~~Public Draft~~

Final Draft

Western Management Area Groundwater Sustainability Plan

WMA

Santa Ynez River Valley Groundwater Basin
Western Management Area
Groundwater Sustainability Agency

REPLACE WITH COVER

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COVER PHOTOGRAPHS

Front Cover: Missile, Flowers, and Mission, graphic produced as alternative logo for the Western Management Area, and photo of Western Management Area Field taken October 22, 2019.

Back Cover: Photo of boundary of Western Management Area and Central Management Area taken October 22, 2019.

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SANTA YNEZ RIVER VALLEY GROUNDWATER BASIN

WESTERN MANAGEMENT AREA

Groundwater Sustainability Plan

~~September 2021~~

~~Public Draft~~

January 2022

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LIST OF ACRONYMS AND ABBREVIATIONS

3D	three-dimensional
AEM	Airborne Electromagnetic
AF	acre-feet
AFB	Air Force Base
AFY	acre-feet per year
AGR	Agriculture Supply
Basin	Santa Ynez River Valley Groundwater Basin
BCM	Basin Characterization Model
BLM	Bureau of Land Management
BMP	Best Management Practices
BNA	Below Narrows Account
CAG	Citizen Advisory Group
CASGEM	California Statewide Groundwater Elevation Monitoring
CCR	California Code of Regulations
CCRWQCB	Central Coast Regional Water Quality Control Board
CCTAG	Climate Change Technical Advisory Group
CCWA	Central Coast Water Authority
CEQA	California Environmental Quality Act
CFS	cubic feet per second
CGPS	Continuous Global Positioning System
CIMIS	California Irrigation Management Information System
CMA	Central Management Area
COMB	Cachuma Operation and Maintenance Board
CRCD	Cachuma Resource Conservation District
CSOB	County of Santa Barbara
CSD	Community Services District
CTA	Conservation Technical Assistance
CWC	California Water Code

~~DACs~~DAC	Disadvantaged Communities
DBID	Database Identification Number
DDW	Division of Drinking Water
DMS	Data Management System
DO	Dissolved Oxygen
DPS	Distinct Population Segment
DRINC	Drinking Water Information Clearinghouse
DWR	Department of Water Resources
EIR	Environmental Impact Report
EMA	Eastern Management Area
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ET	Evapotranspiration
FY	Fiscal Year (July 1 through June 30)
GAMA	Groundwater Ambient Monitoring Assessment
GC	Groundwater Conditions
GCM	Global Circulation Model
GDE	Groundwater Dependent Ecosystem
GPM	gallons per minute
GPS	Global Positioning System
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
GWMP	Groundwater Management Plan
HCM	Hydrogeologic Conceptual Model
HUC	Hydrologic Unit Codes
ID No.1	Improvement District No. 1
ILRP	Irrigated Lands Regulatory Program
IND	Industrial Service Supply
InSAR	Interferometric Synthetic Aperture Radar
IRWM	Integrated Regional Water Management
LSYR	Lower Santa Ynez River

LUST	Leaking Underground Storage Tanks
M&I	Municipal and Industrial
MCL	Maximum Contaminant Level
mg/L	milligrams per liter
MHCSD	Mission Hills Community Services District
MOU	Memorandum of Understanding
MUN	Municipal and Domestic Supply
MWC	Mutual Water Company
NCCAG	Natural Communities Commonly Associated with Groundwater
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetlands Inventory
OEP	Outreach and Engagement Plan
OWTS	In-site Wastewater Treatment System
PCPD	per capita per day
PROC	Industrial Process Supply
RMW	Representative Monitoring Well
RWQCB	Regional Water Quality Control Board
SBCAG	Santa Barbara County Association of Governments
SBCFCWCD	Santa Barbara County Flood Control and Water Conservation District
SBCWA	Santa Barbara County Water Agency
SDAC	Severely Disadvantaged Communities
SDWIS	Safe Drinking Water Information System
SFB	Space Force Base
SGMA	Sustainable Groundwater Management Act
SMCL	Secondary Maximum Contaminant Level
SSC	Species of Special Concern
SWGP	Stormwater Grant Program
SWP	State Water Project
SWRCB	State Water Resources Control Board

SYRA	Santa Ynez River Alluvium
SYRVGB	Santa Ynez River Valley Groundwater Basin
SYRWCD	Santa Ynez River Water Conservation District
TDS	Total Dissolved Solids
USBR	United State Bureau of Reclamation
USDA	United States Department of Agriculture
USGS	United States Geological Survey
USP	United States Penitentiary
UWMA	Urban Water Management Act
UWMP	Urban Water Management Plan
VAFB	Vandenberg Air Force Base
VVCSD	Vandenberg Village Community Services District
WDR	Waste Discharge Requirement
WMA	Western Management Area
WQO	Water Quality Objective
WR	Water Rights Order
WY	Water Year (October 1 through September 30)
µg/L	micrograms per liter

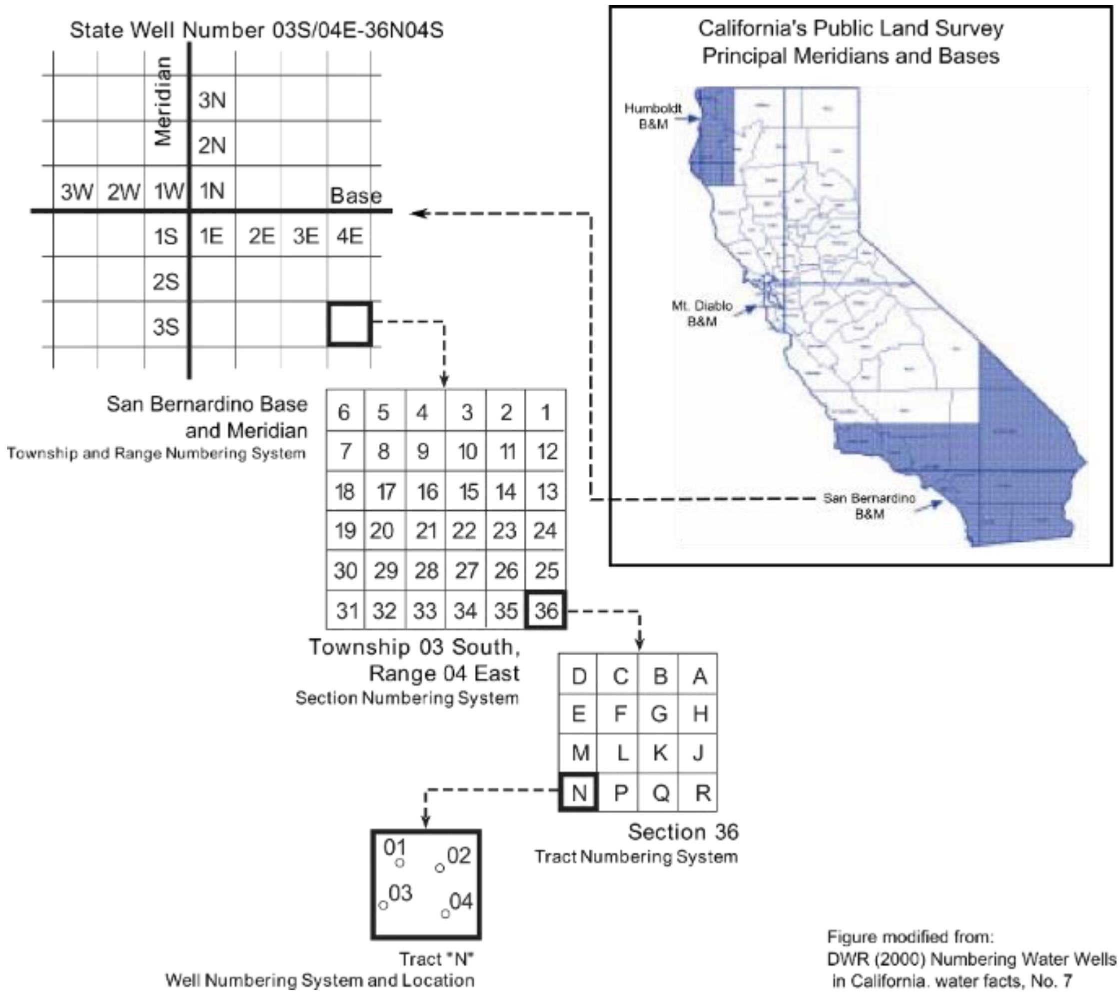
GEOLOGIC UNITS:

QG	Geologic Unit, River Channel Deposits
QAL	Geologic Unit, Younger Alluvium
QOS	Geologic Unit, Older Dune Sands
QOA	Geologic Unit, Terrace Deposits/Older Alluvium
QO	Geologic Unit, Orcutt Sand
QTP	Geologic Unit, Paso Robles Formation
TCA	Geologic Unit, Careaga Sand
TF	Geologic Unit, Foxen Formation
TSQ	Geologic Unit, Sisquoc Formation
TM	Geologic Unit, Monterey Formation

WELL NUMBERING DESCRIPTION

Wells in Santa Ynez River Valley Groundwater Basin have a unique State Well Number assigned by the California Department of Water Resources based on the public land grid, and includes the township, range, and section in which the well is located. Each section is further subdivided into sixteen 40-acre tracts, which are assigned a letter designation as shown below. All wells in Santa Ynez use the San Bernardino ("S") base line and meridian, so this letter is generally omitted. Lands not part of the Bureau of Land Management Cadastral survey, such as Mexican Land grants land map are interpolated from other sources. In maps and in texts monitoring wells by their section, tract, and well number, following the United States Geologic Survey (USGS) convention for abbreviation. If the township and range are otherwise made obvious, the well may be shortened further to section, track, and well numbers. Occasional exceptions to this naming scheme are made for wells drilled or used for other purposes.

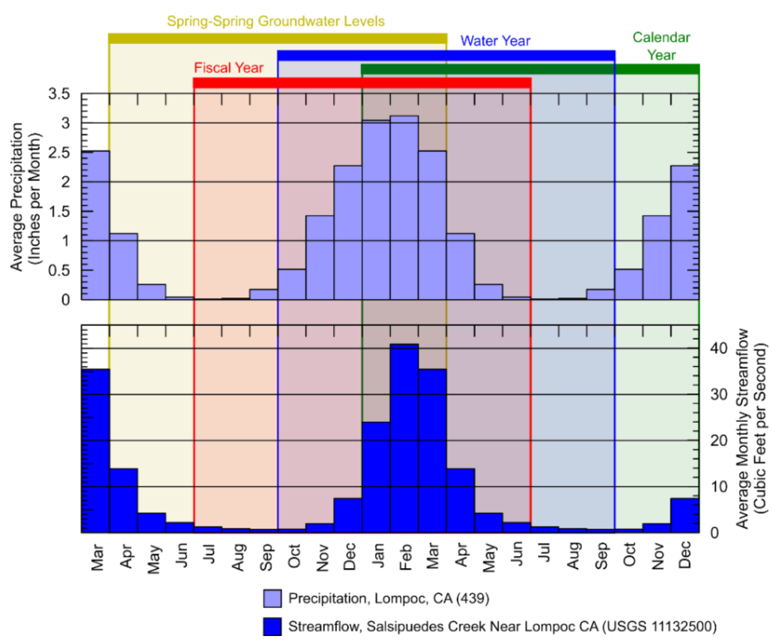
The USGS 15-digit well number based on degrees, minutes, and seconds of latitude (6 digits) and longitude (7 digits) and sequential number (2 digits) are also shown on wells that are part of the USGS databases. Finally, a 4-digit unique database identification number (DBID) is used in the database management system to connect well information from various sources.



California Department of Water Resources' Numbering System for Water Wells

WATER YEAR DESCRIPTION

Several different year time periods are used in managing Santa Ynez River Valley Groundwater Basin water resources: Water Year, Calendar Year, Fiscal Year and Water Year (SYRWCD), and Spring-Spring Groundwater measurements. For the Sustainable Groundwater Management Act Water Years are October 1st to September 30th, (CWC Section 10721(aa)) which combines early winter months in with the remainder of the winter, better dividing the year on a seasonal basis. Calendar Years are the traditional and commonly used January 1st to December 31st year, which starts near the winter solstice. The Santa Ynez River Water Conservation District (SYRWCD) Fiscal Year and Water Year (CWC Section 75507(a)) from July 1st to June 30th is used, which breaks the year during the low summer precipitation months. Annual spring high groundwater levels run from March-March. Finally, the Santa Barbara County Flood Control District annual hydrology reports use a September 1st to August 31st reporting year. Figure below shows how most of these years line up against the average monthly precipitation at Lompoc, and the average monthly stream flow in Salsipuedes Creek at the stream gage.



• Water Year:	October 1st to September 30th
• Calendar Year:	January 1st to December 31st
• Fiscal Year/ Water Year (SYRWCD):	July 1st to June 30th
• Spring-Spring Groundwater Levels:	March to March

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EXECUTIVE SUMMARY

ES Abstract

This Groundwater Sustainability Plan (GSP) is prepared in accordance with the 2014 Sustainable Groundwater Management Act (SGMA) and covers the Western Management Area (WMA) of the Santa Ynez River Valley Groundwater Basin (Basin or SYRVGB) located in coastal central California. There are two principal aquifers within the WMA: an Upper Aquifer, consisting of younger alluvial sediments that are primarily associated with river and surface water geomorphic processes, and a Lower Aquifer, which is more extensive throughout the Basin and consists of older geologic depositions. Marginal geologic formations containing perched water-bearing soils are also identified within the Basin but are not principal aquifers managed under SGMA. The Santa Ynez River is the primary surface water source within the Basin. The ~~subflow~~underflow of the Santa Ynez River is considered part of the river flow and is managed as surface water pursuant to the administrative authority and jurisdiction of the State Water Resources Control Board (SWRCB) over waters flowing in known and definite channels. The analyses conducted for this GSP indicate that current Basin conditions are ~~generally~~ sustainable~~. Potential~~ with no current undesirable results (defined as significant and unreasonable impacts to sustainability indicators~~)~~). Potential undesirable results in the future have been identified and specific minimum thresholds have been developed to help ensure that undesirable results do not occur under future conditions. Potential project operations and management actions designed to maintain and improve groundwater conditions and sustainability have been identified and are described within this GSP.

ES Chapter 1: Introduction

ES Introduction, Administrative Information, and Notes and Communication (GSP Sections 1a, 1b, 1c)

SGMA requires that the Basin develop one or more GSPs that outline how the Basin will achieve groundwater sustainability by 2042. Physical and political complexities within the Basin resulted in decisions by local public agencies to develop three GSPs under a coordination agreement to satisfy SGMA requirements for the entire Basin. The Western, Central, and Eastern Management Areas (WMA, CMA, and EMA) make up the Basin. This GSP has been prepared to address the SGMA requirements for the WMA portion of the Basin.

The primary sustainability goal and purpose of these GSPs are to manage groundwater resources in the WMA, CMA, and EMA without causing undesirable results and facilitate long-term beneficial uses of groundwater within the Basin. Beneficial uses of groundwater in the Basin include municipal, domestic, and agricultural uses, in addition to riparian habitat that supports environmental ecosystems.

In 2016 and 2017, five local Groundwater Sustainability Agencies (GSA) were established for the Basin. Five GSA eligible public entities ratified an agreement and formed the WMA GSA, with each of the public entities having a seat on the WMA GSA Committee. Four of the five member agencies, the City of Lompoc, Vandenberg Village Community Services District, Mission Hills Community Services District, and the Santa Ynez River Water Conservation District all have voting seats on the Committee, whereas the Santa Barbara County Water Agency has a non-voting seat.

During the development of this GSP the WMA GSA Committee met regularly on SGMA matters. The GSA developed an Outreach and Engagement Plan to facilitate engagement with stakeholders. A volunteer public Citizens Advisory Group (CAG) was created, with members representing a group of groundwater users to help solicit public feedback on GSP elements. Newsletters and press releases about the GSA and SGMA were created and distributed through numerous channels, including utility bills. All three management areas used a centralized website to aid with communications, tracking meetings, and receiving public comments.

ES Plan Area (GSP Section 1d)

The Basin is a coastal groundwater basin measuring approximately 317 square miles, located in Santa Barbara County, California. Each of the three management areas of the Basin is covered by a GSP; this GSP is for the WMA, which is approximately 133.7 square miles. The WMA itself is divided into six subareas based on hydrogeology and topography: the Lompoc Plain, Lompoc Terrace, Lompoc Upland, Santa Rita Upland, Santa Ynez River Alluvium, and the Burton Mesa. The Lompoc Plain, Lompoc Upland, and Santa Rita Upland form the majority of the total extent of the WMA. The Lompoc Terrace and Burton Mesa are almost entirely within the federal Vandenberg Space Force Base (VSFB; formerly Vandenberg Air Force

Base) boundary and are mostly perched aquifers. These two subareas have generally been excluded from past water resources studies of the Basin. The Santa Ynez River Alluvium is the ~~subflow area, and the subflow~~underflow of the Santa Ynez River in that area is not groundwater as defined by SGMA and thus is not be managed by the WMA GSA, because such ~~subflow~~underflow constitutes subterranean water flowing in known and definite channels that is treated as surface water and subject to the jurisdiction and management of the SWRCB.

Approximately 44% of the WMA is part of VSFB. The California Department of Parks and Recreation manages the La Purísima Mission State Historic Park, and the California Department of Fish and Wildlife manages the Burton Mesa Ecological Reserve as well as the offshore Vandenberg State Marine Reserve. Other public lands within the WMA include the Lompoc Federal Correctional Complex, local cities, school districts, and other district properties.

The public water agencies that formed the WMA GSA are the City of Lompoc, Vandenberg Village CSD, and Mission Hills CSD. Other water agencies in the WMA include American Water (supplies VSFB) and the small Mutual Water Companies (MWC) of Santa Rita, Tularosa, and Vista Hills. The Central Coast Water Authority (CCWA), a wholesale water agency, operates a water pipeline that passes through the WMA and conveys imported water ~~primarily~~ from the State Water Project to the VSFB within the WMA and other agencies upstream of the WMA. Most people living in the WMA live near or within the City of Lompoc and adjacent communities of Vandenberg Village, or Mission Hills.

Three general plan areas, or equivalent areas, outlining land use in the WMA. The entire WMA is within the general plan area of the County of Santa Barbara. The City of Lompoc has a general plan for use within its jurisdiction, and the California Coastal Zone has a local coastal program under the California Coastal Commission. Additionally, the federal VSFB has its own plan governing land uses.

ES Additional GSP Elements (GSP Section 1e)

A data management system was implemented for this GSP in accordance with the SMGA. As part of its communications and public outreach, the WMA GSA prepared and distributed the Data Management Plan, a whitepaper describing the planned data management system (DMS). The DMS was then implemented.

ES Chapter 2: Basin Setting

ES Hydrogeologic Conceptual Model (GSP Section 2a)

A hydrogeologic conceptual model was developed and used to identify existing and projected groundwater conditions for the Basin. The hydrogeologic conceptual model presents the various conceptual components of the WMA's groundwater system, including the geologic setting; aquifer extents; physical properties, including water imports; and land use.

The geologic setting is related to the northward movement of the Pacific Plate relative to the North America Plate. Groundwater is found in younger geologic formations that have been uplifted and deformed into a large syncline fold. The Santa Ynez River has cut through and filled in the existing geology. The estuary and the Santa Ynez River Alluvium subarea are where the Santa Ynez River has cut into underlying non-water bearing units, causing a 'bedrock channel' that limits groundwater flow. The definable bottom and lateral extents of the Basin were determined using the three-dimensional geologic model included in the hydrogeologic conceptual model. For groundwater management purposes, two principal aquifers were defined based on the Lompoc Plain location: the Upper Aquifer, which consists of alluvial sediments, and the Lower Aquifer, which consists of the water-bearing Careaga Sand and Paso Robles Formation. The Orcutt Sand geologic unit is extensive over the Burton Mesa and most of the Lompoc Terrace, but water is perched, disconnected, and generally not used. The Santa Ynez River Alluvium subarea consists of alluvial formations in a bedrock channel that convey the Santa Ynez River and the ~~subflow~~underflow of the river. Accordingly, the Santa Ynez River and its ~~subflow~~underflow are managed by the SWRCB.

The topography of the WMA is varied, relatively flat in the Lompoc Plain, with hilly in the Lompoc Upland and Santa Rita Upland along the northern boundary. Rainfall is highly influenced by local topography. However, local slope and soil types influence runoff and the amount of potential recharge to the aquifers in any particular location.

Since 1997, the CCWA has delivered State Water Project water to the Basin though the 130 mile long Coastal Branch Pipeline that enters the Basin at Vandenberg Space Force Base and terminates at Lake Cachuma. State Project Water deliveries from the pipeline are received by the Vandenberg Space Force

Base in the WMA. Other water from this pipeline is delivered to City of Buellton, ID No.1, City of Solvang, and Lake Cachuma, east and upstream of the WMA. The Tecolote Tunnel conveys water from Lake Cachuma to Santa Barbara County south coast including the cities of Santa Barbara, Goleta, Montecito, and Carpinteria. The Tecolote Tunnel was completed in 1955 and is the newest of three tunnels used for exporting Santa Ynez River water to the south coast of Santa Barbara County.

Groundwater within the WMA is primarily used for agriculture, which represents the largest proportion of land and water use within the Basin. Other uses of groundwater in the basin include municipal and light industrial, small domestic uses, and environmental uses, such as groundwater dependent ecosystems.

ES Groundwater Conditions (GSP Section 2b)

This GSP describes historical, existing, and projected groundwater conditions with regard to each of the six SGMA sustainability indicators including the chronic lowering of groundwater levels, significant and unreasonable reduction of groundwater in storage, significant and unreasonable seawater intrusion, degraded water quality, land subsidence, and depletion of interconnected surface water).

Groundwater elevation data was collected from wells throughout the WMA, in both the seasonal high (spring) and seasonal low (fall) conditions, for both the Upper Aquifer and the Lower Aquifer. Two sets of groundwater level contours were developed by interpolating between monitoring wells. Groundwater elevations in wells representing the Lower Aquifer were generally found to be higher than in the Upper Aquifer, which is similar to the results of past studies. Additionally, fall water levels were lower than spring levels, with the greatest difference being within the larger agriculturally developed portions of the WMA. In addition to preparing groundwater level contours, groundwater levels were plotted over time (hydrographs) to show the groundwater level trends at specific locations within the WMA.

Groundwater storage over time was compared against the year type and groundwater pumping: year type was found to be a primary influence on groundwater storage. To support this analysis, a quantitate method using flow at the Salsipuedes Creek measured by the U.S. Geologic Survey (USGS) streamflow gage is described which identify the qualitative "dry" and "wet" years.

Location of known potential groundwater contamination sites were identified. The responsibility of remediating groundwater is not under the jurisdiction of the GSA but lies with other state and local agencies. Assessments to beneficial users in the basin and an assessment of recent (2015-2018) groundwater quality data were made for six constituents identified by the SWRCB. The goal of the GSP is to ensure than groundwater quality is not further degraded by groundwater pumping managed under this GSP.

Because the WMA is a coastal basin, seawater intrusion was considered a potential concern. There are several miles between the coast and beneficial uses inland of VSFB. On an annual basis, there are both surface and groundwater flows through the aquifer to the ocean. Long-term monitoring at two wells shows that conditions for chloride, sodium, and salinity are relatively constant over multiple decades.

Land subsidence was determined to be unlikely due to the geologic setting of the WMA. Recent remote sensing data provided by Department of Water Resources (DWR) from 2015 – present show very little change in land surface elevation. Additionally, historical infrastructure records do not indicate land subsidence.

An evaluation of interconnected surface water for ~~both the Santa Ynez River and its~~the tributaries as a result of groundwater management actions was determined to be unlikely, given that there is little perennial surface water in the Basin~~.~~ and the depth to groundwater is below the channel thalweg even during wet periods. In the Lompoc Plain, the Upper Aquifer is seasonally hydraulically connected to the Santa Ynez River~~. The surface water of the Santa Ynez River is directly influenced by releases from Cachuma Reservoir and by diversions via shallow wells in the alluvial subflow deposits upstream of the Lompoc Narrows, both of which are administered by the SWRCB.~~, and the Santa Ynez River in this reach has been identified as interconnected surface water. The surface water leaving the WMA (entering the Pacific Ocean) is a data gap that will be addressed with installation of a gage near the estuary. In connection with this data gap of surface water outflow, the quantity and timing of flow from the Upper Aquifer to the streamflow is also currently a data gap. However, the surface water of the Santa Ynez River within the WMA is still primarily influenced by releases from Cachuma Reservoir and by diversions via shallow wells in the alluvial underflow deposits upstream of the Lompoc Narrows, both of which are administered by the SWRCB.

Groundwater Dependent Ecosystems (GDEs) in the WMA were assessed using an assumed rooting depth and the current depth to groundwater. A map of the GDEs in the WMA was developed. Potential GDEs along the WMA upland tributaries were greater than 30 feet above the groundwater table and were screened out of consideration for future groundwater management. Potential GDEs along the Santa Ynez River are not considered vulnerable due to historically stable water levels, based on a review of previous studies done in the area. The stability may in part be due to the management of the Santa Ynez River under SWRCB Order 2019-148.

ES Water Budget (GSP Section 2c)

Water budgets are calculations of the flows of water in and out of the various components of the Basin's surface water and groundwater systems. The various components of the water budget are introduced in the hydrogeologic conceptual model. Three water budget periods were created: historical, current, and projected. Water flows in any particular year are highly dependent on the weather, and to a lesser extent, the antecedent conditions. The selection of hydrologic years for each of the three budget periods was coordinated with the other two management areas (CMA and EMA).

The period of 1982 through 2018 was selected as the historical period. Stream flow along Salsipuedes Creek were used as a proxy for water supply conditions in the Basin. Flows during this historical period are similar to the long-term monitoring at the same gage, indicating that the years are likely representative of the long-term period. The years from 2012 to 2018 were all relatively dry years, so the current period was started in 2011. To meet the 50-year planning horizon required by SGMA, the projected period is 2018 through 2072.

The length of the historical water budget in this GSP is 36 years, which exceeds the 10-year SGMA requirement. For surface water, the average inflows were 116,290 acre-feet per year (AFY) and ranged from 5,870 to 827,250 AFY, with most of this variability influenced by the Santa Ynez River flows. Surface water outflows were on average 39,630 AFY and ranged from 12,660 to 158,810 AFY. Groundwater is less variable, with inflows ranging between 14,420 to 54,610 AFY, and an average inflow of 31,000 AFY. The two primary drivers of variability in groundwater were percolation from surface water and recharge from precipitation. Groundwater outflows ranged from 24,610 to 39,720 AFY, with an average of 32,000 AFY. Agricultural pumping was the largest influence on groundwater flow and had the greatest variation over the historical period. The total groundwater pumping during the historical period averaged 27,300 AFY. The current estimate of the sustainable yield, defined by SGMA as the maximum quantity of water that can be withdrawn annually without causing undesirable results, is currently estimated to be 26,400 AFY for the WMA based on the historical water budget.

For the current period (2011 through 2018), surface water average inflows were 37,890 AFY and ranged from 9,520 to 168,190 AFY, with most of this variability influenced by the Santa Ynez River flows. Surface water outflows were on average 39,630 AFY and ranged from 12,660 to 158,810 AFY. Groundwater is less variable for the current period, with inflows ranging between 16,420 and 42,050 AFY, and an average inflow of 31,030 AFY. For groundwater, the two primary drivers of variability were percolation from surface water and recharge from precipitation. Groundwater outflows ranged from 27,880 to 37,580 AFY, with an average of 32,240 AFY. Agricultural pumping was the largest influence on groundwater flow and had the greatest variation over this current period.

The projected period water budget estimates population increases, projected precipitation, and climate change factors. The City of Lompoc's 2020 Urban Water Management Plan projects water demand to increase by 30% in the 20-year planning period. Population growth and water demands in the remaining area of the WMA was estimated to follow recent trends with a 5% increase currently expected over the 20-year planning period (by 2042), and a 10% increase over the 50-year planning period (by 2072). Groundwater demand is expected to increase from 26,150 AFY in 2018 to 28,157 AFY in 2042 and 29,266 AFY in 2072. Projected water availability is expected to be relatively to the increase in demand which is projected to result in a loss of groundwater storage of up to 3,000 AFY, unless projects and management actions are undertaken to maintain sustainability.

ES Chapter 3: Monitoring Network and Sustainable Management Criteria

ES Monitoring Networks (GSP Section 3a)

The Monitoring Networks section of the GSP summarizes the parameters that were monitored in the Basin and identifies representative sites for monitoring for each of the six SGMA sustainability indicators.

Federal, state, and local monitoring networks are responsible for groundwater monitoring in the WMA, are described in this GSP. Prior to 2019, the U.S. Geological Survey conducted groundwater level monitoring in the WMA and the entire Basin. Starting in 2019 the groundwater level monitoring was taken over by the Santa Barbara County Water Agency. Local agencies, including the City of Lompoc and

Vandenberg Village CSD, also collect groundwater level information. Estimates for groundwater storage rely on using the same network data.

Groundwater quality is currently monitored by three programs in the WMA:

- The U.S. Geological Survey-directed monitoring program;
- Public water system monitoring of drinking water sources by water suppliers as reported to Safe Drinking Water Information System (including City of Lompoc, Vandenberg Village CSD, Mission Hills CSD); and
- Monitoring by commercial agriculture as part of the Irrigated Lands Regulatory Program

Seawater intrusion is monitored in wells based on water quality sampling.

Land subsidence is monitored using monthly remote sensing satellite data, which covers the entire WMA. Additionally, there is a continuous GPS (CGPS) station in the WMA, and the Central Coast Water Authority, which operates the State Water Project pipeline, has remote access to operators that can be contacted in the event of subsidence. The remote sensing tracks elevation change, while CGPS tracks elevation and horizontal movement. If a decline in land surface elevation is observed, a follow-up analysis would need to be conducted to determine whether the cause was subsidence from groundwater depletion.

Finally, ~~three~~a U.S. Geological Survey stream ~~gages~~gage (USGS ID 11133000) measure and ~~record~~records surface water ~~flows.~~inflow from the Santa Ynez River into the WMA. The surface water outflow from the WMA is currently a data gap which will be addressed with installation of a new gage near the estuary. Monitoring of potential surface water depletion is performed by collecting groundwater levels ~~in wells~~ near the Santa Ynez River in addition to the monitoring of groundwater levels throughout the Upper Aquifer.

These existing monitoring networks were reviewed, and wells were selected from each based upon representativeness. Additionally, several areas were identified as locations where the network could be improved.

ES Sustainable Management Criteria (GSP Section 3b)

This section identifies the sustainability goal of the Basin, conditions of undesirable results for each of the six SGMA sustainability indicators, minimum thresholds at the representative sites, and measurable objectives. These criteria are described below and summarized in **Table ES-1**.

Sustainability goals were identified as follows:

- Maintain long-term groundwater elevation at levels adequate to support existing and anticipated beneficial uses.
- Maintain a sufficient volume of groundwater in storage to ensure groundwater availability during periods of drought and recovery during wet climate conditions.
- Maintain water quality conditions to support ongoing beneficial use of groundwater for agricultural, municipal, domestic, and industrial and environmental interests.

For each of the six SGMA sustainability indicators, the potential undesirable result is identified and quantified based on the identification criteria, and the potential effects on beneficial users are described.

Table ES-1
Sustainable Management Criteria Indicator Summary for the WMA

Sustainability Indicator	Minimum Threshold	Measurement	Measurable Objective	Undesirable Result
Chronic lowering of groundwater levels	Water level minimum thresholds for Representative Monitoring Wells (RMWs) screened in the Upper Aquifer established 10 feet below the 2020 levels. Water level minimum thresholds for RMWs screened in the Lower Aquifer established 20 feet or more below 2020 levels.	Groundwater elevations measured at 13 RMWs screened in the Upper Aquifer, and 13 RMWs screened in the Lower Aquifer.	Spring 2011 groundwater elevations.	Spring groundwater elevations that drop below the established groundwater elevation minimum thresholds in more than 50% of the RMWs for 2 consecutive years.
Reduction of groundwater in storage	Water level minimum thresholds for RMWs screened in the Upper Aquifer established 10 feet below the 2020 levels. Water level minimum thresholds for RMWs screened in the Lower Aquifer established 20 feet or more below 2020 levels	Groundwater elevations are used a proxy for the total volume of groundwater in storage. Groundwater elevations will be measured at 13 RMWs screened in the Upper Aquifer and 13 RMWs screened in the Lower Aquifer	Spring 2011 groundwater elevations.	Spring groundwater elevations that drop below the established groundwater elevation minimum thresholds in more than 50% of the RMWs for 2 consecutive years.
Seawater Intrusion	500 mg/L isocontour migrates east of the 2015 extent, out of the Vandenberg Space Force Base and into the WMA's jurisdictional boundary.	Chloride concentration isocontour maps and time-series of chloride concentrations measured at 17N/35W-17M1 and 7N/35W-21G2	The current extent of the 500 mg/L chloride isocontour.	The landward migration of the 500 mg/L chloride isocontour east of the Vandenberg Space Force Base jurisdictional boundary and corresponding increasing chloride concentration trends measured at 7N/35W-17K20 and 7N/35W-21G2.
Degraded Water Quality	For all constituents except Nitrate, minimum threshold concentrations were established near the historical high constituent concentrations based on individual time-series of concentration graphs and to ensure that the average minimum threshold concentrations do not exceed the RWQCB's established Water Quality Objectives by RWQCB. Nitrate minimum threshold concentration established at the drinking water Maximum Contaminate Level (MCL)	Salt and nutrient concentrations measured at 16 RMWs	The minimum of the secondary maximum contaminant levels (where applicable) and the 2015 groundwater concentration.	Minimum threshold exceedances for each constituent in more than 50% of the RWMs for 2 consecutive years.
Subsidence	A decline of six inches from 2015 land surface elevation resulting from groundwater extractions.	Review of publicly available land subsidence satellite data and continuous GPS data.	Land subsidence less than two inches compared to the 2015 InSAR data.	Land subsidence associated with groundwater production that exceeds half a foot from 2015 conditions.
Depletion of interconnected surface water	Groundwater Elevations in the Upper Aquifer and near the Santa Ynez River that drop 10 feet or more below 2020 groundwater elevation.	Groundwater elevations measured at three RMWs: 7N/34W-35K9, 7N/34W-29F2, and 7N/35W-21G2.	Groundwater elevations at 7N/35W-21G02, 7N/34W-29F02, and 7N/34W-35K09 equal to five feet below the elevation of the Santa Ynez River channel bottom.	Groundwater elevations in the Upper Aquifer that drop 10 feet or more below 2020 groundwater elevations in 2 of the 3 surface water depletion RMWs for 2 consecutive years. Key undesirable result is more surface water depletion due to groundwater extraction than prior to 2015.

RMW = Representative monitoring wells; RWQCB = Regional Water Quality Control Board; MCL =maximum contaminate level; SMCL = secondary maximum contaminate level; TDS = total dissolved solids; GPS = Global Positioning System; InSAR = Interferometric synthetic aperture radar; mg/L = milligrams per liter

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The potential undesirable result from chronic lowering of groundwater levels is less water available for beneficial users using existing infrastructure. This impairment would require more energy to pump water and potential replacement of wells to access water. This undesirable result could occur if groundwater extractions exceed the sustainable yield over a period of years. Evaluation of this potential undesirable result will be based on direct measurements of groundwater levels.

Groundwater storage is the volume of water that is stored in an aquifer. The potential undesirable result of a decline in groundwater storage is less water available for beneficial users, meaning that the water is physically not present to be extracted. As with groundwater levels, groundwater storage is related to pumping and other outflows exceeding the amount of water inflows into the groundwater basin over a period of years. Groundwater storage will be estimated using the groundwater elevation data to assess the volume of water involved.

The potential undesirable result from seawater intrusion is high salinity and other dissolved analytes that would make groundwater unusable for beneficial users. Seawater intrusion is quantified based on the chloride concentrations in wells and will be assessed using periodic sampling and measurements of water chemistry at indicator wells.

Potential undesirable result from degradation of water quality in the aquifer is impaired beneficial uses of the groundwater. To assess water quality, specific salts and nutrients are chosen for analysis. Specifically, concentrations of total dissolved solids, chloride, sulfate, boron, sodium, and nitrate.

Potential undesirable results due to land subsidence may include damage to surface infrastructure and collapsed pore space in the aquifers. Land surface elevation changes are quantified by a remote sensing (satellite) system that uses interference patterns between radar returns to accurately calculate changes in elevation over a wide region.

The potential undesirable results related to depletions in interconnected surface water ~~may result in~~and groundwater dependent ecosystems occur when impacts are greater than impacts due to groundwater ~~dependent ecosystems~~extraction prior to 2015. The Santa Ynez River and River alluvium are under the jurisdiction of the SWRCB. The SWRCB retains administrative authority over the surface flow and ~~subflow~~underflow of the Santa Ynez River, including wells that divert the ~~subflow~~underflow upstream of the Lompoc Narrows. Depletions in interconnected surface water are evaluated by assessing water levels in potential GDE areas along the Santa Ynez River and in the broader monitoring network of water levels in the Upper Aquifer.

With each of the six potential undesirable results described above, specific minimum thresholds were determined to protect against the potential undesirable results. For groundwater levels, thresholds were based on where well screen elevations, sea level, and historical groundwater levels. For groundwater storage, minimum thresholds are based on the number of wells that met the groundwater level criteria. For seawater intrusion, thresholds were based on a chloride iso-contour protective of beneficial users. Minimum thresholds for water quality are based on Water Quality Objectives from the SWRCB. The land subsidence minimum threshold six inches or less relative to the 2015 elevations. Minimum thresholds for interconnected surface water will be monitored by measured water level elevations in nearby wells at or above historical low water levels ~~and within 15 feet of the elevation of the river channel bottom.~~.

Quantifiable goals for the maintenance or improvement of the Basin were identified as the measurable objectives. Groundwater elevations pre-drought conditions (i.e., Spring 2011) were identified as the measurable objective for groundwater levels and storage. Maintaining the current location of the chloride iso-contour near the Santa Ynez River estuary was established as the seawater intrusion measurable objective. No decline in water quality relative to 2015 was set for water quality. Less than two inches of land subsidence since 2015 was set for land subsidence. Finally, to protect surface water, nearby groundwater levels no lower than 5 feet below the local river channel bottom was set as the measurable objective.

Impacts of setting these management criteria on neighboring groundwater basins are expected to be minimal because the WMA is minimally connected to neighboring groundwater basins.

ES Chapter 4: Projects and Management Actions (GSP Section 4)

Projects and Management actions (PMAs) will be implemented to maintain groundwater sustainability in the WMA. The PMAs are categorized into four groups based on when each PMA would be implemented. Group 1 PMAs would be initiated within the first year after GSP submittal. Group 1 Management Actions such as water conservation, ~~tiered~~ pumping fees and the installation of well meters are anticipated to close any potential shortfalls in maintaining the sustainable yield identified in the water budget and maintain sustainability goals. Additional Group 1 PMAs will increase water supplies further such as increased recharge through stormwater capture and recycled water projects.

If Group 1 PMAs fail to have the expected results, then further actions through the implementation of other PMA groups 2, 3, and 4 will be required. PMAs in Group 2 and 3 will be implemented when the early warning and Minimum Threshold triggers for the sustainability indicators are reached.

The WMA GSA is taking an adaptive management approach to WMA management over the planning horizon. Consequently, potential projects and management actions will continuously be considered and evaluated over the planning horizon to ensure that the most beneficial and economically feasible projects and management actions are implemented to achieve the sustainability goal in the WMA and Basin. Proposed projects and management actions may be modified, as necessary, if the intended project benefits are not realized in the intended timeframe.

ES Chapter 5: Plan Implementation (GSP Section 5)

This chapter describes actions to implement this GSP. Five implementation categories are described.

Implementation Group 1 is completion of work started during the drafting of this GSP. This is completion of data collection and survey work that commenced during the development of this GSP. This includes surveying all representative wells in the representative monitoring network. Additionally, data collected during the SkyTEM Airborne Geophysics aerial electromagnetic survey will be evaluated and used to update of the existing geologic model, hydrogeologic conceptual model, and numeric groundwater model.

Implementation Group 2 resolves data gaps in the monitoring network and the conceptual framework as identified in this GSP. This includes determining information about monitoring wells that currently have no well perforation information by video surveying and sounding, and working with landowners on adding voluntary wells to the water level and quality monitoring network. A new surface water gage ~~at~~near the mouth of the Santa Ynez River is also considered to better quantify the amount of surface flow leaving the WMA.

Implementation Group 3 implementation items are data collection actions to allow for improved management of the WMA. Efforts to improve data collection information on water use in the Basin will be done, including additional information from well owners. In addition, the GSA will require the installation of water meters on all wells (excluding *de minimis* domestic wells).

Implementation Group 4 and Implementation Group 5 is improved data management and SGMA updates. The former consists of update and utilized the data management system, the latter is completing SGMA annual reports (first due in 2022) and 5-year assessment and updates to the GSP (first due in 2027) will be done as required by SGMA.

CHAPTER 1: INTRODUCTION AND PLAN AREA

Section 1 A – INTRODUCTION

The Sustainable Groundwater Management Act (SGMA)[1], signed into statue on September 16, 2014, includes a structure and schedule to achieve sustainable groundwater management within 20 years. SGMA requires that groundwater basins identified by the California Department of Water Resources (DWR), as medium and high priority basins must achieve sustainability by January 31, 2042. To meet this goal, State law requires the creation and implementation of a Groundwater Sustainability Plan (GSP) for each basin. The Santa Ynez River Valley Groundwater Basin (SYRVGB), defined by DWR as Basin 3-15 (DWR 2016), is classified as a medium priority groundwater basin and requires submittal of a GSP by January 31, 2022.

Local agencies recognized that the 317.4 square miles of the SYRVGB contains diverse physical and human geographies, resulting in the creation and coordination of three distinct management areas within the SYRVGB. The three distinct areas are defined as the Eastern, Central, and Western Management Areas. This document is the GSP for the Western Management Area (WMA) portion of the SYRVGB (**Figure 1a.1-1**).

The WMA Groundwater Sustainability Agency (GSA) is responsible for preparing and implementing a GSP for the Western portion of the SYRVGB. Two coordinated additional GSPs are also being prepared for the Central Management Area (CMA) and the Eastern Management Area (EMA).

The WMA GSA was formed by a Memorandum of Agreement (MOA) between City of Lompoc, the Vandenberg Village Community Services District, the Mission Hills Community Services District, the Santa Ynez River Water Conservation District, and the Santa Barbara County Water Agency (**Figure 1a.~~3-~~1-2**). The WMA filed a notice of intent to form a GSA with the DWR and became the exclusive GSA for the WMA on February 2, 2017. Two Federal entities also are present in the WMA: the Lompoc Federal Correctional Complex (Lompoc FCC) and

1 CWC Section 10720 et seq. and 23 CCR § 350 et seq.

portions of Vandenberg Space Force Base (VSFB). Federal entities are not required to be subject to SGMA, but VSFB[2] representatives provided support and input into the WMA GSP.

The WMA encompasses 134 square miles of the western portion of the Santa Ynez River Valley Groundwater Basin. The WMA has a complex geology and geography and is divided into six subareas: the Lompoc Plain, Lompoc Terrace and Lompoc Upland, the, and the Santa Rita Upland.

Table 1a.1-1 identifies the Management Areas of the Santa Ynez River Valley Groundwater Basin. Locations for each Management Area are shown in Figure 1a.~~3-~~ 1-2.

Table 1a.1-1
Management Areas of the Santa Ynez River Valley Groundwater Basin

Management Area	Physical Description	Committee Member Agencies
WMA Santa Ynez River Valley Groundwater Basin Western Management Area Groundwater Sustainability Agency	133.7 square miles • Santa Ynez River alluvium west of Santa Rosa Park to the Lompoc Narrows • Lompoc Plain • Lompoc Terrace • Burton Mesa • Lompoc Upland • Santa Rita Upland.	• City of Lompoc • Vandenberg Village Community Services District • Mission Hills Community Services District • Santa Ynez River Water Conservation District • Santa Barbara County Water Agency (non-voting member)
CMA Santa Ynez River Valley Groundwater Basin Central Management Area Groundwater Sustainability Agency	32.8 square miles • Santa Ynez River alluvium east of Santa Rosa Park to just west of the City of Solvang • Buellton Upland	• City of Buellton • Santa Ynez River Water Conservation District • Santa Barbara County Water Agency (non-voting member)
EMA Santa Ynez River Valley Groundwater Basin Eastern Management Area Groundwater Sustainability Agency	150.9 square miles • Santa Ynez River alluvium from City of Solvang east • Santa Ynez Upland	• City of Solvang • Santa Ynez River Water Conservation District, Improvement District No.1 • Santa Ynez River Water Conservation District • Santa Barbara County Water Agency

2 Formerly known as Vandenberg Air Force Base (VAFB) prior to May 14, 2021.

Figure 1a.1 1
Santa Ynez River Watershed and Santa Ynez River Valley Groundwater Basin, Western Management Area

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Figure 1a.1-2
Santa Ynez River Valley Groundwater Basin (DWR Bulletin 118 Basin No. 3-105) and SGMA Management Area Boundaries

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1a.1 PURPOSE OF THE GROUNDWATER SUSTAINABILITY PLAN

The purpose of this GSP is to ensure that groundwater is managed sustainably within the groundwater basin. The GSP must also determine how the basin will achieve sustainable groundwater management within a 20-year period through monitoring and management actions.

The sustainability goal for the Santa Ynez River Valley Groundwater Basin is to manage groundwater resources in the WMA, CMA and EMA for the purpose of facilitating long-term beneficial uses of groundwater within the Basin. Beneficial uses of groundwater in the Basin include municipal, domestic, and agricultural and environmental supply. The sustainability goal is in part defined by the locally-defined minimum thresholds and undesirable results. This GSP describes how the WMA GSA will maintain the sustainability of the Basin, and how the measures recommended in the GSP will achieve these objectives and desired conditions.

The California legislature identified the following specific goals that intended to be achieved as a result of the execution of the SGMA (California Water Code [CWC] Section 10710.2):

> In enacting this part, it is the intent of the Legislature to do all of the following:
>
> (a) To provide for the sustainable management of groundwater basins.
>
> (b) To enhance local management of groundwater consistent with rights to use or store groundwater and Section 2 of Article X of the California Constitution. It is the intent of the Legislature to preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater.
>
> (c) To establish minimum standards for sustainable groundwater management.
>
> (d) To provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater.
>
> (e) To avoid or minimize subsidence.
>
> (f) To improve data collection and understanding about groundwater.

(g) To increase groundwater storage and remove impediments to recharge.

(h) To manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner.

(i) To provide a more efficient and cost-effective groundwater adjudication process that protects water rights, ensures due process, prevents unnecessary delay, and furthers the objectives of this part.

1a.2 SUSTAINABLE MANAGEMENT INDICATORS

Sustainable conditions occur when undesirable results are mitigated, or are not occurring in the Basin. In accordance with SGMA[3] there are six potential undesirable results that must be considered. These potential undesirable results are listed below, and are discussed in detail in Section 3b of this GSP, which details Sustainable Management Criteria.

1. Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon
2. Significant and unreasonable reduction of groundwater storage
3. Significant and unreasonable seawater intrusion
4. Significant and unreasonable degradation of water quality
5. Significant and unreasonable land subsidence
6. Depletion of interconnected surface water and groundwater that has significant and unreasonable adverse impacts on beneficial uses of the surface water.

This GSP is a tool developed by the GSA, within input from the public and a WMA Citizen Advisory Group (CAG), to support sustainable management of, and sustainable decision-making for, the WMA.

[3] CWC Section 10721 (x), 23 CCR § 354.28(c), 23 CCR § 354.34(c),

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1a.3 GROUNDWATER SUSTAINABILITY PLAN ORGANIZATION

This GSP was developed in accordance with SGMA and the DWR-prepared Best Management Practices (BMP) and Guidance Documents. The GSP is organized as outlined below in **Table 1a.3-1**, following SGMA regulations.[4] Figures and tables are organized, labeled, and numbered accordingly.

Table 1a.3-1
Organization of the Groundwater Sustainability Plan

Chapter	Section	Title	Short Description
ES	**Executive Summary**		Summarizes the contents of the report
1	**Introduction and Plan Area**		
	a	Introduction	Introduces Plan Purpose and Contents
	b	Administrative Information	Information about Agency and Governance
	c	Notices and Communication	Outreach and Engagement
	d	Plan Area	Extents and geography of the Management Area: Subareas, Water Agencies, Governments, Well Density, Regulatory Programs, Management Plans, Population, and Land Use Considerations
	e	Additional GSP Elements	Supplemental Plan Content
2	**Basin Setting**		
	a	Hydrogeologic Conceptual Model	Conceptual components of groundwater system: Geology, Aquifers, Inflows, Outflows
	b	Groundwater Conditions	Current and historical status of the Basin: Water Levels, Storage, Seawater Intrusion, Groundwater Quality, Land Subsidence, and Interconnected Surface Water
	c	Water Budget	Flow between components of the groundwater system: Historical, Current, and Projected
3	**Monitoring Network and Sustainable Groundwater Management Criteria**		
	a	Monitoring Network	Current and representative monitoring
	b	Sustainable Management Criteria	Sustainability goal, potential undesirable results, minimum thresholds, and measurable objectives
4	**Project and Management Actions**		Potential ways to improve sustainability as needed.
~~5~~	**~~Plan Implementation~~**a	Overview	Group 1: Planned Project and Management Actions.
	b	Planned	Group 2 & 3: Project and Management Actions planned to respond to Early Warning or Minimum Threshold conditions.
	~~a~~c	~~Implementation Projects~~Responsive	Group 4: Additional Projects and ~~actions~~Management Actions to ~~resolve data gaps and~~ implement ~~the GSP~~as a fallback if results are not met.

4 23 CCR Division 2 Chapter 1.5 Subchapter 2 Article 5. Plan Contents

	~~b~~	~~Implementation Timeline~~	~~Timeline of implementation projects~~
	~~c~~	~~Plan Funding~~	~~Funding opportunities.~~
~~6~~	~~References~~		~~Works cited and relied upon~~
~~7~~	~~Appendices~~d	Supplemental	~~Supporting documents and analysis and public comments~~Group 1: Planned Project and Management Actions.

Table 1a.3-1 - continued

Organization of the Groundwater Sustainability Plan

Chapter	Section	Title	Short Description
5	**Plan Implementation**		
	a	Implementation Projects	Projects and actions to resolve data gaps and implement the GSP
	b	Implementation Timeline	Timeline of implementation projects
	c	Plan Funding	Funding opportunities.
6	**References**		Works cited and relied upon
7	**Appendices**		Supporting documents and analysis and public comments

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Section 1 B – ADMINISTRATIVE INFORMATION

1b.1 AGENCY BACKGROUND

The California Department of Water Resources (DWR) identified the SYRVGB as a medium priority basin (DWR 2020). As such the associated groundwater sustainability agency (GSA) must submit a GSP by January 31, 2022 to comply with the SGMA statute[5] and SGMA regulations[6]. Major organizational documents that supported the development of this GSP are shown in **Figure 1b.1-1**.

On May 23, 2016 SYRVGB public water agencies executed a Memorandum of Understanding (MOU) (Appendix 1b-A) which organized the SYRVGB according to three separate management areas, creating the WMA, CMA, and EMA. The Western Management Area Groundwater Sustainability Agency (WMA GSA) was formed after a "*Memorandum of Agreement for Formation of a Groundwater Sustainability Agency for the Western Management Area in the Santa Ynez River Valley Groundwater Basin*" (MOA) dated January 11, 2017 (Appendix 1b-B).

To adopt the MOA, ratification occurred by all five WMA member agencies. A public hearing for the WMA GSA formation was held on November 17, 2016 at the Lompoc City Council Chambers, as required by SGMA. The public hearing was jointly held by the WMA member agencies. On December 6, 2016, the Lompoc City Council passed Resolution 6083(16) wherein the City of Lompoc resolved to become a member of the WMA GSA in cooperation with the other WMA member agencies. On December 6, 2016, the Santa Barbara County Board of Supervisors, serving as the Santa Barbara County Water Agency (SBCWA) Directors, passed Resolution 16-283 wherein the SBCWA resolved to become a member of the WMA GSA in cooperation with the other WMA member agencies. On December 6, 2016, Vandenberg Village Community Services District (VVCSD) passed Resolution 204-16, wherein the VVCSD resolved to become a member of the WMA GSA in cooperation with the other WMA member agencies. On December 21, 2016, the Mission Hills Community Services District (MHCSD) passed Resolution 16-309 wherein the MHCSD resolved to become a member of the WMA GSA in cooperation with the other WMA member agencies. On January 11, 2017, the Board of Directors for the Santa Ynez River Water Conservation District

5 CWC Section 10720 et seq.
6 23 CCR § 350 et seq.

(SYRWCD) passed resolution 664 wherein the SYRWCD resolved to become a member of the WMA GSA in cooperation with the other WMA member agencies.

The three GSAs for the SYRVGB have coordinated to ensure consistency between the three GSPs prepared in the Basin. The GSPs are being prepared under a SGMA compliant coordination agreement[7] as specified in SGMA. The three SYRVGB GSAs have conferred on governance, starting with the MOU in 2016 followed by the "*Intra-Basin Administrative Agreement for Implementation of the SGMA in the Santa Ynez River Valley Groundwater Basin*" (Appendix 1b-C) dated February 26, 2020. The SYRVGB Coordination Agreement between the WMA, CMA, and EMA will be included as Appendix 1b-D.

1b.1-1 Organizational and Management Structure of the Western Management Agency

GSA Mailing Address

Western Management Area Groundwater Sustainability Agency
P.O. Box 719
Santa Ynez, CA 93460

GSA Physical Address

Western Management Area Groundwater Sustainability Agency
3669 Sagunto St., Suite 101
Santa Ynez CA 93460

Plan Manager Contact Information

William J. Buelow, Water Resources Manager
Santa Ynez River Valley Groundwater Basin Western Management Area GSA
P.O. Box 719, 3669 Sagunto Street, Suite 108 | Santa Ynez, CA 93460
805-693-1156 | bbuelow@syrwcd.com

7 CWC Section 10721 (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

Figure 1b.1-1
Santa Ynez River Valley Groundwater Basin SGMA Organizational Documents

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1b.1-2 Governance

Governance of the WMA GSA is described in the "*Memorandum of Agreement for Formation of a Groundwater Sustainability Agency for the Western Management Area in the Santa Ynez River Valley Groundwater Basin*" (Appendix 1b-B). The WMA GSA is governed by a committee of representatives from each member agency. However, votes are weighted. There are four voting committee members and one non-voting committee member.

The SYRWCD representative has four votes, the City of Lompoc representative has two votes, and VVCSD and MHCSD representatives each have one vote. The SBCWA representative is a non-voting member of the GSA. The SBCWA is represented by the Board of Supervisors for Santa Barbara County, serving as Water Agency Directors.

A quorum to transact business requires a majority of voting member agencies are present. All proposed actions or resolutions must pass by a simple majority vote (presently at least 5 votes needed), provided however, actions or resolutions to adopt budgets or any type of fee/charge, or to approve the GSP, must pass by a 75 percent vote (presently at least 6 votes needed).

1b.1-3 Legal Authority

As part of its creation, the authorizing resolutions for the GSA Committee granted it authority to have all powers that a GSA is authorized to exercise as provided by the SGMA, including developing a GSP consistent with the Act and DWR's regulations and imposing fees to fund GSA and GSP activities (Appendix 1b-B).

As the sole GSA for the WMA, the WMA GSA has the legal authority to manage groundwater within the WMA pursuant to SGMA. As such, SGMA grants the WMA GSA broad powers, including: the legal authority: conduct investigations; adopt rules, regulations, ordinances and resolutions; require registration of groundwater extraction facilities and measurement of groundwater extractions by a water-measuring device satisfactory to the GSA; to enter into written agreements and funding with private parties to assist in, or facilitate the implementation of, a GSP or any elements of the GSP; provide for the measurement of groundwater extractions; regulate groundwater extractions; impose fees on the extraction of groundwater and to fund the costs of groundwater management; and perform any act necessary or proper to carry out the purposes of SGMA.[8]

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

1b.1-4 Implementation and Costs

As plans related to implementation of specific projects are developed, the public will be provided opportunity to review and provide comments to the WMA GSA committee.

Pursuant to CWC Section 10730, the WMA GSA is authorized to fund the costs of groundwater management by imposing fees on the extraction of groundwater or through a parcel tax or fee. The WMA GSA committee in coordination with the other two GSAs in the Basin, are evaluating the type of fee they will use to fund implementation and future project and management actions.

The WMA GSA is funded by a cost sharing agreement between the four voting WMA member agencies develop a GSP and perform related studies as approved by the WMA GSA Committee. The SBCWA, as a non-voting member, is not responsible for any other costs related to the WMA GSP development. All member agencies are responsible for their own costs to attend and participate in the WMA GSA committee.

The WMA together with the CMA and EMA entered an Intra-Basin Administrative Agreement (Appendix 1b-C).

Future implementation of the WMA GSP is described Chapter 5 of this GSP. **Table 1b.1-1** is a summary of potential implementation costs of this GSP. These costs are anticipated to be funded through fees created by the GSA, and or cost sharing between agencies. There may be opportunities to obtain implementation grants from the State of California.

8 CWC Sections 10725, 10725.2, 10725.4, 10725.6, 10725.8, 10726.2, 10726.4, 10726.5, 10730, 10730.2

Table 1b.1-1
Summary Implementation Costs to Manage WMA Groundwater

Implementation Projects			
Task	**Type**	**Completion**	**Additional Cost Estimates [A]**
Surveying Representative Wells	One Time	WY 2023	$2,000 - $4,000
SkyTEM Airborne Geophysics	One Time	WY 2023	Already funded
Video Logging and Sounding Wells	One Time	WY 2023	$22,500 - $36,000
WQ Seawater Monitoring	Annual	Ongoing	$2,500 - $4,000
SW Gage Installation (planning)	One Time	WY 2023	GSA Overhead [B] ($10,000)
Well Registration Update	One Time	WY 2024	GSA Overhead [B] ($20,000)
Well Metering Requirement	One Time	CY 2023	GSA Overhead [B] ($20,000- $40,000)
Data Updates	Annual	Ongoing	$10,000 -$15,000 [C]
SMGA WY Annual Reports	Annual	Ongoing	$40,000 - $60,000 [D]

WQ = Water Quality, SW = Surface Water, WY = water year (October 1 – September 30), FY = fiscal year (July 1 – June 30), CY = calendar year (January 1 – December 31), GSA = Groundwater Sustainability Agency

[A] All estimates are in 2021 dollars. Costs are to the GSP, certain tasks include mandates for well owners.
[B] Estimated as primarily GSA staff time to administer program.
[C] WMA portions assuming continuing cost share with CMA.
[D] Estimate for first year, mature report likely starting with third annual report, estimated as $20,000 per year.

