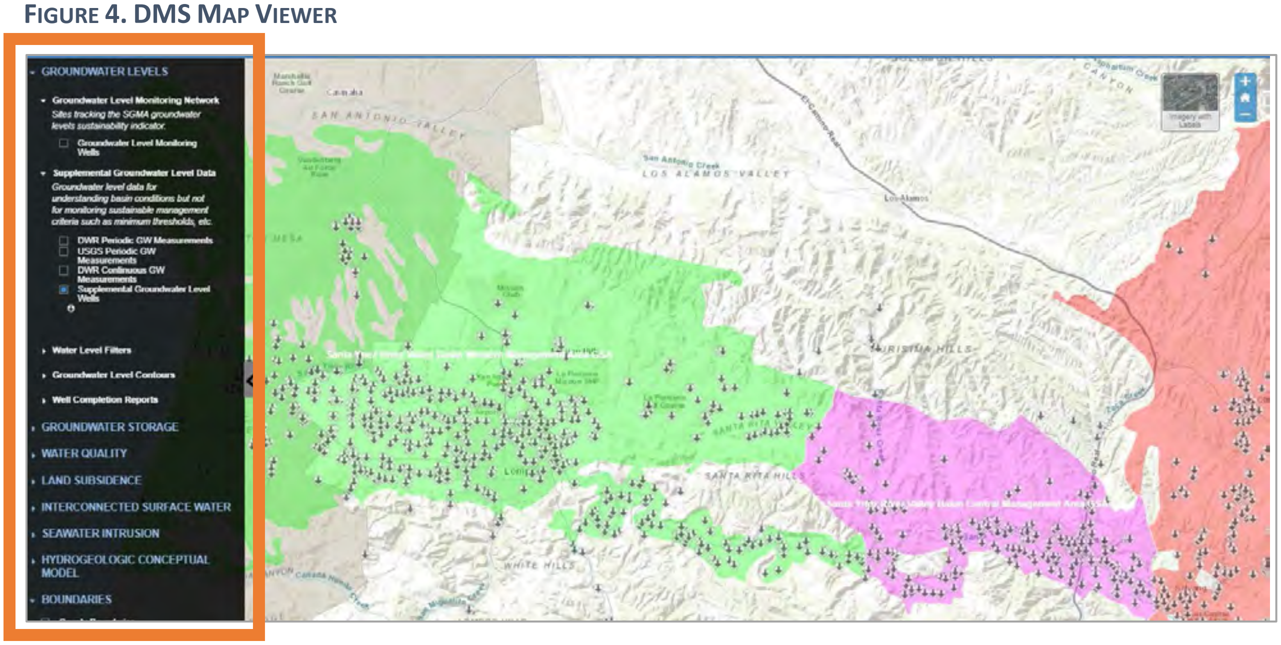


Table 1 lists the data categories. A full description of the data within each category is provided in **Appendix A**.

TABLE 1. LEFT NAVIGATION PANEL LABELS

Label	Description	Stored in DMS?
GROUNDWATER LEVELS		
Groundwater Level Monitoring Network	Wells with sustainable management criteria (SMC) for groundwater levels	✓
Supplemental Groundwater Level Data	Wells with water level data but no SMC	⦿
Water Level Filters	Filter data to fit within a given time span	
Groundwater Level Contours	Display historical water depth, water level elevation, or water level change contours	
Well Completion Reports	Index of records from DWR OSCWR	
GROUNDWATER STORAGE		
Groundwater Storage Monitoring Network	Wells with SMC for groundwater storage	✓
Groundwater Storage Resources	Link to C2VSim	
WATER QUALITY		
Groundwater Quality Monitoring Network	Wells/stations with SMC for water quality	✓
Supplemental Groundwater Quality Data	Wells/stations with water quality data but no SMC	✓
Water Quality Filters	Filter by date or constituent	
Water Quality Resources	Link to GAMA Program Online Tools	
LAND SUBSIDENCE		
LS Representative Monitoring Network	Wells/stations with SMC for subsidence	✓
Supplemental Land Subsidence Data	Wells/stations with subsidence data but no SMC	⦿
TRE Altamira InSAR Dataset	InSAR data processed by TRE Altamira, Inc.	
NASA JPL InSAR Dataset	InSAR data processed by NASA	
INTERCONNECTED SURFACE WATER		
ISW Representative Monitoring Network	Wells/stations with SMC for interconnected surface water	✓
Supplemental Interconnected Surface Water Data	Wells/stations with interconnected surface water data but no SMC	⦿
SEAWATER INTRUSION		
Seawater Intrusion Monitoring Network	Wells/stations with SMC for seawater intrusion	✓
Supplemental Seawater Intrusion Data	Wells/stations with seawater intrusion data but no SMC	✓
HYDROGEOLOGIC CONCEPTUAL MODEL		
Soil and Recharge Map	UC Davis SAGBI	
Geologic Map	CGS Geologic Map – 750k Generalized	
Geologic Map – Quaternary	CGS Geologic Map – Quaternary age and older	
Faults	CGS Fault Activity Map of California	
BOUNDARIES		
Boundaries	GIS layers such as counties, water agencies, etc.	⦿

✓ *Data stored in DMS database* ⦿ *Some data stored in DMS, other from outside sources.*

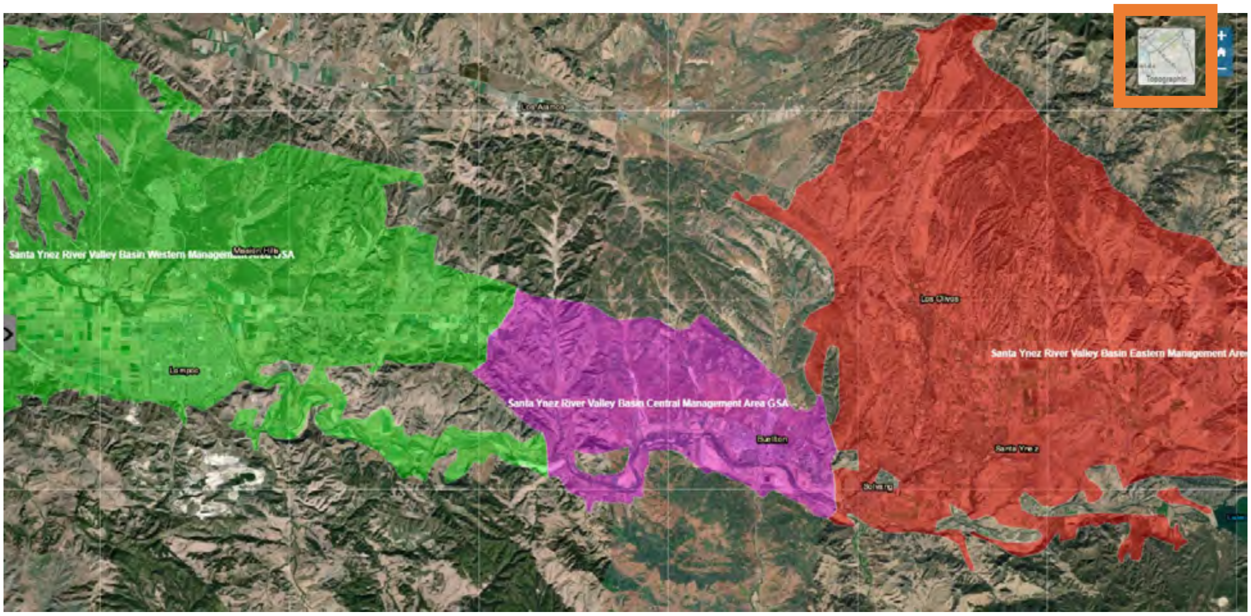
2.1.1. *Changing the Map Background*

By default, the DMS Map Viewer displays a topographic map in the background.

To change the map background to a satellite image:

1. Click the image in the upper right corner of the screen labelled Imagery with Labels.
   A satellite image appears in the background (**Figure 5**).
2. To toggle back to topographic view, click the image in the upper right corner again.

FIGURE 5. SATELLITE IMAGE BACKGROUND MAP



2.1.2. Viewing Groundwater Level Data

To view groundwater level data on the map, follow the steps below.

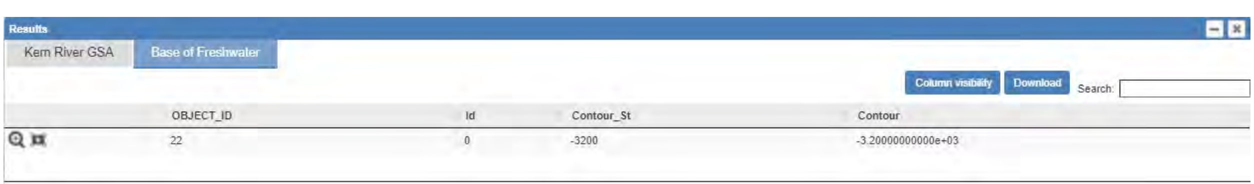
1. On the left navigation panel under the Groundwater Levels heading, click the ► (arrow) to expand the heading of the groundwater level data type you want to see. Descriptions of the available groundwater level data types are provided on **Table 2**.

TABLE 2. GROUNDWATER LEVEL DATA TYPES

Groundwater Level (GL) Data Type	Description
GL Wells	Well locations that are stored in the DMS and have groundwater level data
GL Well Filters	Filters the GL Wells currently displayed on the map by year
DWR Contours	Contours from the DWR Enterprise Water Management database
GSP Contours	Contours as presented in a local GSP
DWR Well Completion Reports	Points with well completion reports
GL Resources	Wells associated with outside agencies that have groundwater level measurements (ties directly to outside source, such as DWR)
GS Resources	C2VSim layers and resources

2. Click the ☐ (check box) next to the data type you want to see.
   Data of the type you checked appear.
3. If you want to view data associated with **a single well**:
   a. On the map, hover over the well symbol for the well you want to view.
      A preview window with the well name and a thumbnail-sized hydrograph appear.
   b. Click the well name.
      The well information window, including hydrograph and time-series data, appears.
4. If you want to view data for **multiple wells on a single hydrograph**:
   a. Follow the instructions through Step 3 above.
   b. In the upper-right corner of the well information window on the satellite image, click a second well (current well is marked with a red flag). *The information for the second well is added to the hydrograph and the second well location is marked with a ◆ (diamond).*
   c. Repeat Step 4b to add additional wells to the hydrograph or click any ◆ (diamond) to remove the associated well from the hydrograph.
5. If you want to view data associated with a non-well **object**:
   a. On the map, click the object you wish to view.
      A results table appears at the bottom of the map window.
   b. Click on the tab labelled with the data you wish to view. For example, if you clicked on a groundwater level contour – base of freshwater, click on the tab labelled Base of Freshwater. See **Figure 6** below.

FIGURE 6. BASE OF FRESHWATER TAB



2.1.3. *Viewing Groundwater Quality Data*

To view groundwater quality data on the map, follow the steps below.

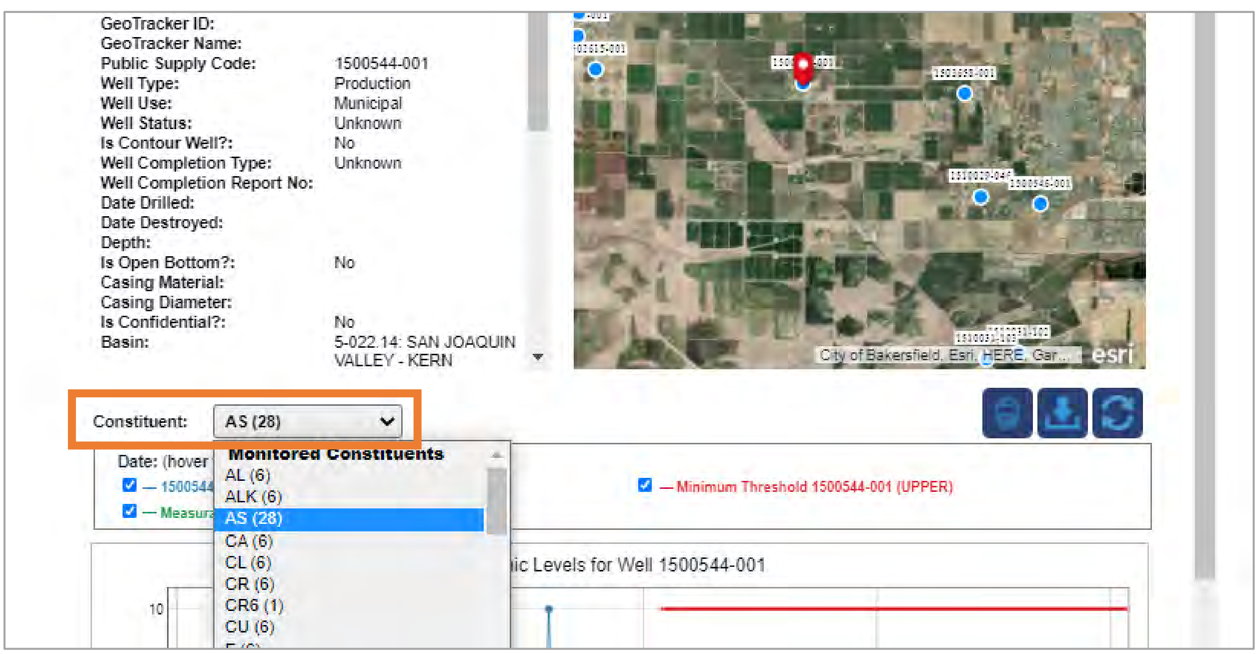
1. On the left navigation panel under the Water Quality heading, click the ► (arrow) to expand the heading of the groundwater quality data type you want to see. Descriptions of the available groundwater quality data types are provided on **Table 3** below.

TABLE 3. GROUNDWATER QUALITY DATA TYPES

Groundwater Quality (WQ) Data Type	Description
WQ Wells	Well locations that are stored in the DMS and have groundwater quality data
WQ Stations	Non-well station locations that are stored in the DMS and have groundwater quality data
WQ Filters	Filter the WQ wells and/or stations currently displayed on the map by constituent and/or year.
WQ Resources	Link to the national Water Quality Portal

2. Click the ☐ (check box) next to the data type you want to see. *Wells and/or stations with data of the type you checked appear.*
3. If you want to view water quality data associated with **a single well or station**:
   a. On the map, hover over the symbol for the well or station you want to view. *A preview window with the well or station name and a thumbnail-sized TDS graph appear*.
   b. Click the well or station name. *The well or site information window, including TDS graph and time-series data, appears* (**Figure 7**).
   c. To view a water quality constituent other than TDS, click the drop-down menu next to the Constituent label (highlighted, **Figure 7**).

FIGURE 7. WATER QUALITY MONITORING WELL INFORMATION WINDOW



2.1.4. Viewing Land Subsidence Data

To view land subsidence data on the map, follow the steps below.

1. On the left navigation panel under the Land Subsidence heading, click the ► (arrow) to expand the heading of the data type you want to see. Descriptions of the available data types are provided on **Table 4** below.

TABLE 4. LAND SUBSIDENCE DATA TYPES

Land Subsidence Data Type	Description
LS Stations	Stations, such as extensometers, that are stored in the DMS and have land subsidence data
LS Resources	Land subsidence data associated with outside agencies (ties directly to outside source) including DWR and USGS extensometers and InSAR data processed by TRE Altamira, Inc. and NASA

2. Click the ☐ (check box) next to the data type you want to see. *Wells and/or stations with data of the type you checked appear.*
3. If you want to view data associated with a station, click the station location marker.

2.1.5. Viewing Interconnected Surface Water Data

To view interconnected surface water data on the map, follow the steps below.

1. On the left navigation panel under the Interconnected Surface Water heading, click the ► (arrow) to expand the heading of the data type you want to see. Descriptions of the available data types are provided on **Table 5** below.

TABLE 5. INTERCONNECTED SURFACE WATER DATA TYPES

Interconnected Surface Water (ISW) Data Type	Description
ISW Wells	Wells/stations with interconnected surface water data
ISW Resources	ISW data associated with outside agencies (ties directly to outside source) including CDEC stations and Natural Communities Commonly Associated with Groundwater (NCCAG) layers

2. Click the ☐ (check box) next to the data type you want to see. *Wells and/or stations with data of the type you checked appear.*
3. If you want to view data associated with a station, click the station location marker.

2.1.6. Viewing Hydrogeologic Conceptual Model Data

Data displayed under the Hydrogeologic Conceptual Model heading is for reference only. These data are not stored in the DMS and cannot be modified. Instead, they are tied directly to outside sources, such as USGS, and are available for display only. Descriptions of the available data are provided on **Table 6**.

TABLE 6. HYDROGEOLOGIC CONCEPTUAL MODEL DATA TYPES

Hydrogeologic Conceptual Model Data Type	Description
Soil and Recharge Map	Soil Agricultural Groundwater Banking Index (SAGBI) and

	Soil Survey Geographic Database (SSURGO) datasets
Geologic Map	Geologic Map of California published by Department of Conservation, California Geological Survey
Geologic Map – Quaternary	Geologic Compilation of Quaternary Surficial Deposits published by the Department of Conservation, California Geological Survey (DOC/CGS)
USGS – Corcoran	USGS Corcoran Clay data including depth, thickness, extent
Recharge Basins	Local recharge basins as of July 8, 2019
Faults	Fault Activity Map of California published by Department of Conservation, California Geological Survey

2.1.7. Viewing Boundaries

The Map Viewer displays area boundaries and other GIS layers relevant to water management. To view boundaries/layers on the map, follow the steps below.

1. On the left navigation panel click the ► (arrow) to expand the Boundaries heading. Descriptions of the available boundaries are provided on **Table 7** below.
2. Click the ☐ (check box) next to the boundary or layer you want to see. *The selected layer appears on the map. Note: layers with a lot of data may take longer to load.*

TABLE 7. MAP BOUNDARIES

Boundary	Description
County Boundaries	Full detailed California county dataset with all coding (islands, inlets, etc.)
Canals and Aqueducts	Minor canal features from DWR, USBR, and various public water agencies
Tribal Trust Boundary	Administrative boundaries of all realty tracts (parcels) within California Indian Trust lands, as administered by the Bureau of Indian Affairs.
Disadvantaged Communities Block Groups	Blocks are the smallest geographic areas for which the U.S. Census Bureau publishes data from the decennial census.
Disadvantaged Communities Places	Boundaries as delineated as part of the Census Bureau's Participant Statistical Areas Program (PSAP) for the 2010 Census.
Disadvantaged Communities Tracts	Geographic and cartographic information from the U.S. Census Bureau's Master Address File.
Water Agencies	Boundaries of all public water agencies in California including public water systems, agricultural water districts, urban water districts, Federal and State water contractors, wholesalers, retailers, and other public or private utilities.
CASGEM Groundwater Basins Prioritization – 2019	Boundaries of 515 groundwater basins and subbasins with 2019 prioritization as defined by the California Department of Water Resources.
Bulletin 118 Groundwater Basins – 2016	Boundaries of 515 groundwater basins and subbasins as defined by the California Department of Water Resources in Bulletin 118, 2016.
State Parks	California State Parks Enterprise Geographic Information Systems.
State Refuges	State refuge boundaries as of 2020.
CDFW Owned and Operated Lands and Conservation Easements	Lands and conservation easements owned and operated by the California Department of Fish and Wildlife as of January 11, 2021.
California Protected Areas Database (CPAD) Holdings	Lands that are owned in fee and protected for open space purposes by over 1,000 public agencies or non-profit organizations.
California Conservation Easement Database (CCED)	Lands protected under conservation easements.
Regional Water Quality Control Board Boundaries	Jurisdictional boundaries of the nine Regional Water Quality Control Boards.
Federal Lands	U.S. Federal land classified by its active Federal surface managing agency.
Township and Range Section Lines	Compiled by the Bureau of Land Management (BLM), National Operations Center (NOC), OC-530.
GSA Boundaries	Boundaries submitted to the California Department of Water Resources SGMA Portal as part of the Groundwater Sustainability Agency (GSA) formation process.

2.2. Selecting and Exporting Data from the Map

There are several methods to select and export data from the DMS. One method is by using the Map Viewer. This method is best-suited for when you use the map's tools to display a specific combination of wells and stations and want to export the well or station data. This method is not well-suited for advanced filtering or exports of entire tables or time-series data. For information about other methods of export, see **Section 3**: Using Interactive Data Tables.

***

IMPORTANT! You may only export well and site information from the map viewer and NOT the associated time-series data (such as water levels or water quality). To export time-series data, use the Interactive Data Tables (see **Section 3**).

***

2.2.1. Selecting Data on the Map

The map viewer provides a set of tools to select data points displayed on the map. These tools are located in the map toolbar (**Figure 8**). **Table 8** describes the tools and their functions. The tools are labelled 1 through 13, from left to right.

FIGURE 8. MAP TOOLBAR

TABLE 8. MAP TOOL DESCRIPTIONS

#	Tool	Description
1	Legends	
2	Measure	
3	Print	
4	Full screen	
5	Bookmark	
6	Drawing	
7	Select	
8	Edit	
9	In-Feature Select	
10	Point Elevation	
11	Elevation Profile	
12	Application Tour	
13	Address Search	

2.2.2. Exporting Data from the Map

To export a full dataset from the map viewer, do the following:

1. Click a well or station. *The Results table appears.*
2. In the upper right portion of the Results table, click the Download button.
   A drop-down menu appears.
3. In the drop-down menu under **Full Dataset**, select how you would like to receive the data. You may choose from the following:
   a. Spreadsheet
   b. KML
   c. Shapefile

   A Save As window appears.
4. Choose the location where you would like to save the exported data, then click Save.
   The file is saved to your chosen location.

To export selected well or station data from the map viewer, do the following:

1. Use the Map Tools to select the wells and/or stations you would like to export.
   The Results table appears.
2. In the upper right portion of the Results table, click the Download button.
   A drop-down menu appears.
3. In the drop-down menu under **Filtered Dataset**, select how you would like to receive the data. You may choose from the following:
   - Spreadsheet
   - KML
   - Shapefile

   A Save As window appears.
4. Choose the location where you would like to save the exported data, then click Save.
   The file is saved to your chosen location.

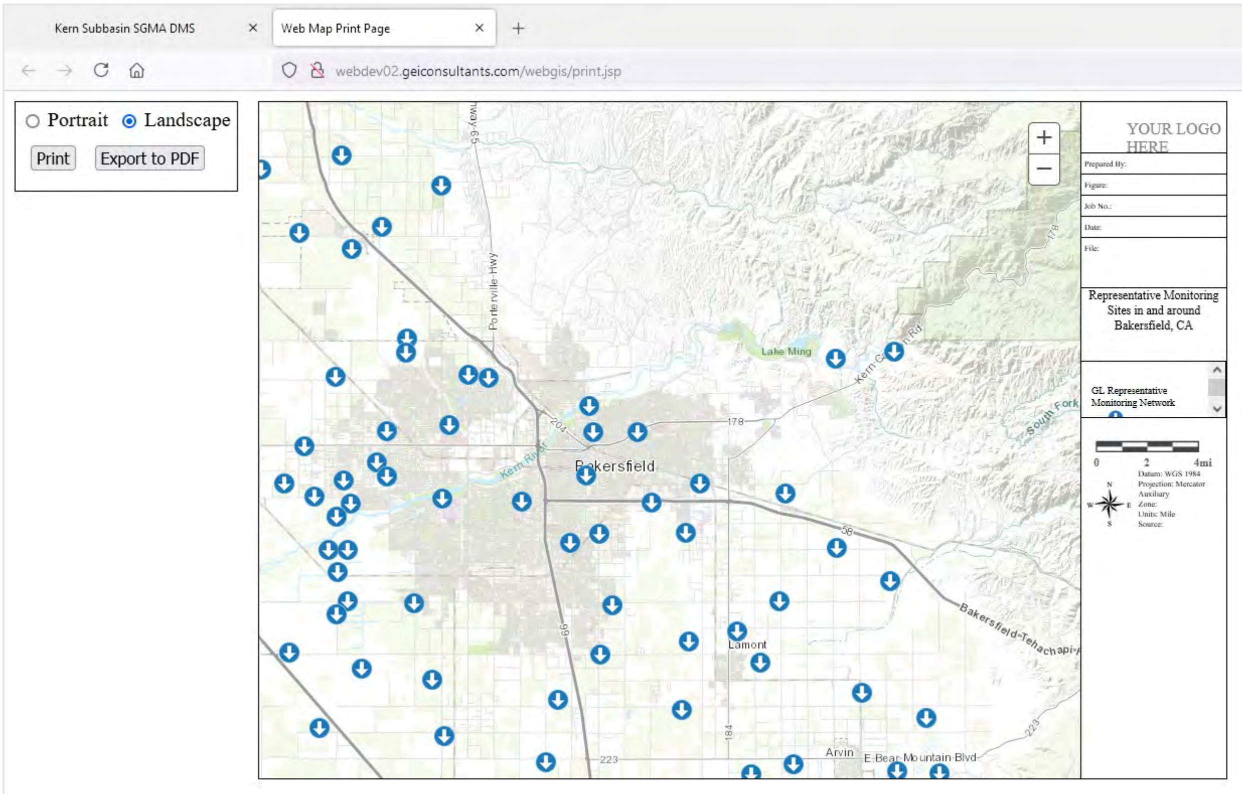
2.3. Creating Map Figures

To create a figure from the map viewer to use in a report or other document, follow the steps below:

1. Use the left navigation panel to turn on the data you want to show on the figure (be sure to also turn off data you do not wish to show).
2. On the Map Toolbar (**Figure 9**), click the Print icon. The Web Map Print page (**Figure 10**) appears.
3. Populate the fields along the bottom (portrait orientation) or right side (landscape orientation) as desired (enter a date, name the figure, upload a logo, etc.).
4. If you want to print directly from your web browser to a printer on your network, click Print.
5. If you want to save the figure as a PDF, click Export to PDF.

FIGURE 9. PRINT ICON ON THE MAP TOOLBAR

FIGURE 10. WEB MAP PRINT PAGE



3. Using the Data Management Tables

Hovering over the Data Management icon displays a menu of data management pages. Below is a list of the data management pages with a brief description of each page:

- **View/Edit**: View or edit the well, station, agency, or water-year data stored in the DMS
- **Import**: Enter new data to the DMS
- **Export**: Export data from the DMS
- **Templates**: Download templates with the required data format for the DMS
- **Reports**: Generate data and figures for annual reports
- **Documents**: Save and retrieve documents

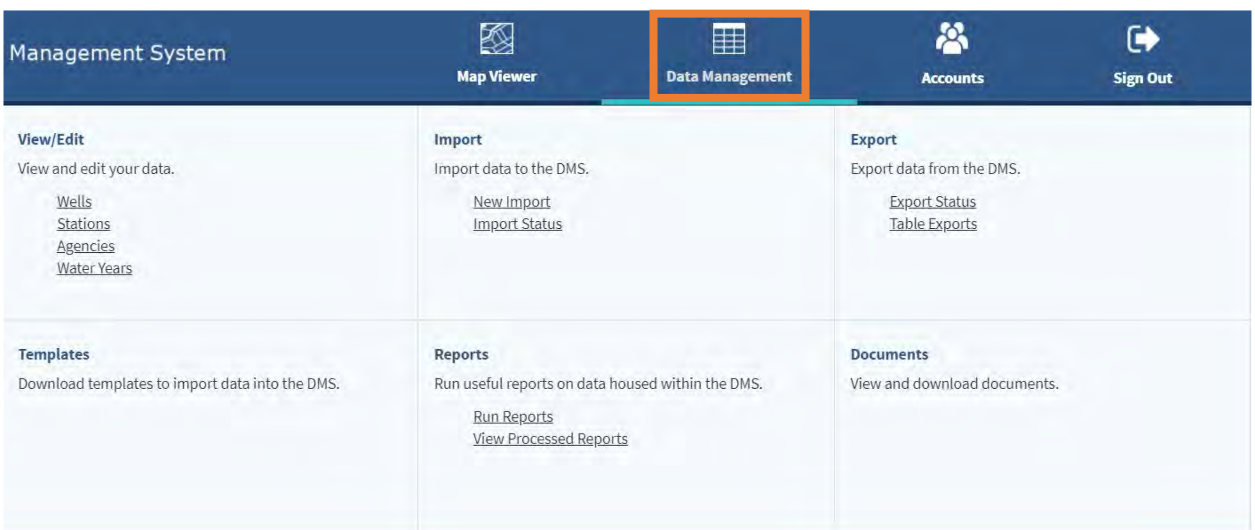
3.1. Viewing and Editing Existing Data

3.1.1. Viewing Data

To view DMS data in table format, follow the steps below.

1. Along the top of the application in the navigation bar, hover over Data Management (highlighted, **Figure 11**). *A menu of options appears.*

FIGURE 11. DATA MANAGEMENT MENU



2. Under the View/Edit heading, click the data type you would like to view. Data types include the following:
   - Wells
   - Stations (e.g., extensometers)
   - Agencies
   - Water Years

The data table loads.

***IMPORTANT**: If you choose Wells or Stations, one table will load followed by a series of empty tables below. <u>This is not an error</u>. The tables below store data for a single well or station, not for all wells and stations. Therefore, these tables do not populate until a well or station is selected in the top table.*

3. If you want to view information associated with a specific well or station, click the desired well or station row. *The row is highlighted and the lower tables populate with data from the selected well or station.*

3.1.2. Searching for Data

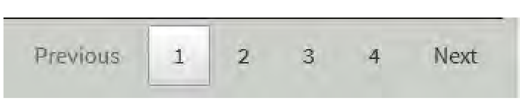
To search for data in any data table, follow the steps below:

1. In the upper right corner of the data table, click inside the search box (**Figure 12**).
2. Type a word, number, or letters relevant to your search. *The data filters as you type.*
3. Look for your desired search term in the table rows. You may need to show more rows or look on the next page.
    - To show more rows, find the number of rows drop-down menu in the upper left corner of the table. (**Figure 13**) Click the number and change to a higher value.
    - To look at data on the next page, find the page numbers along the bottom right side of the table and click Next. (**Figure 14**)

FIGURE 12. TABLE SEARCH BAR

FIGURE 13. TABLE NUMBER OF ROWS

FIGURE 14. TABLE PAGE NUMBERS



3.1.3. *Filtering Data*

The data management tables include powerful filtering tools. You can use these tools to constrain the data shown on the table based on rules you create.

1. From a data table (e.g., Well Data), click Filter Filter. *The filter window* (**Figure 15**) *opens.*

FIGURE 15. WELL FILTER WINDOW

2. In Condition Group 1, use the drop down menu(s) to select the property/properties you would like to filter by and the condition AND or OR.
    - Select AND if you want all criteria true
    - Select OR if you want any criteria true
3. If you want to add additional conditions, click Add Condition Group and repeat Step 2 above for Condition Group 2.
4. Click Filter. *The table refreshes with results that meet your filtering criteria.*

3.1.4. *Editing Data*

To edit data in any of the data tables, follow the steps below:

1. Find the row containing the data you would like to edit.
2. In the action(s) column, click the View (eye) icon. *The data form opens.*
3. In the upper right corner of the form, click the edit (pencil) icon. *The form allows edits.*
4. Edit the data you would like to change and click Save. *The data is saved and the table reloads.*

3.2. Entering New Data

There are two methods of entering new data to the DMS.

- Direct data entry via embedded web form in DMS application (most effective method to import single data entries)
- Excel templates (most effective method to import large volumes of historical data)

3.2.1. *Entering New Data Using the Web Application*

1. In the navigation bar along the top of the screen, hover over Data Management. *A menu of options appears.*
2. Under the View/Edit heading, click Wells. *The Well Data table appears.*

   IMPORTANT: One data table will load followed by a series of empty tables below. This is not an error. The tables below store data for a single well, not for all wells. Therefore, these tables do not populate until a well row is selected in the top table.

3. On the Well Table, click the row with the well associated with the water level values you want to enter. *The row is highlighted and the lower tables refresh with data associated with your selected well.*
4. Scroll down to the Water Elevation Data table and click Add New. *The Water Level Reading Form appears.*
5. Enter your data in the form and click Save. *The data is updated.*
   - If an error is displayed, modify the form and click Save. *The data is updated.*

3.2.2. *Entering New Data Using the Excel Templates*

Downloading the Templates

1. In the navigation bar along the top of the screen, hover over Data Management. *A menu of options appears.*
2. Click Templates. *The Templates page appears.*
3. Click to download the desired template. *The Save As window appears*.
   TIP: You may also click a link to download all templates.
4. Navigate to your desired location and click Save. *The file is saved to your chosen location.*

Populating the Templates

Each Excel template has three sheets:

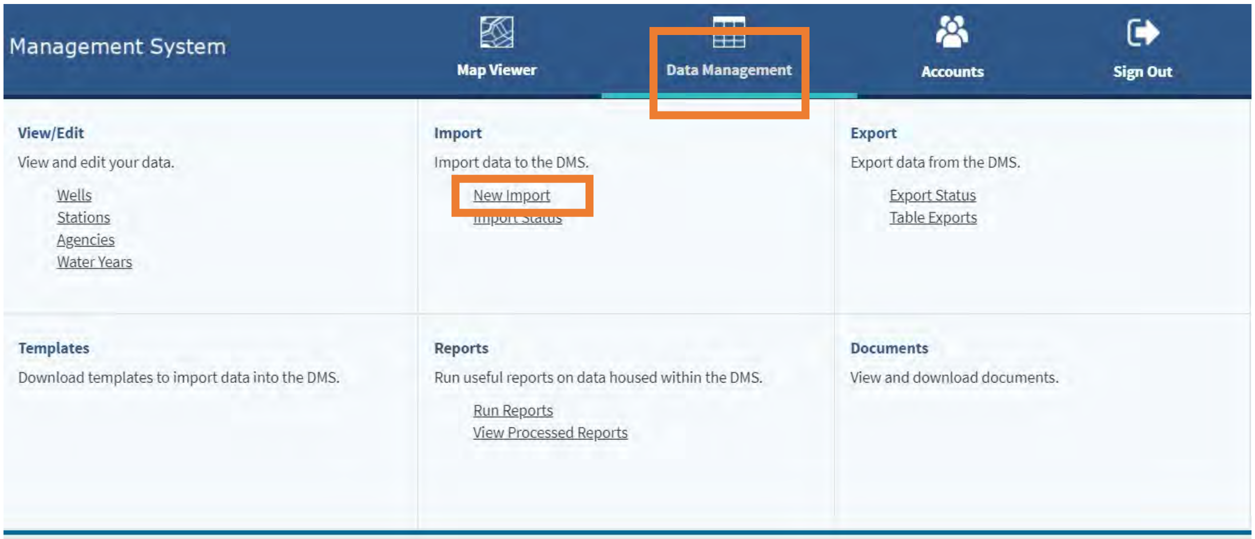
- **Data Entry** – Data to be imported to the DMS. Enter your data on this tab.
- **Lookup Table** – Selections for cells with drop-down choices. **CAUTION**: Do not edit the lookup tables. The DMS will not accept new lookup entries.
- **Description** – Descriptions of the data columns on the Data Entry tab. Refer to this tab if you are unsure what information should go in a column.

Enter your data in the appropriate columns. If you have a question about what data belongs in a column, refer to the Description tab. Some fields must be populated by a drop-down menu. Other fields may require numerical or alphabetical entries only. These constraints are designed to normalize data entry.

Uploading the Templates

1. In the navigation bar along the top of the screen, hover over Data Management. *A menu of options appears.*
2. Under the Import heading, click New Import (**Figure 16**). *The New Import page appears.*

FIGURE 16. NEW IMPORT ON THE DATA MANAGEMENT MENU



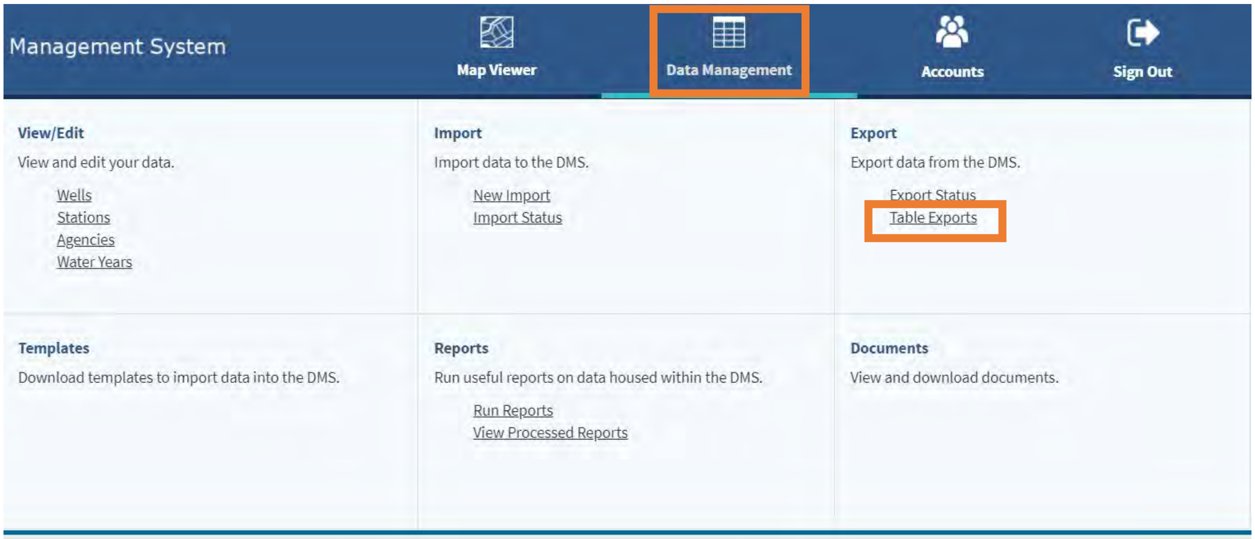
3. Under Step 1, click the drop-down menu and select a category. *Step 2 appears.*
   NOTE: You may select from the following categories:
   - Well Data: Data associated with a well
   - Station Data: Data associated with a non-well site, such as a extensometer
   - Other Data: Data that is not well or site specific
4. Under Step 2, click the drop-down menu and select a data type. *Step 3 appears.*
   NOTE: Data types are dependent upon what category you chose in Step 1.
5. Under Step 3, click the box or drag files into the box to upload. Step 4 appears.
6. Click Submit. *The batch number appears.*
7. To see the results of your upload, check the Status column on the Import Status table.
   - If your batch number status is **Success**, your data was successfully loaded to the DMS.
   - If your batch number status is **Processing**, your data is still being validated by the system before import. Check again later.
   - If your batch number status is **Error(s)**, click the row to populate the Error Table. In the Error Table, click the arrow › to reveal each error. Correct your errors using the Error table actions.

3.3. Exporting Table Data

3.3.1. *Exporting Entire Tables*

1. In the navigation bar along the top of the screen, hover over (do not click) Data Management. *A menu of options appears.*
2. Under the Export heading, click Table Exports (**Figure 17**). *The Export page appears.*
3. In the row corresponding to the table you would like to export, click Download. *The Save As window opens.*
4. Navigate to the location you would like to save your document and click Save. *The table is exported and saved to your desired location.*

FIGURE 17. NEW IMPORT ON THE DATA MANAGEMENT MENU



3.3.2. *Exporting Filtered Data*

The data management tables include powerful filtering tools. You can use these tools to constrain the data shown on the table based on rules you create. You may then export your filtered data.

1. From a data table (e.g., Well Data), click [Filter] Filter. *The filter window* (**Figure 18**) *opens.*

FIGURE 18. WELL FILTER WINDOW

2. In Condition Group 1, use the drop down menu(s) to select the property/properties you would like to filter by and the condition AND or OR.
   - Select AND if you want all criteria true
   - Select OR if you want any criteria true
3. If you want to add additional conditions, click Add Condition Group and repeat Step 2 above for Condition Group 2.
4. Click Filter. *The table refreshes with results that meet your filtering criteria.*
5. Click [Download] Download. *The download window opens.*
6. If available, select related tables to download, if desired.

7. Click Download. *The Export Submitted message appears.*
8. Click Check Export Status. *The Table Exports page appears.*
9. In the row with your export, look at the Status column.
    - If the Status is Success, click the File Name to save your export.
    - If the Status is Processing, wait a few minutes and check again. Exports with a large volume of data take extra time to generate.
    - If the Status is Failed, go back to Step 1 and try again. If the problem persists, contact the DMS Help Desk (dmshelp@geiconsultants.com).

3.4. Generating Report Figures

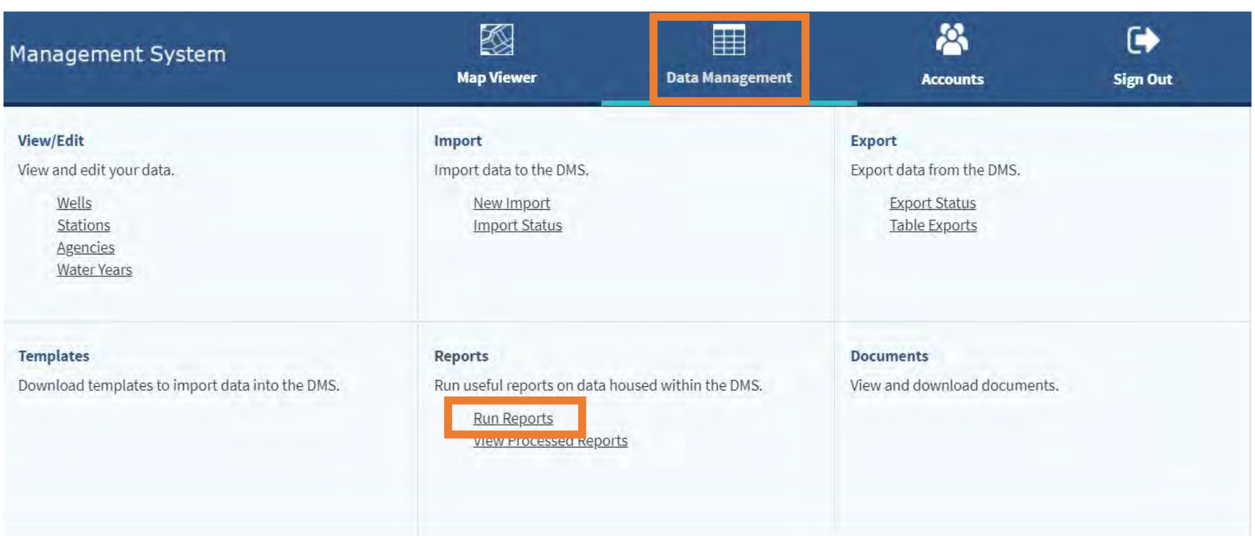
The DMS includes tools to assist with developing groundwater contours and hydrographs.

3.4.1. Groundwater Contours

The Groundwater Contours tool generates a file with the data required to create groundwater contours in a GIS-based application. The tool DOES NOT generate the contours.

1. In the navigation bar along the top of the screen, hover over (do not click) Data Management. *A menu of options appears.*
2. Under the Reports heading, click Run Reports (**Figure 19**). *The Reports page appears.*

FIGURE 19. RUN REPORTS ON THE DATA MANAGEMENT MENU



3. Under Groundwater Elevation Contouring Export, click in the Start Date field. *A calendar appears.*
4. Use the calendar to select the beginning of the date range for your contours. Alternatively, you may type in the date.
5. Repeat Steps 3 and 4 in the End Date field.

6. Use the drop-down menu indicate if you want to include all wells in your export, or only contour wells. NOTE: Contour wells are wells that may be flagged in the database because they were used to generate contours for a Groundwater Sustainability Plan, and it may be beneficial to generate subsequent contours based on the same set of wells.
7. Click Submit. *The Success message appears.*
8. On the success message, click Report Status. *The Processed Reports page appears.*
9. In the row with your report, look at the Status column.
   a. If the Status is Success, click the File Name to save your export.
   b. If the Status is Processing, wait a few minutes and check again. Exports with a large volume of data take extra time to generate.
   c. If the Status is Failed, go back to Step 1 and try again. If the problem persists, contact the DMS Help Desk (dmshelp@geiconsultants.com).

3.4.2. Hydrographs

The Hydrographs tool generates a file with the data required to create hydrographs. The tool DOES NOT generate the hydrographs.

1. In the navigation bar along the top of the screen, hover over (do not click) Data Management. *A menu of options appears.*
2. Under the Reports heading, click Run Reports. *The Reports page appears.*
3. Under Hydrograph Export, click in the Start Date field. *A calendar appears.*
4. Use the calendar to select the beginning of the date range for your contours. Alternatively, you may type in the date.
5. Repeat Steps 3 and 4 in the End Date field.
6. Use the drop-down menu indicate if you want to include all wells in your export, or only contour wells. NOTE: Contour wells are wells that may be flagged in the database because they were used to generate contours for a Groundwater Sustainability Plan, and it may be beneficial to generate subsequent contours based on the same set of wells.
7. Click Submit. *The Success message appears.*
8. On the success message, click Report Status. *The Processed Reports page appears.*
9. In the row with your report, look at the Status column.
   a. If the Status is Success, click the File Name to save your export.
   b. If the Status is Processing, wait a few minutes and check again. Exports with a large volume of data take extra time to generate.
   c. If the Status is Failed, go back to Step 1 and try again. If the problem persists, contact the DMS Help Desk (dmshelp@geiconsultants.com).

3.5. Viewing and Storing Documents

You may store DMS-related documents for other users to view or save, or for you to view or save at a later time. NOTE: The documents page displays three types of documents:

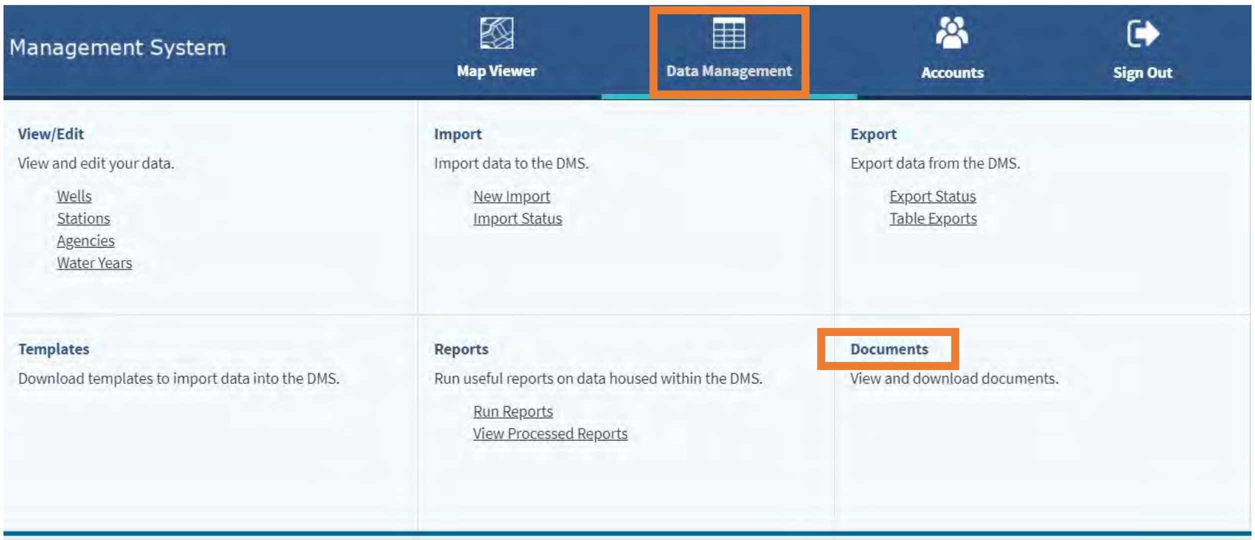
- General Documents – Documents saved to the documents page
- Well Documents – Documents associated with wells

- Station Documents – Documents associated with stations

You may upload General Documents only from the Documents page. The Well and Station Documents are only available for viewing and downloading because those documents are associated with individual wells or stations and must be uploaded from the associated well or station documents table.

1. In the navigation bar along the top of the screen, hover over (do not click) Data Management. *A menu of options appears* (**Figure 20**)*.*
2. Click Documents. *The Documents page appears.*

FIGURE 20. DOCUMENTS ON THE DATA MANAGEMENT MENU



3. If you want to store a new document, click Upload New Upload New. *The Upload Document Form appears.*
4. Complete the form and click Save. *The document is saved to the General Documents table.* **CAUTION**: Do not upload confidential documents to the Documents page. All users with a login may view the General Documents.

4. Managing User Accounts

The DMS includes the ability to manage and edit user accounts.

Note: Most users do not have the permission to manage user account and the Accounts icon (**Figure 21**) does not appear on their Navigation Bar.

If you do not have the Accounts icon on your navigation menu, please contact your designated Database Administrator (or the DMS help team at dmshelp@geiconsultants.com) to request new user accounts.

FIGURE 21. ACCOUNTS ICON

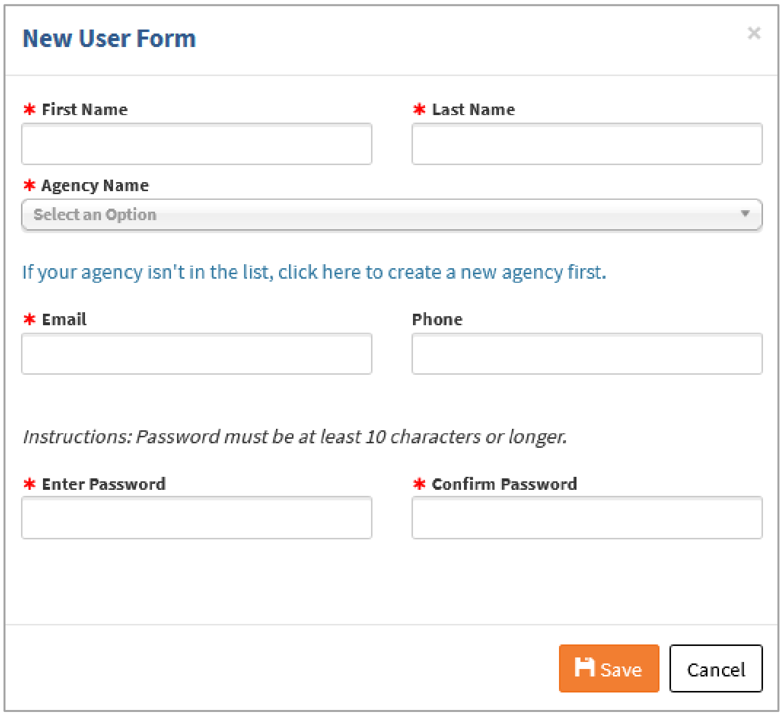
4.1.1. Adding a New User

You may add new users and edit existing user information.

1. In the navigation bar along the top of the screen, hover over (do not click) Accounts. *A menu of options appears*
2. Under the Accounts heading, click Users. *The Accounts page appears*
3. If you want to add a new account, click “Add New”. *The New User Form appears (Figure 21)*
4. Complete the New User Form a click Save. *The user changes are saved to the User Accounts table.*

NOTE: User passwords must be at least 10 characters long.

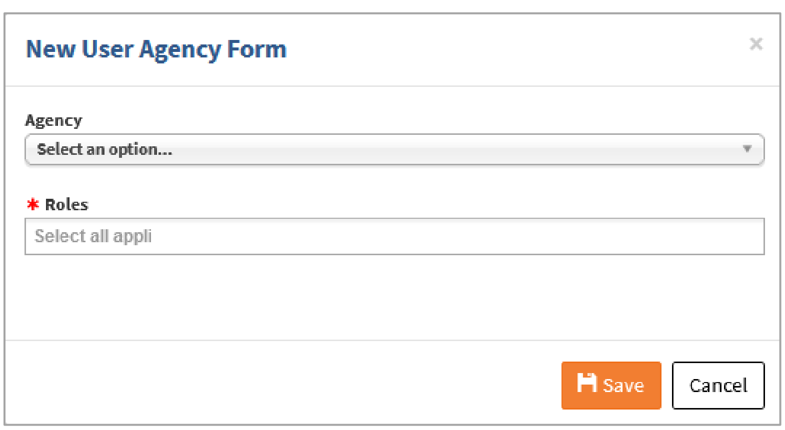
FIGURE 22. NEW USER FORM



4.1.2. Adding a New Agency

1. In the navigation bar along the top of the screen, hover over (do not click) Accounts. *A menu of options appears*
2. Under the Accounts heading, click Users. *The Accounts page appears*
3. If you want to add a new agency to a user, click "Add Agency". *The New User Agency Form appears (Figure 22)*
4. Click "Select an option…" and type agency name into search bar.
5. Select desired agency and click Save. *The agency changes are saved to the Assigned Agencies table.*

FIGURE 23. NEW AGENCY FORM



4.2. User Permissions

The DMS has a variety of types of users. Each user has different permissions associated with their title. User Type definitions and Permissions are described in Table 9 and Table 10.

TABLE 9. USER PERMISSIONS DESCRIPTIONS

User Type	Description of User Permission
Agency Administrator	Manager or person with decision-making authority for a Water District, City, or other entity that owns or manages groundwater wells or other SGMA related infrastructure.
Agency QA/QC Reviewer	Employee or other person that the Agency Administrator authorizes to review and approve data for their Agency. Approved data becomes available in the Map Viewer.
Agency User	Employee or other person that the Agency Administrator authorizes to view and enter/edit data for their Agency.
Basin Coordinator	Person who is responsible for coordinating between the GSA's and with DWR on behalf of all GSA's within the Subbasin.
Stakeholder	Person who has a vested interest in viewing a defined set of non-public well data that is stored in the DMS. Permission is granted by the Agency Administrator and can only be granted for wells within their Agency.
Public	Does not require log-in credentials. Only has access to view publicly available data through the Map Viewer.
Data Type	**Description**
Public	Data that is imported or live linked from a public database such as SDWIS, GAMA, GeoTracker, etc. This data is essentially view only (cannot be edited in the DMS) but is available to use in hydrograph/chemo graph tools.
Owned	A non-public well that is owned, operated and/or monitored by an Agency. Each agency is responsible for adding and maintaining data integrity for these wells. This data is only available to the Agency and it's assigned users with the appropriate log-in credentials.
RMW	SGMA Representative Monitoring Well. Water level data is available in the map viewer once it's approved by the Agency. Data for this well is reported to the SGMA portal and locked for editing once it's approved by the Agency QA/QC Reviewer.

TABLE 10. USER PERMISSIONS MATRIX

Users	View Data			Data Management								Notifications	
	Map Viewer [1]			Search/Download [2]			Add Data		Add Sites, Edit & Delete		Manage Users	Data Entered	MT Exceedance
	Public	Owned	RMW *	Public	Owned	RMW	Owned	RMW	Owned	RMW [3]	Agency		
Agency Administrator	X	X	X	X	X	X	X	X	X		X	X	X [4]
Agency QA/QC Reviewer	X	X	X	X	X	X	X	X	X			X	
Agency User	X	X	X	X	X	X	X	X					
Basin Coordinator	X		X	X		X				X			X
Stakeholder [5]	X	X	X	X	X								
Public	X		X										

[1] Access to the Map Viewer and it's functionality has limited search and print capabilities.

[2] Access to the Data Management tab, which has more robust search and download capabilities with export tools.

[3] Monitoring Network data linked to the SGMA portal: site code, RP and GS Elevations, SMCs and water level reads, consistent with the coordination agreement.

[4] MT Exceedance notifications are triggered after data is approved, and will automatically be emailed to ALL Agency Administrators and the Basin Coordinator.

[5] Stakeholder permission is limited to wells they are associated with by the Agency granting their user permission.

* SGMA Representative Monitoring Well. Data is entered into the DMS and uploaded to the SGMA Portal, consistent with the coordination agreement.

