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).

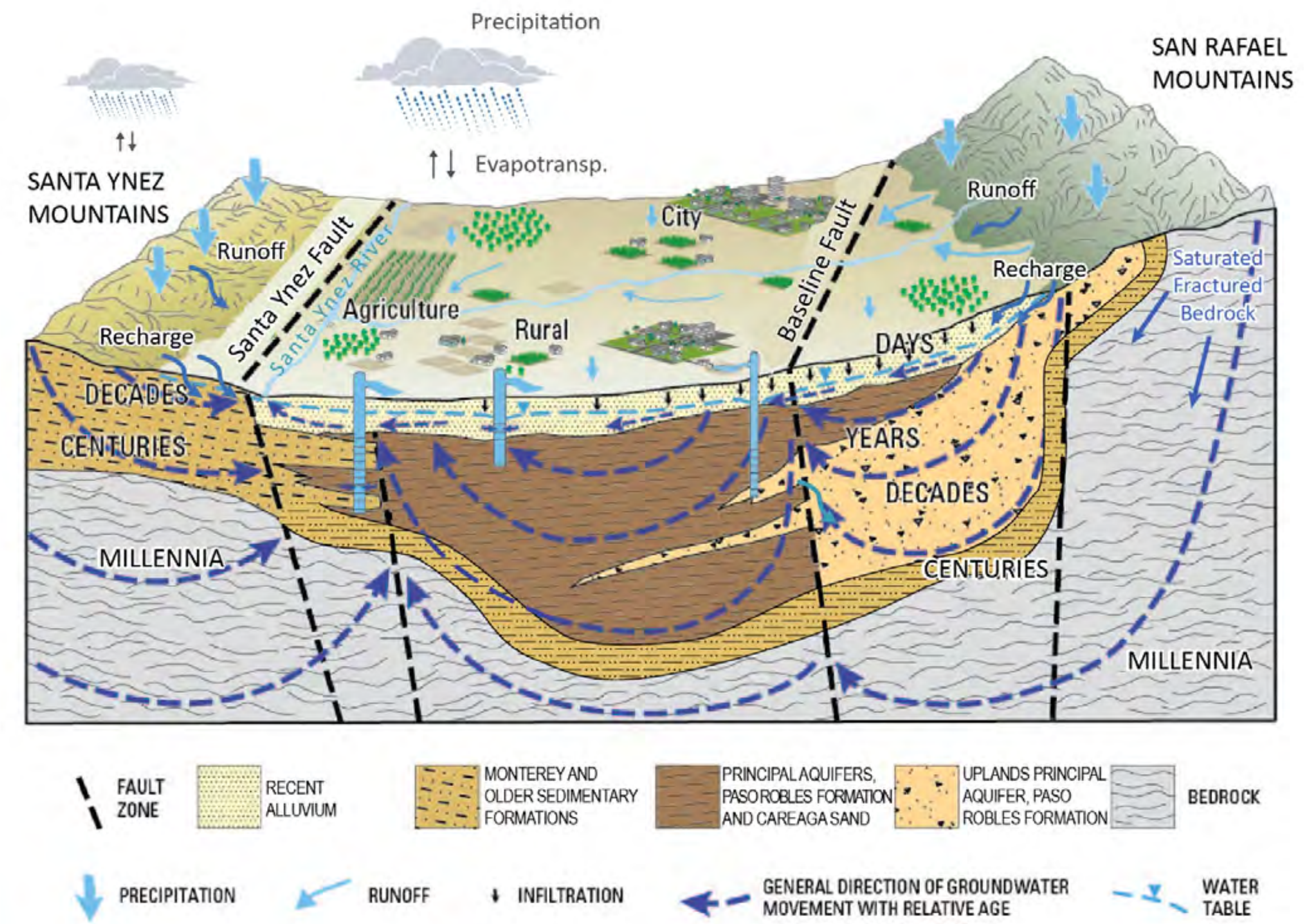


Figure ES-1. Hydrogeologic Conceptual Model and Principal Aquifers

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.