Projects and management actions that would improve sustainability and resilience of the WMA groundwater are discussed in ~~Section 4a~~Chapter 4 of this GSP. Several projects to improve sustainability that are recommended under all basin conditions are summarized in **Table 1b.1-2**. These costs are anticipated to be funded through the GSA fees, agency cost sharing and potentially State grants.

Table 1b.1-2
Sustainability Project and Management Actions: General Management Summary Costs for WMA

Sustainability Project and Management Action			
Project and Management Action	**Proposed Completion**	**Additional Cost Estimates [A]**	**Annual Implementation Costs [B]**
Water Conservation Plan	WY 2023	$50,000	$45,000
Tired Groundwater Extraction Plan	WY 2023	$250,000	GSA Overhead [C] ($80,000 - $160,000)
Recycled Water Feasibility Study	WY 2024	$100,000	Design Dependent Install Costs
Lompoc Bioretention Bioswale Network Project (Design and Benefits Study)	WY 2022	$30,000	Design Dependent Install Costs
Uniform Ban on Water Softeners	WY 2023	GSA Overhead[C] ($5,000)	GSA Overhead [C] ($1,000)

WY = water year (October 1 – September 30), GSA = Groundwater Sustainability Agency

[A] All estimates are in 2021 dollars. Costs are to the GSP, certain items may include costs to other parties.
[B] Actual implementation costs will depend on results of particular suitability project and management action.
[C] Estimated as primarily GSA staff time to administer program.

1b.2 INTRA-BASIN COORDINATION BETWEEN MANAGEMENT AREAS

SGMA statute requires that multiple GSAs coordinate when developing GSPs in a single groundwater basin, such as in the Santa Ynez River Valley Groundwater Basin with the WMA, CMA, and EMA. The SGMA statue (CWC Section 10727.6) states:

> When Multiple Plans Cover a Basin. Groundwater sustainability agencies intending to develop and implement multiple groundwater sustainability plans [...] shall coordinate with other agencies preparing a groundwater sustainability plan within the basin to ensure that the plans utilize the same data and methodologies for the following assumptions in developing the plan:
>
> (a) Groundwater elevation data.
>
> (b) Groundwater extraction data.
>
> (c) Surface water supply.
>
> (d) Total water use.
>
> (e) Change in groundwater storage.
>
> (f) Water budget.
>
> (g) Sustainable yield.

During the GSP development process the WMA GSA and CMA GSA shared the same consultant team and document prepares to ensure that the two plans used the same data and methodologies. To coordinate with the EMA GSA, numerous meetings and conference calls were held between the two consultant teams to coordinate activities in each management area so that the requirements for intra-basin coordination were met. As of September 1, 2021, the WMA consultant team met with the EMA consultant team for over 40 meetings or conference calls during development of the technical elements of the GSP. Additionally, WMA consultant team regularly attended the EMA GSA committee meetings to receive public updates on EMA activity.

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Section 1 C – NOTES AND COMMUNICATION

~~1c.1 ADMINISTRATION~~

~~The Western Management Area Groundwater Sustainability Agency (WMA GSA) was formed by the City of Lompoc, the Vandenberg Village Community Services District, the Mission Hills Community Services District, the Santa Ynez River Water Conservation District, and the Santa Barbara County Water Agency. The WMA filed a notice of intent to form a GSA with the DWR and became the exclusive GSA for the WMA on February 2, 2017. Meetings of the WMA GSA Committee are called, noticed, and conducted, subject to the provisions of the Ralph M. Brown Act (Govt. Code sections 54950 et seq.).~~

~~Appendix 1c-A includes a list of public meetings that have been held to date for the WMA GSA as well as meetings of the WMA Citizens Advisory Group (described below). In accordance with Governor of California issued Executive Orders N-25-20 and N-29-20 which temporarily waived requirements in the Bagley-Keene Act and Brown Act, meetings were convened during the SARS-CoV-2 (COVID-19) pandemic via video teleconference and phone. The Governor of California issued Executive Orders N-33-20 and California State Department of Public Health Order of March 19, 2020 required a stay-at-home directive. Additionally, Santa Barbara County Public Health, Health Officer Order No. 2020-12.5 prohibited all gatherings within the County. Appendix 1c-B includes the reference Proclamations, Executive Orders, Health Orders, and Health Officer Orders.~~

This section addresses 23 CCR § 354.10 of the SMGA regulations, which relates to notification and communication of the WMA with other agencies and interested parties during the development of this GSP. This section documents the efforts made to inform, involve, and empower constituents as well as the broader public, while meeting the requirements of SGMA.

1c.1 COMMUNICATION

1c.1-1 Public Outreach and Engagement Plan

~~In February 2020~~On July 24, 2019, the WMA GSA ~~prepared an~~released a draft Outreach and Engagement Plan (OEP) ~~to provide~~with the goals of providing the framework for individual stakeholders, stakeholder organizations, and other interested parties an opportunity to be involved in the development and evaluation of this GSP~~.~~ and future actions of the GSA. After a 128-day public comment period, a draft final OEP released on February 26, 2020. The OEP, included as **Appendix 1c-~~C~~A** of this GSP, describes the steps the WMA GSA has taken, and will continue to take, to encourage public involvement during the development and implementation phases of this GSP. The OEP includes a list of identified stakeholders as of 2020 and describes the methods the WMA GSA has used to identify additional stakeholders, solicit public involvement and feedback, and consider stakeholder comments and concerns during the development of, and future implementation of, this GSP.

1c.1-2 ~~Table 1c.1-1 provides a summary of identified stakeholder categories~~ Identified Stakeholders in the Plan Area~~.~~

Stakeholder categories within the WMA Plan Area are summarized in **Table 1c.1-1**.

Table 1c.1-1
Stakeholder Categories in the WMA Plan Area

Category of Interest	Examples of Stakeholder Groups	Engagement Purpose
General Public	General public	Inform to improve public awareness of sustainable groundwater management
Land Use	County of Santa Barbara City of Lompoc	Consult and involve to ensure land use policies are supporting GSP and vice-versa
Private Users/Agriculture	Domestic users Agricultural users	Inform and involve to avoid negative impact to these users. Collaborate to ensure sustainable management of groundwater.
Urban/~~Agriculture/~~ Recreational Users	City of Lompoc Vandenberg Villlage CSD Mission Hills CSD Small mutual water systems Golf courses	Collaborate to ensure sustainable management of groundwater
Environmental and Ecosystem	California Department of Fish and Wildlife National Marine Fisheries Service	Inform and involve to sustain a vital ecosystem
Economic Development	City of Lompoc Mayor Jenelle Osborne County District 3 Supervisor Joan Hartmann County District 4 Supervisor Bob Nelson State Assembly Member Steve Bennett State Assembly Member Jordan Cunningham State Senator Monique Limón	Inform and involve to support a stable economy
Human Right to Water	Domestic water users Disadvantaged communities	Inform and involve to provide safe and secure groundwater supplies to DACs
Integrated Water Management	Regional water management groups (IRWM regions)	Inform, involve, and collaborate to improve regional sustainability

Notes: DAC = disadvantaged community; IRWM = Integrated Regional Water Management. There are no Federally-Recognized Tribes within the WMA, however, the Santa Ynez Band of Chumash Mission Indians of the Santa Ynez Reservation is located in the EMA.

Disadvantaged communities (DAC) and severely disadvantaged communities (SDAC) are geographical areas where the median income is 80% or 60% respectively of statewide annual median household income.[9] Population demographics are discussed further in Section 1d.6-1 (Plan Area). The City of Lompoc as a whole is considered a DAC, and smaller geographies are SDACs. No other DACs or SDACs are

9 The DAC and SDAC definition does not take into account relative cost of living throughout the state.

identified. City of Lompoc is member agency of the WMA GSA with half the votes. City of Lompoc's water system is entirely reliant on groundwater as discussed in Section 1d.2-2-1 (Plan Area).

There are no Federal or state recognized Native American tribal lands within the WMA. However, the Santa Ynez Band of Chumash Indians are located within the groundwater basin with a reservation located within the EMA.

1c.1-3 Decision Making Process

Decisions by the GSP are made by the Committee, which is made up of representatives of the public water agencies within the basin. Governance (Section 1b.1-2) describes the voting mechanics for the GSA which is based in part on the financial contribution of each agency. These public agencies are elected by constituents within the WMA.

When particular issues are identified, they are first directed to the technical consultant team for appraisal. Technical consultants then meet with the agency staff. Depending on the topic this may include review by legal staff. Recommendations are then presented to the Committee for consideration, or for further direction.

1c.2 PUBLIC ENGAGEMENT

1c.2-1 Public Meetings and Public Meeting Notices

The Western Management Area Groundwater Sustainability Agency (WMA GSA) was formed by the City of Lompoc, the Vandenberg Village Community Services District, the Mission Hills Community Services District, the Santa Ynez River Water Conservation District, and the Santa Barbara County Water Agency. The WMA filed a notice of intent to form a GSA with the DWR and became the exclusive GSA for the WMA on February 2, 2017. Meetings of the WMA GSA Committee are called, noticed, and conducted, subject to the provisions of the Ralph M. Brown Act (Govt. Code sections 54950 et seq.).

Appendix 1c-B includes a list of public meetings that have been held to date for the WMA GSA as well as meetings of the WMA Citizens Advisory Group (described below). In accordance with Governor of California issued Executive Orders N-25-20 and N-29-20 which temporarily waived requirements in the

Bagley-Keene Act and Brown Act, meetings were convened during the SARS-CoV-2 (COVID-19) pandemic via video teleconference and phone. The Governor of California issued Executive Orders N-33-20 and California State Department of Public Health Order of March 19, 2020 required a stay-at-home directive. Additionally, Santa Barbara County Public Health, Health Officer Order No. 2020-12.5 prohibited all gatherings within the County. **Appendix 1c-C** includes the reference Proclamations, Executive Orders, Health Orders, and Health Officer Orders.

~~1c.1-3~~1c.2-2 Citizens Advisory Group

As part of public outreach and communication, the WMA GSA Committee created the Citizens Advisory Group (CAG) to provide the GSA focused public input from representatives of different categories of groundwater uses and users in the WMA.

CAG members are members of the public who volunteered to participate in reviewing sections of the Draft GSP and other materials produced by the WMA GSA. Members of the community were invited to apply to the CAG. An ad-hoc selection committee reviewed applicants and made a recommendation to the WMA GSA Committee. The WMA GSA Committee considered the recommendations and then "appointed" a slate of members to the CAG. The CAG membership reflects a diversity of interests and different types of groundwater uses and users in the WMA. As requested by the Committee, the CAG provides input to the GSA by reviewing sections of the GSP and other materials, and providing comment, for WMA GSA consideration. The WMA GSA member agency staff organized and facilitated the CAG meetings.

WMA CAG members reviewed the following documents:

- Outreach and Engagement Plan;
- Data Management Plan;
- Subsurface Three-Dimensional Geology Technical Memorandum,
- Hydrogeologic Conceptual Model,
- Groundwater Conditions,
- Numeric Groundwater Model,
- Water Budgets,

- Sustainability Management Criteria;
- Monitoring Networks.

As with the WMA GSA committee meetings, WMA CAG meetings were convened during the SARS-CoV-2 pandemic via phone and video teleconference. Appendix 1c-A includes a list of meeting dates and topics for the CMA CAG. Appendix 1c-B includes the reference Proclamations, Executive Orders, Health Order, and Health Officer Orders.

~~1c.1-4~~1c.2-3 Newsletters and Press Releases

The three management areas of the Santa Ynez River Valley Groundwater Basin (Basin or SYRVGB) coordinated in creating newsletters and press releases to notify the public about the development of the GSP throughout the SYRVGB. Copies of the newsletters and press releases created to date are included as **Appendix 1c-D**.

Newsletters are one-page documents about the SYRVGB, the WMA GSA, and WMA GSP developments. The newsletters were distributed in both English and Spanish. Translation services were provided by DWR's Written Translation Service. The newsletters were distributed in member agency utility bills, e-mailed to interested parties, and posted on the SGMA website for the Basin (below, ~~section~~Section 1c.1-4).

Press releases were also produced and sent to local media organizations about specific topics. As an example, one such press release reported on helicopter flights that were used as part of the Aerial Electromagnetic Method (AEM) survey in November 2020.

~~1c.1-5~~1c.2-4 Communication Website: SantaYnezWater.Org

The three management areas of the SYRVGB coordinated in creating a single website for communication and outreach located at: https://www.santaynezwater.org

This website is a centralized location where updates regarding SGMA activities across the basin are made available. It has been a tool to engage and inform the public and to allow for public involvement in developing the GSP.

Features of this website include a tool to enter physical addresses to identify a management area of interest and obtain additional information about each GSA. Members of the public can register as interested parties for one, or all of the SYRVGB management area GSAs (WMA, CMA or EMA), and receive emails regarding upcoming events such as GSA or CAG meetings, or documents available for public review and comment.

The website also includes items related to noticing and archiving GSA activities including a calendar of GSA meetings, both past and present, upcoming events, and public comment periods, both past and present. Minutes and meeting packets from GSA meetings are made available through the website. Additionally, the website provided opportunity for the public review process used in developing this GSP. Draft documents released to the public were posted to this website, which included a public comment tool to allow individuals to comment on a specific document, or part of documents or make a general comment.

Appendix 1c-E provides additional information about the SantaYnezWater.Org website.

~~1c.2~~1c.3 PUBLIC ~~Review~~ COMMENTS

In accordance with the SGMA regulations[10] the WMA GSA solicited public comments on this GSP as well as supporting draft documents. As described above, request for comments included outreach to specific identified stakeholder groups, running the CAG, newsletters released through multiple channels, press releases, and development and implementation of a communications website.

Written comments received by the WMA GSA are included as Appendix Public Review Comments, located as the last appendix. Public comments were considered throughout the development of the GSP. Comments on draft documents by stakeholder technical consultants identified additional supporting data that was included in this GSP. Comments by State and Federal wildlife agencies resulted in additional clarification about principal aquifer extents, additional discussion of SWRCB Order WR 2019-0148, limits

10 23 CCR § 354(c) Comments regarding the Plan received by the Agency and a summary of any responses by the Agency.

to GSA authority[11] and expanded discussion of wildlife beneficial use including existing biological opinions and wildlife monitoring programs.

1c.4 FUTURE PUBLIC ENGAGEMENT

The groundwater sustainability agency plans to put in place the plans described in this document, which are a result of successful consultation and collaboration with the public. Chapter 4 describes the Project and Management Actions which are the planned to maintain and improve groundwater conditions, and Chapter 5 describes ongoing field tasks which will resolve data gaps, improve monitoring of the basin, as well as plans to address reporting and update requirements. Public engagement and noticing[12] will be an important component of the successful completion of these future projects.

The expected process for notice to the public is planned to follow the methods during this GSP development. Multilingual newsletters sent in all water bills, distribution through the public agencies that are member agencies, as well as notice through the communications website.

11 Including CWC Section 10720.5 (b)

12 23 CCR § 354.44(b)(1)(B) The process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken.

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Section 1 D – PLAN AREA

This Plan Area section addresses 23 CCR § 354.8 of the SMGA regulations. It reintroduces the geographic areas covered by the GSP, and addresses administrative, statutory, and policy issues, in addition to aspects of the built environment related to water supply and demand.

Section 1d.1, WMA Plan Area Location, reintroduces the overall extents of the Santa Ynez River Valley Groundwater Basin (Basin) and adjacent basins, the division of the Basin into three GSP management areas, coverage of the Basin by SGMA, the extents of the Western Management Area (WMA) within the Basin, and the subareas of the WMA.

Section 1d.2 Summary of Jurisdictional Areas and Other Features, describes agencies with land use jurisdiction and water agencies throughout the WMA.

Section 1d.3 Well Density, describes existing well density throughout the WMA.

Section 1d.4 Water Resources Monitoring and Management Programs, describes existing water resource monitoring and management plans within the WMA.

Section 1d.5 Regulatory Programs, describes existing regulatory programs that are applicable to the WMA.

Section 1d.6 Land Use Considerations, describes land use and projected population numbers, general plans, and other applicable planning efforts.

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1d.1 WMA PLAN AREA LOCATION

This GSP for the Western Management Agency addresses the westernmost of three management areas that cover the entire Santa Ynez River Valley Groundwater Basin through a coordination agreement.

1d.1-1 Santa Ynez River Valley Groundwater Basin and Adjacent Basins

Santa Ynez River Valley Groundwater Basin (Basin) is designated by the California Department of Water Resources (DWR) under CWC Section 12924 as one of California's 515 alluvial basins. The Basin (DWR Basin No. 3-015) is a coastal groundwater basin encompassing approximately 317.4 square miles (203,141.4 acres) in central Santa Barbara County (County). The Basin underlies the cities of Solvang, Buellton, and Lompoc, and the unincorporated communities of Santa Ynez, Ballard, Los Olivos, Acorn, Mission Hills, and Vandenberg Village. The Basin is bounded by the Pacific Ocean on the west, the Purisima Hills and San Rafael Mountains on the north, the Santa Ynez Mountains on the south, and consolidated non-water-bearing rocks of Mesozoic[13] and Tertiary[14] age on the east (DWR 2004; Upson and Thomasson 1951). These consolidated rocks underlie the unconsolidated water-bearing deposits of Tertiary and Quaternary[15] age that comprise the Basin, and define the Basin's lower boundary (Upson and Thomasson 1951). To the north, the Basin boundary is coincident with the boundary of the approximately 105.4 square mile (67,473.7-acre) San Antonio Creek Valley Groundwater Basin (DWR Basin No. 3-014).

The Basin is one of several within Santa Barbara County. **Figure 1d.1-1** shows other groundwater basins adjacent to or near the Basin. North of and bordering the Basin, is the San Antonio Creek Valley Groundwater Basin.[16] The Santa Maria River Valley Groundwater Basin[17] is directly adjacent to the north of the San Antonio Creek Valley Groundwater Basin. To the southeast, along the south coast of Santa Barbara County, is the Goleta Groundwater Basin,[18] separated from the Basin by the Santa Ynez Mountain range.

13 Geologic period from 252 million to 66 million years ago.
14 Geologic period from 66 million to 2.6 million years ago.
15 Geologic period from 2.6 million years ago to the present.
16 DWR Basin 3-14
17 DWR Basin 3-12
18 DWR Basin 3-16

The Santa Ynez River Valley and adjacent San Antonio Creek Valley groundwater basins are designated by the DWR as medium priority[19] basins (DWR 2020). The DWR basin prioritization process was completed in accordance with the requirements of the Sustainable Groundwater Management Act (SGMA) of 2014 and CWC sections 10722.4 and 10933, based on eight components as outlined in the *Sustainable Groundwater Management Act 2019 Basin Prioritization Process and Results* (DWR 2020). Basins that received total priority points ranging from greater than 14 points to less than or equal to 21 points, were designated as medium priority basins. The Santa Ynez River Valley Groundwater Basin received a total of 15 priority points, with component 3 (the number of public supply wells that draw from the basin) and component 6 (the degree to which persons overlying the basin rely on groundwater was their primary source of water) being the two components that received the highest number of priority points (DWR 2020).

Table 1d.1-1
Summary of the Santa Ynez River Valley Groundwater Basin, Adjacent Basins, and Contributing Watershed Area

Basin/Watershed Name	Area		DWR Designations			Previous Groundwater Management Plan	GSP Required per SGMA
	Acres	*Square Miles*	*Basin Number*	*Critically Overdrafted*	*Basin Priority*		
Santa Ynez River Valley Groundwater Basin	203,141.4	317.4	3-015	No	Medium	No	Yes
Adjacent Basin							
San Antonio Creek Valley Groundwater Basin	67,473.7	105.4	3-014	No	Medium	No	Yes
Primary Watershed Contributing to the Santa Ynez River Valley Groundwater Basin							
Santa Ynez River Watershed	574,059.0	897.0	Not applicable				

Source: DWR 2016. California's Groundwater. Bulletin 118 Interim Update 2016.
Notes: DWR = Department of Water Resources; GSP = Groundwater Sustainability Plan; SGMA = Sustainable Groundwater Management Act.

19 Basin prioritization classifies California's 515 basins and subbasins into priorities based on components identified in the California Water Code. The priority process consists of applying datasets and information in a consistent, statewide manner in accordance to the provisions in CWC Section 10933(b). Further information on DWR's basin prioritization process can be found on the following website: https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization.

Figure 1d.1-1
Adjacent and Neighboring Groundwater Basins, Western Management Area

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1d.1-2 SGMA Coverage of Basin

The Santa Ynez River Valley Groundwater Basin (Basin or SYRVGB) is divided into three management areas based on hydrogeologic and jurisdictional boundaries, each governed by a Groundwater Sustainability Agency (GSA). The three management areas include the Western Management Area (WMA), Central Management Area (CMA), and Eastern Management Area (EMA). For the purpose of development and implementation of this GSP, the Plan Area is synonymous with the WMA of the Basin. Appendix 1d-A provides the rationale for the divisions of the three management areas.

The entire Santa Ynez River Valley Groundwater Basin is covered by one of the three groundwater sustainability plans prepared for the Basin. The extents of all three management areas were shown previously on Figure 1a.~~3~~ 1-2 (Introduction). There are no adjudicated areas or parts of the Basin covered by a SGMA Alternative plan.[20]

1d.1-3 Plan Area: Western Management Area

The WMA boundary encompasses the westernmost approximately 133.7 square miles (85,595.5 acres) of the Basin (**Figure 1d.1-2**). The WMA GSA committee consists of the Santa Ynez River Water Conservation District (SYRWCD), City of Lompoc, County of Santa Barbara, Mission Hills Community Services District (MHCSD), and Vandenberg Village Community Services District (VVCSD). Although partially within the Basin, as a Federal Facility, Vandenberg Space Force Base (VSFB) is not subject to SGMA.

The WMA is divided into six subareas[21] based on hydrogeologic and topographic characteristics: Lompoc Plain, Lompoc Terrace, Lompoc Upland, Santa Rita Upland, Santa Ynez River Alluvium, and Burton Mesa. **Figure 1d.1-3** shows the locations and extents of the subareas, and **Table 1d.1-2** lists the size of each subarea.

20 Alternative plans are described in 23 CCR Division 2 Chapter 1.5 Subchapter 2 Article 9. Alternatives

21 Subareas are similar to and based on the Santa Ynez River Water Conservation District Annual Report subareas, also used for managing pumping in much of the WMA. Extents were adjusted to cover the entire Bulletin 118 Interim Update 2016 (DWR ~~2016~~2016a) basin boundary.

Table 1d.1-2
Summary of WMA Subareas by Area

WMA Subarea	Acres [A]	Square Miles
Lompoc Plain	18,780	29.3
Lompoc Terrace	10,560	16.5
Lompoc Upland	21,170	33.1
Santa Rita Upland	7,090	11.1
Santa Ynez River Alluvium	4,940	7.7
Burton Mesa	23,060	36.0
Total	**85,600**	**133.7**

[A] Rounded to nearest 10 acres.

1d.1-3-1 Santa Ynez River Valley Groundwater Basin and Adjacent Basins

The Lompoc Plain subarea is composed of the Santa Ynez River floodplain that surrounds and includes the City of Lompoc and surrounding agricultural land. The Santa Ynez River enters the forebay of the Lompoc Plain from the Santa Ynez River Alluvium subarea at the Lompoc Narrows at the east end of the Lompoc Plain, and terminates in the west where the Santa Ynez River flows into the Pacific Ocean. Groundwater in the Lompoc Plain occurs in the unconsolidated units of the Lompoc Plain. The Lompoc Plain subarea includes substantial agriculture, the City of Lompoc, the Lompoc Regional Wastewater Reclamation Plant, the Federal Bureau of Prisons facilities, and undeveloped coastline within the VSFB.

1d.1-3-2 Lompoc Terrace Subarea

The Lompoc Terrace subarea is the upland area southwest of the Lompoc Plain and is bordered on the west by the Pacific Ocean and south by the White Hills. The Lompoc Terrace is similar to the Burton Mesa, with discontinuous, shallow perched groundwater conditions that overlay non-water-bearing, consolidated Monterey or Sisquoc Formations. A small northeastern portion of the Lompoc Terrace includes some Careaga Sand that extends beneath the Lompoc Plain and is considered one of the principal aquifers within the WMA. The portion of Careaga Sand present in the Lompoc Terrace is a down-faulted wedge, overlain by younger Orcutt Sand deposits.

The Lompoc Terrace subarea is almost entirely within the extent of VSFB. It is relatively undeveloped, with no agriculture and no population centers, and has infrastructure related to VSFB space launch operations.

Figure 1d.1-2
Western Management Area Boundary, Santa Ynez River Valley Groundwater Basin Groundwater Sustainability Act

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Figure 1d.1-3
Subareas – Western Management Area

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1d.1-3-3 Lompoc Upland Subarea

The Lompoc Upland subarea is located north and northeast of the Lompoc Plain. The northern boundary of this subarea is, in part, a topographic boundary along the top of the Purisima Hills in the north. The Purisima Hills are a result of the Purisima Hill Anticline, a geologic anticline fold that resulted in uplifting and erosional thinning of the principal water-bearing aquifer units in this area. The Lompoc Upland includes the consumptive water use associated with two residential areas served by Vandenberg Village Community Services District (CSD), and Mission Hills CSD. There is also some agriculture in this subarea. The Mission Hills Wastewater Treatment Plant contributes to groundwater recharge to the Lompoc Upland subarea by way of return flows in the treatment plant's percolation ponds.

1d.1-3-4 Santa Rita Upland Subarea

The Santa Rita Upland subarea is located east of the Lompoc Plain and Upland and is within the Santa Rita Creek watershed. The Santa Rita Upland contains unconsolidated water-bearing principal aquifer units of the Lower Aquifer within an east/west-trending geologic syncline fold. The northern portion of the Santa Rita Upland subarea is bound by the Purisima Hills and the southern portion is bound by the Santa Rita Hills.

The Santa Rita Upland subarea includes approximately 500 acres or agricultural land. Rural residential neighborhoods are served by shared well systems or small Mutual Water Companies.

1d.1-3-5 Santa Ynez River Alluvium Subarea

The Santa Ynez River Alluvium subarea contains the Santa Ynez River channel and alluvial units. The upstream boundary is the WMA-CMA boundary near Santa Rosa Park in the east and extends west to where the Santa Ynez River enters the Lompoc Plain, commonly referred to as the Lompoc Narrows at Robinson Bridge. Groundwater occurs in thin, unconsolidated sedimentary layers of younger alluvium directly over non-water-bearing, consolidated geologic units~~.~~ (Section 2a.2). Non-water-bearing consolidated geologic units also form the lateral boundaries as exposed bedrock in this area.

Groundwater recharge of the alluvium in this subarea is primarily received from the surface and underflow of the Santa Ynez River, tributary creek flow, seepage, and irrigation return flows. The Santa Ynez River and its ~~subflow~~underflow are ~~managed~~within the jurisdiction of and regulated by the California State Water Resources Control Board (SWRCB). River flows including Santa Ynez River underflow responds to releases from upstream reservoirs. SWRCB regulates surface water and underflow for various beneficial purposes including steelhead trout (*Oncorhynchus mykiss*) population. **Appendix 1d-B** describes the extents of the Santa Ynez River underflow and summarizes the history of management by SWRCB as part of the Santa Ynez River.

The water flowing through the alluvium, in known and definite channels,[22] is not considered groundwater as defined by SGMA, but, rather, is considered surface water by the SWRCB and the extraction of such water is not subject to management by the GSA pursuant to SGMA.

1d.1-3-6 Burton Mesa Subarea

The Burton Mesa subarea is an elevated mesa located northwest of the Lompoc Plain and is bordered on the west by the Pacific Ocean. The Burton Mesa is characterized by generally thin layer of sediments that overlay the non-water-bearing Monterey Formation. Groundwater in this subarea occurs primarily in a perched condition, largely influenced by annual precipitation. During wet years, high rates of precipitation result in temporary runoff during storm events and perched conditions above non-water-bearing consolidated bedrock and/or above clays that separate the perched water from the regional aquifer system (Arcadis 2016). The Burton Mesa subarea is almost entirely within the boundaries of VSFB. There is currently no known groundwater pumping for consumptive use in this subarea.

[22] CWC Section 10721 (g) "Groundwater" means water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water, **but does not include water that flows in known and definite channels.** (emphasis added)

1d.2 SUMMARY OF JURISDICTIONAL AREAS AND OTHER FEATURES

1d.2-1 Land Use Jurisdictions within the WMA Plan Area

The WMA Plan Area consists of private rural land under Santa Barbara County jurisdiction, federal land managed by the United States Space Force (USSF), state land managed by the California Department of Parks and Recreation (California State Parks), and the City of Lompoc. The developed land uses in the Plan Area include in general residential, commercial, and agricultural. Approximately 45% of the Plan Area consists of private land, 44% consists of Vandenberg Space Force Base (VSFB), 9% consists of the City of Lompoc, and 2% consists of California State Parks. The land uses in the Plan Area contributing watershed include primarily agricultural (e.g., vineyards, field crops, pasture) and open space (e.g., recreational). In addition to the County, USSF, California State Parks, and City of Lompoc, the California Coastal Commission (Commission) has permitting and oversight responsibilities over land use within the California Coastal Zone, which occupies approximately 9,513.6 acres (11%) of the WMA (**Figure 1d.2-1**). **Figure 1d.2-2** shows the extents of specific State and Federal agencies within the WMA. The Bureau of Land Management (BLM), part of the U.S. Department of the Interior, also runs the California Coastal National Monument which has jurisdiction over small rocks along the shoreline of VSFB. Lands that are shown as under the U.S. Natural Resources Conservation Service, part of the U.S. Department of Agriculture, include the Agricultural Conservation Easement Program - Agricultural Land Easements (ACEP-ALE) and the Farm and Ranch Lands Protection Program (FRPP). **Table 1d.2-1** summarizes the land ownership and jurisdiction in the WMA Plan Area.

Table 1d.2-1
Summary of Land Ownership in the WMA Plan Area

Ownership Type	Agency	Description	Acres / % of Total
Private	Private	Mixed land uses including primarily residential, commercial, and agricultural under Santa Barbara County jurisdiction	38,885.9 / 45%
Federal	U.S. Space Force	Vandenberg Space Force Base	37,534.8 / 44%
State	California State Parks	La Purísima Mission State Historic Park	1,873.0 / 2%
City	City of Lompoc	Mixed land uses including primarily residential and commercial	7,301.8 / 9%
		Grand Total	85,595.5 / 100%

1d.2-1-1 Santa Barbara County

The Department of Planning and Development has land use authority in the unincorporated Santa Barbara County parts of the WMA Plan Area. The Department of Planning and Development conducts policy development, planning, permitting, and inspection services through its divisions which include administration, building and safety division, development review, and long-range planning. Section 1d.6, Land Use Considerations, provides greater detail on land use, population, and general plan land use policies relevant to the GSP.

1d.2-1-2 United States Space Force

The United States Space Force (USSF) is a branch of the U.S. Armed Forces organized under the Department of the Air Force. The USSF manages VSFB, a space launch and missile testing site. The USSF works to protect and preserve the many cultural, ecological, and environmental resources located at VSFB, including several beaches.

For Calendar Year 2020 VSFB employed approximately 2,500 full time employees making it the fourth largest single employer in the County of Santa Barbara (County of Santa Barbara, 2021b).

1d.2-1-3 California State Parks

The California Department of Parks and Recreation (California State Parks) is the state agency that manages California parks under the California Natural Resources Agency. Within the WMA California State Parks manages La Purísima Mission State Historic Park, one of 21 Franciscan Missions established in California in the late 1700s. La Purísima Mission State Historic Park is considered the most completely restored mission in California. The California State Parks manages the property amenities including a visitor center, shops, church, living quarters, and gardens.

1d.2-1-4 City of Lompoc

The City of Lompoc Planning Division has land use authority within the limits of the City of Lompoc. The Planning Division conducts planning, environmental review, and enforcement. Section 1d.6, Land Use Considerations, provides greater detail on land use, population, and general plan land use policies relevant to the GSP.

Figure 1d.2-1
Public Lands, Western Management Area

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Figure 1d.2-2
Stet and Federal Lands, Western Management Area

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1d.2-1-5 California Coastal Commission

The California Coastal Commission (Commission) is a state agency within California Natural Resources Agency that has broad land use authority within the Coastal Zone. Various activities within the Coastal Zone are regulated by the Commission, which was established by the California Coastal Act of 1976. In conjunction with local governments, the Commission regulates aspects of development and access to coastal waters within the Coastal Zone. The Coastal Zone within the WMA extends from three (3) miles offshore to a maximum of about three (3) miles inland. Relevant to the GSP, the Commission regulates the construction of groundwater wells within the Coastal Zone. Section 1d.6, Land Use Considerations, provides greater detail on land use, population, and general plan land use policies relevant to the GSP.

1d.2-2 Water Agencies Relevant to the Plan

The retail water agencies serving the WMA Plan Area include the City of Lompoc, Vandenberg Village CSD (VVCSD), Mission Hills CSD (MHCSD), American Water O&M, LLC – Vandenberg Air Force Base (VAFB),[23] Santa Rita Water Company, Tularosa Mutual Water Company, and Vista Hills Mutual Water Company. The wholesale water agency relevant to the Plan Area is the Central Coast Water Authority (CCWA), which delivers State Project Water to American Water O&M, LLC – VAFB. Each water agency relevant to the Plan Area is described below. Water district boundaries and regional water infrastructure are shown on **Figure 1d.2-3**, Water Agencies and Infrastructure.

1d.2-2-1 City of Lompoc

The City of Lompoc (City) provides potable water service through is Water Division of the Utilities Department (public water system 4210006). The City serves a population of 42,425 through 9,818 connections within a service area of approximately 4,690 acres or 7.3 square miles (City of Lompoc 2021; SWRCB 2021a). The water service area is defined by the city limits and includes residences located one mile south along Miguelito Canyon Road, the Lompoc Cemetery District, River Park, La Purisima Highlands,

23 The Base changed from "Air Force" to "Space Force" in May 2021. Unclear if American Water O&M has similarly updated the name of the water services. The Division of Drinking Water (DDW), State Water Resource Control Board (SWRCB) uses the "Air Force" name for this water system on the Safe Drinking Water Information System (SDWIS) website https://sdwis.waterboards.ca.gov/PDWW/ Accessed 2021-09-05.

Allen Hancock College, and Ken Adams Park (City of Lompoc 2021). The City relies on groundwater as the sole source of water supply (City of Lompoc 2021). The City's water system consists of ten municipal supply wells with a combined capacity of 32.5 acre feet per day (AFD)[24], a treatment plant with a capacity of 30.7 AFD[25], four storage reservoirs with a capacity of 30.7 to 33.8 acre-feet[26], a pump station, and 135 miles of distribution lines (City of Lompoc 2021; SWRCB 2021a). Population and water use in recent years is summarized in **Table 1d.2-2**.

Table 1d.2-2
City of Lompoc Annual Water Use

Calendar Year	Population	Upper Aquifer (AF)	State Water Project (AF)	Total Water (AF)	Daily Per Capita Use (GPDPC)
2020	42,425	4,103	0	4,103	86.1
2019	42,853	4,024	0	4,024	83.8
2018	42,689	4,255	0	4,255	89.0
2017	43,274	4,187	0	4,187	86.4
2016	43,537	4,095	0	4,095	83.7

Source: City of Lompoc (2021), US Census (2021)
Notes: AF = Acre-Feet; GPDPC = gallons per day per capita.

In addition, the City owns and operates the Lompoc Regional Wastewater Reclamation Plant (LRWRP), which treats wastewater for 53,494 municipal and industrial users from the City of Lompoc, VVCSD, and VSFB (City of Lompoc 2021). The LRWRP has an average dry weather flow capacity of 16.9 AFD, peak dry weather flow capacity of 29.2 AFD, and peak wet weather flow capacity of 46.0 AFD[27] (City of Lompoc 2021). A description of the City's Urban Water Management Plan (UWMP) and Groundwater Management Plan (GWMP) are provided in Section 1d.4-2, Management Plans.

24 Reported as 10.6 million gallons per day (MGD)
25 Reported as 10.0 MGD
26 Reported as 10 to 11 million gallons
27 Reported as 5.5 MGD average dry weather, 9.5 MGD peak dry weather, and 15 MGD peak wet weather

Figure 1d.2-3
Water Agencies and Infrastructure, Western Management Area

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1d.2-2-2 Vandenberg Village Community Services District

Vandenberg Village Community Services District (VVCSD) (public water system 4210017) provides potable water service to 2,556 connections and a population of 7,376 within the unincorporated community of Vandenberg Village (SWRCB 2021a). The VVCSD is a community services district organized under CA GOV §61000-61250.

VVCSD relies on groundwater as the sole source of supply (VVCSD 2005). VVCSD's water system consists of three municipal supply wells, five storage tanks with a capacity of 10.1 acre feet[28], three booster stations, two pressure reducing stations, a pressure filter treatment system, and 32 miles of distribution lines (VVCSD 2005, 2021). VVCSD water use for the years 2014 through 2018 ranged between 1,164 to 1,387 acre-feet per year (DWR 2019b).

For wastewater treatment, VVCSD has contractual entitlement to 2.73 AFD[29] of the LRWRP plant capacity (VVCSD 2016).

1d.2-2-3 Mission Hills Community Service District

Mission Hills Community Services District (MHCSD) (public water system 4210019) provides potable water service to 1,271 connections and a population of 3,560 within the unincorporated communities of Mission Hills and Mission Oaks (MHCSD 2021; SWRCB 2021a). The MHCSD is a community services district organized under CA GOV §61000-61250.

MHCSD relies on groundwater as the sole source of supply (MHCSD 2021; SWRCB 2021a). MHCSD's water system consists of three municipal supply wells, two storage tanks with a capacity of 5.5 acre feet[30], a treatment plant, and 27.5 miles of distribution lines (MHCSD 2021). MHCSD water use for the years 2014 through 2018 ranged between 464 and 591 acre-feet per year (DWR 2019b).

28 Reported as 3.3 million gallons
29 Reported as 0.89 MGD
30 Reported as 1.8 million gallons

In addition, MHCSD owns and operates a wastewater treatment system that consists of a headworks system, solid waste removal system, seven treatment ponds, and 30.5 miles of wastewater collection lines (MHCSD 2021).

1d.2-2-4 American Water O&E, LLC – Vandenberg Air Force Base

American Water O&M, LLC (American Water) owns and operates the water (public water system 4210700) and wastewater systems that serve VSFB (American Water 2021), formerly named Vandenberg Air Force Base. American Water provides potable water service to 1,161 connections and a population of 14,971 at VSFB (SWRCB 2021a). American Water relies on State Water Project (SWP) water purchased from CCWA with four groundwater wells in San Antonio basin as a backup to satisfy VSFB water demands (SWRCB 2021a). The VSFB water system consists of four municipal supply wells located in San Antonio groundwater basin, five pumping stations, 15 tanks, a water treatment plant, and over 142 miles of distribution lines (American Water 2021; SWRCB 2021a). Annual water use from 2014 through 2018 ranged from 1,830 to 2,460 acre-feet per year (DWR 2019b).

VSFB is a contract customer of the LRWRP for wastewater treatment. VSFB's contract is not to exceed an average of 4.0 AFD during dry weather flow, and 10.4 AFD during wet weather flow[31] (City of Lompoc 2016).

1d.2-2-5 Santa Rita Water Company

Santa Rita Water Company (public water system 4200822) provides potable water service to 18 connections and a population of 59. Santa Rita Water Company relies on groundwater from two extraction wells as the sole source of supply (SWRCB 2021a). Santa Rita Water Company water use from 2014 through 2018 ranged from 20.4 to 31.3 acre-feet per year (DWR 2019b).

1d.2-2-6 Vista Hills Mutual Water Company

Vista Hills Mutual Water Company (public water system 4200848) provides potable water service to 21 connections and a population of 75. Vista Hills MWC relies on groundwater from two extraction wells as

31 Reported as 1.3 MGD during dry weather flow, and 3.4 MGD

the sole source of supply (SWRCB 2021a). Vista Hills MWC water use from 2014 through 2018 ranged from 31.5 to 36.2 acre-feet per year (DWR 2019b).

1d.2-2-7 Tularosa Mutual Water Company

Tularosa Mutual Water Company (public water system 4200929) is a state small water system[32] with less than 15 service connections and a population of less than 25.

1d.2-2-8 Central Coast Water Authority

The Central Coast Water Authority (CCWA), public water system 4210030, is a wholesale supplier of urban water for thirteen (13) water agencies in Santa Barbara County (CCWA, 2021a). CCWA is a public entity organized under a joint exercise of powers agreement dated August 1, 1991, by the cities and special districts responsible for the creation and maintenance of water resources in portions of the North County, Santa Ynez Valley, and the South Coast areas of Santa Barbara County. The CCWA Board of Directors includes two SYRVGB GSA member agencies: City of Buellton (CMA GSA member agency) with a 2.21% vote, and Santa Ynez River Water Conservation District Improvement District #1 (EMA GSA member agency) with a 7.64% vote (CCWA 2021a).

CCWA owns and operates a water treatment plant and pipeline that delivers water primarily from the State Water Project (SWP) to project participants in Santa Barbara and San Luis Obispo counties. The distribution system consists of an approximate 130-mile-long pipeline (Coastal Branch Pipeline), treated water tanks at the water treatment plant, three interim storage facilities, one energy dissipation facility, nine turnouts, four isolation valve facilities, a chloramines removal and water pumping facility, and the Lake Cachuma inlet monitoring facility (CCWA 2021b). Major reservoirs and pipelines are shown on Figure 1d.2-3, Water Agencies and Infrastructure. In 2020, CCWA delivered 12,175 acre-feet to its clients out of a possible 43,886 acre-feet of water (CCWA, 2021a).

VSFB's full allocation of SWP water is 6,050 acre-feet per year (AFY), which includes a 550 AFY drought buffer to enhance the reliability of SWP water during shortages (CCWA 2020). In fiscal year 2020/21, VSFB requested 2,385 acre-feet (AF) of SWP water (CCWA 2020). Hydrogeologic Conceptual Model (HCM)

32 California Health and Safety Code Section 116275.

(Section 2a.3) includes time series graphs of CCWA imports to the Santa Ynez River basin and major water quality.

1d.2-2-9 Santa Ynez River Water Conservation District

The Santa Ynez River Water Conservation District (SYRWCD) was established by the Santa Barbara County Board of Supervisors in October of 1939 for the primary purpose "To protect water rights and conserve and augment the District's water supplies in an environmentally responsible manner for residential, agricultural and commercial uses." (SYRWCD 2021). The SYRWCD is a water conservation district organized under CWC §74000-76501.

The SYRWCD encompasses approximately 180,000 acres of the Santa Ynez River watershed from Lake Cachuma to where the Santa Ynez River discharges into the Pacific Ocean at Surf Beach (Stetson 2021). The SYRWCD receives its operating budget from ad valorem property taxes and charges levied on the production of groundwater from water-producing facilities within the SYRWCD boundary (Stetson 2021). The SYRWCD works with public agencies and landowners to maintain a balance of water resource allocations for all beneficial uses and users of water in the Basin. The SYRWCD does not serve potable water, including within the WMA.

1d.2-2-10 Santa Barbara County Water Agency

The Santa Barbara County Water Agency (SBCWA) is a special district that was established by the State Legislature in 1945 to control and conserve storm, flood, and other surface waters for beneficial use and to enter into contracts for water supply. As of February 1994, the SBCWA along with the Santa Barbara County Flood Control and Water Conservation District (SBCFCWCD) special district are organized under the Water Resources Division of the Public Works Department of the County of Santa Barbara. The SBCWA prepares investigations and reports on the County's water requirements, groundwater conditions, efficient use of water, and other water-supply-related technical studies, and manages a number of County-wide programs, including the Integrated Regional Water Management (IRWM) Program, the Regional Water Efficiency Program, and the winter cloud seeding program.

The Water Resources Division also administers the Cachuma Project and the Twitchell Dam Project contracts with Reclamation, holds the SWP water contract[33] with DWR, and participates in some of the County's GSAs.

[33] SBCFCWCD holds the contact with DWR for delivery of State Water Project (SWP) water. DWR (2021). Management of the California State Water Project.

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1d.3 WELL DENSITY

The SYRWCD maintains a registry of all water-producing facilities within its jurisdiction. Property owners must register any new water-producing facility within 30 days or be guilty of a misdemeanor (CWC Section 75640). **Table 1d.3-1** is a count of wells and the average density for each of the WMA subareas. **Figure 1d.3-1** shows the density distribution by square mile (section) for wells for agricultural use, **Figure 1d.3-2** shows the same for domestic wells, and **Figure 1d.3-3** shows the same for municipal wells.

Table 1d.3-1
Well Density by Water Use for WMA Subareas

WMA Subarea	Agriculture		Domestic		Municipal	
	Well Count	Average per Sq. Mile	Well Count	Average per Sq. Mile	Well Count	Average per Sq. Mile
Lompoc Plain	192	6.55	69	2.35	11	0.38
Lompoc Terrace	~~7~~-	-~~0.21~~	~~17~~-	-~~0.51~~	~~7~~-	-~~0.21~~
Lompoc Upland	-7	0.21-	-17	0.51-	-7	0.21-
Santa Rita Upland	25	2.25	23	2.07	-	-
Santa Ynez River Alluvium	37	4.81	14	1.82	-	-
Burton Mesa	-	-	-	-	-	-
Total	**261**	**1.95**	**123**	**0.92**	**18**	**0.13**

Source: Santa Ynez River Valley Water Conservation District

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Figure 1d.3-1
Registered Pumping Wells, Agricultural Use, Density by Section

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Figure 1d.3-2
Registered Pumping Wells, Domestic Use, Density by Section

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Figure 1d.3-3
Registered Pumping Wells, Municipal Use, Density by Section

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1d.4 WATER RESOURCES MONITORING AND MANAGEMENT PROGRAMS

1d.4-1 Water Resources Monitoring

Water resource monitoring including groundwater elevation monitoring, water quality, groundwater extraction, and stream flow and precipitation monitoring are introduced in this section. Additional information is provided in additional sections of this GSP, primarily the Groundwater Conditions (Section 2b) and the Monitoring Network (Section 3a) and Sustainable Management Criteria (Section 3b).

1d.4-1-1 Groundwater Elevation

Four groundwater elevation monitoring programs were identified in the WMA. Groundwater elevation or level data was used in the Groundwater Conditions (Section 2b), Monitoring Network (3a), and Sustainable Management Criteria (Section 3b).

Water level data is collected semi-annually by the SBCWA at wells throughout the WMA. This program formerly was run by the United States Geologic Survey (USGS). The United States Bureau of Reclamation collects monthly groundwater levels for wells within the alluvium of the Santa Ynez River as part of information operations of the Lake Cachuma Reservoir. The City of Lompoc and Vandenberg Village CSD collect groundwater levels for their own well networks. Both entities measure on a monthly basis.

1d.4-1-2 Groundwater Quality

Three sources of groundwater quality data were identified in the WMA. Groundwater quality data was used in the Groundwater Conditions (Section 2b), Monitoring Network (3a), and Sustainable Management Criteria (Section 3b).

The USGS collects water quality data at a set of wells, with monitoring occurring at annual to tri-annual frequencies. The USGS is funded for this work by the County of Santa Barbara and the SYRWCD.

The public water systems within the WMA report water quality data for public water sources including wells to the Division of Drinking Water for compliance with the Safe Drinking Water Act. The data is collected by individual public water systems including the WMA GSA member agencies: City of Lompoc, Vandenberg Village CSD, and Mission Hills CSD.

The Irrigated Lands Regulatory Program (ILRP) is a program of the State Water Resource Control Board that applies to commercial crop or pasture lands. Commercial farmers are required to submit the results of water quality testing in order to receive operating permits.

1d.4-1-3 Groundwater Extraction

Three sources of groundwater extraction data were identified for the WMA. Groundwater extraction data was used in developing the Water Budget (Section 2c) and the groundwater model.

The SYRWCD, in its role of managing and conserving groundwater as a Water Conservation District, collects reported production data for all wells within its jurisdiction on a semi-annual basis, and assesses a groundwater charge based on reported production. Not all wells are metered, and production may be estimated by water use factors that include crop type and acreage, household size, and livestock numbers.

The GSA member agencies of City of Lompoc and Vandenberg Village CSD, also monitor the daily pumping volume by well.

An additional source of groundwater pumping information is DWR's Water Use and Efficiency Branch which conducts a yearly survey of public water agencies used in updating the California Water[34] report (DWR 2019). These Public Water Systems Statistics Surveys generally provide monthly totals of water use by public water agency.

1d.4-1-4 Streamflow Monitoring

Streamflow monitoring is conducted by the USGS. Locations and volumes of current and historical monitoring are shown in the Groundwater Conditions (Section 2b).

[34] Previous version of this were published as DWR Bulletin 160.

1d.4-1-5 Precipitation Monitoring

There are three identified sources of precipitation monitoring within the area of the WMA. Precipitation data is discussed in more detail in the Hydrogeologic Conceptual Model (Section 2a).

The County of Santa Barbara operates a series of weather stations throughout Santa Barbara County including stations within the WMA. The National Oceanic and Atmospheric Administration (NOAA) operates a single weather station at Lompoc. The California Irrigation Management Information System (CIMIS), part of DWR's Water Use and Efficiency Branch operates the "Lompoc" and "Santa Ynez" stations.

1d.4-2 Management Plans

1d.4-2-1 City of Lompoc Urban Water Management Plan

The City of Lompoc (City) water supply management is outlined in its 2020 Urban Water Management Plan (UWMP) (City of Lompoc 2021). All urban water suppliers (as defined in CWC Section 10617), including the City of Lompoc, are required to prepare urban water management plans on a 5-year cycle.[35] Past City of Lompoc UWMPs were prepared in 1985, 1990, 1995, 2000, 2005, 2010, and 2016. UWMP describe existing and planned water supply sources, identify human and/or environmental threats to water reliability, outline how state-mandated water conservation targets will be net,[36] establish water shortage contingency plans, and assess whether their existing and future water supplies will be sufficient over a 20-year planning horizon. Projections of growth and land use in the service area along with drought scenarios are incorporated in the long-term water supply assessment. There are no entities considered to be agricultural water suppliers in the Basin and thus there are no agricultural water management plans relevant to the WMA Plan Area.[37]

The City provides upwards of approximately 4,100 AFY of potable water to customers for landscape, industrial, commercial/institutional, and residential use (City of Lompoc 2021). The largest water use

35 Per CWC Section 10617, an urban water supplier means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly, to more than 3,000 customers or supplying more than 3,000 AFY of water.

36 The Water Conservation Act of 2009 (SB X7-7) requires that the state reduce urban water consumption by 20% by the year 2020, as measured in gallons per capita per day.

37 Per CWC Section 10608.12(a), an agricultural water supplier means a water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding recycled water.

sector is residential, accounting for over 67% of all water deliveries (City of Lompoc 2016). The 2015 UWMP indicates the City's 2020 target for water conservation is 117 gallons per capita per day. The daily water use for 2020 was 86 gallons per capita per day indicating the City will meet or exceed the projected water use target by continuing their existing water conservation programs (City of Lompoc 2021).

The City's sole source of existing and planned water supply is groundwater. In 2015 the City pumped 4,222 AF of groundwater from the Basin (City of Lompoc 2021), in 2020 this amount decreased to 4,103 AF (City of Lompoc 2021). The annual volume of groundwater pumped by the City is projected to increase to 5,589 AF in 2025, and to 5,689 AF in 2035 (City of Lompoc 2021). The 2020 UWMP explores opportunities to increase the diversity, reliability, and resilience (drought-proofing) of the City's water supply portfolio including water transfers, desalination, and recycled water. The City currently has an agreement in place with MHCSD to provide water in the event of a water supply emergency, and the City, MHCSD, and VVCSD plan to explore opportunities in the future to connect the three water distribution systems to provide flexibility in delivering water between the agencies (City of Lompoc 2021). In addition, the City plans to investigate the feasibility of drilling deeper wells to access more water, and to utilize recycled water generated at the LRWRP for groundwater recharge upstream of the City's well field (City of Lompoc 2021).

1d.4-2-2 Central Coast Water Authority Urban Water Management Plan

Central Coast Water Authority (CCWA) water supply management is outlined in its 2020 UWMP (CCWA 2021). As a wholesale supplier of urban water, CCWA is required to prepare water management plans on a 5-year cycle.[38] Past CCWA UWMP were prepared in 2005, 2010, and 2016. CCWA supplies thirteen (13) water agencies in Santa Barbara County, and the CCWA UWMP follows this regional water supply perspective.

1d.4-2-3 City of Lompoc Groundwater Management Plan

In 1992, the State Legislature provided an opportunity for local groundwater management with the passage of AB 3030, the Groundwater Management Act (CWC Section 10750 et. seq. Part 2.75). Many basins developed groundwater management plans (GWMPs) to provide planned and coordinated

[38] Per CWC Section 10617, an urban water supplier means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly, to more than 3,000 customers or supplying more than 3,000 AFY of water.

monitoring, operation, and administration of groundwater basins with the goal of long-term groundwater resource sustainability. The Groundwater Management Act was first introduced in 1992 as AB 3030, and has since been modified by SB 1938 in 2002 and AB 359 in 2011. These significant pieces of legislation establish, among other things, specific procedures on how GWMPs are to be developed and adopted by local agencies.

The City of Lompoc adopted a GWMP under AB 3030 in 2013 (City of Lompoc 2013). The GWMP was prepared for the portions of the City's water service area overlying the Santa Ynez River Valley Groundwater Basin. The GWMP provided a review of current and projected groundwater conditions, defined an overall groundwater management goal and basin management objectives, and established a monitoring program for the ongoing management of groundwater in the Basin (City of Lompoc 2013). As of January 1, 2015, new or updated GWMPs cannot be adopted in medium and high priority basins; therefore, the 2013 GWMP will be superseded by this GSP.

1d.4-2-4 Santa Barbara County Integrated Regional Water Management Plan

The Santa Barbara County Integrated Regional Water Management (IRWM) Program began in 2005 following the passage of Proposition 50, the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002. Chapter 8 of Proposition 50 authorized the legislature to appropriate $500 million for IRWM planning, the intent of which was to encourage agencies to develop plans using regional water management strategies for water resources and to develop projects using these IRWM strategies to protect communities from drought, protect and improve water quality, and improve local water security by reducing dependence on imported water. The County IRWM program developed and then adopted its first IRWM plan in 2007, and under Proposition 50 received $25 million for 14 countywide projects. The County IRWM Plan was updated under the Proposition 84 Guidelines in 2013, and received 5.7 million for 13 countywide projects.

The City of Lompoc is a disadvantaged community (DAC) (DWR 2021), and DACs in the WMA are discussed in Section 1d.6-1. In 2018, the region was awarded almost $900,000 in direct funds to DACs, and the region applied for further implementation funds (up to $6.3 million) in spring 2019.

In July 2019, another update to the IRWM Plan was prepared to ensure that the County remains eligible for funding under the Proposition 1 Guidelines (County of Santa Barbara 2019a). The Proposition 1 IRWM Grant Program provides funding for projects that help meet the long-term water needs of the state, including the need to decrease reliance on imported water sources, increase infrastructure resilience to the impacts of climate change, and locally manage and prioritize watershed resources and water infrastructure projects. This 2019 Update focused on improving the previous IRWM Plan and incorporating the outcome of the SGMA and the formation of groundwater sustainability agencies (County of Santa Barbara 2019a). The IRWM Plan region encompasses all of Santa Barbara County. IRWM grants are discussed in Section 5c as potential funding for GSP implementation and proposed project and management actions.

1d.4-2-5 Storm Water and Sewer System Management Plans

In 2008, the City of Lompoc created a Storm Water Management Program to ensure that water quality from stormwater and storm events does not act of a source of pollution to nearby water bodies (City of Lompoc 2008). Additionally, in 2018, the County of Santa Barbara produced a County-Wide Integrated Stormwater Resource Plan which identified and evaluated water quality priorities for each watershed based on waterbodies with current water quality regulatory actions and the pollutant generating activities in each watershed (Geosyntec 2018).

Additionally, the City of Lompoc prepares a Sewer System Management Plan to properly manage, operate, and maintain all parts of the sanitary sewer system to reduce and prevent sanitary sewer overflows (City of Lompoc 2014c).

1d.5 REGULATORY PROGRAMS

1d.5-1 Porter-Cologne Water Quality Control Act and Clean Water Act Permitting

The Porter-Cologne Water Quality Control Act of 1969 (Porter-Cologne Act; codified in CWC Section 13000 et seq.) is the primary state water quality control law for California. Whereas the federal Clean Water Act applies to all waters of the United States, the Porter-Cologne Act applies to waters of the state, which includes isolated wetlands and groundwater in addition to federal waters. The Porter-Cologne Act is implemented by the California State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs). In addition to other regulatory responsibilities, the RWQCBs have the authority to conduct, order, and oversee investigation and cleanup where discharges or threatened discharges of waste to waters of the state could cause pollution or nuisance, including impacts to public health and the environment. The Santa Ynez River Valley Groundwater Basin (Basin or SYRVGB) is located in the southern part of the Central Coast Region (RWQCB Region 3) and within the Santa Ynez Hydrologic Unit, based on the RWQCB Water Quality Control Plan for the Central Coastal Basin (Central Coast Basin Plan; RWQCB 2019). These statutes are relevant to the GSP in that they regulate the quality of point-source discharges (e.g., wastewater treatment plant effluent, industrial discharges, and on-site wastewater treatment systems (OWTSs) and non-point source discharges (e.g., stormwater runoff) to the underlying aquifer).

The Central Coast Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the Central Coast Basin Plan (CWC Sections 13240–13247). The Porter-Cologne Act provides the RWQCBs with authority to include in their Basin Plans water discharge prohibitions applicable to particular conditions, areas, or types of waste. The Central Coast Basin Plan is continually being updated to include amendments related to implementation of total maximum daily loads, revisions of programs and policies within the RWQCB Central Coast Region, and changes to beneficial use designations and associated water quality objectives. The beneficial uses for groundwater are identified in the Central Coast Basin Plan as being suitable for agricultural water supply, municipal and domestic water supply, and industrial use (RWQCB 2019). Unlike beneficial uses of surface water (which vary based on individual surface water), the RWQCB designates the same beneficial uses for all DWR-designated groundwater basins throughout the Central Coast Region.

The Central Coast Basin Plan defines water quality objectives for groundwater generally for taste, odors, and radioactivity, and for specific beneficial uses e.g., municipal/domestic supply and agricultural supply). The water quality objectives for municipal/domestic supply are the same as primary drinking water standards (e.g., maximum contaminant levels) found in Title 22 of the California Code of Regulations. For agricultural uses of groundwater, the Central Coast Basin Plan provides water quality objectives consisting of maximum concentrations for various inorganic chemicals (including certain metals and nitrate) and guidelines for various physical and general mineral properties (Tables 3-1 and 3-2 in RWQCB 2019). The Central Coast Basin Plan defines additional objectives for select constituents specific to certain groundwater basins, including the SYRVGB (RWQCB 2019). **Table 1d.5-1** provides the median groundwater objectives for the Basin as defined in the Central Coast Basin Plan.