APPENDIX A

Map Viewer Data Categories and Contents

Santa Ynez Subbasin Eastern Management Area Data Management System (EMA DMS)

Label	Description	Stored in DMS?
GROUNDWATER LEVELS (GL)		
Groundwater Level Monitoring Network		
Groundwater Level Monitoring Wells	Wells with sustainable management criteria (SMC) for groundwater levels	✓
Supplemental Groundwater Level Data		
DWR Periodic GW Measurements	Groundwater elevation monitoring stations maintained in the DWR Enterprise Water Management database	
USGS Periodic GW Measurements	Groundwater elevation monitoring stations maintained by USGS	
DWR Continuous GW Measurements	Continuously monitored groundwater elevation stations belonging to DWR	
Supplemental Groundwater Level Wells	Wells with water level data but no SMC	✓
Water Level Filters	Filter currently displayed water level data to fit within a given time span	
Groundwater Level Contours	Display historical water depth, water level elevation, or water level change contours.	
Well Completion Reports	Index of records from DWR's Online System for Well Completion Reports (OSWCR)	
GROUNDWATER STORAGE		
Groundwater Storage Monitoring Network		
Monitored Groundwater Storage Wells	Wells with SMC for groundwater storage	✓
Groundwater Storage Resources	Link to C2VSim	
WATER QUALITY		
Groundwater Quality Monitoring Network		
Monitored Water Quality Wells	Wells with SMC for water quality	✓
Monitored Water Quality Stations	Stations with SMC for water quality	✓
Supplemental Groundwater Quality Data		
Supplemental Water Quality Wells	Wells with water quality data but no SMC	✓
Supplemental Water Quality Stations	Stations with water quality data but no SMC	✓
Water Quality Filters	Filter by date or constituent	
Water Quality Resources	Link to GAMA Program Online Tools	
LAND SUBSIDENCE		
LS Representative Monitoring Network		
Monitored Subsidence Stations	Wells and stations with SMC for subsidence	✓
Supplemental Land Subsidence Data		
DWR Extensometers	DWR monitored borehole extensometers	
Supplemental Subsidence Stations	Stations with subsidence data but no SMC	✓
UNAVCO CGPS Site	UNAVCO Continuous Global Positioning System (CGPS) Stations	
TRE Altamira InSAR Dataset	Measurements of vertical ground surface displacement	
NASA JPL InSAR Dataset		
INTERCONNECTED SURFACE WATER		
ISW Representative Monitoring Network		

Label	Description	Stored in DMS?
Monitored Interconnected Surface Water Wells	Wells with SMC for interconnected surface water	✓
Supplemental Interconnected Surface Water Data		
Precipitation & Stream Gage Stations		✓
Precipitation Stations		✓
Stream Gage Stations		✓
California Data Exchange Center (CDEC)		
Natural Communities Commonly Associated with Groundwater (NCCAG)		
SEAWATER INTRUSION		
Seawater Intrusion Monitoring Network		
Monitored Seawater Intrusion Stations	Stations with SMC for seawater intrusion	✓
Monitored Seawater Intrusion Wells	Wells with SMC for seawater intrusion	✓
Supplemental Seawater Intrusion Data		
Supplemental Seawater Intrusion Stations	Stations with seawater intrusion data but no SMC	✓
Supplemental Seawater Intrusion Wells	Wells with seawater intrusion data but no SMC	✓
HYDROGEOLOGIC CONCEPTUAL MODEL		
Soil and Recharge Map		
UC Davis SAGBI	Soil Agricultural Groundwater Banking Index (SAGBI) developed and maintained by the California Soil Resource Lab at UC Davis and UC-ANR.	
Soil Survey Geographic Database	The Soil Survey Geographic Database (SSURGO) dataset is a compilation of soils information collected over the last century by the Natural Resources Conservation Service (NRCS).	
Geologic Map		
CGS Geologic Map – 750k Generalized	Geologic Map of California published by Department of Conservation, California Geological Survey	
Geologic Map – Quaternary	Geologic Compilation of Quaternary Surficial Deposits published by the Department of Conservation, California Geological Survey (DOC/CGS), with funding from DWR	
Faults	Fault Activity Map of California published by Department of Conservation, California Geological Survey	
BOUNDARIES		
County Boundaries		
Canals and Aqueducts		
Tribal Trust Boundary		
Disadvantaged Communities Block Groups		
Disadvantaged Communities Places		
Disadvantaged Communities Tracts		

Label	Description	Stored in DMS?
Water Agencies		
CASGEM Groundwater Basins Prioritization – 2019		
Bulletin 118 Groundwater Basins – 2016		
State Parks		
State Refuges		
CDFW Owned and Operated Lands and Conservation Easements		
California Protected Areas Database (CPAD) Holdings		
California Conservation Easement Database (CCED)		
Regional Water Quality Control Board Boundaries		
Federal Lands		
GSA Boundaries		

APPENDIX I

Representative Well Hydrographs and Minimum Thresholds

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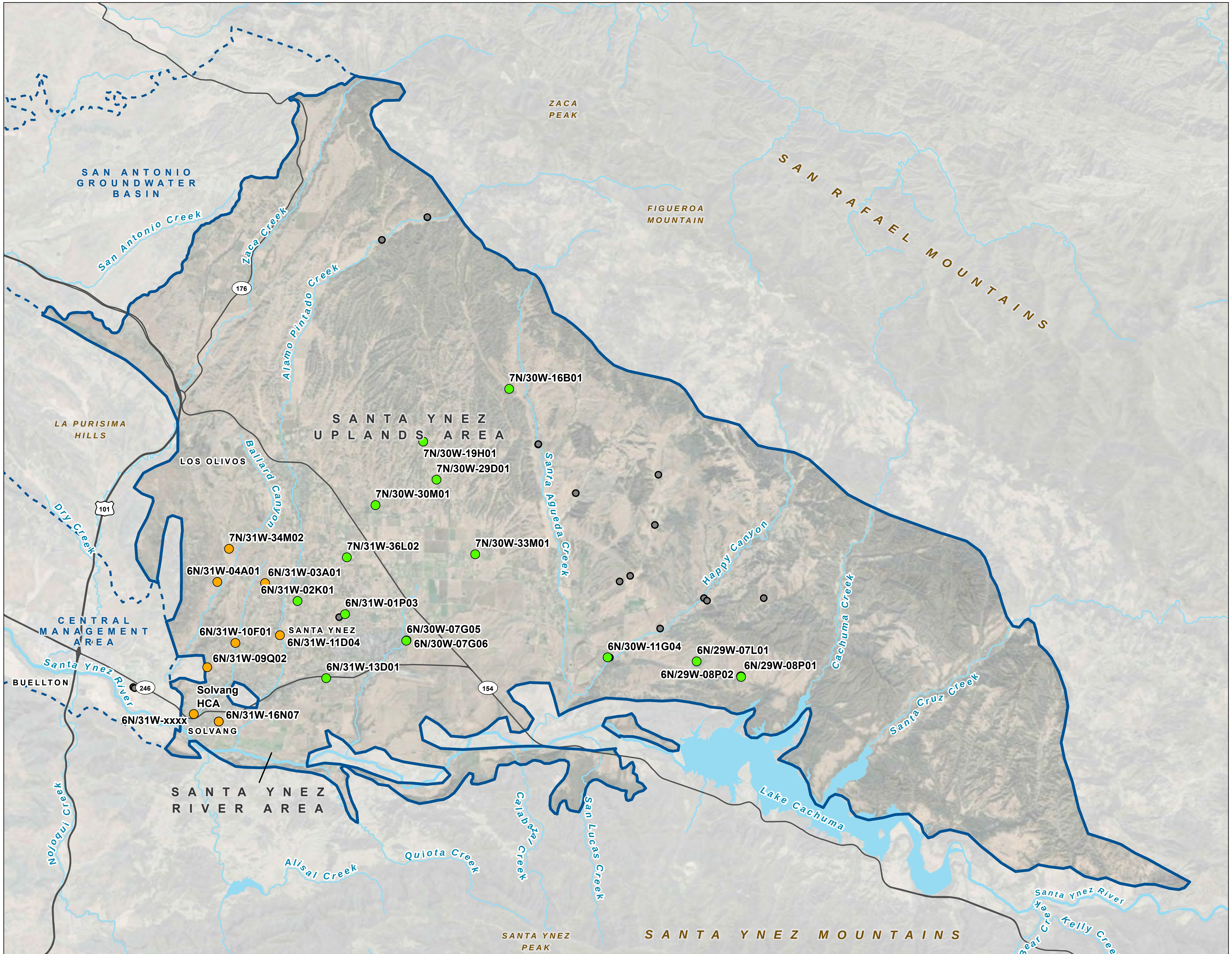

FIGURE I-1

Groundwater Level Monitoring Network

Groundwater Sustainability Plan
Eastern Management Area

LEGEND

Representative Well (by screened aquifer)

- Careaga Sand
- Paso Robles Formation

Other Wells

- Monitored by Santa Barbara County

All Other Features

- Eastern Management Area Basin Boundary
- Major Road
- Watercourse
- Waterbody

Date: June 11, 2021
Data Sources: ESRI, USGS, Maxar 2020

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Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\Monitoring_Network\Figure4-1_Groundwater_Level_Monitoring_Network.mxd, alapostol

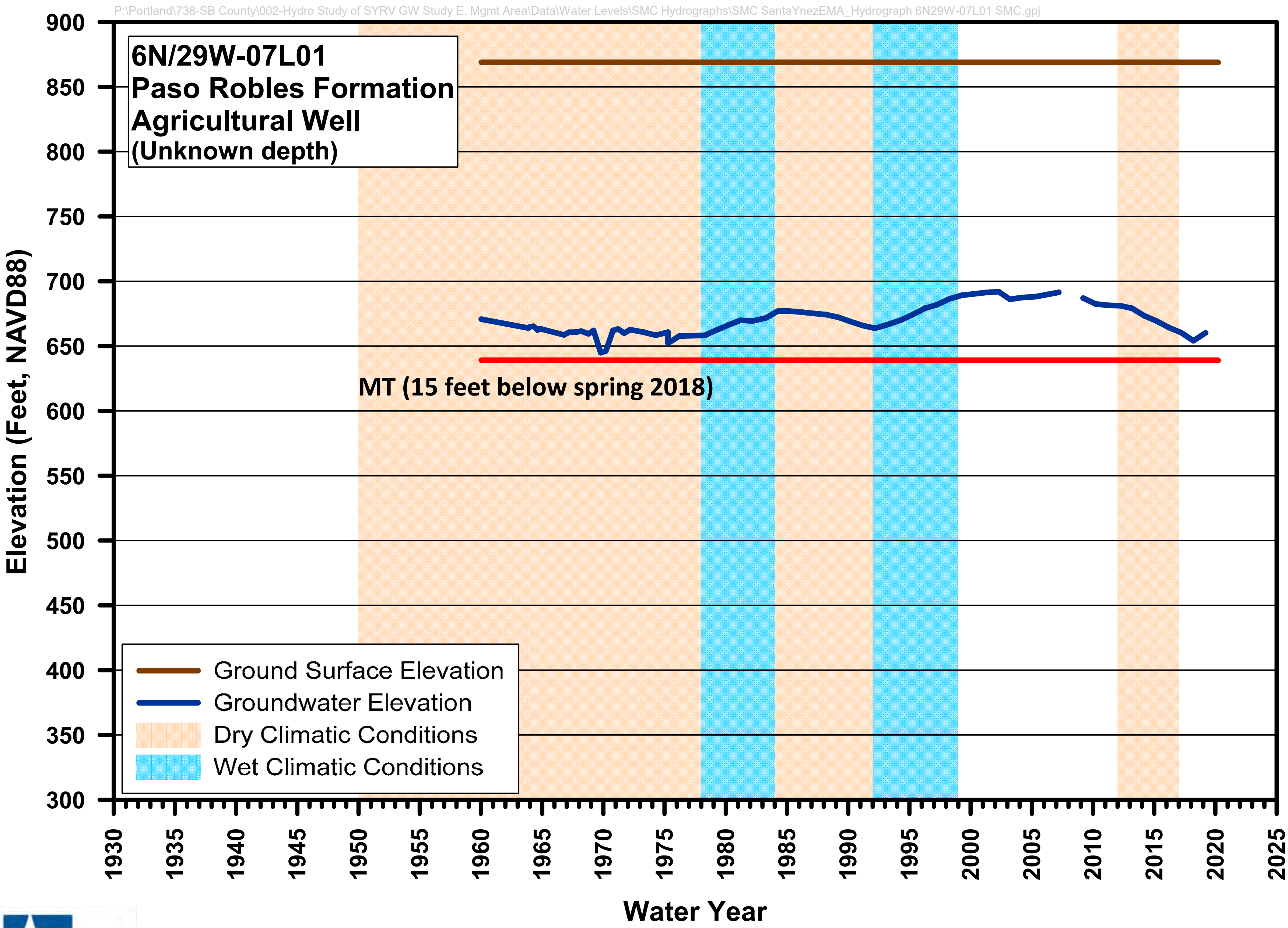

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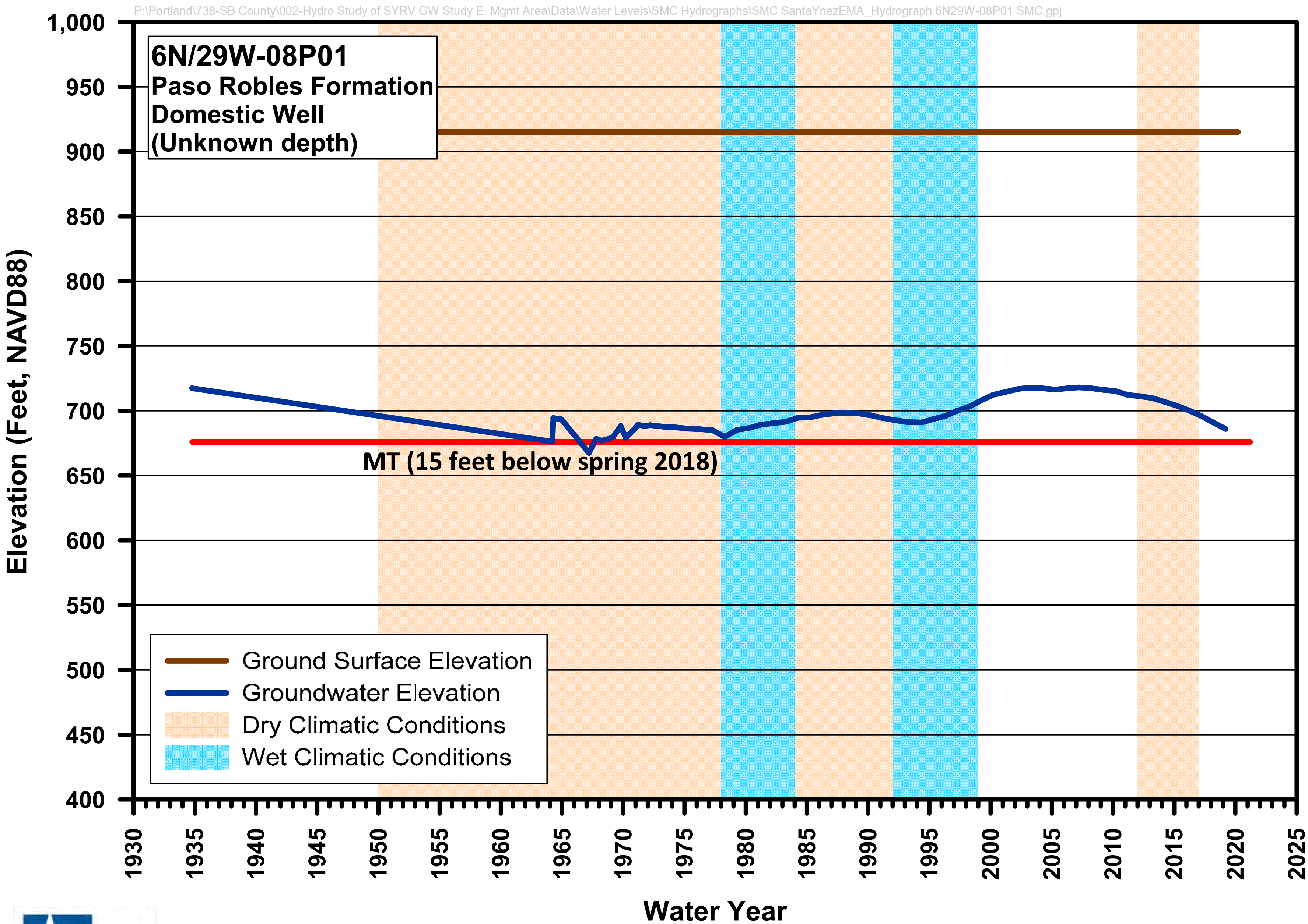
FIGURE I-2
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



GSI Water Solutions, Inc.

FIGURE I-3
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

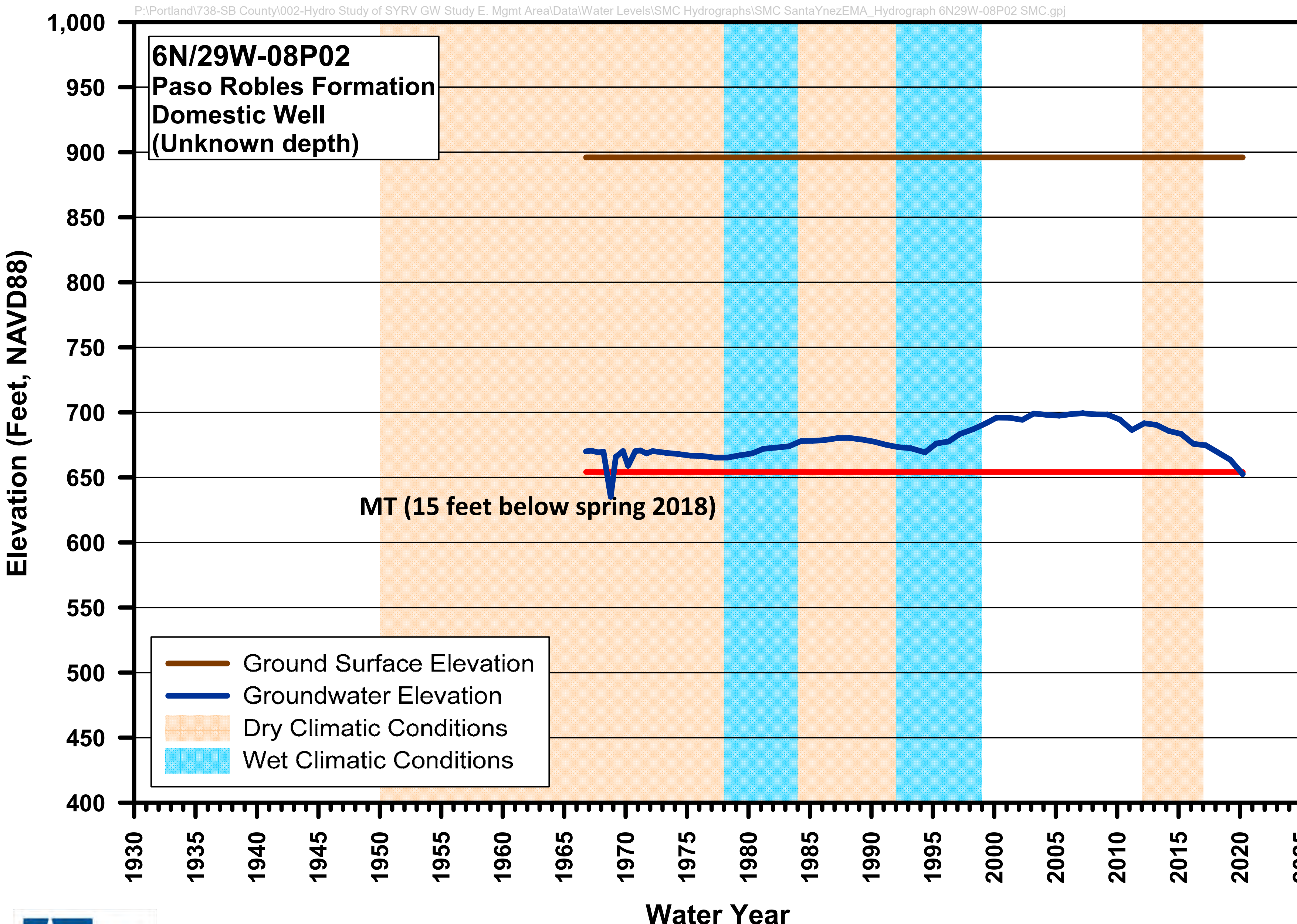


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FIGURE I-4

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

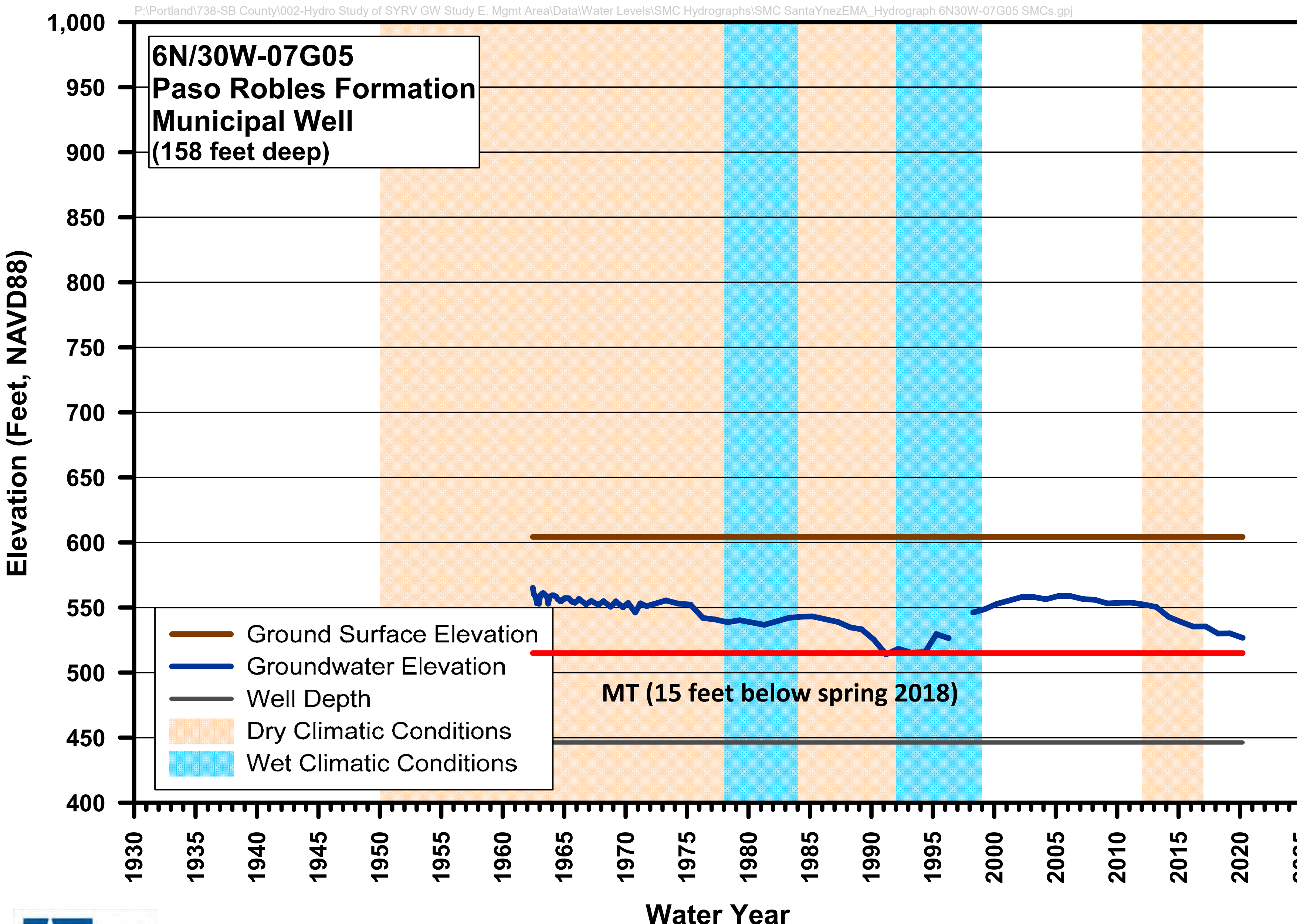

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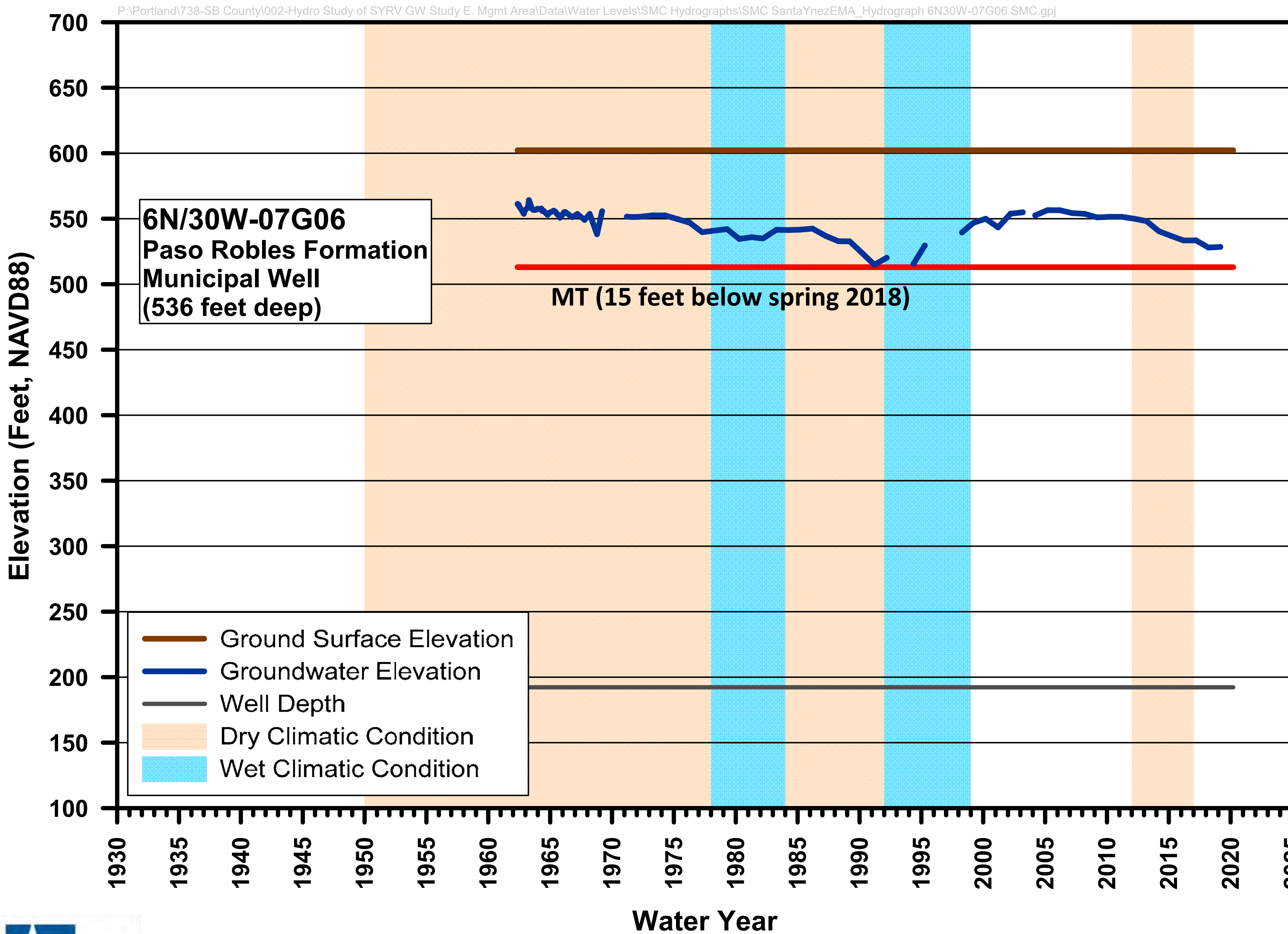
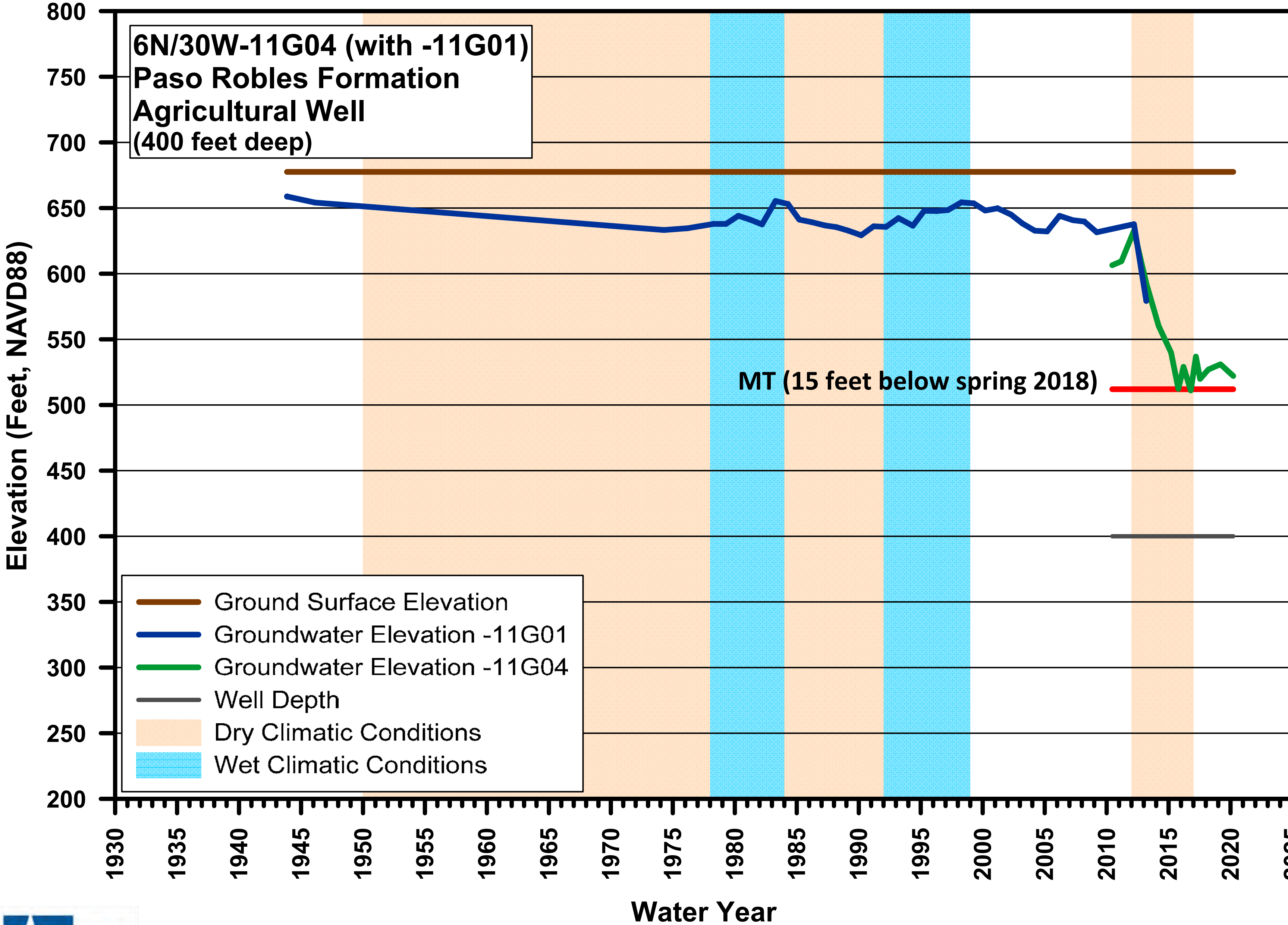
FIGURE I-5
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



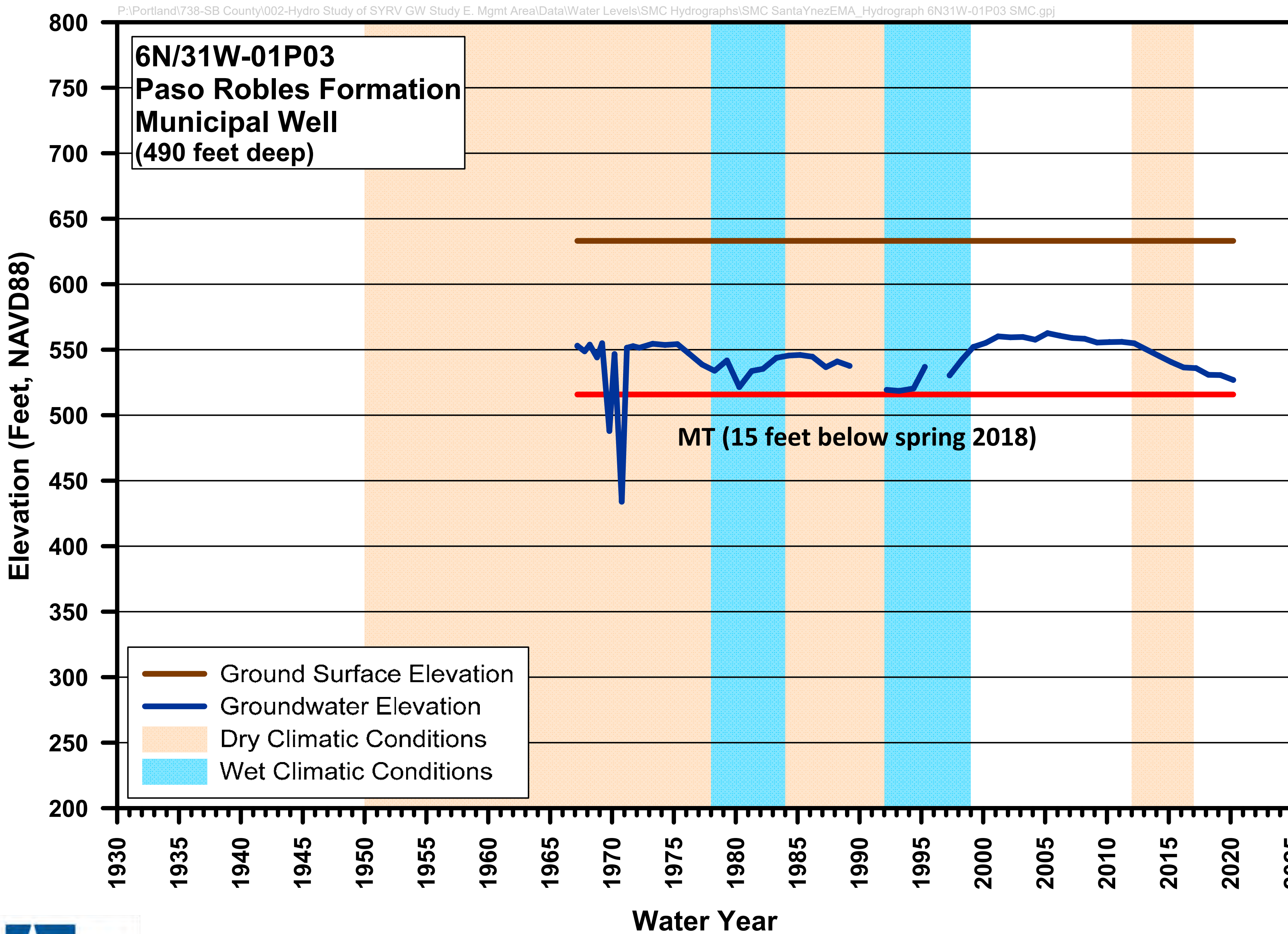
GSI Water Solutions, Inc.

FIGURE I-6
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



GSI Water Solutions, Inc.

FIGURE I-7
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

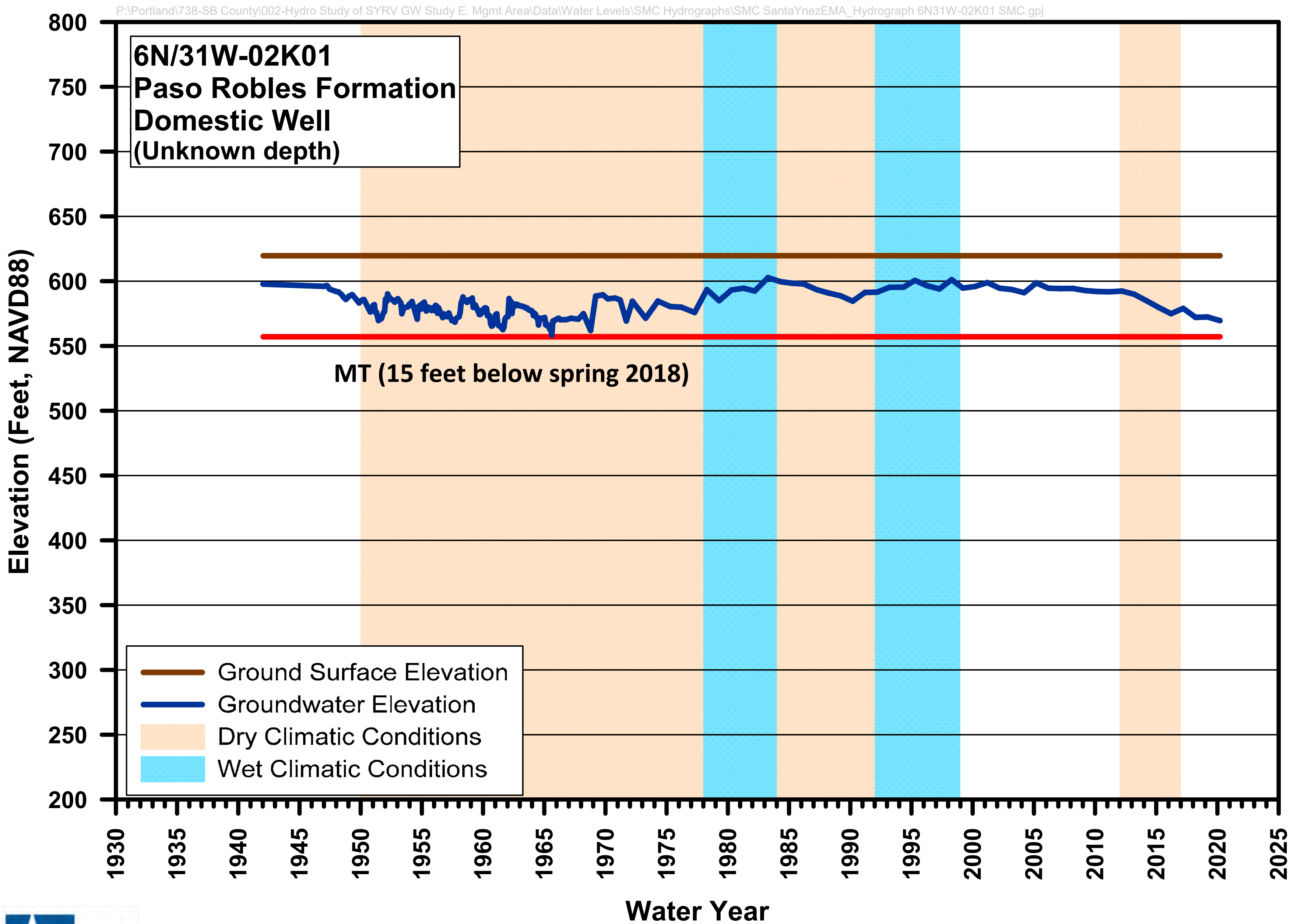


GSI Water Solutions, Inc.

FIGURE I-8

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



GSI Water Solutions, Inc.

FIGURE I-9
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

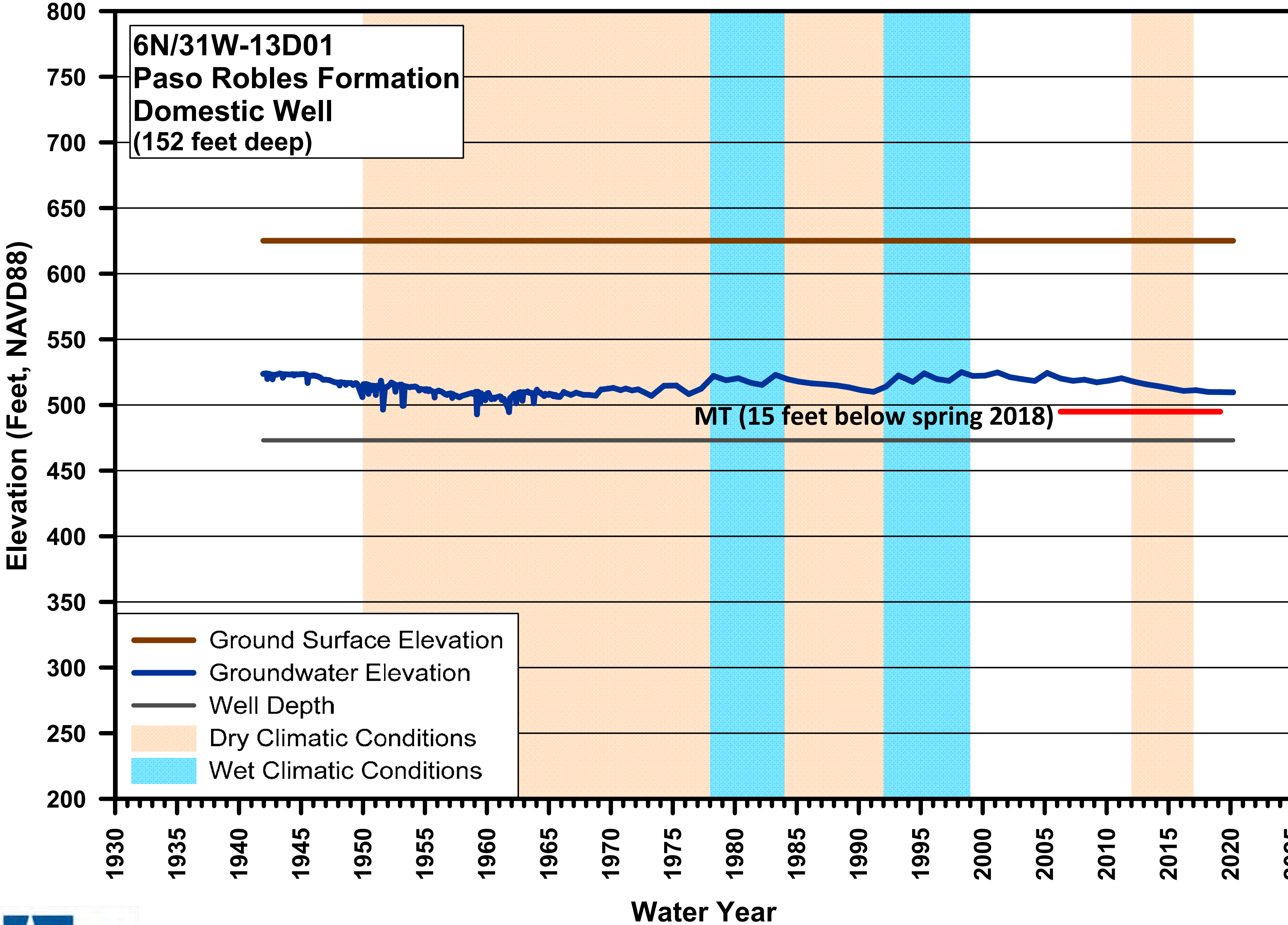


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FIGURE I-10
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

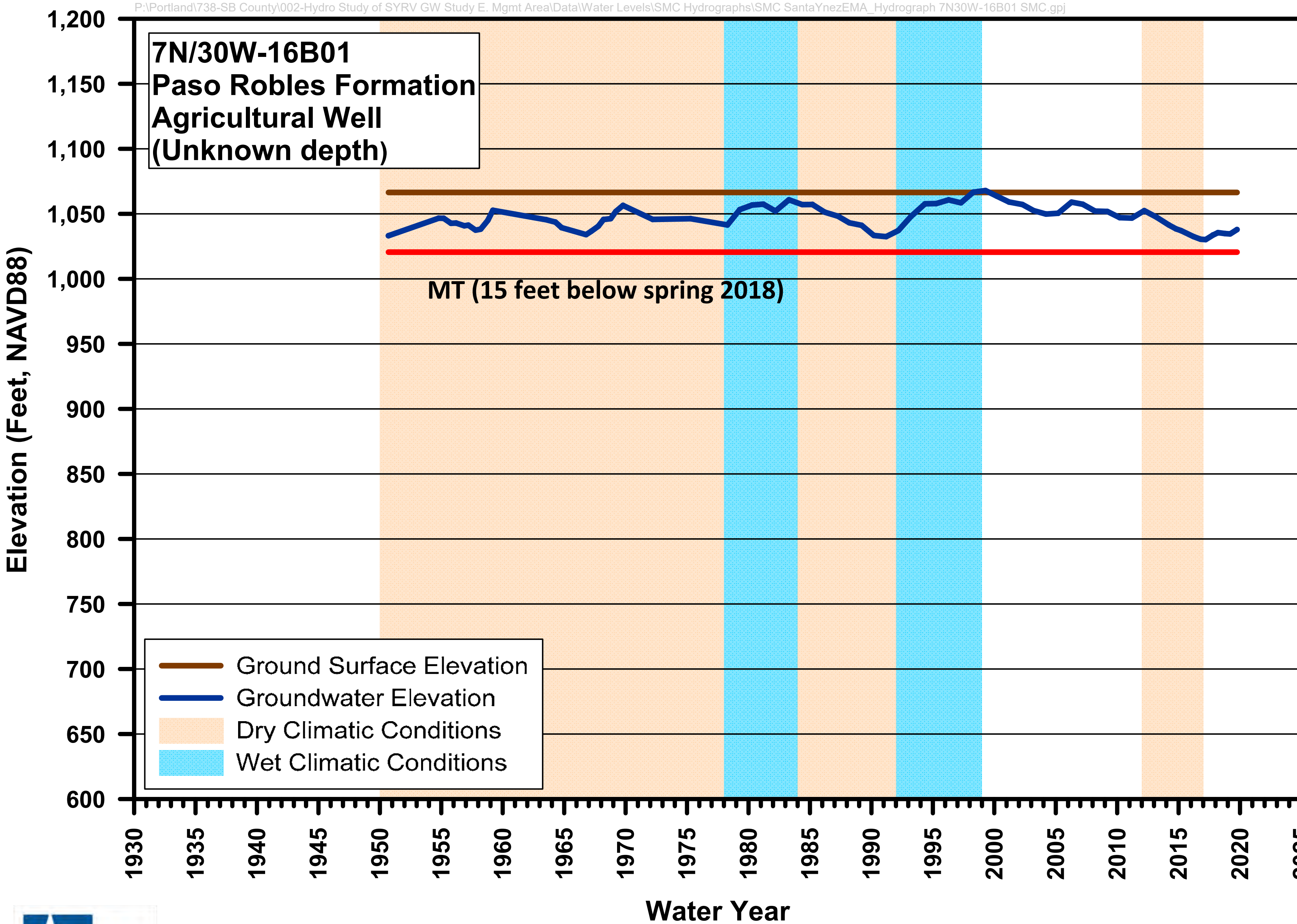

FIGURE I-11
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

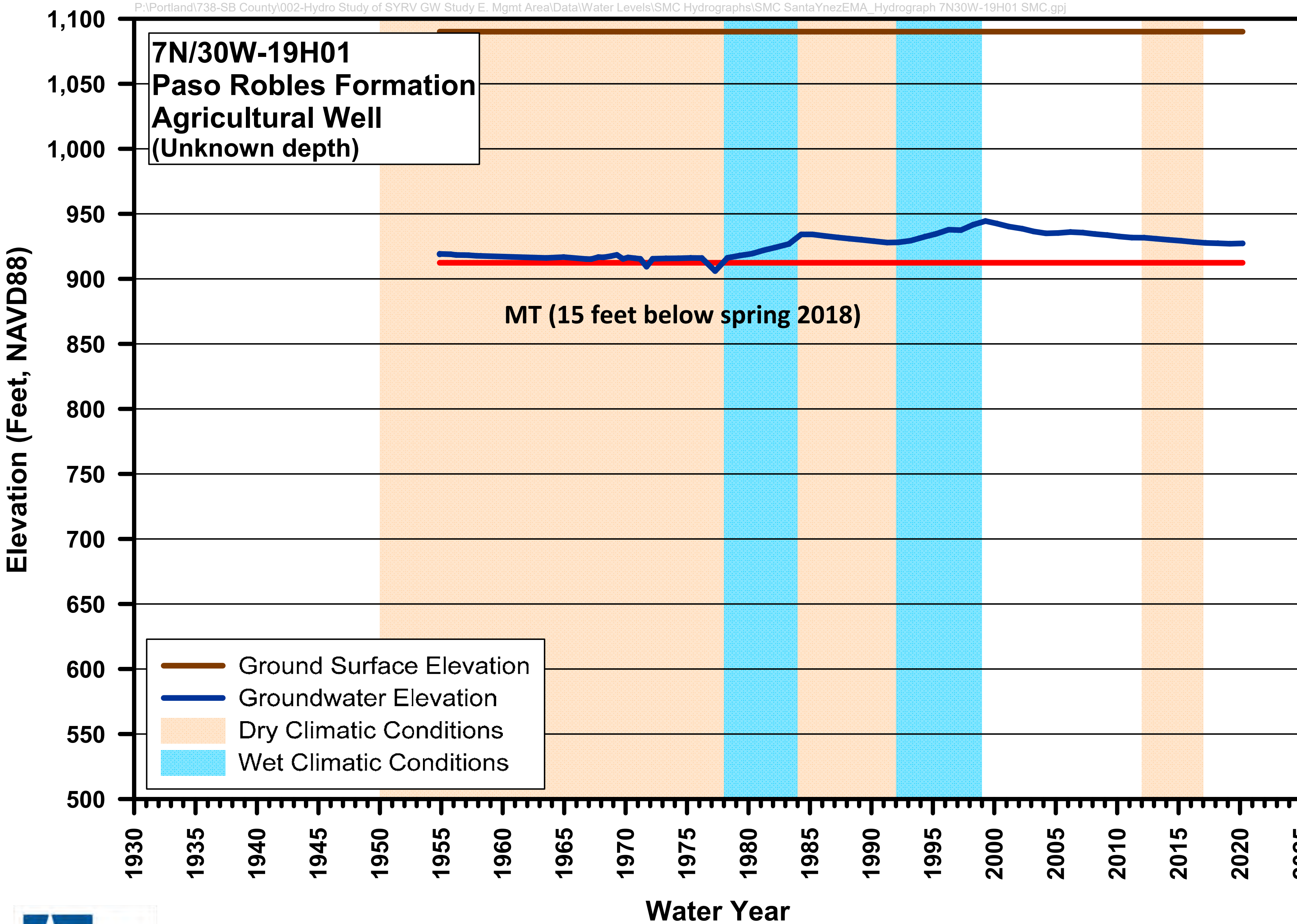

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FIGURE I-12
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

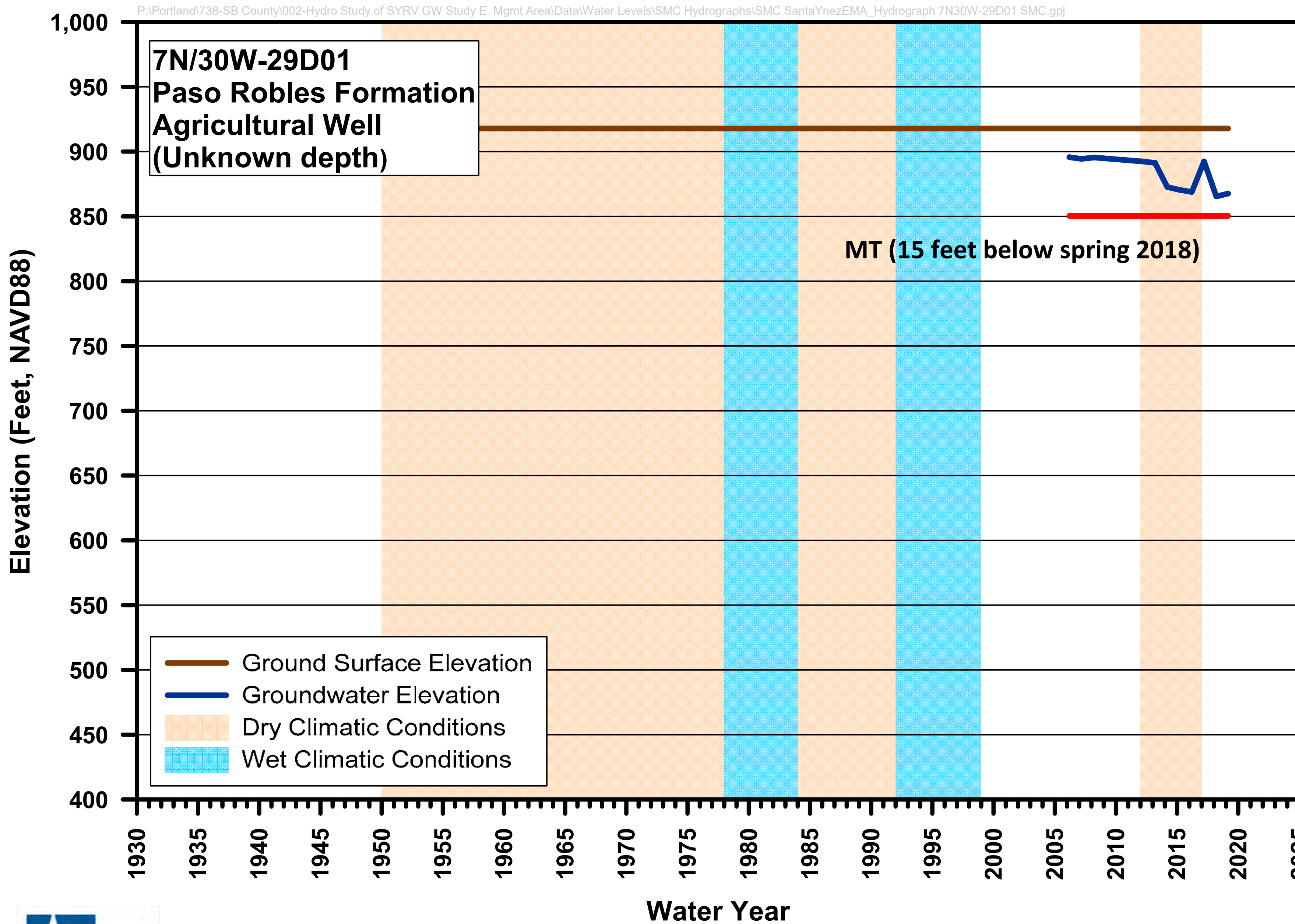

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FIGURE I-13
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

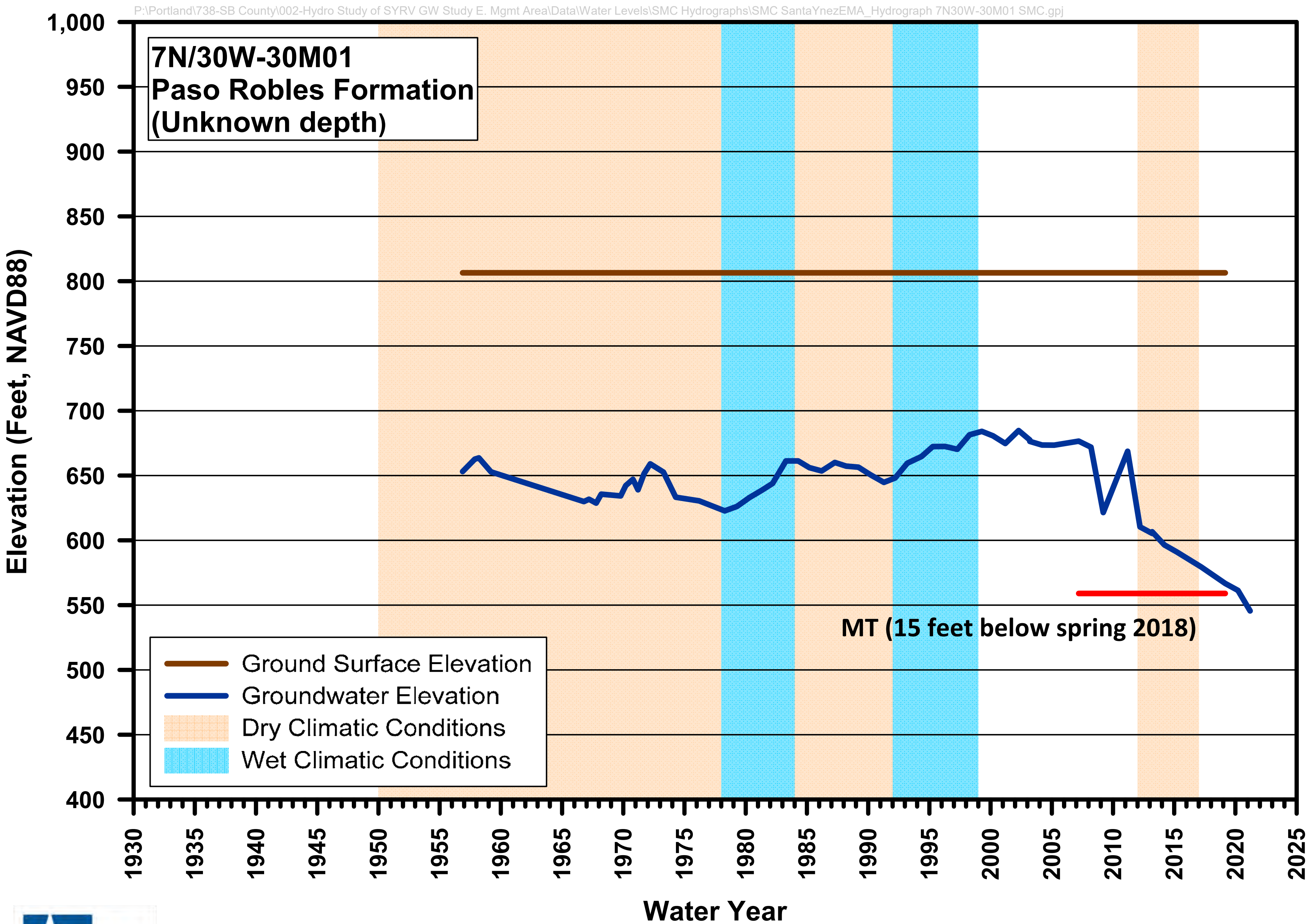

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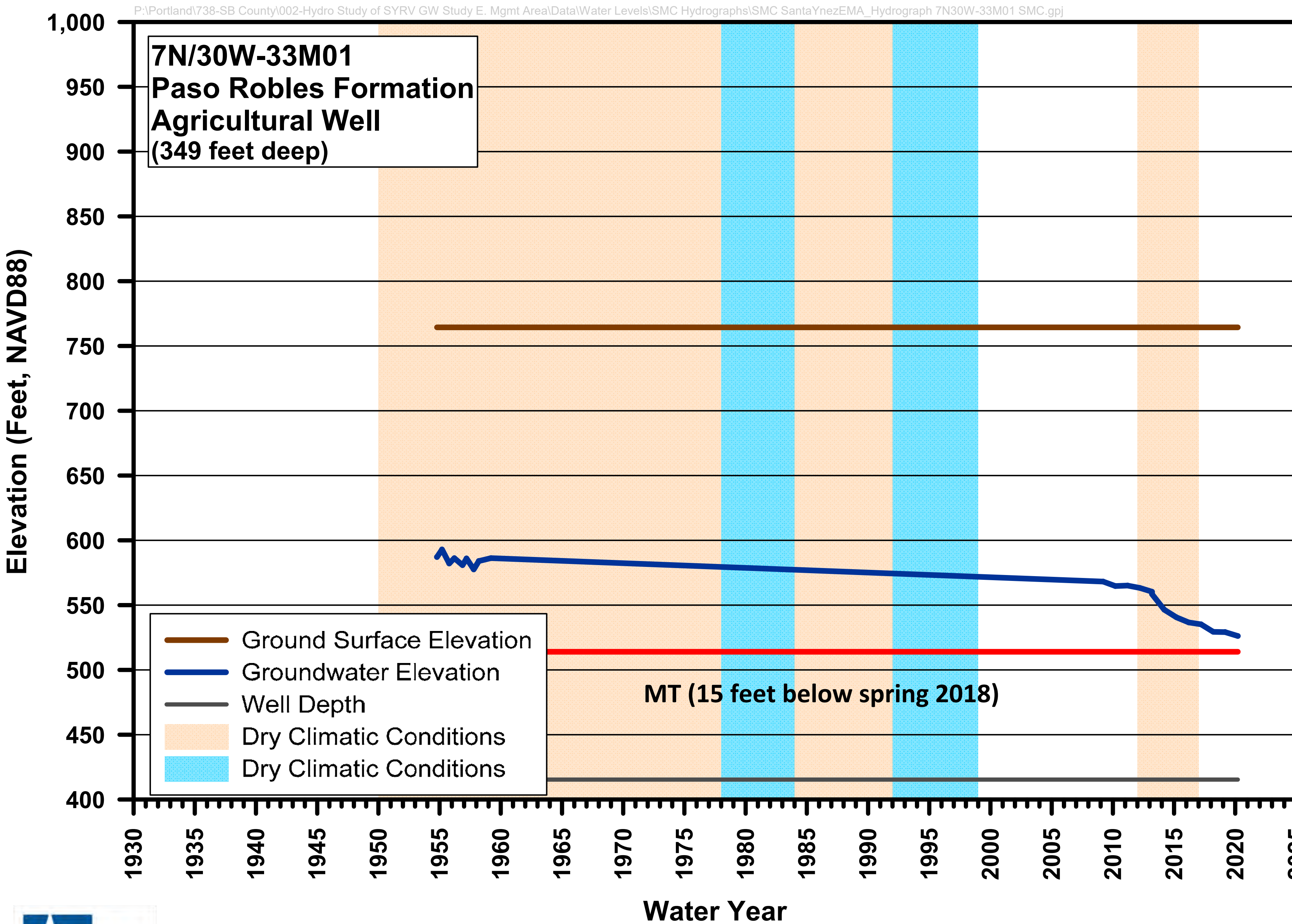
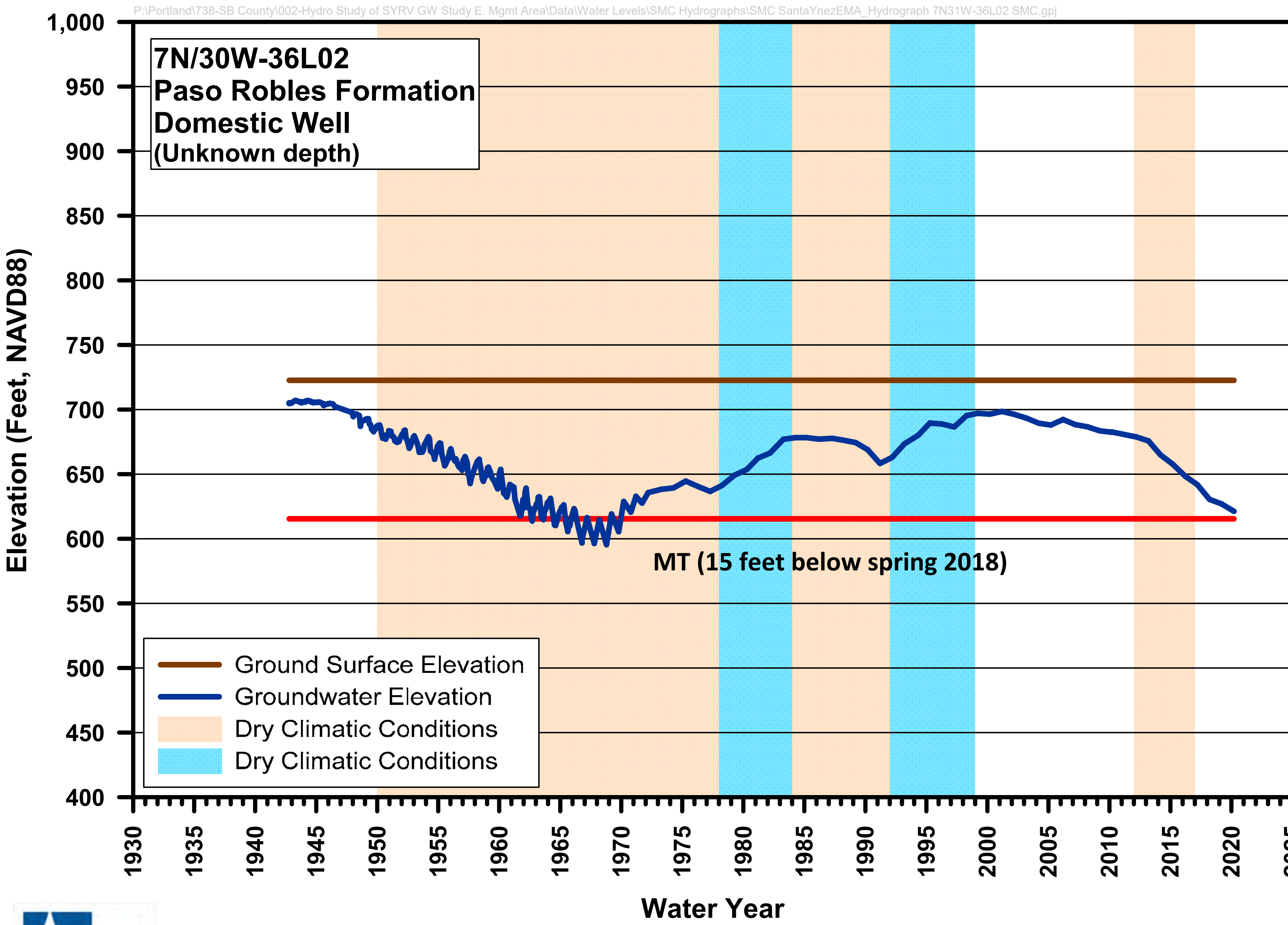
FIGURE I-14
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



GSI Water Solutions, Inc.

FIGURE I-15
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



GSI Water Solutions, Inc.