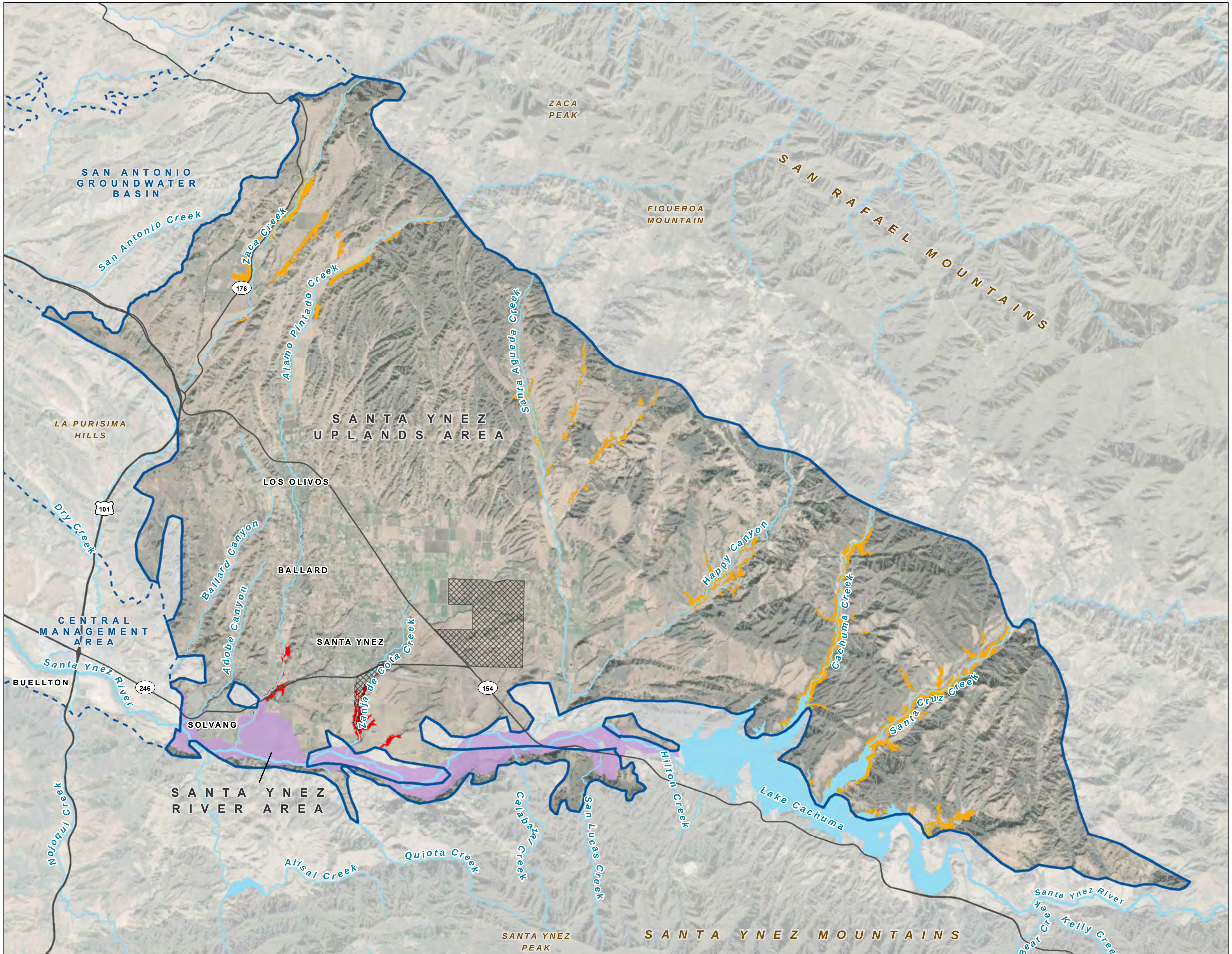
Several palustrine and riverine wetland features, three mapped springs, and five types of vegetation communities are present within the EMA. The five vegetation types are the following:

- 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).