Table 1d.5-1
Median Groundwater Objectives for the Santa Ynez River Valley Groundwater Basin

Sub-Area	TDS	Chloride	Sulfate	Boron	Sodium	Total Nitrogen
Santa Ynez	600	50	10	0.5	20	1
Santa Rita	1,500	150	700	0.5	100	1
Lompoc Plain	1,250	250	500	0.5	250	2
Lompoc Upland	600	150	100	0.5	100	2
Lompoc Terrace	750	210	100	0.3	130	1

Source: RWQCB 2019.

Notes: All values in milligrams per liter (mg/L); TDS = total dissolved solids. Extents and boundaries of Santa Rita and Santa Ynez sub-areas extents are not rigorously defined. Santa Ynez likely means Solvang and east (EMA). Santa Rita likely applies to the Santa Rita Upland (WMA) and Buellton Upland (CMA).

It should be noted that the Central Coast Basin Plan addresses inland waters, coastal waters (enclosed bays, estuaries, and coastal lagoons), and groundwater, whereas the Water Quality Control Plan for Ocean Waters of California (Ocean Plan; SWRCB 2019) establishes beneficial uses and water quality objectives for waters of the Pacific Ocean. Also, the Ocean Plan prescribes effluent quality requirements and management principles for waste discharges and specifies certain waste discharge prohibitions. The Ocean Plan also provides that the SWRCB shall designate Areas of Special Biological Significance and requires wastes to be discharged a sufficient distance from these areas to assure maintenance of natural water quality conditions (SWRCB 2019). The Vandenberg State Marine Reserve, established by the California Department of Fish and Wildlife in September 2007, is an approximately 32.9 square mile Marine Protected Area adjacent to the Basin that extends just beyond Rocky Point to the south, to near Purisima Point to the north, and up to approximately 3.75 miles offshore from the mean high tide line (CDFW 2016). The recreational and/or commercial take of all marine resources is prohibited within the Vandenberg State Marine Reserve. There are no Areas of Special Biological Significance, as identified by the SWRCB, in or adjacent to the Basin.

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

The NPDES and WDR programs regulate construction, municipal, and industrial stormwater and non-stormwater discharges under the requirements of the Clean Water Act of 1972 and the Porter-Cologne Act, respectively. The construction and industrial stormwater programs are administered by the SWRCB, whereas individual WDRs, low-threat waivers, and other Basin-specific programs are administered by the Central Coast RWQCB. Programs and policies that have particular relevance to the Basin include the following:

1. **Stormwater General Permits** (Construction and Industrial General Permits). SWRCB and the Central Coast RWQCB administer a number of general permits that are intended to regulate activities that collectively represent similar threats to water quality across the state and thus can appropriately be held to similar water quality standards and pollution prevention BMPs.

Construction projects more than one acre in size are regulated under the statewide Construction General Permit and are required to develop and implement a stormwater pollution prevention plan. Similarly, industrial sites are also required to develop a stormwater pollution prevention plan that identifies and implements BMPs necessary to address all actual and potential pollutants of concern. There are currently 16 entities within the Basin subject to an industrial stormwater pollution prevention plan based on a review of industrial storm water reports submitted to the SWRCB (SWRCB 2021b). Eleven (11) of the 16 entities are located in the WMA. These entities include Sentinel Peak Resources California LLC, Lompoc Oil & Gas Plant, Lompoc City Landfill, CalPortland Construction, Foley Estates Vineyard and Winery, Lompoc Regional Wastewater Reclamation Plant, Imerys Filtration Minerals, Inc., Vandenberg Space Force Base, Harris Corporation Spaceport Systems, United Launch Alliance, and United Launch Alliance Atlas V (SWRCB 2021b).

2. **Irrigated Lands Regulatory Program**. Water discharges from agricultural operations include irrigation runoff, flows from tile drains, irrigation return flows, and stormwater runoff. These discharges can affect water quality by transporting pollutants, including pesticides, sediment, nutrients, salts (including selenium and boron), pathogens, and heavy metals, from cultivated fields into surface waters and/or groundwater. To prevent agricultural discharges from impairing the waters that receive these discharges, the Irrigated Lands Regulatory Program (ILRP) regulates discharges from irrigated agricultural lands. Regulation by ILRP is accomplished by issuing WDRs or conditional waivers of WDRs to growers. These orders contain conditions requiring water quality monitoring of receiving waters and corrective actions when impairments are found. Through a series of events related to the passage of SB 390 (Alpert), the ILRP originated in 2003. Initially, the ILRP was developed for the Central Valley RWQCB. As the Central Valley RWQCB ILRP progressed, a groundwater quality element was added to the filing requirement for agricultural lands that had previously been subjected to only surface water discharge concerns. To date, the different RWQCBs are in different stages of implementing the ILRP. The Central Coast RWQCB has a conditional waiver program for irrigated agricultural lands throughout the region, focusing on priority water quality issues such as pesticides and toxicity, nutrients, and sediments—especially nitrate impacts to drinking water sources. There are a number of enrollees to the program within the Basin (SWRCB 2021c).

3. **On-site Wastewater Treatment Systems Requirements**. Requirements for the siting, design, operation, maintenance, and management of on-site wastewater treatment systems (OWTS) are specified in the SWRCB's OWTS Policy (SWRCB 2018). The OWTS policy sets forth a tiered implementation program with requirements based upon levels (tiers) of potential threat to water quality. The OWTS policy includes a conditional waiver for on-site systems that comply with the policy. Since 1991, on-site sewage disposal systems in the County have been regulated by the County Public Health Department, Environmental Health Services Division. Santa Barbara County regulations for on-site sewage disposal systems are contained in Article I, Chapter 18C of the County Code, which was most recently updated in 2015. These regulations set forth specific requirements related to (1) permitting and inspection of on-site systems; (2) septic tank design and construction; (3) drywell and disposal field requirements; and (4) servicing, inspection, reporting, and upgrade requirements. Standards pertaining to system sizing and construction are contained in the California (Uniform) Plumbing Code. Additional requirements for on-site sewage disposal systems in the County are adopted as part of community plans or as project-specific mitigation measures or conditions applied to development proposals lying within a designated "Special Problem Area" of the County. The Central Coast RWQCB approved the County's Local Agency Management Program, developed by Environmental Health Services with local stakeholders, on November 20, 2015, and it became fully effective January 1, 2016.

4. **Individual Waste Discharge Requirements**. Individual Waste Discharge Requirements (WDRs) are required for point source discharges to land not otherwise covered under a general permit program or conditional waiver. The purpose of individual WDRs is to define discharge prohibitions, effluent limitations, and other water quality criteria necessary to ensure discharges do not result in exceedances of Central Coast Basin Plan objectives for receiving waters, including groundwater. There are 74 individual active WDRs in the Basin, 18 of which are located within the WMA. Of the 18 active WDRs in the WMA, eight are associated with private agricultural operations (e.g., vineyards), seven are for facilities at VSFB, and three are issued to wastewater treatment facilities (SWRCB 2021c). The three wastewater treatment facilities are the Lompoc Regional Wastewater Reclamation Plant (WDR Order No. 2016-0068-DDW, NPDES Permit CA0048127), Mission Hills La Purisima Wastewater Treatment Plant (WDR Order No. R3-2019-0042), and Lompoc Correctional Facility Wastewater Treatment Plant (WDR Order No. 98-09)

(SWRCB 2021c). These facilities are subject to a monitoring and reporting program which requires regular sampling of influent, effluent and receiving waters to verify that the facilities are meeting applicable water quality standards (e.g., the Ocean Plan). Required submittals under the WDR/NPDES permits include a variety of monitoring, inspection, and technical reports that are submitted monthly and annually to the Central Coast RWQCB, and requirements for reporting and rectifying emergency/unplanned discharges (e.g., sanitary sewer overflows).

Implementation of this WMA GSP would not affect the applicability or implementation of the regulatory programs discussed above. Continued implementation of Porter-Cologne Act and the Clean Water Act permitting would advance the GSP's sustainability goals related to water quality. The County requires new development and redevelopment projects proposed within the Basin to comply with NPDES permits, WDRs, and OWTS requirements as part of its permitting and approval process. These programs will continue to provide benefits to water quality by requiring both point and non-point discharges to comply with Central Coast Basin Plan water quality objectives and to be protective of Central Coast Basin Plan beneficial uses throughout SGMA's planning and implementation horizon. In addition, the application of stormwater permits means specific performance standards for capture and infiltration of stormwater runoff would be implemented, where applicable, providing opportunities for enhanced recharge of the Basin.

1d.5-1-1 Beneficial Uses and Users

The beneficial uses for groundwater identified in the Central Coast Basin Plan include municipal and domestic supply (MUN), agricultural supply (AGR), industrial process supply (PROC), and industrial service supply (IND) (RWQCB 2019). The beneficial uses and users in the WMA Plan Area include, but are not limited to, the following: (1) holders of overlying groundwater rights; (2) municipal, domestic and agricultural well operators; (3) public water systems; (4) local land use planning agencies; (5) environmental users of groundwater; (6) surface water users; (7) federal government; (8) disadvantaged communities; and (9) entities listed in SGMA (CWC Section 10927) that are monitoring groundwater elevations in all or part of the WMA managed by the GSA. Of the beneficial uses and users listed, the municipal and agricultural sectors are the primary groundwater users in the WMA Plan Area. Private groundwater well owners who extract less than 2 AFY are considered de minimis users under SGMA.[39]

1d.5-2 Groundwater Well Permitting

Statewide standards for the construction, repair, reconstruction, or destruction of wells are found in DWR Bulletin 74-81 and 74-90 (California Well Standards) (DWR 1981 and 1991). The California Well Standards include requirements to avoid sources of contamination or cross-contamination, proper sealing of the upper annular space (first 50 feet), disinfection of the well following construction work, use of appropriate casing material, and other requirements. In October 2017, Governor Brown signed SB 252, which became effective on January 1, 2018. SB 252 requires well permit applicants in critically overdrafted basins to include information about the proposed well, such as location, depth, and pumping capacity. The bill also requires the permitting agency to make the information easily accessible to the public and the GSAs. The WMA Basin is not designated as critically overdrafted (DWR ~~2016~~2016a).

Within unincorporated Santa Barbara County the construction, modification, inactivation and destruction of water wells is subject to Chapter 34A of the Code of Ordinances, included as **Appendix 1d-C**. This defines additional local well construction requirements and permit procedure for the well itself. Depending on planned use and the zoned Land Use (see Section 1d.6 and Figure 1d.6-1), an additional land use permit may be required under Chapter 35.

The City of Lompoc is the only incorporated city within the WMA. Well permitting within the City of Lompoc follows 8.24 of Lompoc Municipal Code included as **Appendix 1d-D**. City of Lompoc generally prohibits all wells except for commercial agricultural wells, which are required to follow the statewide standards.

The Santa Barbara County Environmental Health Services issues groundwater well permits in the Basin. The Santa Barbara County Environmental Health Services notifies water agencies in the Basin of newly permitted wells in the Basin. Well owners within the boundaries of the Santa Ynez River Water

39 CWC Section 10721(e) "De minimis extractor" means a person who extracts, for domestic purposes, two acre-feet or less per year.

Conservation District must register their new and existing wells regardless of whether the well is operational or not.

Additionally, water wells drilled within the Coastal Zone qualify as "development" pursuant to Coastal Act Section 30106, and thus require a Coastal Development Permit (CDP), either from the County or the California Coastal Commission. The County adopted a Local Coastal Program (LCP) in 1982 and gained permitting authority within the Coastal Zone at that time. However, the Commission retains permitting authority within certain specified areas, including tidelands, submerged lands, and public trust lands. The Commission also retains appeal jurisdiction throughout many areas in the Coastal Zone, including Environmentally Sensitive Habitat Areas (ESHAs) and areas within 100 feet of any stream, wetland, or other waterway. Therefore, a CDP from the County must be obtained for wells located within the certified LCP jurisdiction. A CDP from the Commission must be obtained for wells located within their retained jurisdiction. Both the County and the Commission maintain land use maps that delineate their respective jurisdictions. Since the policies of the Coastal Act are incorporated into the County LCP, the development standards applied to new wells are similar regardless of which agency is issuing the CDP. Namely, Coastal Act Section 30231 states (emphasis added):

> The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, **preventing depletion of ground water supplies and substantial interference with surface waterflow**, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

The County LCP also contains the following policies:

> **Policy 2-2**: The long-term integrity of groundwater basins or sub-basins located wholly within the coastal zone shall be protected. To this end, the safe yield as determined by competent hydrologic evidence of such a groundwater basin or sub-basin shall not be exceeded except on a temporary basis as part of a conjunctive use or other program managed by the appropriate water district. If the safe yield of a groundwater basin or sub-basin is found to be exceeded for reasons other than a conjunctive use program, new development,

including land division and other use dependent upon private wells, shall not be permitted if the net increase in water demand for the development causes basin safe yield to be exceeded, but in no case shall any existing lawful parcel be denied development of one single family residence. This policy shall not apply to appropriators or overlying property owners who wish to develop their property using water to which they are legally entitled pursuant to an adjudication of their water rights.

Policy 2-3: In the furtherance of better water management, the County may require applicants to install meters on private wells and to maintain records of well extractions for use by the appropriate water district.

1d.5-3 Title 22 Drinking Water Program

The SWRCB Division of Drinking Water (DDW) regulates public water systems in the state to ensure the delivery of safe drinking water to the public. A public water system is defined as a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year. All six water companies in the WMA Plan Area are classified as public water systems (SWRCB 2021a). Private domestic wells, wells associated with drinking water systems with less than 15 residential service connections, industrial wells, and irrigation wells are not regulated by DDW. Single-parcel and multiple parcel/state small water systems are regulated by the County. DDW enforces the monitoring requirements established in Title 22 of the California Code of Regulations (CCR) for public water system wells, and all the data collected must be reported to DDW. Title 22 also designates the maximum contaminate levels (MCLs) for various waterborne contaminants, including volatile organic compounds, non-volatile synthetic organic compounds, inorganic chemicals, radionuclides, disinfection byproducts, general physical constituents, and other parameters. Water quality compliance monitoring of all source water is required every 12 to 108 months (1 to 6 years) depending on the constituent. For example, nitrate as nitrogen shall be tested for every 12 months, whereas gross alpha (radiological) is required to be tested for every 108 months. Additionally, public water systems are required to submit annual consumer confidence reports that detail the water quality testing results. Similarly, the County enforces the monitoring requirement established in Title 22 for single-parcel and multiple-parcel/state small water systems. Small water systems are required to complete water source yield and quality testing as part of the permit application process, and water quality testing at regular defined intervals upon receipt of an approved permit.

1d.5-4 Water Supply Planning and Water Use Efficiency

Over the years, California has passed a series of Senate Bills (SB), including SB X7-7, SB 610, SB 221, SB 1262, and most recently SB 606, that together outline the regulatory framework for water conservation and water supply planning, and for considering issues of water availability in the environmental and permitting process for land use plans, projects, and subdivisions. These bills have been codified in the CWC Sections 10608–10609.42, which establish water use and demand reduction targets; Sections 10610–10657, which address UWMPs; and Sections 10910–10914, which address water supply assessments, and California Government Code Section 66473.7 (part of the Subdivision Map Act of 1893), which contains requirements related to written verifications (e.g., “will-serve” letters). Collectively, these laws, along with the California Environmental Quality Act (CEQA) of 1970, prompt cities, counties, special districts, and water suppliers to evaluate growth in a broader geographic and temporal context, by coordinating land use planning with water availability and sustainability. SB 1262, which became effective in 2017, made changes to existing law to integrate to some extent existing law governing written verifications and water supply assessments with the passage of SGMA. The sections of the California Water Code (CWC) addressing water supply now contain several provisions relating specifically to groundwater, which if used wholly or in part to supply a project or subdivision, triggers additional analytical steps that could expand the necessary scope of a CEQA document, water supply assessment, and/or written verification, as applicable. SB 1262 added language in the subdivision map act clarifying additional considerations when part or all of the water supply comes from groundwater, especially in adjudicated basins, basins in critical overdraft, and/or basins designated as high or medium priority pursuant to SGMA. In addition to incorporating information from UWMPs, water supply assessments may incorporate relevant information from GSPs prepared pursuant to SGMA.

AB 1668 and SB 606, passed in May 2018, would require the SWRCB, in coordination with DWR, to adopt long-term standards for the efficient use of water, as provided, and performance measures for commercial, industrial, and institutional water use on or before June 30, 2022. The bill, among other things, establishes a standard for indoor water use of 55 gallons per capita daily to be reached by 2025, 52.5 gallons per capita daily beginning in 2025, decreasing to 50 gallons per capita daily beginning in 2030, or as determined jointly by DWR and SWRCB in accordance with necessary studies and investigations. DWR will also adopt long-term standards for outdoor residential water use and outdoor irrigation in connection with commercial, industrial, and institutional water use. With the 20% by 2020 conservation goal pursued in the Water Conservation Act of 2009, these bills extend UWMP requirements, but will measure compliance with uniform standards based on the aggregate amount of water that would have been delivered the previous year by an urban retail water supplier if all that water had been used efficiently (rather than relative to a water district's baseline). The legislation has a variance process available to allow for exceptions in special circumstances approved by DWR. AB 1668 continues the requirements for urban water suppliers to submit UWMPs every 5 years (though in years ending in 6 and 1 instead of 0 and 5), and makes water suppliers ineligible for any water grant or loan if it does not submit a UWMP. The bills also add requirements for agricultural water management.

1d.5-5 Operational Flexibility and Conjunctive Management Considerations

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

Water purveyors in the WMA Plan Area rely primarily on groundwater. American Water O&M, LLC – VAFB is the only water agency in the Plan Area that receives SWP water. Because of the significant reliance on groundwater, it is of utmost importance that local groundwater is sustainably managed. With the passage of SGMA and the sustainable management criteria established in this GSP (Chapter 3), once adopted, minimum thresholds and measurable objectives may be established for each sustainability indicator to avoid undesirable results and mitigate potential effects to beneficial uses and users of groundwater in the Basin.

"Conjunctive management or conjunctive use refers to the coordinated and planned use and management of both surface water and groundwater resources to maximize the availability and reliability of water supplies in a region to meet various management objectives" (DWR 2016b). Conjunctive use is the coordination of surface and groundwater use, and envisioned projects within the WMA rely on the Santa Ynez River managed by the SRWCB in accordance with WR 73-37 and subsequent orders (SBCWA 1977). Conjunctive use[40] operations are a consideration of the SWRCB in managing the Santa Ynez River and consist of releases from either or both of the two surface water right accounts (see Section 1d.5-6) and Fish Reserve Account (CCRB 2002). This program has the goals of flow-related improvements to the Santa Ynez River and riparian zone including year-round habitat for the endangered steelhead (*O. mykiss*) (SYRTAC 2000).

1d.5-6 Water Rights Agreements and Environmental Regulations

State water rights and environmental regulations, to a large extent, control the operations of Cachuma Reservoir (Lake Cachuma), the flow in the Santa Ynez River below Bradbury Dam, and storage of water within the Santa Ynez Alluvial Subarea. Bradbury Dam, which impounds water on the Santa Ynez River forming Lake Cachuma, was constructed by the U.S. Bureau of Reclamation (Reclamation) in 1953 to provide a reliable water source for Cachuma Project Member Units including Santa Ynez River Water Conservation District – Improvement District #No. 1, Goleta Water District, the City of Santa Barbara, Montecito Water District, and Carpinteria Valley Water District. In addition, water from Lake Cachuma is released to satisfy downstream users on the lower Santa Ynez River with senior water rights to surface water and to recharge the Santa Ynez River Valley Groundwater Basin (Basin or SYRVGB). Releases from Lake Cachuma are governed by two water accounts, the Above Narrows Account and Below Narrows Account, which accrue credits (acre-feet of water) that can be used to provide water to downstream users. Releases from the Above Narrows Account are made to benefit downstream water users between Bradbury Dam and the Lompoc Narrows. Releases from the Below Narrows Account are conveyed to the Narrows for the benefit of water users in the Lompoc Plain subarea (Stetson 2021).

40 23 CCR § 354.8 (e) A description of conjunctive use programs in the basin.

Reclamation currently owns and operates Bradbury Dam in accordance with permits and water rights orders issued by the SWRCB. In 1958, water rights Permits 11308 and 11310 were issued to Reclamation to store water from the Santa Ynez River. The permits were later modified following a series of hearings and revised orders (Orders WR 73-37 and WR 89-18) to address the volume and timing of water releases from Lake Cachuma to satisfy downstream water rights. In 1987, the California Sportfishing Protection Alliance filed a complaint with the SWRCB against Reclamation alleging Cachuma Project operations were adversely impacting federally listed endangered anadromous steelhead trout (*Oncorhynchus mykiss, O. mykiss*) in the lower Santa Ynez River. In response to the allegation and as required by SWRCB WR 94-5, Reclamation prepared, with direction from SWRCB as lead agency under CEQA, a draft Environmental Impact Report (EIR) that evaluated measures needed to protect the steelhead fishery. The National Marine Fisheries Service (NMFS) simultaneously completed a Biological Opinion (NMFS 2000) pursuant to Section 7 of the Federal Endangered Species Act of 1973 for the Reclamation's operation and maintenance of Bradbury Dam. In 2011, the SWRCB released a final EIR (SWRCB 2011), and subsequently certified the final EIR. The SWRCB subsequently issued WR 2019-0148 based on the findings of the final EIR which requires Reclamation to provide higher flows in the lower Santa Ynez River during above normal and wet water years, and to provide flows equivalent to those required under the Biological Opinion in all other water year types. In addition, WR 2019-0148 requires Reclamation to study the feasibility of additional measures that may be necessary to restore the steelhead fishery to good condition, including fish passage around Bradbury Dam and habitat restoration in the upper Santa Ynez River and its tributaries where the majority of historical spawning and rearing habitat exist. WR 2019-0148 is the latest water rights order issued to Reclamation. Studies that may result in additional amendments to the original water rights permits are ongoing.

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1d.6 LAND USE CONSIDERATIONS

The following section presents a review of population data and land use characteristics for the WMA Plan Area, including the various land use plans and their applicability to groundwater resource management. State law requires that all cities and counties adopt a comprehensive, long-term general plan that outlines physical development for the county or city. The general plan must cover a local jurisdiction's entire planning area so that it can adequately address the broad range of issues associated with the city or county's development. Ultimately, the general plan expresses the community's development goals and embodies public policy relative to the distribution of future public and private land uses. The general plan may be adopted as a single document or as a group of documents relating to subjects or geographic segments of the planning area.

Most of the planning documents relevant to the WMA Plan Area fall under the umbrella of the Santa Barbara County Comprehensive Plan (Comprehensive Plan), which is a "living document" made up of many parts that are periodically updated by the County's Department of Planning and Development. The core structure of the document is to have broad countywide land use policies that are refined in various community plans—the local setting, policy issues, and community concerns are taken into account through a public participation process. Land use plans within the California Coastal Zone must also be consistent with California Coastal Act of 1976 requirements and submitted to the California Coastal Commission (Commission) for review and approval. Planning departments along California's coastline, including the County of Santa Barbara, establish local coastal programs for this purpose. When a local coastal program is approved by the Commission, the Commission's coastal permitting authority over most new development is transferred to the local government, which applies the requirements of the local coastal program in reviewing proposed new developments. All elements of a general plan, whether mandatory or optional—including community plan principles, goals, objectives, policies, and plan proposals—must be internally consistent with each other and all elements have equal legal status (i.e., no element is legally subordinate to another).

The development and implementation of this GSP is relevant to several general plan and community plan elements because each contain policies and implementation actions that are intended to be protective of water resources. All applicable land use plans acknowledge the major constraints on growth that the lack of water availability presents. The County's general plans broadly encourage water conservation, and prohibit development, such as tentative map and subdivision approvals, unless the availability of water can be demonstrated. Several plan elements intersect, including the Conservation Element, the Environmental Resource Management Element, and the Groundwater Resources Element, and contain policies specifically aimed at water resources and groundwater sustainability.

In a few cases, identified below, the passage of SGMA and the adoption of this GSP may supersede some of the land use plan policies or underlying assumptions within them. Where this occurs, it is expected that future general plan and community plan updates, and/or updates to general plan theoretical buildout estimate, will consider the sustainability goals, sustainable management criteria, and the projects and management actions of this GSP, resulting in revisions to relevant land use plan elements.

1d.6-1 Land Use and Population

The primary developed land uses in the Plan Area consist of residential, commercial, and agricultural uses (**Figure 1d.6-1**, Land Use). Miscellaneous land is the single largest land use type comprising approximately 50% of the entire Plan Area. These parcels consist primarily of undeveloped land at VSFB and are characterized by natural hillsides and lowlands vegetated with native chaparral and scattered oak and eucalyptus trees. **Table 1d.6-1** presents a summary of land uses in the Plan Area.

Figure 1d.6-1

Land Use, Western Management Area

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Table 1d.6-1
Summary of Land Use in the WMA Plan Area

Land Use	Number of Parcels	Area (Acres)	Percent of Total
Agricultural	350	27,926.6	32.6%
Commercial	500	2,955.1	3.5%
Highways and Streets[a]	56	1,955.5	2.3%
Industrial	134	107.3	0.1%
Institutional	91	364.5	0.4%
Miscellaneous[b]	60	42,474.3	49.6%
Multi-Family Residential	2,144	452.7	0.5%
Recreational	47	1,740.6	2.0%
Single-Family Residential	11,888	5,972.2	7.0%
Undefined[c]	44	83.4	0.1%
Utilities/Right-of-Ways	128	677.5	0.8%
Vacant	246	885.8	1.0%
Total	**15,688**	**85,595.5**	**100%**

Source: Santa Barbara County 2019 parcel GIS data layer.
Notes:
a Includes road right-of-ways and areas not included in the parcel data layer.
b Consists primarily of undeveloped land at Vandenberg Space Force Base.
c Consists of parcels where land use type has not been defined. Based on a review of aerial imagery, it appears these parcels are primarily residential and commercial.

There are several sources of population data for the Plan Area, most of which are derived from decennial census counts, which last occurred in 2010.[41] Sources of population information are as follows:

- **U.S. Census Bureau:** The U.S. Census Bureau conducts a census count every 10 years. Census data are gathered by tracts, blocks, and census-designated places. Census blocks were intersected with the WMA boundary to determine the population within the Plan Area for 2010. Census blocks that intersected the boundary of the WMA were area-weighted to determine the population that falls within the Plan Area.
- **City and County General Plans**: The City of Lompoc (City) and the County of Santa Barbara (County) gather data on development, growth, and land use patterns, and make population estimates in conjunction with census data. The general plans relevant to the Plan Area were

41 Results from the 2020 census were unavailable at the time of writing this GSP.

reviewed for historical and current population data including the Housing Elements (City of Lompoc 2014, County of Santa Barbara 2015).

- **Santa Barbara County Association of Governments**: Santa Barbara County Association of Governments (SBCAG) is a regional planning agency comprised of the County and eight incorporated cities within the County. The SBCAG produces demographics data and growth forecasts for the County which were reviewed and used to forecast population growth within the Plan Area.

On a countywide level, population growth is associated primarily with the growth of incorporated cities. Between 2000 and 2010, the cities of Buellton, Guadalupe, and Santa Maria experienced significant population increases upwards of 29% while population change within the unincorporated areas of the County was 0% (SBCAG 2012). In 2010, the total population of the County was 423,800. By 2040, the total population of the County is forecast to be 519,965, an increase of 96,165 or approximately 23% from 2010 (SBCAG 2012).

Based on U.S. Census Bureau data, the population of the Plan Area in 2010 was approximately 56,407. As shown in **Table 1d.6-2**, the population of the Plan Area is concentrated in the City of Lompoc, Mission Hills, Vandenberg Village, and Vandenberg Space Force Base (SFB). The City of Lompoc alone accounted for approximately 75% of the Plan Area population in 2010. Using the regional forecast growth rate for each 5-year period for 2010 to 2040, the population of the Plan Area is projected to be approximately 69,000 by the year 2040 (Table 1d.6-2). **Figure 1d.6-2** shows the population density throughout the Plan Area.

Figure 1d.6-2

Population Density, Western Management Area

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Table 1d.6-2
Past, Current, and Projected Population for Santa Barbara County, City of Lompoc, Unincorporated Communities, and WMA Plan Area

Area	Population						
	2010	*2015*	*2020*	*2025*	*2030*	*2035*	*2040*
County	423,800	428,614	445,891	470,445	495,000	507,482	519,965
City of Lompoc	42,434	42,916	44,646	47,104	49,563	50,813	52,063
Mission Hills	3,576	3,617	3,762	3,970	4,177	4,282	4,387
Vandenberg Village	6,497	6,571	6,836	7,212	7,589	7,780	7,971
Vandenberg Space Force Base	3,338	3,376	3,512	3,705	3,899	3,997	4,095
Plan Area	56,407	57,048	59,347	62,615	65,884	67,545	69,206

Source: SBCAG 2012 and 2013; 2010 U.S. Census Bureau GIS data layer.
Notes: 2015 to 2040 population of City of Lompoc, Mission Hills, Vandenberg Village, Vandenberg Space Force Base, and Plan Area estimated based on County growth forecast for same period.

As defined in California Health and Safety Code, Section 116275, disadvantaged communities (DAC) are Census geographies having less than 80% of the statewide annual median household income~~. Based on 2018 DAC mapping at the Census Block Group level, approximately 27% (23,512.1 acres) of the Plan Area is considered disadvantaged (median household income of~~ (less than $56,~~982)~~981 in 2018), and ~~1% (836.9 acres) is considered~~ severely disadvantaged ~~(~~communities (SDAC) are Census geographies having less than 60% of the statewide annual median household income ~~of~~ (less than $42,737~~). The areas identified as disadvantaged include portions of~~ in 2018). Based on 2018 DAC mapping at Census Place indicates the City of Lompoc is a DAC with population of 43,511 with a median income of $52,543.

Census Tracts are smaller relatively permanent statistical subdivisions that provide a stable set of geographic units for the presentation of statistical data representing smaller populations of between 1,200 and 8,000 people, with an optimum size of 4,000 people.[42] Based on 2018 DAC mapping at the ~~rural area to the east of the City. The areas identified as severely disadvantaged are within the~~ Census Tract level (**Figure 1d.6-3**), City of Lompoc includes 100% of the WMA DAC and SDAC population in the Plan Area. **Table 1d.6-3** summarizes the DAC and SDAC land area and population estimates. Approximately 2.5% (2,153 acres) of the Plan Area is a SDAC or DAC, with total population of 27,518.

42 Glossary. United States Census Bureau. https://www.census.gov/programs-surveys/geography/about/glossary.html#ti1142073952 Accessed 2021-11-18

Table 1d.6-3~~(DWR 2021).~~
Disadvantaged Communities and Severely Disadvantaged Communities
Census Tract Level

WMA Subarea	Severely Disadvantaged Community (SDAC)		Disadvantaged Community (DAC)		Total DAC + SDAC	
	Median annual income <60% of state: <$42,737 in 2018		Median annual income 60%-80% of state: $42,737 - $56,981 in 2018		Median annual income <80% of state: <$56,981 in 2018	
	Acres	Population	Acres	Population	Acres	Population
Lompoc Plain	672	11,860	1,481	15,658	2,153	27,518
Lompoc Upland	0	0	0	0	0	0
Lompoc Terrace	0	0	0	0	0	0
Burton Mesa	0	0	0	0	0	0
Santa Rita Upland	0	0	0	0	0	0
SYR Alluvium	0	0	0	0	0	0
Total	**672**	**11,860**	**1,481**	15,658	**2,153**	**27,518**

Notes: DAC and SDAC based on median income in a census tract, not on an individual or household level.
Source: DWR 2021, based on US Census Data for 2018

1d.6-2 General Plans

General plans are considered applicable to the GSP to the extent that they may change water demands within the Basin or affect the ability of the WMA GSA to achieve sustainable groundwater management over the planning and implementation horizon. The general plans applicable to the Plan Area include the Santa Barbara County Comprehensive Plan (Comprehensive Plan) and City of Lompoc General Plan. These two general plans are described below and summarized in **Table 1d.6-~~3~~4**. The areas covered by the General Plans are shown in **Figure 1d.6-4**.

Figure 1d.6-3

Disadvantaged Communities Within Western Management Area Boundary by Census Tract

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Figure 1d.6-4
Western Management Area General Plan Boundary, Santa Ynez River Valley Groundwater Basin, Groundwater Sustainability Agency

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Table 1d.6-4
Summary of General Plan Policies Relevant to Groundwater Sustainability in the WMA Plan Area

Element	Policy/Action No.	Quoted Description	GSP Consistency
Santa Barbara County Comprehensive Plan			
Conservation Element – Groundwater Resources Section	**Goal 1**: To ensure adequate quality and quantity of groundwater for present and future County residents, and to eliminate prolonged overdraft of any groundwater basins.		
	Policy 1.1	The County shall encourage and assist all of the County's water purveyors and other groundwater users in the conservation and management, on a perennial yield basis, of all groundwater resources.	Consistent.
	Action 1.1.1	The County shall encourage and, where feasible, financially assist in continued studies of new or supplemental water sources and the more efficient use of existing sources, for the purpose of avoiding, reducing, or eliminating prolonged overdraft. To ensure that such water is used to reduce overdraft (as opposed to supplying only new uses), the County shall encourage water purveyors to give first priority to offsetting existing demands met by overdrafting groundwater supplies.	Consistent.
	Action 1.1.2	The County will seek the voluntary cooperation with purveyors during the early planning of any supplemental water sources that the purveyors propose or plan to develop. The County will coordinate with the purveyor, to the extent allowed by the purveyor, to ensure that: (1) environmental constraints are fully incorporated into the location and design of such projects; and (2) mitigations are applied to the fullest extent feasible and consistent with County permit conditioning policies and practices to minimize the magnitude of significant impacts.	Consistent.
	Policy 1.2	The County shall encourage innovative and/or appropriate, voluntary water conservation activities for increasing the efficiency of agricultural water use within the County.	Consistent.
	Action 1.2.1	The County shall provide support to the Soil Conservation Service, the Resource Conservation District, and other appropriate agencies to continue the Irrigation Management Program and other such water conservation and management efforts.	Consistent.
	Action 1.2.2	The County shall support the expansion of existing efforts by the U.C. Cooperative Extension/Farm Advisor, in cooperation with the Agricultural Commissioner, Soil Conservation Service, Resource Conservation District, and other appropriate agencies, to develop and update a verifiable comprehensive database on agricultural water use and conservation effectiveness. Such efforts should include incentives for groundwater users to collect and provide more accurate data, as needed to permit the development of more precise determinations of consumptive groundwater use.	Consistent, but SGMA now provides additional regulatory authority and tools to collect groundwater data.
	Policy 1.3	The County shall act within its powers and financial abilities to promote and achieve the enhancement of groundwater basin yield.	Consistent. GSA now has additional authorities to do the same.

Element	Policy/Action No.	Quoted Description	GSP Consistency
	Policy 1.3.1	Where feasible and consistent with the County's applicable Comprehensive Plan element(s), the County shall encourage and assist appropriate agencies in ongoing or future projects and programs which increase groundwater recharge and basin yield, as long as such projects and programs can be shown not to degrade groundwater quality. Such activities could include, but would not be limited to, cloud seeding, range management, dams, and spreading basins.	Consistent.
	Goal 2: To improve existing groundwater quality, where feasible, and to preclude further permanent or long-term degradation in groundwater quality.		
	Policy 2.1	Where feasible, in cooperation with local purveyors and other groundwater users, the County shall act to protect groundwater quality where quality is acceptable, improve quality where degraded, and discourage degradation of quality below acceptable levels.	Consistent.
	Action 2.1.1	In reviewing or preparing basin management plans under the Groundwater Management Act and other applicable law, the County shall consider both the quantity and quality of groundwater in affected basins. Pumpage that causes intrusion of poor quality water, if and where identified, should receive particular attention for improved management.	This policy should be updated to reflect SGMA, as it supersedes the Groundwater Management Act.
	Action 2.1.2	In basins or sub-basins with water quality problems, the County will encourage reduction of salt and other pollutant loading from all sources through cooperative, voluntary efforts and, where feasible, will take direct action in this regard.	Consistent. Note that while cooperative and voluntary efforts are preferred, SGMA gives GSA authority to mandate mitigation if sustainability criteria are threatened or exceeded.
	Policy 2.2	The County shall support the study of adverse groundwater quality effects which may be due to agricultural, domestic, environmental and industrial uses and practices.	Consistent.
	Action 2.2.1	The County shall cooperate in ongoing and future studies which determine the current and potential extent of agricultural, domestic, environmental and industrial pollutants in various County aquifers, and to ascertain better methods by which agriculturalists can prevent increasing pollutant loads in the future. Such studies should be coordinated with the basin planning and enforcement work done by the RWQCB and SWRCB, and should involve other appropriate agencies and groundwater users.	Consistent.
	Goal 3: To coordinate County land use planning decisions and water resources planning and supply availability.		
	Policy 3.1	The County shall support the efforts of the local water purveyors to adopt and implement groundwater management plans pursuant to the Groundwater Management Act and other applicable law.	These policies and actions should be updated to reflect SGMA, as it supersedes the

Element	Policy/Action No.	Quoted Description	GSP Consistency
	Action 3.1.1.	The County shall encourage the preparers of groundwater management plans to consider environmental factors, including but not limited to the potential link between groundwater resources and riparian habitat.	Groundwater Management Act.
	Policy 3.2	The County shall conduct its land use planning and permitting activities in a manner which promotes and encourages the cooperative management of groundwater resources by local agencies and other affected parties, consistent with the Groundwater Management Act and other applicable law.	
	Action 3.2.1	The County Flood Control & Water Conservation District or the County Water Agency, as feasible and as requested by a local agency or agencies pursuant to the Groundwater Management Act, may assume responsibility in preparing a groundwater management plan pursuant to the Groundwater Management Act and other applicable law.	
	Policy 3.2	The County shall use groundwater management plans, as accepted by the Board of Supervisors, in its land use planning and permitting decisions and other relevant activities.	
	Action 3.3.1	The Board of Supervisors, in consultation with the County Planning Commission, shall accept a groundwater management plan which promotes and is consistent with the Goals of this Groundwater Resources Section of the Conservation Element. Such acceptance shall be rescinded where specific facts and circumstances indicate that a plan has been rendered inadequate to promote these Goals.	
	Action 3.3.2	The County shall conserve waters to the extent feasible through exercise of the County's discretionary land use planning and permitting decisions, and shall promote such conservation through related public and private actions.	
	Policy 3.4	The County's land use planning decisions shall be consistent with the ability of any affected water purveyor(s) to provide adequate services and resources to their existing customers, in coordination with any applicable groundwater management plan.	Consistent.
	Action 3.4.1	The County, in its planning activities, shall work cooperatively with local water purveyors, the County Water Agency, the County Flood Control and Water Conservation District, State and Federal agencies concerned with water resources, and private groups and individuals with particular interest and expertise related to water resources.	Consistent.
	Action 3.4.2	Santa Barbara County shall develop its land use plans and policies in a manner which takes into account all groundwater uses (e.g., domestic, agricultural, natural resources and habitats, etc.).	Consistent.
	Action 3.4.4	Santa Barbara County shall encourage and assist local water purveyors in developing adequate water supplies (groundwater, surface water, desalination, etc.) to serve their customers and communities consistent with the applicable general plan(s).	Consistent.
	Action 3.4.5	The County shall facilitate the efforts of purveyors to serve overlying landowners from the purveyor's system.	Consistent.

Element	Policy/Action No.	Quoted Description	GSP Consistency
	Policy 3.5	In coordination with any applicable groundwater management plan(s), the County shall not allow, through its land use permitting decisions, any basin to become seriously overdrafted on a prolonged basis.	Consistent. Note that the Basin is not designated as critically overdrafted by DWR.
	Action 3.5.1	Based on input from the County Water Agency and P&D, the Board, in coordination with the responsible water purveyor(s), shall designate any basins within the county as "seriously overdrafted" if the following conditions are present: Prolonged overdraft which results or, in the reasonably foreseeable future (generally within ten years) would result, in measurable, unmitigated adverse environmental or economic impacts, either long-term or permanent. Such impacts include but are not limited to seawater intrusion, other substantial quality degradation, land surface subsidence, substantial effects on riparian or other environmentally sensitive habitats, or unreasonable interference with the beneficial use of a basin's resources. The County's fundamental policy shall be to prevent such overdraft conditions.	Consistent. These now constitute the main sustainability indicators under SGMA. Note that the Basin is not designated as critically overdrafted by DWR.
	Action 3.5.2	In seriously overdrafted basins, the County shall not approve discretionary development permits if such development requires new net extractions or increases in net extractions of groundwater, pending development and County acceptance of a basin management plan, consistent with the Groundwater Management Act or other applicable law, which adequately addresses the serious overdraft.	Consistent. Note that the Basin is not designated as critically overdrafted by DWR.
	Policy 3.6	The County shall not make land use decisions which would lead to the substantial overcommitment of any groundwater basin.	Consistent.
	Policy 3.6	New urban development shall maximize the use of effective and appropriate natural and engineered recharge measures within project design, as defined in design guidelines to be prepared by the Santa Barbara County Flood Control and Water Conservation District (SBCFCWCD) in cooperation with P&D.	Consistent.
	Action 3.6.1	In cooperation with the USGS and local water purveyors, the County should conduct or participate in a study to identify in more detail those areas where natural and enhanced recharge is occurring or may occur in each of the County's major groundwater basins and develop detailed design guidelines for ways to protect recharge areas from further degradation.	Consistent.
	Policy 3.8	Water-conserving plumbing, as well as water-conserving landscaping, shall be incorporated into all new development projects, where appropriate, effective, and consistent with applicable law.	Consistent.
	Action 3.8.1	The County shall continue to encourage and, where feasible, financially participate in water-saving landscape experiments and education programs, such as those conducted by the Water Agency's Regional Water Conservation Program.	Consistent.

Element	Policy/Action No.	Quoted Description	GSP Consistency
	Action 3.8.2	The County shall continue to develop and refine uniform standards and guidelines for water conservation in new development projects, which shall recognize that different physical characteristics within various areas may require more than a single set of standards and guidelines. All cities within the County shall be encouraged to adopt similar standards and guidelines.	Consistent.
	Policy 3.9	The County shall support and encourage private and public efforts to maximize efficiency in the pre-existing consumptive M&I use of groundwater resources.	Consistent.
	Action 3.9.2	The County, in consultation with the cities, affected water purveyors, and other interested parties, shall promote the use of consistent "significance thresholds" by all appropriate agencies with regard to groundwater resource impact analysis.	Consistent.
	Action 3.9.3	The County shall continue to refine and update its "significance thresholds" as new data becomes available and as overdraft conditions persist, as specified in the County's CEQA Guidelines. The County's acceptance of duly prepared and adopted groundwater management plans also may necessitate the adjustment of appropriate groundwater thresholds.	Consistent. Note that the Basin is not designated as critically overdrafted by DWR, and sustainable management criteria of this GSP may necessitate updated significance thresholds.
	Goal 4: To maintain accurate and current information on groundwater conditions throughout the County.		
	Policy 4.1	The County shall act within its powers and financial abilities to collect, update, refine, and disseminate information on local groundwater conditions.	Consistent.
	Action 4.1.1	The County Water Agency shall continue to monitor water levels from existing monitoring wells and, in coordination with the U.C. Cooperative Extension/Farm Advisor, shall request, on a voluntary basis, private and public water purveyors and major private groundwater users, including agricultural users, to provide periodic records of groundwater production. Unless deemed unnecessary by the Water Agency's Board of Directors for any year, the Agency shall compile an annual report on the status of pumping amounts, water levels, overdraft conditions, and other relevant data, and shall submit this report to the Board of Supervisors for its acceptance and possible further action. The annual report to the Board shall include a review of the results of all groundwater quality monitoring conducted in the County.	Consistent. The GSA will have this responsibility. The GSA will send annual reports required by DWR to the County as well.
	Action 4.1.2	The County, in consultation with the cities, other counties, affected water purveyors, and other interested parties, shall promote the use of consistent standards by all appropriate agencies with regard to groundwater resources.	Consistent. Note that sustainability criteria for basins under management of a GSP will be specific to each basin.

Element	Policy/Action No.	Quoted Description	GSP Consistency
	Action 4.1.3	The County recognizes the need for more accurate data on all groundwater basins within the County and shall continue to support relevant technical studies, as feasible.	Consistent.
	Action 4.1.4	The County should identify areas where natural resources and habitats depend upon groundwater, and where such resources and habitats have been adversely affected by groundwater overdraft.	Consistent.
	Action 4.1.6	The service area boundaries of existing and planned private water companies shall be defined. These companies shall be requested to provide this information to P&D and the County Water Agency no later than 12/31/94 or, for subsequently organized companies, within six months of their final formation.	Consistent.
	Action 4.1.7	The County recommends that all public and private water companies, districts, and agencies, to the extent legally possible, maintain mutual aid agreements with adjacent districts or private water companies in case of water shortages. Any such agreements shall be noted by the County Water Agency in its annual report (see Action 4.1.1). Such agreements would be based on short-term or emergency needs or identified economic benefits to all parties.	Consistent.
	Action 4.1.8	All water districts and city water departments which have prepared a Water Conservation Plan (under the 1984 Urban Water Management Act) and/or other long-term water planning studies, shall be asked to submit a copy of such plan(s) to the County Water Agency and P&D for review and comment. P&D shall meet with these purveyors to discuss the population/land use projections and their current status.	Consistent.
	Action 4.1.9	The County Water Agency shall continue to work with local water purveyors and other appropriate entities to promote the efficient use of water by all users through education and incentive programs. Progress on such programs shall be reported by the County Water Agency in its annual report (see Action 4.1.1).	Consistent. GSP annual reports will be submitted to the County at the same time they are submitted to DWR.
	Action 4.1.10	The County shall continue to encourage and, where feasible, financially participate in USGS, DWR, SWRCB, and local water purveyors' studies of water quality in basins throughout the County.	Consistent.
	Action 4.1.11	The County shall continue to encourage and, where feasible, materially assist the seawater intrusion monitoring programs of the USGS, local water purveyors, and other appropriate agencies.	Consistent.
	Action 4.1.12	The County shall encourage and, where feasible, materially contribute to the refinement and updating of agricultural water use (“duty”) factors by the Soil Conservation Service, the U.C. Cooperative Extension/Farm Advisor, or other appropriate entities.	Consistent.
	Action 4.1.13	The County shall encourage and, where feasible, materially contribute to the refinement of estimates of agricultural water return flows by the State Department of Water Resources, the U.C. Cooperative Extension/Farm Advisor, or other appropriate entities.	Consistent.

Element	Policy/Action No.	Quoted Description	GSP Consistency
Coastal Land Use Plan			
Development Planning Issues	Policy 2-1	In order to obtain approval for a division of land, the applicant shall demonstrate that adequate water is available to serve the newly created parcels except for parcels designated as "Not a Building Site" on the recorded final or parcel map.	Consistent.
	Policy 2-2	The long term integrity of groundwater basins or sub-basins located wholly within the coastal zone shall be protected. To this end, the safe yield as determined by competent hydrologic evidence of such a groundwater basin or sub-basin shall not be exceeded except on a temporary basis as part of a conjunctive use or other program managed by the appropriate water district. If the safe yield of a groundwater basin or sub-basin is found to be exceeded for reasons other than a conjunctive use program, new development, including land division and other use dependent upon private wells, shall not be permitted if the net increase in water demand for the development causes basin safe yield to be exceeded, but in no case shall any existing lawful parcel be denied development of one single family residence. This policy shall not apply to appropriators or overlying property owners who wish to develop their property using water to which they are legally entitled pursuant to an adjudication of their water rights.	Consistent. Terminology will be dated with adoption of this GSP, but spirit and intent is consistent.
	Policy 2-3	In the furtherance of better water management, the County may require applicants to install meters on private wells and to maintain records of well extractions for use by the appropriate water district.	To be determined.
	Policy 2-4	Within designated urban areas, new development other than that for agricultural purposes shall be serviced by the appropriate public sewer and water district or an existing mutual water company, if such service is available.	Consistent.
	Policy 2-5	Water-conserving devices shall be used in all new development.	Consistent.
	Policy 2-6	Prior to issuance of a development permit, the County shall make the finding, based on information provided by environmental documents, staff analysis, and the applicant, that adequate public or private services and resources (i.e., water, sewer, roads, etc.) are available to serve the proposed development. The applicant shall assume full responsibility for costs incurred in service extensions or improvements that are required as a result of the proposed project. Lack of available public or private services or resources shall be grounds for denial of the project or reduction in the density otherwise indicated in the land use plan. Where an affordable housing project is proposed pursuant to the Affordable Housing Overlay regulations, special needs housing or other affordable housing projects which include at least 50% of the total number of units for affordable housing or 30% of the total number of units affordable at the very low income level are to be served by entities that require can-and-will-serve letters, such projects shall be presumed to be consistent with the water and sewer service requirements of this policy if the project has, or is conditioned to obtain all necessary can-and-will-serve letters at the time of final map recordation, or if no map, prior to issuance of land use permits.	Consistent.

Element	Policy/Action No.	Quoted Description	GSP Consistency
	Policy 2-7	Consistent with PRC Section 30604 (e), the County may deny a project for a period of up to one year if the Board of Supervisors finds that 1) a public agency has been specifically authorized to acquire the property on which the development is located, and 2) there are funds available or funds could reasonably be expected to be made available within one year for such acquisition.	Consistent.
	Policy 2-11	All development, including agriculture, adjacent to areas designated on the land use plan or resource maps as environmentally sensitive habitat areas, shall be regulated to avoid adverse impacts on habitat resources. Regulatory measures include, but are not limited to, setbacks, buffer zones, grading controls, noise restrictions, maintenance of natural vegetation, and control of runoff.	Consistent.
Hazards – Hillside and Watershed Protection	Policy 3-18	Provisions shall be made to conduct surface water to storm drains or suitable watercourses to prevent erosion. Drainage devices shall be designed to accommodate increased runoff resulting from modified soil and surface conditions as a result of development. Water runoff shall be retained on-site whenever possible to facilitate groundwater recharge.	Consistent.
	Policy 3-19	Degradation of the water quality of groundwater basins, nearby streams, or wetlands shall not result from development of the site. Pollutants, such as chemicals, fuels, lubricants, raw sewage, and other harmful waste, shall not be discharged into or alongside coastal streams or wetlands either during or after construction.	Consistent.
City of Lompoc General Plan			
Public Services Element – Water Service and Infrastructure	**Goal 9:** Provide economical and dependable water service.		
	Policy 9.2	The City shall assure that sufficient capacity and quality is available in the Lompoc Water Treatment Plant and system prior to approval of new development projects.	Consistent.
	Goal 10: Maximize the conservation of water.		
	Policy 10.1	The City shall promote the conservation of water by all customers.	Consistent.
	Policy 10.2	The City shall investigate, where feasible, financially viable uses of recycled water for appropriate applications including outdoor irrigation, toilet flushing, upstream percolation, and commercial and industrial processes.	Consistent.
	Goal 11: Protect and improve water quality in the Lompoc Groundwater Basin.		
	Policy 11.1	The City shall continue to require public and private wastewater dischargers to connect to the City's waste water treatment system in order to minimize contamination of the Lompoc Groundwater Basin.	Consistent.
	Policy 11.2	The City shall require that all new development be connected to a City-approved wastewater system.	To be determined.

Element	Policy/Action No.	Quoted Description	GSP Consistency
	Policy 11.3	The City shall incorporate water holding areas such as creekbeds, recessed athletic fields, ponds, cisterns, and other features that serve to recharge groundwater, reduce runoff, improve water quality and decrease flooding into the urban landscape.	Consistent.
	Policy 11.4	The City shall identify and protect groundwater recharge areas to maintain suitable groundwater levels and to protect groundwater quality for existing and potential municipal water sources.	Consistent.
	Policy 11.5	All land development shall include a Storm Water Pollution Prevention Plan in accordance with the federal Clean Water Act and current rules and procedures prescribed by the Regional Water Quality Control Board. Low Impact Development (LID) measures shall be incorporated into project design where feasible.	Consistent.
Conservation and Open Space Element – Water Resources	**Goal 5:** Provide a sufficient supply of water to meet projected demand and minimize overdraft of the Lompoc groundwater basin.		
	Policy 5.1	The City shall encourage water conservation, in order to efficiently utilize existing water supplies.	Consistent.
	Policy 5.2	The City shall continue to require new development to offset new water demand with savings from existing water users, and/or the in-lieu fee program to fund water conservation programs, such as recycled water for irrigation or percolation.	Consistent.
	Policy 5.3	The City shall continue to encourage the design and installation of energy conservation, water conservation, and solid waste reduction measures in all construction and rehabilitation projects.	Consistent.
	Policy 5.4	The City shall provide financial and technical assistance (based upon available funding) to property owners who desire to improve energy and water efficiency of their housing units, but are unable to afford improvement costs.	Consistent.
	Policy 5.5	The City shall protect water rights on the Santa Ynez River, which are vital to sustain sensitive biotic habitats, as well as water quality and supply in the Lompoc groundwater basin.	Consistent.
	Policy 5.6	The City shall participate with local, regional, state, and federal agencies in monitoring groundwater supply, quality and developing recharge facilities.	Consistent.
	Goal 6: Protect and improve water quality in the Lompoc groundwater basin.		
	Policy 6.1	The City shall review and condition development proposals to minimize adverse water quality impacts and contamination of the Lompoc groundwater basin.	Consistent.
	Policy 6.2	The City shall reduce waterborne pollutants and sedimentation from existing uses through implementation of the City's Municipal Separate Storm Sewer Systems permit requirements, and its storm water ordinance and grading ordinance.	Consistent.
Land Use Element	**Goal 5:** Protect the City's and Lompoc Valley's natural resources.		

Element	Policy/Action No.	Quoted Description	GSP Consistency
	Policy 5.1	The City shall maintain Open Space designations for areas used for the preservation of scenic beauty, natural resources, or outdoor recreation; or the managed production of resources, including groundwater recharge; or the protection of public health & safety. Groundwater recharge areas shall be protected from incompatible uses that would substantially inhibit aquifer recharge or degrade groundwater quality.	Consistent.

Source: County of Santa Barbara 2009, 2010, 2019b; City of Lompoc 2014a, 2014b, 2019.

Notes: GSP = Groundwater Sustainability Plan; SGMA = Sustainable Groundwater Management Act; GSA = Groundwater Sustainability Agency; Basin = Santa Ynez River Valley Groundwater Basin; RWQCB = Regional Water Quality Control Board; SWRCB = State Water Resources Control Board; P&D = Planning and Development Department; DWR = California Department of Water Resources; M&I = municipal and industrial; CEQA = California Environmental Quality Act; U.C. = University of California; USGS = U.S. Geological Survey; PRC = California Public Resources Code; CWSA = Certificate of Water Service Availability.

1d.6-2-1 Santa Barbara County Comprehensive Plan

The Santa Barbara County Comprehensive Plan (Comprehensive Plan) outlines land use and growth policies at the County-wide level, and has several elements particularly relevant to groundwater sustainability, including the following:

- **Conservation Element**. The Conservation Element describes and recommends policies and programs designed to protect water resources, agricultural resources, ecological systems, historical and archaeological sites, and mineral resources (County of Santa Barbara 2010).
- **Groundwater Resources Section**. The Groundwater Resources Section is a stand-alone section of the Conservation Element that provides a review of groundwater resource limitations throughout the County, and establishes groundwater resource policies for each of the groundwater basins in the County (County of Santa Barbara 2009).
- **Environmental Resources Section**. The Environmental Resource Management Element is a compendium of the Seismic Safety and Safety Element, the Conservation Element, and the Open Space Element and includes topics such as prime agricultural lands, slopes, biological resources, habitat areas, floodplain and floodways, and geologic hazards, among others (County of Santa Barbara 2009).
- **Coastal Land Use Plan**. The Coastal Land Use Plan (CLUP) includes policies related to beach access, recreation, marine environment, environmentally sensitive habitat areas, agriculture, visual resources, coastal dependent energy, and industrial development. These policies establish standards for future growth and development in the Coastal Zone and supersede other policies (County of Santa Barbara 2019b).
- **Community Plans**. The Comprehensive Plan is supplemented by individual community plans that take into account the local setting, policy issues, and community concerns. There are no community plans applicable to the GSP Plan Area. The County has established interpretive guidelines specific to the Lompoc Area (County of Santa Barbara 1999) to provide clear and consistent interpretation of the Comprehensive Plan; however, the guidelines are not particularly relevant to groundwater sustainability and therefore are not included in this GSP.

1d.6-2-2 City of Lompoc General Plan

The City of Lompoc (City) General Plan outlines the City's land use and growth policies, reflecting the community's long-term development goals. Many of the goals and policies included in the City's general plan supplement those contained in the Comprehensive Plan. The elements of the City of Lompoc General Plan with goals and policies that explicitly address water resources include the Public Services (City of Lompoc 2014a), Conservation and Open Space (City of Lompoc 2014b), and Land Use (City of Lompoc 2019) elements.

1d.6-2-3 Santa Barbara County Comprehensive Plan Elements

In the Groundwater Resources section of the Comprehensive Plan's Conservation Element, the County included several findings that generally remain accurate, although certain expectations, particularly with regard to the availability of State Water Project (SWP) water, may no longer be accurate. For example, at the time of preparation (1994), the County recognized that new supplemental water sources, such as SWP water and augmentation of local supplies, would be available and could serve to replenish groundwater basins or be used in lieu of groundwater. However, the availability of SWP water supplies varies with hydrologic cycles where during wet years, the SWP is generally able to deliver sufficient water to meet delivery requests. However, during extended dry periods, the SWP can deliver only a portion of requested deliveries (DWR 2020b, CCWA 2020). Existing conditions therefore may not always serve the expectation contained in the Groundwater Resources section of the County's Comprehensive Plan (County of Santa Barbara 2009a). Furthermore, the land use plans describe groundwater-related actions as voluntary, cooperative, and collaborative efforts that are not mandated under the regulatory schemes that existed at the time. With the passage of SGMA, specific mandates now exist.

1d.6-2-4 Coastal Land Use Plan

In 1982, the County adopted the Coastal Land Use Plan (CLUP), which established land uses within the Coastal Zone. The CLUP and implementation program, which compose the County's local coastal program,[43] are designed as a separate coastal element to the County's Comprehensive Plan. The CLUP

[43] As required by the California Coastal Act of 1976, the local coastal program is the land use plans, zoning ordinances, zoning district maps, and implementing actions which, when taken together, meet the requirements of, and implement the provisions and policies of the California Coastal Act.

lays out the general patterns of development throughout the coastal areas of the County. Its purpose is to protect coastal resources while accommodating development within the Coastal Zone. The local coastal plan provides a high-level overview of land use planning policies aimed at compatibility and compliance with California Coastal Commission regulations protecting wildlife, aesthetic, and recreational resources in the Plan Area. The other Comprehensive Plan elements are applicable within the Coastal Zone. However, the CLUP takes precedence if a conflict exists between these two plans.