FIGURE I-16

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

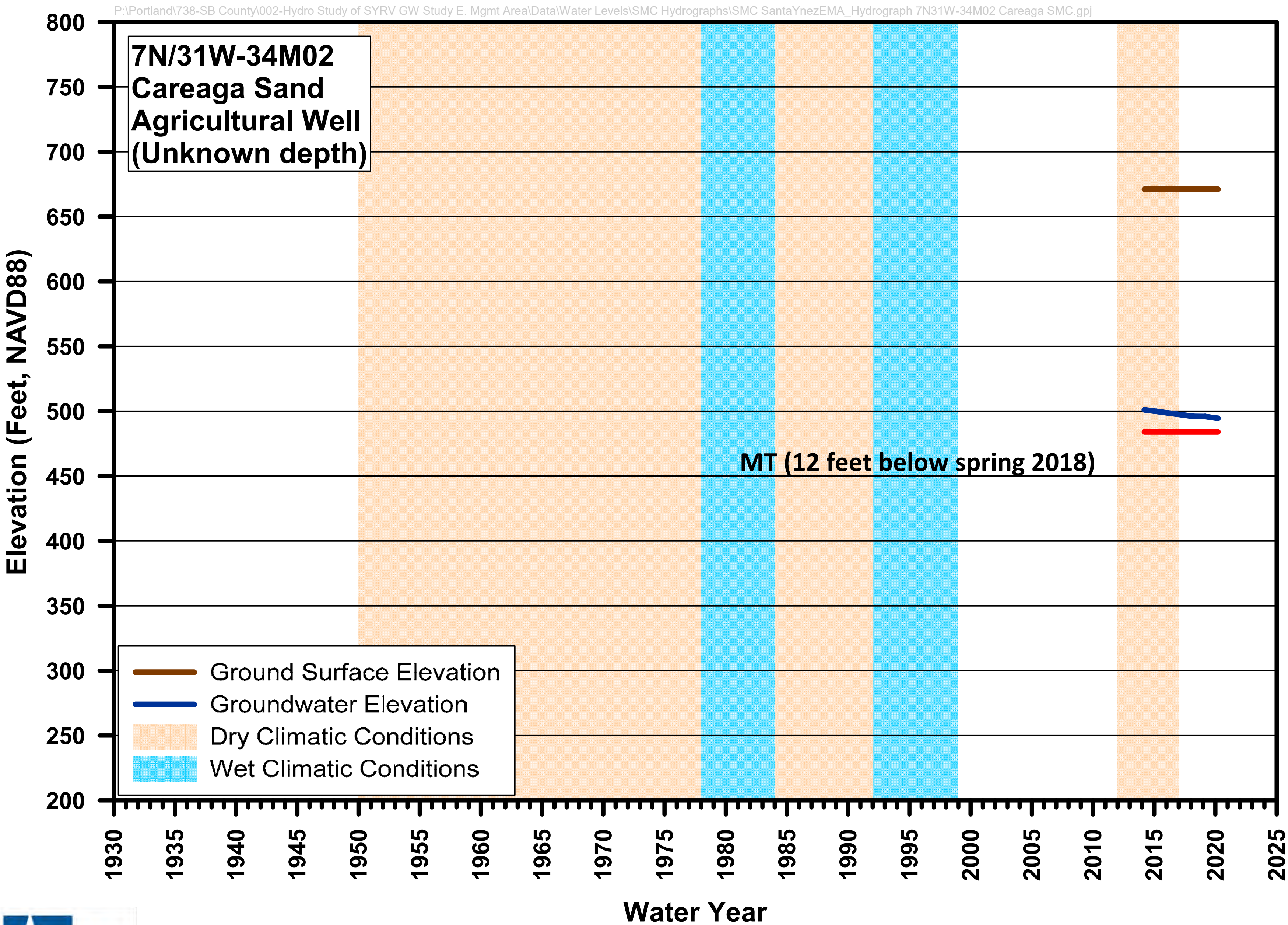


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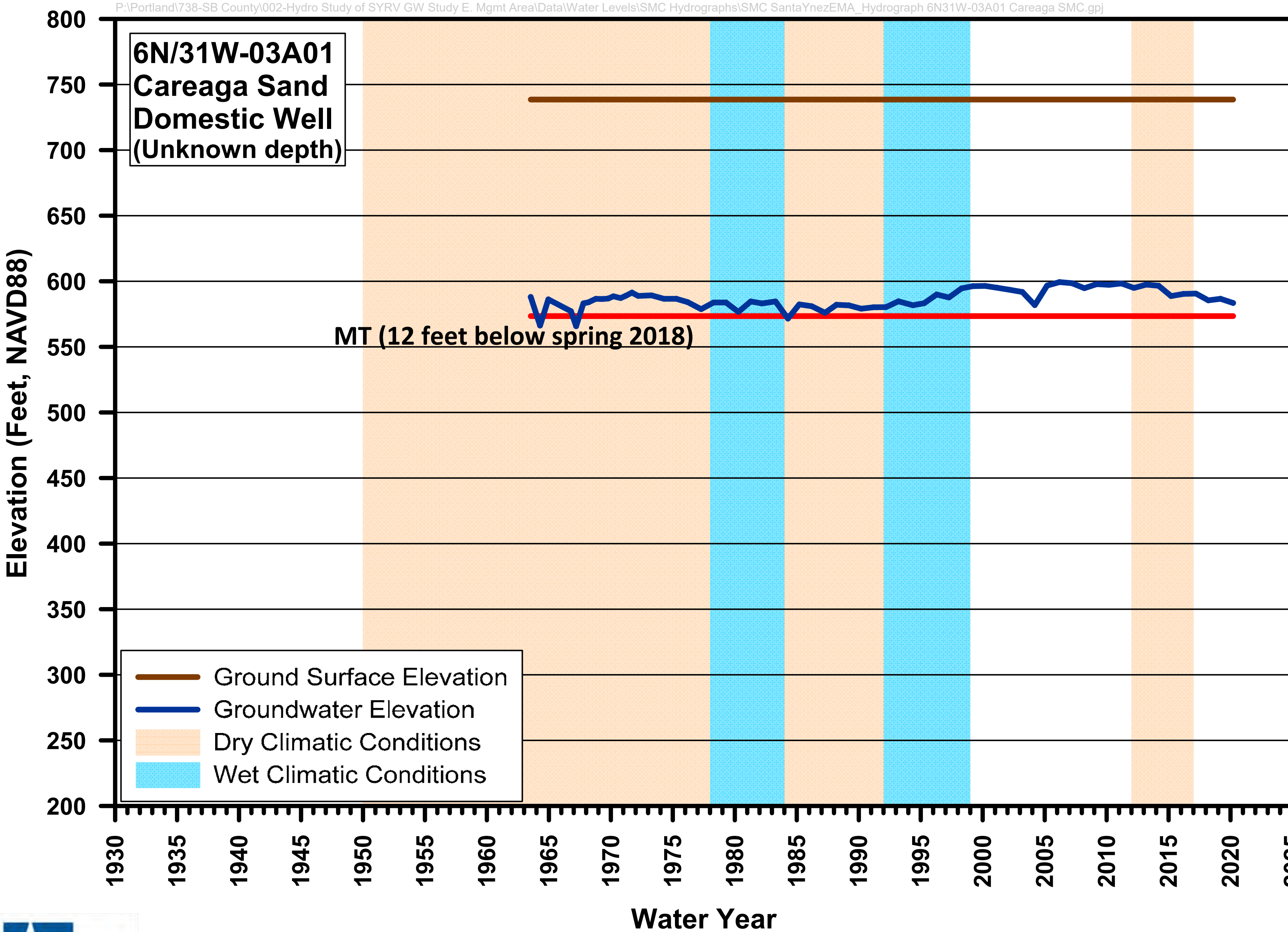
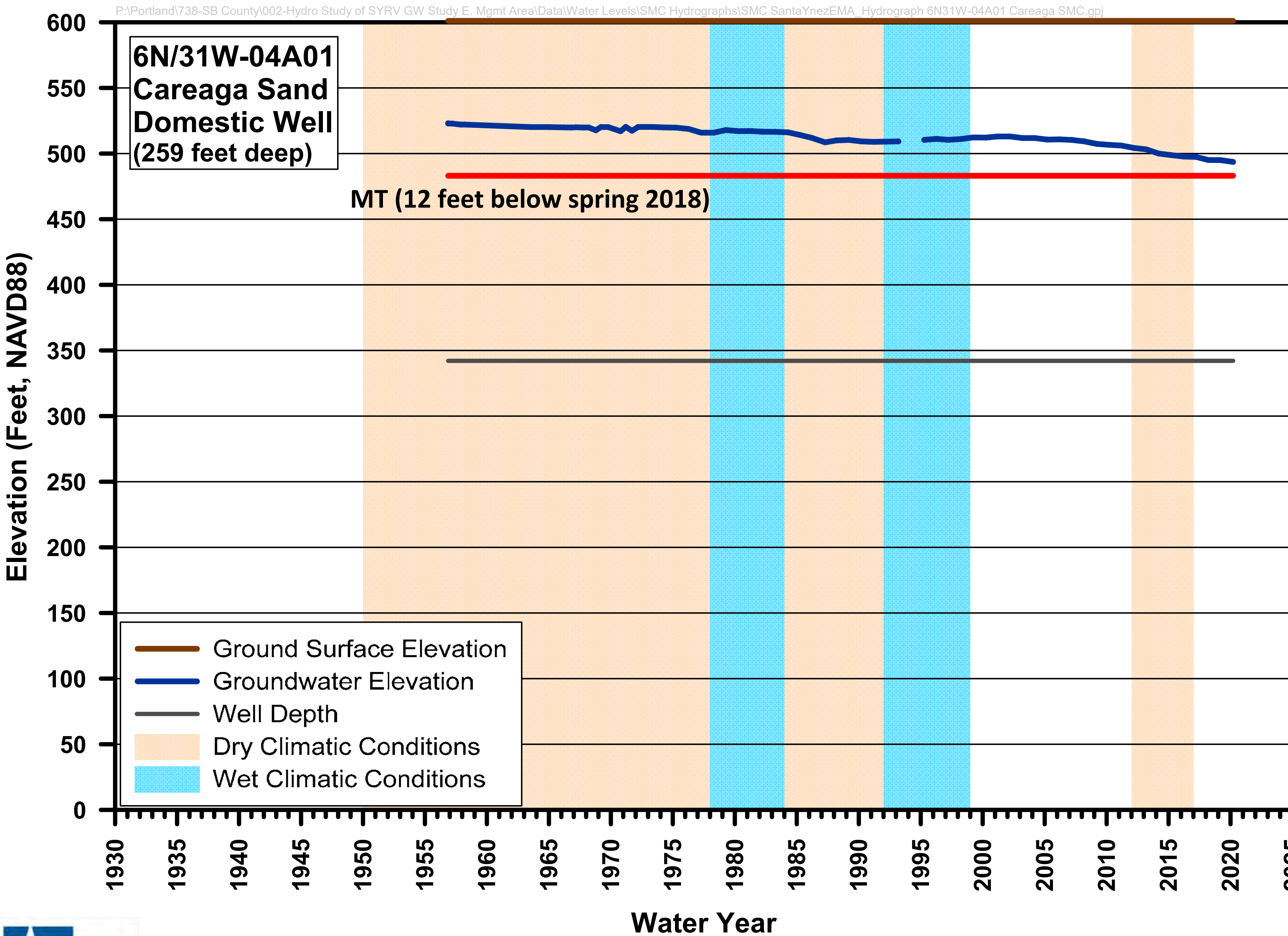
FIGURE I-17
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



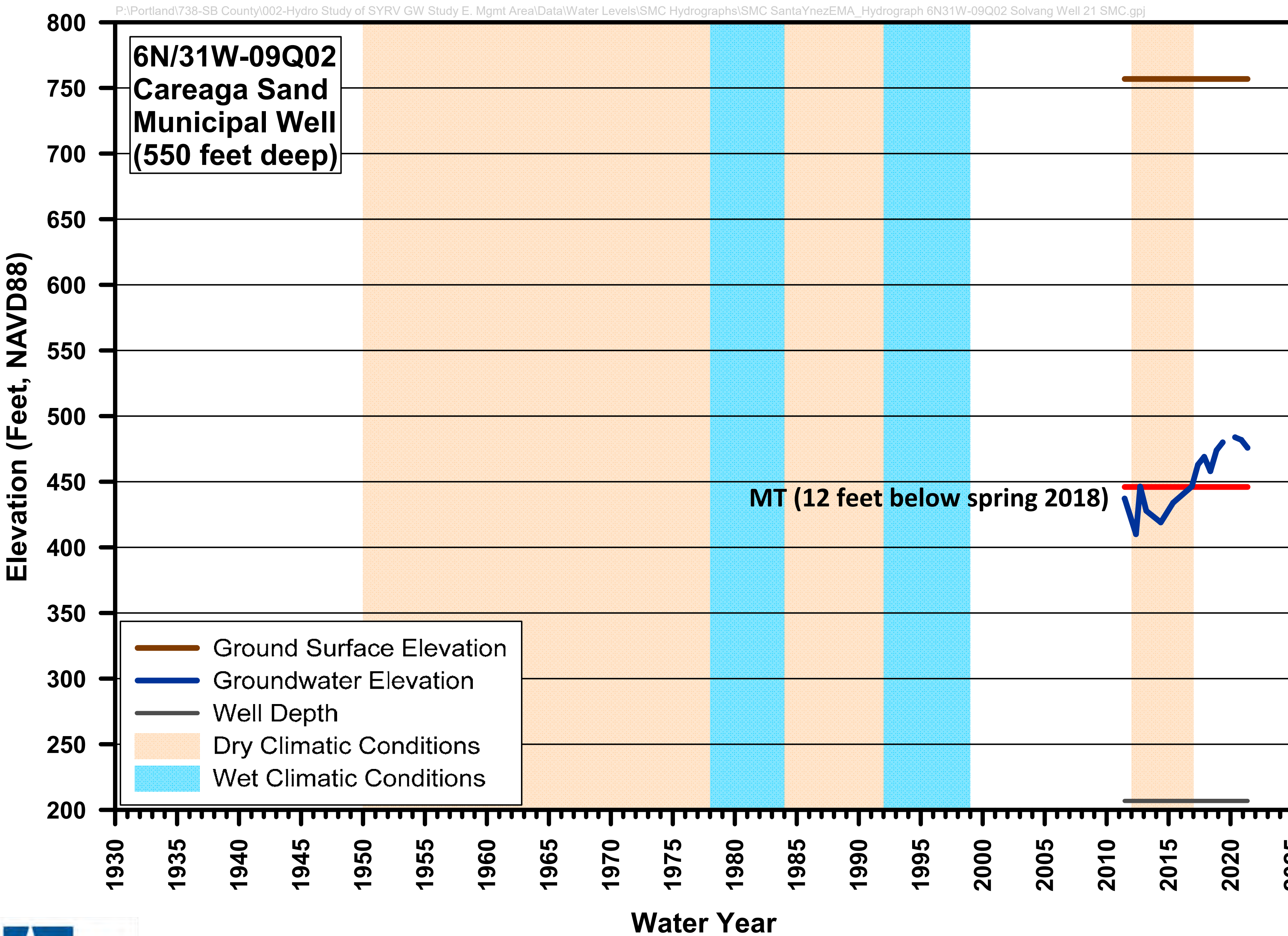
GSI Water Solutions, Inc.

FIGURE I-18
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



GSI Water Solutions, Inc.

FIGURE I-19
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

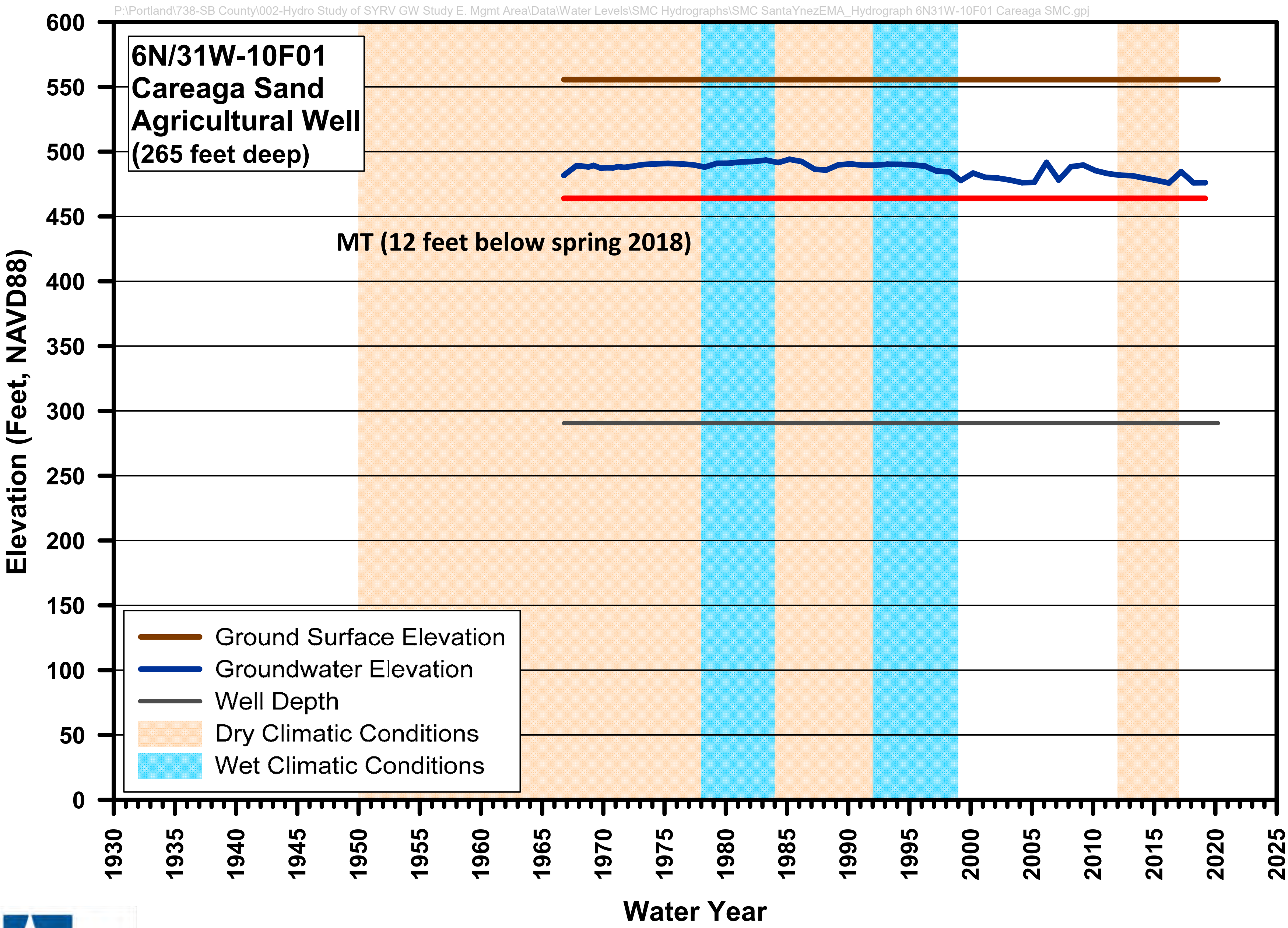


GSI Water Solutions, Inc.

FIGURE I-20

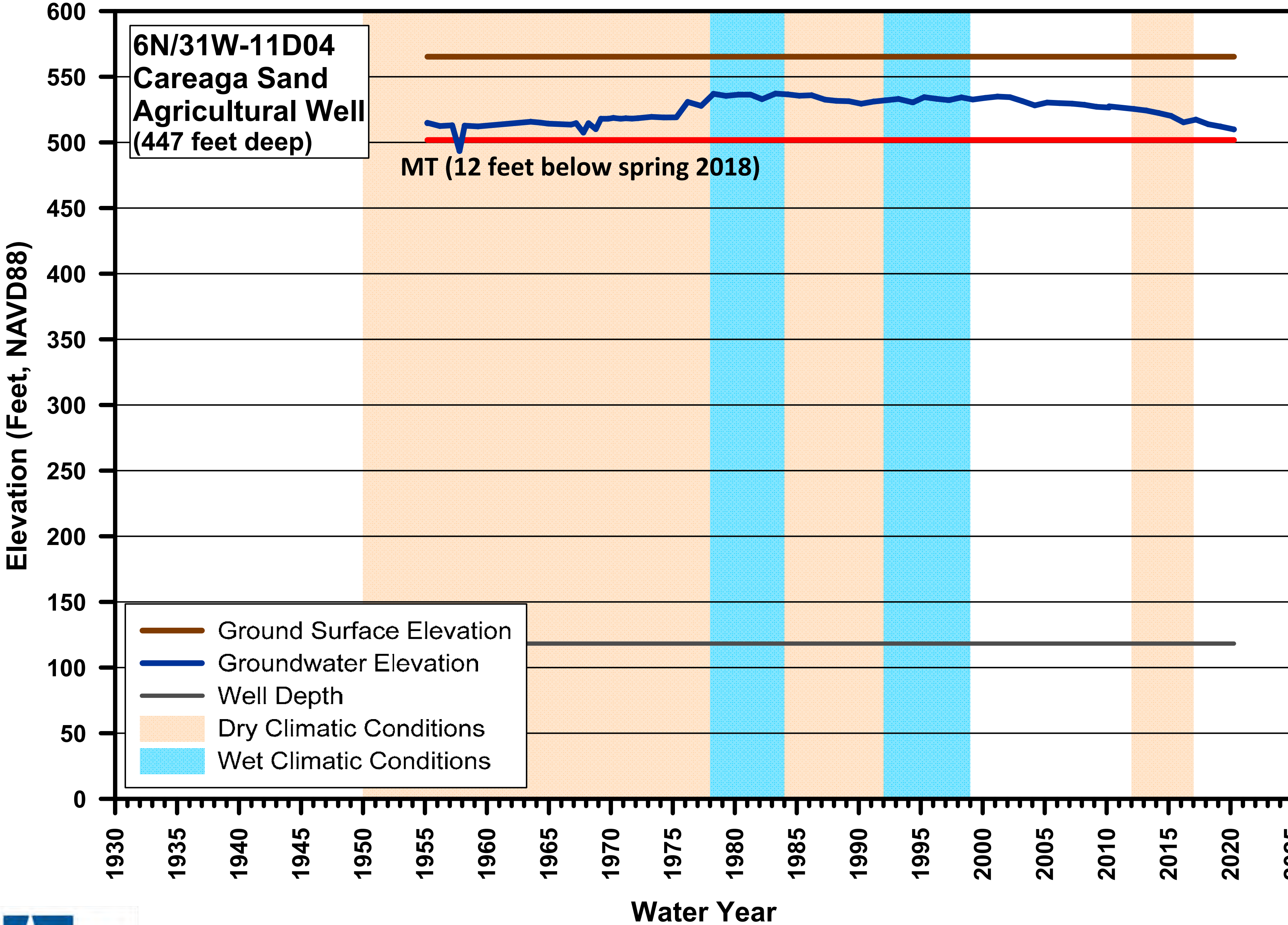
Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



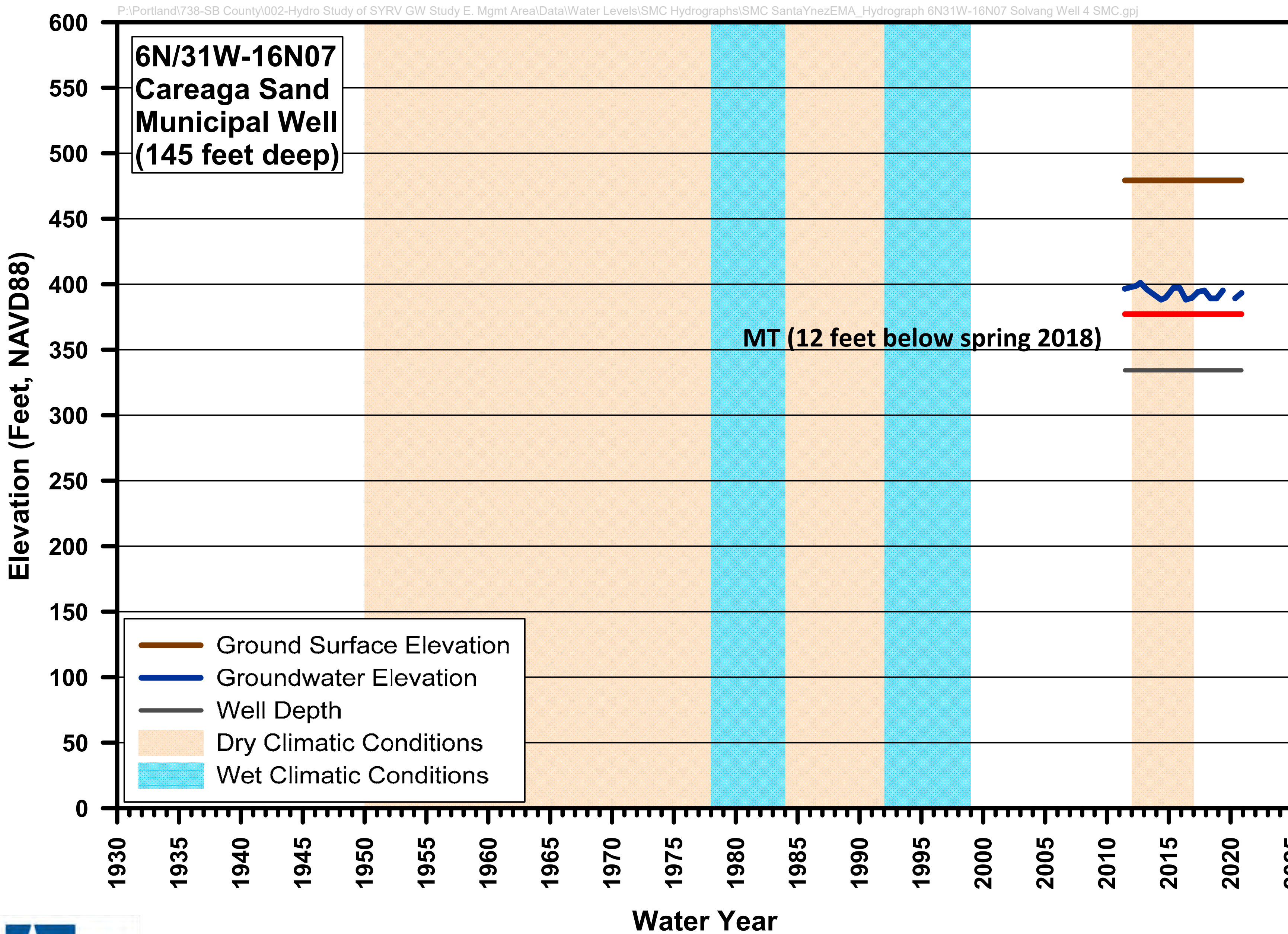
GSI Water Solutions, Inc.

FIGURE I-21
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



GSI Water Solutions, Inc.

FIGURE I-22
Groundwater Elevation Hydrograph
Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

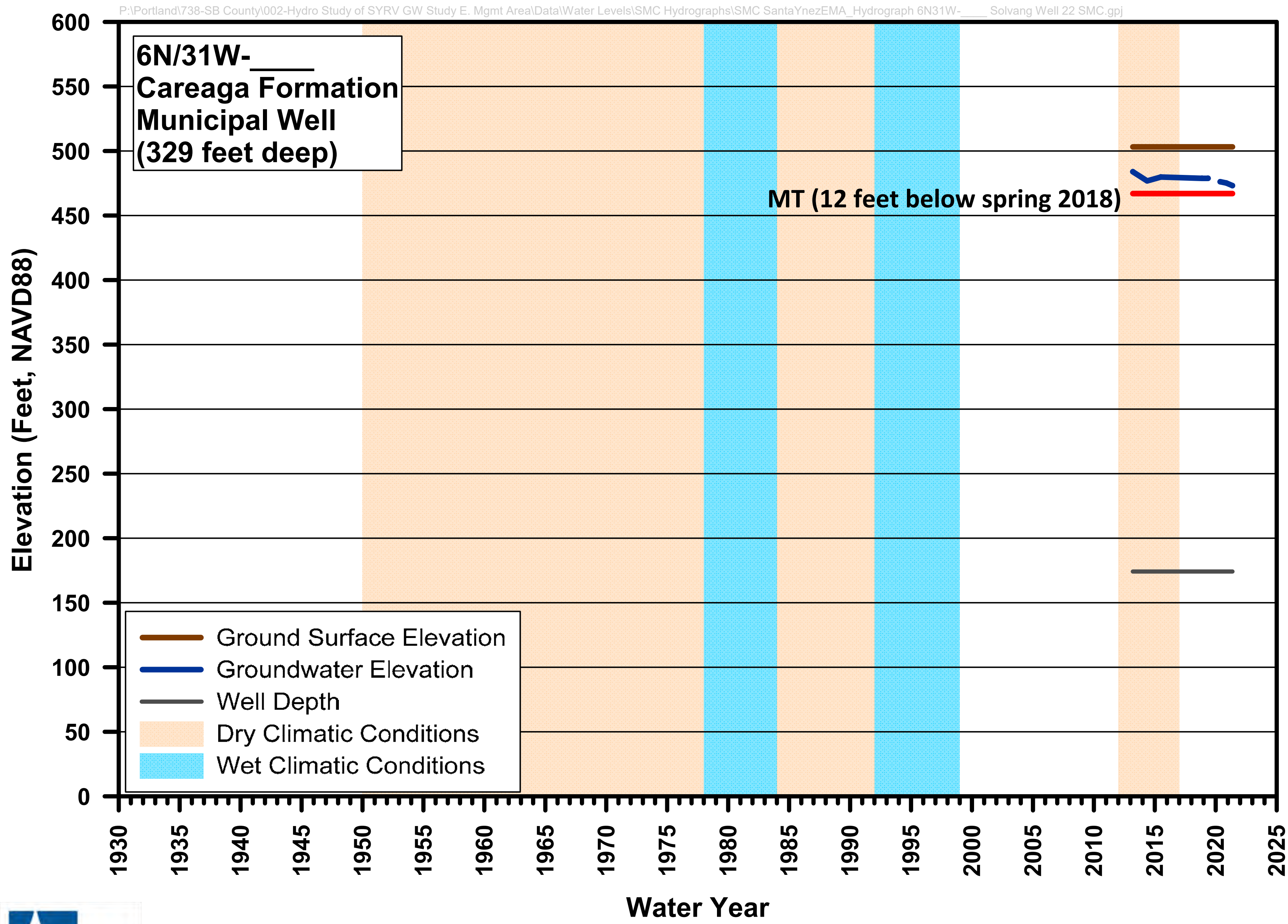


GSI Water Solutions, Inc.

FIGURE I-23

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

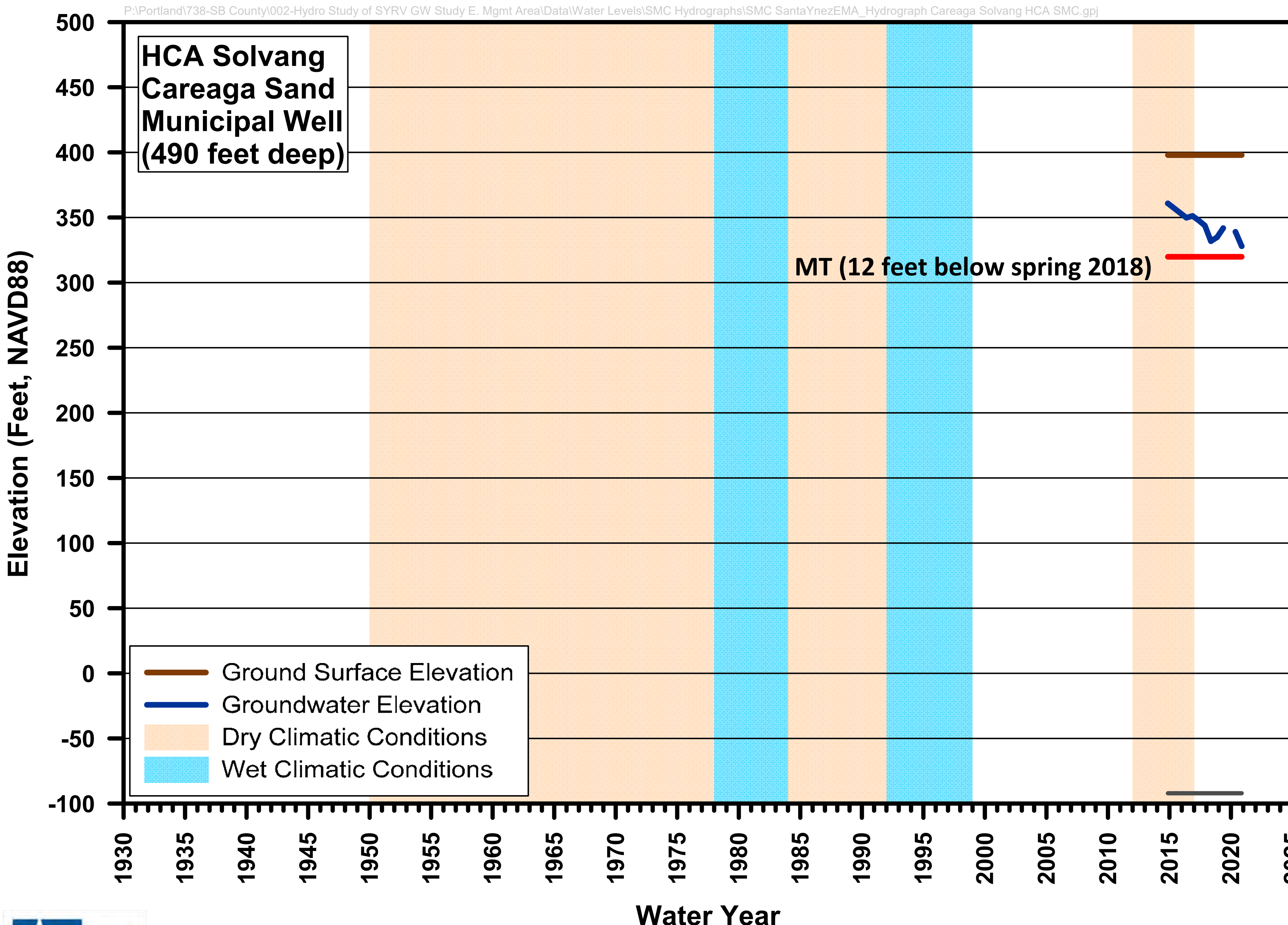


GSI Water Solutions, Inc.

FIGURE I-24

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin



GSI Water Solutions, Inc.

FIGURE I-25

Groundwater Elevation Hydrograph

Eastern Management Area of the Santa Ynez River Valley Groundwater Basin

APPENDIX J

Responses to Public Comments on the Draft GSP

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Commenter	Section	Theme	Comment	Commenter's Recommendation	Response
Steve Slack (CDFW)	General	Public trust	The Public Trust Doctrine imposes a related but distinct obligation to consider how groundwater management affects public trust resources, including navigable surface waters and fisheries. Groundwater hydrologically connected to surface waters is also subject to the Public Trust Doctrine to the extent that groundwater extractions or diversions affect or may affect public trust uses. The GSA has "an affirmative duty to take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible."	Groundwater plans should consider potential impacts to and appropriate protections for ISWs and their tributaries, and ISWs that support fisheries, including the level of groundwater contribution to those waters.	In accordance with the provisions and requirements of SGMA, the Plan addresses the interests of all beneficial uses and users of groundwater, including public trust resources. Generally, these beneficial uses include agricultural, domestic, industrial and environmental uses. The environmental uses were addressed by identifying GDEs, impacts to GDEs, and interconnected surface water, along with the effects of implementation of this Plan on these uses and users. Please refer to additional Responses to Comments herein. More discussion has been added throughout the appropriate sections to address these concerns.
Steve Slack (CDFW)	3.1.4.1	Interconnected surface waters	Comment #1: Section 3.1.4.1 Principal Aquifers (Santa Ynez River Alluvium) The Draft GSP does not provide enough information to conclude that surface waters do not affect groundwater levels. Page 3-29 of the Draft GSP states, "Water present within the Santa Ynez River Alluvium is considered surface water by the SWRCB, and not managed by the GSAs. Therefore, the Santa Ynez River Alluvium is not classified in this GSP as a principal aquifer. The main criterion for defining the water-bearing geologic formations in the EMA as principal aquifers is based on the SGMA definition of a principal aquifer: 'aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems. 'Principal aquifers must exhibit both sufficient permeability and storage potential for the movement and storage of groundwater such that wells can reliably produce groundwater in sufficient quantities on a long-term basis." The EMA-Hydrologic Conceptual Model (HCM) states during downstream water right releases, water infiltrates and recharges the alluvium as "Recharge to the Santa Ynez River Alluvium occurs through percolation of precipitation as well as from upstream Lake Cachuma releases and discharge from the Santa Ynez Uplands Tributaries" (EMA-HCM Memo, Pg. 65). The HCM Memo acknowledges that the younger alluvium in the upper aquifer is being recharged from water right releases. However, the EMA GSA has not provided enough information to properly identify and analyze the interconnectivity between the three zones of the upper aquifer and the relationship with the lower aquifer. The alluvium at the mouth of the Santa Ynez Upland Tributaries is an example in the Basin that has groundwater-surface water interactions based on groundwater recharge during downstream water right releases. CDFW believes this interaction also occurs during the natural flows of various seasons throughout the year. CDFW agrees that the Upper Aquifer is recharged from the surface water, but it is unclear how Upper Aquifer groundwater pumping should be regulated without direct input from the State Water Resources Control Board (SWRCB). The EMA-HCM Memo also states that "The extent and quantity of any groundwater discharge from the groundwater basin into the Tributary Alluvium has not been confirmed or quantified. Conceptually, it is believed that this discharge occurs primarily as surface water flow leaving the tributaries" (EMA-HCM Memo, Pg. 67). The EMA-HCM Memo further states that "Water discharges from the EMA as underflow from the Santa Ynez River Alluvium every year" (Stetson, 2004 among others) (EMA-HCM Memo, Pg. 67). This is another example of an interconnected surface water that WMA-GSA describes in their	Recommendation #1(a): CDFW recommends the EMA-GSA provide justification, based on specific provisions of SGMA, for the conclusion that the Upper Aquifer should not be classified as a principal aquifer or managed by a GSP under SGMA. Alternatively, the WMA-GSA can provide direct input from SWRCB on the classification of the Upper Aquifer. CDFW believes the EMA-GSA must sustainably manage groundwater resources in the Upper Aquifer, in part because it supports GDEs. Furthermore, portions of the Upper Aquifer are interconnected with surface water and is currently identified as a principal aquifer under Department of Water Resources Bulletin 118 (DWR 2020). The communities within the EMA heavily rely on surface and subsurface diversions from the Upper Aquifer. Use of this Lower Aquifer water may become more appealing and economically viable in future years as Upper Aquifer pumping restrictions are placed to meet SGMA sustainable yield and criteria, and to meet SYR instream flow needs. Thus, analyzing the Upper Aquifer as interconnected with surface water is consistent with the sustainability goals of SGMA. Furthermore, identifying and appropriately considering GDEs in the EMA that rely on the Upper Aquifer should be completed irrespective of the amount of pumping in both aquifers so that future impacts on GDEs due to new production can be avoided. CDFW urges the EMA-GSA to identify and consider all GDEs within the WMA per Code of Regulations, Title 23 § 354.16(g). Recommendation #1(b): CDFW strongly recommends the EMA-GSA to map, identify, and analyze depletions of interconnected surface waters and areas with the potential for depletion of interconnected surface waters per Code of Regulations, Title 23 § 354.16(f).	The comment focuses on the classification of the principal aquifers presented in an earlier draft section that precedes submission of the draft Plan, which has been considerably revised in the public draft version of the Plan. Furthermore, this comment focuses on an "Upper Aquifer," which is described within the WMA and not the EMA. There is no reference in the EMA GSP to upper and lower aquifers. There are two Principal Aquifers in the EMA, which include the Paso Robles Formation and Careaga Sand. Shallower materials including the tributary alluvium and Santa Ynez River alluvium are not considered principal aquifers based on criteria presented in Section 3.1.4.1 , which presents the definition of a Principal Aquifer per the SGMA Regulations ("aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems"). In response to the recommendation to further assess interconnection of surface water, additional discussion has been added to Section 3.2.5.1. The tributary alluvium is classified as a losing stream along the majority of the length of these areas based on contoured groundwater levels within the underlying Paso Robles Formation, which are much lower in elevation than the tributary alluvium materials (discussed in Section 3.2.1.1 and 3.2.5.1). The lower reaches of Alamo Pintado and Zanja de Cota Creek represent the only locations within the EMA where surface water within the tributary alluvium is interconnected with a continuous saturated zone. These areas are interconnected with the underlying principal aquifers and appear to support GDEs. An evaluation of potential depletion of surface water in these areas is presented in Section 5.10.2. A GDE monitoring program has been included in the Plan for these areas.

Commenter	Section	Theme	Comment	Commenter's Recommendation	Response
			WMA-HCM Memo but did not identify and analyze in the WMA-GC Memo.		
Steve Slack (CDFW)	3.2.5	GDEs	The Draft GSP still does not provide enough information to conclude how much recharge is occurring within SYR tributaries. As indicated on page 3-84, "A significant source of recharge to the Paso Robles Formation occurs within the shallow alluvial sand and gravel beds of tributaries where they are in direct contact with the Paso Robles Formation. Percolating groundwater moves readily through the tributary alluvium in the Santa Ynez Uplands (LaFreniere and French,1968). In these areas, the tributaries are losing streams, contributing to the groundwater in the underlying Paso Robles Formation (and Older Alluvium)". The Draft GSP identifies two locations in the EMA where groundwater from a principal aquifer is interconnected with surface water. Table ES-1 Summary of Sustainable Management Criteria on page ES-16 indicates the confluence of Alamo Pintado Creek and Zanja de Cota Creek as the two areas connecting surface water and the SYR. Under SGMA, a GSP is required to avoid unreasonable adverse impacts on beneficial uses of interconnected surface waters, defined as "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." (Water Code §§ 10721(x)(6) and 10727.2(b); 23 CCR § 351(o).) To the extent that the tributaries are hydraulically connected and not completely depleted at any time of the year, they qualify as interconnected surface waters and warrant appropriate consideration in the GSP, including the goal to avoid depletions causing significant and unreasonable adverse impacts on beneficial uses. The interconnected surface water narrative also lacks specific estimations of the quantity and timing of streamflow depletions as required by California Code of Regulations, Title 23 §354.16(f). CDFW is very concerned about the health of the steelhead population. Managing the groundwater within the Santa Ynez River Valley is particularly critical to the survival and recovery of the threatened South-Central California Steelhead Designation Population Segment (DPS), a federal Endangered Species Act (FESA) listed species (NMFS 2013). Drought conditions and low flow rates have led CDFW to participate in rescue operations as recently as 2020. The SYR contains important steelhead spawning and rearing tributaries. Threats to steelhead, such as excessively high-water temperatures due to reduced surface flows or groundwater pumping in the spring, summer, and early fall, reduce available juvenile rearing habitat. Low flows in the fall and winter can delay adult passage to critical spawning areas. Groundwater-dependent habitats, including interconnected surface waters, are particularly susceptible to changes in the depth of the groundwater. Lowered water tables that drop beneath the root zones can cut off phreatophyte vegetation from water resources, stressing or ultimately converting vegetated terrestrial habitat. Induced infiltration attributable to groundwater pumping can reverse hydraulic gradients and may cause streams to stop flowing. The frequency and duration of exposure to lowered groundwater tables and low-	Recommendation #2(a): CDFW recommends a more careful review of existing information on surface water-groundwater interconnectivity and recommends the EMA-GSA clarify what a significant source of recharge means in terms of quantity of water. Recommendation #2(b): CDFW recommends the WMA-GSA identify the estimated quantity and timing of streamflow depletions in the subbasin. If this information is not available, identify a proposed plan to estimate these values.	The comment focuses on the interconnection of groundwater and surface water within the tributary alluvium as presented in an earlier draft section that precedes submission of the public draft Plan, which has been considerably revised in the public draft version of the Plan. The amount of recharge that occurs through the tributary alluvium is discussed qualitatively in the section referred to in this comment (3.2.4 - Interconnected Surface Water), but also quantified and described in detail in the water budget Section 3.3.2.2.2 - Tributary Percolation. Stream flow percolation was computed using the USGS BCM model, which was used throughout the Basin, and quantified based on methods described in the historical and current water budgets (3.3.3.4 and 3.3.4.3.1, respectively). As presented, during the historical period an average of 700 AFY percolated though the tributary alluvium to the underlying principal aquifers within the EMA. The comment about the recommendation for actions related to the WMA do not apply to the EMA and therefore no responses or change to the EMA's Plan are warranted. The locations and description of the interconnected surface waters are included in the analysis of GDEs presented in Sections 3.2.6.1 and 3.2.6.2 in the public draft Plan. To the extent some of the comments are focused on potential public trust resources and other beneficial uses of the waters of the mainstem Santa Ynez River, it is important to understand the parameters of SGMA. SGMA is focused primarily on "groundwater", as defined by the SGMA statute. Under Water Code, section 10721(g), "'Groundwater' means water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water, but does not include water that flows in known and definite channels." Under California law, "water beneath the surface ... that flows in known and definite channels" is a subset of "surface water" that is subject to surface water rights and regulation, and is therefore distinct from groundwater under SGMA. The commenter's concerns about the health of the steelhead population in the lower Santa Ynez River are fully acknowledged and the Plan recognizes that steelhead and other species are in fact beneficial uses and users of the River. However, SGMA does not provide for the regulation of surface flows or subsurface underflow of the Santa Ynez River and instead the Plan examines whether and the extent to which groundwater in the principal aquifers of the basin is interconnected with surface water. As set forth by the Plan, the hydrogeology of the basin demonstrates that there is not a continuous saturated zone between the tributaries and the underlying principal aquifer, except where groundwater discharges to surface water on the distal end of two tributaries. Groundwater modeling of potential stream depletion in these areas as a result of groundwater conditions occurring throughout the Basin is discussed in Section 5.10 and has been determined to be not significant. In further regard to the commenter's concerns regarding listed steelhead in the lower Santa Ynez River, the EMA GSA is fully supportive of the comprehensive and ongoing efforts dating back to the 1990s to develop and implement surface flow and non-flow measures in the mainstem lower Santa Ynez River and certain tributaries for the protection of public trust resources, including but not limited to steelhead and its critical habitat. (See, e.g., National Marine Fisheries Service September 2000 Biological Opinion for U.S. Bureau of Reclamation Operation and Maintenance of the Cachuma Project on the Santa Ynez River in Santa Barbara County, California; State Water Resources Control Board Water Order WR 2019-0148 for the Cachuma Project on the Santa Ynez River.) In fact, the member

Commenter	Section	Theme	Comment	Commenter's Recommendation	Response
			flow or no-flow conditions caused by groundwater pumping, as well as habitat and species resilience, will dictate vulnerability to changes in groundwater elevation. For example, some species rely on perennial instream flow, and any interruption to flow can risk species survival.		agencies of the EMA GSA remain actively involved with numerous federal, state, and local entities in proceedings before the State Water Resources Control Board and in the current re-consultation process under the federal Endangered Species Act to protect steelhead and its critical habitat in the lower Santa Ynez River. (See, e.g., August 2020 Term 18 Plan submitted by United States Bureau of Reclamation to State Water Board pursuant to Order WR 2019-0148.)
Steve Slack (CDFW)	3.3.5.1.2	Cannabis cultivation	CDFW is concerned that cannabis groundwater use is not being fully accounted for when evaluating this SGMA area. Ignoring the growth potential of this industry, could result in a lack of groundwater management accountability. Page 3-158 of the Draft GSP states that "While not included as a crop category in the recent crop surveys, cannabis production is projected to enter the Santa Ynez Valley and the EMA in the coming years. The County of Santa Barbara has placed an upper limit on the maximum number of acres county-wide allowed to be planted with cannabis. The assumption for the EMA is that cannabis production will reach a limit for the Santa Ynez Valley over the next several years and will increase beyond the current limit". CDFW has identified, in region, the Santa Ynez River Valley as a high priority watershed. Most projects distributed throughout this SGMA area are clustered within the San Miguelito Creek- Santa Ynez River, Nojoqui Creek, Santa Rosa Creek-Santa Ynez River, Salsipuedes Creek, Santa Rita Valley and Canada De La Vina-Santa Ynez River HUC 12 watersheds. This includes San Miguelito Creek, Salsipuedes Creek, and Santa Ynez River (critical steelhead streams) as well as Nojoqui Creek and Santa Rosa River, and the SYR tributaries (Dagit et. al 2020). The projects range from cultivation of 1-50 acres within the approximate 52 notifications the Department has received with the main source of water coming from groundwater wells. CDFW expects this type of trend to continue in the future. Groundwater and interconnected surface water are critical resources that do not recognize artificial boundaries. Since the implementation of legal cannabis cultivation, CDFW has received multiple applications within the Santa Ynez River Valley, especially in the HUC 12 watersheds listed above. Some of the cannabis grows can range from 1-50 acres, with multiple licenses on a property (resulting in several acres of cultivation) that are dependent on depths within the alluvium. Surface flows (and surface diversions) are regulated in large degree from dam releases, which emphasizes the large roll groundwater wells have in cannabis cultivation. Santa Ynez has sensitive, natural communities consisting of Oak woodlands, grasslands, sage scrub, chaparral, and riparian woodland habitats along the Santa Ynez River and SYR tributaries. According to the California Natural Diversity Database (CNDDB), the Santa Ynez River Valley provides habitat that supports several sensitive species (some listed as endangered or threatened) throughout their life cycles, including southwestern willow flycatcher (Empidonax trailed extimus), least Bell's vireo (Vireo bellii pusillus), red-legged frog (Rana draytonii), and seaside bird's beak (Cordylanthus rigidus ssp. littoralis) (CDFW. 2019). Habitats that support these species also consist of phreatophytes and other vegetation communities that are dependent on shallow aquifers that support surface water in each of these systems.	Recommendation #3: CDFW recommends the WMA-GSP monitor the Santa Ynez River Valley as a Cannabis High Priority Watershed. This High priority captures the documented impacts within the groundwater basin and the shifting groundwater consumption rates, as influenced by legalization of cannabis [Water Code §§ 10933.(b)(7,8)]. Based on the number of Departmental applications for legal cultivation, there is documented significant demand and potential adverse impacts to beneficial users of groundwater. The cannabis market growth is expected to increase almost ten times during an eight-year span (Fortune Business Insights 2021). North America is expected to lead the world cannabis market. Santa Barbara County recently approved a zoning permit for 87 acres of outdoor cannabis cultivation.	This comment was directed at the WMA. Nonetheless, the cultivation of cannabis is subject to permits by the County of Santa Barbara, which are both well-documented because of the permitting process and are considered within the water budget section of the Plan (Section 3.3). As discussed in the Plan, the 350 acres of cannabis production being considered (or approved in the case of a single permit application at this time) in the EMA are discussed in Section 3.3.5.1.2 - Projected Water Budget. The section also includes considerations of conversion of other crops to cannabis based on review of the specific locations of each of the four current individual permit applications both pending and approved and includes the associated changes in water use associated with these land use changes. Likewise, a complete discussion of the listed species within the area managed by the GSA (shown on Figure 2-1 Area Covered by GSP) is included in Section 3.2.6.1.3 and onward. Table 3-13 (Categorized Potential GDEs in the EMA (Excluding Santa Ynez River Area) present the categorized potential GDEs within the area managed by the GSA, and Table 3-14 presents the Special-Status Species including the Santa Ynez River area. Section 3.2.6 Groundwater Dependent Ecosystems presents the relationships between those potential and groundwater conditions within the area managed by the GSA.

Commenter	Section	Theme	Comment	Commenter's Recommendation	Response
			Phreatophytic vegetation is a critical contributor to nesting and foraging habitat, forage for a wide range of species and can be affected by sensitive depth to groundwater threshold impacts (Naumburg et.al. 2005) and (Froend et. al. 2010). This sensitivity to groundwater level thresholds means that localized pumping and recharge actions altering groundwater levels can impact the health and extent of phreatophyte vegetation health. Both decreasing (drying out) or increasing (drowning) groundwater elevation has the potential to stress phreatophytes depending on the plant species, groundwater elevation and duration (e.g., short term wetness/dryness versus prolonged wetness/dryness). Groundwater and interconnected surface water depletion is a major concern for fish and wildlife beneficial users in the Santa Ynez River Valley. Designating this area as a High Priority Cannabis Watershed requires groundwater to be monitored and sustainably managed for the benefit of all beneficial users, including groundwater dependent vegetated communities and interconnected surface waters that are necessary to support riparian and aquatic habitat, and the sensitive species therein such as steelhead. Decreased stream flow may contribute to direct mortality if fish eggs are exposed, covered with silt, or left without sufficient oxygenated water. Water degraded in temperature or chemical composition can displace or limit fish populations.		
Steve Slack (CDFW)	3.3.5.1.2	Cannabis cultivation	Without the designation of the Santa Ynez River Valley as a Cannabis High Priority Watershed, evaluation of cannabis crop water usage may be overlooked throughout the Santa Ynez River Valley Groundwater Basin, especially within the Santa Ynez Alluvium, an area that, as stated on page 3-29, will not be managed under SGMA by the EMA-GSA. Page 3-158 of the Draft GSP states "The projected agricultural acreages and water use are projected to increase only modestly over the next 20 and 50 years. This increase, based principally on conversion to field crops and a more modest increase in vineyard acreage, are together similar in scale to the estimated projected increase in cannabis acreage. The projected rate of expansion of acreage is equal to 36 acres added per year". Cannabis cultivation is a water intensive crop that can have a significant impact to environmental beneficial users of groundwater. Cannabis groundwater wells provide water for the irrigation of water-intensive cannabis cultivation (assuming six gallons of water per day per plant) (Bauer S. 2015). Just within the Santa Ynez Alluvium, CDFW has received approximately 26 cannabis projects. These projects range from cultivation of 3.5 - 50.0 acres with water supplied from groundwater wells. Many of the wells for the cannabis notifications within Santa Ynez Valley are shallow wells located within or immediately adjacent to tributary streams and the SYR. CDFW is concerned that without management of the Santa Ynez Alluvium under SGMA by the EMA-GSA, significant and unreasonable surface water depletions may occur, compromising groundwater dependent ecosystems within and along the streams.	Recommendation #4.1(a): CDFW recommends a more careful review of the existing information on cannabis cultivation within the Santa Ynez alluvium and recommends the information be considered when evaluating groundwater management. As indicated on page 3-84, "A significant source of recharge to the Paso Robles Formation occurs within the shallow alluvial sand and gravel beds of tributaries where they are in direct contact with the Paso Robles Formation. Percolating groundwater moves readily through the tributary alluvium in the Santa Ynez Uplands (LaFreniere and French,1968). In these areas, the tributaries are losing streams, contributing to the groundwater in the underlying Paso Robles Formation (and Older Alluvium)". The majority of cannabis cultivation rely on groundwater for cannabis crops irrigation, and the likely interconnected nature of the Santa Ynez River suggests that such uses (individually or cumulatively) should be considered when evaluating cannabis impacts in the Santa Ynez alluvium. Recommendation #4.1(b): CDFW recommends the Santa Ynez River Valley be classified as a Cannabis High Priority Watershed.	(a) Cannabis is one of several crop types specifically considered within the water budget of this Plan. The water sources for this crop are treated in a similar fashion as the water sources for the other crop types included in the Plan. However, cannabis is different than the other crops included in the group of agricultural crops in that it is subject to permitting by the Planning and Development department of the County of Santa Barbara and therefore the locations of these crops will be well understood into the future. The 350 acres of cannabis production being considered in the EMA are discussed in Section 3.3.5.1, including discussion of the one active and three pending permit applications within the EMA. Please refer to Responses to Comments herein regarding SGMA's distinction between groundwater and surface water systems. Cannabis cultivation that utilizes groundwater as its source of irrigation supply is included and accounted for as part of the Water Budget and in all other related aspects of sustainable groundwater management under the Plan. Cannabis cultivation that utilizes surface water, including subsurface underflow of the lower Santa Ynez River, as its source of irrigation supply is regulated by the State Water Resources Control Board.
Steve Slack (CDFW)	3.3.5.1.2	Cannabis cultivation	The majority reliance on groundwater for cannabis crops irrigation, and the likely interconnected nature of the Santa Ynez River suggests that such uses (individually or cumulatively) should be considered when evaluating cannabis impacts in the Santa Ynez alluvium. As indicated on page 3-	Recommendation #4.2: CDFW recommends a more careful review of the existing information on cannabis cultivation within the Santa Ynez alluvium and recommends the information be considered when evaluating groundwater management.	Cannabis cultivation is subject to permitting by the Planning and Development department of the County of Santa Barbara and therefore the locations of these crops will be well understood into the future. These developments in cannabis cultivation with regard to future groundwater management may be considered following submission of the Plan during the implementation period.

Commenter	Section	Theme	Comment	Commenter's Recommendation	Response
			84, "A significant source of recharge to the Paso Robles Formation occurs within the shallow alluvial sand and gravel beds of tributaries where they are in direct contact with the Paso Robles Formation. Percolating groundwater moves readily through the tributary alluvium in the Santa Ynez Uplands (LaFreniere and French,1968). In these areas, the tributaries are losing streams, contributing to the groundwater in the underlying Paso Robles Formation (and Older Alluvium)".		(b) The 350 acres of cannabis production being considered in the EMA are discussed in Section 3.3.5.1, including discussion of the one active and three pending permit applications within the EMA.
Steve Slack (CDFW)	3.2.6.1.3	GDEs	The Draft GSP still does not provide enough information to conclude that potential GDEs should be excluded from the GSP. The potential GDEs were assessed into two categories based on their relationship to the aquifer, but it is unclear if they were categorized any further. It is also unclear and unknown if there are any GDEs in the Draft GSP that will be protected and monitored into the future.	Recommendation #5(a): CDFW recommends the WMA-GSA evaluate potential effects on each GDE unit based on at least four criteria, such as: 1) groundwater dependence; 2) ecological value (high, moderate, low); 3) ecological condition (good, fair, poor) using Normalized Difference Vegetation Index/ Normalized Difference Moisture Index data; and, 4) susceptibility to changing groundwater conditions (high, moderate, low) based on available hydrologic data, climate change projections and GDE susceptibility classifications using a baseline range to consider future changes in groundwater conditions. Recommendation #5(b): To ensure meaningful consideration of GDEs as required under SGMA, CDFW recommends the EMA-GSA provide a biological assessment identifying species known to occur within the GDEs presented in Table 3-13, including steelhead, least Bell's vireo, and southwestern willow flycatcher. Given the uncertain status of the species and their dependency on GDEs, the EMA-GC Memo must accurately assess drought conditions when water availability will be lower and groundwater extraction might be high. Recommendation #5(c): CDFW recommends the EMA-GSA include, at a minimum, the GDEs identified within the Basin in the final GSP. The EMA-GSA has not provided enough data to conclude that the Lower Aquifer groundwater pumping definitively does not affect GDEs within the Basin. If the EMA-GSA reaches that conclusion in the future, then then Sustainable Management Criteria for GDEs would no longer be needed. CDFW strongly disagrees with entirely excluding GDEs present in the Basin without enough data to conclude GDEs are not impacted by groundwater pumping.	#5(a) Comments within this letter directed to the WMA GSA are not addressed in this document and instead should be directed to the WMA. Nonetheless, the GDE analysis presented in the GSP, which has been updated in Section 3.2.5 in response to this and other closely-related comments. Refer to the updated Section 3.2.5 #5(b) This comment refers to an earlier document that precedes the public draft Plan. With regard to identifying species within GDEs, Section 3.2.6.2 in the public draft Plan describes the following: "A literature review was completed to determine the terrestrial and aquatic special-status species that may use potential GDE units within the EMA." Identification of species within Table 3-13 was addressed as follows: "An on-site biological survey is recommended by TNC (2019) as a final GDE verification step. Biological surveys have not been completed in preparation of this Plan. However, the presence of these potential GDEs will be verified during Plan implementation." #5(c) This comment refers, in part, to aquifers that are not present within the EMA ("Lower Aquifer"). However, as recommended, the GDEs present within the EMA are presented in the public draft Plan. Within the EMA, the areas of the tributary alluvium that ultimately contribute to recharge of the underlying Principal Aquifers (Paso Robles Formation and Careaga Sand) occur throughout the lengths of the tributaries, but are disconnected from the underlying groundwater at all times, with the exception of the areas near the distal ends of two of these tributaries, as identified in the GDE discussion. Outside of these two areas (see Figure 3-39 Category A areas), the tributary alluvium cannot be classified as interconnected surface water, because these areas do not meet both elements of the SGMA definition that: "the 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." Clarification to this point is provided in Section 3.2.5 and the modeling used to support the quantification of this in Section 5.10.2
Steve Slack (CDFW)	Sensitive species and habitats	GDEs	Many sensitive species and habitats in the Santa Ynez EMA comprise of GDEs, the natural communities that rely on groundwater to sustain all or a portion of their water needs. Southwestern pond turtle was designated as a California SSC in 1994. Western pond turtle's preferred habitat is permanent ponds, lakes, streams, or permanent pools along intermittent streams associated with standing and slow-moving water. A potentially important limiting factor for western pond turtle is the relationship between water level and flow in off-channel water bodies, which can both be affected by groundwater pumping. California red-legged frog is rarely encountered far from perennial water. Tadpoles require water for at least three or four months while completing their aquatic development. Adults eat both aquatic and terrestrial invertebrates, and the tadpoles graze along rocky stream bottoms. Groundwater pumping that impairs streamflow could have negative impacts on California redlegged frog populations. Western spadefoot toad migrates to seasonal vernal pools to reproduce. They will use small puddles of water, such as small pools to breed. California tiger salamander is also restricted to vernal pools	Recommendation #6: CDFW highly recommends the EMA-GSA map out locations where there are interconnected surface waters and document aquatic habitats and other GDEs as required under SGMA. The EMA-GSA should then provide appropriate consideration to those habitats and the sensitive species that rely on them. Fish and wildlife resources should be considered in the water budget. Additionally, shallow groundwater levels near interconnected surface water should be monitored to ensure that groundwater use is not depleting surface water and affecting fish and wildlife resources in the EMA.	The locations of the interconnected surface waters are included in the analysis of GDEs presented in Sections 3.2.6.1 and 3.2.6.2 in the public draft Plan: "A literature review was completed to determine the terrestrial and aquatic special-status species that may use potential GDE units within the EMA." Identification of species within Table 3-13 was addressed as follows: "An on-site biological survey is recommended by TNC (2019) as a final GDE verification step. Biological surveys have not been completed in preparation of this Plan. However, the presence of these potential GDEs will be verified during Plan implementation." Monitoring of shallow groundwater is planned on the lower ends of the two tributaries (Alamo Pintado, and Zanja de Cota Creeks) where there is interconnection with surface water.