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.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\202105\ES\FigureES-2_Categorized_Potential_Groundwater_Dependent_Ecosystem.mxd, abarry

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.

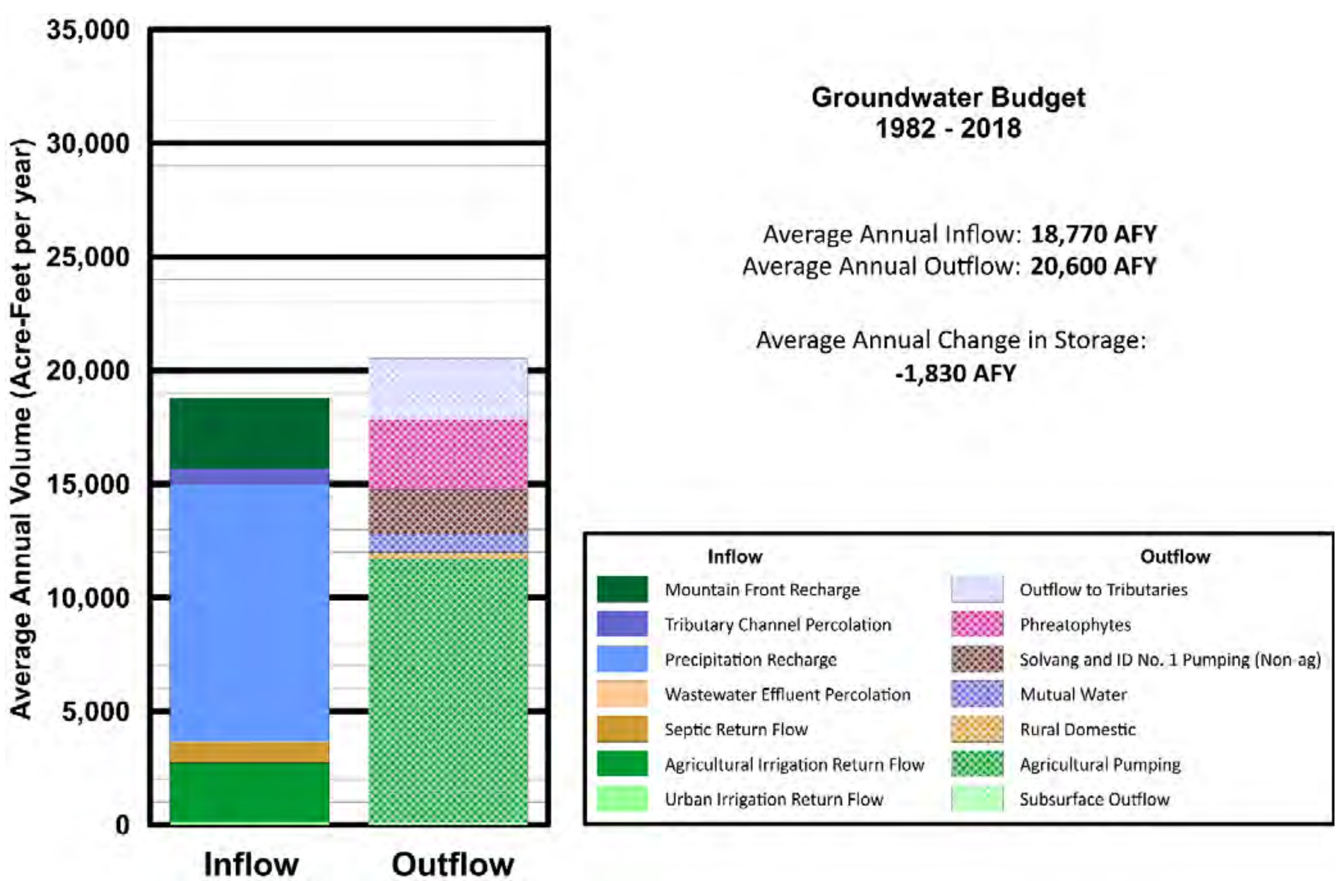


Figure ES-3. Average Groundwater Budget Volumes, Historical Period (1982 through 2018)

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.