1d.6-3 Other Planning / Land Use Considerations

Implementation of existing land use plans are expected to not significantly change water demands within the basin or affect the ability of the WMA to achieve sustainable groundwater management over the planning and implementation horizon.[44] All discretionary projects proposed within the Basin are subject to compliance with CEQA. In 2019, the Governor's Office of Planning and Research released an update to the CEQA Guidelines that included a new requirement to analyze projects for their compliance with adopted GSPs. Specifically, the new applicable significance criteria include the following:

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

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

The County has long implemented its own CEQA significance thresholds based on heightened public concern and awareness for the scarcity of the County's groundwater resources. Under County guidelines, "safe yield" is defined as "the maximum amount of water which can be withdrawn from a basin (or

44 23 CCR § 354.8 (f) (2)

aquifer) on an average annual basis without inducing a long-term progressive drop in water level" (County of Santa Barbara 2021).[45] The Environmental Thresholds and Guidelines Manual prepared by the County (County of Santa Barbara 2021) outlines the appropriate use and application of various environmental impact thresholds as they relate to groundwater resources. The County originally determined in 1992 that the safe yield of the Lompoc Basin (roughly equivalent to what is now considered the Lompoc Plain subarea) was 21,468 AFY, with pumping that put the Lompoc Basin into overdraft with an estimated "remaining life of available storage" at the time to be 88.6 years (County of Santa Barbara 2021).

GSP Implementation described in detail in Chapter 4 (Project and Management Actions) and Chapter 5 (Plan Implementation) which includes project and management actions if conditions become unsustainable. Existing land use plans have taken into account potential negative impacts on groundwater, meaning that implementation of SGMA will be generally consistent with the water supply assumptions of the relevant land use plans over the planning and implementation horizon.[46]

No specific land use plans outside the basin are known to affect the ability of the WMA to achieve sustainable groundwater management.[47] Outside land use plans and policy could change water demand by changing the profitability of particular agricultural crops resulting in changes in land and water use within the plan area. Outside land use plans could also negatively affect water supply by reduce availability of state water project and sources of water imports.

1d.6-4 Well Permitting Process Summary

The process for permitting new or replacement wells in the WMA,[48] is a result of adopted standards in local well ordinances (Section 1d.5-2) and land use (Figure 1d.6-1). Depending on the location within the WMA, the well must receive a drilling permit from the County of Santa Barbara (Appendix 1d-C) or the City of Lompoc (Appendix 1d-D).

45 Note that the safe yield definition in the CEQA significance thresholds is not the same as the SGMA definition.
46 23 CCR § 354.8 (f) (3) A general description of how implementation of the Plan may affect the water supply assumptions of relevant land use plans over the planning and implementation horizon.
47 23 CCR § 354.8 (f) (5) To the extent known, the Agency may include information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management.
48 23 CCR § 354.8 (f) (4) summary of the process for permitting new or replacement wells in the basin, including adopted standards in local well ordinances, zoning codes, and policies contained in adopted land use plans.

Depending on both the zoned location and the proposed use of the well an additional land use permit may be required. **Table 1d.6-5** summarizes land use permit requirements by the proposed use of the well in the unincorporated Santa Barbara County. Agricultural water wells, and water systems with a single connect are generally exempt, wells serving two to less than five connections require a land use permit, more than five connections require a Minor Conditional Use Permit, and commercial use requires a Conditional Use Permit. Wells within the Coastal Zone require a coastal development permit. Land Use permits may also require Development Plan approval by the County.

After completion of the well the property owners must register with the Santa Ynez River Water Conservation District[49] within 30 days or be guilty of a misdemeanor.[50] Additionally within 60 days from the date its construction, alteration, abandonment, or destruction is completed[51] the well completion report be filed with the Department of Water Resources, likewise a misdemeanor if not completed.[52]

As an owner of a water-producing facility, on a semi-annual the property owner is required to file water production statements with the Santa Ynez River Water Conservation District until the well is officially abandonment or destruction is completed.

49 Not including peripheral potions of the WMA outside of the Santa Ynez River Water Conservation District. Currently these areas are Federal lands part of Vandenberg Space Force Base.
50 CWC Section 75640
51 CWC Section 13751
52 CWC Section 13754

Table 1d.6-5

Summary of Santa Barbara County Land Use Permit Requirements by Zone Type in unincorporated WMA

Zone Type	Zone Symbol	Water Extraction	Water System			Water well
		Commercial	1 connection	2 to 4 connections	5 or more connections	Agricultural
Agricultural	AG-I	CUP	E	P	MCUP	E
	AG-II	CUP	E	P	MCUP	E
Residential	RR	CUP	E	MCUP	MCUP	E
	R-1/E-1	CUP	E	MCUP	MCUP	E
	EX-1	-	E	-	MCUP	E
	R-2	CUP	E	MCUP	MCUP	E
	DR	CUP	E	P	MCUP	E
Commercial	C-2	CUP	E	P	MCUP	-
	CH	CUP	E	P	MCUP	E
	PI	CUP	E	P	MCUP	-
	SC	CUP	E	P	MCUP	-
Industrial	M-2	CUP	E	P	MCUP	E
	M-CR	CUP	E	P	MCUP	E
Resource Protection	RMZ	CUP	E	P	MCUP	E
Special Purpose Zones	PU	CUP	E	P	MCUP	E
	REC	CUP	E	P	MCUP	E
	AL	CDP	CDP	CDP	CDP	CDP

Notes: - = not applicable; E = Allowed use, no permit required (Exempt); P = Permitted use, Land Use Permit required, Development Plan approval may also be required; MCUP = Minor Conditional Use Permit required; CUP = Conditional Use Permit required; CDP = Coastal Development Permit

Source: Derived from Santa Barbara County Land Use & Development Code, Update October 2021 which also includes descriptions of zone symbols.

Section 1 E – ADDITIONAL GSP ELEMENTS

The SGMA statue[53] identifies plan additional elements that are not required, but addressed as determined by the WMA GSA[54]:

(a) Control of saline water intrusion.

(b) Wellhead protection areas and recharge areas.

(c) Migration of contaminated groundwater.

(d) A well abandonment and well destruction program.

(e) Replenishment of groundwater extractions.

(f) Activities implementing, opportunities for, and removing impediments to, conjunctive use or underground storage.

(g) Well construction policies.

(h) Measures addressing groundwater contamination cleanup, groundwater recharge, in-lieu use, diversions to storage, conservation, water recycling, conveyance, and extraction projects.

(i) Efficient water management practices, as defined in Section 10902, for the delivery of water and water conservation methods to improve the efficiency of water use.

(j) Efforts to develop relationships with state and federal regulatory agencies.

(k) Processes to review land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity.

(l) Impacts on groundwater dependent ecosystems.

Elements items (a), (e), (f), (g), and (i) are addressed in detail in project and management actions (Chapter 4) to improve conditions within the basin. Items related to (l) "Impacts on groundwater dependent ecosystems" are addressed in Hydrogeologic Conceptual Model (Section 2a) and Groundwater Conditions (Section 2b).

The Data Management System (DMS) is not included in the Plan Contents[55] article of the SGMA regulations and so is included below.

53 CWC Section 10727.4. Additional Plan Elements

54 23 CCR § 352.8 (g) description of any of the additional Plan elements included in Water Code Section 10727.4 that the Agency determines to be appropriate

55 23 CCR Division 2 Chapter 1.5 Subchapter 2 Article 5. Plan Contents

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1e.1 DATA MANAGEMENT SYSTEM

A Data Management System (DMS) was developed as a central source for groundwater data, providing up-to-date technical information regarding Basin conditions. Collecting and centralizing data are steps towards meeting the goals of protecting water rights and ensuring local agencies continue to manage groundwater while minimizing state intervention. In addition to meeting these intentions, SGMA specifically requires the use of a DMS.[56]

The WMA and CMA developed a joint DMS and reserved the following domain name for access:

https://sywater.info

1e.1-1 Data Management Plan

In February 2020, the GSA prepared a Data Management Plan (DMP) to provide a complete description of the planned DMS. The DMP, provided ~~in~~as **Appendix 1e-A** ~~of this GSP~~, provides discussion of the general architecture of the DMS, including aspects of the software to be used and strategies for incorporation of various types of data. The DMS uses open-source software for most of the architecture components. The plan identifies how all data types will be handled in the DMS.

The DMP discusses the expected sources of relevant data (Federal, State, County, Local, Municipal) and how they were collected for inclusion into the DMS. There is an identification of a tiered scheme for data collection and verification efforts, in order to focus efforts on higher impact data.

The DMP also includes a general description of the web interface, access to the data stored within the system, and outlines a process for exporting and importing various datasets into the system. The DMP provides other details with regard to various administration concerns, and security steps taken to protect the system.

56 23 CCR § 352.6 Each agency shall develop and maintain a data management system that is capable of storing and reporting information relevant to the development or implementation of the Plan and monitoring of the basin."

1e.1-2 Implementation

In May 2020, the GSA released a technical memorandum (Appendix 1e-B) summarizing data compilation collected and entered into the DMS during the general data collection phase of the project, and additional features that had been developed. Data collection was undertaken throughout the GSP development. Section 2b (Groundwater Conditions), Section 3a (Monitoring Networks), and Section 3b (Sustainable Management Criteria) of the GSP describe and provide interpretations for the data contained in the DMS.

Planned updates and maintenance of the DMS are described in Chapter 5 (Plan Implementation).

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CHAPTER 2: BASIN SETTING

The Basin Setting for this WMA GSP is described in terms of the following three topics. The details of each topic and how each relates to the Basin Setting are presented in subsequent sections of the Chapter 2.

Section 2a. Hydrogeologic Conceptual Model

The Hydrogeologic Conceptual Model characterizes the WMA extent and management areas, subareas, topography, geology, principal groundwater aquifers, primary sources of water and water uses, and the users of groundwater.

Section 2b. Groundwater Conditions

The Groundwater Conditions Section of this WMA GSP presents the available data that was evaluated, provides an assessment of current WMA groundwater conditions as observed in the period 2015 through 2020, and describes historical conditions using available data from the period 1924 through 2020.

Section 2c. Water Budget

The Water Budget Section of this WMA GSP quantifies groundwater flows into and out of the WMA, including natural conditions (precipitation, groundwater flow, etc.) and human-made conditions (reservoir releases, groundwater pumping, etc.).

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Section 2: A – HYDROGEOLOGIC CONCEPTUAL MODEL

The Hydrogeologic Conceptual Model (HCM) is required to "characterize[s] the physical components and interaction of the surface water and groundwater systems in the basin."[57] Documentation for the HCM provides a written description of the general physical characteristics of the Basin, specifically within the WMA, as related to regional hydrology, land use, geology and geologic structures, lateral and vertical geologic basin structure (or aquifer) limits, introduction of groundwater quality, and definition of principal aquifers and aquitards. Description of these items in the HCM provides context for subsequent sections and chapters of the GSP.

This HCM contains the following sections:

Section 2a.1, Geology of the Western Management Area, provides an introduction and overview of the geology of the WMA. This includes a description of the regional geologic structural setting, relevant geologic units, surface geologic mapping, and major structural features. A three-dimensional geologic model was developed for the Basin. Cross-sections developed from this model are provided.

Section 2a.2, Principal Aquifers and Aquitards, provides a discussion of geologic units corresponding to aquifers, including the three-dimensional Basin boundaries (lateral and basal boundaries). The physical characteristics of the aquifers in each subarea are summarized.

Section 2a.3, Hydrologic Characteristics, describes physical surface conditions that interact with the groundwater. This section includes topography, soil map, and watershed extent; a description of surface water components, including rivers, and ocean coast; and large anthropogenic alterations to the water environment, including imports, exports, and treated wastewater discharge.

Section 2a.4, Uses and Users of Groundwater in the Western Management Area, discusses the primary use of groundwater in each of the WMA subareas, including a summary of where groundwater pumping occurs, agricultural lands, and groundwater-dependent ecosystems.

57 23 CCR § 354.14 (a) Each Plan shall include a descriptive hydrogeologic conceptual model of the basin based on technical studies and qualified maps that characterizes the physical components and interaction of the surface water and groundwater systems in the basin.

Section 2a.5, Data Gaps and Uncertainty, addresses the data gaps at the time that this GSP, and uncertainty with respect to certain components of the HCM.

2a.1 GEOLOGY OF THE WESTERN MANAGEMENT AREA

This section of the WMA GSP introduces and provides an overview of the regional geology and defining structures within the WMA that control the lateral and vertical extent of groundwater presence, groundwater storage, and groundwater flow. Much of this section draws from the "Draft Technical Memorandum on Regional Geology and 3D Geologic Model for the Santa Ynez River Valley Groundwater Basin," by Geosyntec (2020), which is included as **Appendix 2a-A**. **Appendix 2a-A** also describes the development of a three-dimensional geologic model based on data collected and analyzed as part of this GSP and references historical reports and studies.

The Basin is located on the Pacific Plate within the Transverse Range geomorphic province of California, which is characterized by east/west-striking, complexly folded and faulted bedrock formations. The Basin is an east/west-trending, linear, irregular structural depression between rugged mountain ranges and hills within the Transverse Range in Santa Barbara County, California. Primary structural features of the Basin include large anticlines and synclines. These large folds are evident in the rocks and deposits in the lowland between the folded and faulted Santa Ynez Mountains to the south, and the faulted San Rafael Mountains to the north (Upson and Thomasson 1951; for all citations provided herein, see **Appendix 2a-A**).

2a.1-1 Mapped Surface Geology

The surface geology of the WMA and the near vicinity have younger geological formations that consist of the younger water-bearing units, and older non-water-bearing formations that constitute the WMA portion of the groundwater basin (**Figure 2a.1-1**). The extent of the geologic units shown in Figure 2a.1-1 are exports from the three-dimensional model developed by Geosyntec (2020), provided in **Appendix 2a-A**. The Geosyntec report cites the extents of the surface geology that were originally mapped by Thomas Dibblee Jr.[58] Faults based on a Quaternary map compilation by the United States Geological Survey (USGS 2020) are also shown on Figure 2a.1-1.

58 Dibblee conducted field mapping for the following USGS geologic quadrangles: Lompoc Hills and Point Conception Quadrangle, Point Arguello and Tranquillon Mountain Quadrangle, and Lompoc and Surf Quadrangle.

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Figure 2a.1-1
Surface Geology, Western Management Area

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2a.1-1-1 Geologic Units

Descriptions of the geologic units that are shown in Figure 2a.1-1, in agreement with publicly available literature and as shown in the three-dimensional geological model (**Appendix 2a-A**), are provided in the following subsections. The geologic unit descriptions are provided from the surface units (youngest) to deeper underlying units (oldest), as shown in Figure 2a.1-1. Detailed descriptions for the geologic units, as excerpted from **Appendix 2a-A** (Geosyntec 2020) are provided below:

Younger Units

River Channel Deposits (Qg)

The River Channel Deposits (Qg) occurs within the modern-day Santa Ynez River channel and consists of fine-to-coarse sand, gravels, and thin discontinuous lenses of clay and silt (Upson and Thomasson 1951; Wilson 1959; Miller 1976; Bright et al. 1992). The grain size typically decreases along the river's reach, fining towards the ocean (Upson and Thomasson 1951). The Qg unit thickness ranges from 30-feet (ft) to 40-ft, with observations of localized deposits up to 70-ft thickness 6 miles west of the City of Buellton along the Santa Ynez River, however, these deposits are largely indistinguishable from the underlying alluvium (Upson and Thomasson 1951). The Qg in the geologic model is interpreted using the Dibblee geologic map and from borehole data and is generally thought to be hydraulically connected to the Qal, described below.

Alluvium (Qal)

The Quaternary Alluvium (Qal) is composed of a coarse sand upper member and a fine sand lower member which have been previously described by others (Dibblee 1950; Upson and Thomasson 1951; Wilson 1959; Miller 1976; Bright et al. 1992). Qal is composed of unconsolidated, normally graded gravel and medium-to-very coarse sand, which grades upwards into fine to coarse sand with rare gravels, then fines vertically upwards into fine sand, silt and clay (Upson and Thomasson 1951; Wilson 1959; Miller 1976; Bright et al. 1992; Fugro Consultants, Inc. 2007). The thickness of Qal varies from approximately 30 to 90-ft in the Buellton Subarea (Upson and Wilson 1951) to approximately 170-ft to 200-ft in the Lompoc Plain (Dibblee 1950; Upson and Thomasson 1951; Evenson and Miller 1963; Miller 1976; Bright et al. 1992). In sloped areas and drainages, the thickness of Qal varies from less than 10-ft to 50-ft (Fugro Consultants, Inc. 2007).

Qal is the principal source of groundwater in the Lompoc Plain in the WMA (Dibblee 1950; Upson and Thomasson 1951; Evenson and Miller 1963; Miller 1976; Berenbrock 1988; Bright et al. 1992).

Terrace Deposits / Older Alluvium (Qoa)

The Quaternary Terrace Deposits and Older Alluvium (Qoa) typically consists of unconsolidated to poorly consolidated sands and gravels with common silt and clay zones (Dibblee 1950; Upson and Thomasson 1951; Miller 1976; Berenbrock 1988; Bright et al. 1992). Qoa thickness varies from 0-50-ft (Bright et al. 1992), up to 150-ft (Upson and Thomasson 1951; Miller 1976; Berenbrock 1988). Qoa underlies alluvium (Qal) in most of the southern Lompoc Plain and caps hilltops, benches and upland areas of the Santa Ynez River and major tributaries (Upson and Thomasson 1951; Miller 1976; Berenbrock 1988; Bright et al. 1992).

Orcutt Sand (Qo)

The Quaternary Orcutt Sand (Qo) consists of unconsolidated, well sorted, coarse to medium sand and clayey sand with scattered pebbles and gravel stringers (Upson and Thomasson 1951; Bright et al. 1992). The top of the formation is locally indurated in Lompoc Valley and Burton Mesa by iron oxides, whereas the basal portion contains well-rounded pebbles of quartzite, igneous rocks, and Monterey chert and shale (Dibblee 1950). Qo thickness varies from 0-300-ft (Upson and Thomasson 1951; Evenson and Miller 1963; Bright et al. 1992).

Paso Robles Formation (QTp)

The Quaternary-Tertiary Paso Robles Formation (QTp) consists of poorly consolidated to unconsolidated, poorly sorted, gravels, sands, silts and clays (Dibblee 1950; Upson and Thomasson 1951; Wilson 1959; Miller 1976; Berenbrock 1988; Bright et al. 1992; Yates 2010). QTp varies in thickness from 2,800-ft in the Santa Ynez subarea (Upson and Thomasson 1951) 6.5 miles west of the San Lucas Bridge, to 700-ft in Santa Rita Valley (Dibblee 1950; Miller 1976) and thins westward where it pinches out in the eastern Lompoc Plain, also in the WMA (Dibblee 1950; Upson and Thomasson 1951; Miller 1976).

QTp yields water to wells throughout the study area (Upson and Thomasson 1951; Miller 1976; Berenbrock 1988; Bright et al. 1992) and is the principal water bearing unit in the basin near Lake Cachuma and in the Santa Ynez Upland in the EMA (Yates 2010).

Careaga Sand (Tca)

The geologic unit Tertiary Careaga Sand (Tca) yields water and consists of massive, fine-to-coarse sand, with lenses of gravels and fossil shells (Dibblee 1950; Woodring and Bramlette 1950; Upson and Thomasson 1951; Wilson 1959; Evenson and Miller 1963; Miller 1976). Clay and silt beds are characteristically absent, and the uniformity in grain-size and presence of seashells distinguish it from the overlying QTp (Dibblee 1950; Upson and Thomasson 1951). Tca is often differentiated into the upper coarse sand Graciosa Member (Tcag) and the lower, fine sand Cebada Member (Tcac), which have been described in literature (Dibblee 1950; Woodring and Bramlette 1950; Upson and Thomasson 1951; Evenson and Miller 1963; Miller 1976; Berenbrock 1988; Bright et al. 1992). Tca thickness can vary from 450-ft to 1000-ft (Upson and Thomasson 1951), but is typically observed between 500-ft to 800-ft thickness in the Lompoc area, surrounding Lompoc Hills, and in the Buellton area (Dibblee 1950; Evenson and Miller 1963; Miller 1976). The Careaga Sand Formation has been previously identified as an important aquifer within the Santa Ynez River Valley Groundwater Basin (Hoffman 2018).

Older Units

Tertiary-Mesozoic Rocks are consolidated non-water bearing units, all of marine origin. They consist of the near-shore marine Foxen (Tf), Sisquoc (Tsq), and Monterey (Tm) Formations. The Foxen Formation consists of light gray or tan massive claystone, siltstone, and/or mudstone (Dibblee 1950; Woodring and Bramlette 1950; Upson and Thomasson 1951). The Sisquoc Formation is massive to very thin bedded, white diatomite and diatomaceous mudstones, with basal massive fine sands (Dibblee 1950; Woodring and Bramlette 1950; Upson and Thomasson 1951). The Monterey Formation, primarily known for its vast oil reserves, consists of variably bedded siliceous shale, diatomaceous mudstone, porcelaneous shale, chert, phosphatic shale, silty shale, limestone, and a basal clay altered tuff (Dibblee 1950; Woodring and Bramlette 1950; Upson and Thomasson 1951).

2a.1-2 Key Geologic Structures within the Western Management Area

Shown on the geologic map of the WMA and the immediate vicinity (Figure 2a.1-1) are several geologic fault and fold structures. The existence and orientation of these geologic structures are related to regional movement, generally due to north/south compression. The locations and existence of these features are based on two sources: maps produced by Dibblee (Dibblee 1950, Dibblee 2009a, Dibblee 2009b, Dibblee 2009c) and a Quaternary map compilation by the USGS (U.S. Geological Survey 2020).

2a.1-2-1 Synclines and Anticlines

The Santa Rita Syncline is an east/west-trending fold from the CMA to the WMA. The eastern end of the syncline is in the Buellton Upland subarea of the CMA east of the WMA. The syncline extends westward to the WMA through the Santa Rita subarea to the Lompoc Upland subarea in the WMA (Figure 2a.1-1). The unconsolidated sediments in the Santa Rita Syncline form much of the water-bearing principal aquifers in the Santa Rita and Lompoc Upland subareas. Younger Alluvium (Qal) and Orcutt Sand (Qo) overlie much of the Santa Rita Syncline (Figure 2a.1-1).

The Purisima Anticline is an approximate east/west-trending fold present in the Purisima Hills forming the northern boundary of the central part of the Lompoc Upland and Santa Rita Upland in the WMA. In the east, the anticline is eroded, providing surface exposures of the Sisquoc Formation and the Foxen Formation.

2a.1-2-2 Faults

With the exception of the Santa Ynez River Fault described below, faults with potential to impede groundwater recharge, storage, or flow are not currently identified in the WMA. Additional geophysical SkyTEM Aerial Electromagnetic (AEM) survey data collected within the WMA, in conjunction with potential input received from water users and the public, may be used to update current understanding of faults that may affect the water environment within the WMA.

The location of the Santa Ynez River Fault is shown in Figure 2a.1-1, consistent with the recent USGS Quaternary fault-and-fold map. The USGS mapped the fault with limited location accuracy (U.S. Geological Survey 2020). Other small fault features are found in the upper reaches of Purisima Canyon and Cebada Canyon in the Lompoc Upland subarea (Figure 2a.1-1). These small northwest/southeast-tending thrust faults occur directly south of the western end of the Purisima Anticline (Dibblee 1950).

2a.1-2-3 Subsurface Geologic Conditions

The subsurface geologic conditions within the Basin and WMA are the result of tectonic forces. A detailed subsurface three-dimensional model of the geologic units and structures for the entire WMA and immediate vicinity are provided in **Appendix 2a-A**. The geologic modeling effort included compiling new data, collecting recently drilled well completion reports, interpreting and assigning the driller logs to geologic units.[59] Geologic maps and interpretations of the subsurface from past reports were also incorporated into the model. The resulting three-dimensional model is a synthesis of all of these sources and represents the best available three-dimensional understanding of the subsurface geologic units that make up the WMA aquifers.

2a.1-2-4 Geologic Cross- Sections

The locations of five cross- sections through the WMA exported from the three-dimensional geological model are shown in **Figure 2a.1-2**. Details of the five cross-sectional views are shown in **Figure 2a.1-3a** through **Figure 2a.1-3c**. The locations of the cross- sections represent the structure and shape of the geologic units that underlie the WMA[60]. **Appendix 2a-A** includes detailed descriptions of the geology shown in each cross- section.

59 The geologic units included in the geological model, map, cross- sections, and discussion are based on what could be generally recognized from the well drilling logs, which are mostly descriptions of the cuttings as the well is drilled with varying detail. The thinner aquifer units described in the aquifer unit section could not be unambiguously recognized from a majority of these logs.

60 Cross- section E-E' lies near the border of the WMA and CMA and represents the geology at this boundary.

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Figure 2a.1-2
Geologic Cross Sections, Western Management Area

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Figure 2a.1-3a
Western Management Area, Geologic Cross Section A-A' and B-B'

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Figure 2a.1-3b
Western Management Area, Geologic Cross Section C-C'

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Figure 2a.1-3c
Western Management Area, Geologic Cross Section D-D' and E-E'

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2a.2 PRINCIPAL AQUIFERS AND AQUITARDS

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. The WMA is characterized by two principal aquifers: an Upper Aquifer and a Lower Aquifer. Non-water bearing geologic formations and perched groundwater systems are not subject to SMGA and are not principal aquifers. The ~~subflow~~underflow of the Santa Ynez River flowing through the Santa Ynez River alluvium upstream of the Lompoc Narrows is managed by SWRCB pursuant to WR 2019-0148 and other orders and decisions, and is also not a principal aquifer. Appendix 1d-B is a technical memorandum that discusses in more detail the hydrogeological basis for characterization of the water within the Santa Ynez River alluvium above the Lompoc Narrows as underflow or a subterranean stream, which occurs in a known and definite channel, which is not subject to SGMA jurisdiction.

This section relates key geologic units to principal groundwater aquifers within the WMA. Definition of these geologic units and their principal aquifer properties is important in terms of groundwater occurrence, storage, and flow. These properties are also essential during development of the water budget, and evaluation of current groundwater characteristics and conditions, and for the numerical groundwater model employed to quantify groundwater flow in the Basin under historical, current, and projected future conditions. In agreement with the geologic model prepared for the Basin, the lateral and vertical extents of these aquifers, including the definable base of the Basin, are presented and discussed in this section.

2a.2-1 Western Management Area Basin Extent and Thickness

Geologic units are categorized in terms of aquifer properties into two broad categories: (1) water-bearing units composed of "unconsolidated" sedimentary deposits and (2) non-water-bearing units composed of "consolidated" sedimentary deposits and crystalline rocks. The "unconsolidated" deposits allow water to infiltrate into them, be stored within them, and flow through them. The "consolidated" deposits impede groundwater infiltration, storage, and flow.

The unconsolidated, water-bearing sediments are those with sufficient permeability and storage potential to both store and convey groundwater. Less consolidated materials allow for greater permeability of water. In terms of the defined geologic units, the unconsolidated sediment applies to the Careaga Sand, Paso Robles, and younger formations.

Non-water-bearing units are consolidated sediments or rock that have low porosity, low hydraulic conductivity, or a combination of the two. Low porosity means there is relatively little space to contain groundwater. Low hydraulic conductivity means groundwater is transmitted relatively slowly. Consolidation such as cementation and compaction of sedimentary units reduces both porosity and hydraulic conductivity. Crystalline units in the area include igneous and metamorphic rocks, which are also significantly older and have no porosity, which is characteristic of their original extrusion. However, crystalline rock formations may have fractures resulting in localized instances of increased storage capability and hydraulic conductivity, which may be suitable for limited use such as domestic water supply, but as a general rule they are considered non-water-bearing. Within the defined geologic units of the WMA, these include the Foxen Formation, Sisquoc Formation, Monterey Formation, and the older formations.

2a.2-1-1 Western Management Area Definable Bottom of the Basin

The boundary between the water-bearing and underlying non-water-bearing geologic units form the "definable bottom of the basin"[61] and "lateral basin boundaries," [62] as defined by the SGMA. Regarding the lateral basin boundaries, the current DWR Bulletin 118 Basin boundary[63] is very close to the geologic contact between consolidated deposits (Foxen, Sisquoc, Monterey, and the older formations) and unconsolidated deposits (formations younger than or equal to Careaga) shown in **Figure 2a.1-1**. However, there are some minor differences with the geology mapped by Dibblee (Figure 2a.1-1) and the current WMA boundary. For example, in the area north of Vandenberg Village, the Orcutt Sand is mapped by Dibblee to extend about 2,000 feet north of the current WMA Boundary. However, throughout most of the area, the current WMA boundary lies within a couple hundred feet of the surface geology mapped by Dibblee (Figure 2a.1-1).

61 23 CCR § 354.14(b)(3) The definable bottom of the basin.
62 23 CCR § 354.14(b)(2) Lateral basin boundaries, including major geologic features that significantly affect groundwater flow.
63 SGMA Portal – Basin Boundary Modification Request System. Department of Water Resources. Website. https://sgma.water.ca.gov/basinmod/ Accessed 2021-09-02.

Based on the three-dimensional geological model (Geosyntec 2020), the *definable bottom of the Basin* was mapped using the contact between the consolidated deposits (Foxen, Sisquoc, Monterey, and the older Formations) and unconsolidated deposits (formations younger than or equal to Careaga) as the base elevation. The Basin bottom elevation has been contoured and is shown on **Figure 2a.2-1**. The lateral Basin boundaries are also shown in Figure 2a.2-1 as approximated by the WMA basin boundary, where the basin bottom intersects the land surface and is analogous to the hard bottom and side that contains an aquifer.

The combined thickness of the Basin unconsolidated deposits is shown in **Figure 2a.2-2**. This is the maximum depth of a groundwater well in an aquifer throughout the Basin. The variation of the thickness of the unconsolidated deposits across the WMA is shown in Figure 2a.2-2. The saturated thickness of the aquifer at any particular time, or volume of water, is dependent on current groundwater elevations and other factors.

2a.2-2 Principal Aquifers and Description for Each Western Management Area Subarea

The aquifers present within the six subareas of the WMA (**Figure 1d.1-3**, Plan Area) are divided into two Principal Aquifers: Upper Aquifer and Lower Aquifer. Non-water bearing geologic formations and perched groundwater systems are not subject to SMGA and are not principal aquifers. The ~~subflow~~underflow of the Santa Ynez River flowing through the Santa Ynez River alluvium upstream of the Lompoc Narrows is managed by SWRCB under WR 2019-0148 and is also not a principal aquifer~~.~~ (Appendix 2a-B). **Figure 2a.2-3** shows the areal extents of the two principal aquifers based on the three-dimensional geological model (Geosyntec 2020).

An aerial view of the location of two aquifer cross-sections is provided in **Figure 2a.2-4**[64]. Cross-sections of the Upper Aquifer and Lower Aquifer in the Lompoc Plain and Lompoc Upland are provided in **Figure 2a.2-5a** and **Figure 2a.2-5b**. These aquifer cross-sections are from the Lompoc Groundwater Management Plan (West Yost 2013), based on extensive studies conducted by the USGS in the Lompoc

64 The zones in Figure 2a.2-4 correlate with management zones used by the Santa Ynez River Water Conservation District (Stetson 2021), which correlate with five of the six subareas of the WMA. Zone A represents the Santa Ynez River Alluvium. Zone B represents the Lompoc Plain, Lompoc Upland, and Lompoc Terrace. Zone F represents the Santa Rita Upland.

area (Bright et al. 1992; Bright et all. 1997). A description of the Upper and Lower Aquifers in each subarea is provided in the sections below.

2a.2-2-1 Upper Aquifer

The Upper Aquifer consist of Santa Ynez River gravels, younger and older alluvial deposits, and other younger alluvial geologic formations that are found throughout the WMA. Most of the extracted groundwater is from the alluvial areas of the Lompoc Plain. The Upper Aquifer is found in the Lompoc Plain and partially in the Lompoc Terrace adjacent to the Lompoc Plain.

Upper Aquifer in the Lompoc Plain

In the Lompoc Plain subarea, the Upper Aquifer corresponds to the Quaternary alluvium and terrace deposits of the Santa Ynez River. The Lompoc Plain Upper Aquifer is commonly divided into three water-bearing zones[65]: (1) the shallow zone; (2) the middle zone; and (3) the main zone, as described by the USGS (Bright et al. 1992) and adopted locally (West Yost 2013). The three zones in aquifer cross-section A-A' along the Santa Ynez River from east to west are shown in **Figure 2a.2-5a**. This cross-section is from the Lompoc Groundwater Management Plan (West Yost 2013) and agrees with **Figure 2a1-3a**; geologic cross-section A-A' (Geosyntec 2020), although each focus on different details.

The shallow and middle zones of the Quaternary alluvium are also referred to as the upper member of the alluvium (Upson and Thomasson 1951; Berenbrock 1988). The shallow zone in **Figure 2a.2-5a** includes river-channel deposits and predominately fine-grained sand, silt, and clay deposits of the alluvium that confine or partly confine the underlying deposits in the western, central, and northeastern portions of the subarea. The middle-zone deposits are similar to the shallow zone but contain interbedded lenses of coarse-grained sand and gravel deposits (HCI 1997; Bright et al. 1992). The medium to coarse sand and gravel areas in the upper member of the younger alluvium (shallow and middle zones) are described as follows (Upson and Thomasson 1951, p. 48):

65 These layers of the younger alluvium are also referred to as the upper and lower members (Upson and Thomasson 1951; Berenbrock 1988) with the lower member correlating with the "Main Zone" in the City of Lompoc Groundwater Management Plan (West Yost, 2013). Note for the purposes of the WMA Groundwater Sustainability Plan, the younger alluvium (Qya) constitutes a Principal Aquifer, the Upper Aquifer, while these layers within the younger alluvium are considered part of this aquifer system.

Figure 2a.2-1
Bottom of the Basin Subsurface Elevation Contour Within Western Management Area

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Figure 2a.2-2
Maximum Thickness of the Basin Within Western Management Area

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Figure 2a.2-3
Areal Extents of Principal Aquifers, Western Management Area

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Figure 2a.2-4
Santa Ynez River Water Conservation District, Groundwater Zones and the Western Management Area

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Figure 2a.2-5a
Western Management Area Cross Section A-A’

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Figure 2a.2-5b
Western Management Area Cross Section B-B’

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> In tributary canyons along the south margin of the Lompoc plain and along the Santa Ynez River the upper member of the younger alluvium is predominantly sand and gravel and contains only thin, discontinuous beds of clay or silt. The coarsest deposits are those penetrated by wells along the river within a few thousand feet downstream from Robinson Bridge, where very little silt or clay intervenes between the river channel deposits and the lower member of the younger alluvium.

These areas of coarser deposits in the upper part of the younger alluvium, particularly along the Santa Ynez River downstream of Robinson Bridge, are important areas of streamflow infiltration from the Santa Ynez River and tributaries.

The main zone includes the lower member of the alluvium. Medium to coarse sand and gravel comprise this zone. The main zone throughout most of the Lompoc Plain subarea is separated from the middle zone by lenses of silt and clay that result in confined or partially confined conditions in the main zone. However, in the eastern, southern, and northern portions of the Lompoc Plain subarea, the confining deposits are less continuous or absent, allowing movement of groundwater between the shallow, middle, and main zones.

Typical total thickness of the Upper Aquifer in the Lompoc Plain ranges from 160 feet to 200 feet, except in the far eastern portion of the Lompoc Plain east of the Santa Ynez River, where the total thickness ranges from 0 to 100 feet (**Figure 2a.2-5a**). Based on a study by USGS (Bright et al. 1992), the main zone of the Upper Aquifer is absent in the southern portion of the Lompoc Plain (south of Central Avenue in the City of Lompoc) (**Figure 2a.2-5b**).

The divisions of the Lompoc Plain Upper Aquifer are difficult to distinguish in well completion reports. In general, the texture of the three zones is such that the preponderance of coarse-grained textures increases with depth (HCI 1997). The main zone or lower member of the Upper Aquifer has historically been the primary source of water from the Lompoc Plain subarea.

The Upper Aquifer in the southern and eastern portions of the Lompoc Plain is underlain by Careaga Sand. In the western portion of the Lompoc Plain, which includes the estuary adjacent to the Pacific Ocean, the Upper Aquifer alluvium overlies the Sisquoc Formation or the Monterey Formation (**Figure 2a.1-3a**; geologic cross-section A-A').

The intermediate-scale permeability of the younger alluvium ranges from 10 to 400 feet per day within the shallow zone (including the more permeable river channel deposits directly adjacent to the Santa Ynez River), 10 to 20 feet per day within the middle zone, and 300 to 400 feet per day within the main zone (West Yost 2013).

Description of Other Surface Geologic Units Not Under the Jurisdiction of SGMA (Surface and Perched Waters)

Three subareas of the WMA, the Santa Ynez River Alluvium, the Burton Mesa and south Lompoc Terrace, contain waters that are not in a principal groundwater aquifer under SGMA jurisdiction due to being surface or perched water. However, the water budget for these subareas has been incorporated into the water budget of the WMA and as recharge for the principal aquifers. A conceptual diagram showing water flow is **Figure 2a.2-6**. Section 2a.3 describes controls on inflows into the groundwater system, and Section 2a.4 describes uses and outflows of water out of the groundwater system.

The Burton Mesa and south Lompoc Terrace are uplifted marine terraces and not included in the WMA groundwater model because they are disconnected from the principal aquifers in the WMA. Groundwater in these two subareas is perched, and therefore not representative or correlative to the principal groundwater aquifers of the WMA. The water budget for these subareas has been incorporated as recharge for the active cells in the WMA groundwater model (Appendix 2c-A).

WMA Portion of the Santa Ynez River Alluvium

The WMA Santa Ynez River Alluvium subarea consists of alluvial deposits. As described in terms of geology, this includes relatively thin terrace deposits (Upson and Thomasson 1951) and recent and active river channel deposits overlie bedrock of primarily (Monterey Formation). Non-water-bearing consolidated geologic units also form the lateral boundaries as exposed bedrock in this area (**Figure 2a.1-3c**; geologic cross-section E-E').

Figure 2a.2-6
Groundwater Flow Concept, Western Management Area

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The occurrence of water in the WMA Santa Ynez River Alluvium is considered and regulated as surface water because it flows through a known and defined channel. Water flowing in known and definite channels is not groundwater as defined by SGMA.[66] Surface water is managed by and subject to the jurisdiction of the California State Water Resources Control Board and is not subject to SGMA management by the WMA GSA.

The deposits of Santa Ynez River Alluvium consist of fine-to-coarse sand, gravels, and thin discontinuous lenses of clay and silt. Santa Ynez River alluvial deposits are relatively thin, with typical thicknesses of 60 to 80 feet, with local thicknesses of more than 100 feet. Wells completed within these deposits typically yield a few hundred to as high as 1,500 or more gallons per minute (gpm). These deposits underlie the floodplain and active river channel. The younger alluvium consists of clay, silt, sand, and gravel beneath the alluvium and floodplain along the Santa Ynez River (Wilson 1959). The permeability of these deposits ranges from 100 to 700 feet per day (Upson and Thomasson 1951).

Perched Groundwater in WMA Orcutt Sand Deposits: Lompoc Upland, Santa Rita Upland, Burton Mesa, and Lompoc Terrace

Orcutt Sand, which is extant in the Lompoc and Santa Rita Upland, Lompoc Terrace, and Burton Mesa (**Figure 2a.1-1**), is composed of coarse sand, silt, and clay of mostly non-marine origin, with permeability of about 5 feet per day. In the upland and terrace locations, including the Lompoc Terrace, Burton Mesa, Lompoc Upland, and Santa Rita Upland, groundwater is sometimes locally present in "shallow" perched conditions. This occurrence is described as follows (Miller 1976, p. 24):

> Beneath the upland and terrace, the Orcutt Sand locally contains perched groundwater. Water levels in wells that tapped perched zones beneath the uplands in 1972 generally were more than 100 ft higher than levels in the underlying Paso Robles Formation and Careaga Sand.

Perched groundwater in the Orcutt Sand deposits on the Burton Mesa subarea is shown on a conceptualized hydrogeologic cross-section in **Figure 2a.2-7** (Arcadis 2016). The shallow groundwater

[66] CWC Section 10721 (g) "Groundwater" means water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water, but does not include water that flows in known and definite channels.

system in the Burton Mesa varies locally, existing either on top of the non-water-bearing shale that underlies the entire mesa, or on top of clay layers within multiple lenses throughout the subarea.

Currently, perched groundwater units, including the Orcutt Sand deposits on the Burton Mesa, have limited storage capacity and are not considered a primary water source in the WMA. The Orcutt Sand deposits of the VSFB are located above the deposits in the Lompoc Plain and separated by Monterey Shale as shown in **Figure 2a.1-3a**, geologic cross-section B-B'. Orcutt Sand has not been included in historical investigations of groundwater in the WMA, most likely due to their perched condition and separation from the regional saturated flow of the Upper and Lower Aquifers in the Lompoc Plain and Lompoc Upland (SBCWA 1999; Stetson 1992, 2021; Miller 1976; Bright 1997; West Yost 2013). The thickness of the Orcutt Sand varies in the WMA from 0 to 300 feet (Bright et al. 1992).

Groundwater in Orcutt Sand exists in unsaturated conditions (Bright 1997) and contributes to the recharge of the Lower Aquifer, including the Paso Robles and Careaga Formations in the Lompoc Upland and Lompoc Terrace. Where there is no Lower Aquifer and only older consolidated non-water-bearing formations, as is the case in the Burton Mesa and the southwestern portion of the Lompoc Terrace, water is most likely discharged to local tributaries or springs (Arcadis 2016). This discharge is seen as the interflow component of streamflow hydrographs.

WMA Younger Alluvium in Lompoc Terrace Outside of Santa Ynez River Watershed

Additional small quantities of groundwater are found in the Younger Alluvium in the small coastal drainages that exist in the Lompoc Terrace subarea, including Bear Creek, which is outside of the Santa Ynez River watershed. This area is usually not included in the regional groundwater resources for the Lompoc area due to it being outside of the Santa Ynez River watershed. Due to the small size of the drainage, alluvial deposits are estimated to be less than 30 feet thick with low groundwater storage capacity and has been scoured to bedrock in some locations (**Figure 2a.1-1**). Groundwater in bedrock and in well-defined channels surrounded by bedrock like in Bear Creek is not subject to SGMA.

Figure 2a.2-7
Simplified Conceptual Geologic/Hydrogeologic Cross Section, Vandenberg Space Force Base

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2a.2-2-2 Lower Aquifer

The Lower Aquifer consists primarily of the Paso Robles and Careaga Formations. These formations are found in the axis of the Santa Rita Syncline, which trends from the Santa Rita Upland through the Lompoc Upland and continue under the Lompoc Plain and Lompoc Terrace. The Lower Aquifer is also the main aquifer in the Lompoc Terrace and Lompoc Upland (Bright et al. 1992). Groundwater conditions in the Lower Aquifer range from unconfined to confined in the Lompoc Upland and confined in the Lompoc Plain (Bright et al. 1997).

These Lower Aquifer units are older and more consolidated than younger alluvial formations that make up the Upper Aquifer. The Lower Aquifer units lie unconformably beneath the Upper Aquifer units. The Lower Aquifer locally outcrops on the Lompoc Terrace and along the south side of the Purisima Hills.

The Paso Robles Formation is composed of fine to coarse sand, silt, and clay of non-marine origin, with permeabilities that range from 10 to 100 feet per day. The lower part of the Paso Robles Formation is finer grained than the upper part. Except for parts of the Lompoc Upland and the eastern portion of the Lompoc Plain by the Santa Ynez River, the Paso Robles Formation is either completely unsaturated or not present in the Lompoc area (Bright et al. 1992). The younger Paso Robles Formation conformably overlies the Careaga Formation.

The Careaga Formation has two major components: the upper or Graciosa Member with medium to coarse sand, and the lower or Cebada Member with typically finer sand. The Graciosa Member of the Careaga Sand is the main producer of groundwater in the Lower Aquifer (Bright et al. 1992). Hydraulic conductivity of the Cebada Member ranges from 0.1 to 3 feet per day beneath the plain. Hydraulic conductivity of the Graciosa Member ranges from about 5 feet per day beneath the Lompoc Plain to 90 feet per day beneath the Lompoc Upland (Bright et al. 1992).

Lower Aquifer in the Lompoc Plain Subarea

The Lower Aquifer is located under the Upper Aquifer in the Lompoc Plain. The Lower Aquifer is absent in the western portion of the WMA near the Pacific Ocean, but approximately five miles inland, the Careaga Formation is present beneath the Upper Aquifer and throughout the rest of the Lompoc Plain, as shown in Figure 2a.2-5a and Figure 2a.2-5a. The Paso Robles formation is only located east of the Santa Ynez

River in the Lompoc Plain. Most of the City of Lompoc has the Lower Aquifer underneath it. Groundwater in the Lower Aquifer beneath the Lompoc Plain is confined or partly confined by the stratified deposits that form this aquifer (Paso Robles Formation and Graciosa Member of the Careaga Sand), and by the overlying fine-grained deposits in the Upper Aquifer (Bright et al. 1992).

Lower Aquifer in the Lompoc Upland Subarea

As described above, the Lower Aquifer extends from the Lompoc Plain to the north northeast into the Lompoc Upland). In the Lompoc Upland, the Paso Robles Formation forms part of the Lower Aquifer beneath the Lompoc Upland (Figure 2a.1-3a, geologic cross-_section B-B'). However, much of the Paso Robles Formation beneath the Lompoc Upland is unsaturated (Bright et al. 1992). The saturated portions of the Lower Aquifer in the Lompoc Upland are primarily the Careaga Formation. Prior to groundwater development, groundwater in the Lower Aquifer of the Lompoc Upland followed the surface topography and flowed into the Lower Aquifer of the Lompoc Plain. During very wet periods, recharge to the Lompoc Upland aquifer can occur from infiltration of the Santa Ynez River (Berenbrock 1988; pg. 15). Under developed conditions, groundwater levels beneath the Lompoc Upland declined, and the exchange of groundwater between the Lompoc Upland and Lompoc Plain is determined by the relative magnitudes of recharge and pumping in the two subareas (West Yost 2013).

Lower Aquifer in the Lompoc Terrace Subarea

The Lompoc Terrace (the hilly area adjacent to the southwest part of the Lompoc Plain) is a down-faulted wedge of Careaga Sand overlain by Orcutt Sand. The Lower Aquifer is in the buried syncline that becomes broader and widens to the northeast. Only the lower Cebada Member of the Careaga Sand is present or saturated in the Lompoc Terrace (Bright et al. 1992). The groundwater in the Lower Aquifer of the Lompoc Terrace follows the surface topography and flows either into the Lower Aquifer of the Lompoc Plain to the northeast or into the adjacent coastal drainage outside of the Santa Ynez River watershed (Bear Creek).

Lower Aquifer in the Santa Rita Upland Subarea

The Lower Aquifer extends into the Santa Rita Syncline from the Lompoc Upland to the west and continues to the CMA Buellton Upland subarea to the east. The Lower Aquifer is found beneath younger Quaternary alluvial deposits like the Orcutt Sand and Quaternary Terrace deposits, as well as soils with high infiltration rates. Below an unconformity with the Orcutt Sand there is a syncline fold that includes the Paso Robles Formation and Careaga Sand underneath (Figure 2a.1-3c, geologic cross-section D-D'). Consolidated rocks (Tsq and Tm) that out-crop out in the Santa Rita Hills to the south of the Santa Rita Valley locally separate the Santa Ynez River riparian groundwater basins from the Santa Rita Upland (Figure 2a.1-3c, geologic cross-section D-D'; Upson and Thomasson 1951). Groundwater in the Lower Aquifer of the Santa Rita Upland flows westward, partly into the Lower Aquifer of the Lompoc Upland. However, more water level data is needed in the Santa Rita Valley to confirm the direction and rate of movement of groundwater in the Lower Aquifer in this subarea.

Aquifer properties of the Lower Aquifer appear consistent across the Santa Rita Syncline, including the Santa Rita Upland Lower Aquifer. Lower Aquifer deposits consist of fine to coarse sand, with permeabilities that range from 0.1 to 100 feet per day (Upson and Thomasson 1951; Wilson 1959; Bright et al. 1992, 1997).

2a.2-3 Summary of Upper and Lower Aquifer Properties

In the Upper Aquifer of the WMA, the permeability, or hydraulic conductivity, of the alluvial deposits varies widely upon location and depth. The permeability of the river gravel deposits along the Santa Ynez River ranges from 100 to 700 feet per day (Upson and Thomasson 1951). The permeability of the younger alluvium within the shallow zone (including the more permeable river channel deposits directly adjacent to the Santa Ynez River) ranges from 10 to 400 feet per day, 10 to 20 feet per day within the middle zone, and 300 to 400 feet per day within the main zone (West Yost 2013). Similarly, storage coefficients range widely in the Upper Aquifer depending upon location and depth. The specific yield of the river gravel deposits along the Santa Ynez River is estimated as 30 percent (Bright et al. 1997). The specific yield of the shallow and middle zones of the Upper Aquifer in the Lompoc Plain range from 0.1 to 18 percent (Bright et al. 1997). In the main zone of the Lompoc Plain Upper Aquifer, the storage coefficient has been estimated to range from 0.02 to 0.2 percent.

In the Lower Aquifer in the WMA, the permeability and storage coefficients are generally less than the Upper Aquifer alluvial deposits. Hydraulic conductivity of the Graciosa Member of the Careaga Sand Formation (upper Careaga) ranges from about 5 feet per day beneath the Lompoc Plain to 90 feet per day beneath the Lompoc Upland (Bright et al. 1992). Hydraulic conductivity of the Cebada Member of the Careaga Formation (lower Careaga) ranges from 0.1 to 3 feet per day beneath the Lompoc Plain. The Paso Robles Formation has a similar range of hydraulic conductivity as the Careaga Sand. The storage coefficients for the Lower Aquifer have been estimated to range from 0.04 to 0.08 percent (Bright et al. 1997). The specific yield for unconfined portions of the Lower Aquifer have been estimated from 7.5 to 20 percent (HCI 1997).

The wells in the WMA with available aquifer pump tests were analyzed. The data are from well completion reports from DWR, County of Santa Barbara Department of Environmental Health Services[67], and local water agencies. Most data is from the County of Santa Barbara because the County requires a pump test for wells that are permitted as a single parcel and as multiple-parcel water systems, State small water systems[68], and Public Water Systems with less than 200 service connections.[69] Most of the tests are of short duration and only include one observation of drawdown. Specific capacity data was analyzed for 74 pump tests in the Upper Aquifer with well depths of less 220 feet and for 69 pump tests in the Lower Aquifer with well depths greater than 220 feet.

Using the available pump-test data, the median yield, specific capacity, and hydraulic conductivity were calculated for each aquifer. The hydraulic conductivities were estimated using the methodology from Driscoll (Appendix 16D in Driscoll 1986;). The median yield of the pump tests was estimated to be 1,000 gallons per minute (gpm) for the Upper Aquifer and 500 gpm for the Lower Aquifer. The median specific capacity was estimated as 25 gpm per foot of drawdown for the Upper Aquifer and 6 gpm per foot of

67 Acting as Local Primacy Agency (LPA) under Health and Safety Code 116325 et seq.
68 Health and Safety Code Section 116275 (n) “State small water system” means a system for the provision of piped water to the public for human consumption that serves at least five, but not more than 14, service connections and does not regularly serve drinking water to more than an average of 25 individuals daily for more than 60 days out of the year
69 Health and Safety Code Section 116330 (a) [..] This delegation shall not include the regulation of community water systems serving 200 or more service connections. [..]

drawdown for the Lower Aquifer. The median hydraulic conductivities of 160 feet per day (ft/day) was calculated for the Upper Aquifer and 10 ft/day for the Lower Aquifer.

2a.3-1-1 Estimated Groundwater Age

Mapping done by Lawrence Livermore National Laboratory used tritium (^3H) helium (^3He) to estimate groundwater age (**Figure 2a.2-8**). This is an estimate of when the water last was in the atmosphere (Visser et al. 2014). This indicates the oldest groundwater is in the Santa Rita Upland at 40 to 50 years old, followed by the Lompoc Upland at 25 to 40 years old. The central and east Lompoc Plain has an average age of 14–25 years. The youngest water, less than 14 years old, indicating the highest vulnerability, is in the vicinity of the Santa Ynez River Estuary and in the perched water of the Burton Mesa and the Lompoc Terrace.

Groundwater age is related to the relative amount of water that is recharged; younger water indicates higher recharge. In terms of water quality, younger water has high vulnerability to groundwater contamination from the surface, but quicker recovery from contamination. The water budget (Section 2c) uses a modeling method to estimate flows, unlike this trace isotope method.

2a.3-1-2 Water Quality in the Western Management Area

Issues related to the degradation of water quality in the WMA most frequently pertain to excessive salinity and hardness (RWQCB 2019).

In the Upper Aquifer of the WMA, the salinity measured as Total Dissolved-Solids (TDS) concentration of groundwater in the central and western Lompoc Plain has increased from less than 1,000 milligrams per liter (mg/L) in the 1940s to greater than 2,000 mg/L in the 1960s (Bright 1997). Groundwater quality was observed to deteriorate from east to west (Berenbrock 1988). Groundwater conditions in the Lompoc Plain are influenced by the quantity and quality of Santa Ynez River streamflow and Cachuma Project operations. More recent data from water supply wells indicate a decrease in TDS concentrations (West Yost 2013).

The Upper Aquifer of the WMA also has samples for some wells with water quality concentrations exceeding maximum or secondary contaminant levels for drinking water and impairment for irrigation, including the parameters of sodium, chloride, nitrate, hardness, alkalinity, and iron (Berenbrock 1988). In addition, the parameters of arsenic and manganese have exceeded contaminant levels in some well samples in the Lompoc Plain as provided in California's Groundwater Ambient Monitoring Assessment (GAMA) program (Haas et al. 2019).

In the Lower Aquifer of the WMA, the TDS concentration of groundwater are generally less than 1,000 mg/L (Bright 1997). The main water quality issue with the lower aquifer is hardness (Allen 2020). In addition, the parameters of arsenic, iron, and manganese have exceeded contaminant levels in some well samples in the Lompoc Upland and on Vandenberg Space Force Base (Haas et al. 2019). Some wells within the Vandenberg Space Force Base also show water quality impairments due to nitrate, sulfate, and hexavalent chromium (Haas et al. 2019).

The current status of the WMA groundwater quality is discussed in detail in Groundwater Conditions (Section 2b). Monitoring Network (Section 3a) discusses current and future monitoring, and Sustainable Management Criteria (Section 3b) identifies specific monitoring targets as well as time series graphs.

Figure 2a.2-8
Relative Groundwater Age, Western Management Area

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2a.3 HYDROLOGIC CHARACTERISTICS

Hydrologic characteristics of the WMA related to groundwater recharge, including aerial precipitation recharge, mountain-front recharge, and streamflow infiltration, are presented in this section. Additional details for these topics are discussed in Water Budget (Section 2c) which also quantifies the hydrologic inflows and outflows of the WMA.

2a.3-1 Topography

The topography of the WMA is a major factor on the movement of surface water and groundwater and magnitude of precipitation and groundwater recharge. Groundwater movement in the WMA follows the surface topography. The WMA boundary, topography, and various geographic features within or adjacent to the area are shown in **Figure 2a.3-1**. Ground surface elevations in the WMA vary from sea level (0 feet)[70] at the Santa Ynez River estuary to more than 1,000 feet above sea level in the surrounding hills. The City of Lompoc is about 80 to 100 feet above sea level, and the elevation of the Santa Rita Valley is about 400 to 500 feet. The terrain south of the Santa Ynez River rises steeply from the river to the Santa Ynez Mountain range. North of the Santa Ynez River the rise in elevation is gradual over upland terraces and toward the Purisima Hills. Burton Mesa and Lompoc Terrace are about 450 and 350 feet, respectively.

2a.3-2 Precipitation

Precipitation within the WMA is in largely driven by orthographic lift effects and portions of the WMA at lower elevations generally receive less direct precipitation. **Figure 2a.3-2** shows the average precipitation within the WMA and adjacent watersheds (watershed extents discussed below in Section 2a.3-4). Direct annual average precipitation ranges from 13 inches per year at the Santa Ynez River estuary to 20 inches per year at a corner of the Lompoc Terrace. WMA subareas annual average direct precipitation are summarized in the following table (**Table 2a.3-1**), and more detail breakdowns are found in the Water Budget (Section 2c).

70 In accordance with 23 CCR § 351 (v), elevations are in North American Vertical Datum of 1988 (NAVD88).

Table 2a.3-1
Summary of Average Annual Precipitation by WMA Subarea

WMA Subarea	Average Annual Precipitation (Average 1981-2010)
Lompoc Plain	13 – 17 in/year
Santa Rita Upland	16 – 18 in/year
SYR Alluvium	15 – 18 in/year
Lompoc Upland	14 – 17 in/year
Burton Mesa	14 – 15 in/year
Lompoc Terrace	14 – 20 in/year

Source: Derived from PRISM Climate Group (2014), Average Annual Precipitation 1981-2010.

Precipitation gages for the WMA and adjacent areas are also shown on **Figure 2a.3-2**. Within the WMA precipitation is measured at Lompoc City Hall. Data for Water Year 1955-present (2021) is presented in **Figure 2a.3-3**. Shown in Figure 2a.3-3 is the annual precipitation and the cumulative departure from mean (CDM) for this data. CDM trends shows how relatively wet or dry a series of years are to the period of record. The Water Budget (Section 2c) additionally discusses precipitation and future projections.

2a.3-3 Soils and Infiltration

Precipitation and agricultural return flows can infiltrate to become groundwater, evaporate into the atmosphere, or run off to become surface water. Soil properties and slope are important controls on infiltration and runoff as well as indicate the potential for specific agricultural use. The soil characteristics of the WMA in terms of their potential infiltration rates are shown in **Figure 2a.3-4**.

Soils are the combination of minerals, organic matter, living organisms, gas, and water that are located at land surface. Their total composition and elevation greatly affect their infiltration rate and contribution to groundwater recharge in addition to the types of unconsolidated or consolidated sediments underlying them.

Figure 2a.3-1

Topography, Western Management Area

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Figure 2a.3-2

Precipitation Stations and Isohyetals, Western Management Area

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Figure 2a.3-3

Lompoc City Hall Precipitation and Cumulative Departure from Mean, WY 1955-2020

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Figure 2a.3-4

Soil Characteristics, Western Management Area

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2a.3-3-1 Natural Recharge Areas

The areas of soils with high infiltration rates (**Figure 2a.3-5**) relate to the areas of existing recharge. Key areas for recharge to the Lower Aquifer include along the Purisima Hills in the Lompoc Upland and Santa Rita Upland, and to a lesser extent in the Lompoc Terrace and Burton Mesa. Additionally, the Lompoc Plain receives most of its substantial recharge from the Santa Ynez River[71] and much lesser quantities from percolation of runoff in the tributaries in the adjoining subareas. Percolation from the Santa Ynez River channel is the most important source of recharge for the Lompoc Plain, and is controlled by the magnitude and timing of releases from Cachuma Reservoir (West Yost 2013). The Lompoc Terrace, Lompoc Upland and Santa Rita Upland subareas do not receive recharge from Santa Ynez River infiltration but contain large surface areas of soils with high infiltration rates (**Figure 2a.3-5**).