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			and seasonal ponds for reproduction. If groundwater depletion results in reduced streamflow due to interconnected surface waters, the nesting and foraging success of flycatcher, least Bell's vireo, and other bird species may be diminished due to the reduced nesting habitat and food availability. The unsustainable use of groundwater can impact the shallow aquifers and interconnected surface waters on which these species and GDEs depend. This may lead to adverse impacts on fish and wildlife and the habitat they need to survive. Determining the effects that groundwater levels have on surface water flows in the EMA would provide an understanding of how the groundwater levels may be associated with the health and abundance of riparian vegetation. Poorly managed groundwater pumping, and surface water flows have the potential to reduce the abundance and quality of riparian vegetation, reducing the amount of shade provided by the vegetation, and ultimately leading to increased water temperatures in the EMA.		
Steve Slack (CDFW)	GSP drafts	Finalizing GSP	The GSA may need to revise the GSP before it is finalized and adopted.	CDFW recommends the EMA-GSA provide a red-lined version of the final GSP to understand the changes made between the Draft GSP and final GSP. Alternatively, CDFW recommends the GSA provide a summary of changes made and comments addressed by the GSA in preparation of a final GSP.	The final Plan will include a complete list of all the public comments received on the draft Plan, and will also include responses to all of the comments received. The form of these responses and addressed comments are included in this table in the finalized Plan. A redline version of the Plan will be provided to show the changes made between the draft Plan and the final Plan.
Nancy Emerson (WE Watch)	1-1	Implementation timeline	The almost 1,000 page Plan (which includes the Executive Summary, and seven sections with appendices, tables, and figures) is a thorough, detailed examination of the Central Management Area GSA Plan, which ties into the potential statewide plan to achieve groundwater sustainability. The Plan has been carefully constructed and appears to be detailed enough to be able to be utilized for the implementation of local and statewide groundwater sustainability. WE Watch recommends that, even though the State has allowed 20 years to achieve necessary sustainability after development of an approved Groundwater Sustainability Plan, our local implementation period be no more than 10 years, and preferably 5 years. The Eastern Management Area is 1,800 AF short of being rated as "sustainable." That status could change rapidly if drought years persist, temperatures rise, population growth increases, and open space converts to housing or the type of agriculture that overuses water. Groundwater is the primary source of water in the Santa Ynez Valley because the amount of State Water is so unreliable from year to year and the amount of water available from the Santa Ynez River is so small, especially in times of drought. How climate change will affect the Valley is uncertain and we need to be prepared to deal with a worst-case scenario both short-term (5-10 years) and long-term (20 years and beyond). In a 2018 landmark report on California water solutions, the Environmental Water Caucus' first Strategic Goal indicates that groundwater management needs to be overhauled. A new sustainable groundwater management approach that allows 20 years for implementation is unreasonable, and it would never have been contemplated in this report and put off for such a long period.	None	The approach for implementation of the Plan follows the requirements of the SGMA Regulations, which require that the groundwater basin maintain or achieve sustainability within 20 years of Plan adoption. During that period, the GSA will conduct and present an assessment every year in an annual report on the status of implementation and will provide an opportunity to review and update the status of the sustainability goals every five years. The schedule for implementation is presented in Section 7, and the methodology and scope of the 5-year evaluation and update are provided in Section 7.4. Through this process, the public, groundwater producers, and other stakeholders will have opportunities to provide input to the decision-making process, including the scheduled and progress towards implementation and sustainability. As presented in Section 7.2 (Administrative Approach and Implementation Timing), implementation of Group 1 management actions will begin within 1 year of GSP adoption, which will be continually monitored and assessed with regard to meeting the sustainable management criteria. The timing of this implementation may be adjusted based on the progress made and timing of the factors listed in that section, which include groundwater production, drought conditions, or other factors. Climate change is discussed in accordance with the GSP guidance and SGMA regulations in Section 3.3.5 – Projected Water Budget and Appendix F, which documents the numerical water budget.

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Nancy Emerson (WE Watch)	1-1	Implementation timeline	Section 1. Introduction to Plan Contents. The following section will need to be modified for the revised implementation period. This includes Sections 1.1, 1.3 (pg. 1-1)	None	The executive summary in Section ES-6 provides the elements of the conceptual road map for implementation. The details of the implementation are presented in Table 7-1. The timing of implementation is open to public review and input following submission of the Plan.
Nancy Emerson (WE Watch)	2-19	Implementation timeline	The following section will need to be modified for the revised implementation period. Section 2. Administrative Information. Section 2.2.2.5. (pg. 2-19)	None	The timing of implementation is open to public review and input following submission of the Plan. Refer to section 7.2 and Figure 7-1.
Nancy Emerson (WE Watch)	3-1	Implementation timeline	The following section will need to be modified for the revised implementation period. Section 3. Basin Setting. Section 3.1 (pg.3-1)	None	The timing of implementation is open to public review and input following submission of the Plan (Section 7.2; Figure 7-1).
Nancy Emerson (WE Watch)	4-10	Data gaps	Section 4.3.2 Assessment & Improvement of Monitoring Network. The plan needs to say gaps are so spatially large that the groundwater level monitoring network is inadequate and insufficient. This will assist the justification for the Plans action items related to adding monitoring wells. (pg. 4-10)	None	Section 4.2.1 of the Plan presents both the spatial distribution of the monitoring networks and the areas where the addition of monitoring wells would improve the HCM and monitoring of the EMA. (refer to Figure 4-2, which presents this visually). The existing groundwater level monitoring network satisfies the well density guidance cited in the BMP (Section 4.3.2). Section 6.3 provides the requested justification for the expansion for the monitoring network. To expand the monitoring network, the GSA welcomes any well owners to volunteer their wells as candidates for inclusion in the monitoring network. As mentioned in Section 4.3.2, two areas are identified within the EMA (see Figure 4-2) where the addition of monitoring wells would improve the hydrogeologic conceptual model. Any assistance that can be offered to this end would be appreciated and would benefit the effective management of the EMA.
Nancy Emerson (WE Watch)	5-1	Implementation timeline	The following section will need to be modified for the revised implementation period. Section 5. Sustainable Management Criteria. The change to a 5-Year (or a 6 to 10-Year Plan) will affect at least the following: Section 5.2, Table 5-2, Figure 5-3, and Section 5.3.2, 5.5.4, 5.6.4, 5.9.3, 5.10.4, and 5.10.4. (pg. 5-1)	None	The timing of implementation is open to public review and input following submission of the Plan.
Nancy Emerson (WE Watch)	6-1	Implementation timeline	The following section will need to be modified for the revised implementation period. Section 6. Projects and Management Actions. The change to a 5-year (or to a 6 to 10-Year Plan) will affect these portions of Section 6: Section 6-1, Group Two Management Actions, Section 6-7, 6-9. (pg. 6-1)	None	The timing of implementation is open to public review and input following submission of the Plan.
Nancy Emerson (WE Watch)	7-1	Implementation timeline	Section 7. Plan Implementation Changes will need to be made to the 5-Year GSP Evaluation and Update to consider the 5-Year Plan as the final implementation date, at least for the Group 1 Action Items. If necessary, the implementation date beyond the 5-Year limit can be adjusted by one-year increments, but in no case should the implementation date go beyond a 10 year period from the start of implementation. The time period beyond the 5-Year period will depend on the overall groundwater condition of agencies in a particular area. (pg.7-1)	None	The timing of implementation actions is open to public review and input following submission of the Plan.
Nancy Emerson (WE Watch)	7-4 and 7-5	Communications and public engagement	Section 7.4 & 7.5. Annual Reporting and 5-Year GSP Updates. In addition to communication with the State, ongoing communication with groundwater users and the entire community is needed if the Plan is to be implemented successfully and the public reassured about the long-term sustainability of the groundwater on which our lives in the Valley depend. This means not only the GSA, but individual agencies being asked to help by keeping their users informed about the plan and its implementation. (pgs. 7-4 & 7-5)	None	Ongoing communication will be conducted throughout the implementation period in accordance with the implementation Plan presented in Section 7.1 using a communication tool to post data, reports and meetings, all of which will promote successful public involvement to guide the future activities within the GSA.
Nancy Emerson (WE Watch)	7-7 and 7-8	Implementation	Section 7.6. & 7.7. Plan Budget and Funding. WE Watch urges that the action priority be to get a governance structure in place and funded with commitments to implement the plan. (pgs. 7-7 & 7-8).	None	The important issues of funding the implementation measures presented in Sections 6 and 7 of the Plan are being reviewed and will require further input and development through the GSA and public stakeholder process. While specific funding mechanisms are not required to be included in the Plan, they will be priority issues early in 2022 following submission of the Plan.

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Tim Gorham	6	Drought	Why is the County continuing to issue private water well drilling permits in the middle of a long term drought and will the GSP restrict new water well drilling as part of the CMA if necessary?	None	As discussed in Section 2.2.4, the County of Santa Barbara, including but not limited to its Department of Environmental Health Services, is the only agency with well permitting authority within the County. As set forth by Section 6 of the Plan, through coordination with the County well permitting authority, the EMA GSA may seek to develop supplemental conditions to be placed on new wells and new production in the EMA. The GSA may also work with the County well permitting authority to evaluate the applicability of CEQA for new wells, or categories thereof, in the EMA. Among other related Projects and Management Actions, Section 6 of the Plan further provides that wells within the EMA will need to be metered and registered and report pumping to the GSA.
Tim Gorham	3.2	Aquifers	The Hydrologic Conceptional Model states that the Paso Robles Fm "extends from the surface to approximately 3500 ft below the ground surface with an average thickness of 1500 ft". In the eastern uplands area according to several well logs the Paso Robles Fm has water bearing sands only in the upper 600 ft (approx. 50% ss and gravels). The top 150 ft is now depleted and below 600 ft the Paso is mostly mud. The economic limit to drilling is approximately 1000ft and below that any water bearing sands will be non potable. The reader must understand the aquifer limitations of the Paso Robles Fm and clearly potable water bearing sands are not present to 3000ft.	None	Section 3 of the Plan presents both the variation of thickness and depth of the Paso Robles Formation (Section 3.1.4.3 and Table 3-4) as well as discussion about the difference between the coarser upper and finer lower Paso Robles Formation. This difference in hydraulic properties between the two members of the Paso Robles Formation is also discussed within Appendix F, which documents the model development calibration. The groundwater elevations within this formation are discussed within Section 3.2.1.1, which treat the groundwater within the heterogeneous Paso Robles Formation as a single unit in keeping with the planned management of this principal aquifer. It is agreed that there is likely poor quality groundwater present at depth.
Tim Gorham	5	Groundwater levels	In recent CAG meetings the Agriculture members keep repeating that "they see no ground water levels falling in their wells". How is that consistent with the many hydrographs in the GSA that show steeply falling water levels thru 2018 and when data is included from the more recent drought years 2018-2021 even steeper declines in SWL.?	None	The hydrographs included in the Plan are presented on Figures 3-22 and 3-23 for the Paso Robles Formation (and those in Appendix D) do indeed show a decline during the current drought. The water level data "illustrate the long-term stability of water levels over time except during drought periods" per Section 3.2.1.2. Furthermore, "Some wells show water elevation decreases of more than 100 feet during prolonged drought cycles, but most wells appear to fully recover within a few years when the drought conditions end" per the same section of the Plan. These variations in water level were considered when setting the Minimum Thresholds for water levels. The GSA will monitor groundwater conditions to assess whether groundwater levels stabilize when normal rainfall conditions return. If water levels do not recover and the decline appears to be a result of groundwater conditions occurring throughout the Basin, the GSP outlines actions that the GSA may take to avoid undesirable results.
Tim Gorham	3.3	Climate change	The global warming climate model included in the GSP indicates a slight increase in annual rain fall thru 2045. How is that consistent with the last 9 years of significantly lower than normal rain fall?	None	The DWR guidance for projection of climate patterns was based on both the historic dataset discussed in Section 3.3.1 and shown on Figure 3-45, and climate change that was used for preparation of the water budgets for the Plan indeed show a slight increase (on average) in high intensity lower duration rainfall on average on a long-term basis. Note that the historic variability and long term changes due to climate change factors are incorporated into the planning, which together indicate an increase in temperature and ET, which increases crop water demand. Within that average long-term period, the predicted climate change factors also include periods of variability including wet and dry conditions, some of which are similar to the current drought. With that, it may be that the magnitude of the current drought may have exceed the predicted climate change guidance. The condition of the basin and change in storage will be re-evaluated each year and reported in the annual report. The GSA may choose to respond to continued water level decline and reduction in storage due to drought but is only required to if it is determined that undesirable results are evident due to groundwater conditions occurring throughout the Basin and water levels do not recover when normal conditions return.
Tim Gorham	5	Groundwater levels	The GSP states: "while no significant and unreasonable effect has been observed in the EMA as a result of lowering ground water levels to date" this is inconsistent with water well data in the EMA uplands where we have had to replace wells due to sanding and falling SWL, several shallow private wells in the area have gone dry (they have had to hook up to our system).	None	While groundwater levels have been lowering during the current drought as shown on the hydrographs presented in in Appendix D, there is a demonstrated "long-term stability of water levels over time except during drought periods" as discussed in Section 3.2.1.2. Furthermore, "Some wells show water elevation decreases of more than 100 feet during prolonged drought cycles, but most wells appear to fully recover within a few years when the drought conditions end" per the same section

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			That statement leaves the reader with the feeling that "all is well"!		of the Plan. While the anecdotal reports of well replacements have been brought up during public meetings that were conducted in the public comment period, and while new well permits have continued to issue through the County within the past 18 months, there is no published information about whether these wells are "replacement" wells installed due to low water levels. That said, the ongoing drought raises concerns that the storage deficit is likely to increase beyond what was computed in the Plan for the historical period through 2018. This issue will be further evaluated and the data will be updated through 2021 as the first annual report is prepared, which is in preparation and will be submitted to the DWR in April 2022.
Tim Gorham	3.3	Groundwater levels	IN Oct of 2014 the County of Santa Barbara published "County of SB Groundwater Status Report" stating in Table 1 that the Santa Ynez Upland Basin had 900,000 acft of "usable water in storage" with an overdraft of 2,020/yr giving our area of the SYB over 82 years of water supply even without recharge! That information was passed on to our water users for many years until recently when we are faced with severely falling SWL requiring the drilling of new wells and discussions of water rationing.	None	Stating the total volume of useable storage within the entire groundwater basin does not provide the proper context for achieving sustainability within the EMA in accordance with SGMA as presented in the Sustainability Goal in Section 5.2 of the Plan, which pertains to the entire Basin. The sustainability goal requires long-term groundwater elevations to be adequate to support existing and future reasonable and beneficial uses throughout the Basin. An important aspect of this is that sustainability is pertinent to the existing infrastructure in the Basin, including existing depths of agricultural, municipal, and domestic wells. For this reason, the extraction of the entire storage volume of groundwater within the EMA would not support sustainable management of the groundwater resource for all beneficial uses.
Tim Gorham	3.3	Water budget	The Water Budget indicates a negative outflow of 1830 AFY which is a relatively small number. When you look at the drought years of 2012-2018 the budget indicates a 6500 AFY negative budget. When you add in the recent drought data thru 2021 water year things look even worse.	None	The current drought indeed extends past the drought years included in the "current period" in the Plan. The groundwater conditions that have occurred since 2018 will be assessed in the first annual report, which will be submitted in April 2022.
Gay Infanti	3.3	Water budget	Are the DWR guidelines for incorporating climate change into the GSPs reasonable given the current climate situation? Do you expect DWR to update this guidance to take into consideration the long-term drought? Current water budget is significantly worse than historic-based (1982-2018) water budget (only 41% of historical average). If this trend continues or gets worse, the sustainable yield will be much lower than currently budgeted. Therefore, it's critical to verify all of the estimated inflow/outflow volumes used in developing the water budgets asap so we can adjust as needed before we experience undesirable results. Also, the water budgets depend on imported water that probably won't be available for several years and perhaps never again. If either the SWP or Cachuma project deliveries are cut below those estimates, municipalities will be forced to use more G/W or purchased water, which is becoming very scarce and very expensive.	None	Preparation of the projected water budgets relied upon DWR-provided climate change data and methods which used global climate models and radiative forcing scenarios recommended for hydrologic studies in California by the Climate Change Technical Advisory Group, as discussed in section 3.3.5.1 of the Plan. These guidance data that were used for the Santa Ynez EMA are specific to this Basin as discussed in the Plan. Within the long term period, the predicted climate change factors include periods of variability including wet and dry conditions, some of which are similar to the current drought. As more data is collected during GSP implementation, it may be determined during subsequent 5-year updates of the Plan that the magnitude of the current drought exceeds the predicted climate change guidance. The GSA may decide in the future that it wishes to address declining water levels resulting from the ongoing drought by implementing one or more of the management actions and projects presented in the GSP. The projected future availability of SWP water is based on extensive modeling (CalSim) conducted by the State on their own project, which is presented in planning guidance and documentation from the CCWA and DWR's Delivery Capability Report of 2019. This report showed low allocations during these recent years as part of DWR's projections of long-term average availability of SWP supplies. The discussion of SWP reliability has been updated to reflect the most recent delivery projection. (Section 3.3.5.1)
Gay Infanti	3.3	Surface water	Please explain how CCWA and DWR can say that DWR has the delivery capacity of a minimum of 58% allocation of SWP water that may be available to the EMA in their planning guidance? If that were true, Solvang wouldn't already be in a Stage 2 Drought Emergency with 20% mandatory reductions in water usage, as well as trying to purchase water on the open market to provide to residents next year when 0% allocations are expected.	None	The future availability of SWP water was based on the average SWP water availability presented in Planning guidance from the CCWA and DWR's Delivery Capacity Report of 2019. You correctly point out that recent allocations are less than 5 percent. The discussion of SWP reliability has been updated to reflect the most recent delivery projection. (Section 3.3.5.1)

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Gay Infanti	5	Groundwater levels	Section 5.5.1, last paragraph : "There have been no reports from stakeholders in the EMA that wells needed to be deepened." I think this situation needs to be verified. I know of one individual whose well had to be drilled deeper due to reduced production, and have heard in our discussions that one mutual water company had one or more wells going dry. What is the process for reporting these and where is it documented? I think the EMA needs to know if the lack of reports actually means that no wells have either been deepened or gone dry.	None	This statement has been revised to clarify that well "deepening" often consists of well replacement. While there has been an increase in new well permits issued by the County within and outside the SYRWCD within the past 18 months, there is no indication about whether these wells are "replacement" wells. Efforts will be made over the next several years to determine the planned use of forthcoming wells, which may include replacement. A website sponsored by DWR (statewide distribution of reported household water supply shortage) identifies locations where well supplies have been depleted. Only one location is reported in Santa Barbara County (not in Santa Ynez). Well replacements will be tracked in the future, and the GSA and the SYRWCD have added a link to their respective websites where anyone can report a water outage in a well.
Gay Infanti	6	Projects and management actions	Section 6-7 discusses the possibility of developing a Base Pumping Allocation to stabilize the volume of G/W pumping in the EMA. Since there is an annual pumping deficit already, since G/W levels have not recovered since the last wet period, and since an ongoing drought is forecast, I think this MA is a necessity and should be given priority along with verification of pumping volumes via well metering/reporting.	None	The EMA GSA plans to continually monitor and assess its progress in ensuring the sustainable management criteria are met. Under conditions where minimum thresholds are projected to be reached, the EMA GSA will perform assessments to determine whether the trends are related to groundwater pumping throughout the Basin, drought conditions, or other factors. If groundwater level data are trending toward reaching minimum thresholds as a direct consequence of groundwater pumping in the EMA, then the EMA GSA may consider the implementation of Group 2 management actions and Group 3 projects. The Group 2 management actions include possible development and implementation of a Groundwater Allocation (BPA) Program, a GEC Marketing and Trading Program, and a Voluntary Agricultural Crop Fallowing Program. A pre-requisite to the implementation of a Groundwater BPA Program and a GEC Marketing and Trading Program will be the implementation of a Well Registration and Well Meter Installation Program, which is included in Group 1 and planned for beginning the implementation process within 1-year of GSP adoption and submittal. Group 3 projects include various infrastructure and related approaches to add and diversify water supplies.
Gay Infanti	6	Funding	This section discusses financing options for G/W pumping fees that include parcel fees and parcel tax. How would this work for Solvang, which has municipal wells providing water to all residential and commercial users? Unlike parcels with their own well(s), the parcel owners in Solvang have no direct control over G/W pumping and only indirectly via the city's conservation programs and drought emergency ordinances. In addition these municipal parcels are substantially smaller than AG parcels, so using a parcel fee or tax that is applied to all parcels in the EMA, regardless of whether they contain G/W wells, regardless of parcel size or amount of water used by each, would be unfair. Obviously there is not enough detail in this document to understand if either of these approaches is contemplated, but I hope not. G/W pumping fees should be levied per G/W well, not parcel, and should also include consideration of pumped volume.	None	The important issues of funding the implementation measures presented in Sections 6 and 7 of the Plan are being worked on and, while not required to be fully developed in the Plan, will be a priority of the GSA in early 2022 following submission of the Plan.
Gay Infanti	6	Technical error	The first sentence of the last paragraph on this page, which concerns partnering with SB County's Precipitation Enhancement Program, is garbled - it seems to be missing some words. (p. 6-60)	None	There is a typo in this sentence. It has been revised to read as follows: "The project would be to provide financial assistance to the Santa Barbara County Water Agency for the continued operation and potential expansion of the existing precipitation enhancement program that has been operated by Santa Barbara County Water Agency since 1981". (Section 6)
Gay Infanti	ES	General	This is a general comment. Overall, the Draft EMA GSP is comprehensive and well written. I think GSI has done an exceptional job. See below for specific comments and questions on the draft document.	None	Thank you for your comment. It has been a pleasure to conduct this work for the GSA.
Gay Infanti	2	Map	Figure 2-2 shows the Chumash Reservation on the east side of Hwy 154 - I believe this is the Camp 4 property that was recently annexed. The rest of the reservation is not identified specifically on the map in this figure, although there is an area outlined in dark blue shown where Sanja de Cota creek meets the SY river.	None	The updated mapped extents of the Chumash Reservation were provided by the Attorney for the Tribe, who is a member of the Citizens Advisory Group (CAG).

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Gay Infanti	2	Municipal	Section 2.2.3.32, Solvang's comprehensive update of its General Plan is currently underway so the Conservation and Open Space element discussed in this section will change. Solvang's new census information was also recently received indicating that Solvang's population has increased to ~6,000.	None	References to the General Plan in Section 2.2.3.3 were updated to clarify that the General Plan is being updated.
Gay Infanti	3	Water budget	Table 3-17, Water Budget Sources, qualitative data ratings indicating the level of confidence in the estimate are shown for each listed component - a high rating being the best. However, most of the discussion following this Table address the level of uncertainty for each individual element - low being the best. This is confusing. I think this section would be easier to read and understand if, for the sake of consistency, one or the other qualitative rating is used in both Table 3-17 and the discussion sections following it, i.e., either level of confidence or level of certainty to qualitatively rate the data source.	None	The SGMA regulations require discussion of uncertainty, which is included in the text preceding and within Table 3-17 (Plan Section 3.3.2). To that end, the table includes a note that "Higher quality data represent lower uncertainty." The text preceding the table has been updated to reflect this relationship and eliminate the inconsistency.
Mark Capelli (NMFS)	General	Interconnected surface waters and GDEs	Unfortunately our review indicates the Draft GSP does not adequately address the recognized instream beneficial uses of the Santa Ynez River and its major tributaries within the boundaries of the Eastern Management Area, or other GDE, potentially affected by the management of groundwater within the Eastern Management Area. In particular, the Draft GSP does not adequately address the depletion of interconnected shallow groundwater basins and the pattern of groundwater extraction that have occurred historically, currently, or likely to occur in the future, and its potential adverse effects on the federally listed endangered southern California steelhead (Oncorhynchus mykiss). Of particular concern is the potential adverse effects on designated critical habitat for southern California steelhead within the Santa Ynez River, and the Alisal, Quiota, and Hilton creek tributaries, within the boundaries of the Eastern Management Area. The surface flows at the confluence of Alisal, Quiota, and Hilton creek tributaries are important for maintaining surface hydrologic connectivity for steelhead (and other native aquatic-dependent species) attempting to migrate between these tributaries and the middle reaches of the Santa Ynez River.	None	A response to each of the prior comments is included in this comment log, which presents rationale for the responses to each of the NMFS comments with regard to the draft Water Budget and Basin Setting (Section 3). Note that the draft Water Budget of November 2020 was thoroughly revised in March 2021, the revisions for which are included in the draft Plan.
Mark Capelli (NMFS)	General	Interconnected surface waters and GDEs	NOAA's National Marine Fisheries Service (NMFS) has previously provided extensive comments on these issues, which have not been adequately addressed in the Draft GPS for the Eastern Management Area (see, the attached NMFS letters of April 28, 2021, "Draft Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan – Basin Setting: Groundwater Budget" and July 7, 2021, "Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan Section 5 – Sustainable Management Criteria")	None	Responses have been prepared for the earlier round of comment received from NMFS, which are included in this comment log, including some revisions to the text of the Plan as warranted. These comments are appreciated and the Plan has been revised to clarify the analysis with regard to the important issues of interconnected surface waters and GDEs. Please refer to other Responses to Comments herein.

Commenter	Section	Theme	Comment	Commenter's Recommendation	Response
Joseph Hughes, Santa Ynez Water Group	General	Landowner representation	Landowner Representation. There is no exclusive agricultural landowner representation on any of the GSAs' governing committees. Each committee is composed of representatives from governmental agencies with non-agricultural constituencies. For example, the Western Management Area GSA Committee is made up of (1) Santa Ynez River Water Conservation District; (2) the County of Santa Barbara; (3) the City of Lompoc; (4) Mission Hills Community Services District; and (5) Vandenberg Village Community Services District. Both the Central Management Area GSA Committee and the Eastern Management Area GSA Committee are similar. This does not represent the entirety of the water users and interests in the Basin and excludes any direct representation from the agricultural community. Thus, at the outset, the make-up of the GSAs was flawed. The only avenue your GSAs allowed agricultural landowners to voice their unique opinions or concerns is through the Citizens Advisory Groups. But, just as the name suggests, those groups are only advisory, are weighted toward non-agricultural interests, and carry no decision-making authority. Put simply, agricultural landowners have been intentionally disenfranchised from the decision-making. We are aware that the GSAs are exploring a potential reorganization of their governance structure. Whether that reorganization results in each GSA remaining as three separate GSAs or forming a single coordinated GSA, it is likely that each GSA will revisit or draft new organizational documents. When doing so, we ask that each GSA include a voting director position for an agricultural landowner representative on each decision-making body formed or otherwise reorganized.	None	The agricultural community has been actively engaged throughout the GSP development process and has provided written and verbal comments on multiple sections of the GSP, participated in GSA committee meetings, and participated in CAG meetings. The comment indicates that agricultural landowners have been "intentionally disenfranchised" from decision-making, but that is not the case. Per express SGMA requirements, the formation of the EMA GSA includes a combination of local agencies that have water supply, water management, or land use responsibilities within the EMA. (See Water Code sections 10721(n), 10723.6.) Moreover, although SGMA provides the opportunity for mutual water companies to participate in a GSA (Water Code section 10723.6(b)), landowners in the EMA made their own choice in not pursuing that level of involvement on the GSA. Currently, agricultural representation in the EMA is through SYRWCD and the County of Santa Barbara. ID No.1 also purveys up to 50 percent of its water supply to agricultural customers. Furthermore, as recognized by the comment, several agricultural representatives were intentionally selected to serve on the EMA Citizens Advisory Group and have actively served in that important capacity throughout the Plan development process. Formation of the Citizens Advisory Group was not mandatory under SGMA, yet the GSA believed the Group would ensure a critical level of stakeholder review and input, and for nearly two years the Group provided direct feedback to the GSA on the development and specific content of the Plan. Future governance and membership of the GSA will be considered after the GSP is submitted to DWR.
Joseph Hughes, Santa Ynez Water Group	General	Projects and management actions	Implementation of Projects and Management Actions. We are also concerned with the projects and management actions identified by the GSAs in the draft GSPs. While we understand that many of the GSAs' respective Group 1 projects and management actions focus primarily on monitoring and reporting efforts, all other projects single out and discriminate against agricultural landowners. The burden of sustainability is therefore placed solely on the backs of agricultural landowners. Funding for these projects and management actions mirrors that problem. We are aware that the GSAs are considering a groundwater extraction fee, assessment, or other property-related fee to fund the GSAs' projects and management actions. As those considerations continue, we encourage the GSAs to pursue the most equitable option in levying that financial burden. Agricultural landowners should not be unfairly targeted with projects and management actions, and then be forced to pay for their development and implementation.	None	With regard to the Group 2 Management Actions, the only one included in the GSP that is specifically tailored to the agricultural pumpers in the EMA is the Voluntary Agricultural Crop Fallowing Program, which is designed to provide benefit and flexibility to agricultural and other pumpers in the EMA in the event that Program implementation is determined to be needed in the future. The other Group 2 Management Actions would likely include some level of participation by all producers (agricultural and non-agricultural) in the EMA. None of the Group 3 Projects in the GSP apply specifically to agricultural pumpers. The details of how the Groundwater Extraction Fee Program or any other fees will work have not been determined at this time. Per Section 6.4.3 of the GSP, "The Groundwater Pumping Fee Program will be developed in an open and transparent process. Targeted outreach meetings and technical workshops, in addition to regularly scheduled EMA GSA meetings, will be held periodically to inform all groundwater pumpers and other stakeholders about the details of the proposed Groundwater Pumping Fee Program. Groundwater pumpers and interested stakeholders will have the opportunity at these meetings to learn about the programs as well as the opportunity to provide input and comments on how the pumping fee program may be implemented in the EMA".

Commenter	Section	Theme	Comment	Commenter's Recommendation	Response
Joseph Hughes, Santa Ynez Water Group		Overlying groundwater rights	Consideration of Overlying Groundwater Rights. Our last concern underlies all that the GSAs are doing. None of the GSAs have considered the effects their actions will have on overlying groundwater rights of agricultural landowners. This omission is evident in the draft GSPs as the GSAs focus exclusively on the interests of municipal groundwater users. This violates the mandates of SGMA requiring your GSAs to consider the interests of all beneficial uses and users of groundwater. Our hope is that the GSAs expand their focus and discharge their duty to consider all interests in the Basin as required by SGMA. We understand the complexities of the issues and the challenges in developing a GSP. Our desire is a successful GSP, and to be part of the process. But we cannot do that if the GSAs intentionally disenfranchise agricultural landowners and their senior overlying rights in the Basin. Please have the attorney advising the GSAs on these issues contact me so that we can discuss how best to resolve our concerns.	None	The Plan does not include any allocation of water rights, which is outside of the scope of this GSP and SGMA regulations and guidance. The Plan does however contemplate a range of potential projects and management actions that are intended to address undesirable results, if observed, which SGMA requires. Options include a potential allocation program that would be designed to provide for a fair allocation and management of available groundwater supplies within the sustainable yield of the basin. Details of how an allocation program would be developed, implemented, and funded will be discussed in public meetings after the GSP is submitted to DWR, if the program is needed in the future. As set forth throughout the Plan, avoiding undesirable results and managing the basin within its sustainable yield actually helps to protect all beneficial uses and users of groundwater over the long-term, specifically including agricultural landowners.
NMFS (previous comments)	8-9	Definitions	The definition of an undesirable result does not recognize the adverse effects of periodic reduction of groundwater on GDE, including the use by spawning and rearing steelhead. The effects of periodic groundwater reductions on out-of-stream beneficial uses (e.g., domestic or agricultural water supplies) may be addressed with alternative water sources. Nevertheless, instream beneficial uses such as GDE may be more vulnerable to such groundwater reductions, for which there is no alternative water source to sustain the GDE.	None	Undesirable results are defined in the GSP in accordance with Water Code Section 10721 of SGMA. GDEs and potential GDEs have been identified in the public draft and final versions of the Plan and potential impacts to GDEs have been specifically considered in setting the sustainable management criteria.
NMFS (previous comments)	10	Interconnected surface waters and GDEs	The sustainable goals are expressed explicitly and exclusively in terms of groundwater levels, and do not recognize the important relationship between groundwater levels and the surface flows (particularly base flows) that contribute to the maintenance of GDE. This is an important omission that should be corrected in the revised document because GDE for the EMA basin includes the use of surface flow by the federally listed endangered southern California steelhead for migration, spawning and rearing.	None	The sustainability goal in Section 5.2 has been revised in the public draft and final versions of the Plan to include a goal related to avoiding depletion of interconnected surface water and impacts to GDEs resulting from groundwater conditions occurring throughout the Basin.

Commenter	Section	Theme	Comment	Commenter's Recommendation	Response
NMFS (previous comments)	11	Interconnected surface waters and GDEs	The sustainable objectives includes avoiding chronic reduction of groundwater, but not the adverse effects of periodic reduction of groundwater on GDE, including the use by spawning and rearing steelhead. The effects of periodic groundwater reductions on out-of-stream beneficial uses (e.g., domestic or agricultural water supplies) may be addressed with alternative water sources. However, instream uses such as GDE are more vulnerable to such groundwater reductions, because there is generally no alternative water source to sustain the GDE.	None	Potential adverse effects on GDEs resulting from groundwater conditions occurring throughout the Basin and significant and unreasonable depletion of interconnected surface water are discussed in Section 5.10, specifically within Section 5.10.1 of the public draft and final versions of the Plan. Areas within the EMA where there may be spawning and rearing habitat for listed steelhead have been identified as surface water that exists in the lower Santa Ynez River system below Bradbury Dam. The Plan fully recognizes the surface water spawning and rearing habitat for steelhead that has been identified by the National Marine Fisheries Service, the California Department of Fish and Wildlife, and the State Water Resources Control Board in previous and ongoing efforts dating back to the 1990s to develop and implement surface flow and non-flow measures in the mainstem lower Santa Ynez River and certain tributaries for the protection of public trust resources, including but not limited to steelhead and its critical habitat. (See, e.g., National Marine Fisheries Service September 2000 Biological Opinion for U.S. Bureau of Reclamation Operation and Maintenance of the Cachuma Project on the Santa Ynez River in Santa Barbara County, California; State Water Resources Control Board Water Order WR 2019-0148 for the Cachuma Project on the Santa Ynez River.) The member agencies of the EMA GSA remain actively involved with numerous federal, state, and local entities in proceedings before the State Water Board and in the current re-consultation process under the federal Endangered Species Act to protect steelhead and its critical habitat in the lower Santa Ynez River system. (See, e.g., August 2020 Term 18 Plan submitted by United States Bureau of Reclamation to State Water Board pursuant to Order WR 2019-0148.) Please refer to other Responses to Comments herein regarding the extent of interconnection between groundwater and surface water that has been designated as spawning and rearing habitat for steelhead.
NMFS (previous comments)	12-13	Undesirable results	The criteria for defining undesirable results do not, but should, provide meaningful guidance. Some deal with causes not effects, and the effects are expressed in terms that are simply re-statements of goals, not criteria or objectives for meeting identified goals. As a result, there is no way of knowing with a reasonable level of assurance whether identified goals have been truly attained, and whether changes in operations would be necessary to achieve the goals.	None	The criteria for measurable objectives and minimum thresholds have been revised in the public draft Plan, which was prepared after this comment was submitted originally and the final versions of the Plan. The public draft Plan addresses this comment. (Section 5.3.2)
NMFS (previous comments)	13-16	Interconnected surface waters and GDEs	In reviewing the methods used to establish thresholds and objectives, it appears that all of the metrics were physical or chemical, lacking any biological metrics. As NMFS has indicated in its previous comment letter, it is essential to determine what flows adequately supports the freshwater life history phases of steelhead. Without an understanding of these hydrologic/biotic relationships, a Groundwater Sustainability Plan (GSP) cannot ensure that significant and unreasonable adverse impacts from groundwater depletion (and in the case of the Santa Ynez River, the integrally related surface water diversion/groundwater recharge program) are avoided.	None	Section 5.3.3.5 has been revised in the public draft and final versions of the Plan to indicate that designated critical habitat for steelhead will be included in consideration of potential GDEs. It is not within the scope of the Plan to determine what surface water flows adequately support the freshwater life history of steelhead. Please refer to related Responses to Comments herein.
NMFS (previous comments)	15	Interconnected surface waters and GDEs	The Draft Criteria indicates that it relies on "Published documents and independent analysis that identify the extent and distribution of potential GDEs." However the Draft Criteria, as well as the Basin Setting: Groundwater Budget appear to rely on methodology that uses vegetation as the principal means of identifying GDE (e.g., The Nature Conservancy 2019). While this method may be useful for identifying select GDE, it is not adequate to identify GDE that are not defined by vegetation alone. For steelhead, the GSP should also consider the information provided in NMFS' designated critical habitat for this species as well as in NMFS identification of intrinsic potential habitat.	None	Section 5.3.3.5 has been revised in the public draft and final versions of the Plan to indicate that designated critical habitat for steelhead was included in consideration of potential GDEs. No information is available to indicate that listed steelhead are present within the GDE areas identified using vegetative mapping methods in the EMA. Habitat present in the Santa Ynez River mainstem area is not supported by groundwater, it is supported by surface water; thus, that habitat is not considered in this plan.

Commenter	Section	Theme	Comment	Commenter's Recommendation	Response
NMFS (previous comments)	16	Interconnected surface waters and GDEs	The Draft Criteria should also include Individual Minimum Thresholds that address GDE other than those defined by the presence of riparian vegetation.	None	See previous response
NMFS (previous comments)	17-18	Interconnected surface waters and GDEs	The Draft Criteria analyzes lowering groundwater levels primarily in terms of affecting groundwater supplies for out-of-stream beneficial uses, and undesirable results that would affect these uses. It does not, but should, explicitly address other instream beneficial uses, such as those associated with GDE. The Draft Criteria should be revised to include a discussion of specific GDE, including those associated with the federally listed endangered southern California steelhead.	None	See previous response
NMFS (previous comments)	19-23	Interconnected surface waters and GDEs	As with the discussion of lowering groundwater levels, the Draft Criteria discusses minimum thresholds primarily in terms of groundwater supplies for out-of-stream beneficial uses. To develop a clear understanding of the consequence of the Committee's minimum threshold, which is currently lacking, the Draft Criteria should be revised to include a discussion of the predicted consequences of the proposed threshold on GDE, including those associated with the federally listed endangered southern California steelhead.	None	See previous response
NMFS (previous comments)	24	Interconnected surface waters and GDEs	The Draft Criteria recognizes that the CMA is hydrologically down gradient of the EMA and is hydrologically connected. However, the Draft Criteria indicates: "Based on available information, groundwater gradients at the boundary between the EMA and SACV are such that groundwater does not flow between the EMA and SACV and therefore, the SACV would not be impacted by the minimum threshold for the chronic lowering of groundwater levels sustainability indicator in the EMA." (p. 24) As NMFS has noted in previous comments, while groundwater management actions in the mainstem of the Santa Ynez River may not directly affect flow in the tributaries to the Santa Ynez River, drawing down the groundwater near the confluence of the tributary and the Santa Ynez River can affect the hydraulic connectivity between the tributaries and the river. This hydraulic connectivity (even if only seasonal) can have implications for the movement (or migration) of a variety of fish and or amphibian species (See State Water Resources Control Board 2011). These tributaries, therefore, should not be considered as disconnected from the water table, but should be classified in the revised document as having interconnected surface water in accordance with the SGMA.	None	Section 5.5.2.4 in the public draft and final versions of the EMA's Plan have been revised to recognize that the location of production wells in close proximity to the boundary between the EMA and San Antonio Basin could affect the groundwater gradient and alter connectivity. This GSP does not contemplate any groundwater management actions in the mainstem of the Santa Ynez River. Surface water flows in the River are subject to the regulatory authority of the SWRCB along with state and federal wildlife agencies. As set forth in the Plan and these Responses to Comments, comprehensive regulatory efforts have been instituted dating back to the 1990s to develop and implement surface flow and non-flow measures to protect public trust resources, specifically including steelhead, in the lower Santa Ynez River and certain tributaries (see, e.g., National Marine Fisheries Service September 2000 Biological Opinion for U.S. Bureau of Reclamation Operation and Maintenance of the Cachuma Project on the Santa Ynez River in Santa Barbara County, California; State Water Resources Control Board Water Order WR 2019-0148 for the Cachuma Project on the Santa Ynez River; August 2020 Term 18 Plan submitted by United States Bureau of Reclamation to State Water Board pursuant to Order WR 2019-0148). Please refer to Sections 3.2.6 and 5.10 of the Plan and other Responses to Comments herein regarding the extent of interconnection between groundwater and surface water and the lack of designated spawning and rearing habitat for listed steelhead within the upland groundwater management area of the EMA.
NMFS (previous comments)	5.5.2.6	Groundwater levels	The Draft Criteria states that, "No federal, state, or local standards exist for chronic lowering of groundwater levels." (p. 25). While it is true that there are not numeric standards, this statement does not appear to recognize the broad standards that that are established by SGMA.	None	The statement in the Draft Criteria is provided in the context of the SGMA regulations set forth directly above the statement in the public draft and final versions of the Plan, which were prepared since this comment was written. The Plan fully recognizes the broad standards established by SGMA and addresses applicable federal, state, and local standards that apply to sustainable groundwater management in the basin.

Commenter	Section	Theme	Comment	Commenter's Recommendation	Response
NMFS (previous comments)	26-27	Interconnected surface waters and GDEs	See comments above for 5.5.3: In reviewing the methods used to establish thresholds and objectives, it appears that all of the metrics were physical or chemical, lacking any biological metrics. As NMFS has indicated in its previous comment letter, it is essential to determine what flows adequately supports the freshwater life history phases of steelhead. Without an understanding of these hydrologic/biotic relationships, a Groundwater Sustainability Plan (GSP) cannot ensure that significant and unreasonable adverse impacts from groundwater depletion (and in the case of the Santa Ynez River, the integrally related surface water diversion/groundwater recharge program) are avoided	None	It is not within the scope of this Plan to determine what surface water flows adequately support the freshwater life history of steelhead or to regulate surface water diversions. Please refer to related Responses to Comments herein. The GSA recognizes that NMFS and various other federal, state, and local agencies are actively engaged in several ongoing state and federal regulatory proceedings in place to ensure adequate surface water flows to support and protect all freshwater life history phases of steelhead in the lower Santa Ynez River. Please refer to related Responses to Comments herein.
NMFS (previous comments)	33	Interconnected surface waters and GDEs	As noted above, the Draft Criteria, appears to focus primarily on out-of-stream beneficial uses, but should be revised to expressly and explicitly deal with all of the beneficial uses that are associated with GDG, including the federally listed endangered southern California steelhead.	None	Section 5.6.2.3 in the public draft and final versions of the Plan expressly includes GDEs as a beneficial use. The section has been revised in the public draft Plan, which was prepared after this comment was submitted originally, to address beneficial uses that are associated with GDEs. Listed steelhead have not been identified in the groundwater areas that could be affected by GSA groundwater management activities.
NMFS (previous comments)	52-62	Interconnected surface waters and GDEs	As noted above, the Draft Criteria appear to rely on methodology that use vegetation as the principal means of identifying GDE. A decrease in groundwater levels less than the depth of the root zone can result in effects to surface flows, particularly base flows (See Brunke and Goslin 1977, Fetter 1997). As a consequence, the Draft Criteria do not address all the potential GDE, including the federally listed endangered southern California steelhead. Also, in addition to the riparian areas in the vicinity of the confluence of Alamo Pintado and Zanja de Cota Creek with the Santa Ynez River, other reaches of the Santa Ynez River within the EMA (between Hilton Creek and Alisal Creek) are potentially affected by groundwater withdrawals. Additionally, the confluences of Alisal Creek, Quiota Creek, San Lucas Creek, and Zaca Creek (below Bradbury Dam), and Tepusquet Creek, Cachuma Creek and Santa Cruz Creek (above Bradbury) and the Santa Ynez River could be impacted by groundwater withdrawals from the EMA. The Draft Criteria should be revised to recognize these other GDE, including those associated with the federally listed endangered southern California steelhead.	None	Listed steelhead have not been identified within the groundwater areas where the EMA has groundwater management responsibilities and so the minimum threshold has been established to avoid significant and unreasonable adverse impacts to the riparian vegetation in the areas of the tributaries where a connection between groundwater and surface water has been identified (Alamo Pintado and Zanje de Cota Creeks). Tributaries flowing directly into Lake Cachuma above Bradbury Dam are disconnected from the principal aquifers and are not affected by groundwater conditions in the EMA.
NMFS (previous comments)	59	Interconnected surface waters and GDEs	The Draft Criteria also asserts: "The minimum threshold for depletion of interconnected surface water is set to protect habitat and sensitive species at specific locations in the EMA where there is a connection between groundwater and surface water. The minimum threshold for depletion of interconnected surface water in the EMA is not anticipated to impact sustainability in the CMA because conditions that are necessary to avoid impacts to Category A GDEs [i.e., those supporting identified beneficial use in the subject areas] in the EMA will continue to support flows into the CMA." (p. 59) This approach does not adequately recognize all the potential GDE, or does it provide any metric for guiding groundwater withdrawals, or set any numeric standard for the maintenance of base flows necessary to support GDE. The Draft Criteria should be revised to include specific metrics for GDE, including those associated with the federally listed endangered southern California steelhead.	None	See previous response. The public draft and final versions of the Plan demonstrate that subsurface interconnection between the EMA and the CMA is relatively minor and does not support GDEs. A specific metric has been applied to avoid significant and unreasonable adverse impacts to identified GDEs in the areas where groundwater may be supporting GDEs. Steelhead have not been identified in these areas. The map of "Intrinsic Potential Steelhead Spawning and Rearing Habitat" included with the comment letter does not represent known or actual steelhead habitat as set forth in the principal state and federal regulatory proceedings pertaining to the lower Santa Ynez River system.
NMFS (previous comments)	6	GDEs	Because the Draft Budget is being prepared under the authority of SGMA, the introduction should explicitly acknowledge the need to address Groundwater Dependent Ecosystems (GDE) in the introduction	None	The introduction to Section 3 in the public draft and final versions of the Plan explicitly address the needs to sustainably manage the groundwater resource for all of the beneficial uses within the EMA including agricultural, municipal, domestic and environmental uses.

Commenter	Section	Theme	Comment	Commenter's Recommendation	Response
NMFS (previous comments)	9	Aquifers	4th paragraph: The Draft Budget indicates: "The Santa Ynez River and associated underflow within the Santa Ynez River Alluvium is included in the surface water system that is summarized in the budget. As surface water, the Santa Ynez River Alluvium is not considered a principal aquifer because the water within this geological unit is present within the defined bed and banks of the channel and thus is not considered groundwater in accordance with Water Code, Section 10721(g). The surface water system is managed under the jurisdiction of the California State Water Resources Control Board (SWRCB) and is not within the purview of SGMA. Therefore, water both above ground and below ground within the Santa Ynez River, defined as the Santa Ynez River Water Conservation District's (SYRWCD's) Zone A portion of the EMA, is quantified as surface water." This statement raises a number of issues that should be addressed in the revised document. First, it should be noted that the Eastern Management Area includes more than just the mainstem of the Santa Ynez River; it also includes a number of tributaries, including, but not limited to: Zaca Creek, Alamo Pintado Creek, Happy Canyon, Alisal Creek, Hilton Creek, Quiota Creek, San Lucas Creek, Santa Aqueda Creek, Teqepis Creek, Cachuma Creek, and Santa Cruz Creek. Second, the revised Draft Budget should clarify whether (1) a formal determination regarding the nature and status of the subflow has been made, and by what authority; (2) how a "principal aquifer" is defined for the purposes of SGMA; (3) if such a formal designation has been applied, and by what authority; and, (4) the specific provisions of the SGMA supporting this interpretation of the scope of a GSP, specifically for the Central Management Area of the lower Santa Ynez River.	None	The principal aquifers and their definition according to SGMA and the SGMA Regulations are discussed in Section 3.1.4 in the public draft and final versions of the Plan. This description of the principal aquifers and the relationship between the GSA and the Santa Ynez River is discussed in Section 3.1.4. The management of the Santa Ynez River and associated underflow by the SWRCB has been well-established over many decades, as discussed in Section 3.1.1. Further discussion of the basis for these authorities is presented in Appendix G of this GSP. Please also refer to related Responses to Comments herein.
NMFS (previous comments)	12	Water budget	The water budget should explicitly acknowledge the tributaries within the Eastern Management Area that contribute to the groundwater resources within the Eastern Management Area.	None	As described in Section 3.3.1 in the public draft, which was finalized after this comment was submitted, and final version of the Plan, the water budget and numerical flow model includes estimates of the flow through the tributaries that drain the San Rafael Mountains and Santa Ynez Uplands to the north and Santa Ynez Mountains to the south including Zaca Creek, Alamo Pintado Creek, Happy Canyon, Alisal Creek, Hilton Creek, Quiota Creek, San Lucas Creek, Santa Aqueda Creek, and Teqepis Creek, Cachuma Creek and Santa Cruz Creek.
NMFS (previous comments)	13	Water budget	Figure 3-42: The revised Draft Budget should include justification for selecting water years 1982 through 2018 as the historical water budget period. Of particular concern, while the period of record chosen includes two wet and dry periods, the selected period does not necessarily capture the change in land uses and the associated groundwater pumping from the Eastern Management Basin. An assessment should be made of the land-use practices over a longer period to better assess the groundwater pumping patterns within the Eastern Management Area.	None	A more complete discussion of the basis for selecting the historical water budget period selection is included in Section 3.3.1 in the public draft and final versions of the Plan. This period captures multiple wet, dry, and normal hydrologic periods and includes the period that high quality data was available for the analysis. There is no need to consider land use changes prior to 1982 for groundwater management purposes going forward.
NMFS (previous comments)	17	Water budget	3.3.2.1 See comments above regarding tributaries to the Santa Ynez River within the Eastern Management Area.	None	As described in Section 3.3.1, the water budget includes estimates of the flow through the tributaries that drain the San Rafael Mountains and Santa Ynez Uplands to the north and Santa Ynez Mountains to the south including Zaca Creek, Alamo Pintado Creek, Happy Canyon, Alisal Creek, Hilton Creek, Quiota Creek, San Lucas Creek, Santa Aqueda Creek, and Teqepis Creek. Flow from Cachuma Creek and Santa Cruz Creek are included in the numerical groundwater flow model.

Commenter	Section	Theme	Comment	Commenter's Recommendation	Response
NMFS (previous comments)	18	Water budget	3.3.2.1.2 The Draft Budget apparently limits, "Native streamflow in the Santa Ynez River main stem and in tributary creeks to the Santa Ynez River downstream of Bradbury Dam . . ." It is not clear why this limitation is use, since there are other tributaries to the Santa Ynez River above Bradbury Dam which are also within the Easter Management Area (e.g., Cachuma Creek, Santa Cruz Creek). The revised Draft Budget should therefore explain the basis for this limitation.	None	Runoff occurring in the Santa Cruz and Cachuma Creek sub-water sheds flows into Lake Cachuma. Pumping in the upland basin within the EMA and implementation of the GSP will not affect groundwater use in the Santa Cruz or Cachuma Creek sub-watersheds (for agricultural, domestic, municipal or environmental uses), nor groundwater and surface water conditions within these tributaries. Please note changes made in Section 3.3.2.1.
NMFS (previous comments)	19	Interconnected surface waters and GDEs	The Draft Budget states, "The Santa Ynez River and underflow is accurately gauged and highly regulated. Therefore, the level of uncertainty of these data is low." While there are stream flow gauges on the Santa Ynez River that provide information on stream flow fluctuations, these gauging program does not consistently record base flows for a variety of reasons (including timely gauge calibration, shifting channel morphology, etc.). However, these lower base flows can be critical to some GDE such as rearing juvenile O. mykiss and other native aquatic species. The Draft Budge also notes, "The flow from the tributary creeks, however, is ungauged and estimated based on BCM and SYRHM data outputs. The uncertainty of these data are considered high because large scale regional models are being used to estimate these water budget terms." As noted above these lower base flows can be critical to some GDE such as rearing juvenile O. mykiss and other native aquatic species. Finally, the Draft Budget states "In our opinion, the uncertainty associated with estimated tributary flow does not limit the GSA's ability to manage the Santa Ynez Uplands groundwater system because the tributary flow terms are relatively small when compared to the other water budget terms." This assessment does not appear to be valid for two fundamental reasons. First, the uncertainty regarding the contribution of tributary flows, individually and cumulatively, to the groundwater/surface water conditions in the mainstem of the Santa Ynez River within the Eastern Management Area is unknown. Second, the contribution of the tributary flows, relative to other sources of groundwater/surface water to the water budget, is not an appropriate measure for assessing importance of the tributaries GDE, or the tributaries' contribution to GDE in the mainstem of the Santa Ynez River within the Eastern Basin. Furthermore, comparing the relative size of the tributary flow to supporting out-of-stream consumptive beneficial uses of water associated with the Eastern Management Basin is not an appropriate metric in assessing their importance to GDE. Even small contributory flows can be important in sustaining habitats utilized by native aquatic species that have adaptive mechanisms that allow them to carry out their life-cycles, including rearing during periods of naturally small base flows.	None	Section 3.3.2.1 has been revised to clarify that the uncertainty of tributary flows is considered moderate because large scale regional models and a calibrated groundwater model for the EMA are being used to estimate these water budget terms. The uncertainty associated with estimated tributary flows will not limit the GSA's ability to manage the Santa Ynez Uplands groundwater system and avoid significant and unreasonable adverse impacts to GDEs by utilizing the monitoring and associated sustainability thresholds established for two of the tributaries. Tributary flows and potential for depletion of interconnected surface water flows were evaluated in the GSP using the groundwater flow model; depletion was not found to be significant. Monitoring efforts that are included in the GSP will provide additional data and reduce the uncertainty associated with estimating tributary flows and assessing interconnectivity and potential significant and unreasonable depletion.
NMFS (previous comments)	Table 3-3	Water budget	This table does not, but should, include the tributaries to the Sant Ynez River above Bradbury Dam that are also within the boundaries of the Eastern Management Area, but should. These include: Cachuma Creek and Santa Cruz Creek.	None	A footnote has been added to this table (now Table 3-18) to clarify that Santa Cruz and Cachuma Creeks flow though the Santa Ynez Uplands directly into Lake Cachuma.
NMFS (previous comments)	19-20	Water budget	3.3.2.1.4 The Draft Budget states, "Mountain front recharge from the Santa Ynez Mountains that flows directly into streams and the Santa Ynez River Alluvium (considered to be surface water) was calculated using the adjusted and calibrated BCM model as described in Section 3.3.2.1.2." The revised Draft Budget should clarify if the reference to	None	Section 3.3.2.1 has been revised to clarify that mountain front recharge flows directly into the tributary streams (surface water) and ultimately into the Santa Ynez River Alluvium (underflow is also considered to be surface water). Additional numerical model documentation regarding how mountain front recharge was handled appears in Section 3.2 and Appendix F. The water budget and numerical model each have uncertainties that have been identified in the GSP. Each has

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			"considered to be surface water" was intended to refer to both the tributary flows into streams and the Santa Ynez River Alluvium. Also, see comments above regarding issues and questions raised about the authority of SGMA over these groundwater resources. The Draft Budget concludes, "We do not believe that uncertainty associated with estimates of mountain front recharge limit the GSA's ability to manage the Santa Ynez Uplands groundwater system because the overall water budget is consistent with the calibrated groundwater flow model." As noted above NMFS this conclusion appears unsupported given the uncertainty of the groundwater inputs, and the potential importance of even small inputs in supporting GDE, including native O. mykiss and other native aquatic species.		been developed using best available science and data. As new data are collected and the groundwater model updated every 5 years, uncertainties will diminish. As currently prepared, the water budget analysis and groundwater model are suitable in accordance with SGMA for helping the GSA make decisions about how the basin should be managed within its sustainable yield.
NMFS (previous comments)	21	Water budget	3.3.2.2.3 The Draft Budget states, "We do not believe that uncertainty associated with estimates of mountain front recharge limit the GSA's ability to manage the Santa Ynez Uplands groundwater?" See comments above regarding this uncertainty.	None	Additional numerical model documentation describing these estimates and uncertainty appears in Section 3.2 and Appendix F. Section 3.3.2.1.4. See previous response.
NMFS (previous comments)	20	Aquifers	3.3.2.2 The Draft Budget states, "Note that the groundwater system includes only the aquifers in the Santa Ynez Uplands portion of the EMA and specifically excludes all water within the Santa Ynez River Alluvium, which is managed as surface water under the jurisdiction of the SWRCB." See comments above regarding this issue.	None	In the context of SGMA and this Plan "groundwater" refers to water within the two principal aquifers in the Santa Ynez Uplands (Paso Robles Formation and Careaga Sand) and does not include water within Santa Ynez River system. For purposes of this Plan and the hydrogeologic conceptual model, water within the Santa Ynez River system, both above and below ground, is surface water subject to the regulatory jurisdiction of the SWRCB. In accordance with SGMA and the SGMA Regulations, the Plan fully analyzes the relationship and interconnectivity between the groundwater system and the surface water system in the EMA, and the Plan is prepared to ensure sustainable management of the groundwater system. Appendix K includes further discussion of the hydrogeological, jurisdictional, and legal basis for this conclusion. Please also refer to related Responses to Comments herein.
NMFS (previous comments)	23	Water budget	3.3.2.3.1 See comments above regarding the accuracy of measuring base flows.	None	The gauged streamflow within the Santa Ynez River is considered to be accurate and therefore the uncertainty associated with this data is considered low. Section 3.3.2.3.1
NMFS (previous comments)	24	Interconnected surface waters	3.3.2.3.2 The Draft Budget states, "This [subsurface] outflow occurs at the downstream end of the EMA along the border with the CMA." However, there are subsurface outflows from the tributaries (Cachuma Creek and Santa Cruz Creek) at the upstream end of the East Management Area; the outflow location can influenced by the lake level in Cachuma Reservoir.	None	Surface water from the tributaries upstream of Bradbury Dam, including Santa Cruz and Cachuma Creek, flows into Lake Cachuma. Pumping in the upland basin within the EMA and implementation of the GSP will not affect the Santa Cruz or Cachuma Creek sub-watersheds (for agricultural, domestic, municipal or environmental uses), nor groundwater or surface water conditions within these areas. (Changes made in Section 3.3.2.1)
NMFS (previous comments)	35	Water budget	3.3.3 The Draft Budget states, "The period for water years 1982 through 2018 was selected as the historical water budget period because it is long enough to capture typical climate variations (with two wet and two dry hydrologic cycles) and includes recent changes in imported water supply availability, changes to water demand associated with cropping patterns, and associated land use." As noted above, while the period of record chosen includes two wet and dry periods, this period does not necessarily capture the change in land uses and the associated groundwater pumping from the Eastern Management Basin. As assessment should be made of the land-use practices over a longer period to better assess the groundwater pumping patterns within the Eastern Management Area; the results of that assessment should be presented in the revised Draft Budget	None	The period selected for the historical water budget in the Plan was selected based on criteria listed in the first paragraph of Section 3.3.3 and is limited by the availability of relevant data, which includes documented land use data. As presented in Section 3.3.1 (page 3-108), the "37-year period selected for the historical water budget includes the most recently available information" and "considered the availability of good-quality data for the principal water budget components, including streamflow, precipitation, and land use, which will be discussed individually later. For example, in the historical period (since the first land use survey of the EMA was available in 1985), the documented land uses changed significantly, with decreases in pastureland and coincident increases in other types of agricultural uses." Considering land use changes that occurred prior to 1982 is not necessary for management of the EMA going forward.

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NMFS (previous comments)	37	Water budget	3.3.3.1.1 Table 3-7 shows that the average annual combined tributary surface water inflow is approximately 44% of the inflow from the Santa Ynez River; however, the calculation only includes tributaries within the Eastern Management Area that are downstream of Bradbury Dam and does not include any surface water inflow from tributaries above Bradbury Dam within the Eastern Management Area (e.g., Cachuma Creek and Santa Cruz Creek). The revised Draft Budget should include an analysis that corrects this condition.	None	A footnote has been added to this table (now Table 3-22) to clarify that tributary surface water flow within Cachuma and Santa Cruz Creeks are accounted for as they enter Lake Cachuma, enter the Santa Ynez River, and enter the Santa Ynez River system portion of the EMA as surface and subsurface flow. Section 3.3.3.1.2
NMFS (previous comments)	37	Water budget	Table 3-8 indicates the annual subsurface outflow of groundwater is essentially the same for the average, minimum, and maximum. This seem anomalous, given the different annual levels of surface water inflow noted in Table 3-7. Also, Table 3-9 indicates the difference between the average and the maximum and minimum rate of Phreatophyte Evapotranspiration is around 5%; again this seem anomalous given wide range of annual weather conditions. The same comment applies to Table 3-10. It is not clear how this calculation was made. The revised Draft Budget should include an explanation that clarifies or corrects this issue.	None	Discussion has been added to the text in Sections 3.3.3.2 and 3.3.3.5 to more fully describe the variation in outflow and inflow components of the water budget.
NMFS (previous comments)	38	Water budget	Table 3-10 records a significant impact on groundwater outflow during minimum annual water years when groundwater pumping has decreased approximately 10% from the average annual water year, but groundwater outflow decreased approximately 96%. This pattern has potentially significant implication for supporting GDE, including O. mykiss and other native aquatic species.	None	Discussion has been added to the text in Sections 3.3.3.2 and 3.3.3.5 to more fully describe the variation in outflow and inflow components of the water budget. The effects of the groundwater outflow on GDEs is revised in Sections 3.2.6 and 5.10. The latter section presents the modeled results of the timing and magnitude of surface water depletions in the GDE areas.
NMFS (previous comments)	46	GDEs	3.3.3.6.1 The discussion of sustainable yield estimates of the groundwater basin(s) in the Eastern Management Area focuses on out-of-stream consumptive uses of groundwater and does not, but should, include an explicit discussion of the role of groundwater in sustaining GDE, including, but not limited to the federally endangered southern California steelhead.	None	The discussion of GDEs was revised considerably relative to the earlier draft, to which this comment refers and now explicitly describes the role, timing and magnitude of groundwater's interactions with the GDE areas. Listed steelhead are not present within the areas managed by the GSA and instead are comprehensively managed and protected as part of several ongoing state and federal regulatory proceedings pertaining to the lower Santa Ynez River. Please refer to related Responses to Comments herein.
NMFS (previous comments)	47	GDEs	3.3.3.7 The depiction of these components of a water budget focuses on out-of-stream consumptive beneficial uses. However, it should also expressly include a discussion of historical water supplies that have supported GDE within the Eastern Management Area, including but not limited to the federally listed endangered southern California steelhead, as well as other native aquatic species.	None	As described in other responses, this analysis of GDEs has been substantially expanded since this comment was written about an earlier version of this section. The changes are included in the public draft version of the Plan, which addresses this comment. Listed steelhead are not present within the areas managed by the GSA and instead are comprehensively managed and protected as part of several ongoing state and federal regulatory proceedings pertaining to the lower Santa Ynez River. Please refer to related Responses to Comments herein.
NMFS (previous comments)	48-54	Water budget	3.3.4 See comment above regarding the period of record chosen for the Draft Budget.	None	The discussion of the period of record for the water budget was addressed in a response to another comment. The period selected for the historical water budget in the Plan was selected based on criteria listed in the first paragraph of Section 3.3.3 and is limited by the availability of relevant data, which includes documented land use data.
NMFS (previous comments)	55-56	GDEs	3.3.5 The Draft Budget expressly describes only out-of-stream uses of groundwater and surface water (Solvang ID No. 1, Mutual Water, Rural Domestic, Agricultural Pumping), but only expressly recognized non-consumptive out-of-stream uses of groundwater (i.e., Phreatophyte). It does not expressly recognize the other beneficial uses of the surface and groundwater of the Eastern Management Area. The CCRWQCB has listed cold freshwater habitat, fish spawning, reproduction and/or early development, migration of aquatic organisms, and habitat for rare, threatened, and endangered species, as beneficial uses for the Santa Ynez River under their Central Coast Basin Plan (CCRWQCB 2019); these should be explicitly described in the revised Draft Budget. Additionally, there are GDE that should be enumerated and described, as part of the	None	As described in other responses, this analysis of GDEs has been substantially expanded since this comment was written about an earlier version of this section. The changes are included in the public draft version of the Plan, which addresses this comment. Underflow of the Santa Ynez River is a component of the surface water system and is not groundwater for purposes of the Plan in accordance with framework established by SGMA and the SGMA Regulations. As noted above, listed steelhead are not present within the areas managed by the GSA and instead are comprehensively managed and protected as part of several ongoing state and federal regulatory proceedings pertaining to the lower Santa Ynez River. Please refer to related Responses to Comments herein.