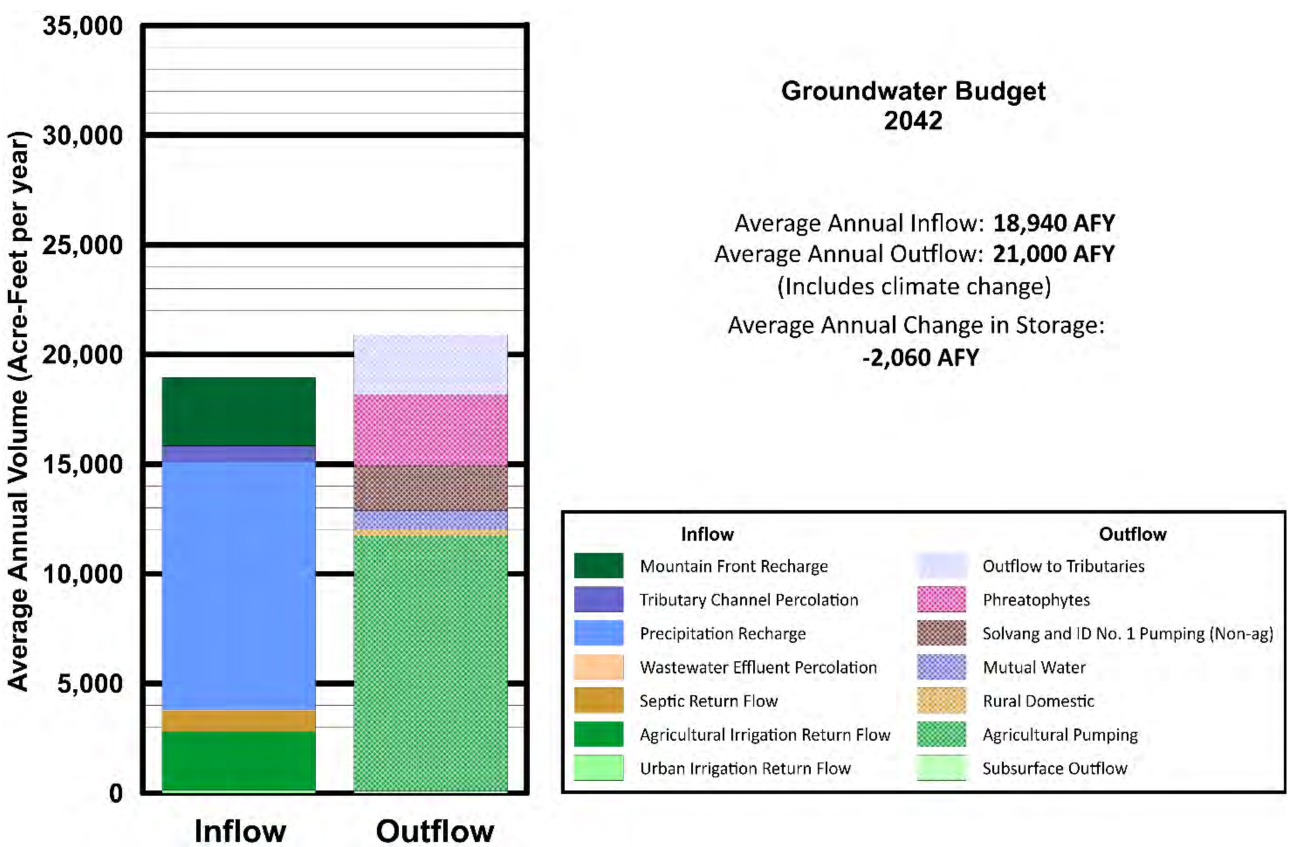


Figure ES-4. Projected Groundwater Budget, 2042

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.