The Water Budget (Section 2c), uses the estimates of total recharge from the USGS Basin Characterization Model (BCM). This USGS model used monthly climate data precipitation and soils information to estimate the volume of groundwater recharge.

2a.3-3-2 Potential Groundwater Recharge Areas

In addition to natural recharge, DWR recommends[72] including in the GSP the Soil Agricultural Groundwater Banking Index map (**Figure 2a.3-5**), which is a classification of the suitability of agricultural land for use in groundwater banking conducted by UC Davis. Groundwater banking means using artificial recharge to store water in the aquifer for later withdrawal through pumping.

The Soil Agricultural Groundwater Banking Index ratings are only available for agricultural land and are based on a combination score using the following five factors[73] to ensure that an artificial recharge project would be successful, including limited adverse impact on existing crops.

1. Deep percolation

---

71 In the Lompoc Plain subarea, the green area shown on Figure 2a.3-4 (soil types with high infiltration rates) overlies primarily the Santa Ynez River.

72 DWR. 2016. *Best Management Practices for Sustainable Management of Groundwater*. Hydrogeologic Conceptual Model.

73 A.T. O'Geen, Matthew, B.B. Saal, Helen E. Dahlke, David A. Doll, Rachel B. Elkins, Allan Fulton, Graham E. Fogg, Thomas Harter, Jan W. Hopmans, Chuck Ingles, Franz J. Niederholzer, Samuel Sandoval Solies, Paul S. Verdegaal, and Mike Walkinshaw. 2015. "Soil Suitability Index Identifies Potential Areas for Groundwater Banking on Agricultural Lands." *California Agriculture* 69(2):75–84. doi: 10.3733/ca.v069n02p75.

2. Root zone residence time
3. Topography
4. Chemical limitations
5. Soil surface condition

Potential groundwater banking projects will be described in further detail when projects and management actions are developed for the WMA. Potential areas for artificial recharge have been identified along the Santa Ynez River and in the Santa Rita Upland, identified as "excellent" as shown on **Figure 2a.3-5**.

2a.3-4 Runoff and Surface Flows

The WMA aquifers are recharged by rainfall in the watershed and infiltration of surface flows in the Santa Ynez River and tributaries. Infiltration from the Santa Ynez River is the primary source of recharge to the aquifers that underlie the Lompoc Plain. These flows are supplemented by water-rights releases into the Santa Ynez River from Bradbury Dam at Lake Cachuma.

2a.3-4-1 Santa Ynez River Watershed

The WMA is primarily composed of the Santa Ynez River watershed, as shown in **Figure 2a.3-6**.[74] Marginal areas in the southwest (Lompoc Terrace) and northwest (Burton Mesa) of the WMA (**Figure 2a.3-7**)[75] are outside the Santa Ynez River watershed. The larger Santa Ynez River watershed is a catchment area for the Santa Ynez River upstream of the WMA, a major source of recharge to the WMA, especially within Santa Ynez River Alluvium underflow above the Lompoc Narrows and the Lompoc Plain. Streamflow infiltration of the Santa Ynez River into the Upper Aquifer particularly occurs in the eastern Lompoc Plain, from the Lompoc Narrows at Robinson Bridge to V Street, which is referred to as the Lompoc Forebay.

Precipitation, water imports, and other water sources in the Santa Ynez River watershed outside of the WMA interact with the WMA through a few routes:

74 Santa Ynez, Hydrologic Unit 18060010: 573,819 acres.

75 HUC in Figure 4-5 refers to the Hydrologic Unit Code. HUC 8 and 10 are watersheds and sub-watersheds delineated by USGS using a nationwide system.

Figure 2a.3-5

Potential Groundwater Recharge Areas, Western Management Area

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Figure 2a.3-6

Santa Ynez River Watershed and Santa Ynez River Valley Groundwater Basin, Western Management Area

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Figure 2a.3-7

Tributary Drainage Areas, Western Management Area

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- As runoff to surface water streams and rivers, which flows as surface water and ~~subflow~~underflow into the WMA. Examples are waters of the Santa Ynez River, Salsipuedes Creek, and San Miguelito Creek.
- As mountain front groundwater recharge, which is the subsurface inflow of groundwater to lowland aquifers from adjacent mountains. This likely occurs in upper elevations of the Santa Rita Upland.
- As groundwater flow between management areas. Increasing groundwater pressure as a result of infiltration in the CMA may result in groundwater flowing into the WMA. This may occur along the eastern boundary of the Santa Rita Upland subarea and as ~~subflow~~underflow through the Santa Ynez River Alluvium.

2a.3-4-2 Santa Ynez River and Tributaries

The Santa Ynez River flows west over approximately 90 miles from its headwaters in the San Rafael and Santa Ynez Mountains, to the Pacific Ocean, draining approximately 900 square miles. The Santa Ynez River headwaters originate in the Santa Ynez and San Rafael Mountains at an elevation of about 4,000 feet near the eastern boundary of Santa Barbara County, with average annual precipitation of up to 49 inches per year.[76] The Santa Ynez River has three dammed reservoirs upstream of the WMA and the CMA: Jameson Reservoir is the farthest upstream, then Gibraltar Reservoir, and finally Cachuma Reservoir (Lake Cachuma) (**Figure 2a.3-6**). Although reservoir releases do flow into the Santa Ynez River, the reservoirs are also managed to divert water out of the Santa Ynez River watershed via a system of tunnels through the Santa Ynez Mountains for use by the cities located on the Santa Barbara County south coast (i.e. Goleta and Santa Barbara).

Downstream of Bradbury Dam, the dam that forms Lake Cachuma, the Santa Ynez River continues flowing west, with the River ~~subflow~~underflow entering a bedrock-confined channel in the western portion of the CMA. After entering the WMA, the Santa Ynez River then flows through a series of meanders incised into confining bedrock units (Monterey Formation) until entering the forebay at the Lompoc Narrows. Historical flows of the Santa Ynez River at the Lompoc Narrows are shown on **Figure 2a.3-8**. Thereafter, it flows northwest and west across the Lompoc Plain, discharging to the Santa Ynez River estuary and the

76 PRISM Climate Group. 2014. *Average Annual Precipitation 1981–2010.*

Pacific Ocean. The flow of the Santa Ynez River is primarily intermittent throughout the Basin, carrying mainly flood flows from tributary watershed land downstream of Bradbury Dam and occasional spills and releases of water from Lake Cachuma. During summer months, water is released from Lake Cachuma to meet downstream water rights and releases for endangered steelhead (*O. mykiss*) as specified in the SWRCB Order, the Cachuma Project Settlement Agreement, and the National Marine Fisheries Service Biological Opinion (see Section 1d.5).

The two largest tributaries in the watershed join the Santa Ynez River in the WMA: Salsipuedes Creek and San Miguelito Creek (**Figure 2a.3-6** and **Figure 2a.3-7**). Salsipuedes Creek drains a 52-square-mile catchment area and joins the Santa Ynez River upstream of the Lompoc Narrows. **Figure 2a.3-8** shows historical flows at the Salsipuedes streamflow gage. San Miguelito Creek drains an approximate 13-square-mile catchment area before encountering a debris basin at the WMA southern boundary and entering a concrete channel constructed through the western portion of the City of Lompoc before meeting the Santa Ynez River. The Santa Ynez H street gage (Figure 2a.3-8) is above the confluence with San Miguelito Creek. San Miguelito Creek is the discharge point for tertiary treated water from the Lompoc Regional Wastewater Reclamation Plant, just upstream of the confluence with the Santa Ynez River. The Lompoc Wastewater Reclamation Plant has a design capacity of up to 5.5 million gallons per day[77] and collects effluent from the City of Lompoc, Vandenberg Village CSD, and VSFB.

2a.3-4-2-1 Downstream Water Rights Releases

A portion of the WMA is recharged by downstream water rights releases from Lake Cachuma as ordered by the Santa Ynez River Water Conservation District (SYRWCD) pursuant to the requirements of then applicable SWRCB orders. Water rights releases for users downstream of Lake Cachuma are set forth in the State Water Resources Control Board Order of 1973 (WR 73-37), as amended in 1989 (WR 89-18) and most recently in 2019 (2019-0148). These releases are based on the establishment of two accounts and accrual of credits (storing water) in Lake Cachuma for the Above and Below Lompoc Narrows areas. Releases from the Above Narrows Account are made at Bradbury Dam for the benefit of downstream water users between the dam and the Lompoc Narrows. Releases from the Below Narrows Account are conveyed to the Narrows for the benefit of water users in the Lompoc Plain. The SYRWCD designates the

[77] Dudek. 2019. *Santa Barbara County Integrated Regional Water Management Plan*. Update 2019.

Figure 2a.3-8

Annual Flows, Santa Ynez River

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riparian flow subarea as Zone A, as shown in Figure 2a.2-4. The figure shows the lower part the Above Narrows area, and SYRWCD designated Zone B (Lompoc Plain) in Figure 2a.2-4 indicates the Below Narrows area.

In addition, the Cachuma Project Settlement Agreement is an important component of downstream water rights releases. Pursuant to the Settlement Agreement between Cachuma Conservation Release Board, SYRWCD, Santa Ynez River Water Conservation District Improvement District No. 1, and the City of Lompoc, relating to operation of the Cachuma Project entered into on December 17, 2002 (2002 Settlement Agreement), State Water Project (SWP)[78] supplies are commingled with water rights releases. The objective of such commingling operations is to maximize delivery of SWP supplies to lower the salinity in the Lower Santa Ynez River at the Narrows.

2a.3-4-3 Water Imports

Water is primarily imported to VSFB in the WMA through the Coastal Branch Pipeline by Central Coast Water Authority (CCWA). Since 1997 this pipeline has delivered water from the State Water Project (SWP). Water is delivered at turnouts to specific water distribution systems, as well as to Lake Cachuma. Within the Basin, the receiving entities of SWP are VSFB, the City of Buellton, the City of Solvang, and the Santa Ynez River Water Conservation District Improvement District No. 1. CCWA water can also be mixed in with the water rights releases at Lake Cachuma based on the Cachuma Project Settlement Agreement. A map of the SYRVGB water import system is shown in **Figure 2a.3-9**. **Figure 2a.3-10** shows the annual imports through the CCWA pipeline to the WMA and to the entire SYRVGB. **Table 2a.3-2** summarizes major water chemistry in the CCWA pipeline, water quality is discussed in groundwater conditions (Section 2b.3).

Within the WMA, the only importer of water is at VSFB, which supplies the base with all of its water for all of its uses. VSFB receives water from the CCWA pipeline at the turnout located in the Burton Mesa area, and additionally has active groundwater wells located in the San Antonio Creek Valley Groundwater Basin (DWR Basin 3-14). The VSFB relies primarily on the SWP / CCWA water, and uses the wells in the San Antonio Well Field as a backup, particularly when the CCWA water delivery system is undergoing maintenance. Imported waters, from CCWA and the San Antonio groundwater basin, enter the Santa Ynez

78 The State Water Project (SWP) is the source of water delivered by the Central Coast Water Authority (CCWA).

River watershed via the domestic and municipal sewer flows from VSFB. Wastewater sourced from VSFB is collected from the Main Cantonment Area and conveyed to the Lompoc Regional Wastewater Reclamation Plant[79] before discharge to San Miguelito Creek, near the confluence with the Santa Ynez River.

Table 2a.3-2
Imported CCWA Water Quality in mg/L at
Polonio Pass Water Treatment Facilities

Calendar Year	Total Dissolved Solids (TDS)	Chloride (Cl)	Sulfate (SO4)	Sodium (Na)	Nitrate as Nitrogen (NO3 as N)
2020	280	70 (0 – 120)	63	56	-
2019	260	59 (13 - 146)	46	58	-
2018	220	81 (39 -140)	55	40	ND (<0.4)
2017	165 (77 – 394)	39 (8 -145)	30	24	-
2016	346 (194 – 442)	97 (41 – 138)	100	87	ND (<0.4)
2015	437 (349 – 708)	122 (80 – 205)	97	84	ND (<0.4)

Source: CCWA 2021. Ranges in parentheses indicate the measured range.
ND = non-detected, parenthesis is detection limit; - = not reported

2a.3-4-4 Treated Wastewater Sources

Wastewater treatment plants act as a point source of water flowing into the surface water system and/or where groundwater recharge is occurring.

Wastewater in the WMA is collected by the City of Lompoc, Federal Bureau of Prisons, Mission Hills Community Services District (CSD), Vandenberg Village CSD, and VSFB. Wastewater is conveyed to the following treatment facilities listed in **Table 2a.3-3** before it is discharged as treated effluent.[80] Locations of the WMA wastewater treatment plants and sewer collection areas are shown in **Figure 2a.3-11**.

79 Dudek. 2019. *Santa Barbara County Integrated Regional Water Management Plan*. Update 2019.
80 Dudek. 2019. *Santa Barbara County Integrated Regional Water Management Plan*. Update 2019.

Figure 2a.3-9

Water Imports, CCWA Pipeline and San Antonio Wells, Western and Central Management Area

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Figure 2a.3-10

Annual Water Imports, Central Coast Water Authority

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Figure 2a.3-11

Wastewater Treatment Plants, Western Management Area

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Table 2a.3-3
Wastewater Treatment Facilities

	Design Capacity		Service Area/ Contributors	Current Disposal Method (Permit)	Level of Treatment	Recycled Water Uses
	(mgd)	(AFD)				
Lompoc Regional Wastewater Reclamation Plant	5.5	16.9	City of Lompoc; Vandenberg Village CSD; Vandenberg SFB.	Discharge to Miguelito Creek (tributary to Santa Ynez River) (NPDES)	Tertiary	On-site irrigation and dust control
Mission Hills CSD	0.57	1.75	Mission Hills CSD	Percolation ponds (WDR)	Primary	Groundwater recharge
US Penitentiary – Lompoc	—	—	US Penitentiary	Percolation Ponds WDR	—	Groundwater recharge

Source: CCWA 2011, page 48.
mgd = million gallons per day; AFD = acre feet per day; WWTP = Wastewater Treatment Plant; NPDES = National Pollutant Discharge Elimination System;
WDR = waste discharge requirement; CSD = Community Services District; SFB = Space Force Base

Historical volumes of water that were collected for the Lompoc Regional Wastewater Reclamation Plant and the Mission Hills CSD systems are summarized in **Table 2a.3-4**.

Table 2a.3-4
Wastewater Influent Volumes

Calendar Year	Lompoc Regional Wastewater Reclamation Plant Influent	Mission Hills Community Services District Sewer Flows
	Acre Feet per Year	Acre Feet per Year
2020	3,133	n/a
2019	3,845	304
2018	3,719	251
2017	3,773	246
2016	3,511	300

Source: City of Lompoc (2021), MHCSD (2020)

VSFB includes remote areas served by leach fields, septic tanks, and package treatment plants. In addition to VSFB, there are domestic users located outside of the sewer collection areas, also on septic systems.

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2a.4 USES AND USERS OF GROUNDWATER IN THE WESTERN MANAGEMENT AREA

This section discusses the primary uses of groundwater in the WMA, and presents a summary of locations where groundwater pumping occurs. In addition, this section describes water use on agricultural lands, and discusses water use by phreatophytes.

2a.4-1 Primary Use of Groundwater

Groundwater production within the WMA for both the Upper and Lower Aquifers is for agricultural, domestic, municipal, and industrial uses including mining operations (wells utilized by the Imery mining operation). There are no managed wetlands in the WMA. Outside of the municipal users, including the City of Lompoc, Vandenberg Village CSD, Mission Hills CSD, VSFB, and the United States Penitentiary-Lompoc (USP or Penitentiary), most of the WMA is a mixture of rural areas with agriculture and some suburban development.

Groundwater production is reported by the Santa Ynez River Water Conservation District (SYRWCD) Annual Report (SYRWCD Annual Report) and includes the CMA and parts of the EMA (Stetson Engineers 2021). The SYRWCD reports on average for the historical period (1982 through 2018) that the use of groundwater in the SYRWCD was 71% "Agricultural Water,"[81] 3% "Special Irrigation Water,"[82] and 26% "Other Water."[83] **Figure 2a.4-1** presents groundwater use over this period for the WMA (Zone B and Zone F, as described below). The Plan Area (Section 1d.3) included maps showing the well density for each of these water use types.

2a.4-1-1 Water Use in the Lompoc Plain, Lompoc Upland, and Lompoc Terrace Subareas

The Lompoc Plain, combined with the Lompoc Terrace and Lompoc Upland, forms the SYRWCD Annual Report's Zone B. Prior to fiscal year (FY) 1993–1994, this also included the Santa Rita Upland (Zone F). For this combined area, overall annual average water production has ranged from 13,632 acre-feet per year

81 Water first used on lands in the production of plant crops or livestock for market (CWC Section 75508).
82 Water used for irrigation purposes at parks, golf courses, schools, cemeteries, and publicly owned historical sites.
83 Water used for purposes not including agriculture or irrigation at parks, golf courses, schools, cemeteries, and publicly owned historical sites. Generally, refers to municipal, industrial, or domestic uses of pumped or produced water.

(AFY) in FY[84] 1979–1980 to 29,815 AFY in FY 2012–2013. For this zone, agricultural water has ranged from 7,233 AFY to 21,257 AFY. Special irrigation water has ranged up to 1,205 AFY. Other water has ranged from 5,778 to 9,407 AFY.

Water use in the Lompoc Plain is primarily agriculture, but also includes domestic usage by the City of Lompoc and the Penitentiary (USP). The City of Lompoc, currently and for the planned future (through 2035), relies entirely on groundwater resources (City of Lompoc 2021) and pumps from the Upper Aquifer. The USP relies on CCWA imported water for the municipal prison facilities. In addition, the USP uses water for a prison farm by using the VSFB's wells located in the Lompoc Plain.

Water use in the Lompoc Upland is primarily domestic and municipal use, including the population centers and urbanized areas of Vandenberg Village CSD and Mission Hills CSD. Both Vandenberg Village CSD and Mission Hills CSD pump from the Lower Aquifer.

The Lompoc Terrace subarea is relatively undeveloped with no agriculture and no population centers, but has several buildings related to VSFB. The Lompoc Terrace contains the Space Launch Complexes which has industrial and municipal water use (i.e., water for sound suppression and military buildings). The Lompoc Terrace currently gets water from the VSFB water supply system (imported water from CCWA and San Antonio well field).

2a.4-1-2 Santa Rita Upland Subarea

The Santa Rita Upland forms the SYRWCD Annual Report's Zone F. This zone was split off from Zone B in FY 1993–1994. Overall annual average water production has ranged from 722 AFY in FY[85] 1993–1994 to 2,423 AFY in FY 2015–2016. For this zone, agricultural water has ranged from 644 AFY to 2,313 AFY. There has been no special irrigation water. Other water has ranged from 50 to 160 AFY.

The Santa Rita Upland has rural and agricultural groundwater uses. Rural residential communities are located in the Santa Rita Upland and are served by small, shared wells or mutual water companies (MWC), such as the Vista Hills MWC, Santa Rita MWC and the Tularosa MWC.

84 Santa Ynez River Water Conservation District's fiscal year is July 1 through June 30.
85 Santa Ynez River Water Conservation District's fiscal year is July 1 through June 30.

Figure 2a.4 1

Groundwater Use, District Zones B & F

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2a.4-1-3 Santa Ynez River Alluvium Subarea

Agriculture occurs in the Santa Ynez River Alluvium, but there are no population centers in this subarea. There are some rural residential single and some shared wells, especially along Santa Rosa Road.

The WMA Santa Ynez River Alluvium subarea comprises a portion of the SYRWCD Annual Report's Zone A, which extends through all of the Santa Ynez River Alluvium in the EMA, CMA, and WMA (Stetson Engineers 2021). For this larger Zone A area, overall annual average water production has ranged from 8,178 AFY in FY[86] 1979–1980 to 15,571 AFY in FY 2014–2015. In Zone A, agricultural water has ranged from 6,363 to 12,677 AFY. Special irrigation water has ranged up to 1,059 AFY. Other water has ranged from 1,355 to 2,806 AFY. Major pumpers for Zone A include the Santa Ynez River Water Conservation District Improvement District No. 1, the City of Buellton, and the City of Solvang, all of which are located outside of the WMA.

2a.4-1-4 Burton Mesa Subarea

The Burton Mesa is almost entirely within the boundaries of VSFB and contains the Cantonment Area which includes most of the base facilities. However, the VSFB public water system does not produce water from the Burton Mesa subarea, and relies on imports. Water is not produced in any great quantity from the Burton Mesa.

Part of the Burton Mesa subarea is within the District Annual Report's Zone C but has no major groundwater pumping.

2a.4-2 Agricultural Lands

In the WMA, a majority of agricultural lands are located in the Santa Ynez River Alluvium, the Lompoc Plain, and the Santa Rita Upland (**Table 2a.4-1**). Some minor agriculture uses are present in the Lompoc Upland. County of Santa Barbara classification of parcels by land use was presented as Figure 1d.6-1 (Plan Area). The distribution of crops within the WMA for a representative year, 2016, based on the California LandIQ database, is provided in **Figure 2a.4-2**.

86 Santa Ynez River Water Conservation District's fiscal year is July 1 through June 30.

Table 2a.4-1
Summary of WMA Land Use for Agriculture

WMA Subarea	Agricultural Class [A]							Total Acres [B]	Agricultural Use (% total)
	Truck Crops (acres)	Vineyard (acres)	Pasture (acres)	Grain and Hay (acres)	Field Crops (acres)	Deciduous Fruits and Nuts (acres)	Citrus / Subtropical (acres)		
Lompoc Plain	6,130	0	290	20	260	140	0	6,840	36.4%
Santa Rita Upland	580	760	10	50	80	0	20	1,500	30.4%
SYR Alluvium	1,270	400	0	0	190	130	0	1,990	8.6%
Lompoc Upland	180	180	130	50	10	10	70	620	2.9%
Burton Mesa	0	0	10	0	0	0	0	10	0.1%
Lompoc Terrace	0	0	0	0	0	0	0	0	0.0%
Total	**8,160**	**1,340**	**440**	**120**	**540**	**280**	**90**	**10,960**	**12.8%**

[A] Source of agriculture land use is from the 2016 LandIQ database. "Idle" lands not included.
[B] All numbers rounded to nearest 10 acres after summing.

Planted crops in the area have changed over the years according to the United States Department of Agriculture.[87] Major crops include grapes, strawberries, raspberries, dry beans, walnuts, alfalfa, barley, herbs, peaches, cut-flowers, lettuce, and broccoli. Based on this United States Department of Agriculture source, dry beans were more common around 2010; since then, strawberries have become a common crop in the Lompoc Plain, and grapes have become common in both the Santa Ynez River Alluvium and Santa Rita Upland.

Table 2a.4-2 presents statistics of agricultural land use for historical 1984/1986 and two recent years (2016 and 2018). This shows that total amount of agricultural land use in the WMA has decreased over time from 13,500 acres in 1984/1986 to around 11,500 acres in 2016 and 2018. Location of active agriculture has shifted somewhat with 70% of the lands irrigated in 1985 irrigated in 2018. By comparison 98% of the active agricultural lands in 2016 were active in 2018.

87 USDA (United States Department of Agriculture). "National Agricultural Statistics Service. CropScape - Cropland Data Layer." Accessed July 20, 2020. https://nassgeodata.gmu.edu/CropScape/.

Figure 2a.4 2

Active Agriculture Area 2016, Western Management Area

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Table 2a.4-2
WMA Agriculture Land Use for 1984/1986, 2016, and 2018

WMA Subarea	Agricultural Land (acres)			Continuation of Land Use (1984/86 Baseline)			
				Irrigated in 2016		Irrigated in 2018	
	1984/1986	2016	2018	Acres	Percent	Acres	Percent
Lompoc Plain	8,510	6,840	7,150	6,380	75%	6,380	75%
Santa Rita Upland	1,980	1,500	1,720	1,130	57%	1,130	57%
SYR Alluvium	2,390	1,990	2,100	1,710	72%	1,710	72%
Lompoc Upland	580	620	780	220	38%	220	38%
Burton Mesa	20	10	10	0	0%	0	0%
Lompoc Terrace	20	0	0	0	0%	0	0%
Total	**13,500**	**10,960**	**11,760**	**9,440**	**70%**	**9,440**	**70%**

Acreage rounded to nearest 10 acres. "Idle" lands not included.
Sources: FMMP 2016 shapefile; 2016 LandIQ database, 2018 LandIQ Database

Crop types affect the amount of water in demand and the timing of water use. Additionally, crops have varying tolerance for degraded water quality, and may require extra water to flush salts from soils. Finally, certain crops, such as leafy vegetables, are associated with fertilizer practices that result in high-nitrate return flows.

2a.4-2-1 Emerging Agricultural Crops: Cannabis Cultivation

The newest regulated crop type in the WMA is cannabis.[88] In June 2016 Senate Bill No. 837 established that the SWRCB has regulatory power to ensure that the diversion of water and discharge of waste associated with cannabis cultivation does not lead to a negative impact on water quality, aquatic habitat, riparian habitat, wetlands, and spring. Santa Ynez River Valley is not identified as a Cannabis Priority Watershed[89] with a high concentration of cannabis cultivation. SWRCB policy (SWRCB 2019b) limits diversions to a maximum of 10 gpm from surface water or subterranean streams without a water right, and requires metering and retention of daily diversion records for a minimum of five years.

88 As defined in California Business and Professions Code Section 26001, parts of the plant *Cannabis sativa Linnaeus*, *Cannabis indica*, or *Cannabis ruderalis*.

89 Designated by SWRCB in coordination with CDFW. California Priority Watersheds. SWRCB. Web site. https://www.waterboards.ca.gov/water_issues/programs/cannabis/california_priority_watersheds.html Accessed 2021-11-05.

In June 2017, Senate Bill No. 94 generally legalized cannabis and established a regulatory system and licensing to control the cultivation, processing, manufacturing, distribution, testing, and sale of cannabis. On July 13, 2021 California established a Department of Cannabis Control to consolidate state regulation. Regulations around protected regional appellations of origin to protect WMA agriculture are being established.

Local and county regulations also apply to cannabis cultivation. In November 2017, the City of Lompoc passed Ordinance No. 1640(17) which requires all cultivation within the City limits occur within a fully enclosed structure and authorized the Lompoc City Manager to issue or deny issuance of commercial cannabis use licenses. In February and May 2018, Santa Barbara County adopted a series of ordinances that regulate commercial cannabis operations within the County's unincorporated area. Lands outside of public lands (Vandenberg Space Force Base and La Purísima Mission State Historic Park) and areas of local jurisdiction (including City of Lompoc, Mission Hills CSD, and Vandenberg Village CSD) are zoned Agriculture-II Zone[90] which requires Land Use Permits from the County.

Table 2a.4-3 summarizes the status of current applications by parcel within the WMA to the County of Santa Barbara for cannabis Land Use Permits. Within the WMA, 78% of the cannabis applications are for parcels that in 2016 were used for agriculture. This indicates primarily a change of crop type, rather than an expansion of agriculture land use. As of August 2021, within the WMA permits for cannabis agriculture have been issued for six parcels, and were closed with no permit issued for three parcels as of August 2021.

90 Agriculture-II Zone. Commercial Cannabis Regulations. County of Santa Barbara. Web site. http://cannabis.countyofsb.org/zone/agriculture-ii.sbc Accessed 2021-08-26.

Figure 2a.4 3

Oil and Gas Well Locations

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Table 2a.4-3
WMA Cannabis Cultivation Land Use Permits as of August 2021

WMA Subarea	Permits Issued	Application In Review			Total Applications
~~WMA Subarea~~		Approved	Processing	Closed	
Lompoc Plain	2	3	7	0	12
Lompoc Upland	4	1	11	1	17
Lompoc Terrace	0	0	0	0	0
Burton Mesa	0	0	0	0	0
Santa Rita Upland	0	3	5	0	8
SYR Alluvium	0	1	5	2	8
Total	**6**	**8**	**28**	**3**	**45**

County of Santa Barbara Commercial Cannabis Application status as of 2021-08-30.

2a.4-3 Industrial Use

The Plan Area (Section 1d) shows the land classification, population, and service areas for water suppliers within the WMA, as well as the distribution of municipal and domestic water supply wells.

As discussed in Section 2a.1, the Purisima Anticline north of the WMA contains the Lompoc oil and gas production field. **Figure 2a.4-3** shows the location of wells drilled for the purpose of oil and gas exploration. Currently the oil and gas industry uses little water from the WMA. However enhanced oil recovery technologies which may be applied in the future can use significant amounts of fresh water that may be used from the WMA.

The Lompoc Diatomite Project[91] is a proposed 2014 enhanced oil recovery project for the Lompoc oil and gas production field that included drilling, completing, and producing nine new oil wells within the Lompoc Oil Field. This project would use cyclic steaming from a 22.5 million British Thermal Units per hour (MMBTU/hr) steam generator to help produce oil from this field. Steam processes such as turbines generally require fresh water with low total dissolved solids in order to operate without scale build up, however the land use permit calls for reclaimed water (produced water[92] from existing Lompoc Oil Field

91 County of Santa Barbara. Land Use Permit No. 13LUP-00000-00009. Freeport McMoran Oil & Gas Lompoc Diatomite Project. Final Approval Date 2014-06-20.

92 Produced water (sometimes called “oilfield brines”) is water that is pumped out along with petroleum. Commonly this is very high salinity water and it is disposed of by injection wells.

operations) without using any freshwater during cyclic steaming operation. Due to conditions in the energy market the project has not been implemented as of 2021.

2a.4-4 Water Exports

Water is exported from the Santa Ynez River watershed from three reservoirs on the Santa Ynez River upstream of the WMA (Jameson Reservoir, Gibraltar Reservoir, and Cachuma Reservoir [Lake Cachuma]) through a series of tunnels to supply cities located on the Santa Barbara County south coast. No groundwater or surface water exports occur within the boundaries of the WMA.

2a.4-5 Potential Groundwater Dependent Ecosystems

DWR recommends (DWR 2016) classification of potential groundwater-dependent ecosystems (GDEs)[93] as (1) wetland features commonly associated with the surface expression of groundwater under natural, unmodified conditions, and (2) vegetation types commonly associated with the sub-surface presence of groundwater (phreatophytes) (**Figure 2a.4-4**). The source of this Natural Communities dataset is a working group consisting of DWR, the California Department of Fish and Wildlife, and The Nature Conservancy[94] (DWR 2018, Klausmeyer et al. 2018). Surface flows were completely depleted during historical years (Figure 2a.3-8) with no surface water to be interconnected with groundwater.[95]

Phreatophytes are plants that depend on, and obtain, groundwater that lies within reach of their roots. These include plants grown within the riparian zone of a river, and some agricultural crops, such as alfalfa. Historical estimates of phreatophytes water use indicate up to 6,000 AFY is used in the WMA (Bright 1997).

The Natural Communities dataset shown in Figure 2a.4-4 of consists of vegetation communities shown on **Figure 2a.4-5**. Biological surveys have not been completed during the preparation of this GSP. The potential vegetation and wetland GDEs within the WMA are summarized in in **Table 2a.4-4** and **2a.4-5**.

93 CWC Section 10727.4 Additional Plan Elements: "where appropriate […] (l) Impacts on groundwater dependent ecosystems."

94 501(c) non-profit environmental conservation organization based out of Washington, DC.

95 23 CCR §351(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.

Figure 2a.4 4

Potential Groundwater Dependent Ecosystems and Groundwater Discharge Areas, Western Management Area

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Figure 2a.4 5

Vegetation Community Classification, Western Management Area

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The mapped area corresponding to each vegetation community type and the dominant species is summarized in Table 2a.4-4, and wetland areas are summarized in Table 2a.4-5.

Table 2a.4-4
Natural Communities Dataset
Mapped Extent of Vegetation Communities in the WMA

WMA Subarea	**Coast Live Oak**	**Valley Oak**	**Riparian Mixed Hardwood**	**Riversidean Alluvial Scrub**	**Willow**	**Willow (Shrub)**	**Total**
	Quercus agrifolia	*Quercus lobata*	-	-	*Salix spp.*	*Salix spp.*	
Lompoc Plain	97.7	-	810.3	-	173.0	-	1081.0
Lompoc Upland	829.6	-	81.7	-	39.7	-	951.0
Lompoc Terrace	113.4	-	157.7		137.1	-	408.2
Burton Mesa	123.5	-	-	-	137.1	-	260.6
Santa Rita Upland	67.7	-	6.1	-	-	-	73.8
SYR Alluvium	39.7	-	780.0	-	-	-	819.7
Total	**1271.6**	**-**	**1835.8**	**-**	**359.3**	**-**	**3466.7**

Source: DWR and The Nature Conservancy (2018)

Table 2a.4-5
Natural Communities Dataset
Mapped Extent of Wetlands in the WMA

WMA Subarea	**Palustrine**		**Riverine**			**Seep or Spring**	**Total**
	Seasonally Flooded	*Seasonally Saturated*	*Seasonally Flooded*	*Semipermanently Flooded*	*Permanently Flooded*		
Lompoc Plain	134.0	0.6	33.5	6.6	45.9	0	220.6
Lompoc Upland	13.3	0.2	0	1.1	0	0.7	15.3
Lompoc Terrace	60.6	4.6	0	2.2	3.4	0.2	71.0
Burton Mesa	87.4	0.7	0	0.6	0	0.2	88.9
Santa Rita Upland	4.5	0	0	0	0	0	4.5
SYR Alluvium	125.4	0	82.4	9.2	13.4	0	230.4
Total	**425.2**	**6.2**	**115.9**	**19.7**	**50.2**	**1.1**	**618.3**

Seasonally flooded includes "fresh tidal" lands. Other subclassifications include description of vegetation.
Source: DWR and The Nature Conservancy (2018)
Notes: The Natural Communities wetlands and vegetation layers in part overlap. Therefore, the total potential GDE acreage in the WMA is less than the sum of the potential wetland GDE and the potential vegetation type GDE acres.

2a.4-5-1 Discharge and Springs Areas

Groundwater discharges are described in terms of springs, seeps, and known areas of groundwater discharge. Active springs and seeps within and adjacent to the Basin are shown in Figure 2a.4-4. Six active springs and seeps have been identified in the WMA including: four springs/seeps located in the Lompoc Upland; one in the Burton Mesa, and one in the Lompoc Terrace (Figure 2a.4-4). The quantity of water discharging from these six springs located within the WMA is currently a data gap.

Groundwater in the WMA also discharges to the Santa Ynez River when the groundwater elevation is higher than the stream thalweg. Groundwater discharge to the Santa Ynez River will occur during wet winter and spring months, but during the summer and dry winter months, the streamflow loses water to the groundwater aquifers in the Lompoc Plain and Santa Ynez River Alluvium. The Santa Ynez River is perennial downstream of the wastewater discharge from the Lompoc Regional Wastewater Treatment Plant to the Santa Ynez River estuary and Pacific Ocean.

Additionally, groundwater discharge to the Pacific Ocean is occurring~~ as subflow~~. Approximately 150 to 400 AFY of~~ underflow or~~ discharge to the Pacific Ocean from groundwater was estimated by the USGS (Bright 1997).

2a.4-6 Wildlife Habitat

Wildlife habitat is a beneficial use of water, primarily through surface water flows of the Santa Ynez River. The controlling document for Santa Ynez River flows, SWRCB Order WR 2019-0148 on the Cachuma Project on the Santa Ynez River (SWRCB 2019) included a Biological Assessment and Environmental Impact Report. Special species that are potentially located within the WMA are summarized here. However, species may have water demands outside of the principal aquifers. All six SGMA sustainability indicators help protect wildlife, with depletion of interconnected surface water being the SGMA indicator most closely associated with most wildlife.

The U.S. Fish and Wildlife Service (USFWS) has identified wildlife habitat areas within the WMA which support threatened or endangered species. These habitats are indirectly supported by water and land use. **Figure 2a.4-~~5~~6** shows the locations of these habitat areas. **Table 2a.4-~~4~~6**, below, lists the species involved.

Figure 2a.4 6

Threatened & Endangered Species Active Critical Habitat

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Table 2a.4-6
U.S. Fish and Wildlife Service Identified
Threatened and Endangered Species with Habitat within the WMA

Common Name	Scientific Name
California tiger salamander	*Ambystoma californiense*
La Graciosa thistle	*Cirsium loncholepis*
Southwestern willow flycatcher	*Empidonax traillii extimus*
Vandenberg monkeyflower	*Diplacus vandenbergensis*

Source: U.S. Fish and Wildlife Service (2021)

Neither of the animal species are directly reliant on groundwater. The California tiger salamander has no known reliance on groundwater. The Southwestern willow flycatcher is indirectly reliant on groundwater as it has reliance on riparian vegetation (Rohde et al. 2019). The California tiger salamander metapopulations of the Purisima Hills and Santa Rita Valley which correspond to the eastern Lompoc Upland and Santa Rita Upland (U.S. Fish and Wildlife Service 2016). The Southwestern willow flycatcher is a migrant bird that spends the winter in locations such as southern Mexico, Central America, and probably South America, and has breeding range that covers southwestern United States from California to Texas (U.S. Fish and Wildlife Service 2002a).

The La Graciosa thistle has not been observed since 1958 within the Santa Ynez River basin, and the U.S. Fish and Wildlife Service listed the status of likely locally extirpated (U.S. Fish and Wildlife Service 2020).

The unarmored three spine stickleback (*Gasterosteus aculeatus williamsoni*) was mapped within the Lower San Antonio creek watershed (U.S. Fish and Wildlife Service 1985; CDFW 2021), which includes the Barka Slough, and VSFB San Antonio well field in the San Antonio Creek Valley Groundwater Basin. The mapped extents partially overlap with the Burton Mesa which is a marginal portion of the WMA.

California species of special concern (SSC) that are potentially within the WMA are the Southern Western Pond Turtle (*Emys marmorata pallida*), the Two-striped Garter Snake (*Thamnophis hammondii*) (CDFW 2021). The Southern Western Pond ~~Turtleis~~Turtle is water dependent (Rhode et al. 2019) and is near endemic and has been found within the Santa Ynez River watershed (Spinks and Shaffer 2005; CDFW 2016) in perennial stretches of the river and elsewhere likely during streamflow events. The Two-striped Garter Snake is among the most aquatic of the garter snakes and is often found in or near permanent and intermittent freshwater streams, creeks, and pools, with a range that historically has included the Santa Ynez River watershed although current presence is less certain (CDFW 2016).

The California Red-legged Frog (*Rana draytonii*) is common in the upper watershed of the Santa Ynez River. However in the lower Santa Ynez River including the WMA these are rare. Deep pools with dense marginal vegetation are rare and introduced aquatic predators are abundant and diverse (U.S. Fish and Wildlife Service 2002b).

2a.4-6-1 Santa Ynez River

Stream flow and ~~subflow~~underflow of the Santa Ynez River (Appendix 2a-B) are managed by California State Water Resources Control Board (SWRCB) under WR 2019-0148 as surface water (Section 1d.5, Plan Area).[96] The 2019 Central Coast Basin Plan identified beneficial uses of the Santa Ynez River that supported wildlife habitats including Warm Fresh Water Habitat (WARM), Cold Fresh Water Habitat (COLD), Commercial and Sport Fishing (COMM), and Spawning, Reproduction, and/or Early Development (SPWN).

Steelhead in the Santa Ynez River is part of the Monte Arido Highlands Biogeographic Population Group, which is part of the Southern California[97] Distinct Population Segment (DPS) of steelhead which is considered endangered (NMFS 2012). With 94% of the estuarian habitat remaining, the Santa Ynez River has the highest percentage of historical estuarian habitat in this DPS. Groundwater extraction and agricultural development affecting SWRCB managed stream flows of the Santa Ynez River were ranked as threats to steelhead (Table 9-2 in NMFS 2012).

Arroyo chub (*Gila orcutti*) is a California species of concern, introduced to the Santa Ynez River in the 1930s that is native to other southern California river systems. In a 1993 survey these were still present in shallow pools (SWRCB 2019).

96 CWC Section 10720.5(b) Nothing in this part or in any groundwater management plan adopted pursuant to this part determines or alters surface water rights or groundwater rights under common law or any provision of law that determines or grants surface water rights.

97 This area primarily consists of the highly urbanized coastal counties of Los Angeles, Orange, and San Diego southeast of Point Conception. Steelhead is Threatened in the adjacent South-Central California Coast which includes San Luis Obispo and Monterey counties also located north of Point Conception is generally more similar in terms of land use to the Santa Ynez River Valley.

In accordance with the SWRCB and National Marine Fisheries Service (NMFS), the Lower Santa Ynez River (LSYR) is monitored by the Cachuma Operation and Maintenance Board (COMB) for Southern California steelhead/rainbow trout (*O. mykiss*) and supporting habitat conditions (COMB 2021). The Lower Santa Ynez River Fish Management Plan (ENTRIX 2000) identified ten native fish species in the Santa Ynez River: four freshwater and six in the estuary. WR 2019-0148 identified eleven native fish species in the watershed. In addition to volume and surface flow conditions, fish are sensitive to water temperature and dissolved oxygen (DO), both of which are supported by shade from riparian vegetation.

2a.4-6-2 Santa Ynez River Estuary

The Santa Ynez River estuary is where the Santa Ynez River meets and mixes with Pacific Ocean water. The estuary is located entirely within the boundaries of federal VSFB and is further protected by being within the Coastal Zone (Section 1d, Plan Area). Quantifying surface water flows into the estuary is identified as a data gap that the WMA GSA plans to address during the Plan Implementation (Chapter 5).

The primary source of fresh water entering the estuary is surface water from the Santa Ynez River which depends on operations of the Cachuma Project. The mixture of river sediment, salinity, and other chemical constituents forms a dynamic setting that changes hourly with tides and with river flows. These physical properties are utilized by particular species of plants and animals form the basis for beneficial habitats.

Tidewater goby (*Eucyclogobius newberryi*) is a small lagoonal fish and endangered species found within the Santa Ynez River estuary. Like other organisms in estuarine habitats, tidewater goby habitat is subject to considerable fluctuation of physical factors on both a daily and a seasonal basis. (U.S. Fish and Wildlife Service 2005). Tidewater gobies live within the fresh-saltwater environment usually with salinities (Total Dissolved Solids [TDS]) of 2,000 to 27,000 mg/L,[98] but have short-term tolerance for hypersaline[99] waters of 45,000 to 54,000 mg/L TDS for at least six months (U.S. Fish and Wildlife Service 2007). Tidewater gobies generally require sandbar closure to produce the calm lagoon conditions that promote their summer population explosion (U.S. Fish and Wildlife Service 2007).

98 Source in parts per thousand (ppt) and unspecified salinity.
99 Average ocean water salinity is approximately 35,000 mg/L.

2a.5 DATA GAPS AND UNCERTAINTY

Overall there are many existing ground water studies and data for the WMA, including two previous ground water models developed by the USGS (Bright 1997; Bright et all 1992) and the City of Lompoc (HCI 1997). However, the following data ~~gaps are~~gap is currently identified for the WMA Hydrogeologic Conceptual Model: ~~Santa Rita Subarea Ground Water Movement and~~ the surface water leaving the WMA (entering the Pacific Ocean). In addition, results of the geophysical AEM data study are planned to become available in the first year of implementation of the plan in 2022. This study will be used to verify the current geologic model of the WMA with possible refinements based on this geophysical study.

~~Additional water-level data are needed to evaluate the hydraulic conditions between several subareas of the WMA including: 1) Santa Rita Upland and Lompoc Upland; 2) the Santa Rita Upland and the Santa Ynez River Alluvium subflow; and 3) the Santa Rita Upland and the CMA's Buellton Upland. Existing groundwater models in the WMA (Bright 1997 and HCI 1997) assume there is subflow between the Santa Rita Upland and Lompoc Upland, but the exact quantity is not well known or quantified.~~

Previously, the USGS operated a stream gage named "Santa Ynez River at Barrier near Surf" (USGS Gage ID 11135500) near the mouth of the Santa Ynez River. However, this stream gage was discontinued in 1965. The location of this historical USGS stream gage is shown on Figure 2b.6-~~1~~2 (Groundwater Conditions). In order to quantify the current streamflow leaving the WMA and assess the potential depletion of surface water, it is recommended that this gage or neaby gage be re-established. The gage will also benefit the entire Santa Ynez River Valley Groundwater Basin (all three management areas) by measuring the total surface water outflow from the entire system. By reestablishing stream measurements at this historical site or nearby site, the total surface water budget can be tracked from Bradbury Dam to the Pacific Ocean. Additionally, a stream gage at this site would help understand the dynamics of the Santa Ynez River estuary which would in turn help with an understanding of potential sea level intrusion and the effects of sea level rise.

Section 2: B – GROUNDWATER CONDITIONS

This section describes groundwater conditions within the Western Management Area (WMA). The Sustainable Groundwater Management Act (SGMA) requires the Groundwater Sustainability Plan include "a description of current and historical groundwater conditions in the basin."[100] This Groundwater Conditions section presents the available data evaluated, provides an assessment of current WMA groundwater conditions as observed in the period 2015-2020, and describes historical conditions using available data from the period 1924 through 2020.

In accordance with SGMA, there are six Sustainable Management Criteria (see also Section 3b) which indicate if conditions are sustainable in the basin.[101] The indicator criteria for sustainability are summarized as:

1. Chronic lowering of groundwater levels
2. Reduction of groundwater storage
3. Seawater intrusion
4. Degraded water quality
5. Land subsidence
6. Depletion of interconnected surface water

[100] 23 CCR § 354.16.
[101] CWC Section 10721 (x), 23 CCR § 354.28(c), 23 CCR § 354.34(c),

The remainder of this section presents results from the review and evaluation of available data for the WMA. The SMC thresholds in Section 3b determine when effects are considered "significant and unreasonable."

This section is organized as follows.

- *Section 2b.1, Groundwater Elevation.* This section evaluates the first of the six sustainability indicators, chronic lowering of groundwater levels, and can provide a framework to evaluate some or all of the remaining sustainability indicators. This section includes groundwater elevation data and hydrographs, groundwater flow directions and maps, lateral and vertical groundwater gradients, regional groundwater pumping patterns, and changes in groundwater elevations over time.

- *Section 2b.2, Groundwater Storage.* This section evaluates the second sustainability indicator, reduction of groundwater storage. It includes data on changes in groundwater storage data over the available period of record (roughly 1980–2020).

- *Section 2b.3, Water Quality.* This section addresses, degraded groundwater quality. Beneficial uses are described, and suitability of water quality for each is discussed. Areas of known groundwater contamination and existing contaminant plumes are documented. Water Quality conditions for recent water years 2015-2018 were evaluated using published water quality objectives for groundwater.

- *Section 2b.4, Seawater Intrusion.* This section addresses seawater intrusion, which could occur at the westernmost margin of the WMA where the aquifer interfaces with the Pacific Ocean. This section evaluates available data and provides the required maps and cross-sections of chloride concentrations for the relevant principal aquifers.

- *Section 2b.5, Land Subsidence.* This section addresses the rate and extent of land subsidence. The section includes available data related to current and historical ground surface elevations, potential for subsidence, and summarizes historical extent, cumulative total, and annual rate of detected land subsidence within the WMA.

- *Section 2b.6, Interconnected Surface Water and Groundwater Dependent Ecosystems.* This section addresses depletion of interconnected surface water. It identifies potential interconnected surface waters, evaluates potential depletions of those waters, and describes the general relationships between surface water, groundwater, and depletions to potential Groundwater Dependent Ecosystems within the WMA.

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2b.1 GROUNDWATER ELEVATION

This section addresses the first of the six sustainability indicators, chronic lowering of groundwater levels. Groundwater elevation data, lateral and vertical groundwater gradients, inferred groundwater flow directions, maps showing lines of equal groundwater elevations (contours), regional groundwater pumping patterns, and graphical changes in groundwater elevations over time (hydrographs) are described and evaluated in the following subsections. These descriptions include both historical seasonal and longer-term trends, and documentation of current conditions in the WMA. This section also provides a framework for data presentation and reporting on the five remaining sustainability indicators.

2b.1-1 Groundwater Elevation Data

Groundwater data were made available by the WMA Groundwater Sustainability Agency (GSA) member agencies. The data are collected by the agencies to monitor and manage their respective groundwater jurisdictions. Data provided by the WMA GSA member agencies include groundwater well names and/or identifying labels, groundwater well locations, static groundwater elevation data, and groundwater pumping or production data. Five sources of groundwater elevation data made available for this evaluation are summarized in **Table 2b.1-1**.

The groundwater elevation data were previously incorporated into the Data Management System as described in the Data Management Plan (Section 1e.1). The Data Management System was utilized to evaluate these data and prepare groundwater elevation hydrographs for the principal groundwater aquifers within the WMA based on well depth, well-casing perforated intervals, geologic conditions, and measured water level responses to recharge and pumping.

Table 2b.1-1
WMA Groundwater Elevation Data Sources

Type	Summary	Description
Monthly	City of Lompoc	Static water level measurements provided by the City of Lompoc.
Monthly	United States Bureau of Reclamation (USBR)	Groundwater elevation data reported in the USBR Cachuma project monthly reports. The vertical datum of the source data was converted from National Geodetic Vertical Datum of 1929 (NGVD29) to North American Vertical Datum of 1988 (NAVD88).[A]
Monthly	Vandenberg Village Community Services District (CSD)	Static water level measurements provided by Vandenberg Village CSD.
Semiannual	United States Geological Survey (USGS) National Water Information System (NWIS)	Groundwater level data available from the USGS NWIS (entire Santa Ynez Valley).
Semiannual	County of Santa Barbara	Groundwater level data collected by the County of Santa Barbara.

Note: [A] 23 CCR § 352.4 requires that groundwater elevations be reported in NAVD88. Vertical datum is the zero-elevation from which all other elevations are referenced. In the Basin, depending on location, the difference between NGVD29 and NAVD88 is approximately 2.5–2.6 feet.

2b.1-2 Groundwater Elevation Contour Maps

In accordance with the Sustainable Groundwater Management Act (SGMA), "groundwater elevation contour maps depicting the groundwater table or potentiometric surface associated with the current seasonal high and seasonal low for each principal aquifer within the basin"[102] are to be prepared for the WMA. Contours were developed for those portions of the WMA having sufficient number and distribution of groundwater wells. Groundwater elevation contour maps for seasonal high (spring 2020) and seasonal low (fall 2019) conditions within the WMA are included as **Figures 2b.1-1** and **2b.1-2**. Elevations shown in Figure 2b.1-1 and Figure 2b.1-2 are in feet based on the North American Vertical Datum of 1988 computed by the National Geodetic Survey.

As described above in the Hydrogeologic Conceptual Model (Section 2b), the WMA has two principal aquifers, the Upper Aquifer and Lower Aquifer, whose names are derived from the Lompoc Plain subarea of the WMA where both aquifers are located.

- Upper Aquifer consists primarily of older and younger alluvial deposits and river gravels of the Santa Ynez River.

102 23 CCR § 354.16 (a)(1). Groundwater elevation contour maps depicting the groundwater table or potentiometric surface associated with the current seasonal high and seasonal low for each principal aquifer within the basin.

Figure 2b.1-1

Groundwater and Underflow Elevation Contours, Seasonal High, Spring 2020, Western Management Area

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Figure 2b.1-2

Groundwater and Underflow Elevation Contours, Seasonal Low, Fall 2020, Western Management Area

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- Lower Aquifer consists of Careaga Sandstone and the Paso Robles Formation in a broad syncline structure.

Two subareas, the Burton Mesa and south Lompoc Terrace, are uplifted marine terraces and not included in the WMA groundwater elevation contour maps because of existing data gaps since they are not part of current monitoring programs, and because they are considered mostly disconnected from the principal aquifers cited above. Groundwater in these two subareas is typically perched, and therefore not representative or correlative to the principal groundwater aquifers above.

2b.1-2-1 Seasonal High and Seasonal Low Groundwater Elevation Contour Maps

Seasonal High – Spring 2020

Seasonal high groundwater elevations represented by Spring 2020 measurements are presented on Figure 2b.1-1. Shown on this map are the locations of wells with groundwater monitoring data, color-coded to identify wells with screened intervals within the Upper Aquifer and wells screened within the Lower Aquifer.

Upper Aquifer seasonal high groundwater elevations were available at wells located across the Santa Ynez River Alluvium and Lompoc Plain. The groundwater elevation data were used to calculate groundwater gradient and flow direction inferred from the contours. In the Upper Aquifer, groundwater generally flows from east to west, in alignment with the Santa Ynez River channel. Adjacent to the Lompoc Narrows is an area with a relatively steep groundwater gradient, as the groundwater at higher elevations in the Santa Ynez River Alluvium disperse across the Lompoc Plain toward the Pacific Ocean.

Lower Aquifer seasonal high groundwater elevations are shown on Figure 2b.1-1 for the Lompoc Terrace, Lompoc Plain, Lompoc Upland, and Santa Rita Upland. Groundwater elevations are highest along the base of the Purisima Hills in the Santa Rita Upland and Lompoc Upland, and groundwater elevations are lowest in the westernmost portions of the Lompoc Plain where the Santa Ynez River discharges to the Pacific Ocean. Groundwater generally flows east to west from the Santa Rita Upland and Lompoc Upland to the adjacent Lompoc Plain and continues toward the Pacific Ocean.

Groundwater elevations are greater in wells representing the Lower Aquifer than in the Upper Aquifer, indicating an upward vertical gradient. The upward vertical gradient is consistent with previous studies (Bright et al. 1997), which concluded that groundwater flow is upward from the Lower Aquifer to the Upper Aquifer.

Seasonal Low – Fall 2019

Seasonal low groundwater levels are represented by Fall 2019 groundwater elevations, and contours based on available data from wells located across the Santa Ynez River Alluvium and Lompoc Plain are shown on Figure 2b.1-2 (the wells are color-coded to correspond to the Upper Aquifer and Lower Aquifer, similar to Figure 2b.1-1). Fall 2019 Upper Aquifer and Lower Aquifer groundwater elevation data are slightly lower in elevation with respect to the Spring 2020 seasonal high. However, horizontal flow directions and vertical gradients are consistent with the Spring 2020 conditions described above.

2b.1-2-2 Evaluation of Seasonal High and Low

As expected, seasonal low Upper Aquifer groundwater elevations are generally lower than those measured in Spring 2020. The groundwater gradient from the western Lompoc Plain to the Pacific Ocean is generally flatter.

Groundwater levels in the Lower Aquifer show less variation between the Fall 2019 seasonal low and Spring 2020 seasonal high, with the largest difference occurring along the Santa Ynez River in the western portion of the Lompoc Plain.

2b.1-3 Groundwater Hydrographs

SGMA requires preparation of "hydrographs depicting long term groundwater elevations, historical highs and lows, and hydraulic gradients between principal aquifers."[103] Hydrographs using data from select WMA wells are shown on **Figure 2b.1-3**. Hydrographs were also prepared for other wells located within the WMA but are not shown on Figure 2b.1-3 because of their relatively short period lengths or limited

[103] 23 CCR § 354.16 (a)(2). Hydrographs depicting long-term groundwater elevations, historical highs and lows,and hydraulic gradients between principal aquifers.

Figure 2b.1-3

Well Hydrograph Locations Within Western Management Area

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value to assess WMA groundwater because of their locations. Additional groundwater level hydrographs are shown in Appendix 3b-A in the context of sustainable management criteria (Section 3b).

The wells shown on Figure 2b.1-3 were utilized to prepare representative hydrographs for the WMA subareas. The colors of hydrograph data points correspond to their data source noted in the figures and described in Section 2b.1-1, "Groundwater Elevation Data." The hydrographs show the measured groundwater elevation on the left y-axis (vertical axis) and the corresponding depth to groundwater on the right y-axis. Grid lines depicting Calendar Year are provided at the top x-axis (horizontal axis) and the bottom x-axis shows the Water Year which spans October through September, annually. Vertical columns for the water year are colored to represent water year index based on precipitation (wet, dry/critically dry, or above/below normal).

The following subsections discuss the hydrograph data presented in **Figure 2b.1-4A-H**. In general, the hydrograph data show visible but slight increases in groundwater elevations during the relatively wet 1990-2000 period and decreases in groundwater elevations during the relatively dry 2005-2020 period.

2b.1-3-1 Lompoc Plain

Groundwater elevation trends across the Lompoc Plain are variable and reflect differences in land and water use. The western margin of the Lompoc Plain, where the Santa Ynez River discharges to the Pacific Ocean, is characterized by the Santa Ynez River Estuary, a brackish natural environment with little to no groundwater pumping. Moving eastward, the western portion of the Lompoc Plain is characterized by abundant agricultural groundwater use. The eastern portion of the Lompoc Plain encompasses the City of Lompoc, and groundwater use in this area is primarily used to meet municipal and industrial demands for water with some limited agricultural use. Eight representative hydrographs have been prepared for these general subareas of the WMA and are reported in Figures 2d.1-4AB through Figure 2b.1-4GH and reveal groundwater elevation trends for the Upper Aquifer and Lower Aquifer.

<u>Santa Ynez River Estuary</u>

In the WMA, the Santa Ynez River estuary is located at the westernmost margin of the Lompoc Plain where the Santa Ynez River discharges to the Pacific Ocean. The Lower Aquifer is missing in this area, and the Upper Aquifer lies non-conformably on top of the non-water-bearing Monterey Formation.

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Figure 2b.1-4AB

Selected Hydrographs, Lompoc Plain

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Figure 2b.1-4CD

Selected Hydrographs, Lompoc Plain

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Figure 2b.1-4EF

Selected Hydrographs, Lompoc Plain

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Figure 2b.1-4GH

Selected Hydrographs, Lompoc Plain

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The location of well 7N/35W-17M1 is shown on Figure 2b.1-3, and it is considered representative of the eight current and historical groundwater monitoring wells in the Santa Ynez River estuary area. The hydrograph for 7N/35W-17M1 shown on Figure 2b.1-4A indicates seasonal groundwater elevations vary by approximately 5 feet, water levels have been relatively stable, and no long-term water level trend is discernable in the data record which began in 1965. Stable groundwater elevations may be due to approximately stable ~~Santa Ynez River subflows~~groundwater flow from the Uplands and long-term water levels in the adjacent Pacific Ocean.