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			suite of beneficial uses, and their locations, that must be addressed as part of the GSP for the Eastern Management Area.		

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NMFS (previous comments)	57	GDEs	3.3.5.1.1 The Draft Budget notes, "The projected changes to streamflow do however apply through the tributaries that flow through the Santa Ynez Uplands and ultimately into the Santa Ynez River." The revised Draft Budget should clarify what this statement means. For instance, is the intent to exclude the tributaries within the Eastern Management Area from consideration in the Draft Budget? We would note that perennial surface water/or flow is not required by SGMA to identify a GDE. Rather, connection via a saturated zone between groundwater and surface water "at any point" when surface waters are not otherwise depleted constitutes an interconnected connection condition. We would note further that seasonally or ephemeral surface flows can be important to a variety of fish and amphibian species (see for example, Erman and Hawthorne 1976, and Boughton et al. 2009). Further, while groundwater management actions may not directly affect flow in the upper reaches of these tributaries, drawing down the groundwater near the confluence of the tributary and the Santa Ynez River can affect the hydraulic connectivity between the tributaries and the river. This hydraulic connectivity (even if only seasonal) can be important for the movement (or migration) of a variety of fish and or amphibian species. These tributaries, therefore, should not be considered as disconnected from the water table, but should be classified as having interconnected surface water under SGMA. Finally, we would note that the SWRCB's analysis and water rights order focused on the mainstem of the Santa Ynez River, and specifically did not address flow requirements in the tributaries to the lower Santa Ynez River. However, the SWRCB did note, "Operations of the dam have also resulted in an increased potential for mortality from stranding and desiccation caused when surface flows in tributaries where fish are residing are disconnected from the main channel"	None	As presented in Section 3.3.1, the "37-year period selected for the historical water budget includes the most recently available information" and "considered the availability of good-quality data for the principal water budget components, including streamflow, precipitation, and land use, which will be discussed individually later. For example, in the historical period (since the first land use survey of the EMA was available in 1985), the documented land uses changed significantly, with decreases in pastureland and coincident increases in other types of agricultural uses." The majority of the tributaries are considered ephemeral. This means that a portion of rainwater runoff may ultimately percolate into the underlying Paso Robles Formation or Careaga Sand in these areas. This flow occurs as unsaturated flow and so a continuous saturated zone between the base of the tributary and the underlying aquifer does not exist and are disconnected from the water table, except in the lower reaches of two tributaries where the underlying aquifer discharges to surface water. This occurs in Alamo Pintado and Zanje de Cota Creek. This is where the interconnection between surface water and groundwater occurs in the EMA and where GDEs (ecosystem supported by groundwater) have been identified in the Plan. Operation of Bradbury Dam and the effects of changing reservoir levels on tributaries are not within the purview of SGMA or the responsibility of the EMA GSA. Please refer to related Responses to Comments herein.
TNC (Pablo Ortiz-Partida)	Figures 2-2 and 2-7	DACs and Human right to water	The identification of Disadvantaged Communities (DACs), drinking water users, and tribes is incomplete. The GSP describes and maps tribal lands in the Eastern Management Area (EMA) in Figure 2-2. The GSP also identifies and maps the location of each DAC within the EMA. However, the plan fails to clearly document the population of each DAC. Additionally, Figure 2-7 provides a map of communities within the EMA served by groundwater, but does not specifically provide the drinking water source for DACs. While the plan provides a density map of domestic wells in the EMA, the GSP fails to provide depth of these wells (such as minimum well depth, average well depth, or depth range). These missing elements are required for the GSA to fully understand the specific water demands of beneficial users, and to support the consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions.	Provide the population of each identified DAC. Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems). Include a map showing domestic well locations and average well depth across the EMA.	There are no disadvantaged communities (DAC) identified within the boundaries of the EMA based on information presented in the updated 2019 IRWMP. The extent of the areas of Communities Dependent on Groundwater is presented on Figure 2-7.

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TNC (Pablo Ortiz-Partida)	3	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 presents a conceptual representation of gaining, losing, and disconnected streams (Figure 3-34. Gaining and Losing Streams). The GSP presents a map (Figure 3-35. Stream Classifications) of the EMA's stream reaches, as classified by the USGS National Hydrography Dataset (NHD), with labels 'Perennial' and `Intermittent'. The relationship of these terms, however, are not discussed in relation to the gaining, losing, and disconnected terms presented in the prior figure. If the GSP is making the unstated assumption that perennial reaches are equivalent to interconnected reaches, this is an incorrect conclusion. Note the regulations [23 CCR §351(o)] define ISW as "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". "At any point" has both a spatial and temporal component. Even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water. Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying ISWs. The GSP does not present or analyze depth to groundwater data when identifying ISWs in the EMA.	Provide a map showing all the stream reaches in the EMA, with reaches clearly labeled 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. Provide depth-to-groundwater contour maps using the best practices presented in Attachment D, to aid in the determination of ISWs. 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. Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015. Reconcile ISW data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.	Please refer to previous responses to this comment and also refer to responses to CDFW comments. Other than the areas discussed in the GDE section, the tributary alluvium is not classified as interconnected surface water at any point, because these areas do not meet both elements of the applicable SGMA definition. Depth to water contour maps were developed for analysis of the interconnection of the groundwater dependent ecosystems, the areas of which are within proximity to the ground surface are presented on Figure 3-37 - Potential Groundwater Dependent Ecosystems 30-foot Depth to Groundwater Screening in Section 3.2.6.1.2. This section describes the method used for this analysis. Groundwater elevation contour maps are provided in responses to the SGMA requirements for the two principal aquifers during the SGMA period (since 2015, which are subject to evaluation under SGMA) on Figure 3-20 - Paso Robles Formation Groundwater Elevation Contour Map, Spring 2018 and Figure 3-21 – Careaga Sand Formation Groundwater Elevation Contour Map, Spring 2018 in Section 3.2.1.1. The variability of these groundwater conditions are presented in hydrographs in Section 3.2.1.2 for as far into the past as the period of record allows, long prior to the recommended 10-year period starting in 2005.

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TNC (Pablo Ortiz-Partida)		GDEs	NC dataset polygons were incorrectly removed based on the assumption that they are supported by the shallow, perched water table. However, shallow aquifers that have the potential to support well development, support ecosystems, or provide baseflow to streams are principal aquifers, even if the majority of the EMA's pumping is occurring in deeper principal aquifers. If there are no data to characterize groundwater 2 conditions in the shallow principal aquifer, then the GDE should be retained as a potential GDE and data gaps reconciled in the Monitoring Network section of the GSP. NC dataset polygons were incorrectly removed from riparian areas of the Santa Ynez River that are considered to be managed by SWRCB as part of Santa Ynez River surface and underflow, and are not considered connected to "groundwater" under SGMA. The GSP has provided no map or details on the physical extent of the basin and wells that have been permitted, licensed and managed as underflow by the SWRCB. According to California's Electronic Water Rights Information Management System (eWRIMS), there appear to be only a handful of water rights permits (2 active and 7 inactive) that fall under "underflow" within the EMA (Figure 1). While a few water rights in the EMA may have "underflow" permits or licenses, the GSP has failed to substantiate the assertion that the shallow aquifer - in its entirety - is classified and managed as "underflow" by the SWRCB. We are generally concerned that the GSP is grossly extrapolating the existence of "underflow" in the shallow alluvium across the entire basin from a limited number of "underflow" points of diversions within the basin that are actually being managed by SWRCB. If the SWRCB is not managing the entire shallow aquifer as "underflow" and the beneficial users of groundwater and surface water reliant on it - this water is actually groundwater and is instead subject to SGMA regulations.	Show the extent of the shallow aquifer that is classified and managed as "underflow" by the SWRCB. For example, include a map and description of extraction points and whether they source "underflow" or "groundwater" from the shallow alluvium. Discuss SWRCB Order WR 2019-0148 and explain how it relates to SGMA and the definition of ISW in the EMA. Cite relevant sections of the order, maps, and cross-sections. Re-evaluate the EMA's GDEs noting the incorrect removal criteria listed above. 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. If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network. Provide depth-to-groundwater contour maps, noting the best practices presented in Attachment D. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.	The groundwater conditions within the principal aquifers are described within Section 3.2.1 and mapped, contoured and described based on the best-available data, which are presented on Figures 3-20 (Paso Robles Formation) Figure 3-21 (Careaga Sand). These groundwater conditions do not describe the underflow of the tributary alluvium nor the areas of perched water, because these areas are not Principal Aquifers as defined by SGMA and the SGMA Regulations, as further described in Section 3.1.4. (See, e.g., SGMA Regulations section 351(aa).) The Nature Conservancy dataset polygons used to define GDEs are not shown in riparian areas of the Santa Ynez River area because the Santa Ynez River and associated underflow is part of the surface water system in the EMA. For these reasons, riparian communities in this area are not groundwater dependent in accordance with SGMA. As noted above, the lower Santa Ynez River system is comprehensively managed and protected as part of several longstanding state and federal regulatory proceedings. Please refer to related Responses to Comments herein.
TNC (Pablo Ortiz-Partida)	3-90	GDEs	The GSP states (3-90): "Contoured groundwater elevation data for spring 2015 was used to determine areas where the Natural Communities polygons were within 30 feet depth to groundwater. Spring 2015 groundwater elevations were chosen for this analysis because this marked a period of the greatest recent data availability. These data are considered representative of average spring-summer conditions within the last 5 years."	We recommend using groundwater data from multiple seasons and water year types to determine the range of depth to groundwater around NC dataset polygons. 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 pre-SGMA baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types.	The analysis described in Section 3.2.6 refers to the period described by the regulations on the top of page 3-87 of that section: "including data from January 1, 2015, to current conditions." As noted in that section: groundwater elevations are generally the highest in the spring, following recharge from winter rains. Spring-time groundwater elevations in 2015, are considered representative of average high-water level conditions and so was used to identify potential GDEs where the elevation of the water table is within 30 feet of ground surface. This analysis, which relies on the higher spring water elevation is considered to be more protective of GDEs than the use of fall water levels, which typically have lower groundwater elevations. The period selected also represents the period when SGMA was enacted; GDEs observed after January 2015 are subject to evaluation under SGMA. The method included in the Plan addresses these concerns and improves on identification of the interaction between groundwater elevations in the immediate vicinity of the potential GDEs.
TNC (Pablo Ortiz-Partida)	3.2.6.1.1	GDEs	We commend the GSA for including an inventory of flora and fauna species in the EMA's GDEs. Section 3.2.6.1.1 presents a discussion of potential GDE vegetation classifications, and each of these GDE units is mapped individually on Figure 3-36 (Natural Communities Commonly Associated with Groundwater Dataset). Table 3-14 presents the special-status species within the EMA. Within Section 3.2.6.1.1 (Potential GDE Vegetation Classifications), the GSP states that the maximum rooting depth of valley oak (Quercus lobata) is 80 feet. However, this deeper rooting depth was not used when verifying whether valley oak polygons from the NC Dataset are supported by groundwater.	Refer to Attachment B for more information on TNC's plant rooting depth database. Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as valley oak (Quercus lobata). We recommend 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 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 approach taken to identify potential GDEs within the EMA relied upon TNC guidance for a 30- foot rooting depth criterion. As noted in the comment, actual rooting depth data are limited and require site specific information including soil type, soil moisture, exposure (north or south facing), geologic setting, presence/absence of perched water, etc. As described in Section 6.3, the EMA GSA plans to conduct additional studies on the nature and extent of potential GDEs in the EMA.

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TNC (Pablo Ortiz-Partida)	2-15	Native vegetation	Native vegetation and managed wetlands are water use sectors that are required to be included in the water budget. , The integration of native vegetation into the water budget is sufficient. We commend the GSA for including the groundwater demands of this ecosystem in the historical, current and projected water budgets. The GSP states on p. 2-15 that there are no managed wetlands in the EMA.	None	The inclusion of native vegetation into the water budget, as presented in the Plan, is both prudent and required for accurate analysis for the historical, current and projected water budgets.
TNC (Pablo Ortiz-Partida)	Appendix J	DACs	Although the Communication and Engagement Plan describes efforts to conduct outreach to DACs during GSP development, including the use of culturally appropriate language, education about the SGMA process, and quarterly newsletters in English and Spanish, there is no active participation of DACs within the EMA CAG. Public involvement and engagement with environmental stakeholders are described in very general terms. Aside from allowing environmental organizations involvement in the SGMA process regarding environmental uses of groundwater and invitations to apply to participate on the Citizens Advisory Group, there are no specific details of outreach to environmental communities. The Communication and Engagement Plan does not include specific, targeted outreach and engagement opportunities to DACs, tribal stakeholders, and environmental stakeholders during the GSP implementation phase.	In the Communication and Engagement Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to Attachment B for specific recommendations on how to actively engage stakeholders during all phases of the GSP process. Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.	A single tribal land is located within the boundaries of the EMA: Santa Ynez Band of Chumash Indians. As discussed in Section 2.2.1.4, the Chumash tribal government is participating directly in the SGMA process for the EMA GSA through its representative on the Citizens Advisory Group (CAG) and will remain involved during the entirety of the implementation process. The location of this tribal land is presented on Figure 2-2. Based on several datasets, there are no DACs within the EMA (refer to the 2019 County-wide Integrated Regional Water Management Program report, 2020 California Air Resources Board and 2018 California Climate Investments Priority Populations online maps). Outreach has been conducted in accordance with the Communication and Engagement Plan, which included outreach to private well domestic owners within the entire EMA. This outreach included meetings with tribal leaders from the Santa Ynez Band of Chumash Indians.
TNC (Pablo Ortiz-Partida)	SMC	DACs and Human right to water	For chronic lowering of groundwater levels, the GSP presents a well impact analysis to assess the potential impacts of water level decline on domestic wells screened in the Paso Robles Formation and Careaga Sand. The GSP states (p. 5-20): "Based on the well impact analysis, the GSA Committee agreed to set the minimum threshold for representative wells screened in the Paso Robles Formation at 15 feet below spring 2018 groundwater levels." At this groundwater elevation, 33% of domestic wells are predicted to have water levels fall below the top of the screen. The GSP states (p. 5-20): "Based on the well impact analysis, the GSA Committee agreed to set the minimum threshold for representative wells screened in the Careaga Sand at 12 feet below spring 2018 groundwater levels." At this groundwater elevation, 39% of domestic wells are predicted to have water levels fall below the top of the screen. Despite this well impact analysis, the GSP does not sufficiently describe whether minimum thresholds will avoid significant and unreasonable loss of drinking water, especially given the absence of a well mitigation plan in the GSP. In addition, the GSP does not sufficiently describe or analyze direct or indirect impacts on DACs or tribes when defining undesirable results, nor does it describe how the existing groundwater level minimum thresholds will avoid significant and unreasonable impacts to DACs and domestic well users beyond 2015 and be consistent with Human Right to Water policy.	Describe direct and indirect impacts on drinking water users, DACs, and tribes when describing undesirable results and defining minimum thresholds for chroenic lowering of groundwater levels.	The well impact analysis presents the rationale for the setting of minimum thresholds and measurable objectives to Avoid Chronic Lowering of Groundwater Levels for all well users in the EMA, including agricultural, municipal wells, and domestic wells, as described in Section 5.3.3.1 in the Plan. This analysis, described in detail in Section 3.2, was conducted over several months in development of the Plan with several public meetings to set the MTs and MOs with the input of the GSA and public. Minimum thresholds were set based on consideration of all of these groundwater users, which includes the tribe. As discussed in Section 5.5.2, there was considerable debate among stakeholders about how much depletion of supply could result from water levels falling below the top of screen. Municipal, agricultural, and domestic wells have different sensitivities to this condition and will experience depletion of supply differently. The methodology and results of this analysis were discussed with stakeholders and ultimately chosen by the GSA Committee as the basis for establishing undesirable results and minimum thresholds. Special consideration was given to domestic well owners who cannot easily respond to a reduction in supply, particularly during extended dry periods, and would have to absorb substantial cost if wells had to be replaced and deepened. The GSA decided to not allow water levels in municipal wells to drop below the top of screen if possible and to set the MT to be protective of domestic wells. Local agricultural interests expressed that their water supplies would be less adversely affected by water levels falling below top of screen because they have not observed undesirable results or depletion of supply, and therefore wanted to set the minimum thresholds at deeper levels. The needs of all of the water users were considered, and the minimum thresholds were selected to represent groundwater conditions that would be protective of all of the beneficial users.
TNC (Pablo Ortiz-Partida)	SMC	DACs	For degraded water quality, the GSP presents water quality standards for constituents of concern (COCs) in Table 5-3. The GSP establishes minimum thresholds pertaining to salts and nutrients as follows (p. 5-41): "Concentrations of TDS, chloride, sulfate, boron, sodium, and nitrate are equal to or greater than WQOs in 50 percent of representative wells or are equal to concentrations present when SGMA was enacted	Describe direct and indirect impacts on drinking water users, DACs, and tribes when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act." Evaluate the cumulative or indirect impacts of proposed minimum	The method presented in Section 5 includes the rationale for the setting of minimum thresholds and measurable objectives to avoid the degradation of water quality in compliance with the SGMA regulations. The analysis presented is protective of all groundwater uses and users in the EMA, including agricultural, municipal, and domestic wells, and affected GDEs as presented in in Section 3.2.3 and 5.3.3.3 in the Plan. The presented methods are protective of public health for domestic and municipal water supply in response to the State's early review of

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			(January 2015). The WQOs [Water Quality Objectives] for each constituent are presented in Table 5-3 are considered the minimum thresholds for salts and nutrients. In cases where the ambient (prior to January 2015) water quality exceeds the WQO, the ambient water quality is considered the minimum threshold." The GSP does not state which COCs this applies to or present the ambient concentrations, however. The GSP should include SMC for all COCs in the EMA that may be impacted by groundwater use and/or management, in addition to coordinating with water quality regulatory programs. The GSP only includes a very general discussion of impacts to drinking water users when defining undesirable results and evaluating the impacts of proposed minimum thresholds. The GSP does not, however, mention or discuss direct and indirect impacts on DACs, drinking water users, or tribes when defining undesirable results for degraded water quality, nor does it evaluate the cumulative or indirect impacts of proposed minimum thresholds on DACs, drinking water users, or tribes.	thresholds for degraded water quality on drinking water users, DACs, and tribes. In Table 5-3 (Water Quality Standards for Selected Constituents of Concern), compare WQOs, MCLs, and ambient (prior to January 2015) water quality concentrations. Ensure that the most protective value is chosen for the minimum threshold. Set minimum thresholds and measurable objectives for all water quality constituents within the EMA. Ensure they align with drinking water standards.	several plans in other basins, which includes protection of users within the single tribal area in the EMA. The protection of drinking water users is based on state and federal drinking water standards and on water quality objectives established by the Regional Water Quality Control Board to protect all groundwater uses. The GSA did not set minimum thresholds for contaminants that might be detected in groundwater because these constituents are regulated under the authority of the RWQCB and DDW.
TNC (Pablo Ortiz-Partida)	SMC	GDEs	When defining undesirable results for chronic lowering of groundwater levels, the GSP states that high rate of pumping in the Paso Robles Formation or Careaga Sand could result in potential impacts to GDEs (p. 5-13). However, these impacts are not described or analyzed. This is problematic because without identifying potential impacts on GDEs, minimum thresholds may compromise these environmental beneficial users. Since GDEs may be present in areas of the EMA that are not adjacent to ISW (see our comments in the GDE section of this letter), they must also be considered when developing SMC for chronic lowering of groundwater levels. For depletion of interconnected surface water, the GSP mentions, but does not sufficiently analyze, the impacts of minimum thresholds on terrestrial GDEs. The GSP states: "The minimum threshold for this sustainability indicator is presented below and in Table 5-6: Groundwater levels measured at the piezometers proposed to be installed in the GDE areas of Alamo Pintado and Zanja de Cota Creek are 15 feet below the stream bed. This minimum threshold was selected because it represents the lowest groundwater level that most GDE plants can typically access with their roots, assuming that capillary action will bring groundwater further up into the profile. It is also intended to ensure that groundwater use does not significantly reduce the flow of surface water from the tributaries into the Santa Ynez River." Furthermore, the GSP makes no attempt to evaluate the impacts of the proposed minimum threshold on environmental beneficial users of surface water. The GSP does not explain how the chosen minimum thresholds and measurable objectives avoid significant and unreasonable effects on surface water beneficial users in the EMA, such as increased mortality and inability to perform key life processes (e.g., reproduction, migration).	Define chronic lowering of groundwater SMC directly for environmental beneficial users of groundwater. 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 on 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 EMA. Defining undesirable results is the crucial first step before the minimum thresholds can be determined. 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 EMA are reached.15 The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on both environmental beneficial users of groundwater and surface water 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. When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems".	Undesirable results and minimum thresholds for chronic declines in water levels and significant and unreasonable depletion of interconnected surface water took into consideration the need to avoid impacts to GDEs in accordance with SGMA, the SGMA Regulations, and DWR guidance. Undesirable results with respect to GDEs and approaches to avoid impacts to GDEs are described in section 5.10.1 through section 5.10.4. The proposed monitoring wells to be located with the identified GDE area are intended to provide monitoring data that can be used to assess depletion of interconnected surface water and significant and unreasonable adverse impacts to GDEs resulting from groundwater conditions occurring throughout the Basin. Additional projects and management actions described in Section 6.3 will be conducted by the EMA GSA to further evaluate the nature and extent of potential GDEs within the EMA.

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TNC (Pablo Ortiz-Partida)	General	Climate change	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 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 should clearly and transparently incorporate the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the EMA. While these extreme scenarios may have a lower likelihood of occurring, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management. The GSP incorporates climate change into key inputs (e.g., precipitation and evapotranspiration) of the projected water budget. However, imported water should also be adjusted for climate change and incorporated into the surface water flow inputs of the projected water budget. Furthermore, the GSP does not provide a sustainable yield based on the projected water budget with climate change incorporated. If the water budgets are incomplete, including the omission of projected climate change effects on imported water inputs, and sustainable yield is not calculated based on climate change projections, 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 and domestic well owners.	Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions. Incorporate climate change into surface water flow inputs, including imported water, for the projected water budget. Estimate sustainable yield based on the projected water budget with climate change incorporated. Incorporate climate change scenarios into projects and management actions.	Central tendency climate change factors provided by DWR were used for the projected future water budgets in accordance with DWR guidance. The EMA may choose to evaluate more extreme climate conditions in the future. It is anticipated that the effects of climate change and extended drought will be described in each annual report and evaluated as part of the GSP update process every five years. The GSA will use this information to determine whether additional management actions are warranted if undesirable results are observed. The projected future availability of imported SWP water is based on extensive CALSIM modeling conducted by the State, which is presented in Planning guidance from the CCWA and DWR's Delivery Capacity Report of 2019. This report showed and specifically accounted for low SWP allocations during these recent years. The discussion of SWP reliability in the Plan has been updated to reflect the most recent very low delivery projection. (Section 3.3.5.1.3)
TNC (Pablo Ortiz-Partida)	Monitoring Networks	Data gaps	The consideration of beneficial users when establishing monitoring networks is insufficient, due to lack of specific plans to increase the Representative Monitoring Sites (RMSs) in the monitoring network that represent shallow groundwater elevations around GDEs in the EMA. Figure 4-2 (Groundwater Level Monitoring Network Low Well Density Areas) does highlight the areas of data gaps in the EMA based on well density in the EMA. The GSP, however, does not specifically acknowledge data gaps in the GDE monitoring network for the Category B potential GDEs noted in Section 3.2.6 (Groundwater Dependent Ecosystems). Because maps of RMSs did not include DACs, tribes, domestic wells, and GDE mapping layers, it was difficult to determine whether or not the RMSs adequately represent water quality conditions and shallow groundwater elevations around DACs, tribes, domestic wells, and GDEs in the EMA.	Provide maps that overlay monitoring well locations with the locations of DACs, domestic wells, tribes, and GDEs to clearly identify potentially impacted areas. Increase the number of RMSs in the shallow aquifer across the EMA as needed to adequately monitor shallow groundwater elevations supporting beneficial users such as GDEs and shallow domestic wells. Provide specific plans, such as locations and a timeline, to fill the data gaps in the GDE monitoring network. Evaluate how the gathered data will be used to identify and map GDEs.	Section 5 and 6 include extensive discussion about plans to address data gaps with regard to water level monitoring in the EMA, including the two GDE areas as presented in Section 5.10.2 and on Figure 4-4. The specific locations shown on Figure 4-4 may be adjusted slightly but are designed specifically for the protection of the GDEs within these areas. These monitoring wells are in addition to the monitoring wells presented on Figure 4-1 (Groundwater Level Monitoring Network) and Figure 4-2 (Groundwater Level Monitoring Network Low Well Density Areas) and are solely intended for assessing surface water depletion and impacts to GDEs that could result from pumping. The specific plans and timeline for installation of these monitoring wells is discussed in Section 6.3 as one of the Group 1 Management Actions. The monitoring wells will be installed during implementation of the GSP.

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TNC (Pablo Ortiz-Partida)	Projects & Management Actions	DACs, GDEs	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, and drinking water users. The proposed projects and management actions that would improve the water supply, GDE habitats, or provide benefits to DACs within the EMA are currently classified as Group 2 or 3 projects, and the GSA does not have specific plans to develop these projects. Therefore, potential project and management actions may not protect beneficial users during the GSP implementation phase. Groundwater sustainability under SGMA is defined not just by sustainable yield, but by the avoidance of undesirable results for all beneficial users. We recommend including specific plans to implement a drinking water well impact mitigation program since the SMC section of the GSP outlines that up to 39% of domestic wells will be impacted at minimum thresholds.	For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to Attachment B for specific recommendations on how to implement a drinking water well mitigation program. For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts. The GSP discusses the Group 3 Project: Distributed Stormwater Managed Aquifer Recharge (DSW-MAR). Note that 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 further guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document." Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.	The well registration program described in Section 6 is intended to include all domestic wells, including well information provided by tribal members. No DACs are present within the EMA. This information will help the GSA understand whether undesirable results are being experienced by domestic well owners. A drinking water well impact mitigation program is not required by SGMA and is considered unnecessary at this time. The GSA will address undesirable results experienced by domestic wells owners if necessary. To this end, the GSA and the SYRWCD have added a link to their respective websites where anyone can report a water outage in a well. There are no disadvantaged communities identified within the EMA, based on several datasets (refer to the updated 2019 County-wide Integrated Regional Water Management Program report; 2020 California Air Resources Board and 2018 California Climate Investments Priority Populations online maps; and DWR's DAC mapping data from 2018 at the places and tract scales).
Joseph Hughes, Santa Ynez Water Group	Projects & Management Actions	Overlying groundwater rights	As previously expressed to the GSA, our members primary concern continues to be the GSA's failure to adequately consider the interests of agricultural landowners holding overlying groundwater rights and the effects of the GSA's actions on those landowners. This lack of consideration is evident in the GSA's proposed projects and management actions and associated financing structure. For example, the draft GSP anticipates increased pumping demands by groundwater users who hold appropriative groundwater rights. (Draft GSP, Table 3-37.) The draft GSA goes on to provide that projects or management actions may be implemented in response to these projected increases in demand. (Draft GSP, Section (3.3.3.7.).) Further, the draft GSP proposes a "proportional and equitable approach to funding implementation of the GSP. . . ." (Draft GSP, Section 6.2.) This will result in fees being levied for groundwater pumping "against all groundwater pumpers in the [Eastern Management Area]. . . ." (Draft GSP, Section 6.4.) Therefore, effectively, the GSA is requiring agricultural landowners who hold overlying groundwater rights to pay for the increased pumping of groundwater users who hold appropriative groundwater rights. Our members do not agree that this approach is equitable, as intended by the GSA.	None	The Plan does not include any allocation of pumping or water rights, which is outside of the scope of this GSP and SGMA regulations and guidance. The Plan does however contemplate a range of projects and management actions that are intended to address undesirable results, if observed. Options include a potential allocation program that would be designed to provide for a fair allocation of available groundwater supplies within the sustainable yield of the basin and consistent with water rights. Details of how an allocation program will be developed, implemented, and funded will be discussed in public meetings after the GSP is submitted to DWR, if the program is needed in the future. As set forth throughout the Plan, avoiding undesirable results and managing the basin within its sustainable yield actually helps to protect all beneficial uses and users of groundwater over the long-term, specifically including agricultural landowners. The comment states that agricultural landowners with overlying rights are being required to pay for the increased pumping of groundwater users who hold appropriative rights, but that is not correct. The Plan is not required to and does not establish or otherwise describe how the actual costs of maintaining groundwater sustainability will be allocated within the EMA. With that in mind, financial planning and possible approaches to cost allocation will be high priority matters following completion and submission of the Plan. Notably, all appropriative groundwater producers and those overlying producers in the EMA who are located within the SYRWD have paid groundwater pump charges to SYRWCD for over 50 years to help pay for groundwater monitoring, reporting, and related management activities. On the other hand, agricultural landowners located outside the SYRWD, which constitutes the majority of groundwater production in the EMA, have not incurred any costs to date related to a groundwater pump charge.
Bryan Bondy (via letter from Joseph Hughes, Santa Ynez Water Group)	2.3.1	Overlying groundwater rights	SYRWCD, City of Solvang, and ID No. 1 are incorrectly listed as overlying groundwater rights holders on p. 2-38	None	Comment noted. The text has been revised.

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Bryan Bondy (via letter from Joseph Hughes, Santa Ynez Water Group)	3.2.3	Management actions	Section 3.2.3 states that the "GSP focuses on constituents that relate to beneficial uses of groundwater that might be impacted by groundwater management activities" and later says "projects and management actions that are currently being considered, even if tentatively, are not anticipated to directly cause concentrations of any of these constituents in groundwater to increase" (emphasis added). These statements are conflicting. It is requested that the GSP clarify whether there is a demonstrable causal relationship between groundwater management or groundwater pumping and water quality degradation.	None	None of the Group 1 or Group 2 Management Actions have any direct relationship between groundwater management or groundwater pumping and water quality degradation. Three of the Group 3 Projects could potentially pertain to and help address potential water quality degradation as needed, including the following: • City of Solvang / Santa Ynez Community Services District WWTF Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse • Los Olivos Community Service District WWTF Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse • Santa Ynez Band of Chumash Indians WWTF Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse In this regard, Section 6.10.5 of the Plan states: "Each of the identified Group 3 projects would require planning and permitting prior to implementation, and all would require compliance with applicable regulations, including CEQA. These permitting and regulatory compliance issues for any specific project would be addressed during the study, planning, preliminary design/engineering, and permitting phases of any project that is identified by the EMA GSA for potential future consideration."
Bryan Bondy (via letter from Joseph Hughes, Santa Ynez Water Group)	3.2.5	Interconnected surface waters	This section does not include estimates of the quantity and timing of interconnected surface water depletions as required by GSP Emergency Regulations §354.16(f).	None	Within the EMA, the areas of the tributary alluvium that ultimately recharge the underlying Principle Aquifers (Paso Robles Formation and Careaga Sand) occur throughout the lengths of the tributary but are disconnected from the underlying groundwater, with the exception of the areas identified in the GDE discussion near the distal ends of two of these tributaries. Outside of these two areas, the tributary alluvium is not classified as interconnected surface water because these areas do not meet both elements of the applicable SGMA definition where: "the 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." Within these two areas, additional clarification to this point has been added to Section 3.2.5 and the modeling used to support the quantification of this in Section 5.10.
Bryan Bondy (via letter from Joseph Hughes, Santa Ynez Water Group)	3.2.5.1	Tributary alluvium	The 4th paragraph discusses various perennial reaches of various creeks that cross the EMA. Other than near the southern boundary of the Santa Ynez Uplands area, the text does not state whether interconnection exists along these reaches. The GSP could be improved by including a conceptual discussion concerning the approximate location and timing of interconnection along the remainder of the perennial reaches, if any. When taken together, the last two sentences of the 4th paragraph may be interpreted to imply that all perennial surface water flow is sourced from EMA groundwater (presumably during non-storm flow conditions). It is requested that the text be revised to indicate that many of the perennial reaches extend north of the basin boundary, indicating that they are, at least in part, spring fed from the surrounding bedrock of the San Rafael Mountains.	None	Clarification to this point has been added to Section 3.2.5 about the lack of a continuous saturated zone between the tributaries and the underlying principle aquifer except at the very distal ends of the tributaries where groundwater discharges to surface water. Everywhere else, the tributary reaches are losing and do not form a continuous saturated zone. The groundwater model was used to quantify the amount and timing of surface water depletion in the areas where the interconnection exists as discussed in Section 5.10. Please also refer to related Responses to Comments herein.

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Bryan Bondy (via letter from Joseph Hughes, Santa Ynez Water Group)	Figure 3-52	Water budget	Comparison of Figure 3-52 with the representative hydrographs provided in the appendices, suggests that the water balance is not following groundwater level trends. Based on the hydrographs for the Paso Robles Formation, the cumulative storage change should peak sooner (earlier in the 2000s) and should do so at a higher value that is significantly greater than the starting value of zero (groundwater levels were notably higher in the early 2000s as compared to the 1982). The groundwater level trends also suggest that the declining storage in the 1980s is overestimated. Based on these observations, there is a concern that the historical water budget is not well "calibrated" to the groundwater level data and is biased toward overestimating storage declines and underestimating storage increases. As a result, there is a concern that the historical water balance overstates the EMA storage deficit.	None	The water budget values were compared to water levels within Section 3 during development of the overall Plan. While the water levels in the Paso Robles Formation show a strong correlation with climatic conditions with water elevation decreases of more than 100 feet during prolonged drought cycles in some wells, most wells appear to fully recover within a few years when the drought conditions end over the historic period, likely related to groundwater pumping and climatic conditions. The timing of storage change was calculated based on available datasets described in Section 3.3.2 on Table 3-17. The water duty factors that were chosen to be historically consistent with SYRWCD self-reported values, in coordination with the entire Basin. Groundwater levels vary throughout the basin and some may not precisely match the overall change in storage trend. The groundwater model was calibrated to many dozens of wells in the EMA and the computed change in storage using the model over the historical period was a very close match to the estimated change of storage used in the water budget for that period. During Plan implementation, the installation of flow meters on all wells in the EMA and other actions presented in Sections 5 and 6 will ensure that total groundwater production is accurately quantified, which will improve the estimated change in storage.
Bryan Bondy (via letter from Joseph Hughes, Santa Ynez Water Group)	Water budget	Water budget	The projected increase in irrigated acreage is likely overstated. Based on feedback from growers in the Santa Ynez Water Group, the current trend is one of higher value, higher water demand crops leaving the region. As crops leave the region area, there is less incentive to convert pastureland or other land into irrigated land. The "large increase expected" in cannabis stated in memo will likely occur on previously unirrigated acres, if it happens at all. It is requested that the projected water budget be updated considering this comment. The water duty factors for vineyards are too high. A more realistic water duty is closer to 1 – 1.2 AFY/acre, inclusive of both irrigation and frost protection (per vineyard operators in Santa Ynez Water Group). It is requested that the projected water budget be updated considering this comment.	None	The projected increase in irrigated acreage was based on various data, including comments made by a number of agricultural growers and landowners in the EMA. It is not possible to determine at this time exactly where the increase in cannabis production will occur. The actual amount and location of irrigated crop production will be reevaluated every 5 years when the GSP is updated. The water duty factors were chosen to be historically consistent with SYRWCD self-reported values, in coordination with the entire Basin. The choice of the water duty factors for vineyards was established and revised based on discussion during public meetings, of which the SYWG was part. As set forth in Section 3.3.5.1.2: "There has been some discussion in public meetings that the water duty factor of 1.60 acre-feet per acre per year for vineyards may be too high and the current water use for the crop may be closer to 1.0 to 1.2 acre-feet per acre per year inclusive of irrigation and frost protection." Installation of flow meters that is part of the GSP will help quantify the actual amount of water produced and will assist in further estimating actual water duty factors for the EMA based on particular crop types.
Bryan Bondy (via letter from Joseph Hughes, Santa Ynez Water Group)	SMC	Groundwater levels	Chronic Lowering of Groundwater Levels – The logic behind the minimum thresholds is questionable and the minimum thresholds themselves appear arbitrary. The GSP concludes that well operational issues that may be associated with groundwater levels below the top of well screens are indicative of significant and unreasonable depletion of supply. First, well operational issues are not a depletion of supply in of themselves; rather they are infrastructure issues that can be remedied through well redevelopment, well replacement, or backup wells, which could be implemented as GSP projects. It is suggested that depletion of supply not be viewed as well issues that can be remedied; rather, depletion of supply is more appropriately characterized as the inability to produce adequate water because the water isn't there. Second, the "well impact" analysis provides clear evidence contrary to the GSP conclusions. Approximately 25-30% of the wells in the EMA had groundwater levels below top of screen in 2018, yet the GSP states that no reported significant and unreasonable effects occurred (see p. 5-13). If the premise is that groundwater levels below top of screen causes significant and unreasonable effects, then why haven't numerous instances of significant and unreasonable effects been reported already? Moreover, the number of wells with groundwater levels below the top screen at minimum threshold groundwater elevations is not materially different	None	The minimum threshold is based on the well-documented reasons summarized in the sustainability goal (Section 5.2), which includes "Long-term groundwater elevations are adequate to support existing and future reasonable and beneficial uses throughout the Basin." The minimum thresholds were based on well-documented water levels and documented well-completion information, which was discussed during several public meetings. The protection of all known agricultural, municipal, and domestic wells from loss of production (depletion of supply) is a priority and the selected minimum thresholds were chosen to "Maintain sufficient groundwater volumes in storage to sustain current and ongoing beneficial uses and users of groundwater which maintains access to groundwater supplies, including during prolonged drought conditions while avoiding undesirable results (Section 5.2.1). The loss of ability of any of the users to be able to access groundwater with existing wells would violate the sustainability goal. As indicated in Responses to Comments above and as set forth throughout the Plan, avoiding undesirable results and managing the basin within its sustainable yield actually helps to protect all beneficial uses and users of groundwater over the long-term, specifically including agricultural landowners. In regard to the second comment, the well impact analysis was the method chosen in public meetings to achieve this goal, which was based on public input for agricultural, environmental, domestic, and municipal uses (listed in alphabetical order). The GSA contemplated the analysis at length and it was determined that the selected method was protective of most groundwater users, which became the basis of the minimum threshold. The method is protective of existing well infrastructure, because the GSA believes it is an unfair burden for most users to

Commenter	Section	Theme	Comment	Commenter's Recommendation	Response
			than the number of wells at 2018 groundwater levels. (0% more municipal wells, 0-3% more agricultural wells, and 1.7-4% more domestic wells). There is no justification for why the very small increase in the number of wells with groundwater levels below top of screen results causes the EMA to cross the line into the realm of significant and unreasonable effects. No specific, demonstrable effects that are not occurring at 2018 levels, but are expected to occur at the minimum threshold levels are identified. For these reasons, the minimum thresholds seem arbitrary. The GSP states that the magnitude of impacts from groundwater levels below tops of well screens differs depending on well type (i.e., agricultural versus municipal, versus domestic) and notes that domestic wells tend to be shallower and may be more sensitive to water levels falling within the screen interval. The GSP goes on to say that municipal wells serve drinking water to citizens living in the EMA and so supply reduction cannot be easily addressed. Agricultural wells often are deeper and have longer well screens that can tolerate loss of efficiency and more drawdown resulting from water levels falling below top of screen. It is noted that there is nothing that has or would prevent municipal or domestic well owners from drilling deeper wells. It is unfair to restrict the use of the groundwater resource and/or charge fees to benefit specific types of beneficial users who have not made the same level of investment to access the groundwater resource as others. If the GSP is to keep groundwater levels high enough to prevent well issues for those who have not fully invested in infrastructure to access the resource during droughts, then those users should fund the management actions necessary to do so, particularly in the case of appropriators whose groundwater rights are junior to the overlying landowners.		replace current infrastructure with deeper wells should water levels decline significantly and unreasonably.
Bryan Bondy (via letter from Joseph Hughes, Santa Ynez Water Group)	SMC	Degraded water quality	The GSP could be improved by explaining how the GSA will differentiate between changes in concentrations caused by groundwater pumping or GSA activities versus other mechanisms.	None	None of the Group 1 or Group 2 Management Actions have any direct relationship between groundwater management or groundwater pumping and water quality degradation. Three of the Group 3 Projects could potentially pertain to and help address potential water quality degradation as needed, including the following: 1. City of Solvang / Santa Ynez Community Services District WWTF Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse 2. Los Olivos Community Service District WWTF Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse 3. Santa Ynez Band of Chumash Indians WWTF Recycled Water & Reuse In Lieu of Groundwater Pumping or Indirect Potable Reuse In this regard, Section 6.10.5 of the Plan states: "Each of the identified Group 3 projects would require planning and permitting prior to implementation, and all would require compliance with applicable regulations, including CEQA. These permitting and regulatory compliance issues (including water quality) for any specific project would be addressed during the study, planning, preliminary design/engineering, and permitting phases of any project that is identified by the EMA GSA for potential future consideration".
Bryan Bondy (via letter from Joseph Hughes,	SMC	Subsidence	The subsidence minimum threshold does not appear to be supported by any evidence to indicate that significant and unreasonable effects would occur if it were exceeded. The three bullets listed on page 5-46 and text elsewhere in Section 5.9 may be more appropriately called "land surface	None	The subsidence MT is based on published values for accuracy. The text has been updated to differentiate between land surface elevation changes and land subsidence. Land surface may rise or fall, elastically, in any one year. Land surface elevation fluctuation may or may not indicate long-term permanent subsidence.

Commenter	Section	Theme	Comment	Commenter's Recommendation	Response
Santa Ynez Water Group)			elevation changes" instead of "land subsidence", because the data sets relied on up do not differentiate between land surface elevation changes resulting from tectonic activity versus elastic or inelastic land subsidence due to groundwater withdrawal. N: "The InSAR data provided by DWR is subject to measurement error. DWR has stated that, on a statewide level, the total vertical displacement measurements between June 2015 and June 2018 is subject to two error sources (Brezing, personal communication): 1. The error between InSAR data and continuous GPS data is 16 mm (0.052 feet) with a 95% confidence level 2. The measurement accuracy when converting from the raw InSAR data to the maps provided by DWR is 0.048 feet with 95% confidence level. Simply adding the errors 1 and 2 results in a combined potential error of 0.1 foot (or 1.2 inches). While this is not a robust statistical analysis, it does provide an estimate of the potential error in the InSAR maps provided by DWR. A land surface change of less than 0.1 feet is therefore within the noise of the data, and is equivalent to no subsidence in this GSP."		This can be caused by tectonic activity in the earth. It can also be caused by grading activities, particularly in agricultural areas or housing developments.
Bryan Bondy (via letter from Joseph Hughes, Santa Ynez Water Group)	SMC	Interconnected surface waters	The depletions of interconnected surface water minimum threshold of 15 feet below the stream bed was selected based on the conclusion that it is the lowest groundwater level that most GDE plants can typically access with their roots. However, Table 3-13 indicates that Coast Live Oaks occupy approximately one-half of the Category A GDE, which have a rooting depth of approximately 30 feet1. Riparian mixed hardwood makes up the balance of the Category A GDE area, with a shallower typical rooting depth. If a deeper minimum threshold (say 30 feet) was used and the result was replacement of riparian mixed hardwood with Coast Live Oaks, would that be a significant and unreasonable effect?	None	The analysis of GDEs in Section 3.2.6 does not consider the replacement of one GDE species with another as such analysis does not represent the existing GDEs that have been identified. Selection of a deeper minimum threshold would increase the possibility of significant and unreasonable adverse impacts to the groundwater dependent riparian community that is presently there.
Bryan Bondy (via letter from Joseph Hughes, Santa Ynez Water Group)	6.1	Management actions	Section 6.1 states "The EMA GSA has developed a portfolio of potential management actions and projects compatible with the respective operational philosophies that can be implemented in a phased manner as the conditions I the Basin dictate" (emphasis added). What are the "operational philosophies" and what is their source?	None	For clarification purposes, the referenced sentence has been revised as follows: "The EMA GSA has developed a portfolio of potential management actions and projects compatible with EMA GSA sustainability goal that can be implemented in a phased manner as the conditions in the Basin dictate. The GSP sustainability goal referenced in Section 6.1 of the GSP reflects input from the EMA GSA, the EMA Citizens Advisory Group (CAG), stakeholders, and the public at large.
Bryan Bondy (via letter from Joseph Hughes, Santa Ynez Water Group)	6.1	Management actions	Section 6.1 states "Further, the EMA GSA may determine that the implementation of Group 2 management actions and/or Group 3 projects is desirable for reasons other than reaching sustainability within the EMA and may elect to implement initiatives from either Group 2 or 3 at any time." Please provide examples and please explain what authority the EMA GSA would use to implement projects or management actions for any reason other than to achieve sustainability.	None	As clearly set forth in the Plan, any future decision to implement Group 2 management actions and/or Group 3 projects will be a function of groundwater conditions existing in the basin and the need to avoid undesirable results and maintain groundwater sustainability as defined by SGMA and established by the Plan. If at such time such a decision is made, any actions that would be associated with such action(s) would be accompanied by CEQA review, if required, and developed and implemented in accordance with all applicable laws and regulations and in accordance with a fully transparent and inclusive public stakeholder process.

Commenter	Section	Theme	Comment	Commenter's Recommendation	Response
Bryan Bondy (via letter from Joseph Hughes, Santa Ynez Water Group)	6.1	Management actions	Section 6.1 states "Based on the results of the analysis that was performed in conjunction with the development of this GSP, the EMA GSA concludes that the sustainability goals described in this GSP and required under the provisions of SGMA can be achieved through the implementation, as needed, of the Group 1 management actions described in Sections 6.3 through 6.6." What is the referenced analysis and where can details be found?	None	Please refer to GSP Sections 6.4.7, 6.5.7, 6.6.7, and 6.9.7. The sustainability goals can be achieved as described in those sections, including (briefly) the following: As a critical element of the GSP implementation, the Groundwater Pumping Fee Program is expected to mitigate a portion of the estimated storage deficit by motivating groundwater users that currently do not pay any pump charge to reduce pumping or pump groundwater supplies in a more sustainable fashion (6.4.7). Installation of meters and an extraction fee has been shown to reduce pumping in other basins. The management action described in this section will be designed and implemented for the specific purpose of obtaining data that will allow an enhanced understanding of the total volume of water being extracted. (6.5.7) The implementation of water use efficiency and best management measures have been shown to reduce water usage by up to 20 percent or more. Assuming EMA-wide implementation of these programs achieves a 10 percent reduction in pumping, the resulting benefit would be approximately 1,450 AFY. (6.6.7) A voluntary fallowing and conversion program involving 10 percent of the irrigated cropland could result in a benefit of approximately 1,450 AFY. (6.9.7) When taken together, implementation of these Group 1 management actions will likely total at least 1800 AFY, an amount equal to the estimated storage deficit for the historical period.
Bryan Bondy (via letter from Joseph Hughes, Santa Ynez Water Group)	6.2	Overlying groundwater rights	Section 6.2 states "A proportional and equitable approach to funding implementation of the GSP and any optional actions will be developed in accordance with all state laws and applicable public process requirements" (emphasis added). Section 6.4 adds "Fees to be levied for groundwater pumping will likely be in addition to a tiered base fee structure that will be levied against all groundwater pumpers in the EMA, including de minimis pumpers" The SYWG overlying rights holders do not agree that a proportional approach to funding GSP implementation applied to all groundwater pumpers is equitable because it does not consider groundwater rights priorities. Because overlying landowners' groundwater rights are senior to appropriators; The SYWG overlying rights holders believe consideration should be given to requiring appropriators to first reduce their pumping and/or fund actions necessary to achieve the sustainable yield.	None	As noted above, the important issues of funding the implementation measures presented in Sections 6 and 7 of the Plan will require further input and development through the GSA and public stakeholder process. While specific funding mechanisms are not required to be included in the Plan, they will be priority issues early in 2022 following submission of the Plan. The Plan contemplates a range of potential projects and management actions that are intended to address undesirable results, if observed, which SGMA requires. Options include a potential allocation program that would be designed to provide for a fair allocation and management of available groundwater supplies within the sustainable yield of the basin and in consideration of water rights. Details of how an allocation program would be developed, implemented, and funded will be discussed in public meetings after the GSP is submitted to DWR, if the program is needed in the future. As set forth throughout the Plan, avoiding undesirable results and managing the basin within its sustainable yield actually helps to protect all beneficial uses and users of groundwater over the long-term, specifically including agricultural landowners.
Bryan Bondy (via letter from Joseph Hughes, Santa Ynez Water Group)	Water budget	Storage deficit	The GSP water budgets indicate a "storage deficit" under historical and projected future conditions. Despite the specific requirement to identify and quantify overdraft conditions, (GSP Emergency Regulations §354.18(5)), the GSP does not explicitly indicate whether an overdraft condition exists because of the how the term "storage deficit" is used in the text, apparently in place of "overdraft." It is requested that the GSP clearly state whether overdraft conditions existed over a period of years during which water year and water supply conditions approximate average conditions and, if so, quantify the overdraft.	None	The EMA has chosen to use the word storage deficit rather than the term overdraft in order to avoid legal interpretations of the term overdraft, which is not specifically defined in SGMA. According to DWR, overdraft occurs where the average annual amount of groundwater extraction exceeds the long-term average annual supply of water to the basin. The GSP has met the requirement to identify the amount of groundwater extraction that exceeds the long term average annual supply during the historical, current, and projected future conditions.

Commenter	Section	Theme	Comment	Commenter's Recommendation	Response
Bryan Bondy (via letter from Joseph Hughes, Santa Ynez Water Group)	6.2	Management actions	Table 3-37 presents projections of increasing pumping by EMA appropriators. Section 3.3.3.7 (Reliability of Historical Surface Water Supplies) and Section 3.3.5.2 (Summary of Projected Water Budget) describes the potential for additional increases in pumping by groundwater appropriators in the EMA not captured in Table 3-37 to address potential decreases in Lake Cachuma or imported water supplies. The draft GSP goes on to say that projects or management actions may be implemented by the GSA to address these increased demands. Based on text in Section 6.2, it is anticipated that the costs for these projects or management actions would be paid for by all EMA groundwater users. The SYWG believes it would be more appropriate for the costs for any projects or management actions to address increased pumping by the appropriators be paid for by the appropriators instead of sharing those costs with senior water rights holders.	None	The GSP contemplates potential modest increases in pumping to serve both municipal and agricultural uses in the future. Should undesirable results be observed, and water levels and storage continue to decline, the GSA has the authority to implement projects and management actions to address the condition as described in Section 6. The GSA also has the authority to levy fees to pay for the programs. As noted above, the important issues of funding the implementation measures presented in Sections 6 and 7 of the Plan will require further input and development through the GSA and public stakeholder process after the GSP is submitted. Any fees that will be levied will be developed in an open and transparent process. Targeted outreach meetings and technical workshops, in addition to regularly scheduled EMA GSA meetings, will be held to inform all groundwater pumpers and other stakeholders about the details of the proposed Groundwater Pumping Fee Program. Groundwater pumpers and interested stakeholders will have the opportunity at these meetings to learn about the programs as well as the opportunity to provide input and comments on how the pumping fee program may be implemented in the EMA.
Sharyne Merritt	General	Multiple	Questions raised by neighboring farmers: Have the Farm Bureau and vintner's association been engaged so meters and fee requirements don't come as a surprise? Is it possible for additional directors to be added to the GSA Board? such as local water agencies, an environmental director, or an agricultural director. Will implementation of the GSP affect new wells (as in Cuyama) and/or the Growth of Buellton (as Urban Growth Boundary) runs out?	None	As noted in Responses to Comments above, the agricultural community has been actively engaged throughout the GSP development process and has provided written and verbal comments on multiple sections of the GSP, participated in GSA committee meetings, and participated in CAG meetings. The comment indicates that agricultural landowners have been "intentionally disenfranchised" from decision-making, but that is not the case. Per express SGMA requirements, the formation of the EMA GSA includes a combination of local agencies that have water supply, water management, or land use responsibilities within the EMA. (See Water Code sections 10721(n), 10723.6.) Moreover, although SGMA provides the opportunity for mutual water companies to participate in a GSA (Water Code section 10723.6(b)), landowners in the EMA made their own choice in not pursuing that level of involvement on the GSA. Currently, agricultural representation in the EMA is through SYRWCD and the County of Santa Barbara. ID No.1 also purveys up to 50 percent of its water supply to agricultural customers. Furthermore, as recognized by the comment, several agricultural representatives were intentionally selected to serve on the EMA Citizens Advisory Group, and have actively served in that important capacity throughout the Plan development process. Formation of the Citizens Advisory Group was not mandatory under SGMA, yet the GSA believed the Group would ensure a critical level of stakeholder review and input, and for nearly two years the Group provided direct feedback to the GSA on the development and specific content of the Plan. Future governance and membership of the GSA will be considered after the GSP is submitted to DWR.
Mark Infanti (Solvang City Council Member)	General	Disadvantaged communities; Interconnected surface waters	The TNC seemed to have drinking water for disadvantaged communities as a priority while the GSA is trying to make sure that all the users have water. They do suggest a map showing all the stream reaches in the EMA, with reaches clearly labeled as interconnected or disconnected.		As included in responses to the TNC comments: There are no disadvantaged communities identified within the EMA, based on several datasets (refer to the updated 2019 County-wide Integrated Regional Water Management Program report; 2020 California Air Resources Board and 2018 California Climate Investments Priority Populations online maps; and DWR's DAC mapping data from 2018 at the places and tract scales). The discussion about interconnected surface waters is presented throughout the responses to comments and has been clarified within the text of the Plan. The lower reaches of Alamo Pintado and Zanja de Cota Creek represent the only locations within the EMA where surface water within the tributary alluvium is interconnected with a continuous saturated zone. These areas are interconnected with the underlying principal aquifers and appear to support GDEs. An evaluation of potential significant and unreasonable depletion of interconnected surface water in these areas is presented in Section 5.10.2. A GDE monitoring program has been included in the Plan for these areas.

Commenter	Section	Theme	Comment	Commenter's Recommendation	Response
Mark Infanti (Solvang City Council Member)	General	Interconnected surface waters	Fish and Wildlife review listed concerns for the surface water for fish. This included suggestions for maps identifying species, identify the estimated quantity and timing of streamflow depletions and map depletions of interconnected surface waters.		These issues have been significantly expanded upon within these responses to comments and in the text of the Plan.
Mark Infanti (Solvang City Council Member)	Water Budget	Timeframe of water budget	NOAA also listed impact on the GDE and fish. Their comment that I found pertinent was "the revised Draft Budget should include justification for selecting water years 1982 through 2018 as the historical water budget period" and "an assessment should be made of the land-use practices over a longer period to better assess the groundwater pumping patterns within the Eastern Management Area."		A more complete discussion of the basis for selecting the historical water budget period selection is included in Section 3.3.1 in the public draft and final versions of the Plan. This period captures multiple wet, dry, and normal hydrologic periods and includes the period that high quality data was available for the analysis. There is no need to consider land use changes prior to 1982 for groundwater management purposes going forward.

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September 21, 2021

VIA E-MAIL AND U.S. MAIL

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Re: Sustainable Groundwater Management Act

Gentlemen:

We are counsel for the Santa Ynez Water Group (Group), which is a coalition of farmers and ranchers within the Santa Ynez River Groundwater Basin (Basin). These agricultural landowners formed the Group to protect their overlying rights to groundwater in the Basin. This includes engaging with your three groundwater sustainability agencies (GSA) as you develop and administer your respective groundwater sustainability plans (GSP) under the Sustainable Groundwater Management Act (SGMA).

The Group has been monitoring the activities of the Western Management Area GSA, the Central Management Area GSA, and the Eastern Management Area GSA. We have several concerns regarding the current course of events and the burdens your GSAs apparently intend to place solely on agricultural landowners. The purpose of this letter is to express those concerns and request the ability to participate directly regarding the GSPs and the activities of the GSAs.

1. Landowner Representation

There is no exclusive agricultural landowner representation on any of the GSAs' governing committees. Each committee is composed of representatives from governmental agencies with non-agricultural constituencies. For example, the Western Management Area GSA Committee is made up of (1) Santa Ynez River Water Conservation District; (2) the County of Santa Barbara; (3) the City of Lompoc; (4) Mission Hills Community Services District; and (5) Vandenberg Village Community Services District. Both the Central Management Area GSA Committee and the Eastern Management Area GSA Committee are similar. This does not represent the entirety of the water users and interests in the Basin and excludes any direct representation from the agricultural community. Thus, at the outset, the make-up of the GSAs was flawed.

The only avenue your GSAs allowed agricultural landowners to voice their unique opinions or concerns is through the Citizens Advisory Groups. But, just as the name suggests, those groups are only advisory, are weighted toward non-agricultural interests, and carry no decision-making authority. Put simply, agricultural landowners have been intentionally disenfranchised from the decision-making.

We are aware that the GSAs are exploring a potential reorganization of their governance structure. Whether that reorganization results in each GSA remaining as three separate GSAs or forming a single coordinated GSA, it is likely that each GSA will revisit or draft new organizational documents. When doing so, we ask that each GSA include a voting director position for an agricultural landowner representative on each decision-making body formed or otherwise reorganized.

2. Implementation of Projects and Management Actions

We are also concerned with the projects and management actions identified by the GSAs in the draft GSPs. While we understand that many of the GSAs' respective Group 1 projects and management actions focus primarily on monitoring and reporting efforts, all other projects single out and discriminate against agricultural landowners. The burden of sustainability is therefore placed solely on the backs of agricultural landowners.

Funding for these projects and management actions mirrors that problem. We are aware that the GSAs are considering a groundwater extraction fee, assessment, or other property-related fee to fund the GSAs' projects and management actions. As those considerations continue, we encourage the GSAs to pursue the most equitable option in levying that financial burden. Agricultural landowners should not be unfairly targeted with projects and management actions, and then be forced to pay for their development and implementation.

3. Consideration of Overlying Groundwater Rights

Our last concern underlies all that the GSAs are doing. None of the GSAs have considered the effects their actions will have on overlying groundwater rights of agricultural landowners. This omission is evident in the draft GSPs as the GSAs focus exclusively on the interests of municipal groundwater users. This violates the mandates of SGMA requiring your GSAs to consider the interests of all beneficial uses and users of groundwater. Specifically, Water Code section 10723.2 provides, in part:

> "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater, as well as those responsible for implementing groundwater sustainability plans. These interests include, but are not limited to, all of the following:

(a) Holders of overlying groundwater rights, including:

(1) Agricultural users, including farmers, ranchers, and dairy professionals.

. . ."

Our hope is that the GSAs expand their focus and discharge their duty to consider *all* interests in the Basin as required by SGMA.

We understand the complexities of the issues and the challenges in developing a GSP. Our desire is a successful GSP, and to be part of the process. But we cannot do that if the GSAs intentionally disenfranchise agricultural landowners and their senior overlying rights in the Basin.

Please have the attorney advising the GSAs on these issues contact me so that we can discuss how best to resolve our concerns.

Very truly yours,

Joseph D. Hughes

JDH/sbh

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
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September 23, 2021

Bill Buelow, Water Resources Manager
Santa Ynez River Valley Groundwater Basin
Eastern Management Area
Groundwater Sustainability Agency
P.O. Box 719
Santa Ynez, California 93460

Re: Draft Santa Ynez River Valley Groundwater Sustainability Plan – Eastern Management Area (September 8, 2021)

Dear Mr. Buelow:

The Santa Ynez River Valley Groundwater Basin Groundwater Sustainability Plan (Draft GSP) for the Eastern Management Area is intended to meet the requirement of the California Sustainability Groundwater Management Act (SGMA). The SMGA includes specific requirements to identify and consider impacts to Groundwater Dependent Ecosystems (GDE) that have significant and unreasonable adverse impacts on all recognized beneficial uses of groundwater and related surface waters (Water Section 10720).