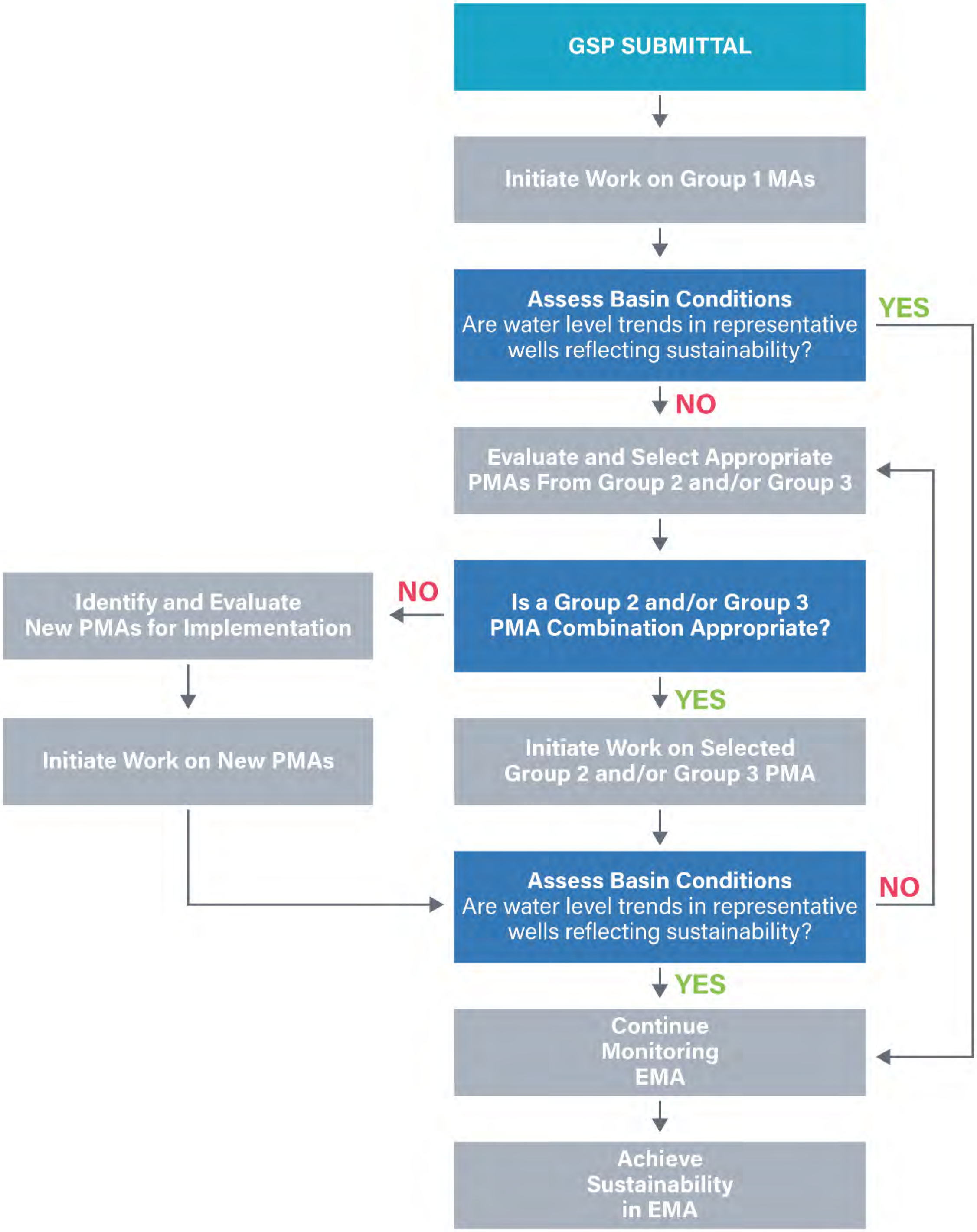


Figure ES-5. Adaptive Implementation Strategy for Projects and Management Actions

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.