Western Lompoc Plain

There is significant agricultural groundwater use in this area. As such water level measurements in the wells can be influenced by pumping from nearby wells. Hydrographs for three Upper Aquifer wells representative of the western portion of the Lompoc Plain are shown on Figure 2b.1-4B, C and D. The hydrograph for well 7N/35W-22J1 (Figure 2b.1-4B) shows typical seasonal variation and an approximate 10 foot decline in groundwater elevation since about 1950; average groundwater elevation has been approximately stable since 2010. Well 7N/35W-23E6 (Figure 2b.1-4C) is constructed within the deeper parts of the Upper Aquifer and exhibits larger seasonal high and low groundwater elevation changes than measured in well 7N/35W-22J1 and other nearby wells. There is no long-term trend visible in the hydrograph from this well. The hydrograph for well 7N/35W-26F4 (Figure 2b.1-7D) shows seasonal variations that can exceed 20 feet. Groundwater elevations appeared to respond to climatic conditions, showing declines during dry periods within 1985-1990 and 2000-2010, but have recovered since around 2015 despite the dry climatic conditions. As a result, there is no visible net long-term trend.

Well 7N/35W-26L4 is located in the western portion of the Lompoc Plain where both the Upper Aquifer and Lower Aquifer are present (Figure 2b.1-3). The hydrograph for this well (Figure 2b.1-4E) shows up to 15 feet of seasonal variation in groundwater elevations. Longer term trends are similar to other wells, where there is a visible increase in groundwater elevations during characteristically normal and wet years in the period 1990- 2000, followed by groundwater elevation decreases during dry years. Overall, there has not been a significant net change in groundwater levels since the late 1980's.

Eastern Lompoc Plain

The east-central portion of the Lompoc Plain is bound by the Lompoc Narrows to the east and San Miguelito Creek to the west. In this area, both the Upper Aquifer and Lower Aquifer are present. Groundwater is used to meet a mix of municipal, industrial, and limited agricultural demands for water. Hydrographs were prepared using data from two representative Upper Aquifer wells and one Lower Aquifer well (Figure 2b.1-3).

The hydrograph for Upper Aquifer well 7N/34W-27P5 (Figure 2b.1-4F) shows seasonal variation up to 10 feet, and longer-term declines of about 30 feet during characteristically dry conditions during the late 1980's to early 1990's, and after 2010. Water levels increase during the relatively wet periods. Overall, there has been no significant net change in groundwater elevations in the Upper Aquifer since the mid 1960's except during extended drought periods.

The hydrograph for Upper Aquifer well 7N/34W-35K9 (Figure 2b.1-4G) is likely influenced by recharge from the Santa Ynez River and exhibits oscillating groundwater elevations associated with seasonal conditions and river discharge. Groundwater elevations exhibit seasonal variations of up to 20 feet, typically returning to a relatively stable elevation. Groundwater elevation declines are visible during the extended drought period between 2010 and 2019.

The hydrograph for Lower Aquifer well 7N/34W-24N1 (Figure 2b.1-4H) shows a consistent, long-term groundwater elevation decline since approximately 1925. Temporary increases in groundwater elevations are observed during characteristically wet periods between 1990 and 2000, consistent with other wells in the area, but are followed by continued groundwater elevation declines during relatively dry periods. The seasonal variation in groundwater elevations is approximately 5 feet.

2b.1-3-2 Lompoc Terrace

The Lompoc Terrace is geologically similar to the tectonically uplifted Burton Mesa (Geosyntec 2020). However, the Lompoc Terrace has geologic units corresponding to the Lower Aquifer present in the Lompoc Plain. The Lompoc Terrace Orcutt Sand has perched water but it is hydrogeologically disconnected from the Lompoc Plain. Where groundwater is observed in the Orcutt Sand it is considered perched. The corresponding Lower Aquifer geologic units present in the Lompoc Terrace may be hydrogeologically connected to the Lompoc Plain. However, due to data gaps from the limited number of wells and resulting lack of available groundwater elevation data, confirmation of this connection is not possible.

A representative hydrograph for the Lompoc Terrace 7N/35W-27P1 (**Figure 2b.1-5**) shows annual seasonal water level variations on the order of several feet but approximately no net change in groundwater elevation since the late 1960s. Consistent with other WMA subareas, there were periods of extended groundwater elevation decreases and increases during relatively dry and wet climatic periods. For example, slight increases in groundwater elevations are observed between 1990 and 2000 after a period of normal and wet years followed by groundwater elevation declines between approximately 2010 through 2019 in response to long-term drought conditions.

2b.1-3-3 Burton Mesa

The Burton Mesa (Figure 2b.1-3) is a tectonically uplifted marine terrace, as previously discussed and presented in the Geologic Model Technical Memorandum (Geosyntec 2020). The Burton Mesa is characterized by the non-conformable deposition of the Orcutt Sand directly over the non-water-bearing Monterey formation. In the WMA, the Orcutt Sand is typically associated with perched water. The Burton Mesa is not hydrogeologically connected to the Upper Aquifer and the presence of groundwater in this area is considered perched. Vandenberg Space Force Base (VSFB), the current landowner and primary water user in the Burton Mesa subarea, confirmed the lack of groundwater and groundwater use.

2b.1-3-4 Lompoc Upland

In the Lompoc Upland, groundwater is used to meet municipal and agricultural demands for water. ~~The Upper Aquifer~~Perched water and the Lower Aquifer are both present in the Lompoc Upland. However, groundwater monitoring occurs only in the Lower Aquifer (Figure 2b.1-3). Hydrographs for the Lompoc Upland are provided in **Figure 2b.1-6**.

The hydrograph for Lower Aquifer well 7N/34W-15E1 (Figure 2b.1-6A) represents groundwater conditions in the western portion of the Lompoc Upland. Since the late 1960's, groundwater levels have experienced an overall net decline of about 10 feet, but most of that decline has occurred since approximately 2005 to the present. The data indicate groundwater elevations were relatively stable between 1975 through 1990, fluctuating within a range of approximately 5 feet to 10 feet. Slight increases in groundwater elevation are observed after 1990 during normal and wet years and continued through 2000. Groundwater elevations declined during the recent drought periods that began after 2005.

The hydrograph for Lower Aquifer well 7N/34W-12E1 (Figure 2b.1-6B) represent groundwater conditions in the eastern portion of the Lompoc Upland. This hydrograph shows a fairly steady, long-term decline in groundwater elevation since 1950. Minor groundwater elevation increases are observed between 1990 and 2000 following normal and wet years, followed by continued decline since approximately 2010. The long-term net decline in this well was about 30 feet.

2b.1-3-5 Santa Rita Upland

In the Santa Rita Upland, groundwater is used to meet a mix of agricultural and domestic demands for water. The Upper Aquifer and Lower Aquifer are both present in the Santa Rita Upland, but groundwater monitoring is primarily conducted in Lower Aquifer wells with limited data available for the Upper Aquifer. Hydrographs for both aquifers are provided on **Figures 2b.1-7AB** and **2b.1-7CD**.

In the central-western portion of the Santa Rita Upland, groundwater elevations in Lower Aquifer well 7N/33W-21N1 (Figure 2b.1-7A) show seasonal variations of a few feet. However, an approximately 20 foot decline in water levels occurred during the period 1970-1995, and after 1995 water levels have been relatively stable with no apparent net change in groundwater elevations. Hydrographs for Lower Aquifer wells in the northern portion of the Santa Rita Upland 7N/33W-21G2 (Figure 2b.1-7B) and south-central portion of the Santa Rita Upland 7N/33W-27G1 (Figure 2b.1-7C) both show consistent groundwater elevation declines. In the northern area, the net decline in groundwater elevation has been about 50 feet since approximately 1988. Similarly, in the south-central area the net decline in groundwater elevation has been more than 40 feet since about 1968. During normal and wet years, minor groundwater elevation increases are measured in these wells. These increases do not have a substantial influence on the longer-term trends.

In the eastern portion of the Santa Rita Upland, the elevation of groundwater in Upper Aquifer well 7N/33W-27J01 (Figure 1-7D) is hundreds of feet higher than groundwater elevations in Lower Aquifer well 7N/33W-27G1 (Figure 2b.1-7C) located less than one quarter mile to the west. Groundwater in the Upper Aquifer at this well is only about 20 feet below ground surface, whereas groundwater in the Lower Aquifer

Figure 2b.1-5

Selected Hydrographs, Lompoc Terrace

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Figure 2b.1-6

Selected Hydrographs, Lompoc Upland

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Figure 2b.1-7AB

Selected Hydrographs, Santa Rita Upland

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Figure 2b.1-7CD

Selected Hydrographs, Santa Rita Upland

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is several hundred feet or more below land surface. These groundwater elevations suggest that groundwater in the Upper Aquifer is likely underlain by an unsaturated zone, and the water table is perched above the Lower Aquifer.

2b.1-3-6 Santa Ynez River Alluvium

In the WMA upstream of the Lompoc Narrows, as discussed in the HCM, the Santa Ynez River Alluvium is considered part of the ~~subflow~~underflow of the Santa Ynez River, which is regulated by the SWRCB~~.~~ (Appendix 2a-B). Because ~~subflow~~underflow is considered surface water, the Santa Ynez River Alluvial deposits upstream of the Lompoc Narrows would not be classified as a principal aquifer or managed by a GSP under SGMA. The hydrograph for a well screened within this ~~subflow~~underflow of the Santa Ynez River, well 6N/33W-8E2 (**Figure 2b.1-8**), indicates water level elevations are relatively stable to slightly declining, following periods of prolonged drought in the late 1990s and late 2010s. Seasonal variations up to 10 feet are observed annually. These seasonal and longer-term trends are determined primarily by managed releases from Cachuma Reservoir and extractions of the ~~subsurface~~underflow water from wells in the river alluvium.

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Figure 2b.1-8

Selected Hydrographs, Santa Ynez River Alluvium

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2b.2 GROUNDWATER STORAGE

This section addresses the second sustainability indicator, reduction of groundwater storage. In the WMA, the change in groundwater storage in the Basin was evaluated in this section with respect to baseline conditions established in 1982, using data reported annually by the SYRWCD (Stetson 2021). Groundwater storage data for the WMA is evaluated and the cumulative changes in groundwater storage over time are discussed below. In accordance with SGMA, the section also includes "*a graph depicting estimates of the change in groundwater in storage, based on data, demonstrating the annual and cumulative change in the volume of groundwater in storage between seasonal high groundwater conditions, including the annual groundwater use and water year type*."[104] Graphs were created for the WMA subareas that show changes to groundwater in storage since the established baseline (1982) and are included as **Figure 2b.2-1**. Groundwater storage under future scenarios will be analyzed and refined with the groundwater budget and groundwater model being developed for the GSP.

2b.2-1 Cumulative Change in Groundwater Storage

~~Accumulated~~Historically reported change of groundwater in storage for the WMA is shown on Figure 2b.2-1 in acre-feet (AF). This annual and cumulative change in the volume of groundwater in storage is from the annual groundwater reports produced by the SYRWCD (Stetson 2021). For the historical period (1982 through 2018), the data indicate a net decline of groundwater storage in the WMA of about 15,000 AF.

The annual reporting of changes in groundwater storage (Stetson 2021) is based on changes in groundwater levels in representative monitoring wells. For the Lompoc Plain, the United States Bureau of Reclamation (USBR), in connection with SWRCB Order No. 2019-0148, determines on a monthly basis the quantity of dewatered storage beneath the forebay on the Lompoc Plain and in the Santa Ynez River alluvial deposits. The SYRWCD uses a similar methodology with representative monitoring wells to estimate the changes in groundwater storage for the Lompoc Upland, Lompoc Terrace, and Santa Rita Upland (Stetson 2021).

[104] 23 CCR § 354.16(b). A graph depicting estimates of the change in groundwater in storage, based on data, demonstrating the annual and cumulative change in the volume of groundwater in storage between seasonal high groundwater conditions, including the annual groundwater use and water year type.

The Burton Mesa subarea is not included in Figure 2b.2-1 as it has perched groundwater conditions that are not hydrogeologically connected to the principal aquifers of the WMA. In contrast, the Lompoc Terrace is included in Figure 2b.2-1 because it may be hydrogeologically connected to the Lower Aquifer. Both the Burton Mesa and the Lompoc Terrace have limited pumping and groundwater use, and therefore experience relatively minimum changes in groundwater storage.

2b.2-2 Classification of Wet and Dry Years

The HCM (Section 2a) introduced water flow elements, including precipitation over time at the Lompoc City Hall (Figure 2a.3-3). The four wettest water years (water-year defined as October through September, annually) based on precipitation in the period of record at Lompoc (Water Year 1911-2020)[105] are 1998 (36.42 inches precipitation), 1941 (32.71 inches), 1983 (32.46 inches), and 1995 (31.39 inches). The four driest water years in the period of record based on precipitation correspond to 2007 (5.32 inches), 1989 (6.35 inches), 1934 (6.45 inches) and 1924 (6.49 inches). However, precipitation does not fully account for carryover effects from previous years, so a surface water stream gage was used to characterize conditions.

To characterize all water years as either wet, above/below normal, or dry/critically dry as shown on **Figure 2b.2-2**, the Salsipuedes Creek streamflow gage (U.S. Geological Survey [USGS] gage 11132500) was selected as a proxy to classify each water year. The Salsipuedes Creek streamflow gage is located in Salsipuedes creek just below the confluence with El Jaro Creek, representing a 47.1-square-mile[106] drainage area. The 79-year dataset for the gage spans 1942 through 2020 and represents unimpeded runoff due to the absence of upstream water diversion and storage.

Discharge in acre-feet per year (AFY) for Salsipuedes Creek gage is shown on **Figure 2b.2-3** for the period of record. The data are presented as a power law distribution, meaning the highest recorded flows in acre-feet have occurred in a minority of the total years recorded. Classification into a water year type followed the State Water Resources Control Board Order WR 2019-0148 methodology. Years were classified based on the rank in the period of record in one of five categories: “critically dry” (bottom 20 percentile), “dry”

[105] Lompoc City Hall, Gage 439, Santa Barbara County Flood Control & Water Conservation District.
[106] USGS NWIS (2020) USGS 11132500 SALSIPUEDES C NR LOMPOC CA

Figure 2b.2-1

Cumulative Change in Groundwater Storage by Subarea, Relative to March 1982

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Figure 2b.2-2

11132500 Salsipuedes Creek Near Lompoc Cumulative Departure from Mean and Period of Record (WY 1942-2020)

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Figure 2b.2-3

Water Year Type, Santa Ynez River Valley Groundwater Basin,

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(20th to 40th percentile), “below normal (40th to 60th percentile), “above normal” (60th to 80th percentile), and “wet” (80th to 100th percentile).

Using the robust dataset from the Salsipuedes Creek gage (Figure 2b.2-2) the period of record was classified as wet, above/below normal, or dry/critically dry. The cumulative departure from mean graph at the bottom indicates that the period 1993 through 2006 was relatively wet, while the period 2012 through 2018 has been relatively dry.

2b.2-3 Groundwater Use and Effects on Storage

Total annual reported groundwater use for the WMA is compared to cumulative groundwater storage loss on **Figure 2b.2-4**. Water use was introduced in the HCM (Section 2a.4 and Figure 2a.4-1). Groundwater use was relatively constant from the late 1987 through 2012. For years 2013 through 2019 (current), total annual groundwater use has declined from about 31,000 to 25,000 acre-feet per year. The observed decline in groundwater use has occurred during a period with relatively dry water years. Cumulative groundwater storage loss indicates that during dry periods the groundwater storage decreased (e.g., 2012 through 2018), and conversely, during wet periods the groundwater storage increased (e.g., 1993 through 2006).

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Figure 2b.2-4

Change in Storage

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2b.3 WATER QUALITY

In accordance with SGMA, "Groundwater quality issues that may affect the supply and beneficial uses of groundwater, including a description and map of the location of known groundwater contamination sites and plumes"[107] are described in this section. Water quality objectives vary depending on the beneficial use and users of groundwater being evaluated. To determine existing or future potential water quality issues within the WMA, the beneficial uses of groundwater must first be established.

This section is divided as follows:

- Section 2b.3-1, Beneficial Uses. This subsection describes the various beneficial uses for groundwater within the Basin and provides context for water quality objectives for those beneficial uses.
- Section 2b.3-2, Suitability for Beneficial Use, includes discussion of major beneficial uses.
- Section 2b.3-3, Groundwater Contamination Sites and Plumes. This section describes the known existing groundwater contaminant sites and plumes that are currently managed by other State of California regulatory bodies responsible for protecting groundwater quality and quantity.
- Section 2b.3-4, Current Groundwater Quality (2005-2018), includes data for selected major diffuse or natural constituents for the period water year 2015 through 2018.

2b.3-1 Beneficial Uses

The Central Coast Basin Water Quality Control Plan herein referred to as the 2019 Central Coast Basin Plan (RWQCB 2019), which includes the SYRVGB, identifies 18 beneficial uses of surface and groundwater in the SYRVGB below Cachuma Reservoir (RWQCB 2019 Table 2-1), which are briefly listed and described below. Beneficial uses were previously introduced in the Plan Area (Section 1d.5).

107 23 CCR § 354.16 (d) A graph depicting estimates of the change in groundwater in storage, based on data, demonstrating the annual and cumulative change in the volume of groundwater in storage between seasonal high groundwater conditions, including the annual groundwater use and water year type.

The following four beneficial categories apply to both groundwater and surface water in the WMA.

- Municipal and Domestic Supply (MUN). Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
- Agricultural Supply (AGR). Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
- Industrial Process Supply (PROC). Uses of water for industrial activities that depend primarily on water quality (e.g., waters used for manufacturing, food processing, etc.).
- Industrial Service Supply (IND). Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization.

For surface water, the 2019 Central Coast Basin Plan has identified an additional 14 beneficial uses in the SYRVGB below the Cachuma Reservoir[108]. The importance of groundwater quality on these beneficial uses depends on the quantity and timing of discharge of groundwater to surface water.

2b.3-1-1 Median Groundwater Quality Objectives

The 2019 Central Coast Basin Plan includes median groundwater objectives for several major water quality constituents specifically for portions of the WMA. These are shown in **Table 2b.3-1** along with the secondary maximum contaminant levels (SMCL), a national federal drinking water standard for guidance regarding water for potential public supply. These "objectives are intended to serve as a water quality baseline for evaluating water quality management in the basin" (RWQCB 2019) and represent an average value in each subarea.

108 See "Table 2-1. Identified Uses of Inland Surface Waters (continued)", page 20, 2019 Basin Plan (RWQCB 2019).

Table 2b.3-1
Median Groundwater Objectives in MG/L
for the Western Management Area

Basin/Subarea	Salinity as Total Dissolved Solids (TDS)	Chloride (Cl)	Sulfate (SO_4^{2-})	Boron (B)	Sodium (Na)	Total Nitrogen (N)
Lompoc Plain	1,250	250	500	0.5	250	2
Lompoc Upland	600	150	100	0.5	100	2
Lompoc Terrace*	750	210	100	0.3	130	1
Santa Rita Upland	1,500	150	700	0.5	100	1
SMCL	*500*	*250*	*250*	-	-	-

Note: * 2019 Central Coast Basin Plain map of the Lompoc Terrace only includes areas where the Lower Aquifer is present.

2b.3-2 Suitability for Beneficial Use

Groundwater quality in the WMA is suitable for potable and agricultural uses. Key water quality parameters in the WMA in relation to the primary beneficial uses and primary users are summarized below.

2b.3-2-1 Municipal Supply

Municipal supply is the best documented water quality in the WMA, as all public water systems of significant size are required to collect and report water quality to the State Water Resources Control Board (SWRCB) as part of the Safe Drinking Water Information System (SDWIS). Because the major public water systems treat the groundwater in the WMA including the City of Lompoc, Vandenberg Village Community Services District (CSD) and Mission Hills CSD, the majority of the water quality issues are constituents likely related to the distribution system and do not indicate general groundwater quality impairing this beneficial use. The exception is the elevated nitrate found by the Vista Hills Mutual Water Company and Tularosa Mutual Water Company, both located in the Santa Rita Upland, and reported problems to the SWRCB in 2019 and 2020.

2b.3-2-2 Agricultural Supply

Agricultural beneficial use is the primary beneficial use in the WMA. Different crops have different sensitivities to water quality constituents, and water quality is one of many considerations in terms of crop selection. Section 2a.4-2 of the HCM identified major crops in the WMA, including wine-grapes, strawberries, raspberries, dry beans, walnuts, alfalfa, barley, herbs, peaches, cut-flowers, lettuce, and broccoli. These include crops that are sensitive to high total dissolved solids (TDS), chloride, and boron. Agricultural water is generally untreated before use. However, poor water quality (high TDS) often can be mitigated by increased water application (increased leaching fraction).

Historical water quality in the WMA was reviewed relative to the 2019 Central Coast Basin Plan general water quality objectives for agricultural water use. In parts of the Lompoc Plain, boron is above the reference value of 0.75 milligrams per liter (mg/L) and iron has measurements above the reference of 5.0 mg/L. Manganese has several values above 0.2 mg/L in the Santa Ynez River Alluvium and Lompoc Plain. Molybdenum has values above 0.01 mg/L in the Lompoc Terrace and Lompoc Plain.

2b.3-2-3 Domestic Supply

Impaired beneficial use for domestic supply was reviewed using the SWRCB Needs Analysis GAMA Tool. This tool identifies the location of domestic wells by section and indicates if groundwater is adversely affected by nitrate, arsenic, hexavalent chromium, perchlorate, 1,2,3-trichloropropane, and uranium. Unlike municipal supply, domestic supply is less likely to involve water treatment so groundwater quality is more likely to have a direct negative impact on this beneficial use. Domestic suppliers are not required to take and submit water quality samples.

In the WMA, nitrate exceedances occurred in sections with domestic supply wells in the Lompoc Plain, Lompoc Terrace, Santa Rita Upland, and the Santa Ynez Alluvium. Arsenic exceedances only occurred in sections in the eastern Lompoc Plain, although it was detected below action levels in the Lompoc Upland. No issues were identified related to hexavalent chromium, perchlorate, 1,2,3-trichloropropane, and uranium in the WMA.

2b.3-3 Groundwater Contamination Sites and Plumes

Publicly available databases maintained by various State of California regulatory agencies, including the State Water Resources Control Board GeoTracker GAMA site[109], and the California Department of Toxic Substances Control EnviroStor site[110] were reviewed and evaluated. In accordance with SGMA,[111] the available data were used to identify sites that could potentially affect groundwater quality within the WMA. Identification of existing groundwater contamination sites are mapped on **Figure 2b.3-1** and the historical extents of contaminant plumes in groundwater are mapped on **Figure 2b.3-2**. These sites are regulated and under the oversight authority of their respective State of California agencies responsible for ensuring the contamination is mitigated in-place and directing appropriate actions to protect groundwater quantity and quality. SGMA requires[112] that sustainable groundwater management not influence plume migration and negatively influence groundwater quality. Hence, discussion of these sites is for information purposes, and all management, monitoring, compliance and reporting activities related to these sites remain under their respective State of California agencies.

A summary of the identified sites within the WMA is provided in **Table 2b.3-2**. Most of the sites within the City of Lompoc are located along Highway 246 (Ocean Avenue) and Highway 1 (H Street). The sites are primarily related to historical fueling station operations and the contaminants are related to leaking underground storage tank sites. The Vandenberg SFB Cantonment Area is currently regulated under the oversight of the Central Coast Regional Water Quality Control Board (CCRWQCB). Although the site has multiple contaminants of concern[113], they are currently considered compliant with applicable regulatory

109 GeoTracker. State Water Resources Control Board. Web Application. https://geotracker.waterboards.ca.gov/ Accessed 2021-08-21.
110 EnviroStor. Department of Toxic Substances Control. Web Application. https://www.envirostor.dtsc.ca.gov/public/ Accessed 2021-08-20.
111 23 CCR § 354.16 (d) [...] including a description and map of the location of known groundwater contamination sites and plumes.
112 CWC Section 10721 (x)(4) […] including the migration of contaminant plumes that impair water supplies.
113 Identified contaminants of concern at the VSFB Cantonment area include: heavy metals (hexavalent chromium, arsenic, nickel, lead, cadmium, antimony, selenium, beryllium, thallium, vanadium, and barium), DDT and byproducts (4,4'-DDT, 4,4'-DDD, and 4,4'-DDE), degreasing solvents (1,2,3-trichloropropane, 1,1 dichloroethylene, vinyl chloride, and acetone), petroleum products (methyl-tert-butyl ether (MTBE), tert-butyl alcohol (TBA), and benzene), dieldrin and heptachlor. Vandenberg SFB Space Launch Complexes have identified groundwater contamination from trichloroethene (TCE), vinyl chloride, and groundwater contamination related to rocketry, including perchlorate, an oxidizer.

orders and the contaminants are being effectively monitored and managed in place or remediated to reduce future potential to impair groundwater quality.

Table 2b.3-2
Count of Potential Point Sources of Groundwater Contamination
Shown on Figure 2b.2-3 by WMA Subarea

Basin/Subarea	SWRCB Cleanup Program		LUST Cleanup		Military Cleanup		DTSC Cleanup		Total	
	Open	Total	Open	Total	Open	Total	Open	Total	Open	Total
Lompoc Plain	3	12	5	43	4	9	4	6	16	70
Lompoc Upland	1	5	0	9	5	7	2	3	8	24
Lompoc Terrace	0	0	0	0	8	20	0	0	8	20
Burton Mesa	0	1	0	0	48	288	4	5	52	294
Santa Rita Upland	0	1	0	0	0	0	0	0	0	1
Santa Ynez River Alluvium	0	0	0	0	0	0	0	0	0	0
Total	4	19	5	52	65	324	10	14	84	409

Note: LUST = leaking underground storage tank; DTSC = Department of Toxic Substances Control.

2b.3-4 Current Groundwater Quality (2015-2018)

The distribution and concentration of selected naturally occurring or diffuse groundwater constituents are discussed in the following subsections. The constituents in this section correspond to the same constituents used for the 2019 Central Coast Basin Plan groundwater quality objectives (Table 2b.3-1). Averages for the recent 4-year period of water years 2015 through 2018 are shown. Water quality data was primarily evaluated from three primary data compilation sources:

- Water Quality Portal, a cooperative service from USGS, the U.S. Environmental Protection Agency, and the National Water Quality Monitoring Council, which in addition to these federal sources includes some state, tribal, and local data. This is the primary source for USGS water quality data. Water quality data collected by the Santa Barbara County Water Agency is submitted to the USGS and included here.

Figure 2b.3-1

Location of Potential Point Sources of Groundwater Contaminants, Western Management Area

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Figure 2b.3-2

Groundwater Plumes, Western Management Area

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- Safe Drinking Water Information System, which is a compilation service from SWRCB that compiles mandated water quality reports from California public water systems. Public water systems include the WMA member agencies of City of Lompoc, Vandenberg Village CSD, and Mission Hills CSD.

- Irrigated Lands Regulatory Program (ILRP), an SWRCB program that tracks discharges from irrigated agricultural lands. Participants submit water quality sampling results for selected constituents. The ILRP is made available through the Safe Drinking Water Information System GeoTracker GAMA website.

The Data Management System, described in the Data Management Plan, was configured to automatically update the database with data from these three sources of water quality data. The sections below provide a snapshot of current groundwater conditions in the WMA, based on the best available data from January 1, 2015, through 2018. The spatial distribution of water quality is assessed using maps, and average concentrations are compared to the 2019 Central Coast Basin Plan water quality objectives and summarized in tables.

2b.3-4-1 Salinity (Total Dissolved Solids)

Salinity, as measured by total dissolved solids (TDS), is the dry mass of constituents dissolved in a given volume of water. There are two measurements of salinity: TDS, which is a measurement of the total mass of the mineral constituents dissolved in the water, and electrical conductivity, which is a measurement of the conductivity of the solution of water and dissolved minerals.

The Secondary Maximum Contaminant Level (SMCL) includes a recommended standard of 500 mg/L, an upper limit of 1,000 mg/L, and a short-term limit of 1,500 mg/L (SWRCB 2017). The 2019 Central Coast Basin Plan for irrigation does not provide a TDS guidance for salinity. Major crops in the WMA sensitive to salinity are beans, strawberries, raspberries, and peaches (Hanson 2006).

Average TDS concentrations in groundwater during water years 2015 through 2018 for 437 measurements at 110 wells in the WMA are shown on **Figure 2b.3-3**, and a summary of the data is provided in **Table 2b.3-3**. As shown in **Table 2b.3-3**, the average constituent concentrations in most wells located in the Lompoc Upland, Santa Rita Upland and Santa Ynez River Alluvium were below the 2019 Central Coast Basin Plan

Water Quality Objective (WQO); whereas only 43-percent of the wells located in the Lompoc Plain were below the WQO. The average concentrations were generally lower in the Santa Rita Upland and Lompoc Upland, and relatively higher in the Santa Ynez River Alluvium and the Lompoc Plain. The highest salinity was measured in the central and western portions of the Lompoc Plain (**Figure 2b.2-4**).

Table 2b.3-3
Summary of Salinity as Total Dissolved Solids (TDS)
in the WMA during Water Years 2015–2018

Subarea	TDS Average (mg/L)	TDS Minimum (mg/L)	TDS Maximum (mg/L)	TDS WQO (mg/L)	Wells Below WQO (count)	Wells Above WQO (count)
Lompoc Plain	1,600	ND	5,450	1,250	32	42
Lompoc Upland	756	390	1,970	600	4	5
Lompoc Terrace	-	-	-	750	0	0
Santa Rita Upland	583	340	1,050	1,500	12	0
SYR Alluvium	1,276	840	2,590	1,500	12	3

2b.3-4-2 Chloride

Chloride (Cl^-) is a mineral anion and a major water quality constituent in natural systems. Chloride is characteristically retained in solution through most of the processes that tend to separate out other ions (Hem 1985). The circulation of chloride ions in the hydrologic cycle is largely through physical processes. For example, chloride is a chemical indicator commonly used to evaluate seawater intrusion, as high chloride concentrations are characteristic of seawater and it remains dissolved in solution in most surface water conditions (see **Section 2b.4**, Seawater Intrusion).

For general municipal and domestic beneficial uses the SMCL is a recommended standard of 250 mg/L, an upper limit of 500 mg/L, and a short-term limit of 600 mg/L. For agricultural beneficial use, the 2019 Central Coast Basin Plan indicates chloride levels that exceed 106 mg/L cause increasing problems for crop irrigation. Major crops grown in the WMA sensitive to chloride in irrigation water include strawberries (tolerance of 100–180 mg/L) and raspberries (tolerance of 100 mg/L) (Hanson et al. 2006).

Figure 2b.3-3

Salinity - Total Dissolved Solids, Average WY 2015 – 2018, Western Management Area

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Figure 2b.3-4

Chloride (CL), Average WY 2015 – 2018, Western Management Area

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Average chloride groundwater concentrations during water years 2015 through 2018 for 357 measurements at 112 wells are shown on **Figure 2b.3-4**, and a summary of the data is provided in **Table 2b.3-4**. The average concentration in samples from most wells were below the 2019 Central Coast Basin Plan WQO. Highest chloride concentrations were in samples from the central and western portions of the Lompoc Plain (Figure 2b.3-4).

Table 2b.3-4
Summary of Chloride (CL) Concentrations
in the WMA during Water Years 2015–2018

Subarea	Cl^- Average (mg/L)	Cl^- Minimum (mg/L)	Cl^- Maximum (mg/L)	Cl^- WQO (mg/L)	Wells Below WQO (count)	Wells Above WQO (count)
Lompoc Plain	285	77	2,710	250	48	27
Lompoc Upland	157	72	364	150	6	4
Lompoc Terrace	-	-	-	210	-	-
Santa Rita Upland	95	53	203	150	11	1
SYR Alluvium	122	61	270	150	13	2

2b.3-4-3 Sulfate

Sulfate (SO_4^{2-}) is a naturally occurring anion and a major water quality constituent. The SMCL includes a recommended standard of 250 mg/L, an upper limit of 500 mg/L, and a short-term limit of 600 mg/L. The 2019 Central Coast Basin Plan does not indicate a specific sulfate guideline for irrigation water.

Average sulfate concentrations in groundwater during water years 2015 through 2018 were determined from 349 samples collected at 111 WMA wells, and the results are mapped on **Figure 2b.3-5**, and a summary of the data is provided in **Table 2b.3-5**. The average concentration in most wells were above the 2019 Central Coast Basin Plan WQO. Sulfate concentrations were generally lower in the Santa Rita Upland and Lompoc Upland, and relatively higher in the Santa Ynez River Alluvium and the Lompoc Plain. The highest sulfate concentrations were measured in samples from the central Lompoc Plain (Figure 2b.3-5).

Table 2b.3-5
Summary of Sulfate Concentrations
in the WMA during Water Years 2015–2018

Subarea	SO_4^{2-} Average (mg/L)	SO_4^{2-} Minimum (mg/L)	SO_4^{2-} Maximum (mg/L)	SO_4^{2-} WQO (mg/L)	Wells Below WQO (count)	Wells Above WQO (count)
Lompoc Plain	518	ND	1,800	500	9	66
Lompoc Upland	174	31	736	100	4	5
Lompoc Terrace	-	-	-	100	-	-
Santa Rita Upland	149	34	490	700	6	6
SYR Alluvium	474	189	1,060	700	0	15

2b.3-4-4 Boron

Boron (B) is a trace water quality constituent, and plants have specific tolerance limits for boron concentrations in irrigation water. The 2019 Central Coast Basin Plan's general guidance regarding boron toxicity from irrigation water increases from 500 to 2,000 micrograms per liter (µg/L). Major crops in the WMA considered sensitive to boron are beans (750–1,000 µg/L), grapes (500–750 µg/L), peaches (500–750 µg/L), strawberries (750–1,000 µg/L), and walnuts (500–750 µg/L) (Hanson et al. 2006). Concentrations above 10,000 µg/L may be toxic to fish.

Average boron groundwater concentrations during water years 2015 through 2018 for 146 measurements in 40 wells in the WMA are shown on **Figure 2b.3-6**, and a summary of the data is provided in **Table 2b.3-6**. Averages concentrations in most wells located in the WMA were below the 2019 Central Coast Basin Plan WQO. Boron concentrations were generally lower in the Santa Rita Upland and Lompoc Upland, and relatively higher in the Lompoc Plain. The highest concentrations were in samples from wells located in the central portions of the Lompoc Plain (Figure 2b.3-6).

Figure 2b.3-5

Sulfate (SO4), Average WY 2015 – 2018, Western Management Area

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Figure 2b.3-6

Boron (B), Average WY 2015 – 2018, Western Management Area

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Table 2b.3-6
Summary of Boron Concentrations
in the WMA during Water Years 2015–2018

Subarea	B Average (µg/L)	B Minimum (µg/L)	B Maximum (µg/L)	B WQO (µg/L)	Wells Below WQO (count)	Wells Above WQO (count)
Lompoc Plain	666	99	6,340	500	26	16
Lompoc Upland	290	ND	550	500	4	1
Lompoc Terrace	-	-	-	300	-	-
Santa Rita Upland	248	73	520	500	2	1
SYR Alluvium	-	-	-	500	0	0

Note: Non-Detect (ND) Values are Treated as Zero in Calculations.

2b.3-4-5 Sodium

Sodium (Na^+) is a mineral cation and a major water quality constituent in natural systems. The 2019 Central Coast Basin Plan indicates the primary concern for sodium in irrigation water is the sodium absorption ratio (SAR). The sodium absorption ratio is the relative concentration of sodium to calcium and magnesium and is managed to maintain soil permeability.

Average sodium groundwater concentrations during water years 2015 through 2018 for 359 measurements at 113 wells in the WMA are shown on **Figure 2b.3-7**, and a summary of the data is provided in **Table 2b.3-7**. The average concentrations in most wells were below the 2019 Central Coast Basin Plan WQO. Sodium concentrations were generally lower in the Santa Rita Upland and Lompoc Upland, and highest in the Lompoc Plain. The highest concentrations were in samples from wells located in the central and western Lompoc Plain.

Table 2b.3-7
Summary of Sodium Concentrations
in the WMA during Water Years 2015–2018

Subarea	Na^+ Average (mg/L)	Na^+ Minimum (mg/L)	Na^+ Maximum (mg/L)	Na^+ WQO (mg/L)	Wells Below WQO (count)	Wells Above WQO (count)
Lompoc Plain	190	61	2,000	250	65	11
Lompoc Upland	89	49	150	100	7	3
Lompoc Terrace	-	-	-	130	-	-
Santa Rita Upland	68	40	110	100	12	0
SYR Alluvium	99	1	578	100	9	6

2b.3-4-6 Nitrate

Nitrogen is the primary atmospheric gas, however its presence in water is related to the breakdown of organic waste. Total nitrogen in groundwater is the sum of organic nitrogen and the three inorganic forms: nitrate (NO_3^-), nitrite (NO_2^-), and ammonia (NH_3). These forms are ubiquitous in nature and come from fixation by microbes in soil and water and by lightning. Sources for high concentrations in water sources include fertilizers, animal and human waste streams, and explosives. Nitrogen and phosphorus are key for life and are found in many fertilizers.

The maximum contaminant limit (MCL) and public health goal is 10 mg/L for combined nitrate plus nitrite as nitrogen (Banks et al. 2018). The 2019 Central Coast Basin Plan indicates increasing problems for irrigation of sensitive crops if nitrate as nitrogen is between 5 and 30 mg/L, and problems for livestock watering if nitrate plus nitrite as nitrogen exceeds 100 mg/L.

Nitrate concentrations are reported either as nitrate (the full mass of the nitrate anion), or as nitrogen (the mass of the nitrogen). For this study all values have been converted to nitrate as nitrogen. The best available data and coverage for nitrogen within the WMA for recent years is from ILRP, which measures and reports combined nitrate-nitrite values. In the WMA, measurements of nitrate concentrations are significantly greater than nitrite, so combined nitrate-nitrite are approximately equal to nitrate alone.

Figure 2b.3-7

Sodium (NA), Average WY 2015 – 2018, Western Management Area

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Average nitrate groundwater concentrations during water year 2015 through 2018 for 304 measurements at 117 wells in the WMA are shown on **Figure 2b.3-8**, and a summary of the data is provided in **Table 2b.3-8**. Nitrate concentrations that exceed the MCL occur in the WMA, but average concentrations of samples from most of the wells are below the MCL. The highest concentrations of nitrate are measured in samples from wells located in the Santa Ynez River Alluvium and the Lompoc Plain.

Table 2b.3-8
Summary of Nitrate as Nitrogen
in the WMA during Water Years 2015–2018

Subarea	NO_3 as N Average (mg/L)	NO_3 as N Minimum (mg/L)	NO_3 as N Maximum (mg/L)	NO_3-NO_2 as N WQO (mg/L)	Wells Below WQO (count)	Wells Above WQO (count)
Lompoc Plain	9.9	ND	150	2	44	31
Lompoc Upland	1.9	ND	6.7	2	8	4
Lompoc Terrace	-	-	-	1	-	-
Santa Rita Upland	1.5	ND	9.4	1	7	8
SYR Alluvium	4.0	1.00	37.7	1	8	7

2b.3-4-7 Historical Trends

Historical water quality trends in the WMA have been analyzed with available historical data from 1980 to present in California's Groundwater Ambient Monitoring Assessment (GAMA) program (Haas et al. 2019). Mixed trends, both increasing and decreasing, were noted for the identified constituents in the 2019 Central Coast Basin Plan (TDS, sulfate, and nitrate) and additional constituents (arsenic, hexavalent chromium, iron, and manganese)[114]. The mixed nature of these trends is most likely to various natural and manmade sources (Haas et al. 2019).

Salinity measured as TDS has historically been an issue of concern for the Upper Aquifer in the Lompoc Plain (Bright, 1997). The salinity conditions in the Lompoc Plain are influenced by the quantity and quality of Santa Ynez streamflow and Cachuma Project operations. Pursuant to a Settlement Agreement entered into on December 17, 2002 (2002 Settlement Agreement) between Cachuma Project Member Units and downstream local interests, State Water Project (SWP) supplies are commingled with water rights

[114] Figures 20-26 (Haas et al. 2019)

releases. The objective of such commingling operations is to maximize delivery of SWP supplies to lower the salinity in the Lower Santa Ynez River at the Lompoc Narrows. As a result, data from water supply wells showed a decrease in TDS concentrations (West Yost 2013). However, in more recent years the mixing of reservoir and imported water has been limited owing to conflicting purposes for the dam penstock operations, biological opinion restrictions, and other operational conflicts.

These baseline water quality data are provided as a snapshot of current conditions. The responsibility of regulating water quality lies with other existing agencies and programs, and a goal of the WMA GSP will be to not significantly and unreasonably influence existing (background) water quality conditions. Future monitoring is discussed in the Monitoring Network (Section 3a) and protective targets are discussed in Sustainable Management Criteria (Section 3b). Hence, future groundwater management actions implemented by the WMA will not interfere with other agencies objectives or responsibility to manage, maintain, or improve water quality.

Figure 2b.3-8

Nitrate as Nitrogen (NO3 as N), Average WY 2015 – 2018, Western Management Area

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2b.4 SEAWATER INTRUSION

The fourth sustainability indicator, seawater intrusion, is addressed in this section through presentation of "seawater intrusion conditions in the basin, including maps and cross-sections of the [potential] seawater intrusion front for each principal aquifer."[115] The potential undesirable result from seawater intrusion is degraded water quality (third sustainability indicator) from increased salt and mineral content from seawater, which is orders of magnitude higher (saltier) than freshwater. Seawater salinity (total dissolved solids) is approximately 35,000 mg/L, seawater chloride is about 19,000 mg/L, and seawater sodium is 10,500 mg/L (Hem 1985). Estuary environments, like the Santa Ynez River estuary, occur naturally where rivers meet and mix with seawater and are characterized by changing salinity concentrations affected by tidal influence from the ocean, and discharge influence from the river.

Chloride is a chemical indicator commonly used to evaluate seawater intrusion, as chloride concentrations are typically much greater than measured in inland waters and it remains dissolved in solution in most surface water conditions. Chloride concentrations for seawater, the Santa Ynez River estuary and inland wells in the WMA are shown in aerial and cross-section view on **Figures 2b.4-1**, **2b.4-2**, 2b.4-3, and **2b.4-4**. In the WMA, chloride concentrations in samples from Upper Aquifer wells range from 50 mg/L[116] to more than 650 mg/L in the Lompoc Plain[117]. As indicated above in Section 2b.3, the Basin Plan objectives for median groundwater use in the Lompoc Plain is 250 mg/L. Historically measured chloride concentrations in Santa Ynez River water samples, a primary source of recharge to the Lompoc Plain, range from 14.0 mg/L to 270 mg/L. Currently seawater intrusion is not an issue of concern in the WMA as discussed in more detail in the section below.

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115 23 CCR § 354.16(c) Seawater intrusion conditions in the basin, including maps and cross-sections of the seawater intrusion front for each principal aquifer.

116 52.1 mg/L USGS 343830120065001 007N031W35K004S measured on 2014-08-07.

117 663 mg/L USGS 344043120322407 007N035W23E007S measured on 2018-08-21.

2b.4-1 Western Management Area Subareas Adjacent to Pacific Ocean

2b.4-1-1 Lompoc Plain

In the Lompoc Plain, the Santa Ynez River meets the Pacific Ocean in the Santa Ynez River estuary. In the inter-tidal zone, seawater mixes with Santa Ynez River water. The land in the lower Santa Ynez River is within the inter-tidal zone is shown in Figure 2b.4-1 and is located almost entirely within federal lands of Vandenberg SFB. The tidal fluctuation was mapped by the Pacific Marine and Estuarine Fish Habitat Partnership (2018) using high resolution elevation data, and results show that these areas are almost entirely located within federal lands of Vandenberg SFB. The tidal zone extends 3.1 miles inland from the coast and covers 588 acres.

Figure 2b.4-2 is a conceptual model of mixing in the estuary at low and high tides. Higher chloride groundwater is associated with proximity to the Pacific Ocean. Lower chloride groundwater is associated with the Santa Ynez River. Seawater mixes with fresh water within the tidal zone of the estuary (Figure 4-2), creating a mixed saline environment both spatially and temporally, depending upon the condition of high or low tides.

The locations of historical and current chloride monitoring and the extents of the estuary are shown on Figure 2b.4-3. Approximate lines of equal chloride concentrations in groundwater (isochlors) were constructed from this dataset to approximate conditions in 2020.[118] The contours show the relative influences of seawater near the coast and mixing of different waters and water qualities that influence groundwater conditions beneath the estuary.

The estuary is located geologically in an alluvium-filled channel cut into the non-water-bearing Monterey formation. The only aquifer unit is the Upper Aquifer comprised of the alluvial sediments of the Santa Ynez River. Groundwater in the Upper Aquifer is hydraulically connected to the overlying estuary, and the absence of the Lower Aquifer in this area near the coast as shown in cross-section Figure 2b.4-4 impedes the potential inland advancement of seawater.

118 An airborne geophysics survey was conducted in late 2020 over the Santa Ynez River Estuary, with results expected in mid-2022. The results are expected to provide a basis for improved resolution of the chloride isocontours shown in Figure 2b.4-3.

Figure 2b.4-1

Seawater Intrusion, Current and Historical Estuary Extent, Santa Ynez River

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Figure 2b.4-2

Western Management Area, Conceptual Model of Mixing in Santa Ynez River Estuary

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Figure 2b.4-3

Seawater Intrusion, Isocontour of Chloride Advancement 2020

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Figure 2b.4-4

Western Management Area Aquifer Cross Section A-A', Upper Aquifer Chloride Concentration Near and Upstream of Estuary

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Graphs of salinity (TDS), chloride, and sodium concentrations in water from regularly monitored wells located in the Lompoc Plain are shown in **Figure 2b.4-5**. One of the wells (7N/35W-17K20) is located about 1.2 miles inland from the ocean and near the Santa Ynez River estuary; the comparison wells (7N/35W-26F4, and 7N/35W-26F5) are located about 3.5 miles farther inland in the Lompoc Plain. Concentrations in the estuary well (7N/35W-17K20) are elevated relative to those measured further inland (7N/35W-26F4, and 7N/35W-26F5), but are significantly less than the concentrations measured in seawater. Long-term trends of all three constituents in samples from the estuary well have been relatively stable, suggesting that there has been no significant movement of the natural interface between seawater in the subsurface and the relatively fresh groundwater in the Lompoc Plain.

Figure 2b.4-6 is a Piper diagram showing the relationships between the major cations and anions measured in samples from selected wells and surface water gages in the lower Santa Ynez River. The water quality in samples from two inland wells (7N/35W- 17K20 and 7N/35W- 18H1) is similar to Santa Ynez River water, whereas the samples from wells located further west (7N/35W- 26F4 and 7N/35W- 21G2) and toward the coast and in the estuary show an increasing influence of seawater.

Chloride concentrations that exceed 650 mg/L occur in samples from wells located in the Santa Ynez River Estuary (Figures 2b.4-2 through 2b.4-4), consistent with estuary environments where fresh water mixes with seawater. The Santa Ynez River Estuary is an established estuarine environment, known for its connection to the Pacific Ocean and associated tidal influences. Therefore elevated chloride concentrations observed in groundwater in this part of the Lompoc Plain is likely a natural condition and not indicative of active sea water intrusion. Moreover, previous studies concluded there is a net outflow of relatively fresh groundwater to the Pacific Ocean from the principal aquifers in this part of the Basin. For example, Bright et al. (1992) indicated up to 400 AFY of net groundwater outflow in the Upper Aquifer from the Lompoc Plain to the Pacific Ocean (Figure 2b.4-4).

2b.4-1-2 Lompoc Terrace

The Lompoc Terrace includes part of the Lower Aquifer consisting of Careaga Sand along the trace of the syncline. Along most of the coast, the land surface elevation is well above sea-level and as a result perched Orcutt Sand deposits are physically separated from the ocean, which prevents seawater intrusion from occurring. In the Lower Aquifer, the water level elevations along the coast in the Lompoc Terrace are 100 feet higher than sea level and there is no groundwater pumping in this area (Ken Domako, VSFB, personal communication 2020), so seawater intrusion is not an issue of concern. Furthermore, VSFB is federal facility and not subject to SGMA.

2b.4-1-3 Burton Mesa

In the Burton Mesa subarea, water-bearing sediments are physically separated from the Pacific Ocean by the low permeability Monterey formation. The perched sand deposits in this area are not hydraulically connected to the ocean, and therefore seawater intrusion is not an issue of concern.

Figure 2b.4-5

Major Water Quality Trends, Selected Wells, Lompoc Plain Subarea

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Figure 2b.4-6

Lower Santa Ynez River, Piper Diagram Water Quality Influence from Seawater Intrusion

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2b.5 LAND SUBSIDENCE

The fifth sustainability indicator, land subsidence, is evaluated within the WMA in this section. SGMA requires evaluation of the "extent, cumulative total, and annual rate of land subsidence, including maps depicting total subsidence,"[119] with the overall goal of avoiding the undesirable result of "significant and unreasonable land subsidence that substantially interferes with surface land uses" as a result of changing groundwater conditions throughout the Basin.[120] Land subsidence is not an issue of concern in the WMA as discussed in more detail below. The USGS land subsidence map of California does not include any portion of the SYRVVGB.[121]

Land subsidence may result from tectonic forces or the extraction of oil, gas, and water. Land subsidence resulting from groundwater use and aquifer deformation (the action or process of changing in shape or distorting, especially through the application of pressure) may be of two kinds: elastic or inelastic.

Elastic deformation occurs from the compression and expansion of sediments due to pore pressure changes that occur with fluctuations in groundwater elevations (Borchers and Carpenter 2014). Therefore, elastic deformation may be cyclical in nature corresponding to seasonal groundwater recharge or groundwater discharge or extraction. Elastic deformation does not result in permanent loss of pore space or land subsidence.

Inelastic deformation may result in irreversible land subsidence and is commonly related to groundwater discharge or extraction from fine grained sediments within clay or silt aquitards (Borchers and Carpenter 2014). Permanent land subsidence related to groundwater withdrawal generally occurs in an aquifer when groundwater elevations and changes in groundwater storage consistently decrease falling below historical seasonal and longer-term ranges. The resulting combination of increased pressure from the weight of the overlying sediments (overburden stress) and reduction in hydraulic pressure within the

119 23 CCR § 354.16(e). The extent, cumulative total, and annual rate of land subsidence, including maps depicting total subsidence, utilizing data available from the Department, as specified in Section 353.2, or the best available information.
120 CWC Section10721(x)(5). Significant and unreasonable land subsidence that substantially interferes with surface land uses.
121 USGS, Areas of Land Subsidence Web Application. https://ca.water.usgs.gov/land_subsidence/california-subsidence-areas.html. Accessed 2021-07-08.

aquifer (pore pressure) essentially squeezes the water out of the compressible clay beds within the aquifer system. This type of deformation is irreversible and represents a permanent loss in aquifer storage.

2b.5-1 Geologic Setting

The HCM (Section 2a) introduces the geologic setting, units, and extents, which are discussed relative to their potential influence on land subsidence. Generally, fine-grained sediments are susceptible to inelastic deformation. Inelastic compaction of coarse-grained sediment is usually negligible (Borchers and Carpenter 2014). The principal aquifers of the WMA and CMA are primarily coarser material and not subject to a significant risk of land subsidence. Previous studies of well logs in the WMA indicate 40 to 70 percent coarse grained material in the Upper Aquifer (HCI 1997).

2b.5-1-1 Tectonic Movement

Tectonic movement is a potential source for land surface elevation changes within the WMA. The Basin is within the Transverse Range geomorphic province of California, a tectonically active region of California. Rapid uplift is occurring in places within the Transverse Range, such as in the Santa Ynez Mountains, where uplift is estimated at approximately 2 millimeters per year (Hammond et al. 2018). Likewise, in tectonically active areas where uplift is occurring, subsidence may also be observed in response to fault motion. However, this type of subsidence is not influenced by groundwater use or water resource management actions in the WMA.

2b.5-2 Historical Records

There is little or no documentation of physical evidence of subsidence such as well casing failure, infrastructure disruption, or earth fissures within the WMA. According to the 2013 City of Lompoc Groundwater Management Plan, there has been no evidence of land subsidence resulting from groundwater-level declines within the Lompoc Plain (City of Lompoc 2013). The risk of future significant impacts is low because long-term groundwater levels have been mostly static.

The Caltrans (District 5), Department of Water Resources (DWR), and Santa Ynez River Water Conservation District have not observed or reported infrastructure failures due to land subsidence within the Basin for the past 100 years (Appendix 2b-A, Dudek, 2020). Staff from the City of Solvang Public Works

Department are not aware of any land subsidence issues throughout the Santa Ynez Valley (M. van der Linden, personal communication, August 12, 2020; Appendix 2b-A, Dudek, 2020). John Brady of the Central Coast Water Authority (CCWA) engineering department reported that since the 27-mile long CCWA pipeline (see Figure 2a.3-9, HCM) was built in 1990 there have been no triggers of the isolation valves and, in his opinion, there has been no groundwater related land subsidence in the area (Appendix 2b-A, Dudek, 2020).

2b.5-3 Remote Sensing Data

Remote sensing data from Interferometric Synthetic Aperture Radar (InSAR) for January 2015 through September 2019 is available from DWR. Over this time period, land surface elevation changes have ranged from an estimated increase of 0.5 inches to a decrease of 1 inch, although vertical accuracy of InSAR data is around 0.61 inches (Towill 2020). The distribution of these elevation changes is mapped in **Figure 2b.5-1** and shows the greatest land surface declines generally occurred in the upland areas that surround the Lompoc Plain, and in areas where there is little to no reported groundwater use. Appendix 2b-A includes detailed maps of the remote sensing dataset.

2b.5-4 Continuous Global Positioning System Data

USGS continuous global positioning system (CGPS) station (LOMP) was installed near Mission Hills and has been collecting horizontal and vertical displacement data since May 15, 2015 as shown on **Figure 2b.5-2**. This indicates very little vertical change over this time, with the biggest changes (of approximately 20 mm, or 0.78 inches) due to manual updates.

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Figure 2b.5-1

Land Subsidence, January 2015 to September 2019, InSAR Data Within Western Management Area

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Figure 2b.5-2

Continuous Global Positioning System, LOMP Station Trends

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2b.6 INTERCONNECTED SURFACE WATER AND GROUNDWATER DEPENDENT ECOSYSTEMS

The sixth sustainability indicator, depletion of interconnected surface water, is addressed in this section. The various beneficial uses of surface water and groundwater are presented in Section 2a.4 and 2b.3 and include various natural environments that rely on surface water and groundwater.

In accordance with SGMA, "interconnected surface water" is defined as "surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted."[122] In this section, surface waters within the WMA that potentially meet this definition are identified. In addition, SGMA regulations require Groundwater Dependent Ecosystems (GDEs) be identified[123] as part of the description of groundwater conditions. GDEs are ecological communities or species that depend on groundwater emerging from aquifers or rely on groundwater occurring near the ground surface. Hence, GDEs are considered and discussed below because they could be influenced by chronic lowering of groundwater levels (sustainability indicator) and depletions of interconnected surface water.

2b.6-1 Interconnected Surface Water for the Santa Ynez River

The portion of the Santa Ynez River between the Lompoc Narrows and the Pacific Ocean is identified as seasonally interconnected surface water because at times surface water in this reach is hydraulically connected to the underlying water table in the principal aquifer~~.~~ (**Figure 2b.6-1**). During periods of high flows, the groundwater levels in the Upper Aquifer are hydraulically connected to the channel thalweg in the Santa Ynez River. The reach is considered seasonally interconnected because the Santa Ynez River is dry for significant periods of time during the year, and as a result is not "hydraulically connected" to the underlying water table.

[122] 23 CCR § 351 (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.

[123] 23 CCR § 354.16 (g) Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.

2b.6-1-1 Santa Ynez River Alluvium Subarea

In the WMA upstream of the Lompoc Narrows, as discussed in the HCM, the Santa Ynez River Alluvium is considered part of the underflow of the river, which is managed by the SWRCB~~.~~ (Appendix 2a-B). Because the underflow is considered part of the surface water, the Santa River Alluvial deposits upstream of the Lompoc Narrows would not be classified as a principal aquifer under SGMA. Underneath and to the sides of the Santa Ynez River Alluvium are the non-water bearing sediments of the consolidated Monterey Shale and Sisquoc Formations. As such, there is no underlying aquifer in this reach upstream of Lompoc Narrows in the WMA, and consequently no interconnected surface water with groundwater.

2b.6-1-2 Lompoc Plain Subarea

In the Lompoc Plain, the Upper Aquifer is seasonally hydraulically connected to the Santa Ynez River~~.~~ (Figure 2b.6-1). As discussed in Section 2a.2 (HCM), in the eastern and northern portions of the Lompoc Plain, particularly along the Santa Ynez River, the confining deposits are less continuous or absent, allowing movement of groundwater between the river and the entire depth interval of the Upper Aquifer (Bright et al. 1992).

Under SGMA, part of the criteria for interconnected surface waters requires identification of the reaches that are "not completely depleted."[124] As discussed in the HCM, the Santa Ynez River dries up completely in the WMA each year due primarily to the seasonal rainfall and runoff patterns. The USGS gauging stations in the WMA are shown in **Figure 2b.6-~~1~~2**, and the seasonality of the flows for measured gages is shown in **Figure 2b.6-~~2~~3**. High flows can exist from December through May due to rainfall but flow quickly subsides for the remainder of the year. The gages show that the streambed is typically dry during the summer and early fall months of the year. For example, the surface flow at the USGS H Street gage (ID No. 11134000) indicates that annual minimum flows are zero and the river has dried up every year, including wet years, for the past 20 years (Figure 2b.6-~~1~~3 and **Table 2b.6-1**).

There are some exceptions to dry conditions in the Santa Ynez River besides seasonal runoff patterns and releases from Lake Cachuma (Figure 2b.6-~~2~~3), including the following:

[124] 23 CCR § 351 (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.

Figure 2b.6-1

Interconnected Surface Waters in the Western Management Area

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Figure 2b.6-2

Detailed Streams and USGS Gages, Western Management Area

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Figure 2b.6-3

Monthly Flow Statistics, Santa Ynez River

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- Spills from Lake Cachuma
- Water rights releases from Bradbury Dam
- Discharge from the Regional Lompoc Wastewater Treatment Plant

Table 2b.6-1
Annual Minimum Gaged Flows of the Santa Ynez River in the WMA

Water Year	Minimum Flow at Lompoc Narrows (USGS Gage 11133000) cubic-feet/second	Minimum Flow at H Street (USGS Gage 11134000) cubic-feet/second	Spill from Cachuma Reservoir acre-feet/year	Hydrologic Year Type [A]
2001	1.3	0	112,313	Wet
2002	0	0	0	Dry
2003	0	0	0	Below Normal
2004	0	0	0	Dry
2005	1.5	0	260,078	Wet
2006	0.5	0	62,869	Above Normal
2007	0	0	0	Critical
2008	0	0	22,994	Above Normal
2009	0	0	0	Dry
2010	0	0	0	Below Normal
2011	1.8	0	85,755	Wet
2012	0	0	0	Dry
2013	0	0	0	Critical
2014	0	0	0	Critical
2015	0	0	0	Critical
2016	0	0	0	Dry
2017	0	0	0	Above Normal
2018	0	0	0	Dry
2019	0	0	0	Above Normal
2020	0	0	0	Below Normal

Note: [A] Based on Hydrologic Year Type Classification in SWRCB Order 2019-0148, based on Lake Cachuma inflow, which also correspond to the classification using Salsipuedes Creek gage. Water Year 2010 is classified Below Normal in the lower watershed (Salsipuedes Creek gage) and Above Normal in the upper watershed (Lake Cachuma inflow).