Unfortunately our review indicates the Draft GSP does not adequately address the recognized instream beneficial uses of the Santa Ynez River and its major tributaries within the boundaries of the Eastern Management Area, or other GDE, potentially affected by the management of groundwater within the Eastern Management Area. In particular, the Draft GSP does not adequately address the depletion of interconnected shallow groundwater basins and the pattern of groundwater extraction that have occurred historically, currently, or likely to occur in the future, and its potential adverse effects on the federally listed endangered southern California steelhead (*Oncorhynchus mykiss*).

Of particular concern is the potential adverse effects on designated critical habitat for southern California steelhead within the Santa Ynez River, and the Alisal, Quiota, and Hilton creek tributaries, within the boundaries of the Eastern Management Area. The surface flows at the confluence of Alisal, Quiota, and Hilton creek tributaries are important for maintaining surface hydrologic connectivity for steelhead (and other native aquatic-dependent species) attempting to migrate between these tributaries and the middle reaches of the Santa Ynez River.

NOAA's National Marine Fisheries Service (NMFS) has previously provided extensive comments on these issues, which have not been adequately addressed in the Draft GPS for the Eastern Management Area (see, the attached NMFS letters of April 28, 2021, "Draft Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan – Basin Setting: Groundwater Budget" and July 7, 2021, "Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan Section 5 – Sustainable Management Criteria").

NMFS appreciates the opportunity to comment on the proposed GSP for Eastern Management Area. If you have a question regarding this letter or enclosure, please contact Mr. Mark H. Capelli in our Santa Barbara Office (805) 963-6478 or mark.capelli@noaa.gov.

Sincerely,

Anthony P. Spina
Chief, Southern California Branch
California Coastal Office

Enclosure

cc: Natalie Stork, Chief, DWR, Groundwater Management Program
Mark Nordberg, CDWR
Trevor Joseph, CDWR, Senior Engineering Geologist
James Nachbaur, SWRCB
Darren Brumback, NMFS
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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
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April 28, 2021

Bill Buelow, Water Resources Manager
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Eastern Management Area
Groundwater Sustainability Agency
P.O. Box 719
Santa Ynez, California 93460

Re: Draft Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan – Basin Setting: Groundwater Budget (April 6, 2021)

Dear Mr. Buelow:

Enclosed with this letter are NOAA's National Marine Fisheries Service's (NMFS) comments on the Draft Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan – Basin Groundwater Budget (Draft Budget).

The Draft Budget is intended to meet the requirement of the California Sustainability Groundwater Management Act (SGMA). The SMGA includes specific requirements to identify and consider impacts to Groundwater Dependent Ecosystems (GDE) that have significant and unreasonable adverse impacts on all recognized beneficial uses of groundwater and related surface waters. (See Cal. Water Code §§ 10720.1, 10721, 10727.2.)

As explained more fully in the enclosure, the Draft Budget does not adequately address the recognized instream beneficial uses of the Santa Ynez River, or other GDE, potentially affected by the management of groundwater within the Eastern Management Area. In particular, the Draft Budget does not adequately recognize or analyze important GDE, including the federally endangered steelhead (*Oncorhynchus mykiss*) dependent on groundwater supported surface flows.

The reasons for these conclusions are set forth in the enclosure. NMFS recommends that the revised Draft Budget be re-circulated to give interested parties an opportunity to review and comment on the Draft Budget before it is finalized.

NMFS appreciates the opportunity to comment regarding on the Draft Budget. If you have a question regarding this letter or enclosure, please contact Mr. Mark H. Capelli in our Santa Barbara Office (805) 963-6478 or mark.capelli@noaa.gov.

Sincerely,

Anthony P. Spina
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cc:

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NOAA's National Marine Fisheries Service's Comments on Draft Eastern Management Area Groundwater Budget for the Santa Ynez River, Santa Barbara County

(April 6, 2021)

April 28, 2021

Overview

NOAA's National Marine Fisheries Service (NMFS) herein comments on the April 2021 draft Eastern Management Area Groundwater Budget technical memorandum prepared by GSI Water Solutions, Inc. (hereafter referred to as "Draft Budget") as background for the Groundwater Sustainability Plan (GSP). Prior to presenting the comments, NMFS first presents background information on the endangered steelhead (*Oncorhynchus mykiss*), which reside in the Santa Ynez River Watershed, including the Eastern Management Area. That background information includes the status of the species, actions that are essential for recovery of the species, and life history and habitat requirement needs. That information provides context for understanding the potential implications of operating the Eastern Management Area in the Santa Ynez River Valley for this imperiled species. Our comments on the Draft Budget are presented subsequently.

Status of Steelhead, Recovery Needs, and Life History and Habitat Requirements

Status of steelhead and habitat for the species in the Santa Ynez River Watershed.—NMFS listed southern California steelhead, including the populations in the Santa Ynez River watershed (which includes the Eastern Management Area), as endangered in 1997 (62 FR 43937), and reaffirmed the endangered listing in 2006 (71 FR 5248).

NMFS designated critical habitat for southern California steelhead in 2005 (70 FR 52488). This designation included the main stem of the Santa Ynez River (and estuary), which traverses the Eastern Management Area, and upstream tributaries to the Santa Ynez (see enclosed map of "Lower Santa Ynez River Watershed Critical Habitat").

Critical habitat for endangered steelhead provides: 1) freshwater spawning habitat with water quality and quantity conditions and substrate supporting spawning, incubation, and larval development, 2) freshwater rearing sites with water quality and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility, water quality and forage supporting juvenile development, and natural cover such as shade, submerged and overhanging vegetation, and 3) freshwater migration corridors free of passage obstructions to promote adult and juvenile mobility and survival. See map of Lower Santa Ynez River Watershed Steelhead Critical Habitat

As part of the recovery planning process for southern California steelhead, NMFS's Southwest Fisheries Science also developed maps of the intrinsic potential habitat within the coastal watersheds, including the Santa Ynez River watershed (Boughton and Goslin 2006). The maps are based on information on observed associations between fish distribution and the values of environmental variables such as stream gradient, summer mean discharge and air temperature, valley width to mean discharge, and the presence of alluvial deposits that are essential to steelhead spawning and rearing. One limitation of the methodology used for the mapping exercise is that it does not fully account for groundwater inputs that therefore may in some cases underestimate the extent of intrinsic potential

habitat. (see enclosed map of "Lower Santa Ynez River Intrinsic Potential Steelhead Spawning and Rearing Habitat" within the Eastern Management Area above Bradbury Dam).
Habitat for this species has been adversely affected by loss and modification of physical or biological features (substrate, water quality and quantity, water temperature channel morphology and complexity, riparian vegetation, passage conditions) through activities such as groundwater extractions and related surface-water diversions (NMFS 2012). Thus many of the physical and biological features of designated critical habitats have been significantly degraded (and in some cases lost) in ways detrimental to the biological needs of steelhead. These habitat modifications have hindered the ability of designated critical habitat to provide for the survival and ultimately recovery of this species.

Recovery needs of endangered steelhead.—Among other federally mandated responsibilities, NMFS is responsible for administering the U.S. Endangered Species Act for the protection and conservation of endangered steelhead inhabiting the Santa Ynez River Watershed. Consistent with this responsibility, NMFS developed the Southern California Steelhead Recovery Plan (NMFS 2012)[1] and through a comprehensive analysis of threats to this species, groundwater pumping and surface flow diversions were identified as "very high" threats to the long-term survival of endangered steelhead in the Santa Ynez River (NMFS 2012, pp. 9-1 through 9-17.)

To address the identified water-related threats to endangered steelhead in the Santa Ynez River watershed, NMFS' Southern California Steelhead Recovery Plan identifies a number of recovery actions targeting surface diversions and groundwater extraction (NMFS 2012, p. 8-6, Table 9-7, p. 9-61). These include:

SYR-SCS-6.1 Conduct groundwater extraction analysis and assessment. Conduct hydrological analysis to identify groundwater extraction rates, effects on the natural stream pattern (timing, duration and magnitude) of surface flows in the mainstem and tributaries, and the estuary, and effects on all *O. mykiss* life history stages, including adult and juvenile *O. mykiss* migration, spawning, incubation, and rearing habitats.

SYR-SCR-6.2 Develop and implement groundwater monitoring and management program. Develop and implement groundwater monitoring program to guide management of groundwater extractions to ensure surface flows provide essential support for all *O. mykiss* life history stages, including adult and juvenile *O. mykiss* spawning, incubation and rearing habitats to support the life history and habitat requirements of adult and juvenile steelhead. (Table 9-2, p. 9-37).

Steelhead life history and habitat requirements.—Adult steelhead spend a majority of their adult life in the marine environment. However, much of this species life history (migration to and from spawning areas, spawning, incubation of eggs and the rearing of juveniles) occurs in the freshwater environment, including in the main stem and tributaries such as those in the Santa Ynez River Watershed. Many of the natural limiting factors (such as seasonal variation in rainfall, runoff, and ambient air and water temperatures) are exacerbated by the artificial modification of these freshwater habitats. This includes both surface and sub-surface extractions that lower the water table and can, in turn, affect the timing, duration, and magnitude of surface flows essential for steelhead migration, spawning and rearing. In southern California, warm, rain-free summers require that juvenile

[1] National Marine Fisheries Service. 2012. Southern California Coast Steelhead Recovery Plan. West Coast Region, California Coastal Area Office, Long Beach, California.

steelhead spend rearing time in sections of the stream network that do not desiccated or overheat beyond thermal-tolerance levels. The over-summering period can be challenging to juvenile steelhead survival and growth. Lowered groundwater tables during the dry season can indirectly affect rearing individuals by reducing vegetative cover, and directly by reducing or eliminating the summertime surface flows in parts of the watershed.

General Comments

When analyzing impacts on steelhead or other aquatic organisms resulting from groundwater and related streamflow diversions, identifying flow levels that effectively support essential life functions of this organism is critical (Barlow and Leake 2012). Specifically, it is essential to determine what flows adequately supports adult steelhead migration during the winter and spring, and juvenile rearing year round. Without an understanding of these hydrologic/biotic relationships, a Groundwater Sustainability Plan cannot ensure that significant and unreasonable adverse impacts from groundwater depletion (and in the case of the Santa Ynez River, the integrally related surface water diversion/groundwater recharge program) are avoided (California Department of Water Resources 2016, Heath 1983).

Groundwater inputs to surface flows can buffer daily temperature fluctuations in a stream (Hebert 2016, Barlow and Leake 2012, Brunke et al. 1996, Heath 1983). Artificially reducing the groundwater inputs would likely expand or shrink the amount of fish habitat and feeding opportunities for rearing juvenile steelhead (Croyle 2009, Glasser et al. 2007, Sophocleous 2002, Fetter 1997), and reduce opportunities for juveniles to successfully emigrate to the estuary and the ocean (Hayes, et al. 2008, Bond 2006). As noted above, low summer baseflow, likely caused by both surface water diversions and pumping hydraulically connected groundwater, is noted as a significant stress to steelhead survival in the Santa Ynez River and tributaries (NMFS 2012, p. 9-15, Table 9-2).

Specific Comments

The following specific comments on the Draft Budget are arranged by page and paragraph number.

3 Basin Setting

Page 6

3rd paragraph: Because the Draft Budget is being prepared under the authority of SGMA, the introduction should explicitly acknowledge the need to address Groundwater Dependent Ecosystems (GDE) in the introduction (*e.g.*, *see* Belin 2018, The Nature Conservancy 2018).

3.3 Water Budget

3.3.1 Overview of Water Budget Development

Page 9

4th paragraph: The Draft Budget indicates: “The Santa Ynez River and associated underflow within the Santa Ynez River Alluvium is included in the surface water system that is summarized in the budget. As surface water, the Santa Ynez River Alluvium is not considered a principal aquifer because the water within this geological unit is present within the defined bed and banks of the channel and thus is not considered groundwater in accordance with Water Code, Section 10721(g). The surface water system is managed under the jurisdiction of the California State Water Resources Control Board (SWRCB) and is not within the purview of SGMA. Therefore, water both above ground and below ground within the Santa Ynez River, defined as the Santa Ynez River Water Conservation District's (SYRWCD's) Zone A portion of the EMA, is quantified as surface water."

This statement raises a number of issues that should be addressed in the revised document. First, it should be noted that the Eastern Management Area includes more than just the mainstem of the Santa Ynez River; it also includes a number of tributaries, including, but not limited to: Zaca Creek, Alamo Pintado Creek, Happy Canyon, Alisal Creek, Hilton Creek, Quiota Creek, San Lucas Creek, Santa Aqueda Creek, Teqepis Creek, Cachuma Creek, and Santa Cruz Creek. Second, the revised Draft Budget should clarify whether (1) a formal determination regarding the nature and status of the subflow has been made, and by what authority; (2) how a "principal aquifer" is defined for the purposes of SGMA; (3) if such a formal designation has been applied, and by what authority; and, (4) the specific provisions of the SGMA supporting this interpretation of the scope of a GSP, specifically for the Central Management Area of the lower Santa Ynez River. (*e.g.*, *see* Sax 2002 for a general discussion of groundwater classified as subterranean flow)

Surface Water Inflows (Santa Ynez River)

Page 12

2nd paragraph: The water budget should explicitly acknowledge the tributaries within the Eastern Management Area that contribute to the groundwater resources within the Eastern Management Area.

Page 13

Figure 3-42. Historical, Current, and Projected Water Budget Periods

The revised Draft Budget should include justification for selecting water years 1982 through 2018 as the historical water budget period. Of particular concern, while the period of record chosen includes two wet and dry periods, the selected period does not necessarily capture the change in land uses and the associated groundwater pumping from the Eastern Management Basin. An assessment should be made of the land-use practices over a longer period to better assess the groundwater pumping patterns within the Eastern Management Area.

3.3.2 Water Budget Data Sources

3.3.2.1 Surface Water Inflow Components

Page 17

See comments above regarding tributaries to the Santa Ynez River within the Eastern Management Area.

3.3.2.1.2 Native Stream Flow

Page 18

1st paragraph: The Draft Budget apparently limits**, "**Native streamflow in the Santa Ynez River main stem and in tributary creeks to the Santa Ynez River downstream of Bradbury Dam . . ." It is not clear why this limitation is use, since there are other tributaries to the Santa Ynez River above Bradbury Dam which are also within the Easter Management Area (e.g., Cachuma Creek, Santa Cruz Creek). The revised Draft Budget should therefore explain the basis for this limitation.

Page 19

1st paragraph: The Draft Budget states, "The Santa Ynez River and underflow is accurately gauged and highly regulated. Therefore, the level of uncertainty of these data is low." While there are stream flow gauges on the Santa Ynez River that provide information on stream flow fluctuations, these gauging program does not consistently record base flows for a variety of reasons (including timely gauge calibration, shifting channel morphology, etc.). However, these lower base flows can be critical to some GDE such as rearing juvenile *O. mykiss* and other native aquatic species.

The Draft Budge also notes, "The flow from the tributary creeks, however, is ungauged and estimated based on BCM and SYRHM data outputs. The uncertainty of these data are considered high because large scale regional models are being used to estimate these water budget terms." As noted above these lower base flows can be critical to some GDE such as rearing juvenile *O. mykiss* and other native aquatic species.

Finally, the Draft Budget states "In our opinion, the uncertainty associated with estimated tributary flow does not limit the GSA's ability to manage the Santa Ynez Uplands groundwater system because the tributary flow terms are relatively small when compared to the other water budget terms."

This assessment does not appear to be valid for two fundamental reasons. First, the uncertainty regarding the contribution of tributary flows, individually and cumulatively, to the groundwater/surface water conditions in the mainstem of the Santa Ynez River within the Eastern Management Area is unknown. Second, the contribution of the tributary flows, relative to other sources of groundwater/surface water to the water budget, is not an appropriate measure for assessing importance of the tributaries GDE, or the tributaries' contribution to GDE in the mainstem of the Santa Ynez River within the Eastern Basin. Furthermore, comparing the relative size of the tributary flow to supporting out-of-stream consumptive beneficial uses of water associated with the Eastern Management Basin is not an appropriate metric in assessing their importance to GDE. Even small contributory flows can be important in sustaining habitats utilized by native aquatic species that have adaptive mechanisms that allow them to carry out their life-cycles, including rearing during periods of naturally small base flows.

Table 3-3. Tributary Creeks to the Santa Ynez River Downstream of Bradbury Dam

This table does not, but should, include the tributaries to the Sant Ynez River above Bradbury Dam that are also within the boundaries of the Eastern Management Area, but should. These include: Cachuma Creek and Santa Cruz Creek.

3.3.2.1.4 Subsurface Inflow: Mountain Front Recharge to Surface Water

Pages 19-20

1st paragraph: The Draft Budget states**, "**Mountain front recharge from the Santa Ynez Mountains that flows directly into streams and the Santa Ynez River Alluvium (considered to be surface water) was calculated using the adjusted and calibrated BCM model as described in Section 3.3.2.1.2." The revised Draft Budget should clarify if the reference to "considered to be surface water" was intended to refer to both the tributary flows into streams and the Santa Ynez River Alluvium. Also, see comments above regarding issues and questions raised about the authority of SGMA over these groundwater resources.

2nd paragraph: The Draft Budget concludes, "We do not believe that uncertainty associated with estimates of mountain front recharge limit the GSA's ability to manage the Santa Ynez Uplands groundwater system because the overall water budget is consistent with the calibrated groundwater flow model." As noted above NMFS this conclusion appears unsupported given the uncertainty of the groundwater inputs, and the potential importance of even small inputs in supporting GDE, including native *O. mykiss* and other native aquatic species.

3.3.2.2.3. Subsurface Inflow: Mountain Front Recharge

Page 21

The Draft Budget states, "We do not believe that uncertainty associated with estimates of mountain front recharge limit the GSA's ability to manage the Santa Ynez Uplands groundwater?" See comments above regarding this uncertainty.

3.3.2.2 Groundwater Inflow Components

Page 20

1st paragraph: The Draft Budget states, "Note that the groundwater system includes only the aquifers in the Santa Ynez Uplands portion of the EMA and specifically excludes all water within the Santa Ynez River Alluvium, which is managed as surface water under the jurisdiction of the SWRCB." See comments above regarding this issue.

3.3.2.3 Surface Water Outflow Components

3.3.2.3.1 Santa Ynez River Outflow

Page 23

See comments above regarding the accuracy of measuring base flows.

3.3.2.3.2 Subsurface Outflow

Page 24

1st paragraph: The Draft Budget states, “This [subsurface] outflow occurs at the downstream end of the EMA along the border with the CMA.” However, there are subsurface outflows from the tributaries (Cachuma Creek and Santa Cruz Creek) at the upstream end of the East Management Area; the outflow location can influenced by the lake level in Cachuma Reservoir.

3.3.2.4 Groundwater Outflow Components

3.3.2.4.6 Subsurface Groundwater Outflow

3.3.3 Historical Water Budget (Water Years 1982 through 2018)

Page 35

2nd paragraph: The Draft Budget states, “The period for water years 1982 through 2018 was selected as the historical water budget period because it is long enough to capture typical climate variations (with two wet and two dry hydrologic cycles) and includes recent changes in imported water supply availability, changes to water demand associated with cropping patterns, and associated land use.” As noted above, while the period of record chosen includes two wet and dry periods, this period does not necessarily capture the change in land uses and the associated groundwater pumping from the Eastern Management Basin. As assessment should be made of the land-use practices over a longer period to better assess the groundwater pumping patterns within the Eastern Management Area; the results of that assessment should be presented in the revised Draft Budget

3.3.3.1 Surface Water Inflows

3.3.3.1.1 Local Surface Water Inflow

Page 37

Table 3-7. Annual Surface Water Inflow, Historical Period (1982 through 2018)

Table 3-7 shows that the average annual combined tributary surface water inflow is approximately 44% of the inflow from the Santa Ynez River; however, the calculation only includes tributaries within the Eastern Management Area that are downstream of Bradbury Dam and does not include any surface water inflow from tributaries above Bradbury Dam within the Eastern Management Area (e.g., Cachuma Creek and Santa Cruz Creek). The revised Draft Budget should include an analysis that corrects this condition.

Table 3-8. Annual Surface Water Outflow, Historical Period (1982 through 2018)

Table 3-8 indicates the annual subsurface outflow of groundwater is essentially the same for the average, minimum, and maximum. This seem anomalous, given the different annual levels of surface water inflow noted in Table 3-7.

Also, Table 3-9 indicates the difference between the average and the maximum and minimum rate of Phreatophyte Evapotranspiration is around 5%; again this seem anomalous given wide range of annual weather conditions. The same comment applies to Table 3-10. It is not clear how this calculation was made. The revised Draft Budget should include an explanation that clarifies or corrects this issue.

Table 3-10. Annual Groundwater Outflow, Historical Period (1982 through 2018)

Page 38

Table 3-10 records a significant impact on groundwater outflow during minimum annual water years when groundwater pumping has decreased approximately 10% from the average annual water year, but groundwater outflow decreased approximately 96%. This pattern has potentially significant implication for supporting GDE, including *O. mykiss* and other native aquatic species.

3.3.3.6.1 Sustainable Yield Estimate of the Basin

Page 46
1st and 2nd paragraph: The discussion of sustainable yield estimates of the groundwater basin(s) in the Eastern Management Area focuses on out-of-stream consumptive uses of groundwater and does not, but should, include an explicit discussion of the role of groundwater in sustaining GDE, including, but not limited to the federally endangered southern California steelhead.

3.3.3.7 Reliability of Historical Surface Water Supplies

Page 47

1st through 3rdth paragraphs: The depiction of these components of a water budget focuses on out-of-stream consumptive beneficial uses. However, it should also expressly include a discussion of historical water supplies that have supported GDE within the Eastern Management Area, including but not limited to the federally listed endangered southern California steelhead, as well as other native aquatic species.

3.3.4 Current Water Budget (Water Years 2011 through 2018)

Pages 48-54

See comment above regarding the period of record chosen for the Draft Budget.

3.3.5 Projected Water Budget

Page 55-56
The Draft Budget expressly describes only out-of-stream uses of groundwater and surface water (Solvang ID No. 1, Mutual Water, Rural Domestic, Agricultural Pumping), but only expressly recognized non-consumptive out-of-stream uses of groundwater (i.e., Phreatophyte). It does not expressly recognize the other beneficial uses of the surface and groundwater of the Eastern

Management Area. The CCRWQCB has listed cold freshwater habitat, fish spawning, reproduction and/or early development, migration of aquatic organisms, and habitat for rare, threatened, and endangered species, as beneficial uses for the Santa Ynez River under their Central Coast Basin Plan (CCRWQCB 2019); these should be explicitly described in the revised Draft Budget. Additionally, there are GDE that should be enumerated and described, as part of the suite of beneficial uses, and their locations, that must be addressed as part of the GSP for the Eastern Management Area.

3.3.5.1.1 Projected Hydrology

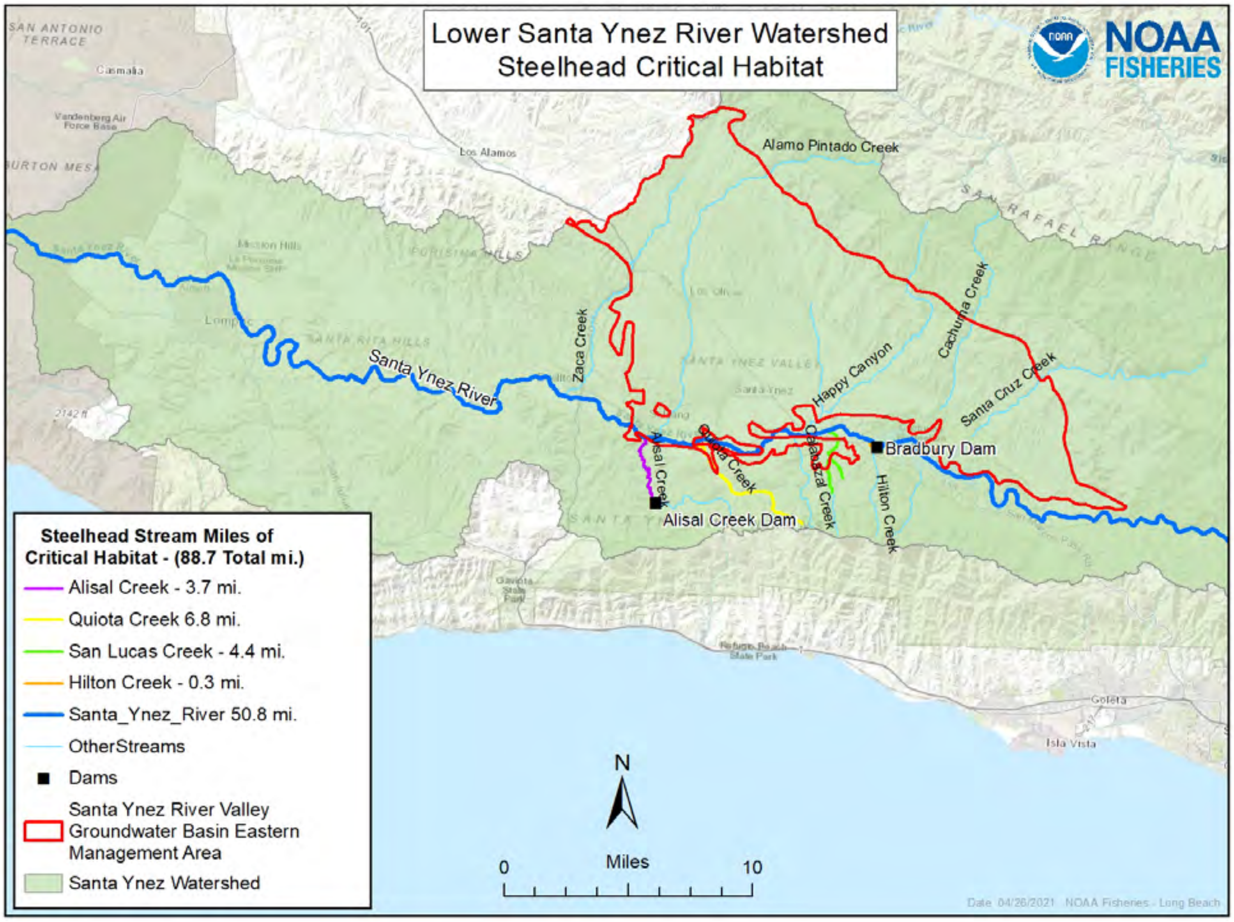
Page 57

3rd paragraph: The Draft Budget notes, "The projected changes to streamflow do however apply through the tributaries that flow through the Santa Ynez Uplands and ultimately into the Santa Ynez River."

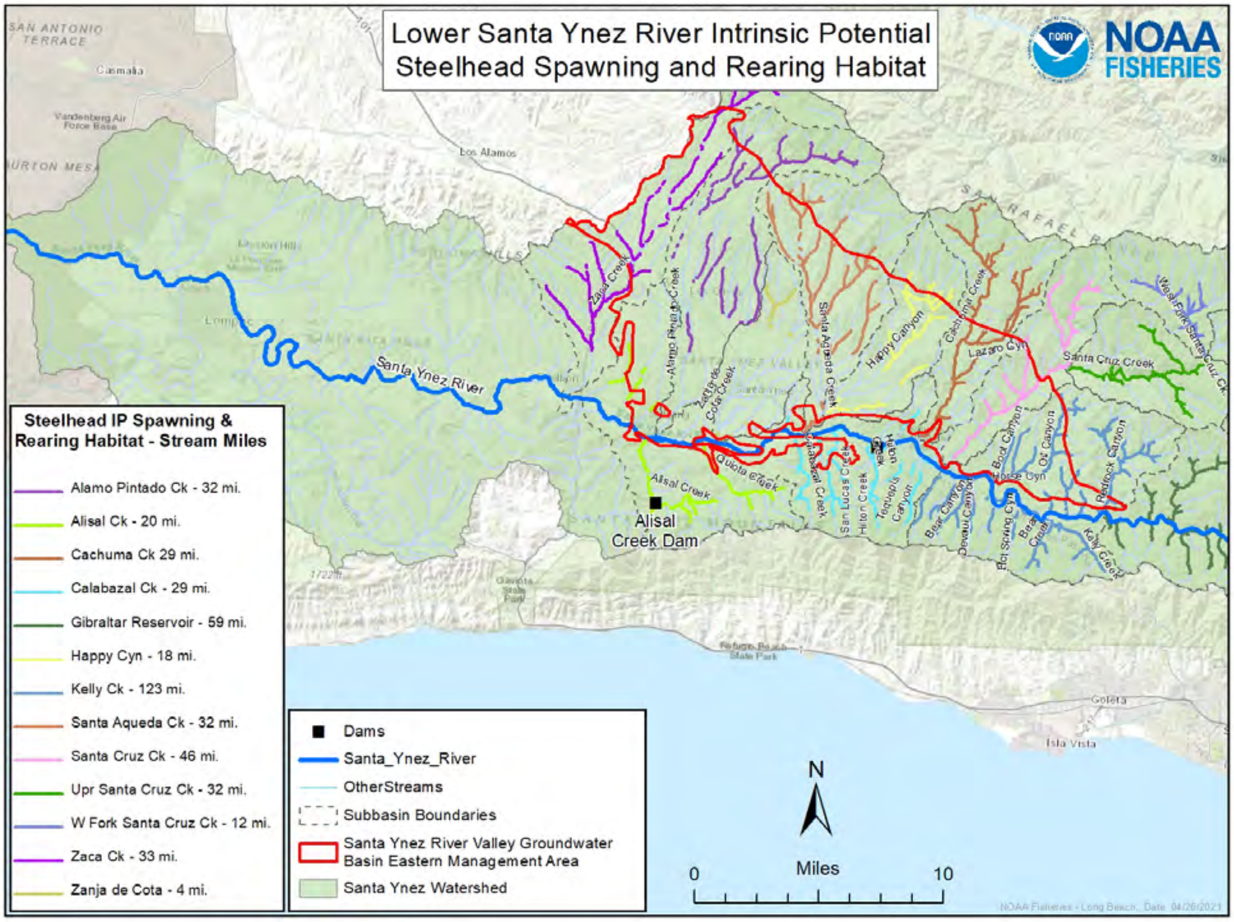
The revised Draft Budget should clarify what this statement means. For instance, is the intent to exclude the tributaries within the Eastern Management Area from consideration in the Draft Budget? We would note that perennial surface water/or flow is not required by SGMA to identify a GDE. Rather, connection via a saturated zone between groundwater and surface water "at any point" when surface waters are not otherwise depleted constitutes an interconnected connection condition. We would note further that seasonally or ephemeral surface flows can be important to a variety of fish and amphibian species (see for example, Erman and Hawthorne 1976, and Boughton et al. 2009).

Further, while groundwater management actions may not directly affect flow in the upper reaches of these tributaries, drawing down the groundwater near the confluence of the tributary and the Santa Ynez River can affect the hydraulic connectivity between the tributaries and the river. This hydraulic connectivity (even if only seasonal) can be important for the movement (or migration) of a variety of fish and or amphibian species. These tributaries, therefore, should not be considered as disconnected from the water table, but should be classified as having interconnected surface water under SGMA.

Finally, we would note that the SWRCB's analysis and water rights order focused on the mainstem of the Santa Ynez River, and specifically did not address flow requirements in the tributaries to the lower Santa Ynez River. However, the SWRCB did note, "Operations of the dam have also resulted in an increased potential for mortality from stranding and desiccation caused when surface flows in tributaries where fish are residing are disconnected from the main channel" (State Water Resources Control Board, FEIR, Vol. III, Appendix D, pp. 29, 52.).



70 FR 52488. 2005. Final Rule: Endangered and Threatened Species; Designation of Critical Habitat for Seven Evolutionarily Significant Units/Distinct Population Segments of Pacific Salmon and Steelhead in California.



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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
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July 7, 2021

Bill Buelow, Water Resources Manager
Santa Ynez River Valley Groundwater Basin
Eastern Management Area
Groundwater Sustainability Agency
P.O. Box 719
Santa Ynez, California 93460

Re: Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan Section 5 – Sustainable Management Criteria (June 18, 2021)

Dear Mr. Buelow:

Enclosed with this letter are NOAA's National Marine Fisheries Service's (NMFS) comments on the Draft Santa Ynez River Valley Groundwater Basin – Eastern Management Area Groundwater Sustainability Plan – Sustainable Management Criteria.

The Draft Sustainable Management Criteria are intended to meet the requirement of the California Sustainability Groundwater Management Act (SGMA). The SMGA includes specific sustainable criteria to address impacts to Groundwater Dependent Ecosystems (GDE) that have significant and unreasonable adverse impacts on all recognized beneficial uses of groundwater and related surface waters. (*See* Cal. Water Code §§ 10720.1, 10721, 10727.2)

As explained more fully in the enclosure, the Draft Sustainable Management Criteria do not adequately address the recognized instream beneficial uses of the Santa Ynez River, or other GDE, potentially affected by the management of groundwater within the Eastern Management Area. In particular, the Draft Sustainable Management Criteria do not adequately recognize or analyze important GDE, including the federally endangered steelhead (*Oncorhynchus mykiss*) that rely on groundwater supported surface flows.

The reasons for these conclusions are set forth in the enclosure. NMFS recommends that the revised Draft Sustainable Management Criteria be re-circulated to give interested parties an opportunity to review and comment on the Draft Sustainable Management Criteria before they are finalized.

NMFS appreciates the opportunity to comment on the Draft Sustainable Management Criteria. If you have a question regarding this letter or enclosure, please contact Mr. Mark H. Capelli in our Santa Barbara Office (805) 963-6478 or mark.capelli@noaa.gov.

Sincerely,

Anthony P. Spina
Chief, Southern California Branch
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cc:
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NOAA's National Marine Fisheries Service's Comments on Draft Eastern Management Area Sustainable Management Criteria for the Santa Ynez River, Santa Barbara County

July 7, 2021

Introduction

NOAA's National Marine Fisheries Service (NMFS) previously commented on the February 2021 draft Eastern Management Area (EMA) Groundwater – Basin Setting: Groundwater Budget (April 28, 2021). NMFS incorporates those comments herein, including those dealing with the status, recovery needs, and life history and habitat requirements of the federally listed endangered southern California steelhead (*Oncorhynchus mykiss*).

General Comments

Groundwater inputs to surface flows can perform a number of functions important to the maintenance of Groundwater Dependent Ecosystems (GDE); for example, they can buffer daily temperature fluctuations in a stream (Heath 1983, Brunke *et al*. 1996, Barlow and Leake 2012, Hebert 2016). Artificially reducing the groundwater inputs can also shrink the amount of habitat and feeding opportunities for rearing juvenile steelhead (Fetter 1997, Sophocleous 2002, Glasser *et al*. 2007, Croyle 2009), and reduce opportunities for juveniles to successfully emigrate to the estuary and the ocean (Bond 2006, Hayes *et al*. 2008, Hayes *et al.* 2011). Low summer baseflow, likely caused by both surface water diversions and pumping hydraulically connected groundwater, is recognized as a significant stress to steelhead survival in the Santa Ynez River and tributaries (NMFS 2012, p. 9-15, Table 9-2).

Specific Comments

The following specific comments on the Draft Sustainable Management Criteria (Draft Criteria) are arranged by section and page number.

5.1 Definitions

Undesirable result refers to the definition provided in § 10721(x) of SGMA

Pages 8-9

The Draft Criteria defines an undesirable result as:

> Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods. (p. 9)

However, as noted below, this definition do not recognize the adverse effects of *periodic* reduction of groundwater on GDE, including the use by spawning and rearing steelhead. The effects of periodic groundwater reductions on out-of-stream beneficial uses (*e.g.*, domestic or agricultural water supplies) may be addressed with alternative water sources. Nevertheless, instream beneficial uses such as GDE may be more vulnerable to such groundwater reductions, for which there is no alternative water source to sustain the GDE.

5.2 Sustainability Goals

Page 10

The sustainable goals are expressed explicitly and exclusively in terms of groundwater levels, and do not recognize the important relationship between groundwater levels and the surface flows (particularly base flows) that contribute to the maintenance of GDE. This is an important omission that should be corrected in the revised document because GDE for the EMA basin includes the use of surface flow by the federally listed endangered southern California steelhead for migration, spawning and rearing.

5.2.1 Qualitative Objectives for Meeting Sustainability Goals

Page 11

The sustainable objectives includes avoiding chronic reduction of groundwater, but not the adverse effects of periodic reduction of groundwater on GDE, including the use by spawning and rearing steelhead. The effects of periodic groundwater reductions on out-of-stream beneficial uses (*e.g.*, domestic or agricultural water supplies) may be addressed with alternative water sources. However, instream uses such as GDE are more vulnerable to such groundwater reductions, because there is generally no alternative water source to sustain the GDE.

5.3 Process for Establishing Sustainable Management Criteria [Section 354.26(a)

Pages 11-12

The Draft Criteria describes the public process of receiving comments on the various draft components of the GSP; however, the Draft Criteria does not appear to, but should, reflect the comments that NMFS has previously provided on the February 2021 draft EMA Groundwater – Basin Setting: Groundwater Budget (April 28, 2021). There are no specific criteria in the Draft Criteria that deal with the GDE associated with the federally listed species (or the designated critical habitat) which utilize portion of the EMA. In fact, the word “steelhead”, “trout”, or even “fish” do not appear in the Draft Criteria. The revised document should correct this deficiency and include a description of the extensiveness of designated critical habitat for endangered steelhead that exists in the project area, as well as identify the intrinsic potential habitat (*See* Figures 1 and 2 below).

5.3.2. Criteria for Defining Undesirable Results [Sections 354.26(1) and (d)]

Pages 12 -13

The criteria for defining undesirable results do not, but should, provide meaningful guidance. Some deal with causes not effects, and the effects are expressed in terms that are simply re-statements of goals, not criteria or objectives for meeting identified goals. As a result, there is no way of knowing with a reasonable level of assurance whether identified goals have been truly attained, and whether changes in operations would be necessary to achieve the goals.

5.3.3 Information and Methodology Used to Establish Minimum Thresholds and Measurable Objectives [Sections 354.28(b)(1), (c)(1)(A)(B), and (e)]

Pages 13 -16

In reviewing the methods used to establish thresholds and objectives, it appears that all of the metrics were physical or chemical, lacking any biological metrics. As NMFS has indicated in its previous comment letter, it is essential to determine what flows adequately supports the freshwater life history phases of steelhead. Without an understanding of these hydrologic/biotic relationships, a Groundwater Sustainability Plan (GSP) cannot ensure that significant and unreasonable adverse impacts from groundwater depletion (and in the case of the Santa Ynez River, the integrally related surface water diversion/groundwater recharge program) are avoided (Heath 1983, California Department of Water Resources 2016).

5.3.3.5 Avoid Depletion on Interconnected Surface Water

Page 15

The Draft Criteria indicates that it relies on "Published documents and independent analysis that identify the extent and distribution of potential GDEs." However the Draft Criteria, as well as the Basin Setting: Groundwater Budget appear to rely on methodology that uses vegetation as the principal means of identifying GDE (*e.g*., The Nature Conservancy 2019). While this method may be useful for identifying select GDE, it is not adequate to identify GDE that are not defined by vegetation alone. For steelhead, the GSP should also consider the information provided in NMFS' designated critical habitat for this species as well as in NMFS identification of intrinsic potential habitat (Boughton and Goslin 2006; *see* also Boughton *et al.* 2009) (*See* Figures 1 and 2 below for graphical presentation of this information).

5.3.4 Relationship between Individual Minimum Thresholds and Other Sustainability Indicators (Section 354.28(b)(23)]

Page 16

The Draft Criteria should also include Individual Minimum Thresholds that address GDE other than those defined by the presence of riparian vegetation. See additional comments below.

5.5 Chronic Lowering of Groundwater Levels Sustainable Management Criterion

5.5.1. Undesirable Results [Section 345.26(a)(2), (c) and (d)]

Pages 17-18

The Draft Criteria analyzes lowering groundwater levels primarily in terms of affecting groundwater supplies for out-of-stream beneficial uses, and undesirable results that would affect these uses. It does not, but should, explicitly address other instream beneficial uses, such as those associated with GDE

The Draft Criteria should be revised to include a discussion of specific GDE, including those associated with the federally listed endangered southern California steelhead.

55.2 Minimum Thresholds [Section 354.28(a)(b)(1)(A)(B), (d), and (e)]

Pages 19-23

As with the discussion of lowering groundwater levels, the Draft Criteria discusses minimum thresholds primarily in terms of groundwater supplies for out-of-stream beneficial uses.

For example, the Draft Criteria indicates:

> "Based on the well impact analysis, the GSA Committee agreed to set the minimum threshold for representative wells screened in the Careaga Sand at 12 feet below spring 2018 groundwater levels. If groundwater levels continued to decline at current rates (2019–2021) in representative wells, minimum thresholds for the chronic lowering of groundwater levels sustainability indicator would be exceeded in 50 percent of representative wells (*See* Section 5.5.2.7), approximately four to five years following implementation of the GSP. These thresholds are not expected to cause a significant and unreasonable reduction of groundwater in storage." (p. 22)

To develop a clear understanding of the consequence of the Committee's minimum threshold, which is currently lacking, the Draft Criteria should be revised to include a discussion of the predicted consequences of the proposed threshold on GDE, including those associated with the federally listed endangered southern California steelhead.

5.5.2.4 Effects of Minimum Thresholds on Neighboring Basin [Section 354.28(b)(3)]

Page 24

The neighboring basins include the Santa Ynez River Valley Groundwater Basin – Central Management Area (CMA) of the Santa Ynez Basin and San Antonio Creek Valley Groundwater Basin (SACV).

The Draft Criteria recognizes that the CMA is hydrologically down gradient of the EMA and is hydrologically connected. However, the Draft Criteria indicates:

> "Based on available information, groundwater gradients at the boundary between the EMA and SACV are such that groundwater does not flow between the EMA and SACV and therefore, the SACV would not be impacted by the minimum threshold for the chronic lowering of groundwater levels sustainability indicator in the EMA." (p. 24)

As NMFS has noted in previous comments, while groundwater management actions in the mainstem of the Santa Ynez River may not directly affect flow in the tributaries to the Santa Ynez River, drawing down the groundwater near the confluence of the tributary and the Santa Ynez River can affect the hydraulic connectivity between the tributaries and the river. This hydraulic connectivity (even if only seasonal) can have implications for the movement (or migration) of a variety of fish and or amphibian species (*See* State Water Resources Control Board 2011). These tributaries, therefore, should not be considered as disconnected from the water table, but should be classified in the revised document as having interconnected surface water in accordance with the SGMA.

5.5.2.5 Effects of Minimum Thresholds on Beneficial Uses and Land Use [Section 354.28(b)(4)

Page 25

The Draft Criteria states that, "No federal, state, or local standards exist for chronic lowering of groundwater levels." (p. 25). While it is true that there are not numeric standards, this statement does not appear to recognize the broad standards that that are established by SGMA.

5.5.3 Measurable Objectives (Section 354.30(a), (b), (c), (d), and (g)]

Pages 26-27

See comments above regarding Information and Methodology Used to Establish Minimum Thresholds and Measurable Objectives (5.3.3).

5.6.2 Minimum Thresholds [Section 354.28(a)(b)(1), (c)(2), (d), and (e)]

Pages 30-32

See comments above regarding Information and Methodology Used to Establish Minimum Thresholds and Measurable Objectives (5.3.3).

5.6.2.3 Effects on Beneficial Uses and Land Uses [Section 354.28(b)(4)]

Page 33

The beneficial uses of the surface waters of the Santa Ynez River that are associated with the GDE include: Warm Fresh Water Habitat (WARM), Cold Fresh Water Habitat (COLD), Estuarine Habitat (EST), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Migration of Aquatic Organisms (MIGR), and Spawning, Reproduction, and /or Early

Development of fish (SPWN) (*See*, for example, California Regional Water Quality Control Board, Central Coast Region (2019), Table 2.1. Identified Uses of Inland Surface Waters).

As noted above, the Draft Criteria, appears to focus primarily on out-of-stream beneficial uses, but should be revised to expressly and explicitly deal with all of the beneficial uses that are associated with GDG, including the federally listed endangered southern California steelhead.

5.6.3 Measurable Objective [354.30(a)(c), (d), and (g)]

Page 34

See comments above regarding Information and Methodology Used to Establish Minimum Thresholds and Measurable Objectives (5.3.3).

5.8.1 Undesirable Results [Section 354.26(a), (b)(1), (b)(2), and (d)]

Page 36

See comments above regarding Effects on Beneficial Uses and Land Uses (5.6.2.3)

5.8.2 Minimum Thresholds [Section 354.28(b)(1), (c)(4), and (e)]

Pages 38-41

See comments above regarding Information and Methodology Used to Establish Minimum Thresholds and Measurable Objectives (5.3.3).

5.8.2.5 Effects of Minimum Thresholds on Beneficial Uses and Land Use [Section 354.26(b)(3)]

Pages 42-44

See comments above regarding Information and Methodology Used to Establish Minimum Thresholds and Measurable Objectives (5.3.3).

5.9.2 Minimum Thresholds [Section 354.26(c) and 354.28(a), (b)(1), (c)(5)(A)(B), (d), and (e)]

Pages 47-51

See comments above regarding Information and Methodology Used to Establish Minimum Thresholds and Measurable Objectives (5.3.3).

5.10 Depletion of Interconnected Surface Water Sustainability Management Criterion

Pages 52 - 62

As noted above, the Draft Criteria appear to rely on methodology that use vegetation as the principal means of identifying GDE (*e.g*., The Nature Conservancy 2019). For example, the Draft Criteria indicates:

> "A sustained drop in groundwater levels below root zones caused by groundwater pumping could result in permanent loss of GDEs. Monitoring of groundwater levels near the confluence of Alamo Pintado and Zanja de Cota Creek with the Santa Ynez River will be conducted by the GSA as part of EMA monitoring programs (*See* Section 4) to assess whether there is potential for significant and unreasonable adverse impacts to a long-term decline in the health of the GDEs in the subject areas and eventual permanent habitat loss." (p. 55)

A decrease in groundwater levels less than the depth of the root zone can result in effects to surface flows, particularly base flows (*See* Brunke and Goslin 1977, Fetter 1997). As a consequence, the Draft Criteria do not address all the potential GDE, including the federally listed endangered southern California steelhead. Also, in addition to the riparian areas in the vicinity of the confluence of Alamo Pintado and Zanja de Cota Creek with the Santa Ynez River, other reaches of the Santa Ynez River within the EMA (between Hilton Creek and Alisal Creek) are potentially affected by groundwater withdrawals. Additionally, the confluences of Alisal Creek, Quiota Creek, San Lucas Creek, and Zaca Creek (below Bradbury Dam), and Tepusquet Creek, Cachuma Creek and Santa Cruz Creek (above Bradbury) and the Santa Ynez River could be impacted by groundwater withdrawals from the EMA. See also comments above on Effects of Minimum Thresholds on Neighboring Basins, 5.5.2.4.

The Draft Criteria should be revised to recognize these other GDE, including those associated with the federally listed endangered southern California steelhead.

The Draft Criteria also asserts:

> "The minimum threshold for depletion of interconnected surface water is set to protect habitat and sensitive species at specific locations in the EMA where there is a connection between groundwater and surface water. The minimum threshold for depletion of interconnected surface water in the EMA is not anticipated to impact sustainability in the CMA because conditions that are necessary to avoid impacts to Category A GDEs [i.e., those supporting identified beneficial use in the subject areas] in the EMA will continue to support flows into the CMA." (p. 59)

This approach does not adequately recognize all the potential GDE, or does it provide any metric for guiding groundwater withdrawals, or set any numeric standard for the maintenance of base flows necessary to support GDE.

The Draft Criteria should be revised to include specific metrics for GDE, including those associated with the federally listed endangered southern California steelhead.

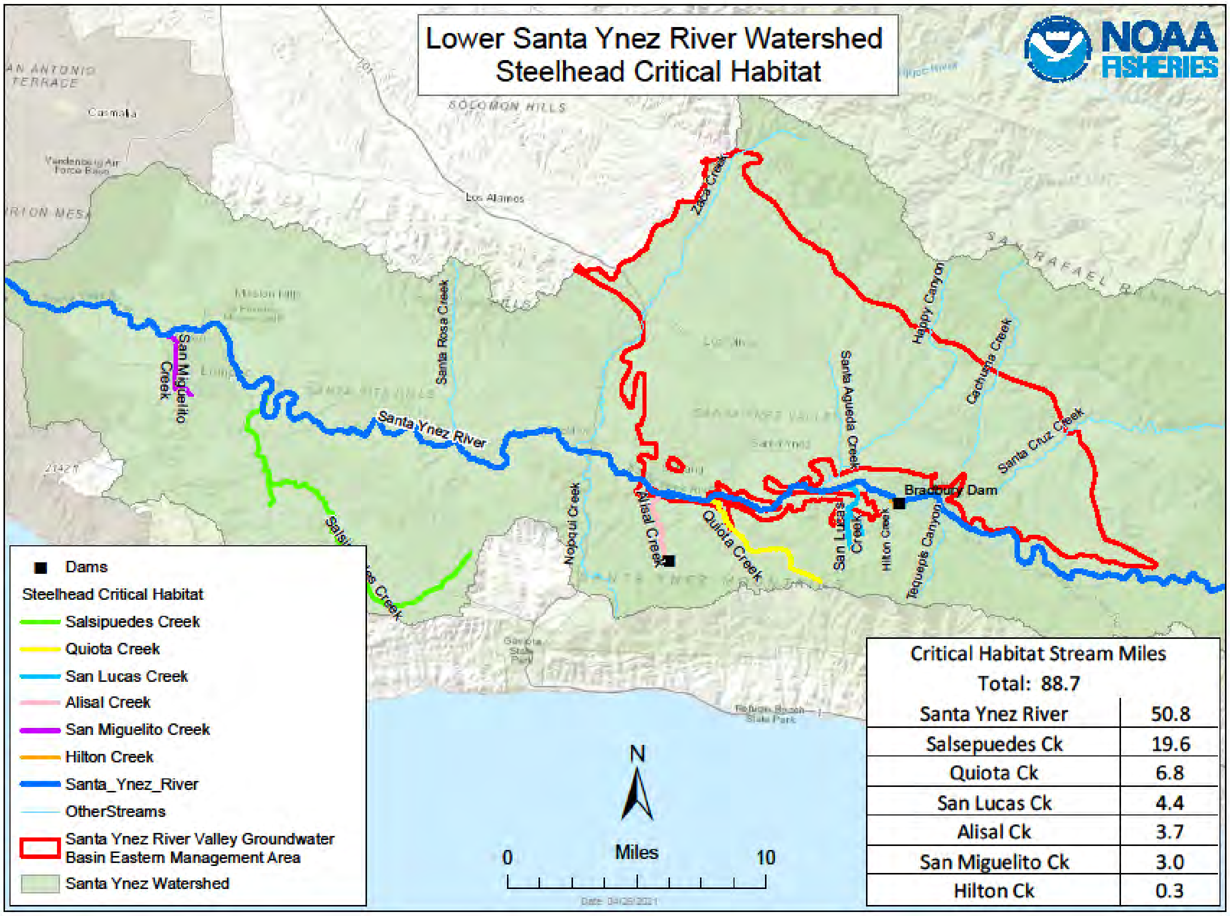

Figure 1. Lower Santa Ynez River Steelhead Critical Habitat Map. Source: 70 FR 52488). Final Rule: Endangered and Threatened Species; Designation of Critical Habitat for Seven Evolutionarily Significant Units/Distinct Population Segments of Pacific Salmon and Steelhead in California.

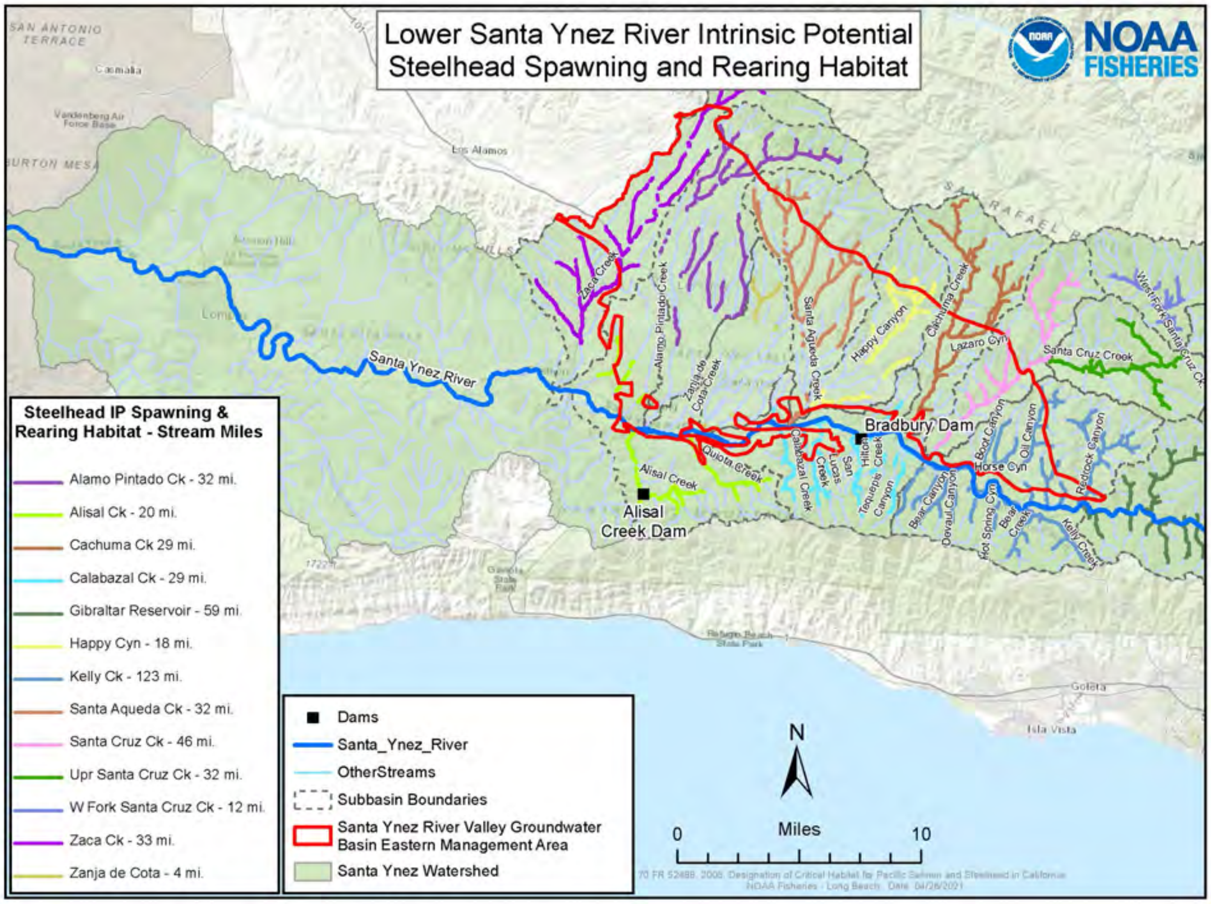

Figure 2. Lower Santa Ynez River Steelhead Intrinsic Potential Steelhead Spawning and Rearing Habitat Map. Source: Boughton and Goslin 2006.

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Subject: Comments on the Santa Ynez River Valley Groundwater Basin's Eastern Management Area Draft Groundwater Sustainability Plan

Dear Mr. Bill Buelow:

The California Department of Fish and Wildlife (CDFW) appreciates the opportunity to provide comments on the Santa Ynez River Valley Groundwater Basin's Eastern Management Area Groundwater Sustainability Agency (EMA-GSA) Draft Groundwater Sustainability Plan (Draft GSP) prepared pursuant to the Sustainable Groundwater Management Act (SGMA).

As trustee agency for the State's fish and wildlife resources, CDFW has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and the habitat necessary for biologically sustainable populations of such species (Fish & Game Code §§ 711.7 and 1802).

Development and implementation of groundwater sustainability plans (GSPs) under SGMA represents a new era of California groundwater management. CDFW has an interest in the sustainable management of groundwater, as many sensitive ecosystems, species, and public trust resources depend on groundwater and interconnected surface waters (ISWs), including ecosystems on CDFW-owned and managed lands within SGMA-regulated basins.

SGMA and its implementing regulations afford ecosystems and species specific statutory and regulatory consideration, including the following as pertinent to GSPs:

- GSPs must **consider impacts to groundwater dependent ecosystems** (GDEs) (Water Code § 10727.4(l); see also 23 CCR § 354.16(g));
- GSPs must consider the interests of all beneficial uses and users of groundwater, including environmental users of groundwater (Water Code § 10723.2) and GSPs must **identify and consider potential effects on all beneficial uses and users of groundwater** (23 CCR §§ 354.10(a), 354.26(b)(3), 354.28(b)(4), 354.34(b)(2), and 354.34(f)(3));
- GSPs must **establish sustainable management criteria that avoid undesirable results** within 20 years of the applicable statutory deadline, including **depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water** (23 CCR § 354.22 *et seq*. and Water Code §§ 10721(x)(6) and 10727.2(b)) and describe monitoring networks that

can identify adverse impacts to beneficial uses of interconnected surface waters (23 CCR § 354.34(c)(6)(D)); and

- GSPs must **account for groundwater extraction for all water use sectors,** including managed wetlands, managed recharge, and native vegetation (23 CCR §§ 351(al) and 354.18(b)(3)).

Furthermore, the Public Trust Doctrine imposes a related but distinct obligation to consider how groundwater management affects public trust resources, including navigable surface waters and fisheries. Groundwater hydrologically connected to surface waters is also subject to the Public Trust Doctrine to the extent that groundwater extractions or diversions affect or may affect public trust uses. (*Environmental Law Foundation v. State Water Resources Control Board* (2018), 26 Cal. App. 5th 844; *National Audubon Society v. Superior Court* (1983), 33 Cal. 3d 419.) The GSA has "an affirmative duty to take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible." (*National Audubon Society*, *supra*, 33 Cal. 3d at 446.) Accordingly, groundwater plans should consider potential impacts to and appropriate protections for ISWs and their tributaries, and ISWs that support fisheries, including the level of groundwater contribution to those waters.

Individually and collectively, the SGMA statutes and regulations, and Public Trust Doctrine considerations, necessitate that groundwater planning carefully consider and protect environmental beneficial uses and users of groundwater, including fish and wildlife and their habitats, GDEs, and ISWs.

COMMENT OVERVIEW

CDFW supports ecosystem preservation and enhancement in compliance with SGMA and its implementing regulations based on CDFW expertise and best available information and science. CDFW understands the Santa Ynez River Valley (3-015) (Basin) is rated as a medium priority basin under SGMA with 15 priority points. The Basin sits isolated from other SGMA Basins with only San Antonio Creek Valley (3-014) adjacent to the north that is also rated as a medium priority basin with 15 priority points. These Santa Ynez River Valley Groundwater Basin has been separated into three management areas. They are the Western Management Area (WMA), Central Management Area (CMA) and the Eastern Management Area (EMA). CDFW offers the following comments and recommendations below to assist EMA-GSA in identifying and evaluating impacts on biological resources including GDEs within the adjacent groundwater basins. Additional suggestions are included for EMA-GSA's consideration during revisions of the Draft GSP.

SPECIFIC COMMENTS AND RECOMMENDATIONS

Comment #1: Section 3.1.4.1 Principal Aquifers (Santa Ynez River Alluvium)

Issue: The Draft GSP does not provide enough information to conclude that surface waters do not affect groundwater levels. Page 3-29 of the Draft GSP states, "*Water present within the Santa Ynez River Alluvium is considered surface water by the SWRCB, and not managed by the GSAs. Therefore, the Santa Ynez River Alluvium is not classified in this GSP as a principal aquifer. The main criterion for defining the water-bearing geologic formations in the EMA as principal aquifers is based on the SGMA definition of a principal aquifer: "aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems." Principal aquifers must exhibit both sufficient* *permeability and storage potential for the movement and storage of groundwater such that wells can reliably produce groundwater in sufficient quantities on a long-term basis*".

The EMA-Hydrologic Conceptual Model (HCM) states during downstream water right releases, water infiltrates and recharges the alluvium as "*Recharge to the Santa Ynez River Alluvium occurs through percolation of precipitation as well as from upstream Lake Cachuma releases and discharge from the Santa Ynez Uplands Tributaries*" (EMA-HCM Memo, Pg. 65). The HCM Memo acknowledges that the younger alluvium in the upper aquifer is being recharged from water right releases. However, the EMA GSA has not provided enough information to properly identify and analyze the interconnectivity between the three zones of the upper aquifer and the relationship with the lower aquifer. The alluvium at the mouth of the Santa Ynez Upland Tributaries is an example in the Basin that has groundwater-surface water interactions based on groundwater recharge during downstream water right releases. CDFW believes this interaction also occurs during the natural flows of various seasons throughout the year. CDFW agrees that the Upper Aquifer is recharged from the surface water, but it is unclear how Upper Aquifer groundwater pumping should be regulated without direct input from the State Water Resources Control Board (SWRCB).

The EMA-HCM Memo also states that "*The extent and quantity of any groundwater discharge from the groundwater basin into the Tributary Alluvium has not been confirmed or quantified. Conceptually, it is believed that this discharge occurs primarily as surface water flow leaving the tributaries*" (EMA-HCM Memo, Pg. 67). The EMA -HCM Memo further states that "*Water discharges from the EMA as underflow from the Santa Ynez River Alluvium every year*" (Stetson, 2004 among others) (EMA-HCM Memo, Pg. 67). This is another example of an interconnected surface water that WMA-GSA describes in their WMA-HCM Memo but did not identify and analyze in the WMA-GC Memo.

Recommendation #1(a): CDFW recommends the EMA-GSA provide justification, based on specific provisions of SGMA, for the conclusion that the Upper Aquifer should **not** be classified as a principal aquifer or managed by a GSP under SGMA. Alternatively, the WMA-GSA can provide direct input from SWRCB on the classification of the Upper Aquifer. CDFW believes the EMA-GSA must sustainably manage groundwater resources in the Upper Aquifer, in part because it supports GDEs. Furthermore, portions of the Upper Aquifer are interconnected with surface water and is currently identified as a principal aquifer under Department of Water Resources Bulletin 118 (DWR 2020). The communities within the EMA heavily rely on surface and subsurface diversions from the Upper Aquifer. Use of this Lower Aquifer water may become more appealing and economically viable in future years as Upper Aquifer pumping restrictions are placed to meet SGMA sustainable yield and criteria, and to meet SYR instream flow needs. Thus, analyzing the Upper Aquifer as interconnected with surface water is consistent with the sustainability goals of SGMA. Furthermore, identifying and appropriately considering GDEs in the EMA that rely on the Upper Aquifer should be completed irrespective of the amount of pumping in both aquifers so that future impacts on GDEs due to new production can be avoided. CDFW urges the EMA-GSA to identify and consider all GDEs within the WMA per Code of Regulations, Title 23 § 354.16(g).

Recommendation #1(b): CDFW strongly recommends the EMA-GSA to map, identify, and analyze depletions of interconnected surface waters and areas with the potential for depletion of interconnected surface waters per Code of Regulations, Title 23 § 354.16(f).

Comment #2: Section 3.2.5 Interconnected Groundwater and Surface Water for Tributaries to the Santa Ynez River

Issue: The Draft GSP still does not provide enough information to conclude how much recharge is occurring within SYR tributaries. As indicated on page 3-84, "*A **significant** source of recharge to the Paso Robles Formation occurs within the shallow alluvial sand and gravel beds of tributaries where they are in direct contact with the Paso Robles Formation. Percolating groundwater moves readily through the tributary alluvium in the Santa Ynez Uplands (LaFreniere and French,1968). In these areas, the tributaries are losing streams, contributing to the groundwater in the underlying Paso Robles Formation (and Older Alluvium)*". The Draft GSP identifies two locations in the EMA where groundwater from a principal aquifer is interconnected with surface water. Table ES-1 Summary of Sustainable Management Criteria on page ES-16 indicates the confluence of Alamo Pintado Creek and Zanja de Cota Creek as the two areas connecting surface water and the SYR.

Under SGMA, a GSP is required to avoid unreasonable adverse impacts on beneficial uses of interconnected surface waters, defined as "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." (Water Code §§ 10721(x)(6) and 10727.2(b); 23 CCR § 351(o).)

To the extent that the tributaries are hydraulically connected and not completely depleted at any time of the year, they qualify as interconnected surface waters and warrant appropriate consideration in the GSP, including the goal to avoid depletions causing significant and unreasonable adverse impacts on beneficial uses.

The interconnected surface water narrative also lacks specific estimations of the quantity and timing of streamflow depletions as required by California Code of Regulations, Title 23 § 354.16(f).

CDFW is very concerned about the health of the steelhead population. Managing the groundwater within the Santa Ynez River Valley is particularly critical to the survival and recovery of the threatened South-Central California Steelhead Designation Population Segment (DPS), a federal Endangered Species Act (FESA) listed species (NMFS 2013). Drought conditions and low flow rates have led CDFW to participate in rescue operations as recently as 2020. The SYR contains important steelhead spawning and rearing tributaries. Threats to steelhead, such as excessively high-water temperatures due to reduced surface flows or groundwater pumping in the spring, summer, and early fall, reduce available juvenile rearing habitat. Low flows in the fall and winter can delay adult passage to critical spawning areas.

Groundwater-dependent habitats, including interconnected surface waters, are particularly susceptible to changes in the depth of the groundwater. Lowered water tables that drop beneath the root zones can cut off phreatophyte vegetation from water resources, stressing or ultimately converting vegetated terrestrial habitat. Induced infiltration attributable to groundwater pumping can reverse hydraulic gradients and may cause streams to stop flowing. The frequency and duration of exposure to lowered groundwater tables and low-flow or no-flow conditions caused by groundwater pumping, as well as habitat and species resilience, will dictate vulnerability to changes in groundwater elevation. For example, some species rely on perennial instream flow, and any interruption to flow can risk species survival.

Recommendation #2(a): CDFW recommends a more careful review of existing information on surface water-groundwater interconnectivity and recommends the EMA-GSA clarify what a significant source of recharge means in terms of quantity of water.

Recommendation #2(b): CDFW recommends the WMA-GSA identify the estimated quantity and timing of streamflow depletions in the subbasin. If this information is not available, identify a proposed plan to estimate these values.

Comment #3: Section 3.3.5.1.2 Projected Water Budget (Cannabis Cultivation) – Cannabis High Priority Watershed

Issue: CDFW is concerned that cannabis groundwater use is not being fully accounted for when evaluating this SGMA area. Ignoring the growth potential of this industry, could result in a lack of groundwater management accountability. Page 3-158 of the Draft GSP states that "*While not included as a crop category in the recent crop surveys, cannabis production is projected to enter the Santa Ynez Valley and the EMA in the coming years. The County of Santa Barbara has placed an upper limit on the maximum number of acres county-wide allowed to be planted with cannabis. The assumption for the EMA is that cannabis production will reach a limit for the Santa Ynez Valley over the next several years and will increase beyond the current limit*". CDFW has identified, in region, the Santa Ynez River Valley as a high priority watershed. Most projects distributed throughout this SGMA area are clustered within the San Miguelito Creek-Santa Ynez River, Nojoqui Creek, Santa Rosa Creek-Santa Ynez River, Salsipuedes Creek, Santa Rita Valley and Canada De La Vina-Santa Ynez River HUC 12 watersheds. This includes San Miguelito Creek, Salsipuedes Creek, and Santa Ynez River (critical steelhead streams) as well as Nojoqui Creek and Santa Rosa River, and the SYR tributaries (Dagit et. al 2020). The projects range from cultivation of 1-50 acres within the approximate 52 notifications the Department has received with the main source of water coming from groundwater wells. CDFW expects this type of trend to continue in the future.

Groundwater and interconnected surface water are critical resources that do not recognize artificial boundaries. Since the implementation of legal cannabis cultivation, CDFW has received multiple applications within the Santa Ynez River Valley, especially in the HUC 12 watersheds listed above. Some of the cannabis grows can range from 1-50 acres, with multiple licenses on a property (resulting in several acres of cultivation) that are dependent on depths within the alluvium. Surface flows (and surface diversions) are regulated in large degree from dam releases, which emphasizes the large roll groundwater wells have in cannabis cultivation.

Santa Ynez has sensitive, natural communities consisting of Oak woodlands, grasslands, sage scrub, chaparral, and riparian woodland habitats along the Santa Ynez River and SYR tributaries. According to the California Natural Diversity Database (CNDDB), the Santa Ynez River Valley provides habitat that supports several sensitive species (some listed as endangered or threatened) throughout their life cycles, including southwestern willow flycatcher (*Empidonax traillii extimus*), least Bell's vireo (*Vireo bellii pusillus*), red-legged frog (*Rana draytonii*), and seaside bird's beak (*Cordylanthus rigidus ssp. littoralis*) (CDFW. 2019). Habitats that support these species also consist of phreatophytes and other vegetation communities that are dependent on shallow aquifers that support surface water in each of these systems. Phreatophytic vegetation is a critical contributor to nesting and foraging habitat, forage for a wide range of species and can be affected by sensitive depth to groundwater threshold impacts (Naumburg et.al. 2005) and (Froend et. al. 2010). This sensitivity to groundwater level thresholds means that localized pumping and recharge actions altering groundwater levels can impact the health and extent of phreatophyte vegetation health. Both decreasing (drying out) or increasing (drowning) groundwater elevation has the potential to stress phreatophytes depending on the plant species, groundwater elevation and duration (e.g., short term wetness/dryness versus prolonged wetness/dryness).

Groundwater and interconnected surface water depletion is a major concern for fish and wildlife beneficial users in the Santa Ynez River Valley. Designating this area as a High Priority Cannabis Watershed requires groundwater to be monitored and sustainably managed for the benefit of all beneficial users, including groundwater dependent vegetated communities and interconnected surface waters that are necessary to support riparian and aquatic habitat, and the sensitive species therein such as steelhead. Decreased stream flow may contribute to direct mortality if fish eggs are exposed, covered with silt, or left without sufficient oxygenated water. Water degraded in temperature or chemical composition can displace or limit fish populations.

Recommendation #3: CDFW recommends the WMA-GSP monitor the Santa Ynez River Valley as a Cannabis High Priority Watershed. This High priority captures the documented impacts within the groundwater basin and the shifting groundwater consumption rates, as influenced by legalization of cannabis [Water Code §§ 10933. (b)(7,8)]. Based on the number of Departmental applications for legal cultivation, there is documented significant demand and potential adverse impacts to beneficial users of groundwater. The cannabis market growth is expected to increase almost ten times during an eight-year span (Fortune Business Insights 2021). North America is expected to lead the world cannabis market. Santa Barbara County recently approved a zoning permit for 87 acres of outdoor cannabis cultivation.

Comment #4: Section 3.3.5.1.2 Projected Water Budget (Cannabis Cultivation)- Cannabis Impacts

Issue #4.1: Without the designation of the Santa Ynez River Valley as a Cannabis High Priority Watershed, evaluation of cannabis crop water usage may be overlooked throughout the Santa Ynez River Valley Groundwater Basin, especially within the Santa Ynez Alluvium, an area that, as stated on page 3-29, will not be managed under SGMA by the EMA-GSA. Page 3-158 of the Draft GSP states "*The projected agricultural acreages and water use are projected to increase only modestly over the next 20 and 50 years. This increase, based principally on conversion to field crops and a more modest increase in vineyard acreage, are together similar in scale to the estimated projected increase in cannabis acreage. The projected rate of expansion of acreage is equal to 36 acres added per year*". Cannabis cultivation is a water intensive crop that can have a significant impact to environmental beneficial users of groundwater.

Cannabis groundwater wells provide water for the irrigation of water-intensive cannabis cultivation (assuming six gallons of water per day per plant) (Bauer S. 2015). Just within the Santa Ynez Alluvium, CDFW has received approximately 26 cannabis projects. These projects range from cultivation of 3.5 - 50.0 acres with water supplied from groundwater wells. Many of the wells for the cannabis notifications within Santa Ynez Valley are shallow wells located within or immediately adjacent to tributary streams and the SYR. CDFW is concerned that without management of the Santa Ynez Alluvium under SGMA by the EMA-GSA, significant and unreasonable surface water depletions may occur, compromising groundwater dependent ecosystems within and along the streams.

Recommendation #4.1(a): CDFW recommends a more careful review of the existing information on cannabis cultivation within the Santa Ynez alluvium and recommends the information be considered when evaluating groundwater management. As indicated on page 3-84, "*A significant source of recharge to the Paso Robles Formation occurs within the shallow alluvial sand and gravel beds of tributaries where they are in direct contact with the Paso Robles Formation. Percolating groundwater moves readily through the tributary alluvium in the Santa Ynez Uplands (LaFreniere and French,1968). In these areas, the tributaries are losing streams, contributing to the groundwater in the underlying Paso Robles Formation (and Older Alluvium)*". The majority of cannabis cultivation rely on groundwater for cannabis crops irrigation, and the likely interconnected nature of the Santa Ynez River suggests that such uses (individually or cumulatively) should be considered when evaluating cannabis impacts in the Santa Ynez alluvium.

Recommendation #4.1(b): CDFW recommends the Santa Ynez River Valley be classified as a Cannabis High Priority Watershed.

Issue #4.2: The majority reliance on groundwater for cannabis crops irrigation, and the likely interconnected nature of the Santa Ynez River suggests that such uses (individually or cumulatively) should be considered when evaluating cannabis impacts in the Santa Ynez alluvium. As indicated on page 3-84, "*A significant source of recharge to the Paso Robles Formation occurs within the shallow alluvial sand and gravel beds of tributaries where they are in direct contact with the Paso Robles Formation. Percolating groundwater moves readily through the tributary alluvium in the Santa Ynez Uplands (LaFreniere and French,1968). In these areas, the tributaries are losing streams, contributing to the groundwater in the underlying Paso Robles Formation (and Older Alluvium)*".

Recommendation #4.2: CDFW recommends a more careful review of the existing information on cannabis cultivation within the Santa Ynez alluvium and recommends the information be considered when evaluating groundwater management.

Comment # 5: Section 3.2.6.1.3 Categorization of Potential GDEs

Issue: The Draft GSP still does not provide enough information to conclude that potential GDEs should be excluded from the GSP. Page 3-95 of the Draft GSP states that "*The potential GDEs identified in the section above are further categorized based on their proximity to, and association with, the regional principal aquifers in the EMA (refer to Figure 3-39) as follows:*

- *Category A refers to potential GDEs that are associated with a principal aquifer in the EMA and are potentially affected by groundwater management activities.*
- *Category B refers to potential GDEs that are unlikely to be affected by pumping and groundwater management activities within the EMA.*

The focus of this GSP is to preserve the existing Category A GDEs where identified, regardless of composition, or condition."

Page 3-95 of the Draft GSP also states that "*In total, there are 1,546 acres of Category B potential GDEs in the EMA as shown on Figure 3-39 and in Table 3-13. All of the orange areas identified on Figure 3-39 are Category B areas for the following reasons:*

- *The potential GDEs in the upper portions of Zaca Creek and upper Alamo Pintado Creek are categorized as Category B due to apparent hydrogeologic separation between the perched tributary alluvium, which supports the potential GDEs, and the deeper principal aquifer groundwater elevations that support significant agricultural irrigation in the area.*
- *The potential GDEs located in upper Santa Agueda Creek and Happy Canyon are categorized as Category B due to limited groundwater production occurring within the area and the apparent hydrogeologic separation between the perched tributary alluvium aquifers and the deeper principal aquifer groundwater elevations.*
- *The potential GDEs located in the eastern portion of the EMA in Cachuma and Santa Cruz Creeks are categorized as Category B due to the absence of significant groundwater production in the area and an assumed hydrogeologic separation between the perched tributary alluvium aquifers and the deeper principal aquifer groundwater elevations*".

Page 3-97 of the Draft GSP uses Table 3-13 to show the number of acres of potential GDEs in both category A and B:

Table 3-13. Categorized Potential GDEs in the EMA (Excluding Santa Ynez River Area)

Potential GDE Category	**Natural Communities Vegetation Classification**	**Acres**
Category A	Coast Live Oak	91
Category A	Riparian Mixed Hardwood	93
	Subtotal	**184**
Category B	Coast Live Oak	1,159
Category B	Valley Oak	279
Category B	Riparian Mixed Hardwood	99
Category B	Riversidean Alluvial Scrub	5
Category B	Willow (Shrub)	4
	Subtotal	**1,546**
	Total	**1,731**

The potential GDEs were assessed into two categories based on their relationship to the aquifer, but it is unclear if they were categorized any further. It is also unclear and unknown if there are any GDEs in the Draft GSP that will be protected and monitored into the future.

Recommendation #5(a): CDFW recommends the WMA-GSA evaluate potential effects on each GDE unit based on at least four criteria, such as:

1) groundwater dependence;

2) ecological value (high, moderate, low);

3) ecological condition (good, fair, poor) using Normalized Difference Vegetation Index/ Normalized Difference Moisture Index data; and,

4) susceptibility to changing groundwater conditions (high, moderate, low) based on available hydrologic data, climate change projections and GDE susceptibility classifications using a baseline range to consider future changes in groundwater conditions.

Recommendation #5(b): To ensure meaningful consideration of GDEs as required under SGMA, CDFW recommends the EMA-GSA provide a biological assessment identifying species known to occur within the GDEs presented in Table 3-13, including steelhead, least Bell's vireo, and southwestern willow flycatcher. Given the uncertain status of the species and their dependency on GDEs, the EMA-GC Memo must accurately assess drought conditions when water availability will be lower and groundwater extraction might be high.

Recommendation #5(c): CDFW recommends the EMA-GSA include, at a minimum, the GDEs identified within the Basin in the final GSP. The EMA-GSA has not provided enough data to conclude that the Lower Aquifer groundwater pumping definitively does not affect GDEs within the Basin. If the EMA-GSA reaches that conclusion in the future, then then Sustainable Management Criteria for GDEs would no longer be needed. CDFW strongly disagrees with entirely excluding GDEs present in the Basin without enough data to conclude GDEs are not impacted by groundwater pumping.

GENERAL COMMENTS AND RECOMMENDATIONS

Comment #6: Sensitive Species and Habitats

Issue: Many sensitive species and habitats in the Santa Ynez EMA comprise of GDEs, the natural communities that rely on groundwater to sustain all or a portion of their water needs. Some of the special-status species in the Santa Ynez River watershed that rely on surface water supported and supplemented by groundwater include the federally endangered Southern California steelhead; southwestern pond turtle (*Actinemys pallida*), a CDFW species of special concern (SSC) and U.S. Forest Service sensitive species; California red-legged frog (*Rana draytonil*), a CDFW SSC and ESA-listed species; western spadefoot toad (*Spea hammondii*), a CDFW SSC and Bureau of Land Management sensitive species; and California tiger salamander (*Ambystoma californiense*), an ESA-listed and California Endangered Species Act (CESA)-listed species.Some of the special-status species in the SYR watershed that rely on surface water supported and supplemented by groundwater include the federally endangered Southern California steelhead; southwestern pond turtle (*Actinemys pallida*), a CDFW species of special concern (SSC) and U.S. Forest Service sensitive species; California red-legged frog (*Rana draytonil*), a CDFW SSC and ESA-listed species; western spadefoot toad (*Spea hammondii*), a CDFW SSC and Bureau of Land Management sensitive species; and California tiger salamander (*Ambystoma californiense*), an ESA-listed and California Endangered Species Act (CESA)-listed species.

Southwestern pond turtle was designated as a California SSC in 1994. Western pond turtle's preferred habitat is permanent ponds, lakes, streams, or permanent pools along intermittent streams associated with standing and slow-moving water. A potentially important limiting factor for western pond turtle is the relationship between water level and flow in off-channel water bodies, which can both be affected by groundwater pumping.

California red-legged frog is rarely encountered far from perennial water. Tadpoles require water for at least three or four months while completing their aquatic development. Adults eat both aquatic and terrestrial invertebrates, and the tadpoles graze along rocky stream bottoms. Groundwater pumping that impairs streamflow could have negative impacts on California red-legged frog populations.

Western spadefoot toad migrates to seasonal vernal pools to reproduce. They will use small puddles of water, such as small pools to breed. California tiger salamander is also restricted to vernal pools and seasonal ponds for reproduction.

If groundwater depletion results in reduced streamflow due to interconnected surface waters, the nesting and foraging success of flycatcher, least Bell's vireo, and other bird species may be diminished due to the reduced nesting habitat and food availability.

The unsustainable use of groundwater can impact the shallow aquifers and interconnected surface waters on which these species and GDEs depend. This may lead to adverse impacts on fish and wildlife and the habitat they need to survive. Determining the effects that groundwater levels have on surface water flows in the EMA would provide an understanding of how the groundwater levels may be associated with the health and abundance of riparian vegetation. Poorly managed groundwater pumping, and surface water flows have the potential to reduce the abundance and quality of riparian vegetation, reducing the amount of shade provided by the vegetation, and ultimately leading to increased water temperatures in the EMA.

Recommendation #6: CDFW highly recommends the EMA-GSA map out locations where there are interconnected surface waters and document aquatic habitats and other GDEs as required under SGMA. The EMA-GSA should then provide appropriate consideration to those habitats and the sensitive species that rely on them. Fish and wildlife resources should be considered in the water budget. Additionally, shallow groundwater levels near interconnected surface water should be monitored to ensure that groundwater use is not depleting surface water and affecting fish and wildlife resources in the EMA.

Comment #7: Draft GSP vs. Final GSP

Issue: The GSA may need to revise the GSP before it is finalized and adopted.

Recommendation #7: CDFW recommends the EMA-GSA provide a red-lined version of the final GSP to understand the changes made between the Draft GSP and final GSP. Alternatively, CDFW recommends the GSA provide a summary of changes made and comments addressed by the GSA in preparation of a final GSP.

CONCLUSION

CDFW has significant concerns about ISWs for the SYR, and its tributaries, and surface water and the SYR alluvium, interconnected surface water for tributaries to the SYR, cannabis cultivation into the future and CDFW urges the EMA-GSA to plan for and engage in responsible groundwater management that minimizes or avoids these impacts to the maximum extent feasible as required under applicable provisions of SGMA and the Public Trust Doctrine.

In conclusion, the Draft GSP does not comply with all aspects of SGMA statute and regulations, and CDFW deems the Draft GSP inadequate to protect fish and wildlife beneficial users of groundwater for the following reasons:

1. The assumptions, criteria, findings, and objectives, including the sustainability goal, undesirable results, minimum thresholds, measurable objectives, and interim milestones are not reasonable and/or not supported by the best available information and best available science. [CCR § 355.4(b)(1)] (See Comments # 1, 2, 3, 4 and 5);

2. The Draft GSP does not identify reasonable measures and schedules to eliminate data gaps. [CCR § 355.4(b)(2)] (See Comments # 1, 2, and 5);

3. The interests of the beneficial uses that are potentially affected by the use of groundwater in the basin, have not been considered. [CCR § 355.4(b)(4)] (See All Comments).

CDFW appreciates the opportunity to provide comments. Additionally, we appreciate EMA-GSA continued coordination with CDFW while EMA-GSA develops a final GSP. If you have any questions or comments regarding this letter, please contact Steve Slack, Environmental Scientist, at Steven.Slack@wildlife.ca.gov.

Sincerely,

DocuSigned by:

B6E58CFE24724F5...

Erinn Wilson-Olgin
Environmental Program Manager I
South Coast Region

Enclosures (Literature Cited)

ec: California Department of Fish and Wildlife

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October 22, 2021

Eastern Management Area GSA
c/o William Buelow
Santa Ynez River Water Conservation District
3669 Sagunto Street, Suite 101
Santa Ynez, CA 93460

Re: **Eastern Management Area draft GSP Comments**

Dear Directors and Staff:

The purpose of this letter is to provide the Eastern Management Area Groundwater Sustainability Agency (EMA GSA) with the comments of the Santa Ynez Water Group to the EMA GSA's draft groundwater sustainability plan (GSP).

Enclosed with this letter is a memorandum prepared by our consultant, Bondy Groundwater Consulting, Inc., focusing on the technical issues and concerns identified during their review of the GSP. In addition to those comments, we add the following.

As previously expressed to the GSA, our members primary concern continues to be the GSA's failure to adequately consider the interests of agricultural landowners holding overlying groundwater rights and the effects of the GSA's actions on those landowners. This lack of consideration is evident in the GSA's proposed projects and management actions and associated financing structure.

For example, the draft GSP anticipates increased pumping demands by groundwater users who hold appropriative groundwater rights. (Draft GSP, Table 3-37.) The draft GSA goes on to provide that projects or management actions may be implemented in response to these projected increases in demand. (Draft GSP, Section (3.3.3.7.).) Further, the draft GSP proposes a "proportional and equitable approach to funding implementation of the GSP. . . ." (Draft GSP, Section 6.2.) This will result in fees being levied for groundwater pumping "against all groundwater pumpers in the [Eastern Management Area]. . . ." (Draft GSP, Section 6.4.) Therefore, effectively, the GSA is requiring agricultural landowners who hold overlying groundwater rights to pay for the increased pumping of groundwater users who hold appropriative groundwater rights. Our members do not agree that this approach is equitable, as intended by the GSA.

While this is one example of our members' concerns, several others are provided in the enclosed memorandum. We appreciate the significance of the considerations and decisions the GSA must undertake, and we look forward to working with you further regarding these matters.

Please feel free to contact us if you have any questions or wish to discuss any of our comments.

Very truly yours,

Joseph D. Hughes

JDH:ps
Enclosure

MEMORANDUM

To: Joe Hughes / KDG

From: Bryan Bondy / BGC *BB*

CC: Doug Circle, SYWG

Date: October 22, 2021

Re: EMA Draft GSP Review

Pursuant to your request, this memorandum presents the material findings from my review of the Draft Groundwater Sustainability Plan (GSP) for the Eastern Management Area of the Santa Ynez River Valley Groundwater Basin. Please note that my review focused on the key GSP elements only; not all GSP aspects were reviewed in detail.

- Section 2.3.1: SYRWCD, City of Solvang, and ID No. 1 are incorrectly listed as overlying groundwater rights holders on p. 2-38.

- Section 3.2.3 states that the "GSP focuses on constituents that relate to beneficial uses of groundwater that *might be impacted by groundwater management activities*" and later says "projects and management actions that are currently being considered, even if tentatively, *are not anticipated to directly cause concentrations of any of these constituents in groundwater to increase*" (emphasis added). These statements are conflicting. It is requested that the GSP clarify whether there is a demonstrable causal relationship between groundwater management or groundwater pumping and water quality degradation.

- Section 3.2.5 – Interconnected Groundwater and Surface Water: This section does not include estimates of the quantity and timing of interconnected surface water depletions as required by GSP Emergency Regulations §354.16(f).

- Section 3.2.5.1 – Tributary Alluvium:
    - The 4th paragraph discusses various perennial reaches of various creeks that cross the EMA. Other than near the southern boundary of the Santa Ynez Uplands area, the text does not state whether interconnection exists along these reaches. The GSP could be improved by including a conceptual discussion concerning the approximate location and timing of interconnection along the remainder of the perennial reaches, if any.

o When taken together, the last two sentences of the 4th paragraph may be interpreted to imply that all perennial surface water flow is sourced from EMA groundwater (presumably during non-storm flow conditions). It is requested that the text be revised to indicate that many of the perennial reaches extend north of the basin boundary, indicating that they are, at least in part, spring fed from the surrounding bedrock of the San Rafael Mountains.

- Historical Water Budget:

  o Comparison of Figure 3-52 with the representative hydrographs provided in the appendices, suggests that the water balance is not following groundwater level trends. Based on the hydrographs for the Paso Robles Formation, the cumulative storage change should peak sooner (earlier in the 2000s) and should do so at a higher value that is significantly greater than the starting value of zero (groundwater levels were notably higher in the early 2000s as compared to the 1982). The groundwater level trends also suggest that the declining storage in the 1980s is overestimated. Based on these observations, there is a concern that the historical water budget is not well "calibrated" to the groundwater level data and is biased toward overestimating storage declines and underestimating storage increases. As a result, there is a concern that the historical water balance overstates the EMA storage deficit.

- Projected Water Budget:

  o The projected increase in irrigated acreage is likely overstated. Based on feedback from growers in the Santa Ynez Water Group, the current trend is one of higher value, higher water demand crops leaving the region. As crops leave the region area, there is less incentive to convert pastureland or other land into irrigated land. The "large increase expected" in cannabis stated in memo will likely occur on previously unirrigated acres, if it happens at all. It is requested that the projected water budget be updated considering this comment.

  o The water duty factors for vineyards are too high. A more realistic water duty is closer to 1 – 1.2 AFY/acre, inclusive of both irrigation and frost protection (per vineyard operators in Santa Ynez Water Group). It is requested that the projected water budget be updated considering this comment.

- Sustainable Management Criteria:

  o Chronic Lowering of Groundwater Levels – The logic behind the minimum thresholds is questionable and the minimum thresholds themselves appear arbitrary.

    The GSP concludes that well operational issues that may be associated with groundwater levels below the top of well screens are indicative of significant and unreasonable depletion of supply. First, well operational issues are not a depletion of supply in of themselves; rather they are infrastructure issues that can be remedied through well redevelopment, well replacement, or backup wells, which could be implemented as GSP projects. It is suggested that depletion of supply not be viewed as well issues that can be remedied; rather, depletion of supply is more appropriately characterized as the inability to produce adequate water because the water isn't there.

Second, the "well impact" analysis provides clear evidence contrary to the GSP conclusions. Approximately 25-30% of the wells in the EMA had groundwater levels below top of screen in 2018, yet the GSP states that no reported significant and unreasonable effects occurred (see p. 5-13). If the premise is that groundwater levels below top of screen causes significant and unreasonable effects, then why haven't numerous instances of significant and unreasonable effects been reported already? Moreover, the number of wells with groundwater levels below the top screen at minimum threshold groundwater elevations is not materially different than the number of wells at 2018 groundwater levels. (0% more municipal wells, 0-3% more agricultural wells, and 1.7-4% more domestic wells). There is no justification for why the very small increase in the number of wells with groundwater levels below top of screen results causes the EMA to cross the line into the realm of significant and unreasonable effects. No specific, demonstrable effects that are *not* occurring at 2018 levels, but are expected to occur at the minimum threshold levels are identified. For these reasons, the minimum thresholds seem arbitrary.

The GSP states that the magnitude of impacts from groundwater levels below tops of well screens differs depending on well type (i.e., agricultural versus municipal, versus domestic) and notes that domestic wells tend to be shallower and may be more sensitive to water levels falling within the screen interval. The GSP goes on to say that municipal wells serve drinking water to citizens living in the EMA and so supply reduction cannot be easily addressed. Agricultural wells often are deeper and have longer well screens that can tolerate loss of efficiency and more drawdown resulting from water levels falling below top of screen. It is noted that there is nothing that has or would prevent municipal or domestic well owners from drilling deeper wells. It is unfair to restrict the use of the groundwater resource and/or charge fees to benefit specific types of beneficial users who have not made the same level of investment to access the groundwater resource as others. If the GSP is to keep groundwater levels high enough to prevent well issues for those who have not fully invested in infrastructure to access the resource during droughts, then those users should fund the management actions necessary to do so, particularly in the case of appropriators whose groundwater rights are junior to the overlying landowners.

- Degraded Water Quality:
  - The GSP could be improved by explaining how the GSA will differentiate between changes in concentrations caused by groundwater pumping or GSA activities versus other mechanisms.

- Land Subsidence:
  - The subsidence minimum threshold does not appear to be supported by any evidence to indicate that significant and unreasonable effects would occur if it were exceeded.
  - The three bullets listed on page 5-46 and text elsewhere in Section 5.9 may be more appropriately called "land surface elevation changes" instead of "land subsidence", because the data sets relied on up do not differentiate between land surface elevation changes resulting from tectonic activity versus elastic or inelastic land subsidence due to groundwater withdrawal.
  - Please reconsider the minimum thresholds and measurable objectives based on the following information from the Paso Robles GSP concerning the accuracy of InSAR data:

    "The InSAR data provided by DWR is subject to measurement error. DWR has stated that, on a statewide level, the total vertical displacement measurements between June 2015 and June 2018 is subject to two error sources (Brezing, personal communication):

    1. *The error between InSAR data and continuous GPS data is 16 mm (0.052 feet) with a 95% confidence level*
    2. *The measurement accuracy when converting from the raw InSAR data to the maps provided by DWR is 0.048 feet with 95% confidence level.*

    Simply adding the errors 1 and 2 results in a combined potential error of 0.1 foot (or 1.2 inches). While this is not a robust statistical analysis, it does provide an estimate of the potential error in the InSAR maps provided by DWR. A land surface change of less than 0.1 feet is therefore within the noise of the data, and is equivalent to no subsidence in this GSP."

- Depletions of Interconnected Surface Water –

  - The depletions of interconnected surface water minimum threshold of 15 feet below the stream bed was selected based on the conclusion that it is the lowest groundwater level that most GDE plants can typically access with their roots. However, Table 3-13 indicates that Coast Live Oaks occupy approximately one-half of the Category A GDE, which have a rooting depth of approximately 30 feet[1]. Riparian mixed hardwood makes up the balance of the Category A GDE area, with a shallower typical rooting depth. If a deeper minimum threshold (say 30 feet) was used and the result was replacement of riparian mixed hardwood with Coast Live Oaks, would that be a significant and unreasonable effect?

- Projects and Management Actions

  - Section 6.1 states "The EMA GSA has developed a portfolio of potential management actions and projects compatible with the respective *operational philosophies* that can be implemented in a phased manner as the conditions I the Basin dictate" (emphasis added). What are the "operational philosophies" and what is their source?

  - Section 6.1 states "Further, the EMA GSA may determine that the implementation of Group 2 management actions and/or Group 3 projects is desirable for reasons other than reaching sustainability within the EMA and may elect to implement initiatives from either Group 2 or 3 at any time." Please provide examples and please explain what authority the EMA GSA would use to implement projects or management actions for any reason other than to achieve sustainability.

  - Section 6.1 states "Based on the results of the analysis that was performed in conjunction with the development of this GSP, the EMA GSA concludes that the sustainability goals described in this GSP and required under the provisions of SGMA can be achieved through the implementation, as needed, of the Group 1 management actions described in Sections 6.3 through 6.6." What is the referenced analysis and where can details be found?

  - Section 6.2 states "A *proportional and equitable* approach to funding implementation of the GSP and any optional actions will be developed in accordance with all state laws and applicable public process requirements" (emphasis added). Section 6.4 adds "Fees to be levied for groundwater pumping will likely be in addition to a tiered base fee structure that will be levied against *all* groundwater pumpers in the EMA, including de minimis pumpers" The SYWG overlying rights holders do not agree that a proportional approach to funding GSP implementation applied to all groundwater pumpers is

[1] https://groundwaterresourcehub.org/sgma-tools/gde-rooting-depths-database-for-gdes/

equitable because it does not consider groundwater rights priorities. Because overlying landowners' groundwater rights are senior to appropriators; The SYWG overlying rights holders believe consideration should be given to requiring appropriators to first reduce their pumping and/or fund actions necessary to achieve the sustainable yield.

- Miscellaneous Comments
    - The GSP water budgets indicate a "storage deficit" under historical and projected future conditions. Despite the specific requirement to identify and quantify overdraft conditions, (GSP Emergency Regulations §354.18(5)), the GSP does not explicitly indicate whether an overdraft condition exists because of the how the term "storage deficit" is used in the text, apparently in place of "overdraft." It is requested that the GSP clearly state whether overdraft conditions existed over a period of years during which water year and water supply conditions approximate average conditions and, if so, quantify the overdraft.
    - Table 3-37 presents projections of increasing pumping by EMA appropriators. Section 3.3.3.7 (Reliability of Historical Surface Water Supplies) and Section 3.3.5.2 (Summary of Projected Water Budget) describes the potential for additional increases in pumping by groundwater appropriators in the EMA not captured in Table 3-37 to address potential decreases in Lake Cachuma or imported water supplies. The draft GSP goes on to say that projects or management actions may be implemented by the GSA to address these increased demands. Based on text in Section 6.2, it is anticipated that the costs for these projects or management actions would be paid for by all EMA groundwater users. The SYWG believes it would be more appropriate for the costs for any projects or management actions to address increased pumping by the appropriators be paid for by the appropriators instead of sharing those costs with senior water rights holders.

Closing

Please contact me if you have any questions regarding this memorandum. The opportunity to assist KDG / SYWG is greatly appreciated.

October 24, 2021

Santa Ynez River Valley Basin Eastern Management Area GSA
P.O. BOX 719,
Santa Ynez, CA 93460

Submitted via web: https://portal.santaynezwater.org/comment/new?gsaKey=EMA

Re: Public Comment Letter for Santa Ynez River Valley Basin Eastern Management Area Draft GSP

Dear Bill Buelow,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Draft Groundwater Sustainability Plan (GSP) for the Santa Ynez River Valley Basin Eastern Management Area 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 **needs additional plans** 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 Santa Ynez River Valley Basin Eastern Management Area 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,

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Clean Water Action/Clean Water Fund

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Western States Climate and Water Scientist
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Attachment A

Specific Comments on the Santa Ynez River Valley Basin
Eastern Management Area (EMA) 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, Drinking Water Users, and Tribes
The identification of Disadvantaged Communities (DACs), drinking water users, and tribes is **incomplete**.

The GSP describes and maps tribal lands in the Eastern Management Area (EMA) in Figure 2-2. The GSP also identifies and maps the location of each DAC within the EMA. However, the plan fails to clearly document the population of each DAC. Additionally, Figure 2-7 provides a map of communities within the EMA served by groundwater, but does not specifically provide the drinking water source for DACs.

While the plan provides a density map of domestic wells in the EMA, the GSP fails to provide depth of these wells (such as minimum well depth, average well depth, or depth range).

These missing elements are required for the GSA to fully understand the specific water demands of beneficial users, and to support the consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions.

RECOMMENDATIONS
• Provide the population of each identified DAC. Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems). • Include a map showing domestic well locations and average well depth across the EMA.

[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.

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 presents a conceptual representation of gaining, losing, and disconnected streams (Figure 3-34. Gaining and Losing Streams). The GSP presents a map (Figure 3-35. Stream Classifications) of the EMA's stream reaches, as classified by the USGS National Hydrography Dataset (NHD), with labels 'Perennial' and `Intermittent'. The relationship of these terms, however, are not discussed in relation to the gaining, losing, and disconnected terms presented in the prior figure. If the GSP is making the unstated assumption that perennial reaches are equivalent to interconnected reaches, this is an incorrect conclusion. Note the regulations [23 CCR §351(o)] define ISW as "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". "At any point" has both a spatial and temporal component. Even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water.

Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying ISWs. The GSP does not present or analyze depth to groundwater data when identifying ISWs in the EMA.

RECOMMENDATIONS
● Provide a map showing all the stream reaches in the EMA, with reaches clearly labeled 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. ● Provide depth-to-groundwater contour maps using the best practices presented in Attachment D, to aid in the determination of ISWs. 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. ● Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015. ● Reconcile ISW data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.

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, we found that some mapped features in the NC dataset were improperly disregarded, as described below.

- NC dataset polygons were incorrectly removed based on the assumption that they are supported by the shallow, perched water table. However, shallow aquifers that have the potential to support well development, support ecosystems, or provide baseflow to streams are principal aquifers, even if the majority of the EMA's pumping is occurring in deeper principal aquifers.[2] If there are no data to characterize groundwater conditions in the shallow principal aquifer, then the GDE should be retained as a potential GDE and data gaps reconciled in the Monitoring Network section of the GSP.

- NC dataset polygons were incorrectly removed from riparian areas of the Santa Ynez River that are considered to be managed by SWRCB as part of Santa Ynez River surface and underflow, and are not considered connected to "groundwater" under SGMA. The GSP has provided no map or details on the physical extent of the basin and wells that have been permitted, licensed and managed as underflow by the SWRCB. According to California's Electronic Water Rights Information Management System (eWRIMS), there appear to be only a handful of water rights permits (2 active and 7 inactive) that fall under "underflow" within the EMA (Figure 1). While a few water rights in the EMA may have "underflow" permits or licenses, the GSP has failed to substantiate the assertion that the shallow aquifer - in its entirety - is classified and managed as "underflow" by the SWRCB. We are generally concerned that the GSP is grossly extrapolating the existence of "underflow" in the shallow alluvium across the entire basin from a limited number of "underflow" points of diversions within the basin that are actually being managed by SWRCB. If the SWRCB is not managing the entire shallow aquifer as "underflow" and the beneficial users of groundwater and surface water reliant on it - this water is actually groundwater and is instead subject to SGMA regulations.

[2] "'Principal aquifers' refer to 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)]

Figure 1. Points of Diversion (black circles) classified as “Santa Ynez River Underflow” within the EMA (red) and Central Management Area (CMA; orange). No “underflow” points of diversion were located in the Western Management Area (WMA; purple). Data Source: eWRIMS.

The GSP states (3-90): “*Contoured groundwater elevation data for spring 2015 was used to determine areas where the Natural Communities polygons were within 30 feet depth to groundwater. Spring 2015 groundwater elevations were chosen for this analysis because this marked a period of the greatest recent data availability. These data are considered representative of average spring-summer conditions within the last 5 years.*” We recommend using groundwater data from multiple seasons and water year types to determine the range of depth to groundwater around NC dataset polygons.

We commend the GSA for including an inventory of flora and fauna species in the EMA's GDEs. Section 3.2.6.1.1 presents a discussion of potential GDE vegetation classifications, and each of these GDE units is mapped individually on Figure 3-36 (Natural Communities Commonly Associated with Groundwater Dataset). Table 3-14 presents the special-status species within the EMA. Within Section 3.2.6.1.1 (Potential GDE Vegetation Classifications), the GSP states that the maximum rooting depth of valley oak (*Quercus lobata*) is 80 feet. However, this deeper rooting depth was not used when verifying whether valley oak polygons from the NC Dataset are supported by groundwater.

RECOMMENDATIONS

- Show the extent of the shallow aquifer that is classified and managed as "underflow" by the SWRCB. For example, include a map and description of extraction points and whether they source "underflow" or "groundwater" from the shallow alluvium. Discuss SWRCB Order WR 2019-0148 and explain how it relates to SGMA and the definition of ISW in the EMA. Cite relevant sections of the order, maps, and cross-sections.

- Re-evaluate the EMA's GDEs noting the incorrect removal criteria listed above. 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. If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- Provide depth-to-groundwater contour maps, noting the best practices presented in Attachment D. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.

- 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 pre-SGMA baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types.

- Refer to Attachment B for more information on TNC's plant rooting depth database. Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as valley oak (*Quercus lobata*). We recommend 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 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.

<u>Native Vegetation and Managed Wetlands</u>

Native vegetation and managed wetlands are water use sectors that are required to be included in the water budget.[3,4] The integration of native vegetation into the water budget is **sufficient**. We commend the GSA for including the groundwater demands of this ecosystem in the historical, current and projected water budgets. The GSP states on p. 2-15 that there are no managed wetlands in the EMA.

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[3] "'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)]

[4] "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]

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 Communication and Engagement Plan (Appendix J).[5]

The Communication and Engagement Plan describes outreach to the Santa Ynez Band of Chumash Indians. A representative of the Chumash Tribe is a member of the EMA Citizens Advisory Group (CAG). However, we note the following deficiencies with the overall stakeholder engagement process:

- Although the Communication and Engagement Plan describes efforts to conduct outreach to DACs during GSP development, including the use of culturally appropriate language, education about the SGMA process, and quarterly newsletters in English and Spanish, there is no active participation of DACs within the EMA CAG.

- Public involvement and engagement with environmental stakeholders are described in very general terms. Aside from allowing environmental organizations involvement in the SGMA process regarding environmental uses of groundwater and invitations to apply to participate on the Citizens Advisory Group, there are no specific details of outreach to environmental communities.

- The Communication and Engagement Plan does not include specific, targeted outreach and engagement opportunities to DACs, tribal stakeholders, and environmental stakeholders during the GSP *implementation* phase.

RECOMMENDATION
• In the Communication and Engagement Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to Attachment B for specific recommendations on how to actively engage stakeholders during all phases of the GSP process. • Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[6]

[5] "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)]

[6] 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

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.[7,8,9]

Disadvantaged Communities and Drinking Water Users

For chronic lowering of groundwater levels, the GSP presents a well impact analysis to assess the potential impacts of water level decline on domestic wells screened in the Paso Robles Formation and Careaga Sand. The GSP states (p. 5-20): *"Based on the well impact analysis, the GSA Committee agreed to set the minimum threshold for representative wells screened in the Paso Robles Formation at 15 feet below spring 2018 groundwater levels."* At this groundwater elevation, 33% of domestic wells are predicted to have water levels fall below the top of the screen. The GSP states (p. 5-20): *"Based on the well impact analysis, the GSA Committee agreed to set the minimum threshold for representative wells screened in the Careaga Sand at 12 feet below spring 2018 groundwater levels."* At this groundwater elevation, 39% of domestic wells are predicted to have water levels fall below the top of the screen. Despite this well impact analysis, the GSP does not sufficiently describe whether minimum thresholds will avoid significant and unreasonable loss of drinking water, especially given the absence of a well mitigation plan in the GSP.

In addition, the GSP does not sufficiently describe or analyze direct or indirect impacts on DACs or tribes when defining undesirable results, nor does it describe how the existing groundwater level minimum thresholds will avoid significant and unreasonable impacts to DACs and domestic well users beyond 2015 and be consistent with Human Right to Water policy.[10]

For degraded water quality, the GSP presents water quality standards for constituents of concern (COCs) in Table 5-3. The GSP establishes minimum thresholds pertaining to salts and nutrients as follows (p. 5-41): *"Concentrations of TDS, chloride, sulfate, boron, sodium, and nitrate are equal to or greater than WQOs in 50 percent of representative wells or are equal to concentrations present when SGMA was enacted (January 2015). The WQOs [Water Quality Objectives] for each constituent are presented in Table 5-3 are considered the minimum thresholds for salts and nutrients. In cases where the ambient (prior to January 2015) water quality exceeds the WQO, the ambient water quality is considered the minimum threshold."* The GSP does not state which COCs this applies to or present the ambient concentrations, however. The GSP should include SMC for all COCs in the EMA that may be impacted by groundwater use and/or management, in addition to coordinating with water quality regulatory programs.

The GSP only includes a very general discussion of impacts to drinking water users when defining undesirable results and evaluating the impacts of proposed minimum thresholds. The GSP does not, however, mention or discuss direct and indirect impacts on DACs, drinking water users, or tribes when defining undesirable results for degraded water quality, nor does it evaluate

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[7] "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)]

[8] "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)]

[9] "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)]

[10] California Water Code §106.3. Available at: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=106.3

the cumulative or indirect impacts of proposed minimum thresholds on DACs, drinking water users, or tribes.

RECOMMENDATIONS
Chronic Lowering of Groundwater Levels ● Describe direct and indirect impacts on drinking water users, DACs, and tribes when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. **Degraded Water Quality** ● Describe direct and indirect impacts on drinking water users, DACs, and tribes when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[11] ● Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users, DACs, and tribes. ● In Table 5-3 (Water Quality Standards for Selected Constituents of Concern), compare WQOs, MCLs, and ambient (prior to January 2015) water quality concentrations. Ensure that the most protective value is chosen for the minimum threshold. ● Set minimum thresholds and measurable objectives for all water quality constituents within the EMA. Ensure they align with drinking water standards.[12]

Groundwater Dependent Ecosystems and Interconnected Surface Waters

When defining undesirable results for chronic lowering of groundwater levels, the GSP states that high rate of pumping in the Paso Robles Formation or Careaga Sand could result in potential impacts to GDEs (p. 5-13). However, these impacts are not described or analyzed. This is problematic because without identifying potential impacts on GDEs, minimum thresholds may compromise these environmental beneficial users. Since GDEs may be present in areas of the EMA that are not adjacent to ISW (see our comments in the GDE section of this letter), they must also be considered when developing SMC for chronic lowering of groundwater levels.

For depletion of interconnected surface water, the GSP mentions, but does not sufficiently analyze, the impacts of minimum thresholds on terrestrial GDEs. The GSP states: *"The minimum threshold for this sustainability indicator is presented below and in Table 5-6: Groundwater levels measured at the piezometers proposed to be installed in the GDE areas of Alamo Pintado and Zanja de Cota Creek are 15 feet below the stream bed. This minimum threshold was selected because it represents the lowest groundwater level that most GDE plants can typically access with their roots, assuming that capillary action will bring groundwater further up into the profile. It is also intended to ensure that groundwater use does not significantly reduce the flow of surface water from the tributaries into the Santa Ynez River."* Furthermore, the GSP makes no attempt to evaluate the impacts of the proposed minimum threshold on environmental beneficial users of

[11] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858.

[12] "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)]

surface water. The GSP does not explain how the chosen minimum thresholds and measurable objectives avoid significant and unreasonable effects on surface water beneficial users in the EMA, such as increased mortality and inability to perform key life processes (e.g., reproduction, migration).

RECOMMENDATIONS

- Define chronic lowering of groundwater SMC directly for environmental beneficial users of groundwater. 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 on 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 EMA.[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 EMA are reached.[15] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on both environmental beneficial users of groundwater and surface water 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.[6,16]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include “impacts on groundwater dependent ecosystems”.

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

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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

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 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 should clearly and transparently incorporate the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the EMA. While these extreme scenarios may have a lower likelihood of occurring, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

The GSP incorporates climate change into key inputs (e.g., precipitation and evapotranspiration) of the projected water budget. However, imported water should also be adjusted for climate change and incorporated into the surface water flow inputs of the projected water budget. Furthermore, the GSP does not provide a sustainable yield based on the projected water budget with climate change incorporated. If the water budgets are incomplete, including the omission of projected climate change effects on imported water inputs, and sustainable yield is not calculated based on climate change projections, 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 and domestic well owners.

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change into surface water flow inputs, including imported water, for the projected water budget.
- Estimate sustainable yield based on the projected water budget with climate change incorporated.
- Incorporate climate change scenarios into projects and management actions.

[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

3. Data Gaps

The consideration of beneficial users when establishing monitoring networks is **insufficient**, due to lack of specific plans to increase the Representative Monitoring Sites (RMSs) in the monitoring network that represent shallow groundwater elevations around GDEs in the EMA. Figure 4-2 (Groundwater Level Monitoring Network Low Well Density Areas) does highlight the areas of data gaps in the EMA based on well density in the EMA. The GSP, however, does not specifically acknowledge data gaps in the GDE monitoring network for the Category B potential GDEs noted in Section 3.2.6 (Groundwater Dependent Ecosystems).

Because maps of RMSs did not include DACs, tribes, domestic wells, and GDE mapping layers, it was difficult to determine whether or not the RMSs adequately represent water quality conditions and shallow groundwater elevations around DACs, tribes, domestic wells, and GDEs in the EMA.

RECOMMENDATION

- Provide maps that overlay monitoring well locations with the locations of DACs, domestic wells, tribes, and GDEs to clearly identify potentially impacted areas.
- Increase the number of RMSs in the shallow aquifer across the EMA as needed to adequately monitor shallow groundwater elevations supporting beneficial users such as GDEs and shallow domestic wells.
- Provide specific plans, such as locations and a timeline, to fill the data gaps in the GDE monitoring network. Evaluate how the gathered data will be used to identify and map GDEs.

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, and drinking water users.

The proposed projects and management actions that would improve the water supply, GDE habitats, or provide benefits to DACs within the EMA are currently classified as Group 2 or 3 projects, and the GSA does not have specific plans to develop these projects. Therefore, potential project and management actions may not protect beneficial users during the GSP implementation phase. Groundwater sustainability under SGMA is defined not just by sustainable yield, but by the avoidance of undesirable results for *all* beneficial users.

We recommend including specific plans to implement a drinking water well impact mitigation program since the SMC section of the GSP outlines that up to 39% of domestic wells will be impacted at minimum thresholds.

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to Attachment B for specific recommendations on how to implement a drinking water well mitigation program.

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- The GSP discusses the Group 3 Project: Distributed Stormwater Managed Aquifer Recharge (DSW-MAR). Note that 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 further guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the “Multi-Benefit Recharge Project Methodology Guidance Document.”[19]

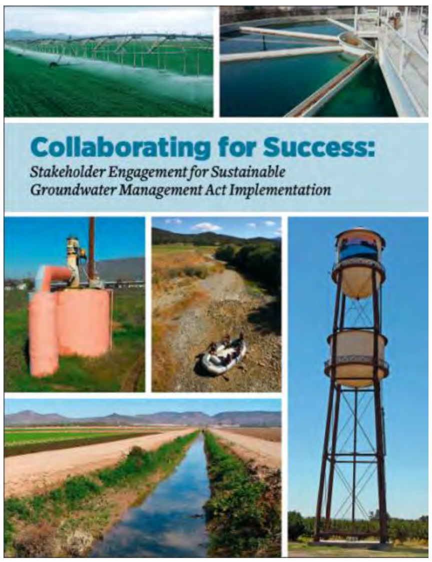
- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[19] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

Attachment B

SGMA Tools to address DAC, drinking water, and environmental beneficial uses and users

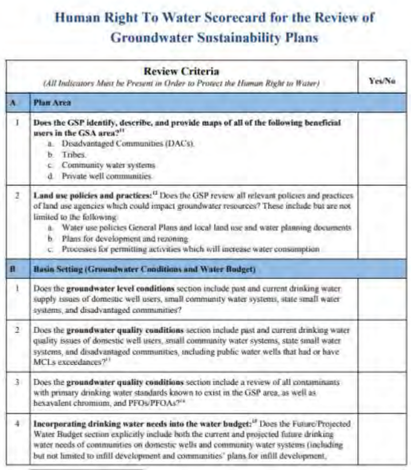
Stakeholder Engagement and Outreach



Clean Water Action, Community Water Center and Union of Concerned Scientists developed a guidance document called Collaborating for success: Stakeholder engagement for Sustainable Groundwater Management Act Implementation. It provides details on how to conduct targeted and broad outreach and engagement during Groundwater Sustainability Plan (GSP) development and implementation. Conducting a targeted outreach involves:

- Developing a robust Stakeholder Communication and Engagement plan that includes outreach at frequented locations (schools, farmers markets, religious settings, events) across the plan area to increase the involvement and participation of disadvantaged communities, drinking water users and the environmental stakeholders.
- Providing translation services during meetings and technical assistance to enable easy participation for non-English speaking stakeholders.
- GSP should adequately describe the process for requesting input from beneficial users and provide details on how input is incorporated into the GSP.

The Human Right to Water

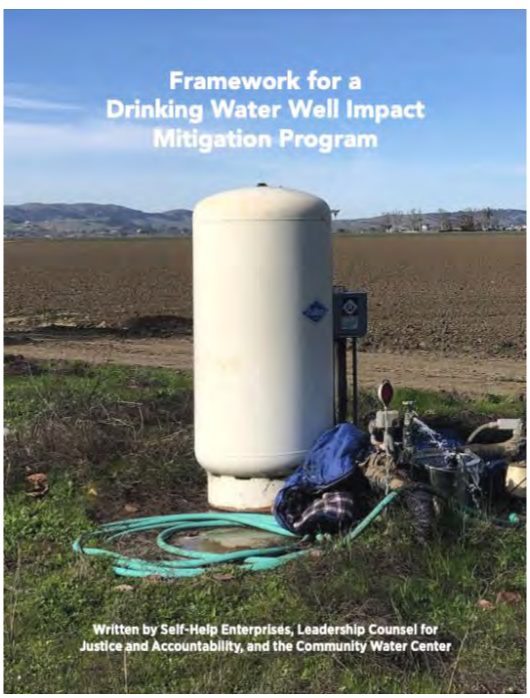


Human Right To Water Scorecard for the Review of Groundwater Sustainability Plans

	Review Criteria (All Indicators Must be Present in Order to Protect the Human Right to Water)	Yes/No
A	**Plan Area**	
1	**Does the GSP identify, describe, and provide maps of all of the following beneficial users in the GSA area?**[11] a. Disadvantaged Communities (DACs). b. Tribes. c. Community water systems d. Private well communities	
2	**Land use policies and practices:**[12] Does the GSP review all relevant policies and practices of land use agencies which could impact groundwater resources? These include but are not limited to the following: a. Water use policies General Plans and local land use and water planning documents b. Plans for development and rezoning c. Processes for permitting activities which will increase water consumption	
B	**Basin Setting (Groundwater Conditions and Water Budget)**	
1	Does the **groundwater level conditions** section include past and current drinking water supply issues of domestic well users, small community water systems, state small water systems, and disadvantaged communities?	
2	Does the **groundwater quality conditions** section include past and current drinking water quality issues of domestic well users, small community water systems, state small water systems, and disadvantaged communities, including public water wells that had or have MCLs exceedances?[13]	
3	Does the **groundwater quality conditions** section include a review of all contaminants with primary drinking water standards known to exist in the GSP area, as well as hexavalent chromium, and PFOs/PFOAs?[14]	
4	**Incorporating drinking water needs into the water budget:**[15] Does the Future/Projected Water Budget section explicitly include both the current and projected future drinking water needs of communities on domestic wells and community water systems (including but not limited to infill development and communities' plans for infill development,	

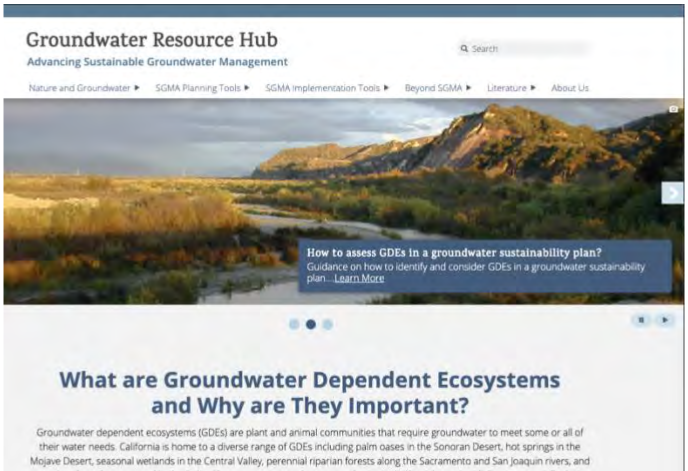
The Human Right to Water Scorecard was developed by Community Water Center, Leadership Counsel for Justice and Accountability and Self Help Enterprises to aid Groundwater Sustainability Agencies (GSAs) in prioritizing drinking water needs in SGMA. The scorecard identifies elements that must exist in GSPs to adequately protect the Human Right to Drinking water.

Drinking Water Well Impact Mitigation Framework



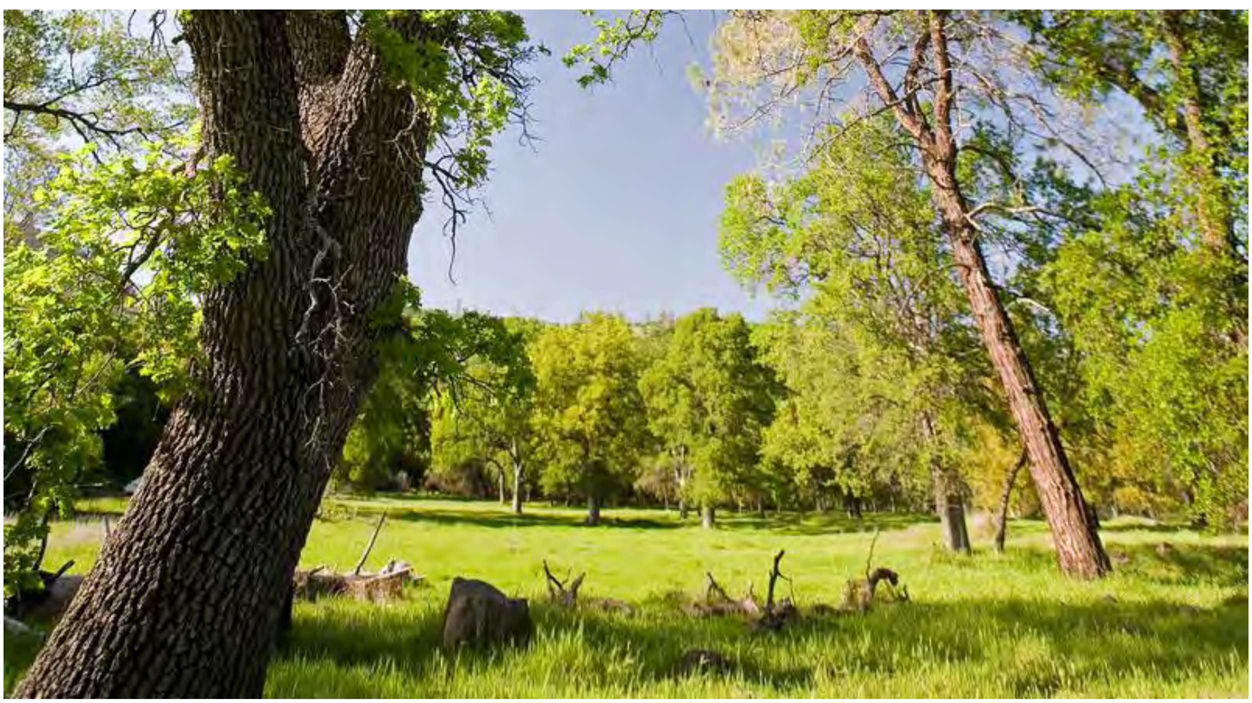
The Drinking Water Well Impact Mitigation Framework was developed by Community Water Center, Leadership Counsel for Justice and Accountability and Self Help Enterprises to aid GSAs in the development and implementation of their GSPs. The framework provides a clear roadmap for how a GSA can best structure its data gathering, monitoring network and management actions to proactively monitor and protect drinking water wells and mitigate impacts should they occur.

Groundwater Resource Hub



The Nature Conservancy has developed a suite of tools based on best available science to help GSAs, consultants, and stakeholders efficiently incorporate nature into GSPs. These tools and resources are available online at GroundwaterResourceHub.org. The Nature Conservancy's tools and resources are intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

Rooting Depth Database



The Plant Rooting Depth Database provides information that can help assess whether groundwater-dependent vegetation are accessing groundwater. Actual rooting depths will depend on the plant species and site-specific conditions, such as soil type and availability of other water sources. Site-specific knowledge of depth to groundwater combined with rooting depths will help provide an understanding of the potential groundwater levels are needed to sustain GDEs.

How to use the database

The maximum rooting depth information in the Plant Rooting Depth Database is useful when verifying whether vegetation in the Natural Communities Commonly Associated with Groundwater (NC Dataset) are connected to groundwater. A 30 ft depth-to-groundwater threshold, which is based on averaged global rooting depth data for phreatophytes[1], is relevant for most plants identified in the NC Dataset since most plants have a max rooting depth of less than 30 feet. However, it is important to note that deeper thresholds are necessary for other plants that have reported maximum root depths that exceed the averaged 30 feet threshold, such as valley oak (*Quercus lobata*), Euphrates poplar (*Populus euphratica*), salt cedar (*Tamarix spp.*), and shadescale (*Atriplex confertifolia*). The Nature Conservancy advises that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to groundwater threshold of 80 feet should be used instead of the 30 ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to re-emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

The Plant Rooting Depth Database is an Excel workbook composed of four worksheets:

1. California phreatophyte rooting depth data (included in the NC Dataset)
2. Global phreatophyte rooting depth data
3. Metadata
4. References

How the database was compiled

The Plant Rooting Depth Database is a compilation of rooting depth information for the groundwater-dependent plant species identified in the NC Dataset. Rooting depth data were compiled from published scientific literature and expert opinion through a crowdsourcing campaign. As more information becomes available, the database of rooting depths will be updated. Please Contact Us if you have additional rooting depth data for California phreatophytes.