Cachuma Inflow acre-feet/year (afy)	Classification
<4,550 afy	Critical
4,551 - 15,366 afy	Dry
15,367 - 33,707 afy	Below Normal
33,708 - 117,842 afy	Above Normal
>117,842 afy	Wet

Surface flow entering the Lompoc Plain (Lompoc Narrows gage 11133000) can exist year-round (perennial) in wet and above normal hydrologic years in which Cachuma Reservoir spills, as shown in **Table 2b.6-1**. However, in 2008, the flow at the Lompoc Narrows still dried up even though Cachuma Reservoir spilled about 23,000 acre-feet. Surface flows will also exist at the Lompoc Narrows gage during water rights releases made for the Below Narrows Account as described in the HCM Section 2a.3-4. Water rights releases for the Below Narrows Account are typically made during the months of July through October when flows at the Lompoc Narrows would otherwise not exist. Hence, river flows are substantially influenced by dam and reservoir operations.

Another exception for interconnected surface water status is the reach below the Lompoc Regional Wastewater Treatment Plant to the Pacific Ocean (Figure 2a.3-11, HCM). The Lompoc Regional Wastewater Treatment Plant treats effluent for the City of Lompoc, Vandenberg Village Community Services District, and Vandenberg SFB before discharging to San Miguelito Creek, near the confluence with the Santa Ynez River. The average discharge from 1981 to present has been about 5 cubic feet per second (cfs), which has created perennial surface flow conditions downstream of the discharge. This is another example of where river flows are substantially influenced by human activities. The Upper Aquifer in this western portion of the Lompoc Plain contains more clay deposits, such that the main pumping zone of the Upper Aquifer is not hydraulically connected to the Santa Ynez River (Bright et al. 1992).

The quantity and timing of depletions of the surface water in the Lompoc Plain is complex due to the seasonality of surface flows in the Santa Ynez River. In addition, surface flows in the Lompoc Plain are managed by water rights releases from Cachuma Reservoir as regulated by the SWRCB for the Below Narrows Account (HCM Section 2a.3). The surface water leaving the WMA (entering the Pacific Ocean) is a data gap that will be addressed with installation of a gage near the estuary. In connection with this data gap of surface water outflow, the quantity and timing of flow between the Upper Aquifer and the streamflow is also currently a data gap.

2b.6-2 Interconnected Surface Water for Tributaries to the Santa Ynez River

All of the tributaries within the WMA (Figure 2b.6-~~1~~2) are ephemeral. Several small streams flow year-round in canyons outside of the WMA and south of the Lompoc Plain (Bright et al. 1997). Once these flows reach the unconsolidated alluvial deposits within the boundary of the WMA, all of the flow infiltrates and recharges the groundwater. ~~Thus, the perennial~~ Within the boundaries of the Upper and Lower aquifers (Figure 2a.2-3), the depth to groundwater is below the channel thalweg of the tributaries even during wet periods. Thus, the flows in these tributaries are not influenced by groundwater management actions in the WMA and would not be classified as ~~having~~being interconnected surface water under SGMA because they are disconnected from the water table in the primary aquifer and "completely depleted"[125] as sources of groundwater recharge in the WMA. An exception being along the WMA tributaries that are near the confluence of the Santa Ynez River and tributaries near the estuary where groundwater levels are closer to the surface (Figure 2b.6-1). The quantity and timing of flow between the Upper Aquifer and the surface flow in the WMA is currently a data gap.

2b.6-3 Groundwater Dependent Ecosystems in the Western Management Area

SGMA statute identifies addressing GDEs as a potential additional plan element.[126] SGMA defines GDEs as "ecological communities of species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface." [127] In some settings, groundwater can be critical to sustaining springs, wetlands, and perennial flow (baseflow) in streams, as well as to sustaining vegetation such as phreatophytes that directly tap groundwater through long and extensive root systems.

Mapping of California Department of Water Resources' Natural Communities Commonly Associated with Groundwater dataset indicates most potentially sensitive ecological habitats within the WMA are located along the Santa Ynez River (HCM Figure 2a.4-4). The recent WR SWRCB Order 2019-0148 states (pg. 2):

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125 23 CCR § 351 (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.

126 CWC Section 10727.4 Additional Plan Elements: "where appropriate […] (l) Impacts on groundwater dependent ecosystems."

127 23 CCR § 351 (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.

> The Santa Ynez River provides habitat for the Southern California Distinct Population Segment (DPS) of steelhead trout (Oncorhynchus mykiss) (steelhead), which is listed as an endangered species under the federal Endangered Species Act (ESA). (16 U.S.C. §§ 1531-1544.) The Cachuma Project has adversely affected the steelhead fishery by blocking access to the majority of suitable spawning and rearing habitat upstream, and by modifying flows in the mainstem of the lower Santa Ynez River (mainstem) below Bradbury Dam to the point that the survival of the species is uncertain. (E.g., NOAA-12, p. 6.) Currently, Reclamation operates and maintains Bradbury Dam on the Santa Ynez River in accordance with a Biological Opinion issued by the National Marine Fisheries Service (NMFS) on September 11, 2000 (2000 Biological Opinion) pursuant to section 7 of the federal ESA. (16 U.S.C. § 1536.)

SWRCB Order WR 2019-0148 requires additional releases from Cachuma Reservoir beyond the 2000 Biological Opinion (NMFS 2000) to protect steelhead (*O. mykiss*). In addition to the endangered steelhead trout species, riparian habitat along the lower Santa Ynez River also supports a great diversity of aquatic non-fish and terrestrial wildlife species (SWRCB 2019).

Historical impacts to GDEs along the Santa Ynez River were evaluated as part of the SWRCB Cachuma Project Water Rights hearings (Jones and Stokes 2000). The SWRCB Final Environmental Impact Report (SWRCB 2011) summarized the findings as follows:

> Jones & Stokes (2000) observed that, even in dry years, groundwater levels in the basin remained less than 10 feet below the channel thalweg along most of the river and remained at relatively constant depths below the ground surface on the banks of the river. The groundwater has been maintained at depths suitable to support mature phreatophytic plants (such as willows and cottonwoods), in combination with winter flows. Jones & Stokes (2000) concluded that the operations of the Cachuma Project since 1973 have not altered groundwater conditions in a manner that adversely affects riparian vegetation.

Based on this study by Jones and Stokes (2000), habitats along the Santa Ynez River are not currently considered vulnerable due to pumping in the Upper Aquifer, due in part to water rights releases under the SWRCB Order WR 2019-0148 for the Cachuma Project and the resulting stable groundwater levels. Moreover, as explained above, the Alluvium's ~~subflow~~underflow is not considered groundwater as defined by SGMA.

Additional potential GDEs have been mapped by the California Department of Water Resources, the California Department of Fish and Wildlife, and The Nature Conservancy along the tributaries of the WMA (Figure 2a.4-4, HCM), including the following:

- The same tributaries north of the Lompoc Plain with identified springs, including Santa Lucia Canyon Creek, Davis Creek, Purisima Canyon Creek and Cebada Creek
- Additional creeks south of the Lompoc Plain, including Lompoc Canyon, La Salle Canyon, and Sloane Canyon Creeks

These potential GDEs were assessed into three categories based on the relationship to the aquifer (**Figure 2b.6-~~3~~4**). If depth to groundwater has historically[128] exceeded the 30-foot depth identified by the Nature Conservancy as representative of groundwater conditions that may sustain common phreatophytes and wetland ecosystems (Rohde et al. 2018), the potential GDE was identified as unlikely to be affected by groundwater management (Category C on Figure 2b.6-~~3~~4). Riparian areas of the Santa Ynez River were identified as being managed by the SWRCB as part of Santa Ynez River surface and ~~subflow~~underflow (Category B on Figure 2b.6-~~3~~4). The remaining area consists of GDEs likely related to groundwater levels (Category A on Figure 2b.6-~~3~~4). **Table 2b.6-2** below summarizes the land areas involved.

Table 2b.6-2
Potential WMA Groundwater Dependent Ecosystem Categorization

Category	Description	Acres	Percentage
A	Potential GDE Associated with a Principal Aquifer	2,256	44%
B	Riparian vegetation not subject to SGMA	1,201	23%
C	Unlikely to be Affected by Groundwater Management	1,704	33%
Total		**5,161**	**100%**

128 In addition to fall 2019 and spring 2020 (current conditions) measured groundwater level data, spring 2015 (SGMA starting year) and spring 1998 (wet year) groundwater data were evaluated. The majority of GDEs in Category C are located in the Uplands and are greater than 100 feet above regional water table.

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Figure 2b.6-4

Evaluation of Groundwater Dependent Ecosystems

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Section 2 C – WATER BUDGET

The Sustainable Groundwater Management Act (SGMA) requires that a Groundwater Sustainability Plan (GSP) include: "a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored."[129] This section describes the water budget within the Western Management Area (WMA) of the Santa Ynez River Valley Groundwater Basin (Basin or SYRVGB).

A water budget is an accounting tool that quantifies inflows (sources) and outflows (sinks) occurring within a groundwater basin (or specified management area) using the following equation:

Inflows – Outflows = Change in Storage

The water budget is a key component of overall understanding of the Basin and contributes to developing the following GSP elements:

- Identifying data gaps
- Evaluating monitoring requirements
- Evaluating potential projects and management actions
- Estimating the sustainable yield
- Evaluating undesirable results (negative impacts)
- Informing water management decision making

Annual water budget components for the historical period (1982 through 2018) were assembled, compiled, and summarized. Total inflow and outflow components are presented in the water budgets for the historical data period (1982 through 2018), "current conditions" (2011 through 2018), and "projected conditions" (2018 through 2072). These data are evaluated to identify potential long-term trends in groundwater basin supply and demand and estimates of inflows and outflows and groundwater storage

129 23 CCR § 354.18.

changes. The results support interpretation of trends in measured water levels in wells, and a preliminary estimate of sustainable yield based on the perennial or safe yield.

Perennial yield, also referred to as safe yield, is defined as a long-term average annual amount of water which can be withdrawn from a basin under specified operating conditions without inducing a long-term progressive drop in water levels (Stetson 1992). The estimated perennial yield for the base period is calculated as follows:

Perennial Yield = Average Annual Pumping + Average Annual Change in Storage

Perennial yield can also be defined as pumping but that does not impact the physical or chemical integrity of the groundwater, but as used here relates only to the chronic lowering of groundwater levels for a base period in which precipitation approximates long term average precipitation.[130]

Sustainable yield is defined in SGMA as "the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing an undesirable result."[131] An undesirable result[132] is defined as significant and unreasonable effects on one or more of the following six sustainability indicators:

130 The focus on long-term lowering of groundwater levels is also the focus of DWR's definition of overdraft in Bulletin 118 Update 2003 (DWR 2003): "Condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years, during which the water supply conditions approximate average conditions. Overdraft can be characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years."

131 CWC Section 10721 (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.

132 CWC Section 10721 (x)

1. Chronic lowering of groundwater levels
2. Reduction of groundwater storage
3. Seawater intrusion
4. Degraded water quality
5. Land subsidence
6. Depletion of interconnected surface water

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2c.1 WATER BUDGET ELEMENTS

This section summarizes data sources used to construct the water budgets. A conceptual diagram showing the components of surface water and groundwater systems in the WMA is provided in **Figure 2c.1-1**. Water supply and water use within the WMA as well as groundwater conditions are dependent upon precipitation. Precipitation, either directly or as streamflow infiltration, recharges the groundwater supplies of the WMA. This Water Budget quantifies groundwater flows into and out of the WMA, including natural conditions (runoff and recharge from precipitation, groundwater flow, and riparian evapotranspiration) and human-made conditions (dam releases, groundwater pumping, and return flows).

2c.1-1 Water Year Type Classification

Groundwater Conditions Section 2b.2-2 ("Classification of Wet and Dry Years") describes how water year types are classified in the WMA. For consistency, the hydrologic year type for the WMA is based on the methodology similar to the 2019 State of California Water Resources Control Board (SWRCB) Order WR 2019-0148. Years are classified based on the rank in the period of record in one of five categories: critically dry (bottom 20th percentile), dry (20th to 40th percentile), below normal (40th to 60th percentile), above normal (60th to 80th percentile), and wet (80th to 100th percentile). **Table 2c.1-1** compares the water year classification of the WMA and SWRCB Order WR 2019-0148 to the annual precipitation at Lompoc City Hall for the historical period (1982 through 2018).[133] Consistency between different stations throughout the Basin is indicated in **Table 2c.1-1**, except the WMA and SWRCB hydrologic year type based on surface water inflow reflects antecedent soil moisture conditions. For example, the annual precipitation in year 1997 was 81% of average at Lompoc City Hall. However, because the precipitation occurred during a wet climatic trend following wet years 1993 and 1995, the water year is classified with above normal runoff and recharge conditions.

[133] Lompoc City Hall, Precipitation Gauge 439, Santa Barbara County Flood Control & Water Conservation District. Water Years 1955–2020. Period of record average is 14.6 inches per year.

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Figure 2c.1-1

Hydrogeological Conceptual Model, Central Management Area, Santa Ynez River Valley Groundwater Basin

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Table 2c.1-1
Annual Precipitation and Water Year Classification for WMA

Water Year	Lompoc City Hall		Hydrologic Year Type Classification [A]		
	~~Lompoc City Hall~~		WMA	Upper Santa Ynez River	Climatic Trends[C]
~~Water Year~~	Precipitation (in/year)	% of Average [B]	USGS Gage 11132500 (Salsipuedes Creek)	SWRCB WRO 2019-0148	~~Climatic Trends[C]~~
1982	11.9	81%	Dry	Below normal	Wet
1983	34.0	231%	Wet	Wet	Wet
1984	8.0	54%	Below normal	Above normal	Dry
1985	9.8	67%	Dry	Dry	Dry
1986	19.3	131%	Above normal	Above normal	Dry
1987	11.2	76%	Dry	Critically Dry	Dry
1988	15.4	105%	Dry	Dry	Dry
1989	6.6	45%	Critically Dry	Critically Dry	Dry
1990	6.6	45%	Critically Dry	Critically Dry	Dry
1991	15.0	102%	Below normal	Above normal	Dry
1992	15.8	107%	Above normal	Wet	Wet
1993	17.7	120%	Wet	Wet	Wet
1994	12.8	87%	Below normal	Below normal	Wet
1995	33.8	229%	Wet	Wet	Wet
1996	12.2	82%	Below normal	Below normal	Wet
1997	12.0	82%	Above normal	Above normal	Wet
1998	34.3	233%	Wet	Wet	Wet
1999	15.2	103%	Above normal	Below normal	Normal
2000	15.1	103%	Above normal	Above normal	Normal
2001	17.8	121%	Wet	Wet	Normal
2002	7.5	51%	Dry	Dry	Normal
2003	11.7	79%	Below normal	Below normal	Normal
2004	8.6	58%	Dry	Dry	Normal
2005	24.9	169%	Wet	Wet	Normal
2006	16.8	114%	Above normal	Above normal	Normal
2007	5.3	36%	Critically Dry	Critically Dry	Normal
2008	13.6	92%	Above normal	Above normal	Normal
2009	10.4	71%	Critical	Dry	Normal
2010	19.5	132%	Below normal	Above normal	Normal
2011	26.8	182%	Wet	Wet	Normal

Water Year	Lompoc City Hall		Hydrologic Year Type Classification [A]		
	~~Lompoc City Hall~~		WMA	Upper Santa Ynez River	Climatic Trends[C]
~~Water Year~~	Precipitation (in/year)	% of Average [B]	USGS Gage 11132500 (Salsipuedes Creek)	SWRCB WRO 2019-0148	~~Climatic Trends[C]~~
2012	10.6	72%	Dry	Dry	Dry
2013	7.2	49%	Critically Dry	Critically Dry	Dry
2014	7.2	49%	Critically Dry	Critically Dry	Dry
2015	8.0	55%	Critically Dry	Critically Dry	Dry
2016	11.7	79%	Critically Dry	Dry	Dry
2017	22.5	153%	Above normal	Above normal	Normal
2018	8.3	56%	Critically Dry	Dry	Normal

[A] Dry and critically dry years are shaded yellow; wet years are shaded blue; and normal, below normal, and above normal years are unshaded. **Notes:** WMA = Western Management Area; USGS = U.S. Geological Survey; SWRCB = State Water Resources Control Board; WRO = Water Resources Order; in/year = inches per year.
[B] Average for period of record (1955–2020) is 14.6 inches per year.
[C] GSI 2021.

2c.1-2 Water Budget Analysis Time Periods (Historical, Current, and Projected)

The historical water budget period, or base period, was selected in coordination with the Central Management Area and Eastern Management Area to be water years 1982 through 2018 (37 years; see **Figure 2c.1-2**). Water years start on October 1 of the previous year and run through September 30th of the current year.[134] This 37-year period meets two SGMA criteria: longer than 10 years and includes the “most recently available information.”[135] This period includes two major historical droughts (1985 through 1991 and 2012 through 2018), and average precipitation (14.7 inches) is similar to the 65-year average of 14.6 inches per year measured. Thus, the historical period (1982 through 2018) represents long-term average hydrologic conditions. For example, the average precipitation at the Lompoc City Hall station (is 14.6 inches per year for the period of 1955 through 2020) and 14.7 inches for the historical period (1982 through 2018), a difference of only 1%. Furthermore, the 37-year period also includes when the Santa Ynez River Water Conservation District (SYRWCD) collecting self-reported groundwater pumping data in

134 Per SGMA regulations, all years refer to water years, start in October 1st of the previous year through September 30th of the current year.
135 23 CCR § 354.18(c).

the Basin. This base period was also coordinated with the two other management agencies (CMA and EMA) in the Basin. The historical water budget is presented below in Section 2c.2.

Water years 2011 through 2018, an eight-year subset of the historical data record, was used to represent current conditions. This eight-year period includes "the most recent hydrology, water supply, water demand,

Figure 2c.1-2

Historical, Current, and Projected Water Budget Periods

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and land use information,"[136] including data from January 1, 2015. Current conditions are considered very dry, but includes 2011 which was a wet year. The average annual precipitation for the 8-year period is 12.8 inches per year (87% of average). The current water budget is presented in Section 2c.3.

The projected water budget for the period of 2018 through 2072 extends 50 years past the 2022 submittal of this Groundwater Sustainability Plan (GSP), for a total of 55 years. The projected water budget is presented in Section 2c.4.

2c.1-3 Surface Water and the Santa Ynez River Alluvium

In addition to groundwater inflows and outflows, GSP regulations state that the "total surface water entering and leaving a basin by water source type" must also be accounted for.[137] This will include the Santa Ynez River, tributaries, and State Water Project (SWP) imports. In addition, as discussed in the HCM (Section 2a.2), the Santa Ynez River Alluvium upstream of the Lompoc Narrows is part of the ~~subflow~~underflow of the River, which is regulated by SWRCB~~.~~ (Appendix 2a-B). Because ~~subflow~~underflow is considered surface water and not groundwater, the Santa Ynez River Alluvium would not be classified as a principal aquifer or managed by a GSP under SGMA. Therefore, the Santa Ynez River Alluvium is considered part of the underflow of the Santa Ynez River and is treated as part of the surface water in the historical, current, and projected water budgets.

136 23 CCR § 354.18(c)(1). Current water budget information shall quantify current inflows and outflows for the basin using the most recent hydrology, water supply, water demand, and land use information.
137 23 CCR § 354.18(b).

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2c.2 WATER BUDGET DATA SOURCES

The historical and current water budgets were developed using various publicly available data. The projected water budget was developed using the SGMA guidance, further described below. **Table 2c.2-1~~-2~~** presents a summary of the data sources employed for developing the historical and current water budgets and a description of each data set's qualitative data rating. Data that is measured is usually rated at a high quality, and data that is estimated is rated low to medium depending upon its source. Each of these data sets is described in further detail in the following sections.

Table 2c.2-1-
Water Budget Data Sources

Water Budget Component	Data Source(s)	Comment(s)	Qualitative Data Rating
Surface Water Inflow Components			
Santa Ynez River Inflow	USGS	Narrows Gage	Gauged – High
Tributary Inflow	Correlation with gaged data	Methods described in text	Calibrated Model – Medium
Lompoc Regional Wastewater Reclamation Plant	City of Lompoc	Methods described in text	Metered – High
Imported: SWP	Central Coast Water Authority	—	Metered – High
Groundwater Inflow Components			
Deep Percolation of Precipitation: Overlying and Mountain Front Recharge	USGS BCM Recharge	BCM calibrated to Basin precipitation station data	Calibrated Model – Medium
Streamflow Percolation	Santa Ynez RiverWare Model, USGS BCM	Collaborative Modeling effort: Stetson and GSI	Calibrated Model – Medium
Subsurface inflow	Darcian flux calculation	Collaborative Modeling effort: Stetson and GSI	Estimated – Medium
Irrigation Return Flows	Land use surveys, self-reported pumping data	Basinwide Collaborative Estimation: Stetson and GSI using Yates 2010	Estimated – Low
Percolation of Treated Wastewater	Mission Hills CSD and Lompoc Penitentiary	Received	Metered – High
Percolation from Septic Systems	SYRWCD self-reported data, Santa Barbara County Water Agency return estimates	Methods described in text	Estimated – Low

Water Budget Component	Data Source(s)	Comment(s)	Qualitative Data Rating
Surface Water Outflow Components			
Santa Ynez River Outflow	USGS	Methods described in text	Calibrated Model - Medium
Streamflow Percolation	Santa Ynez RiverWare Model, USGS BCM	Collaborative modeling effort: Stetson and GSI	Calibrated Model - Medium
Riparian Evapotranspiration	Aerial photography, NCCAG/NWI data sets, CIMIS weather station	Methods described in text	Estimated – Medium/Low
~~Water Budget Component~~	~~Data Source(s)~~	~~Comment(s)~~	~~Qualitative Data Rating~~

Groundwater Outflow Components			
Agricultural Irrigation Pumping	Land use surveys, self-reported pumping data	Methods described in text	Estimated – Medium/Low

~~Table 2c.1-2 (continued) - Water Budget Data Sources~~

~~Water Budget Component~~	~~Data Source(s)~~	~~Comment(s)~~	~~Qualitative Data Rating~~
~~Groundwater Outflow Components (continued)~~			
Municipal Pumping	Self-reported pumping data	Methods described in text	High/Medium
Rural Domestic/Small Public Water Systems Pumping	SYRWCD self-reported data, DRINC	Methods described in text	Estimated – Medium/Low
Riparian Evapotranspiration	Aerial photography, NCCAG/NWI datasets, CIMIS weather station	Methods described in text	Estimated – Medium/Low
Subsurface Outflow	Darcian flux calculations, groundwater model	Methods described in text	Estimated – Medium

Notes: USGS = U.S. Geological Survey; SWP = State Water Project; BCM = Basin Characterization Model; Stetson = Stetson Engineers; GSI = GSI Water Solutions, Inc.; SYRWCD = Santa Ynez River Water Conservation District; NCCAG = The Natural Communities Commonly Associated with Groundwater (NCCAG) Wetland dataset; NWI = National Wetlands Inventory; CIMIS = California Irrigation Management Information System; DRINC = Drinking Water Information Clearinghouse.

A numerical groundwater model (**Appendix 2c-A**) was constructed to support and verify the water budgets for the Groundwater Sustainability Plans for the WMA and CMA. The model was developed as an analysis and planning tool for the sustainable management of groundwater resources within the basin. The model currently illustrates a good fit of the simulated groundwater levels to the observed data, which helps to verify the water budget estimates (Appendix 2c-A). The groundwater model is planned to be recalibrated when more gaged surface water data become available. Surface water data is identified as a data gap and will be addressed with a new gage near the Santa Ynez River estuary (see Chapter 5a.2-4). In addition, results of the geophysical AEM data study are planned to become available in the first year of implementation of the plan in 2022. This AEM study will be used to verify the current geologic model of the WMA with possible refinements based on results of the AEM study.

The areal extents of the WMA/CMA Model (Figure 1 in Appendix 2c-A) cover about 110 square miles (72,000 acres) from east of Buellton (upstream) to the Pacific Ocean (downstream). Seven groundwater subareas (Figure 2 in Appendix 2c-A) are represented within the model: CMA Santa Ynez River alluvium, CMA Buellton Upland, WMA Santa Ynez River alluvium, WMA Santa Rita Upland, WMA Lompoc Plain, WMA Lompoc Upland, and WMA Lompoc Terrace). Please see Appendix 2c-A for more information presented in a Technical Memorandum that documents the construction and calibration of the WMA/CMA Modflow Groundwater Model.

2c.2-1 Sources of Surface Water Inflows

2c.~~1-4~~2-1-1 Santa Ynez River

Surface water inflows include both local and imported water entering the WMA. As discussed in Section 2a.2, all of the inflow into the Santa Ynez River Alluvium is considered as part of the surface water inflow.[138] The Santa Ynez River Alluvium upstream of the Lompoc Narrows includes fluxes that are associated with groundwater data sources (e.g., ~~subflow~~well pumping, recharge from precipitation), but in Sections 2c.~~2, 2c.~~3, 2c.4, and 2c.~~4~~5, all Santa Ynez River Alluvium fluxes will be accounted for as part of the total surface water in the water budget.

The U.S. Geological Survey (USGS) Lompoc Narrows gage (USGS ID 11133000) measures the flow of Santa Ynez River water entering the Lompoc Plain of the WMA. Figure 2a.3-7 (HCM) shows the location of the gage, Figure 2a.3-8 (HCM) shows annual flow totals, and Figure 2b.6-~~2~~3 (GC) shows average monthly flows. Santa Ynez River flows in the WMA are substantially influenced by upstream dam and reservoir operations. Downstream releases and spillway flows from Lake Cachuma are controlled and monitored by the U.S. Bureau of Reclamation at Bradbury Dam. Flows at the Lompoc Narrows gage are based on upstream outflows from the Basin's Central Management Area (CMA) and Eastern Management Area (EMA).

138 The Santa Ynez River Alluvium subarea corresponds to Zone A in the SYRWCD management and annual reports (Figure 2a.2-4, HCM Section). This alluvium is included as part of the Above Narrows area in the SWRCB Order WR 2019-0148 (SWRCB 2019).

2c.~~1~~~~-4~~2-1-2 Tributaries

Watershed drainage areas and average precipitation for Santa Ynez River tributaries to the Santa Ynez River within the WMA are summarized in **Table 2c.~~1-3~~2-2**. Figure 2a.3-2 (HCM) shows the aerial distribution of precipitation in the WMA watershed. In general, the tributaries to the south of the Santa Ynez River receive more precipitation and are on steeper slopes compared with the tributaries to the north of the Santa Ynez River.

Table 2c.~~1-~~2-2
Tributary Creeks of the WMA

	Drainage Area (mi²)	Average Annual Precipitation (in/year)[A]
North of the Santa Ynez River		
Santa Rita Creek	4.5	18.6
Cebada Canyon Creek	6.2	17.1
Purisima Canyon Creek	2.6	17.2
Davis Creek	4.6	16.1
Santa Lucia Canyon	9.5	15.1
Unnamed Tributaries	11.7	16.2
South of the Santa Ynez River		
Salsipuedes Creek	51.1	22.6
Miguelito Creek	10.4	22.4
Sloanes/ Le Salle Canyon	7.8	20.1
Lompoc Canyon	1.4	19.6
Bear Creek (La Honda watershed)	2.8	17.3
Unnamed Tributaries	4.75	21.2

Notes: WMA = Western Management Area.
[A] PRISM 2014.

Tributary flow was estimated directly using stream gage data, when available, or by correlation with nearby stream gage data. Salsipuedes Creek and Miguelito Creek have USGS gages (USGS ID 11132500 and ID 11134800, respectively; Figure 2b.6-~~1~~2, Groundwater Conditions). The tributary in the Lower Santa Ynez River with the longest period of record is Salsipuedes Creek (USGS ID 11132500), located in the WMA.

Flows in ungauged areas and data missing from the Miguelito Creek record are estimated based on the Salsipuedes Creek gage prorated by drainage area and average annual precipitation, as shown in Table 2c.~~1-3~~2-2. This method was also utilized for the development of the County hydrologic model (Stetson 2008).

2c.~~1-4~~2-1-3 Lompoc Regional Wastewater Reclamation

The historical discharge from the Lompoc Regional Wastewater Reclamation Plant to Miguelito Creek and Santa Ynez River are reported by the City of Lompoc (see HCM Section 2a.3-4-4) and assembled for this water budget.

2c.~~1-4~~2-1-4 State Water Project Imports

In the WMA, imported State Water Project (SWP) water is delivered directly to Vandenberg Space Force Base (VSFB). Imported SWP water deliveries were provided by the Central Coast Water Authority for September 1997 through present. Prior to the completion of the Coastal Branch Pipeline in 1997, no water was imported into the Basin (HCM Figure 2a.3-10).

2c.2-2 Sources of Groundwater Inflows

The data sources used for the groundwater budget inflow terms are described below.

2c.~~1-4~~2-2-1 Recharge from Precipitation

As is typical of a Mediterranean climate, the WMA experiences many months in the summer and fall with no precipitation. The area also goes through periodic dry cycles, with as many as seven consecutive years with below normal precipitation. Precipitation that infiltrates into the soil zone and eventually recharges the regional groundwater table can be broken into two components: overlying recharge and mountain front recharge (also referred to as mountain block recharge). Overlying recharge occurs from precipitation on the land surface that directly overlies the principal aquifer. Mountain front recharge occurs from ~~subflow~~drainage from the adjacent bedrock or the older consolidated formations that are not part of the Basin. Both types of recharge relate to the amount of precipitation in the drainage basin that infiltrates into the soil and drains to the groundwater aquifer.

Recharge to groundwater from deep percolation of precipitation was determined using the USGS Basin Characterization Model (BCM) for California (Flint and Flint 2017). BCM uses a soil budget based on monthly climate data and soils information to estimate the recharge, as shown on **Figure 2c.2-1~~-3~~**.

The BCM data are provided statewide on roughly 20-acre cells (**Figure 2c.~~1-4~~2-2**). This BCM recharge data set is the same data set being used in the EMA (GSI 2021) and CMA. As described in GSI 2021, the BCM recharge data set has been adjusted based on comparison to monthly precipitation records at weather stations across the entire Basin. A correction was applied to the BCM values for each monthly timestep such that the adjusted BCM data exactly matched all recorded weather station monthly precipitation values. These monthly adjustments were also applied to the BCM-generated recharge data sets. The timing of overlying recharge was modified from the BCM output. The BCM recharge output was very concentrated in wet years, but local well hydrographs indicate a more attenuated recharge flux across many years. The average annual recharge from the BCM was utilized and disaggregated based on percentage of rainfall at Lompoc City Hall for any particular year compared to the average rainfall for the historical period (1982 through 2018).

The BCM does not route flows downstream. For areas outside the Basin and not within the major tributaries (i.e., Salsipuedes, Miguelito, Santa Rita, Cebada, Purisima, Davis, and Santa Lucia Creeks), mountain front recharge areas are estimated based on the Salsipuedes Creek gage prorated by drainage area and average annual precipitation.

2c.~~1-4~~2-2-2 Percolation of Streamflow to Groundwater

Streamflow percolation, or leakage of surface water to groundwater through the Santa Ynez River streambed, was estimated using the calibrated Santa Ynez River RiverWare flow model (Stetson 2008) for percolation in the Santa Ynez River Alluvium subarea upstream of the Lompoc Narrows.[139] Below the Lompoc Narrows, from the Lompoc Narrows USGS Gage to the confluence with Miguelito Creek (see Figure 2b.6-2, Groundwater Conditions), the percolation curve for the SWRCB Water Rights Order (WRO) WR 2019-0148 is utilized~~.~~ **(Figure 2c.2-3)**. This curve is used in the WRO to determine the percolation from

139 The California Central Valley Groundwater-Surface Water Simulation Model (C2VSIM) and the Integrated Water Flow Model (IWFM), as provided by 23 CCR § 354.18 (f), are most applicable for the Central Valley. The existing calibrated Santa Ynez River RiverWare flow model was chosen for the WMA for surface water flows.

Figure 2c.2-1
Basin Characterization Model Water Components

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Figure 2c.2-2

Basin Characterization Model (BCM) Recharge

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Figure 2c.2-3

Below Narrows Percolation Curve State Water Resources Control Board Order 2019-014

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the surface flow to the groundwater aquifer in the Lompoc Plain. From the confluence of Miguelito Creek with the Santa Ynez River to the Pacific Ocean, the USGS gages nearest the estuary (USGS gages ID 11135500 and ID 11135250; see Figure 2b.6-~~1~~2 in the Groundwater Conditions) were utilized to determine the streamflow percolation. Percolation occurring in the tributary channels in the upland areas (Santa Rita Upland, Lompoc Upland, and Lompoc Terrace Subareas) was estimated using results from previous groundwater model studies for the WMA (Bright 1997; HCI 1997).

2c.~~1-4~~2-2-3 Subsurface Inflow from Adjacent Aquifers

~~Subflow~~Subsurface flow is estimated using Darcy's Law for the five main subareas into the WMA (the Santa Ynez River Alluvium, Santa Rita Upland, Lompoc Upland, Lompoc Terrace, and the Lompoc Plain). Darcy's law is an equation that quantifies fluid flow through porous media (for example, the movement of water through geologic materials like sand and gravel). The Darcy flow rate is calculated from the permeability of the water-transmitting material, its cross-sectional area, and potential gradient driving the flow as summarized in the equation below:

$$\mathbf{Q = K * I * A}$$

where

Q = flow in ft^3/sec (cfs)
K = hydraulic conductivity in ft/sec
I = hydraulic gradient in ft/ft
A = cross-sectional area in ft^2

Subsurface groundwater inflows occur at the upstream boundary of the WMA along the border with CMA by the Santa Ynez River. This site occurs in a very narrow portion of Santa Ynez River alluvium, bordered by low permeability rocks north and south of the river. The estimated inflows were coordinated with the CMA water budget calculations, and the flows will be updated with results from the numerical groundwater model.

The amount of ~~subflow~~subsurface flow between the Santa Rita Upland subarea (CMA) and Buellton Upland subarea (WMA) is unknown. The USGS (Hamlin 1985) estimated groundwater flow following the surface topography (i.e., south along Santa Rosa Creek) with no ~~subflow~~subsurface flow estimated between Santa Rosa Creek and Santa Rita Creek. Locally there are anecdotes about groundwater levels being higher within the Santa Rosa Creek drainage compared to the Santa Rita Creek drainage, which indicates there might be some structural impediment to flow near the surface divide between the two upland subareas. Results from the AEM geophysics study currently being compiled for the project area is expected to provide additional data. Currently no subsurface inflow is assumed in the upland area from the CMA.

2c.~~1~~42-2-4 Irrigation Return Flows

Irrigation return flow is the excess water from water applied to crops that percolates below the root zone and returns back to the groundwater aquifer. Irrigation return flow is related to the irrigation application efficiency and the plants consumptive use of water. The fraction of applied water utilized to satisfy the crop demand for water (evapotranspiration [ET]) is represented by the application efficiency and expressed as a percent. The remaining fraction of applied water represents the irrigation return flow. For example, if the application efficiency is 60%, then 60% of the applied water is consumed by the crops and 40% percolates past the root zone as return flows. Irrigation return flows can either recharge the groundwater or leave the field as surface water in drains or tail water and discharge to a nearby creek or river. It is assumed that most of the irrigation return flow percolates to groundwater within the WMA, either directly beneath the field or in the field drain. Consistent with the basin wide assumptions in other parts of the r Basin (Yates 2010), an application efficiency of 80% is assumed for all crops except vineyards, which are assumed to be irrigated using drip and having an application efficiency of 95%. Accordingly, groundwater recharge from deep percolation of irrigation is assumed to be 20% of the water applied to most crops and 5% of the water applied to vineyards. The urban landscape application efficiency is assumed to be 70%, but only 15% is assumed to return to groundwater based on historical estimates (Stetson 1992). Irrigation return flow volumes have been calculated using these efficiencies multiplied by the calculated annual volumes of irrigation water applied to each crop type, based on self-reported pumping data and assumed crop-specific water duty factors.

2c.~~1~~42-2-5 Percolation of Treated Wastewater

There are three wastewater treatment plants within the WMA. The Lompoc Regional Wastewater Reclamation Plant (LRWRP) discharges to surface water and is discussed in Section 2a.3-4-4. Mission Hills CSD and Lompoc Penitentiary wastewater treatment plants discharge to percolation ponds that recharge the groundwater table. The measured treated wastewater quantities were obtained from Mission Hills CSD for the historical period (1982 through 2018). From this amount sent to the percolation ponds, an additional 10% was assumed to evaporate and not recharge the aquifer. The wastewater discharge to the percolation ponds at the Lompoc Penitentiary were estimated based on the existing Lompoc groundwater model (HCI 1997).

2c.~~1-4~~2-2-6 Percolation from Septic Systems

Outside of the sewer service areas within the WMA, domestic wastewater is discharged to septic systems. Return flows from the septic systems recharge the groundwater. The recharge from septic systems is calculated using estimates from previous SYRWCD and County studies (Stetson 1992). These previous analyses assumed that 40% of domestic water is used indoors and that 87% of this water will return to the groundwater. After accounting for the 60% for urban irrigation (outdoor water use) with 15% return flow, the total return flow from domestic/rural residential pumping for both indoor and outdoor use is estimated at 44%.

2c.2-3 Sources of Surface Water Outflows

The data sources used for the surface water budget outflow terms are described below.

2c.~~1-4~~2-3-1 Santa Ynez River Outflow

Santa Ynez River surface water outflows were calculated as the sum of the Santa Ynez River inflows plus tributary inflows plus discharge from the Lompoc wastewater plant minus streamflow infiltration to groundwater. Each of these terms are described in the sections above.

2c.~~1-4~~2-3-2 Percolation of Streamflow to Groundwater

The calculation of streamflow percolation to groundwater is discussed in ~~Section 2c.1-4-2-2 (pg. 2c.16).~~Section2c.2-2-2.

2c.2-4 Sources of Groundwater Outflows

The data sources used for the groundwater budget outflow terms are described below.

2c.~~1~~42-4-1 Agricultural Irrigation Pumping

The largest source of water for irrigating crops in the WMA is pumped groundwater. Groundwater pumpers located within the SYRWCD boundaries are required to self-report their estimated pumping volumes to SYRWCD for each 6-month period. These estimates are based on multiple methods, including application of water duty factors specified in SYRWCD's Groundwater Production Information and Instructions pamphlet (SYRWCD 2010); metered pumping records; and metered electricity records. The groundwater users specify which type of water they are using (agricultural, special irrigation [parks, schools, and golf courses], or other [municipal and industrial]). This reported pumping was checked against available land use surveys in 1985, 2014, and 2016 from sources provided by the California Department of Water Resources (DWR).[140] For example, in 2016 a total of 18,550 acre-feet (AF) was reported to the SYRWCD for agricultural pumping from the Lompoc Plain and Lompoc Upland. DWR identified 7,441 acres of irrigated land in the Lompoc Plain and Lompoc Upland in 2016, which would total 18,600 AF using an average crop duty of 2.5 AF per acre. Monthly irrigation pumping was disaggregated from the biannual (6-month) totals using monthly multipliers based on historical average monthly irrigation, precipitation, temperature, and monthly crop water demands (HCI 1997).

2c.~~1~~42-4-2 Municipal Pumping

Municipal water in the WMA is extracted by wells from the Lompoc Plain Upper Aquifer and the Lompoc Upland Lower Aquifer (Paso Robles and Careaga Sand formations). The pumping includes all extractions for municipal, industrial, and domestic use that occurs within the City of Lompoc, Vandenberg Village CSD, Mission Hills CSD, and VSFB, including water used for urban landscape irrigation. The measured monthly pumping quantities were obtained from each entity for the historical period (1982 through 2018). This water budget combines the two categories reported to the SYRWCD: "other" water, which includes municipal, industrial, small public water systems, and domestic use, and "special irrigation" water, which refers to urban landscape irrigation. These municipal pumping volumes are reported by SYRWCD in their annual reports.

140 The data were delineated by LandIQ for years 2014 and 2016 from imagery provided by the National Agriculture Imagery Program. The data are derived from a combination of remote sensing, agronomic analysis, and ground verification. The data set provides information for resource planning and assessments across multiple agencies throughout the state and serves as a consistent base layer for a broad array of potential users and multiple end-uses.

2c.~~1-4~~2-4-3 Rural Domestic and Small Public Water Systems Pumping

Besides the entities discussed in Section 2c~~-1.~~.2-4~~.4.~~-2 Municipal Pumping, the “other” water reported in the SYRWCD annual reports includes all other domestic uses, including rural domestic and small public water systems in the WMA. Groundwater pumping for rural domestic and small public water systems are reported to SYRWCD by subarea (Lompoc Plain, Lompoc Upland, Santa Rita Upland, or Santa Ynez River Alluvium). The biannual pumping quantities of rural domestic and small public water systems were disaggregated using the City of Lompoc monthly average pumping distribution.

2c.~~1-4~~2-4-4 Riparian Vegetation Evapotranspiration

Riparian evapotranspiration was calculated using three sources to determine acreages of riparian vegetation types occurring within the WMA:

- The Natural Communities Commonly Associated with Groundwater (NCCAG) Wetland data set[141]
- The National Wetlands Inventory (NWI) dataset[142]
- An analysis of color-infrared aerial photos from 2012 (NAIP 2012) that was completed for this study by Stetson Engineers.

Color-infrared aerial photography captures a band of near infrared in addition to bands for visible light (red, green, and blue). Near infrared is a range of electromagnetic waves that are longer than the human eye can see and is widely used for interpretation of natural resources. The spectrum is effectively blueshifted (near infrared as red, red as green, and green as blue) which creates a ‘pseudocolor’ image. In this pseudocolor image very intense reds indicate dense, vigorously growing vegetation. Dense vegetation is commonly associated with riparian evapotranspiration related to groundwater use. The infrared aerial photos were the primary method of detecting vegetation along the Santa Ynez River. In the upland areas, the combination of the NCCAG and NWI data sets were relied on. Surface geology and topography data were used to avoid acreage on hillsides, which would be above the regional water table.

141 Natural Communities Commonly Associated with Groundwater (NCCAG) dataset. Web Application. https://gis.water.ca.gov/app/NCDatasetViewer/ Accessed 2021-08-10

142 National Wetlands Inventory (NWI). Website. https://www.fws.gov/wetlands/Data/Data-Download.html Accessed 2021-08-10.

The riparian acreage analysis is multiplied by a monthly riparian water duty based on a weather station operated by the California Irrigation Management Information System (CIMIS). The station closest to the WMA is the Lompoc station (HCM Figure 2a.3-2). CIMIS has daily evaporation data for the station located near Lompoc since July 2010. **Table 2c.~~1~~-~~4~~2-3** shows the monthly average CIMIS data. The riparian water duty factor used is 3.7 feet per year, which is similar to the 4.5 and 4.2 feet per year rates used in the EMA and CMA, respectively.

Table 2c.~~1~~-2-3
CIMIS Monthly Average Reference Evapotranspiration (2010 through 2019)

Month	Reference Evapotranspiration (inches)
January	1.7
February	2.2
March	3.4
April	4.5
May	5.2
June	5.3
July	5.4
August	5.0
September	4.1
October	3.2
November	2.1
December	1.6
Total **inches**/year	43.9
Total **feet**/year	3.7

Note: CIMIS = California Irrigation Management Information System.

2c.~~1-4~~2-4-5 Subsurface Groundwater Outflows

Subsurface groundwater outflow ~~(or subflow)~~ occurs at the downstream end of the WMA to the Pacific Ocean. The outflow site is located geologically in an alluvium-filled channel cut into the non-water-bearing Monterey formation. The only aquifer unit is the Upper Aquifer comprised of the alluvial sediments of the Santa Ynez River. Because of the constriction by the bedrock north and south of the river, the outflow is limited but focused in a narrow channel. The magnitude of the ~~subflow~~subsurface flow has been calculated using Darcy's law, with estimated values for hydraulic conductivity, the average hydraulic gradient, and outflow plane cross-sectional area (based on saturated thickness estimates). These values will be updated with results from the numerical groundwater model.

A smaller flux of subsurface outflow also flows to the Pacific Ocean from the Lompoc Terrace. The water level elevations along the coast in the Lompoc Terrace are 100 feet higher than sea level, which indicates very low conductivity deposits limit the amount of ~~subflow~~subsurface flow out of the basin in this location.

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2c.3 HISTORICAL WATER BUDGET

SGMA regulations require that the historical surface water and groundwater budget be based on at least 10 years of the most recent data.[143] The 1982 through 2018 period was utilized to represent the historical water budget (also referred to as the historical base period) because it represents average conditions with several different dry and wet periods. The surface water and groundwater budgets are determined from the various components, which can vary spatially and temporally within the Basin, and the results summarized and reported as a total for the WMA.

2c.3-1 Historical Surface Water Component

SGMA regulations require that the water budget include the total annual volume of surface water entering and leaving the basin, and evaluates their historical and future reliability.[144] The WMA relies on two surface water source types identified in DWR's Best Management Practices (DWR 2016): local and State Water Project (SWP) supplies.

2c.3-1-1 Inflows: Local Surface Water (Santa Ynez River and Tributaries) and Imported Surface Water

Local surface water supplies include precipitation runoff within the watershed and Santa Ynez River inflow to the WMA, regulated by SWRCB as outflows from Lake Cachuma. In addition, as discussed in the HCM (Section 2a.2), the Santa Ynez River Alluvium Upper Aquifer, upstream of the Lompoc Narrows is part of the ~~subflow~~underflow of the river, which is regulated by SWRCB.

143 23 CCR § 354.18 (c)(2)(B) A quantitative assessment of the historical water budget, starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to calibrate and reduce the uncertainty of the tools and methods used to estimate and project future water budget information and future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon.

144 23 CCR § 354.18 (a) Each Plan shall include a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored. Water budget information shall be reported in tabular and graphical form.

Imported surface water from the SWP became available after completion of the Coastal Branch pipeline in 1997. The VSFB has an SWP allocation of 5,500 AFY and a drought buffer of 550 AFY for a total of 6,050 AFY.

Table 2c.~~2~~3-1 summarizes the average, minimum, and maximum inflow from surface water from all sources. The estimated average annual total inflow over the historical base period is approximately 116,290 AFY. The large difference between the minimum and maximum inflows reflects the climatic variability between dry and wet years. The largest components of this average local inflow are releases from Bradbury Dam and flow in the Santa Ynez River upstream of the WMA, which represent about 78% of the average annual surface inflow. Inflow from the Lompoc and Santa Rita Upland and the Santa Ynez Mountains contributes 14% of the total surface water inflow. The remaining surface flow components make up 8% of the total surface water inflow (**Table ~~2c2~~2c.3-1**).

Table 2c.~~2~~3-1
Annual Surface Water Inflow, Historical Period (1982 through 2018)

Surface Water Inflow Component	Average	Minimum	Maximum
	(Acre-Feet per Year)		
Santa Ynez River Inflow from CMA	91,320	40	699,280
Santa Ynez River Tributary Inflow	16,130	230	114,090
Lompoc Regional Wastewater Reclamation Plant	3,790	2,950	4,720
Imported SWP	1,470	0	4,320
Santa Ynez River Alluvium Subarea (Surface Water Underflow)			
~~Subflow~~Subsurface inflow	800	800	800
Recharge from Precipitation (Overlying and Mountain Front)	1,900	1,400	2,750
Recharge from Agricultural Return Flows to Underflow	860	450	1,250
Recharge from Domestic Return Flows to Underflow	20	0	40
TOTAL	**116,290**	**5,870**	**827,250**

The annual average, minimum, and maximum volumes of imported local surface water during the historical base period (1982 through 2018) are presented Table 2c.~~2~~3-1. The average value of 1,470 AFY does not represent the typical SWP imports by the VSFB because deliveries did not start until 1997. The average amount of SWP imports for the period of 1998–2018 was approximately 2,600 AFY. The imported water supply provides approximately zero to 2% of the total volume of surface water that enters the WMA.

2c.3-1-2 Surface Water Outflows

The estimated annual average total surface water outflow leaving the WMA as flow in the Santa Ynez River, within the Santa Ynez River Alluvium Upper Aquifer, and percolation into Lower Aquifer over the historical base period is summarized in **Table 2c.~~2~~3-2**. Similar to inflows, the Santa Ynez River surface outflow represents the majority (79%) off the average annual surface flow out of the WMA.

Table 2c.~~2~~3-2
Annual Surface Water Outflow, Historical Period (1982 through 2018)

Surface Water Outflow Component	Average	Minimum	Maximum
	(Acre-Feet per Year)		
Santa Ynez River Outflow to Pacific Ocean	89,190	0	687,050
Net Channel Percolation to Groundwater [A]	14,300	3,500	28,130
Santa Ynez River Alluvium Subarea (Surface Water Underflow)			
Santa Ynez River Underflow Out	1,200	1,200	1,200
River well pumping [B] – Agriculture	4,510	2,340	6,620
River well pumping [B] – Domestic	50	10	100
Riparian Vegetation Evapotranspiration	3,170	3,170	3,170
TOTAL	**112,420**	**10,220**	**726,270**

A Does not include percolation to Santa Ynez River Alluvium, which is part of the surface water component.

B River well pumping occurs from wells in the Santa Ynez River Alluvium. The wells pump from the ~~subflow~~underflow of the Santa Ynez River and are administered by the SWRCB as a surface water diversion.

2c.3-1-3 Summary

As indicated in Tables 2c.~~2~~3-1 and 2c.~~2~~3-2 the average surface flow in and out averaged 116,290 AFY and 112,420 AFY, respectively, for the historical period (1982 through 2018). The surface water inflow exceeded outflow by 3,870 AFY.

The surface water budget for the historical period in the WMA is presented on **Figure 2c.~~2~~3-1** and **Table 2c.~~2~~3-3**. The inflows and outflows for the Santa Ynez River Alluvium shown in Tables 2c.~~2~~3-1 and 2c.~~2~~3-2 are totaled in Figure 2c.~~2~~3-1 and Table 2c.~~2~~3-3. The figure shows how flashy the hydrologic system is, with ten wet years showing orders of magnitude more flux of surface water than the other, drier, years. In these wet years, surface water inflows and outflows are extremely large in response to precipitation, compared with the drier years.

2c.3-2 Historical Groundwater Budget

The historical groundwater budget (1982 through 2018) includes a summary of the estimated groundwater inflows and, groundwater outflows, followed by the change of groundwater in storage and discussion about the sustainable yield of the WMA. The inflows and outflows are for the entire groundwater basin in the WMA, which includes the Lompoc Plain, Lompoc Upland, Santa Rita Upland, and Lompoc Terrace subareas (see Plan Area Figure 1d.1-3). The water budget for the Burton Mesa subarea is included as inflow into the Lompoc Plain and Lompoc Upland subareas. The Santa Ynez River Alluvium subarea is included as part of the surface water component.

Figure 2c.3-1

Historical Surface Water Components, 1982-2018

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Table 2c.~~2~~3-3

Annual Surface Water Components, Historical Period (1982 through 2018), AFY

		Inflows						Outflows				
Water Year	Hydrologic Year Type	Santa Ynez River	Tributary	Lompoc Wastewater	Imported SWP	River Alluvium Total Inflows	Total Inflows	Santa Ynez River	Net Percolation to Groundwater	River Alluvium Total Outflows	Total Outflows	Inflow - Outflow
1982	Dry	3,402	2,902	3,583	0	3,289	13,175	1,592	9,517	7,433	18,542	-5,367
1983	Wet	539,648	64,565	3,786	0	4,112	612,111	499,844	28,131	7,286	535,262	76,849
1984	Below normal	26,082	6,168	3,666	0	3,363	39,279	22,370	17,657	7,267	47,295	-8,015
1985	Dry	562	2,297	3,968	0	3,260	10,087	0	8,070	6,957	15,028	-4,940
1986	Above normal	14,906	19,078	4,090	0	3,275	41,350	20,688	19,973	6,723	47,384	-6,034
1987	Dry	1,392	2,896	4,107	0	2,960	11,355	654	9,665	6,800	17,120	-5,765
1988	Dry	1,320	1,688	3,944	0	3,122	10,073	0	8,249	6,813	15,062	-4,989
1989	Critically Dry	109	400	4,019	0	3,014	7,542	0	4,224	7,579	11,804	-4,261
1990	Critically Dry	39	317	3,707	0	3,070	7,134	0	3,888	8,415	12,303	-5,170
1991	Below normal	11,091	9,445	3,616	0	3,293	27,446	13,782	14,458	8,022	36,263	-8,817
1992	Above normal	43,968	12,689	3,691	0	3,602	63,950	47,843	22,267	7,814	77,923	-13,973
1993	Wet	377,397	30,539	3,889	0	3,748	415,572	382,370	22,844	7,698	412,911	2,660
1994	Below normal	10,416	5,068	3,725	0	3,206	22,415	5,071	16,084	7,691	28,846	-6,430
1995	Wet	590,940	114,087	4,017	0	3,822	712,866	504,051	26,319	7,603	537,974	174,893
1996	Below normal	17,646	7,849	4,107	0	3,406	33,007	17,436	15,071	8,480	40,987	-7,979
1997	Above normal	19,711	10,077	4,120	13	3,695	37,616	25,270	16,567	9,901	51,739	-14,123
1998	Wet	699,276	80,355	4,568	3,174	4,238	791,611	687,053	27,616	8,698	723,366	68,245
1999	Above normal	14,156	10,941	4,652	3,339	3,813	36,900	22,503	14,226	9,234	45,964	-9,064
2000	Above normal	32,004	19,256	4,719	4,086	3,788	63,854	44,838	15,155	9,256	69,248	-5,395
2001	Wet	176,979	38,318	4,045	4,316	4,078	227,737	248,894	18,714	9,297	276,905	-49,168
2002	Dry	7,722	2,677	3,824	3,809	3,575	21,606	720	13,469	9,598	23,787	-2,180
2003	Below normal	9,747	6,626	3,746	4,018	3,582	27,719	4,110	17,652	9,170	30,931	-3,213
2004	Dry	6,017	2,917	3,879	4,176	3,628	20,616	875	10,662	9,984	21,522	-906
2005	Wet	404,441	57,620	3,730	3,260	4,442	473,493	432,183	20,239	9,333	461,755	11,738
2006	Above normal	98,411	10,028	3,744	3,337	3,684	119,204	78,283	16,452	8,953	103,687	15,516
2007	Critically Dry	7,714	996	3,993	3,802	3,478	19,983	360	10,735	9,967	21,061	-1,078
2008	Above normal	57,782	16,465	3,921	2,321	3,921	84,410	69,645	12,246	10,011	91,901	-7,491
2009	Critically Dry	2,362	977	3,395	1,377	3,591	11,703	360	7,032	10,171	17,563	-5,860
2010	Below normal	18,906	8,751	3,408	961	3,878	35,904	19,559	18,670	9,991	48,220	-12,316
2011	Wet	130,640	27,575	3,190	2,002	3,721	167,129	125,814	21,914	9,170	156,897	10,232
2012	Dry	3,107	1,753	2,946	2,238	3,625	13,669	720	8,407	10,032	19,159	-5,490
2013	Critically Dry	6,378	624	3,288	2,070	3,652	16,012	0	7,542	11,052	18,594	-2,582
2014	Critically Dry	4,433	430	3,588	145	3,490	12,086	0	8,228	10,584	18,812	-6,727
2015	Critically Dry	3,370	233	3,334	109	3,430	10,475	0	3,495	10,799	14,294	-3,819
2016	Critically Dry	3,823	329	3,324	1,758	3,402	12,637	0	5,776	10,769	16,545	-3,908
2017	Above normal	24,538	19,517	3,439	1,924	3,723	53,142	22,633	19,911	10,988	53,532	-389
2018	Critically Dry	8,527	438	3,338	2,296	3,374	17,974	360	7,967	10,926	19,253	-1,279
Average 1982 - 2018		**91,323**	**16,132**	**3,787**	**1,474**	**3,577**	**116,293**	**89,186**	**14,300**	**8,931**	**112,417**	**3,876**

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2c.3-2-1 Groundwater Inflows

Groundwater inflow components include subsurface inflow, deep percolation of direct precipitation and mountain front recharge, streamflow percolation, and return flows from agricultural irrigation and, municipal, and domestic water uses. The annual groundwater inflows during the historical base period are summarized in **Table 2c.~~2~~3-4**. During the historical base period, an average of 31,069 AFY of total groundwater inflow occurred. During this time, the groundwater inflow components ranged from 14,420 AFY to 54,610 AFY, due to differences in rainfall in dry and wet years. The three largest groundwater inflow components were recharge from percolation of surface water, recharge from precipitation overlying the groundwater basin, and return flows from agriculture, which account for 46%, 26%, and 12% of the total annual average inflow, respectively. The remaining groundwater components make up 18% of the total groundwater inflow (Table 2c.~~2~~3-4).

Table 2c.~~2~~3-4
Annual Groundwater Inflow, Historical Period (1982 through 2018)

Groundwater Inflow Component	Average	Minimum	Maximum
	(Acre-Feet per Year)		
~~Subflow~~Subsurface inflow [A]	1,200	1,200	1,200
Recharge from Precipitation – Overlying	7,990	4,830	14,080
Recharge from Precipitation – Mountain Front	2,730	1,320	4,920
Net Channel Percolation from Surface Water [B]	14,300	3,500	28,130
Agricultural Return Flows	3,820	2,970	5,010
Municipal Return Flows [C]	880	520	1,130
Domestic Return Flows	110	80	140
TOTAL	**31,030**	**14,420**	**54,610**

A Based on ~~subflow~~subsurface inflow at the Lompoc Narrows, flowing from the river alluvium to the Lompoc Plain.

B Does not include percolation to Santa Ynez River alluvium upstream of the Lompoc Narrows which is part of the surface water component.

C Does not include return flows from Lompoc Wastewater Reclamation Plant, which is included in the surface water components.

2c.3-2-2 Groundwater Outflows

Groundwater outflow components include total groundwater pumping from all water use sectors, subsurface flow out to the Pacific Ocean, and phreatophyte (riparian vegetation) evapotranspiration. The estimated annual groundwater outflows for the historical base period are summarized in **Table 2c.~~2~~3-5**.

Table 2c.~~2~~3-5
Annual Groundwater Outflow, Historical Period (1982 through 2018)

Groundwater Outflow Component	Average	Minimum	Maximum
	(Acre-Feet per Year)		
Total Pumping	*27,290*	*21,050*	*34,710*
Pumping – Agriculture	19,570	14,920	25,160
Pumping – Municipal	7,480	5,940	9,220
Pumping – Domestic	240	190	330
Riparian Vegetation Evapotranspiration	4,630	3,460	4,910
~~Subflow~~Subsurface outflow	100	100	100
TOTAL	**32,020**	**24,610**	**39,720**

Groundwater pumping was the largest groundwater outflow component, totaling 85% of all the groundwater outflow. The estimated annual groundwater pumping by water use sector for the historical base period is summarized in Table 2c.~~2~~3-5 and on **Figure 2c.~~2~~3-2**. Agricultural and municipal pumping were the largest components of groundwater pumping, accounting for approximately 72% (agricultural) and 27% (municipal) of total pumping over the historical base period. As indicated on Figure 2c.~~2~~3-2, total pumping remained steady over the base period. Domestic and small mutual water companies accounted for 1% of total pumping during the historical base period.