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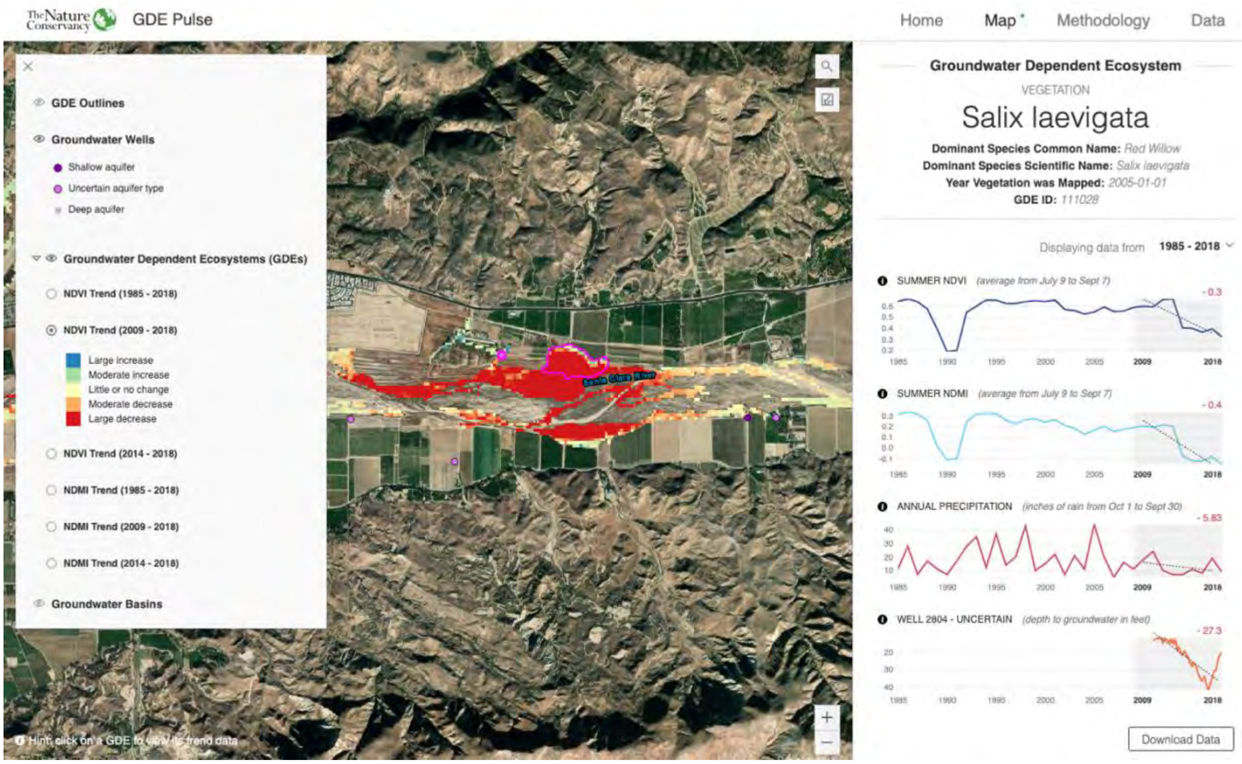
[1] Canadell, J., Jackson, R.B., Ehleringer, J.B. et al. 1996. Maximum rooting depth of vegetation types at the global scale. Oecologia 108, 583–595. https://doi.org/10.1007/BF00329030

GDE Pulse



[GDE Pulse](#) is a free online tool that allows Groundwater Sustainability Agencies to assess changes in groundwater dependent ecosystem (GDE) health using satellite, rainfall, and groundwater data. Remote sensing data from satellites has been used to monitor the health of vegetation all over the planet. GDE pulse has compiled 35 years of satellite imagery from NASA's Landsat mission for every polygon in the Natural Communities Commonly Associated with Groundwater Dataset. The following datasets are available for downloading:

Normalized Difference Vegetation Index (NDVI) is a satellite-derived index that represents the greenness of vegetation. Healthy green vegetation tends to have a higher NDVI, while dead leaves have a lower NDVI. We calculated the average NDVI during the driest part of the year (July - Sept) to estimate vegetation health when the plants are most likely dependent on groundwater.

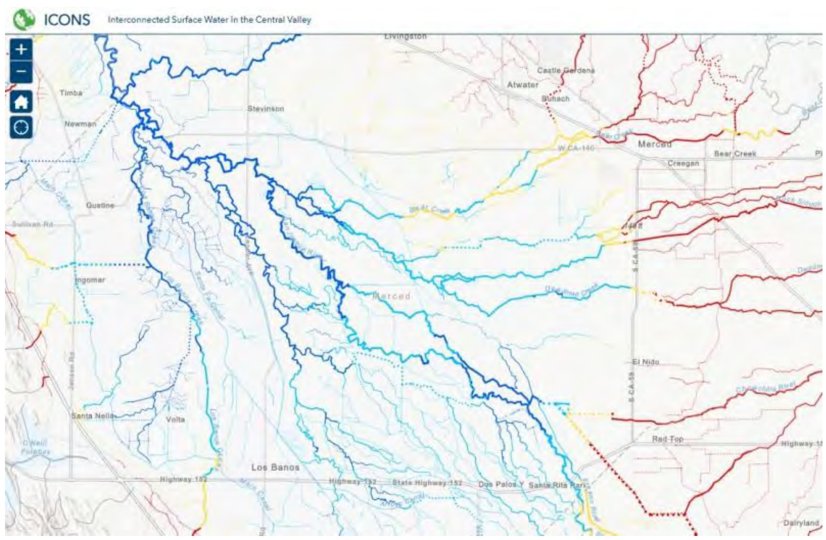
Normalized Difference Moisture Index (NDMI) is a satellite-derived index that represents water content in vegetation. NDMI is derived from the Near-Infrared (NIR) and Short-Wave Infrared (SWIR) channels. Vegetation with adequate access to water tends to have higher NDMI, while vegetation that is water stressed tends to have lower NDMI. We calculated the average NDVI during the driest part of the year (July–September) to estimate vegetation health when the plants are most likely dependent on groundwater.

Annual Precipitation is the total precipitation for the water year (October 1st – September 30th) from the PRISM dataset. The amount of local precipitation can affect vegetation with more precipitation generally leading to higher NDVI and NDMI.

Depth to Groundwater measurements provide an indication of the groundwater levels and changes over time for the surrounding area. We used groundwater well measurements from nearby (<1km) wells to estimate the depth to groundwater below the GDE based on the average elevation of the GDE (using a digital elevation model) minus the measured groundwater surface elevation.

ICONOS Mapper

Interconnected Surface Water in the Central Valley



[ICONS](#) maps the likely presence of interconnected surface water (ISW) in the Central Valley using depth to groundwater data. Using data from 2011-2018, the ISW dataset represents the likely connection between surface water and groundwater for rivers and streams in California's Central Valley. It includes information on the mean, maximum, and minimum depth to groundwater for each stream segment over the years with available data, as well as the likely presence of ISW based on the minimum depth to groundwater. The Nature Conservancy developed this database, with guidance and input from expert academics, consultants, and state agencies.

We developed this dataset using groundwater elevation data available online from the California Department of Water Resources (DWR). DWR only provides this data for the Central Valley. For GSAs outside of the valley, who have groundwater well measurements, we recommend following our methods to determine likely ISW in your region. The Nature Conservancy's ISW dataset should be used as a first step in reviewing ISW and should be supplemented with local or more recent groundwater depth data.

Attachment C

Freshwater Species Located in the Santa Ynez River Valley Subbasin

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 Santa Ynez River Valley Subbasin. 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				
Vireo bellii pusillus	Least Bell's Vireo	Endangered	Endangered	
Actitis macularius	Spotted Sandpiper			
Aechmophorus clarkii	Clark's Grebe			
Aechmophorus occidentalis	Western Grebe			
Agelaius tricolor	Tricolored Blackbird	Bird of Conservation Concern	Special Concern	BSSC - First priority
Aix sponsa	Wood Duck			
Anas acuta	Northern Pintail			
Anas americana	American Wigeon			
Anas clypeata	Northern Shoveler			
Anas crecca	Green-winged Teal			
Anas cyanoptera	Cinnamon Teal			
Anas discors	Blue-winged Teal			
Anas platyrhynchos	Mallard			
Anas strepera	Gadwall			
Anser albifrons	Greater White-fronted Goose			
Ardea alba	Great Egret			
Ardea herodias	Great Blue Heron			
Aythya affinis	Lesser Scaup			
Aythya americana	Redhead		Special Concern	BSSC - Third priority

[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

Aythya collaris	Ring-necked Duck			
Aythya marila	Greater Scaup			
Aythya valisineria	Canvasback		Special	
Botaurus lentiginosus	American Bittern			
Bucephala albeola	Bufflehead			
Bucephala clangula	Common Goldeneye			
Butorides virescens	Green Heron			
Calidris alpina	Dunlin			
Calidris mauri	Western Sandpiper			
Calidris minutilla	Least Sandpiper			
Chen caerulescens	Snow Goose			
Chen rossii	Ross's Goose			
Chlidonias niger	Black Tern		Special Concern	BSSC - Second priority
Chroicocephalus philadelphia	Bonaparte's Gull			
Cistothorus palustris palustris	Marsh Wren			
Cygnus columbianus	Tundra Swan			
Egretta thula	Snowy Egret			
Empidonax traillii	Willow Flycatcher	Bird of Conservation Concern	Endangered	
Fulica americana	American Coot			
Gallinago delicata	Wilson's Snipe			
Gelochelidon nilotica vanrossemi	Gull-billed Tern	Bird of Conservation Concern	Special Concern	BSSC - Third priority
Haliaeetus leucocephalus	Bald Eagle	Bird of Conservation Concern	Endangered	
Himantopus mexicanus	Black-necked Stilt			
Icteria virens	Yellow-breasted Chat		Special Concern	BSSC - Third priority
Laterallus jamaicensis coturniculus	California Black Rail	Bird of Conservation Concern	Threatened	
Limnodromus scolopaceus	Long-billed Dowitcher			
Lophodytes cucullatus	Hooded Merganser			
Megaceryle alcyon	Belted Kingfisher			
Mergus merganser	Common Merganser			
Mergus serrator	Red-breasted Merganser			
Numenius americanus	Long-billed Curlew			

Numenius phaeopus	Whimbrel			
Nycticorax nycticorax	Black-crowned Night-Heron			
Oreothlypis luciae	Lucy's Warbler		Special Concern	BSSC - Third priority
Oxyura jamaicensis	Ruddy Duck			
Pelecanus erythrorhynchos	American White Pelican		Special Concern	BSSC - First priority
Phalacrocorax auritus	Double-crested Cormorant			
Phalaropus tricolor	Wilson's Phalarope			
Piranga rubra	Summer Tanager		Special Concern	BSSC - First priority
Plegadis chihi	White-faced Ibis		Watch list	
Pluvialis squatarola	Black-bellied Plover			
Podiceps nigricollis	Eared Grebe			
Podilymbus podiceps	Pied-billed Grebe			
Porzana carolina	Sora			
Rallus limicola	Virginia Rail			
Recurvirostra americana	American Avocet			
Riparia riparia	Bank Swallow		Threatened	
Rynchops niger	Black Skimmer			
Setophaga petechia	Yellow Warbler			BSSC - Second priority
Tachycineta bicolor	Tree Swallow			
Tringa melanoleuca	Greater Yellowlegs			
Tringa semipalmata	Willet			
Tringa solitaria	Solitary Sandpiper			
Xanthocephalus xanthocephalus	Yellow-headed Blackbird		Special Concern	BSSC - Third priority
CRUSTACEANS				
Branchinecta lynchi	Vernal Pool Fairy Shrimp	Threatened	Special	IUCN - Vulnerable
Americorophium spinicorne				Not on any status lists
Cyprididae fam.	Cyprididae fam.			
Gammarus spp.	Gammarus spp.			
Hyalella spp.	Hyalella spp.			
Neomysis mercedis				Not on any status lists
Ramellogammarus spp.	Ramellogammarus spp.			
FISH				
Eucyclogobius newberryi	Tidewater goby	Endangered	Special Concern	Vulnerable - Moyle 2013
Gasterosteus aculeatus williamsoni	Unarmored threespine stickleback	Endangered	Endangered	Endangered - Moyle 2013

Oncorhynchus mykiss irideus	Coastal rainbow trout			Least Concern - Moyle 2013
Oncorhynchus mykiss - Southern CA	Southern California steelhead	Endangered	Special Concern	Endangered - Moyle 2013
HERPS				
Actinemys marmorata marmorata	Western Pond Turtle		Special Concern	ARSSC
Ambystoma californiense californiense	California Tiger Salamander	Threatened	Threatened	ARSSC
Anaxyrus boreas boreas	Boreal Toad			
Pseudacris cadaverina	California Treefrog			ARSSC
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
Taricha torosa	Coast Range Newt		Special Concern	ARSSC
Thamnophis hammondii hammondii	Two-striped Gartersnake		Special Concern	ARSSC
Thamnophis sirtalis sirtalis	Common Gartersnake			
Anaxyrus boreas halophilus	California Toad			ARSSC
Pseudacris regilla	Northern Pacific Chorus Frog			
Thamnophis atratus atratus	Santa Cruz Gartersnake			Not on any status lists
Thamnophis elegans elegans	Mountain Gartersnake			Not on any status lists
Thamnophis elegans terrestris	Coast Gartersnake			Not on any status lists
Thamnophis sirtalis infernalis	California Red-sided Gartersnake			Not on any status lists
INSECTS & OTHER INVERTS				
Acentrella spp.	Acentrella spp.			
Acilius abbreviatus				Not on any status lists
Agabinus glabrellus				Not on any status lists
Agabus disintegratus				Not on any status lists
Agabus lutosus				Not on any status lists
Agabus spp.	Agabus spp.			
Agapetus spp.	Agapetus spp.			

Ambrysus spp.	Ambrysus spp.			
Anacaena signaticollis				Not on any status lists
Anax junius	Common Green Darner			
Anax spp.	Anax spp.			
Anisitsiellidae fam.	Anisitsiellidae fam.			
Apedilum spp.	Apedilum spp.			
Archilestes grandis	Great Spreadwing			
Argia spp.	Argia spp.			
Argia vivida	Vivid Dancer			
Baetidae fam.	Baetidae fam.			
Baetis adonis	A Mayfly			
Baetis spp.	Baetis spp.			
Belostomatidae fam.	Belostomatidae fam.			
Berosus infuscatus				Not on any status lists
Berosus punctatissimus				Not on any status lists
Caenis bajaensis	A Mayfly			
Caenis spp.	Caenis spp.			
Callibaetis spp.	Callibaetis spp.			
Caudatella spp.	Caudatella spp.			
Centroptilum spp.	Centroptilum spp.			
Chaetarthria magna				Not on any status lists
Chaetarthria punctulata				Not on any status lists
Cheumatopsyche spp.	Cheumatopsyche spp.			
Chironomidae fam.	Chironomidae fam.			
Chironomus anonymus				Not on any status lists
Chironomus spp.	Chironomus spp.			
Coenagrionidae fam.	Coenagrionidae fam.			
Colymbetes strigatus				Not on any status lists
Copelatus glyphicus				Not on any status lists
Cordulegaster dorsalis	Pacific Spiketail			
Corisella spp.	Corisella spp.			
Corixidae fam.	Corixidae fam.			
Cricotopus annulator				Not on any status lists
Cricotopus spp.	Cricotopus spp.			
Cybister ellipticus				Not on any status lists
Cymbiodyta columbiana				Not on any status lists

Cymbiodyta dorsalis				Not on any status lists
Cymbiodyta pacifica				Not on any status lists
Dicrotendipes adnilus				Not on any status lists
Dicrotendipes spp.	Dicrotendipes spp.			
Dytiscidae fam.	Dytiscidae fam.			
Dytiscus marginicollis				Not on any status lists
Enallagma cyathigerum				Not on any status lists
Enallagma praevarum	Arroyo Bluet			
Enallagma spp.	Enallagma spp.			
Enochrus californicus				Not on any status lists
Enochrus carinatus				Not on any status lists
Enochrus cristatus				Not on any status lists
Enochrus cuspidatus				Not on any status lists
Enochrus piceus				Not on any status lists
Enochrus pygmaeus				Not on any status lists
Ephydridae fam.	Ephydridae fam.			
Eubrianax edwardsii				Not on any status lists
Eukiefferiella spp.	Eukiefferiella spp.			
Fallceon quilleri	A Mayfly			
Fallceon spp.	Fallceon spp.			
Helichus spp.	Helichus spp.			
Helichus suturalis				Not on any status lists
Hetaerina americana	American Rubyspot			
Heterocerus mexicanus				Not on any status lists
Hydrobius fuscipes				Not on any status lists
Hydrophilidae fam.	Hydrophilidae fam.			
Hydrophilus triangularis				Not on any status lists
Hydropsyche spp.	Hydropsyche spp.			
Hydropsychidae fam.	Hydropsychidae fam.			
Hydroptila spp.	Hydroptila spp.			
Hydroptilidae fam.	Hydroptilidae fam.			
Ischnura perparva	Western Forktail			
Labrundinia spp.	Labrundinia spp.			
Laccobius spp.	Laccobius spp.			

Laccophilus maculosus				Not on any status lists
Lauterborniella spp.	Lauterborniella spp.			
Libellula saturata	Flame Skimmer			
Limnophyes asquamatus				Not on any status lists
Limnophyes spp.	Limnophyes spp.			
Liodessus obscurellus				Not on any status lists
Microcylloepus spp.	Microcylloepus spp.			
Micropsectra nigripila				Not on any status lists
Micropsectra spp.	Micropsectra spp.			
Nectopsyche spp.	Nectopsyche spp.			
Neoclypeodytes pictodes				Not on any status lists
Neoclypeodytes plicipennis				Not on any status lists
Ochthebius apache				Not on any status lists
Ochthebius discretus				Not on any status lists
Ochthebius puncticollis				Not on any status lists
Ochthebius spp.	Ochthebius spp.			
Optioservus spp.	Optioservus spp.			
Orthocladius appersoni				Not on any status lists
Orthocladius spp.	Orthocladius spp.			
Oxyethira spp.	Oxyethira spp.			
Parametriocnemus spp.	Parametriocnemus spp.			
Paraphaenocladius spp.	Paraphaenocladius spp.			
Paratanytarsus spp.	Paratanytarsus spp.			
Peltodytes callosus				Not on any status lists
Peltodytes spp.	Peltodytes spp.			
Pentaneura spp.	Pentaneura spp.			
Plathemis lydia	Common Whitetail			
Procloeon venosum	A Mayfly			
Pseudochironomus spp.	Pseudochironomus spp.			
Pseudosmittia forcipata				Not on any status lists
Pseudosmittia spp.	Pseudosmittia spp.			
Psychodidae fam.	Psychodidae fam.			
Rhantus anisonychus				Not on any status lists
Rhantus gutticollis				Not on any status lists

Rhantus wallisi				Not on any status lists
Rheotanytarsus spp.	Rheotanytarsus spp.			
Rhionaeschna multicolor	Blue-eyed Darner			
Serratella micheneri	A Mayfly			
Sigara spp.	Sigara spp.			
Simulium spp.	Simulium spp.			
Sperchon spp.	Sperchon spp.			
Sperchontidae fam.	Sperchontidae fam.			
Stictotarsus griseostriatus				Not on any status lists
Stictotarsus spp.	Stictotarsus spp.			
Stictotarsus striatellus				Not on any status lists
Sympetrum illotum	Cardinal Meadowhawk			
Tanytarsus spp.	Tanytarsus spp.			
Tramea lacerata	Black Saddlebags			
Trichocorixa arizonensis				Not on any status lists
Trichocorixa spp.	Trichocorixa spp.			
Tricorythodes spp.	Tricorythodes spp.			
Tropisternus californicus				Not on any status lists
Tropisternus spp.	Tropisternus spp.			
Uvarus subtilis				Not on any status lists
Zaitzevia parvula				Not on any status lists
MAMMALS				
Castor canadensis	American Beaver			Not on any status lists
MOLLUSKS				
Gyraulus vermicularis	Pacific Coast Gyraulus			CS
Physa acuta	Pewter Physa			Not on any status lists
Physa spp.	Physa spp.			
Physella virgata	Protean Physa			CS
Planorbella trivolvis	Marsh Rams-horn			CS
Planorbidae fam.	Planorbidae fam.			
Sphaerium occidentale				Not on any status lists
Sphaerium spp.	Sphaerium spp.			
Vorticifex spp.	Vorticifex spp.			
PLANTS				
Lasthenia glabrata coulteri	Coulter's Goldfields		Special	CRPR - 1B.1
Alnus rhombifolia	White Alder			

Alopecurus carolinianus	Tufted Foxtail			
Alopecurus saccatus	Pacific Foxtail			
Anemopsis californica	Yerba Mansa			
Arundo donax	NA			
Azolla filiculoides	NA			
Baccharis glutinosa	NA			Not on any status lists
Berula erecta	Wild Parsnip			
Bolboschoenus maritimus paludosus	NA			Not on any status lists
Callitriche marginata	Winged Water-starwort			
Carex harfordii	Harford's Sedge			
Carex pellita	Woolly Sedge			
Carex senta	Western Rough Sedge			
Ceratophyllum demersum	Common Hornwort			
Cotula coronopifolia	NA			
Crassula aquatica	Water Pygmyweed			
Downingia cuspidata	Toothed Calicoflower			
Elatine brachysperma	Shortseed Waterwort			
Elatine californica	California Waterwort			
Eleocharis macrostachya	Creeping Spikerush			
Eleocharis montevidensis	Sand Spikerush			
Eleocharis parishii	Parish's Spikerush			
Epilobium campestre	NA			Not on any status lists
Euthamia occidentalis	Western Fragrant Goldenrod			
Helenium puberulum	Rosilla			
Hypericum anagalloides	Tinker's-penny			
Isoetes howellii	NA			
Isolepis cernua	Low Bulrush			
Jaumea carnosa	Fleshy Jaumea			
Juncus effusus effusus	NA			
Juncus falcatus falcatus	Sickle-leaf Rush			
Juncus phaeocephalus phaeocephalus	Brown-head Rush			
Juncus textilis	Basket Rush			

Juncus xiphioides	Iris-leaf Rush			
Lemna minuta	Least Duckweed			
Mimulus guttatus	Common Large Monkeyflower			
Muhlenbergia utilis	Aparejo Grass			
Nasturtium gambelii	NA	Endangered	Threatened	CRPR - 1B.1
Oenanthe sarmentosa	Water-parsley			
Persicaria lapathifolia				Not on any status lists
Phacelia distans	NA			
Plagiobothrys acanthocarpus	Adobe Popcorn-flower			
Plagiobothrys undulatus	NA			Not on any status lists
Plantago elongata elongata	Slender Plantain			
Platanus racemosa	California Sycamore			
Populus trichocarpa	NA			Not on any status lists
Psilocarphus brevissimus brevissimus	Dwarf Woolly-heads			
Psilocarphus tenellus	NA			
Rumex conglomeratus	NA			
Rumex fueginus				Not on any status lists
Rumex salicifolius salicifolius	Willow Dock			
Salix laevigata	Polished Willow			
Salix lasiandra lasiandra				Not on any status lists
Salix lasiolepis lasiolepis	Arroyo Willow			
Samolus parviflorus	NA			Not on any status lists
Schoenoplectus acutus occidentalis	Hardstem Bulrush			
Schoenoplectus californicus	California Bulrush			
Schoenoplectus pungens pungens	NA			
Scirpus microcarpus	Small-fruit Bulrush			
Sinapis alba	NA			
Sparganium eurycarpum eurycarpum				
Stachys chamissonis chamissonis	Coast Hedge-nettle			
Stachys pycnantha	Short-spike Hedge-nettle			

Stuckenia pectinata				Not on any status lists
Triglochin scilloides	NA			Not on any status lists
Typha domingensis	Southern Cattail			
Typha latifolia	Broadleaf Cattail			
Veronica anagallis-aquatica	NA			
Veronica peregrina	NA			
Wolffiella lingulata	Tongue Bogmat			
Zannichellia palustris	Horned Pondweed			

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.

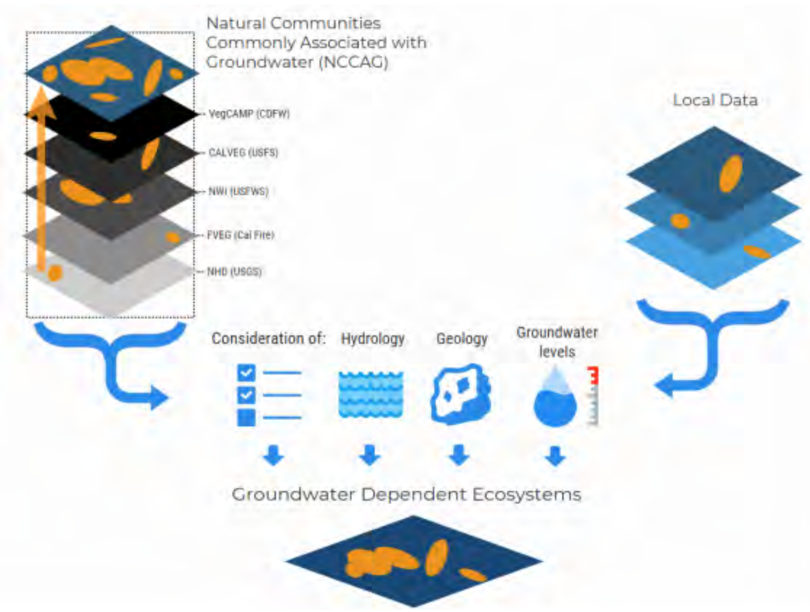


Figure 1. Considerations for GDE identification.
Source: DWR[2]

[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

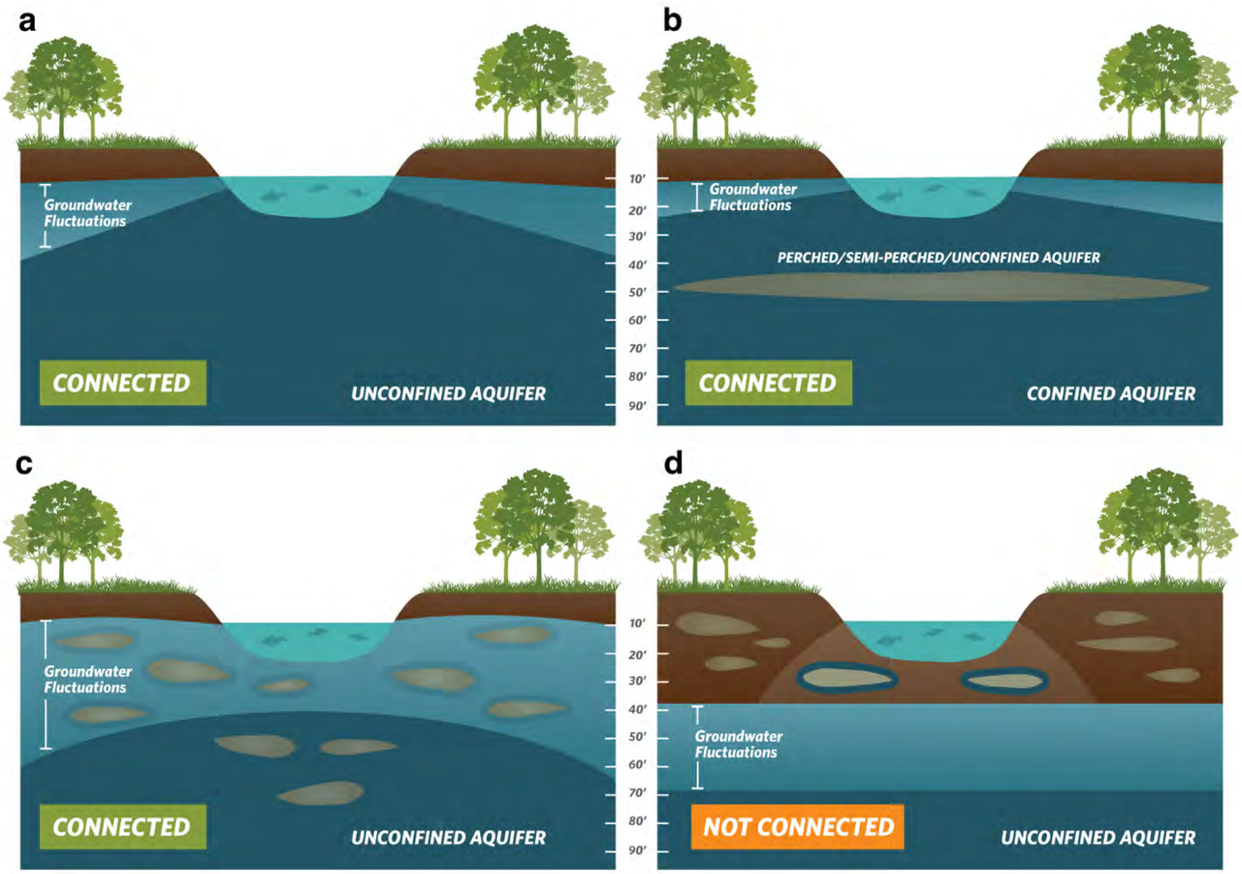


Figure 2. Confirming whether an ecosystem is connected to groundwater. Top: (a) Under the ecosystem is an unconfined aquifer with depth-to-groundwater fluctuating seasonally and interannually within 30 feet from land surface. (b) Depth-to-groundwater in the shallow aquifer is connected to overlying ecosystem. 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 <u>until</u> data gaps are reconciled in the monitoring network (see Best Practice #6).

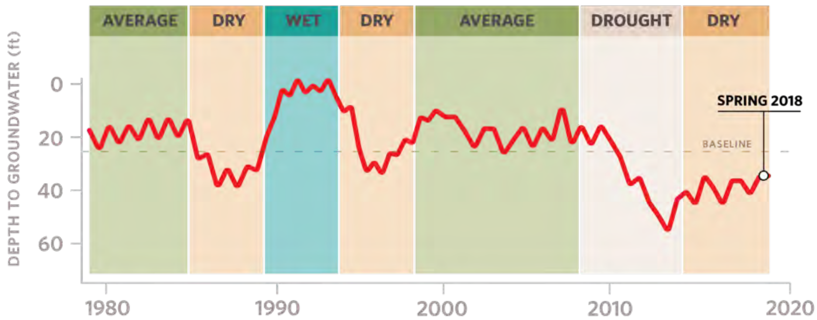


Figure 3. Example seasonality and interannual variability in depth-to-groundwater over time. Selecting one point in time, such as Spring 2018, to characterize groundwater conditions in GDEs fails to capture what groundwater conditions are necessary to maintain the ecosystem status into the future so 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).

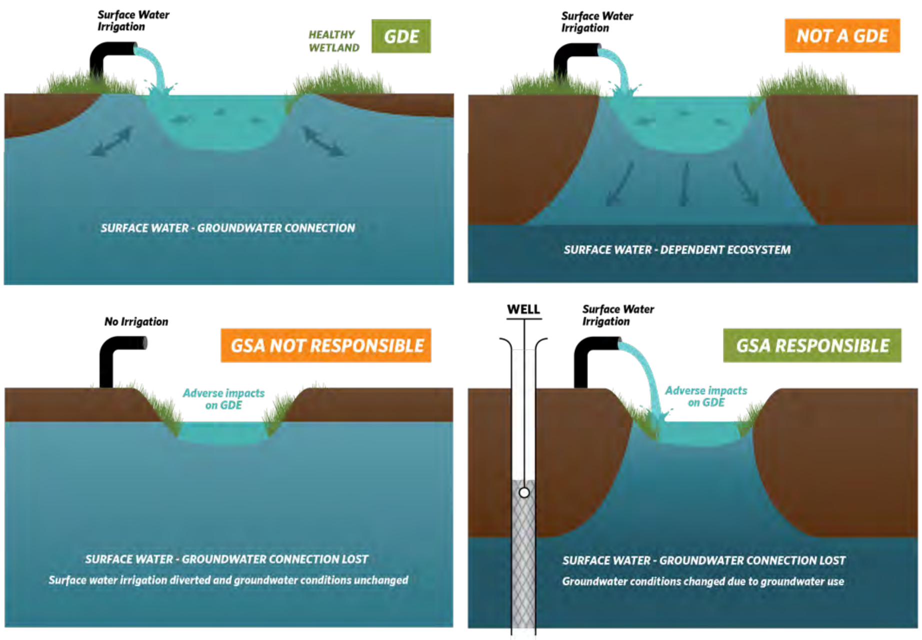


Figure 4. Ecosystems often depend on multiple sources of water. Top: (Left) Surface water and groundwater are interconnected, meaning that the GDE is supported by both groundwater and surface water. (Right) Ecosystems that are only reliant on non-groundwater sources are not groundwater-dependent. Bottom: (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.

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[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.

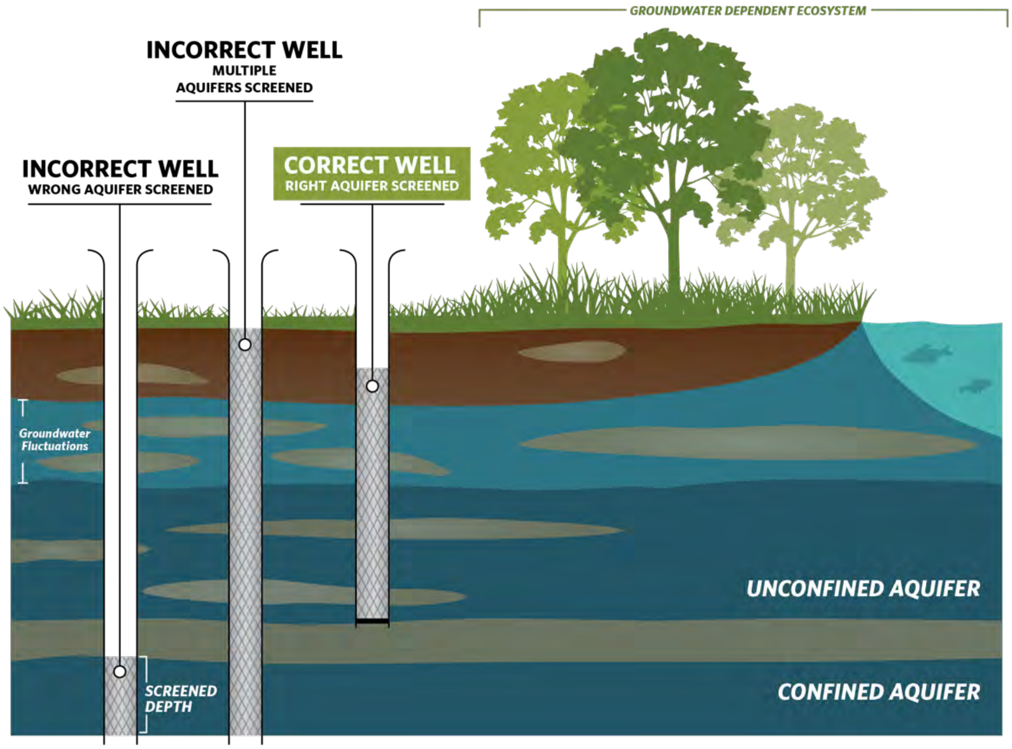

Figure 5. Selecting representative wells to characterize groundwater conditions near GDEs.

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.

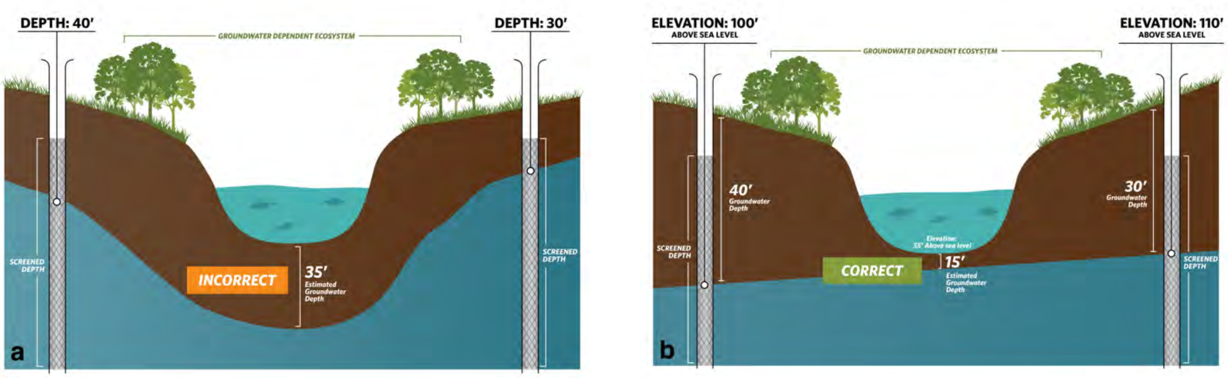

Figure 6. Contouring depth-to-groundwater around surface water features and GDEs. (a) Groundwater level interpolation using depth-to-groundwater data from monitoring wells. (b) Groundwater level interpolation using groundwater elevation data from monitoring wells and DEM data.

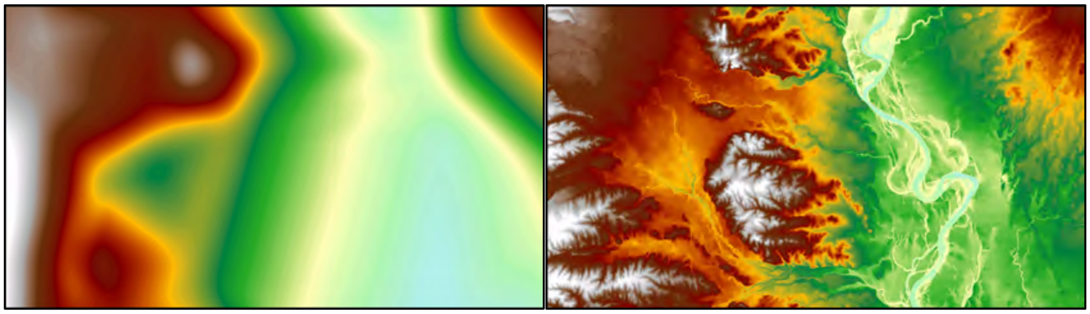

Figure 7. Depth-to-groundwater contours in Northern California. (Left) Contours were interpolated using depth-to-groundwater measurements determined at each well. (Right) Contours were determined by interpolating groundwater elevation measurements at each well and superimposing ground surface elevation 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.

APPENDIX K

Hydrogeological Basis for Characterization of Water within the Santa Ynez River Alluvium Upstream of the Lompoc Narrows as Underflow of the River in a Known and Definite Channel

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TECHNICAL MEMORANDUM

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STETSON ENGINEERS INC.

TO:	**Santa Ynez River Water Conservation District**	DATE:	**December 2021**
FROM:	**Ali Shahroody** **Curtis Lawler**	JOB NO:	**1126-2**
RE:	**Hydrogeological Basis for Characterization of Water within the Santa Ynez River Alluvium Upstream of the Lompoc Narrows as Underflow of the River in a Known and Definite Channel**		

1 INTRODUCTION

This memorandum documents the hydrogeological basis for the characterization of the water within the Santa Ynez River Alluvium as underflow of the river flowing in a known and definite channel. The area of this underflow is located downstream of Lake Cachuma and upstream of the Lompoc Narrows[1] (Figure 1).[2] The Groundwater Sustainability Plans ("GSPs") that have been developed for the Western, Central, and Eastern Management Areas of the Santa Ynez River Valley Groundwater Basin, referred to as Bulletin 118 Basin No. 3-015 ("Basin"), appropriately characterize this water as underflow of the river within the jurisdiction of and regulated by the State Water Resources Control Board ("State Board"), and not "groundwater" as defined by the Sustainable Groundwater Management Act ("SGMA"). For purposes of SGMA, "groundwater" is defined as "water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water but <u>does not include water that flows in known and definite channels</u>." (Wat. Code, § 10721(g), emphasis added.) Water that flows in known and definite channels is regulated by and subject to the jurisdictional authority of the State Board in the same manner as surface water. (See Wat. Code § 1200 et seq.)

Importantly, SGMA does not require Groundwater Sustainability Agencies ("GSAs") or GSPs to legally establish the distinction between groundwater and surface water in a basin. Instead, GSPs must identify and describe the respective systems, characterize their interrelationship, and explain the basis of those analyses. (See, e.g., SGMA Regulations § 354.18.)In this Basin, the GSPs have reasonably relied upon and utilized the longstanding technical and administrative record that identifies the Santa Ynez River Alluvium above the Lompoc Narrows as a known and definite subsurface channel of the lower Santa Ynez River. In fact, diversion and use of this

[1] This memorandum does not attempt to characterize subsurface water within or downstream of the Lompoc Plain, nor does it make any determination about the particular water rights of any water user.
[2] This underflow area also corresponds to the Above Narrows Area as defined by the United States Bureau of Reclamation ("Reclamation") and to Zone A of the Santa Ynez River Water Conservation District.

subsurface water have historically been regulated by the State Board, which has characterized it as underflow of the Santa Ynez River since at least Water Rights Decision 886 in 1958. The State Board further reinforced this characterization of this alluvium in Water Rights Decisions 1338 and 1486 when it considered applications and granted permits to divert underflow of the river: “The Santa Ynez River in the reach between Cachuma Dam and Robinson Bridge, where it enters the Lompoc subarea, flows over recent river channel deposits and the younger alluvium that range in width from a few hundred feet to about one mile and in thickness from 40 to 85 feet. The underflow of the river moves slowly through these deposits.” (State Board Decision 1338, pp. 3-4, emphasis added.)[2]

State Board Water Rights Order (“WRO”) 73-37, as amended by WRO 89-18 and incorporated in WRO 2019-0148, has also defined the Santa Ynez River “Above Narrows” alluvial deposits as underflow, and states in relevant part that water shall be released “from Lake Cachuma in such amounts and at such times and rates as will be sufficient, together with inflow from downstream tributary sources, to supply downstream diversions of the surface flow under vested prior rights to the extent water would have been available for such diversions from unregulated flow.” (WRO 73-37, Paragraph 5.) Notably, the downstream diversions referenced in these State Board WROs and Water Rights Decisions are made from wells constructed in the underflow of the Santa Ynez River alluvium. As recognized by the State Board and as further discussed below, the geology of the River-channel Deposits and the Younger Alluvium demarcate a known and definite channel through which this subsurface water flows, with older and less permeable formations forming the bed and banks.

2 DESCRIPTION OF THE SUBSURFACE CHANNEL

The geology of the shallow and water bearing sediments of the Santa Ynez River below Lake Cachuma is discussed in United States Geological Survey (“USGS”) Water Supply Papers 1107 and 1467. Along much of the Santa Ynez River below Lake Cachuma, the river overlies River-channel Deposits and the Younger Alluvium. These water-bearing units are located in a river-cut channel through older non-water bearing units of the thick Tertiary aged Monterey Formation (primarily lower permeability clays) and other older units. The River-channel Deposits comprise the materials intermittently transported by the present river. The Younger Alluvium includes quaternary alluvial fill of recent age that extends alongside the Santa Ynez River in the flood plain.

[2] For certain purposes, such as under the Water Conservation District Law, underflow of the lower Santa Ynez River has been referred to as groundwater. (See, e.g., Wat. Code, § 75500 et seq.)

In addition to the State Board record discussed above, the USGS papers provide substantial evidence that reasonably support several technical conclusions:

1. The Santa Ynez River replenishes the River-channel Deposits and Younger Alluvium.
2. Older impermeable formations along the south side of the river form the underflow channel limits on that side. The older formations rise steeply to the south where more rainfall and runoff typically occurs due to the higher elevations and orographic effects.
3. Older impermeable formations along the north side of the river form underflow channel limits on that side. These formations form a bedrock lip that separates older less permeable formations (Paso Robles and Careaga Sand) from the River-channel Deposits and Younger Alluvium adjacent to the Santa Ynez River. There are some additional permeable depositions to the north along tributaries, however the bottom elevations of those depositions are higher than the top of the river channel basin.
4. In the Buellton area, there is limited hydrologic continuity between the Younger Alluvium and the older less permeable formations (Paso Robles and Careaga Sand) which are exposed to the base of the Younger Alluvium. There are extensive clay zones in the upper portion of the Paso Robles and Careaga Sands in this area. This clayey material restricts the hydrologic continuity of Santa Ynez River underflow to the deeper aquifer (see also, Stetson, 1977; Stetson, 1992).

Figure 1 shows the plan view and width of the River-channel Deposits and the Younger Alluvium in the Santa Ynez River Alluvium subarea. Upstream of the Lompoc Narrows, the subsurface channel of the Santa Ynez River ranges from 0.5 to 1.5 miles in width. Figure 2 shows a cross-section of this geology at the Highway 154 Bridge, which is representative of the subsurface channel of the lower Santa Ynez River above the Lompoc Narrows. Throughout the reach from Lake Cachuma to the Lompoc Narrows, the subsurface channel composed of River-channel Deposits and Younger Alluvium ranges from 25 to 150 feet in thickness and is typically 30 - 80 feet thick (Stetson, 1992).

The permeability of the river gravel deposits along the Santa Ynez River ranges from 100 to 700 feet per day with typical values of about 500 feet per day (USGS, 1951). This permeability of the River-channel Deposits and the Younger Alluvium is further indicative of the direct connectivity between the surface and underflow of the Santa Ynez River. In contrast, the permeability of the clays and shales that form the bed and banks for the majority of the subsurface channel would be expected to be less than 0.01 feet per day based on the hydrogeologic properties of clays and shales (Freeze and Cherry, 1979).

In the Buellton area, between Solvang and the Buellton Bend where the subsurface channel River-channel Deposits and the Younger Alluvium are in contact with the older formations of

Paso Robles and Careaga Sands, the permeability of the bed and banks is estimated to range from 0.1 to 3 feet per day (Stetson, 2020). This permeability is two to three orders of magnitude less than the permeability of the River-channel Deposits and the Younger Alluvium in the subsurface channel and thus relatively impermeable.

3 EVIDENCE OF UNDERFLOW

The direct hydraulic connection between the River-channel Deposits and the Younger Alluvium and the surface flow in the Santa Ynez River upstream of the Lompoc Narrows is evidenced by the high permeability of the river alluvium and responses in water levels of alluvial wells during surface flows. In USGS Water Supply Paper 1107 (USGS, 1951), this area of underflow was described as follows:

> The unconsolidated deposits beneath and adjacent to the river transmit a certain amount of underflow which is not measured at the successive gaging stations. Obviously, however, this underflow is an integral part of the water resources of the river valley.

The hydraulic connection between the subsurface channel deposits and the Santa Ynez River is described in USGS Water Supply Paper 1467 as follows (USGS, 1959, emphasis added):

> The Santa Ynez River in the reach between Cachuma Dam and Robinson Bridge flows on a body of alluvial deposits that ranges in width from a few hundred feet to more than a mile and in maximum thickness from about 40 to about 185 feet. These deposits, *which are in hydraulic contact with the river*, form a ground-water storage reservoir from which water can be pumped to irrigate the agricultural lands adjacent to the river.

As described above, the hydraulic connection between the water level in the subsurface channel deposits and surface flow is so strong that the water levels in the underflow channel are entirely dependent upon flow in the Santa Ynez River. In fact, the existence of a relatively impermeable subsurface channel and a hydrologic connection between surface and subsurface flows in this area have been relied upon by the State Board, to determine when water is to be released from Bradbury Dam to satisfy downstream water rights.

The Santa Ynez River Valley experienced a prolonged drought from 1947 through 1951, followed by storms in early 1952. Figure 3 shows that over the drought and recovery periods the response of wells to surface flow in the Santa Ynez River is immediate and illustrates the direct connection between subsurface water levels and the surface stream. This quick response in water levels in the underflow is also evident after water rights releases from Bradbury Dam during periods when no storms are occurring.

The hydrograph for well 6N/32W- 9A1 located in the Younger Alluvium about a half mile from the river responds quickly to flow in the river similar to the well located in the River-channel

Deposits, 6N/32W- 9J2. In the USGS Water Supply Paper 1107 (USGS, 1951), the USGS further describes the connection in both geologic formations:

> Thus, throughout its reach from San Lucas Bridge downstream to about 3,000 feet beyond Robinson Bridge, no thick impermeable strata intervene between the bed of the Santa Ynez River and the lower member of the younger alluvium. Accordingly, throughout that reach there is free interchange of water between the river and the lower member of the younger alluvium. Therefore, the lower member contains and transmits river underflow. Also, as its cross-sectional area is much greater than that of the river-channel deposits, the lower member transmits the bulk of that underflow.

4 CONCLUSION

Based on extensive evidence, as well as Stetson's experience of more than 50 years working in the Santa Ynez River Valley for a number of agencies, including work for the State Board, we believe that the water in the River-channel Deposits and the Younger Alluvium downstream of Lake Cachuma and upstream of the Lompoc Narrows constitutes underflow in a definite and known channel with a defined and relatively impermeable bed and banks. This finding is also consistent with the practice of the State Board, which has considered applications and granted permits for diversion of underflow of the Santa Ynez River. (See, e.g., State Board Water Rights Decisions 886, 1338, 1486; State Board WROs 73-37, 89-18, 2019-0148; USGS Papers 1107, 1467.) Accordingly, this water is distinct from "groundwater" as defined by SGMA. In addition to the technical analyses contained in the respective GSPs for the Basin, the information described herein has been used to support the descriptions and analyses of the groundwater system and surface water systems of the Basin in accordance with the provisions of SGMA and the SGMA Regulations.

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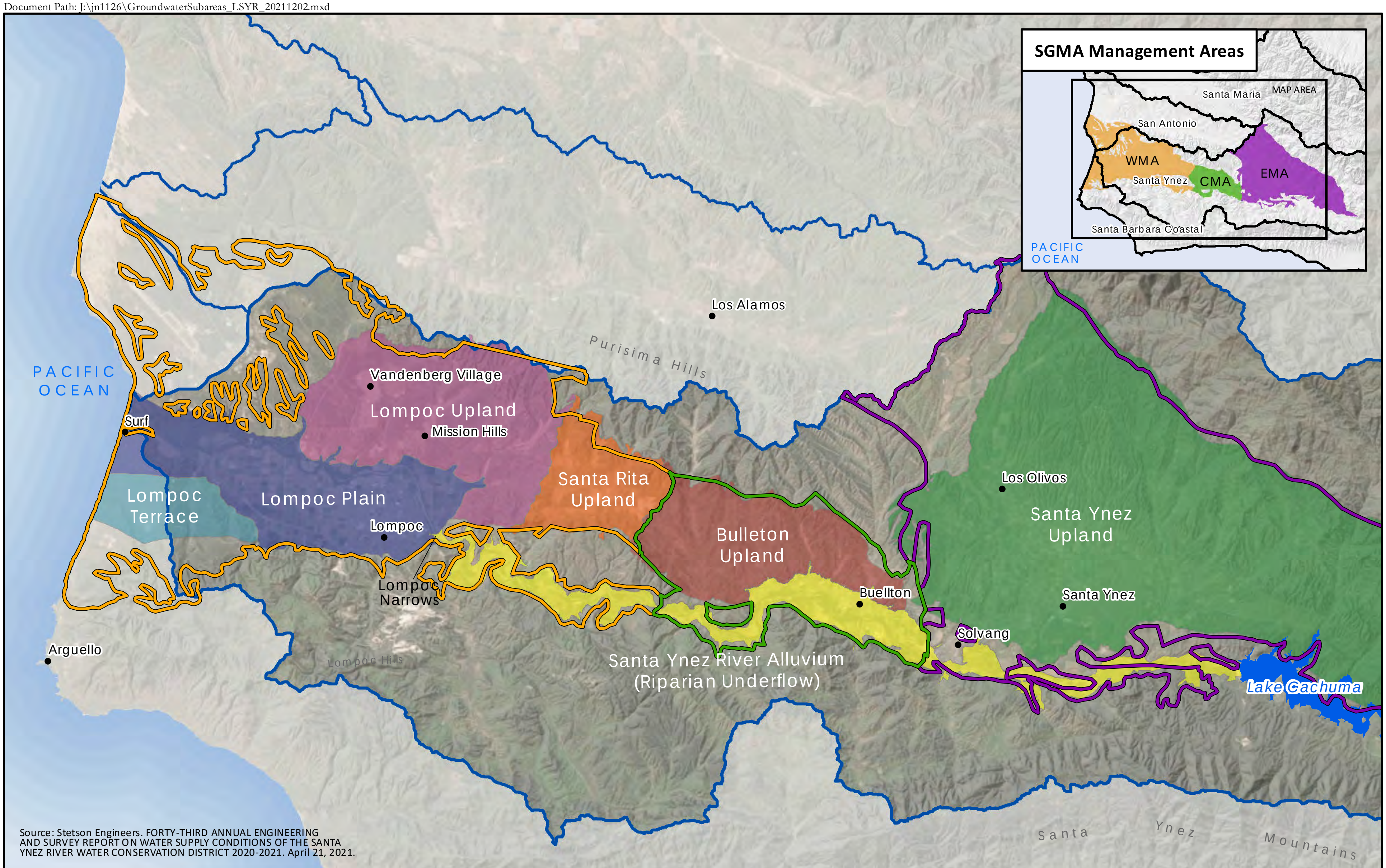

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- Santa Ynez River Watershed
- Central Management Area
- Western Management Area
- Eastern Management Area

GROUNDWATER SUBAREAS AND UNDERFLOW LOWER SANTA YNEZ RIVER

0 2 4 Miles

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FIGURE 1

Components of Subterranean Flow
(aka Surface Flow occurring in Underflow Channel)
at Highway 154 Bridge

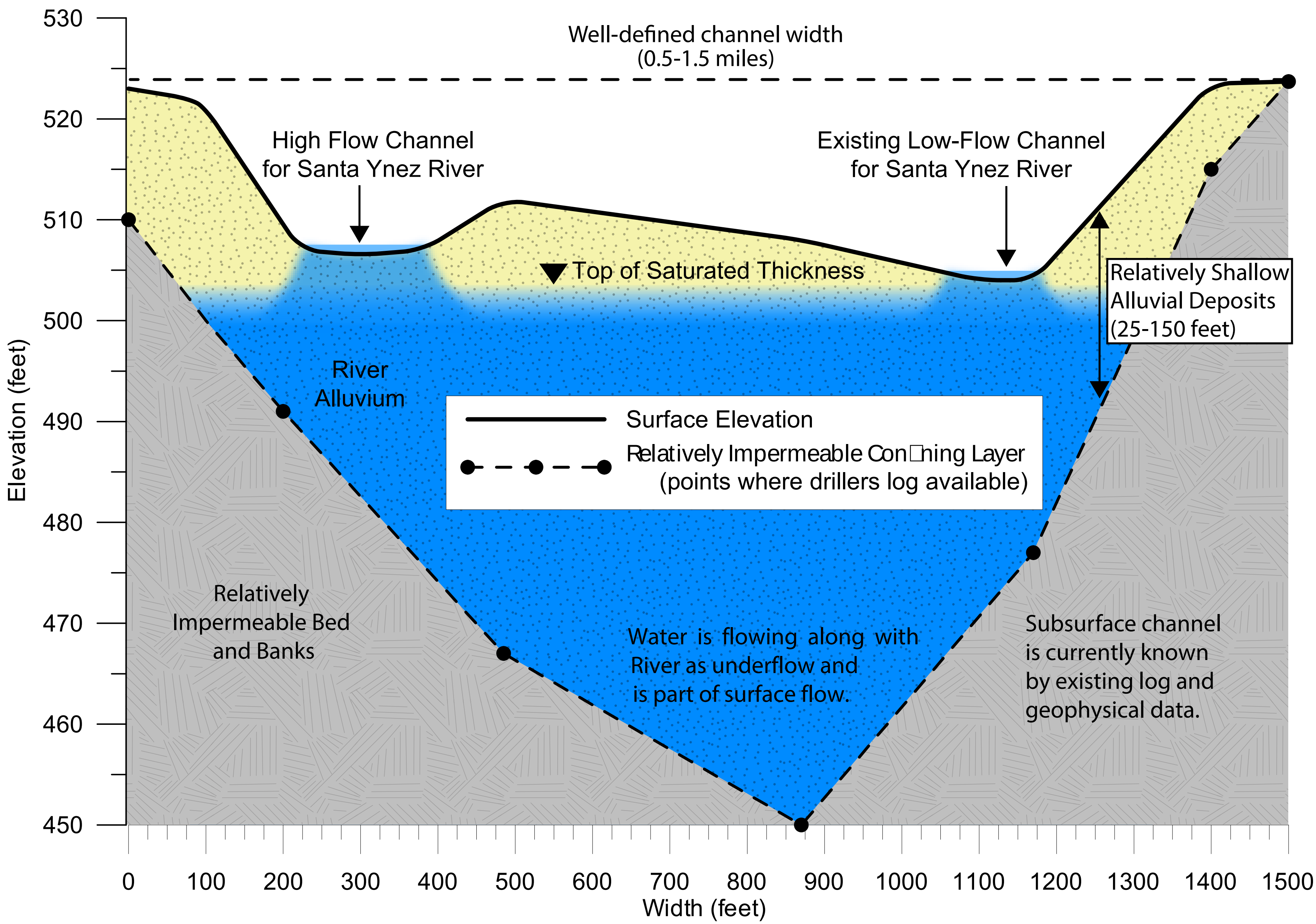

FIGURE 2

Response to River Flow

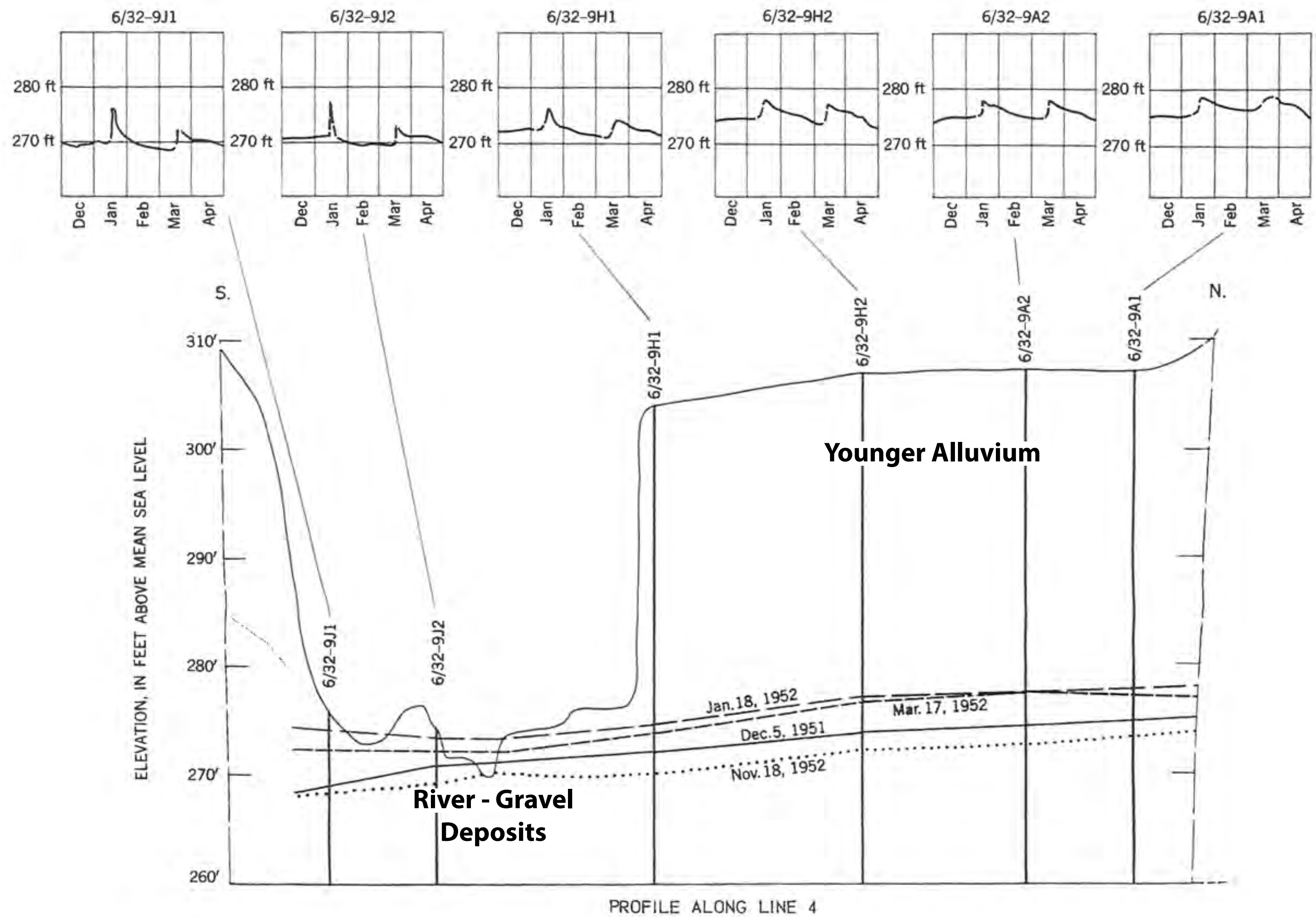

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Figure 3 - Underflow Water Level Response to Surface Flow upstream of Buellton Bend in January and March 1952