2c.3-2-3 Summary and Change in Storage

Annual changes in groundwater in storage were calculated for each year of the historical base period of 1982 through 2018 (37 years). A summary of the average annual inflows and outflows within the groundwater for the WMA for the historical base period are presented graphically on **Figure 2c.~~2~~3-3AB**. Figure 2c.~~2~~3-3B shows the magnitude of the average annual flow for each individual water budget component. Recharge from precipitation and agricultural pumping are the two largest fluxes for inflow

Figure 2c.3-2

Groundwater Pumping by Sector, WY1982-2018

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Figure 2c.3-3AB

Average Groundwater Budget Volumes, Historical WY1982-2018

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and outflow, respectively. The results of the water budget during the historical period show that the WMA had more total outflow than total inflow. As shown on Figure 2c.~~2~~3-3AB, the average total outflow of approximately 32,000 AFY was about 1,000 AFY more that the average total inflow of approximately 31,000 AFY. The variability of the average inflow and outflow components are presented for each year of the historical period on **Figure 2c.~~2~~3-4**, which presents groundwater inflow components above the zero line and outflow components below the zero line. The annual variation on Figure 2c.~~2~~3-4 shows that the amount of recharge will fluctuate widely depending on precipitation and streamflow (also shown in Table 2c.~~2~~3-4). These data are also presented in **Table 2c.~~2~~3-6**.

As shown on **Figure 2c.~~2~~3-5**, the cumulative change of groundwater in storage during each year and during the overall historical base period indicates an average annual decrease in storage in the WMA. The cumulative change in storage increased in the wet period from 1995 through 2011 for a net surplus, but then decreased from 2012 to 2018, for a net decrease for the entire period. There was about 37,000 AF of accumulated water supply deficiency over the entire 37-year period, which is equal to an average surplus/deficit of 1,000 AFY for the entire WMA.

The cumulative change in storage based on the water budget components is different in magnitude than the cumulative change in storage in SYRWCD's annual reports (Figure 2b.2-1 and Figure 2b.2-4, Groundwater Conditions) because the annual report data is based on a portion of the entire WMA. However, the trends shown in both analyses are the same in that there is a net decrease in the cumulative groundwater storage over the 37-year period. The cumulative change in storage estimated from the water budget also matches measured groundwater level trends, including rises during wet periods and declines during dry periods (Table 2c.3-6). The average annual groundwater storage increase or decline during the historical base period—or the difference between outflow and inflow to the WMA—is approximately 1,000 AFY.

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Figure 2c.3-4

Historical Groundwater Components, 1982-2018

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Figure 2c.3-5

Cumulative Change in Groundwater Storage by Subarea, Relative to March 1982

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Table 2c.~~2~~3-6
Annual Groundwater Inflows, Outflow, and Change in Storage,
Historical Period (1982 through 2018), AFY

		Inflows						Outflows						
Water Year	Hydrologic Year Type	Subflow In	Precipitation Recharge-Overlying	Mountain Front Recharge	Net Stream Percolation	Agricultural Return Flows	Urban Return Flows	Agricultural Pumping	Municipal Pumping	Domestic Pumping	Phreatophytes	Subflow Out	Change in Storage	Cumulative Change in Storage
1982	Dry	1,200	6,583	2,086	9,517	3,387	623	17,031	6,443	203	4,914	100	-5,293	-5,293
1983	Wet	1,200	10,570	4,919	28,131	2,967	613	14,924	6,110	218	4,914	100	22,134	16,841
1984	Below normal	1,200	8,496	2,450	17,657	3,223	845	16,209	6,990	235	4,914	100	5,424	22,265
1985	Dry	1,200	7,756	2,288	8,070	3,276	830	16,463	7,503	260	4,914	100	-5,819	16,446
1986	Above normal	1,200	8,941	2,380	19,973	3,413	922	17,134	8,510	279	4,914	100	5,894	22,339
1987	Dry	1,200	6,359	2,907	9,665	4,292	907	21,548	8,126	259	4,914	100	-9,616	12,723
1988	Dry	1,200	8,799	3,657	8,249	3,912	1,019	19,647	8,732	242	3,718	100	-5,602	7,121
1989	Critically Dry	1,200	5,194	3,091	4,224	3,912	1,063	19,656	9,219	213	3,464	100	-13,968	-6,847
1990	Critically Dry	1,200	5,669	2,875	3,888	4,104	1,018	20,617	7,945	222	3,464	100	-13,595	-20,442
1991	Below normal	1,200	8,113	2,906	14,458	3,977	897	19,976	7,173	224	4,533	100	-455	-20,897
1992	Above normal	1,200	7,526	2,367	22,267	4,058	910	20,362	7,365	211	4,914	100	5,375	-15,522
1993	Wet	1,200	8,965	3,172	22,844	3,984	903	20,029	7,890	226	4,914	100	7,909	-7,614
1994	Below normal	1,200	7,056	1,908	16,084	3,511	937	17,680	8,144	214	4,914	100	-355	-7,969
1995	Wet	1,200	11,637	4,828	26,319	3,020	853	15,213	7,656	220	4,914	100	19,754	11,785
1996	Below normal	1,200	6,769	1,976	15,071	3,803	955	19,154	8,181	216	4,914	100	-2,791	8,994
1997	Above normal	1,200	6,326	2,028	16,567	5,005	1,094	25,165	8,114	224	4,914	100	-6,296	2,697
1998	Wet	1,200	14,080	4,392	27,616	3,640	888	18,297	7,230	186	4,914	100	21,090	23,788
1999	Above normal	1,200	7,874	2,774	14,226	4,192	984	21,084	7,631	211	4,914	100	-2,689	21,098
2000	Above normal	1,200	8,643	2,707	15,155	4,430	1,055	22,303	7,952	214	4,914	100	-2,292	18,806
2001	Wet	1,200	10,054	2,888	18,714	4,314	1,068	21,767	7,392	224	4,914	100	3,842	22,649
2002	Dry	1,200	7,286	1,730	13,469	4,420	1,143	22,399	7,953	234	4,914	100	-6,352	16,297
2003	Below normal	1,200	7,231	1,787	17,652	3,509	1,122	17,906	7,841	223	4,914	100	1,517	17,814
2004	Dry	1,200	6,901	1,738	10,662	3,700	1,198	18,969	8,099	224	4,914	100	-6,907	10,908
2005	Wet	1,200	11,851	4,367	20,239	3,550	1,096	18,162	7,351	238	4,914	100	11,539	22,446
2006	Above normal	1,200	9,141	2,462	16,452	3,212	1,130	16,643	7,642	245	4,914	100	4,053	26,499
2007	Critically Dry	1,200	4,831	1,319	10,735	3,573	1,258	18,596	8,225	280	4,914	100	-9,199	17,300
2008	Above normal	1,200	8,364	2,285	12,246	3,566	1,250	18,537	8,215	297	4,914	100	-3,151	14,149
2009	Critically Dry	1,200	7,971	1,567	7,032	3,785	1,183	19,712	7,402	326	4,914	100	-9,717	4,432
2010	Below normal	1,200	9,131	2,687	18,670	3,837	1,052	19,989	6,892	309	4,914	100	4,374	8,807
2011	Wet	1,200	9,521	3,508	21,914	3,460	1,154	18,139	6,879	309	4,914	100	10,415	19,221
2012	Dry	1,200	8,753	2,306	8,407	4,145	1,097	21,862	6,901	281	4,914	100	-8,149	11,073
2013	Critically Dry	1,200	6,978	2,684	7,542	4,753	1,100	24,959	7,296	282	3,464	100	-11,844	-771
2014	Critically Dry	1,200	6,481	2,930	8,228	4,052	1,021	21,297	7,153	297	3,464	100	-8,400	-9,172
2015	Critically Dry	1,200	5,246	2,752	3,495	4,090	853	21,761	6,083	281	3,464	100	-14,053	-23,225
2016	Critically Dry	1,200	6,466	2,924	5,776	3,904	859	20,934	6,138	244	3,464	100	-9,751	-32,976
2017	Above normal	1,200	8,215	2,501	19,911	3,812	835	20,419	5,945	239	4,744	100	5,027	-27,949
2018	Critically Dry	1,200	5,914	2,708	7,967	3,622	895	19,451	6,374	254	4,914	100	-8,786	-36,734
Average 1982 - 2018		**1,200**	**7,990**	**2,730**	**14,300**	**3,820**	**990**	**19,570**	**7,480**	**240**	**4,630**	**100**	**(990)**	

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Figure 2c.~~2~~3-5 also shows the change in groundwater storage for the subareas of the WMA, including the Lompoc Plain, Lompoc Upland, Santa Rita Upland, and Lompoc Terrace. The average annual change in storage and cumulative change in storage over the base period for each subarea is shown in **Table 2c.~~2~~3-7** based on this water budget analysis for the WMA.

Table 2c.~~2~~3-7
Average Annual Change in Groundwater Storage
by Subarea in the WMA, Historical Period (1982 through 2018)

Groundwater Subarea	Average Annual Change in Storage (Acre-feet/year)	Cumulative Change in Storage (Acre-feet)
Lompoc Plain	-640	-23,680
Lompoc Upland	-110	-4,070
Santa Rita Upland	-250	-9,250
Lompoc Terrace	0	0
TOTAL WMA:	**-1,000**	**-37,000**

2c.3-3 Sustainable Perennial Yield Estimate of the Basin

The water budget for the WMA during the base period indicates that total groundwater outflow was more than the total inflow on average for the historical period years (1982 through 2018, 37 years). This indicates that there is a net deficit occurring.

Perennial yield is a long-term average annual amount of water which can be withdrawn from a basin under specified operating conditions (i.e., legal, economic, environmental, and management parameters) without inducing a long-term progressive drop in water levels. The estimated perennial yield for the base period is calculated as follows:

Perennial Yield = Average Annual Pumping + Average Annual Change in Storage

The average annual pumping and change in storage totals for each subarea for the historical period (1982 through 2018, 37 years) are shown in **Table 2c.~~2~~3-8**. In addition, the period 2002 through 2011 (10 years) is another balanced hydrologic period within the historical period (1982 through 2018), with the precipitation at Lompoc averaging 14.5 inches/year, which is within 1% of the long-term average of 14.6

inches/year. This water budget analysis indicates that the perennial yield of the basin is approximately 26,000 to 27,000 AFY. It should be recognized that the definitions of safe/perennial/sustainable yield and overdraft reflect conditions of water supply and use over a long-term period. The historical period (1982 through 2018) and 2002 through 2011 are both representative of long-term average conditions.

Table 2c.~~2~~3-8
Average Pumping and Change in Storage
for Periods Representative of Average Precipitation in the Basin

	Average 1982-2018			Average 2002-2011		
Groundwater Subarea	**Annual Pumping (AFY)**	**Annual Change in Storage (AFY)**	**Perennial Yield: Pumping + Change in Storage (AFY)**	**Annual Pumping**	**Annual Change in Storage (AFY)**	**Perennial Yield: Pumping + Change in Storage (AFY)**
Lompoc Plain	22,800	-640	22,160	21,703	310	22,000
Lompoc Upland	3,130	-110	3,020	3,440	-294	3,150
Santa Rita Upland	1,350	-250	1,100	1,681	-386	1,300
Lompoc Terrace	0	0	0	0	0	0
TOTAL WMA:	**27,280**	**-1,000**	**26,280**	**26,824**	**-369**	**26,450**

When relating the perennial yields in Table 2c.~~2~~3-8 and the concept of sustainable yields, an evaluation of undesirable results must be performed. The undesirable results as defined in SGMA covers a broader range of criteria than the lowering of water levels and groundwater storage addressed in Table 2c.~~2~~3-8 and also includes degraded groundwater quality, seawater intrusion, land subsidence, and depletion of interconnected surface water and groundwater dependent ecosystems.

Undesirable results are specific to the local conditions and are defined by the GSAs. In the case of the Lompoc Plain, review of the characteristics indicates a minor adjustment to the perennial yields in Table 2c.~~2~~3-7 may be warranted. For example, during the base period about 400 AFY of imported water recharged the Lompoc Plain based on the average imports of 1,500 AFY by the VSFB and a 25% return flow estimate via the Lompoc Regional Wastewater Reclamation Plant. In addition, the County of Santa Barbara Groundwater Basins Status Report (SBCWA 2014), states:

> Groundwater within the Lompoc Plain is managed in accordance with Water Rights Decision 89-18. Therefore, water levels would not be expected to decline in response to climate but in response to the water available according to the Decision. In fact, water levels in wells from the Lompoc Plain are generally not the lowest of record and show only modest declines in recent years most likely due to releases from Cachuma.

So, while groundwater levels were low in the Lompoc Plain at the end of water year 2018 (the end of the base period), the water levels have since recovered to pre-drought levels by the end of 2020 after an above normal water year in 2019 and additional water rights releases in the year 2020. This ability to quickly recover from droughts indicates that annual basin yield can be increased by managed releases of water from Cachuma Reservoir. The City of Lompoc Groundwater Management Plan (West Yost 2013) comes to a similar conclusion:

> The historical data for the Lompoc Groundwater Basin indicate that long-term groundwater levels are not declining and groundwater quality is not deteriorating with respect to groundwater use by the City, MHCSD, and VVCSD. Correspondingly, the Lompoc Groundwater Basin is not in overdraft. Nevertheless, that status is dependent on the quantity and quality of Santa Ynez River stream flow at the Narrows and Cachuma Project operations under State Board Order 89-18.

Similarly, the yield of the Lompoc Terrace cannot be based strictly on the perennial yield equation because historically this subarea does not have groundwater pumping. So, a previous estimate of 300 AFY is utilized for the perennial yield of the Lompoc Terrace (Stetson Engineers 1992). **Table 2c.~~2~~3-9** summarizes the estimates of perennial yield based on this water budget analysis.

Table 2c.~~2~~3-9
Estimated Perennial Yields by Subarea in the WMA

Groundwater Subarea	Estimated Sustainable Perennial Yield (AFY)
Lompoc Plain	22,000- 24,000
Lompoc Upland	3,000 - 3,200
Santa Rita Upland	1,100 - 1,300
Lompoc Terrace	200 - 500
TOTAL WMA:	**26,300 - 29,000**

While sustainable perennial yield is difficult to estimate due to the inherent uncertainties in the estimates of recharge and discharge, this independent analysis is within ten percent of the safe or perennial yield estimate in the SYRWCD Annual Reports of 29,500 AFY for the WMA and the range of sustainable yields for the subareas in the City of Lompoc Groundwater Management Plan (West Yost 1993) and County of Santa Barbara groundwater planning documents (SBCWA 2014). The results also support interpretation of trends in measured water levels in wells presented in the groundwater current conditions section. This current yield estimate also does not include any potential conjunctive use programs or projects to increase the recharge into the Basin.

2c.3-4 Reliability of Historical Surface Water Supplies

The long-term reliability of the surface water from the local sources, including Bradbury Dam outflows and tributary runoff, is subject to climatic variability and is affected by exports out of the Santa Ynez River watershed to the Santa Barbara County south coast. The most recent drought, from 2012 through 2018, was very severe. The variability of the surface water flow from local and imported sources is summarized in Section 2c.~~2.~~3-1~~.~~-1 and Table 2c.~~2~~3-1 and Table 2c.~~2~~3-3.

The VSFB has a State Water Project (SWP) allocation of 5,500 AFY and a drought buffer of 550 AFY for a total of 6,050 AFY. This SWP supply is not as reliable as the local groundwater supplies in the WMA. The average import amount for the period of 1998 through 2018 was approximately 2,600 AFY. During the dry "current period" of 2011 through 2018, VSFB was only able to import approximately 1,600 AFY, which is a 74% reduction from total possible delivery of 6,050 AFY. VSFB compensates for supply deficits by pumping from adjacent San Antonio Creek Valley Groundwater Basin. Overall, imported water represents only a small fraction of the total water deliveries (28,600 AFY) in the WMA (less than 6%).

2c.4 CURRENT WATER BUDGET

SGMA regulations require a current water budget be developed based on the "most recent hydrology, water supply, water demand, and land use information."[145] For the GSP, the period selected to represent current conditions is water years 2011 through 2018. This period is a subset of the historical base period (1982 through 2018) described in Section 2c.2.

The current water budget period is dominated by a drought period when annual precipitation averaged about 88% of the historical average. As a result, the current water budget period represents drought conditions and is not representative of long-term, balanced conditions needed for sustainability planning purposes. The current period was extended to year 2011 to add a wet year to the current hydrology (see **Table 2c.1-1**). The current water budget is used to project the future baseline and is based on current water demands and land use information.

Estimates of the surface water and groundwater inflow and outflow, and changes in storage for the current water budget period, are provided in this section.

2c.4-1 Current Surface Water Component

Similar to the historical surface water inflow and outflow components, the current surface water components include two surface water source types: State Water Project (SWP) and local supplies.

2c.4-1-1 Inflows: Local and Imported

Local surface water supplies include surface water flows that enter the WMA from precipitation runoff within the watershed and Santa Ynez River inflow to the WMA, regulated by SWRCB as outflows from Lake Cachuma. In addition, as discussed in the HCM (Section 2a.3), the Santa Ynez River Alluvium Upper Aquifer is part of the ~~subflow~~underflow of the Santa Ynez River, which is regulated by SWRCB. Imported surface water through the SWP became available after completion of the Coastal Branch pipeline in 1997. The VSFB has an SWP allocation of 5,500 AFY and a drought buffer of 550 AFY for a total of 6,050 AFY.

145 23 CCR § 354.18(c)(1) Current water budget information shall quantify current inflows and outflows for the basin using the most recent hydrology, water supply, water demand, and land use information.

Table 2c.~~3~~4-1 summarizes the average, minimum, and maximum inflow from surface water for all sources. The estimated average annual total inflow over the current period is approximately 38,450 AFY. The largest components of this average local inflow are releases from Bradbury Dam and flow in the Santa Ynez River upstream of the WMA, which represents about 62% of the average annual surface inflow for this period. Inflow from the adjacent tributaries, including Salsipuedes Creek, contribute 17% of the total surface water inflow. The imported water supply provides approximately 4% of the total volume of surface water that enters the WMA in the current period.

Table 2c.~~3~~4-1
Annual Surface Water Inflow, Current Period (2011 through 2018)

Surface Water Inflow Component	**Average**	**Minimum**	**Maximum**
	(Acre-Feet per Year)		
Santa Ynez River Inflow from CMA	23,100	3,110	130,640
Santa Ynez River Tributary Inflow	6,360	230	27,570
Lompoc Regional Wastewater Reclamation Plant	3,310	2,950	3,590
Imported State Water Project	1,570	110	2,300
Santa Ynez River Alluvium Subarea (Surface Water Underflow)			
~~Subflow~~Subsurface inflow	800	800	800
Recharge from Precipitation (Overlying and Mountain Front)	1,600	1,400	2,000
Recharge from Agricultural Return Flows to Underflow	1,120	890	1,250
Recharge from Domestic Return Flows to Underflow	30	30	40
TOTAL	**37,890**	**9,520**	**168,190**

2c.4-1-2 Surface Water Outflows

The estimated annual surface water outflow leaving the WMA as flow in the Santa Ynez River and percolation into the groundwater system over the current water budget period is summarized in **Table 2c~~-3~~.4-2**.

Table 2c.~~3~~4-2
Annual Surface Water Outflow, Current Period (2011 through 2018)

Surface Water Outflow Component	Average	Minimum	Maximum [A]
	(Acre-Feet per Year)		
Santa Ynez River Outflow to Pacific Ocean	18,690	0	125,810
Net Channel Percolation to Groundwater [A]	10,400	3,500	21,910
Santa Ynez River Alluvium Subarea (Surface Water Underflow)			
Santa Ynez River Underflow Out	1,200	1,200	1,200
River well pumping [B] – Agriculture	6,100	4,730	6,620
River well pumping [B] – Domestic	70	60	100
Riparian Vegetation Evapotranspiration	3,170	3,170	3,170
TOTAL	**39,630**	**12,660**	**158,810**

A Does not include percolation to Santa Ynez River Alluvium, which is part of the surface water component.

B River well pumping occurs from wells in the Santa Ynez River Alluvium. The wells pump from the ~~subflow~~underflow of the Santa Ynez River and are administered by the SWRCB as a surface water diversion.

2c.4-1-3 Summary

During this current period (2011 through 2018), precipitation was well below average, which resulted in very little surface water flow. The current period (2011 through 2018) had about 30% of the total surface flows in the historical period (1982 through 2018). The imported water supplies increased as percentage of the overall surface water inflows due to the drought conditions, 1% in the historical period (1982 through 2018) and 4% in the current period (2011 through 2018).

2c.4-2 Current Groundwater Budget

The current groundwater budget includes a summary of the estimated groundwater inflows, groundwater outflows, and change in groundwater in storage.

2c.4-2-1 Groundwater Inflows

Groundwater inflow components include subsurface inflow, deep percolation of direct precipitation and mountain front recharge, streamflow percolation, and return flows from agricultural irrigation and, municipal, and domestic water uses. The annual groundwater inflows during the current period are summarized in **Table 2c.~~3~~4-3**. During the current period, an average of 26,550 AFY of total groundwater inflow occurred. During this time, the groundwater inflow ranged from 16,560 AFY to 42,050 AFY, due to differences in rainfall in dry and wet years. The largest groundwater inflow component was recharge from channel percolation, which accounts for approximately 39% of the total annual average inflow. The current period (2011 through 2018) had 85% of the total groundwater inflows in the historical period (1982 through 2018).

Table 2c.~~3~~4-3
Annual Groundwater Inflow, Current Period (2011 through 2018)

Groundwater Inflow Component	Average	Minimum	Maximum [A]
	(Acre-Feet per Year)		
~~Subflow~~Subsurface inflow [A]	1,200	1,200	1,200
Recharge from Precipitation – Overlying	7,200	5,250	9,520
Recharge from Precipitation – Mountain Front	2,790	2,310	3,510
Net Channel Percolation from Surface Water [B]	10,400	3,500	21,910
Agricultural Return Flows	3,980	3,460	4,750
Municipal Return Flows [C]	860	730	1,020
Domestic Return Flows	120	110	140
TOTAL	**26,550**	**16,560**	**42,050**

A Based on ~~subflow~~subsurface inflow at the Lompoc Narrows, flowing from the river alluvium to the Lompoc Plain.

B Does not include percolation to Santa Ynez River alluvium upstream of the Lompoc Narrows which is part of the surface water component.

C Does not include return flows from Lompoc Wastewater Reclamation Plant, which is included in the surface water components.

2c.4-2-2 Groundwater Outflows

Groundwater outflow components include total groundwater pumping from all water use sectors, subsurface flow out to the Pacific Ocean, and phreatophyte (riparian vegetation) evapotranspiration. The estimated annual groundwater outflows for the current period are summarized in **Table 2c.~~3~~4-4**.

Table 2c.~~3~~4-4
Annual Groundwater Outflow, Current Period (2011 through 2018)

Groundwater Outflow Component	Average	Minimum	Maximum
	(Acre-Feet per Year)		
Pumping – Agriculture	21,100	18,140	24,960
Pumping – Municipal	6,600	5,940	7,300
Pumping – Domestic	270	240	310
Riparian Vegetation Evapotranspiration	4,170	3,460	4,910
~~Subflow~~Subsurface outflow	100	100	100
TOTAL	**32,240**	**27,880**	**37,580**

For the current water budget period, estimated total groundwater outflow components ranged from 27,880 to 37,580 AFY, with an average outflow of 32,240 AFY. This is about the same outflow as the total average groundwater outflows estimated for the historical base period (32,020 AFY average).

Total average annual groundwater pumping in the current period was about 28,000 AFY, an increase of 2.5% compared with the historical baseline period, which was 27,300 AFY. Agricultural, municipal, and domestic sectors accounted for 75%, 24%, and 1% of total pumping, respectively, during the current period.

2c.4-2-3 Summary and Change in Storage

Average groundwater inflows and outflows for the current water budget period are presented on **Figure 2c.~~3~~4-1AB**. Figure 2c.~~3~~4-1B shows the magnitude of the average annual flow for each individual water budget component during the current period. Precipitation from recharge, channel percolation and agricultural pumping are the largest fluxes. More details regarding the data for each year in the current period (2011 through 2018) are presented in Table 2c.~~2~~3-6.

The current groundwater budget is directly influenced by the drought conditions from 2012 to 2018, which is one of the driest periods on historical record in the Santa Ynez River Valley. The results of the water budget during the current period show that the WMA experienced more total outflow than inflow. As shown on Figure 2c.~~3~~4-1AB, the average total inflow of approximately 26,500 AFY is 5,700 AFY less than the average total outflow of 32,200 AFY. During the current period, the amount of recharge from channel percolation was diminished and at the same time total groundwater pumping was about the same compared with the baseline period. During the current water budget period (2011 through 2018), an estimated net decline of groundwater in storage of approximately 45,600 AF occurred (Figure 2c.~~2~~3-5). The annual average groundwater storage decline during the current water budget period (2011 through 2018) was approximately 5,700 AFY.

The short-term depletion of groundwater in storage indicates that the total groundwater outflows exceeded the total inflows during the current period. As summarized in Table 2c.~~3~~4-4, total groundwater pumping averaged approximately 28,000 AFY during the current period. Due to the drought conditions and short period analyzed (8 years), the current water budget period is not appropriate for long-term sustainability planning. However, the current water demands are useful to project the future water budget as discussed in the next section.

Figure 2c.4-1AB

Average Groundwater Budget Volumes, Current WY2011-2018

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2c.5 PROJECTED WATER BUDGET

SGMA regulations require the following regarding projected water budgets:

> "3. Projected water budgets shall be used to estimate future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify the uncertainties of these projected water budget components."
>
> "(A) Projected hydrology shall utilize 50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition for estimating future hydrology…"
>
> "(B) Projected water demand shall utilize the most recent land use, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demand…"
>
> "(C) Projected surface water supply shall utilize the most recent water supply information as the baseline condition for estimating future surface water supply. The projected surface water supply shall also be applied as the baseline condition used to evaluate future scenarios of surface water supply availability and reliability as a function of the historical surface water supply identified in Section 354.18(c)(2)(A), and the projected changes in local land use planning, population growth, and climate."[146]

2c.5-1 Projected Estimation Methodology

The future water budget in the WMA was estimated utilizing estimated future population forecasts and projected climatic conditions provided by DWR for the period 2030 through 2072. The effects of climate change were evaluated using DWR-provided climate change factors. This section describes the estimated components of the future water budget that includes land use, water demand, and climate change.

The 2030 and 2070 precipitation and ET climate change factors are available on 6-kilometer resolution grids. The climate data sets have been routed to the subbasins defined by 8-digit Hydrologic Unit Codes (HUCs), and the resulting downscaled hydrologic time series are available on the DWR SGMA Data Viewer.[147] Precipitation and ET data used in this analysis were downloaded from the DWR SGMA Data

[146] 23 CCR § 354.18 (c)(3)
[147] SGMA Data Viewer. Web resource. https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer Accessed 2021-02-15.

Viewer for climate grid cells covering the WMA within HUC 18060010, which is the HUC for the Santa Ynez River. These change factors are available monthly from 1915 to 2011 for the Santa Ynez River watershed. The monthly change factors for the Santa Ynez River watershed were applied to the historical hydrology for the WMA. Mean monthly and annual values were then computed from the subbasin time series to show projected patterns of change under 2030 and 2070 conditions.

2c.5-1-1 Projected Hydrology and Surface Water Supply

DWR has provided SGMA Climate Change Data and published a guidance document, "Guidance for Climate Change Data Use for Groundwater Sustainability Plan Development" (DWR 2018), as the primary source for developing the future water budget.

A common approach to forecast the new water resources balance under climate change conditions in the future is the use of global circulation model (GCM) outputs, downscaled to local geographic scales. There are more than 30 GCMs, each with different ways of representing aspects of the climate system. DWR's Climate Change Technical Advisory Group (CCTAG) has identified the most applicable and appropriate GCMs for water resource planning and analysis in California. Key future climate projection scenarios identified by DWR are summarized in **Table 2c.45-1**.

Table 2c.45-1
Summary of Climate Scenarios

Year	Type	Scenario Name	Description
2030	Average	Central Tendency	Central tendency of the ensemble of 10 GCM and two RCPs (high and middle emissions scenarios).
2070	Average	Central Tendency	Central tendency of the ensemble of 10 GCM and two RCPs (high and middle emissions scenarios).
2070	Extreme	Drier/Extreme Warming (2070DEW)	Single GCM, HadGEM2-EM model for RCP 8.5 (high emissions scenario)
2070	Extreme	Wetter/Moderate Warming (2070WMW)	Single GCM, CNRM-CM5 model for RCP 4.5 (middle emissions scenario)

Source: DWR (2018) Guidance for Climate Change Data Use for Groundwater Sustainability Plan Development
GCM = general circulation models, RCP = representative concentration pathway

The Central Tendency scenarios are based on an average of 20 GCMs to project change in precipitation and evapotranspiration around 2030 and 2070 and used for projecting future conditions for the water budget. The Central Tendency scenarios were developed using an ensemble of climate models such that the entire probability distribution at the monthly scale was transformed to reflect the mean of the 20 climate projections[148] (DWR 2018). The DWR data set also includes two additional simulation results for extreme climate scenarios under 2070 conditions: Drier/Extreme Warming (2070DEW) and Wetter/Moderate Warming (2070WMW). Use of the extreme scenarios in GSPs is optional.

Due to the concentration of greenhouse gases in the atmosphere, temperatures under the Central Tendency are estimated to rise by 3~~o~~° to ~~7o~~7° Fahrenheit between 2020 and 2070 as shown in **Figure 2c.~~4~~5-1** showing the range of the GCMs forecasted maximum daily temperatures for Lompoc.[149] Generally, change factors under the Central Tendency scenario have a seasonal pattern with wetter conditions in the winter months, and drier during the spring and fall months when compared to historical conditions. Within the Basin, streamflow is projected to increase slightly by 0.5% in 2030 and 3.8% in 2070.

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 WMA is projected to experience average annual ET increases of 3.2% relative to the baseline period. Under 2070 conditions, annual ET is projected to increase by 7.9% relative to the baseline period.

The seasonal timing of precipitation in the WMA is projected to change. Sharp decreases are projected early fall and late spring precipitation accompanied by increases in winter and early summer precipitation. The WMA is projected to experience minimal changes in total annual precipitation. A slight increase of 0.9% annual precipitation is projected under 2030 conditions relative to the baseline period. Under 2070 conditions, small decreases in annual precipitation are projected by 2%.

2c.5-1-2 Projected Water Demand for WMA

Based upon the historical and current water budget, the total water demands within the WMA were estimated for the future period extending for 20 years through the implementation period (2022-2042) and further through 50 years into the future, through 2072.

148 10 GCMs selected are combined with two emission scenarios for a total of twenty scenarios utilized. The two emissions scenarios include a "middle" scenario (RCP 4.5) with emissions peaking around 2040 and a "business as usual" scenario with emission peaking around 2080 (RCP 8.5).

149 Local Climate Change Snapshot. Web Resource. https://cal-adapt.org/tools/local-climate-change-snapshot/ Accessed 2021-02-15.

The average annual pumping for agricultural irrigation in 2018 was 19,500 AFY. For this analysis of projected water demand, no changes in future irrigated acres and type of crops are assumed. However, based on the climate change Central Tendency scenario, described above, irrigation demands will increase by 3.2% by 2030 and 7.9% by 2070. Using these same increases in crop water demand, future projection of agricultural demand in the WMA will increase to 20,124 AFY in 2042 and 21,041 AFY in 2072.

Future Municipal and Industrial (M&I) and rural domestic demands were estimated based on population estimates and Urban Water Management Plans (UWMP) for the WMA. The Santa Barbara County Association of Governments Regional Growth Forecasts estimate large increases in population for the Lompoc area (SBCAG 2012). For example, the population of the City of Lompoc (City) is forecasted to increase to 47,723 by the year 2040, which represents a 10% increase from the current population of 43,200 in 2020. The City's 2020 UWMP projects that Lompoc's water demand will increase by about 30% to 5,740 AFY by 2040 (City of Lompoc 2021), which is assumed to be 5,750 AFY in 2042 for this analysis. Assuming build-out conditions would have been approached by 2042, a similar water demand by the City of 5,800 AFY by 2072 c is assumed for this analysis.

For the remaining municipal and rural domestic demands more modest growth is assumed at 5% by 2042 and 10% by 2072. VSFB import demands also uses these assumptions of 5% more water demand by 2042 and 10% by 2072.

Based on 2018 pumping, total municipal groundwater demands would increase from 6,350 AFY to 7,800 AFY in 2042 and to 7,950 AFY in 2072. Based on 2018 pumping of 250 AFY for domestic use, future projection of the rural domestic demand will increase to 263 AFY in 2042 and 275 AFY in 2072.

The total demand from the WMA groundwater during 2018 and projected values for 2042 and 2072 are presented on **Table 2c.~~4~~5-2**. By 2042, at the end of the GSP implementation period, total groundwater demand in the WMA may increase by 8% relative to 2018 to 28,157 AFY, and further by a total of 12% by 2072 to 29,266 AFY due to a combination of increased temperatures due to climate change and population increases. Using similar increase in demands for each sector (agriculture and domestic), the surface water demands in the Santa Ynez River Alluvium subarea and VSFB imports are projected to increase by 4% in 2042 and 8% in 2072, as shown in Table 2c.~~4~~5-2.

Figure 2c.5-1

Annual Average Maximum Temperature at Lompoc, Climate Projections

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Table 2c.45-2
Projected Water Demand for WMA

	2018 Demand	Estimated 2042 Demand	Estimated 2072 Demand
	(Acre-Feet per Year)		
Groundwater Demand			
Pumping – Agriculture	19,500	20,124	21,041
Pumping – Municipal	6,400	7,800	7,950
Pumping – Domestic	250	263	275
TOTAL Groundwater Demand	**26,150**	**28,157**	**29,266**
Surface Water Demand			
River well pumping – Agriculture	6,500	6,708	7,014
River well pumping – Domestic	60	63	66
VSFB SWP Imports	2,300	2,415	2,530
TOTAL Surface Water Demand	**8,860**	**9,186**	**9,610**
TOTAL	**35,010**	**37,373**	**38,876**

2c.5-2 Projected Water Supply

The water demands in Table 2c-45-1 will be supplied from the same historical sources of groundwater and surface water in the Santa Ynez River Alluvium subarea. Based on current planning from the Central Coast Water Authority and DWR's 2019 Delivery Capability Report (DWR 2020), a 58% delivery allocation for SWP to the WMA for the projected future period has been assumed. Based on the VSFB's current SWP allocation of 5,500 AFY and a drought buffer of 550 AFY, the total available imports to meet future demands is assumed at 3,509 AFY on average.

The source for surface water supplies, the Santa Ynez River, is projected to continue to be a reliable source of water for the Santa Ynez River Alluvium Subarea due to Cachuma Reservoir operations located about 11 miles upstream of the WMA. The ability to store water in Cachuma Reservoir will help attenuate the effects of the flashier runoff forecasted to occur under the Central Tendency scenario. Downstream water rights releases and releases for endangered steelhead (*O. mykiss*) from Bradbury Dam pursuant to WR 2019-0148 are assumed to be able to mitigate impacts downstream caused by climate change. Detailed climate change studies and impacts to the operations of Cachuma Reservoir are currently not available. However, releases from Cachuma Reservoir did sustain Santa Ynez River underflow during the recent critical drought of 2012-2018 and is expected to provide similar mitigation during future droughts. However, if climate change does not continue under the Central Tendency scenario but rather is more like the Drier/Extreme Warming Climate scenario, then the water supply for the entire region will be affected and re-evaluated.

Recharge from precipitation will be affected by climate change to an uncertain degree. Because recharge is the resultant after three key processes (precipitation, runoff, and evapotranspiration) which among themselves have associated uncertainty, the combined uncertainty is compounded. Under the Central Tendency scenario in the WMA, only minor changes (a 0.9% increase) for annual precipitation are projected under 2030 conditions relative to the baseline period (1982 through 2018), and under 2070 conditions, small decreases in annual precipitation are projected by 2%. Recharge from precipitation to the groundwater aquifer is assumed to be affected by climate change by these same percentages of +0.9% increase by 2042 and 2% reduction by 2072. Recharge from streamflow infiltration is assumed to be similar to the projected increases in runoff by 0.5% in 2042 and 3.8% increase by 2072. Recharge from the water rights releases for the Lompoc Plain is assumed to exist in the future similar to the baseline period (1982 through 2018).

The net effect of the small percentage changes due to climate change is that the current estimate of perennial yield of 26,300 to 28,000 AFY for the WMA is assumed to be roughly the same for this analysis under climate change conditions.

2c.5-3 Summary of Projected Water Budget

Groundwater supplies are projected to be about the same under projected future conditions, while overall groundwater demand is projected to increase up to 9% by 2072 to 29,266 AFY (Table 2c.45-2) resulting from a combination of increased temperatures due to climate change and increases in local population. **Table 2c.45-3** summarizes the projected total groundwater budget and average change in storage in the future.

Table 2c.~~4~~5-3
Projected Groundwater Budget for WMA

	Baseline Hydrology and 2018 Demands	Estimated 2042 Hydrology and Demands	Estimated 2072 Hydrology and Demands
~~Subflow~~Subsurface inflow	1,200	1,200	1,200
Recharge from Precipitation- Aerial (Overlying)	7,990	7,990	7,830
Recharge from Precipitation- Mountain Front	2,730	2,730	2,680
Net Channel Percolation from Surface Water	14,300	14,300	14,850
Agricultural Return Flows	3,620	3,735	3,905
Municipal/ Domestic Return Flows	860	1,040	1,060
TOTAL Inflows	**30,700**	**30,995**	**31,525**
Pumping ~~-~~– Agriculture	19,500	20,120	21,040
Pumping ~~-~~– Municipal	6,400	7,800	7,950
Pumping ~~-~~– Domestic	250	260	280
Riparian Vegetation Evapotranspiration	4,910	5,070	5,300
~~Subflow~~Subsurface outflow to Pacific Ocean	100	100	100
TOTAL Outflows	**31,160**	**33,350**	**34,670**
TOTAL Inflows - Outflows	**-460**	**-2,355**	**-3,145**

Average groundwater inflows and outflows for the projected future water budget period are presented on **Figure 2c.~~4~~5-2AB** for years 2042 and 2072, respectively. The results of the water budget during the future period show that the WMA has more total outflow than inflow. As shown on Figure 2c.~~4~~5-2A, in the year 2042 the average total inflow of 30,995 AFY is 2,355 AFY less than the average total outflow of 33,350 AFY. Similarly, as shown on Figure 2c.~~4~~5-2B, in the year 2072 the average total inflow of 31,525 AFY is 3,100 AFY less than the average total outflow of 34,670 AFY. The next steps in the GSP process will be to discuss the potential undesirable results from potential future losses of approximately 500 to 3,000 AFY in groundwater storage compared to the historical baseline and developing a monitoring system for the WMA.

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Figure 2c.5-2

2c.5-2AB Average Groundwater Budget Volumes, Future Projections

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CHAPTER 3: MONITORING NETWORKS AND SUSTAINABLE MANAGEMENT CRITERIA

The chapter consist of the following two related sections which describe the monitoring of the basin.

Section 3a. Monitoring Networks

The section summarizes the monitoring done in the WMA, as well as identifies representative sites for monitoring for each of the six SGMA sustainability indicators.

Section 3b. Sustainable Management Criteria

This section discusses the Sustainable Management Criteria (SMC). It identifies the stainability goal of the WMA, conditions of undesirable results for each of the six SGMA sustainability indicators, Minimum Thresholds at the representative sites, and Measurable Objectives.

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Section 3 A – MONITORING NETWORKS

This section of the GSP describes the existing monitoring networks within the WMA that are currently used to collect groundwater levels and water quality data, and the recommended WMA monitoring networks that will be used to monitor the six sustainability indicators in accordance with SGMA and the SMCs described above. The recommended WMA monitoring networks were developed to support GSA decision making to achieve groundwater sustainability goals and objectives outlined in Section 3b.

Existing monitoring networks within the WMA for groundwater levels and water quality are described, and the wells from those existing networks that are part of the *California Statewide Groundwater Elevation Monitoring* (CASGEM) and the *Groundwater Ambient Monitoring and Assessment Program* (GAMA) are identified. Using the existing groundwater level and water quality monitoring networks within the WMA, recommended WMA monitoring networks were developed, and a subset of those wells were selected for representative monitoring.

Data gaps identified in Chapter 2 and discussed as part of the SMCs in Section 3b, were considered during development of the recommended WMA monitoring networks. Those data gaps are described, followed by a brief description of how they will be addressed. Detailed approaches to address the identified data gaps are included in Plan Implementation (Chapter 5).

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3A.1 MONITORING NETWORKS OBJECTIVES

The objectives of the WMA monitoring networks are to identify and select representative monitoring wells to collect data to support monitoring of groundwater conditions and detection of potential undesirable results, and to achieve sustainability goals. As stated in the SGMA regulations[150], the monitoring networks will support:

- Demonstrate progress toward achieving measurable objectives described in the GSP;
- Monitor impacts to the beneficial uses or users of groundwater;
- Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds; and
- Quantify annual changes in water budget components.

The recommended monitoring network presented herein for the WMA GSA, is intended to monitor for the six sustainability indicators[151] and their associated undesirable results, listed below:

1. Chronic lowering of groundwater levels
2. Reduction of groundwater storage
3. Seawater intrusion
4. Degraded water quality
5. Land subsidence
6. Depletion of interconnected surface water

150 23 CCR § 354.34(b)
151 23 CCR § 354.26. Undesirable Results

3a.1-1 WMA Basin Conditions

The WMA basin setting is described in detail in Chapter 2, (Hydrogeologic Conceptual Model (HCM), Groundwater Conditions (GC), and Water Budget) of this GSP. A summary of WMA conditions that were considered during the development of the monitoring networks are described below, including hydrogeologic conditions, land uses and historical groundwater conditions.

The WMA covers an area of 85,600 acres, subdivided into six distinct subareas as indicated below in **Table 3a.1-1.** The Lompoc Plain is the most complex subarea and includes agriculture, the City of Lompoc, as well as the estuary of the Santa Ynez River. The Lompoc Upland and Santa Rita Upland have similar agricultural and domestic development. The Santa Ynez River Alluvium (SYRA) comprises the alluvium along the bedrock channel of the Santa Ynez River and is managed in accordance with WR 73-37, 89-18, 2019-0148.[152] The Lompoc Terrace and Burton Mesa, almost entirely within the boundary of Vandenberg Space Force Base (VSFB), have been minimally developed in terms of groundwater use, and water that is observed in these areas is considered perched, as described in Chapter 2.

Table 3a.1-1
Summary of WMA Subareas by Size

WMA Subarea	Acres [A]	Square Miles
Lompoc Plain	18,780	29.3
Lompoc Upland	21,170	33.1
Santa Rita Upland	7,090	11.1
Santa Ynez River Alluvium	4,940	7.7
Lompoc Terrace	10,560	16.5
Burton Mesa	23,060	36.0
Total	**85,600**	**133.7**

[A] Rounded to nearest 10 acres.

There are two principal aquifers within the WMA, the Upper Aquifer, and the Lower Aquifer. The Lower Aquifer, as described in Section 2a (HCM), is comprised of relatively coarse-grained sedimentary rocks identified as the Paso Robles, and the Careaga Sand formations. Locally, these two geologic formations

152 SWRCB Order WR 73-37 and other decisions and orders of the SWRCB provide for the management of both River surface and subflow as surface water by the SWRCB.

are present in a wide synclinal fold that extends from the Santa Rita Upland in the northeastern portion of the WMA, through the Lompoc Upland, central and eastern Lompoc Plain, and the Lompoc Terrace in the southwest portion of the WMA. Detailed cross sections of these formations that comprise the Lower Aquifer are included in (Section 2a, HCM and Appendix 2a-A, 3D Geologic Tech Memo**)**. The Lower Aquifer varies in vertical thickness within the WMA and hydraulic conductivity within the principal aquifer ranges from 15 to 40 feet per day, with a thickness of 0 to 1,500 feet.

The second principal aquifer is the Upper Aquifer, comprised of alluvial sediments primarily observed within the Lompoc Plain. Where present, the Upper Aquifer thickness ranges between 160 to 200-feet and hydraulic conductivity within the principal aquifer ranges from 360 to 600 feet per day.

Water is also observed in the Santa Ynez River bedrock channel, alluvium, and adjacent terrace deposits (alluvium), herein referred to as the SYRA Water observed in the SYRA has been managed by the SWRCB as part of the Santa Ynez River streamflow the same as surface water pursuant to various SWRCB orders and decisions dating back to at least 1973. In accordance with the SWRCB Order WR 73-37, 89-18, 2019-0148 and the SGMA, the water observed in the SYRA is not considered a principal aquifer of the WMA. Although the SYRA is not considered groundwater as defined by SGMA or a principal aquifer within the WMA, SYRA wells are considered in the WMA monitoring network to collect data to support sustainable groundwater management decision making by the WMA GSA, and to evaluate sustainable management criteria.

Groundwater may be found in perched conditions within the Burton Mesa and Lompoc Terrace. However as described in Chapter 2, the observed perched water is not considered a principal aquifer of the WMA.

The primary groundwater users within the WMA are agricultural (78% of the volume of groundwater pumped) and municipal and domestic use (22% of the volume of groundwater pumped).[153] The aerial extent of agricultural users within the WMA are shown on HCM Figure 2a.4-2. Agricultural land uses comprise approximately 10,960 acres (13%) of the total WMA area as shown below in **Table 3a.1-2**.

153 Five-year averages for Fiscal Year (FY) 2015-16 through FY2019-20 for Santa Ynez River Water Conservation District Zones B (Lompoc Plain, Lompoc Upland, and Lompoc Terrace) and F (Santa Rita Upland). Source is Stetson (2021) Forty-Third Annual Engineering and Survey Report on Water Supply Conditions of the Santa Ynez River Water Conservation District 2020-2021.

Table 3a.1-2
Summary of WMA Land Use for Agriculture [A]

WMA Subarea	Agricultural Use	Agricultural Acres [B]
Lompoc Plain	36.4%	6,840
Santa Rita Upland	30.4%	1,500
Santa Ynez River Alluvium	8.6%	1,990
Lompoc Upland	2.9%	620
Burton Mesa	0.1%	10
Lompoc Terrace	0.0%	0
Total	78.4%	10,960

[A] Source of land use is from the 2016 LandIQ database.
[B] Rounded to nearest 10 acres.

3A.2 EXISTING MONITORING NETWORKS

Groundwater level and water quality networks are actively monitored within the WMA and these data are used to evaluate changes in groundwater levels, calculate estimates of groundwater in storage, assess changes in groundwater quality and understand surface water conditions. The details of those existing monitoring networks are presented below. Additionally, the existing networks were evaluated and used to develop the recommended WMA monitoring networks to support GSA decision making to sustainably manage groundwater in accordance with established sustainable management criteria (SMC), within the WMA. The following subsections summarize the existing monitoring networks for the period of 2015 through 2021.

3a.2-1 Groundwater Levels

The County of Santa Barbara (COSB)[154] , the United States Bureau of Reclamation (USBR), the City of Lompoc, and the Vandenberg Village Community Services District currently collect groundwater elevation data (groundwater levels) from their respective monitoring networks within the WMA. The monitored wells are shown in aerial view on **Figure 3a.2-1** and summarized below in **Table 3a.2-1**.

Table 3a.2-1
Summary of Existing Groundwater Elevation Monitoring Network Wells
Spring 2015 through Spring 2021

Monitoring Network	Monitoring Frequency	Upper Aquifer	Lower Aquifer	SYRA ~~Subflow~~Underflow	Total
COSB (formerly USGS)[155]	Semi-annual / Annual	63	25	4	92
USBR	Monthly	8	0	10	18
City of Lompoc	Monthly	9	1	0	10
VVCSD	Monthly	0	4	0	4
Duplicates[156]:		6	1	0	7
Totals:		**74**	**29**	**14**	**117**

154 Groundwater levels are collected by the Santa Barbara County Water Agency which is one of five divisions of the Santa Barbara County Public Works Department, which in turn is one of several departments under the County of Santa Barbara.
155 Prior to 2019, the COSB monitoring network data was collected by the United States Geological Survey (USGS).
156 Wells in multiple monitoring networks during 2015-2021.

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Figure 3a.2-1

Current Groundwater Level Monitoring Programs

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Of the wells monitored within the WMA for groundwater levels, as summarized above in Table 3a.2-1, data collected from some of them are also submitted to the CASGEM program. The CASGEM wells are summarized below in **Table 3a.2-2**, including the principal aquifer their data represent, their assigned State identification (ID) number, their USGS ID, CASGEM ID and CASGEM type (mandatory or voluntary monitoring).

Table 3a.2-2a
List of WMA CASGEM Wells,
Lompoc Plain Subarea (59 wells)
Spring 2015-Spring 2021

Principal Aquifer	State ID	CASGEM Well ID	Voluntary Monitoring	Master Site ID	USGS Well ID
LA	7N/34W-20K04	49150	Voluntary	346710N1204820W001	344017120285502
LA	7N/34W-22J06	49155	Voluntary	346760N1204430W001	344033120263404
UA	7N/34W-22Q08	38451	Voluntary	346689N1204462W002	344008120263902
LA	7N/34W-24N01	49156	Voluntary	346690N1204210W001	344010120251601
UA	7N/34W-26H03	49154	Voluntary	346620N1204230W001	343943120252201
UA	7N/34W-27E04	23438	Voluntary	346608N1204570W001	343939120271801
UA	7N/34W-27F07	37470	Voluntary	346636N1204501W001	343949120265301
UA	7N/34W-27F08	23439	Voluntary	346636N1204498W001	343949120265201
UA	7N/34W-27G06	49152	Voluntary	346640N1204470W001	343949120264901
UA	7N/34W-27K04	37471	Voluntary	346605N1204467W001	343938120264101
UA	7N/34W-27K05	23441	Voluntary	346605N1204467W002	343938120264102
LA	7N/34W-27K06	37575	Voluntary	346605N1204464W001	343938120264001
UA	7N/34W-27N06	37576	Voluntary	346555N1204559W001	343920120271401
UA	7N/34W-27P06	36325	Voluntary	346553N1204542W001	343919120270801
UA	7N/34W-28B05	23533	Voluntary	346678N1204651W002	344004120274702
UA	7N/34W-28M01	36326	Voluntary	346605N1204753W001	343938120282401
UA	7N/34W-28M02	23534	Voluntary	346605N1204753W002	343938120282402
UA	7N/34W-28Q01	36327	Voluntary	346566N1204634W001	343924120274101
UA	7N/34W-29E04	49149	Voluntary	346630N1204890W001	343948120292002
UA	7N/34W-29F01	23536	Voluntary	346622N1204856W001	343944120290101
UA	7N/34W-29F02	36328	Voluntary	346622N1204856W002	343944120290102
UA	7N/34W-29H03	38163	Voluntary	346622N1204776W001	343944120283201
UA	7N/34W-29N06	49148	Voluntary	346570N1204920W001	343926120293001
LA	7N/34W-29N07	23538	Voluntary	346572N1204937W002	343926120293002
UA	7N/34W-30L10	23688	Voluntary	346614N1205023W004	343941120300106

Principal Aquifer	State ID	CASGEM Well ID	Voluntary Monitoring	Master Site ID	USGS Well ID
UA	7N/34W-31R02	49147	Voluntary	346410N1204920W001	343828120293201
UA	7N/34W-32H02	49151	Voluntary	346500N1204780W001	343901120284201
UA	7N/34W-33E05	23690	Voluntary	346469N1204762W001	343849120282701
UA	7N/34W-34A04	39671	Voluntary	346503N1204414W001	343901120262202
UA	7N/34W-35K09	49153	Voluntary	346440N1204300W001	343840120254701
UA	7N/35W-15M01	49172	Voluntary	346900N1205510W001	344124120334401
UA	7N/35W-17K20	37900	Voluntary	346866N1205884W001	344112120351001
UA	7N/35W-17M01	25268	Voluntary	346872N1205953W001	344114120353501
UA	7N/35W-17Q06	49158	Voluntary	346860N1205870W001	344110120351201
UA	7N/35W-18J02	49157	Voluntary	346880N1206000W001	344118120355902
UA	7N/35W-21G02	25271	Voluntary	346780N1205720W001	344041120341101
UA	**7N/35W-22J01**	**37748**	**CASGEM**	**346725N1205467W001**	**344021120324101**
UA	7N/35W-22M01	49170	Voluntary	346740N1205590W001	344025120333401
UA	7N/35W-23B02	49171	Voluntary	346800N1205340W001	344048120320201
UA	7N/35W-23E05	37895	Voluntary	346786N1205420W005	344043120322405
UA	7N/35W-23E06	25322	Voluntary	346786N1205420W006	344043120322406
UA	7N/35W-23E07	37896	Voluntary	346786N1205420W007	344043120322407
UA	7N/35W-23E08	25323	Voluntary	346786N1205420W008	344043120322408
UA	7N/35W-23J05	49164	Voluntary	346740N1205270W001	344025120313701
UA	7N/35W-23Q02	25325	Voluntary	346691N1205364W002	344009120320402
UA	7N/35W-23Q03	49160	Voluntary	346690N1205340W001	344009120320403
UA	7N/35W-23Q04	25326	Voluntary	346689N1205378W001	344008120320901
UA	7N/35W-24J04	49146	Voluntary	346730N1205100W001	344021120303504
UA	7N/35W-24K05	38183	Voluntary	346747N1205195W005	344029120310305
UA	7N/35W-24N03	24442	Voluntary	346686N1205281W001	344046120321401
UA	7N/35W-25F06	49165	Voluntary	346630N1205190W001	343947120310703
UA	7N/35W-25F07	24445	Voluntary	346630N1205206W003	343947120310702
UA	**7N/35W-26F04**	**49161**	**CASGEM**	**346630N1205360W001**	**343948120320901**
UA	7N/35W-26L01	38297	Voluntary	346580N1205381W001	343929120321001
UA	7N/35W-26L02	49162	Voluntary	346580N1205360W001	343929120321002
LA	7N/35W-26L04	38298	Voluntary	346580N1205381W003	343929120321004
UA	7N/35W-27C01	49159	Voluntary	346670N1205540W001	344001120331401
UA	7N/35W-27F01	49169	Voluntary	346640N1205560W001	343952120332001
UA	7N/35W-35A03	49163	Voluntary	346500N1205280W001	343859120314003

Table 3a.2-2b
List of WMA CASGEM Wells,
Lompoc Terrace Subarea (3 wells)
Spring 2015-Spring 2021

Principal Aquifer	State ID	CASGEM Well ID	Voluntary Monitoring	Master Site ID	USGS Well ID
LA	7N/35W-27P1	49168	Voluntary	346560N1205570W001	343923120332501
UA	7N/35W-30G1	24672	Voluntary	346619N1206073W001	343944120361901
UA	7N/35W-31J2	24714	Voluntary	346441N1205992W001	343841120355202

Table 3a.2-2c
List of WMA CASGEM Wells,
Lompoc Upland Subarea (10 wells)
Spring 2015-Spring 2021

Principal Aquifer	State ID	CASGEM Well ID	Voluntary Monitoring	Master Site ID	USGS Well ID
LA	7N/33W-17M1	49144	Voluntary	346830N1203800W001	344100120224901
LA	7N/33W-17N2	23684	Voluntary	346808N1203823W001	344051120224901
LA	7N/33W-19D1	49143	Voluntary	346760N1204000W001	344035120235901
LA	7N/33W-20G1	49145	Voluntary	346740N1203710W001	344025120221601
LA	**7N/34W-12E1**	**49139**	**CASGEM**	**347050N1204180W001**	**344219120250601**
LA	7N/34W-14F4	49142	Voluntary	346910N1204310W001	344126120255201
LA	7N/34W-14L1	23897	Voluntary	346880N1204326W001	344117120255001
LA	7N/34W-15P2	49138	Voluntary	346830N1204510W001	344101120265901
LA	7N/34W-15D2	49140	Voluntary	-	344140120272302
LA	7N/34W-15E1	25659	Voluntary	346928N1204571W001	344134120272201

Table 3a.2-2d
List of WMA CASGEM Wells,
Santa Rita Upland Subarea (5 wells)
Spring 2015-Spring 2021

Principal Aquifer	State ID	CASGEM Well ID	Voluntary Monitoring	Master Site ID	USGS Well ID
LA	7N/33W-16G05	49131	Voluntary	346880N1203570W001	344115120212601
LA	7N/33W-21G02	23686	Voluntary	346736N1203562W001	344025120211501
LA	7N/33W-21N01	49130	Voluntary	346660N1203610W001	343956120214001
LA	7N/33W-27G01	49132	Voluntary	346570N1203360W001	343926120201001
LA	7N/33W-28D03	49129	Voluntary	346630N1203650W001	343946120215301

Table 3a.2-2e
List of WMA CASGEM Wells,
Santa Ynez River Alluvium Underflow Subarea[A] (4 wells)
Spring 2015-Spring 2021

Geologic Unit	State ID	CASGEM Well ID	Voluntary Monitoring	Master Site ID	USGS Well ID
SYRA	6N/34W-12C05	49135	Voluntary	346270N1204160W001	343735120245902
SYRA	6N/33W-09M01	25592	Voluntary	346131N1203638W001	343647120215001
SYRA	6N/33W-08R01	49136	Voluntary	346110N1203680W001	343640120220401
SYRA	6N/33W-08J03	38440	Voluntary	346124N1203674W001	343645120220301

[A]Bedrock channel and managed as surface water as Santa Ynez River ~~subflow~~underflow.

Additional historical groundwater elevation data exists for wells not included in the existing groundwater monitoring network, i.e., for wells that may have been monitored in the past but are no longer part of the current monitoring network[157]. Available data from those wells have been incorporated into the Data Management System (DMS), as described in Section 1e[158]. Additionally, detailed summaries and analysis of available historical groundwater elevation data are included in Section 2b.1 discussions of WMA groundwater condition.

157 Wells may be removed from monitoring programs over time due to land development, change in ownership or access, well destruction, well redundancy, lack of well completion or screen interval information, or other applicable criteria.
158 The DMS and the associated Data Management Plan (DMP) describe available WMA data and resources considered.

3a.2-2 Groundwater Storage

The existing groundwater level monitoring network (described above) and the collected data are used to estimate annual changes to groundwater in storage within the Santa Ynez River Water Conservation District (SYRWCD). The estimated changes to groundwater in storage are included in the SYRWCD Annual Reports, which are available for public access at the Buellton, Lompoc, and Solvang Public Libraries and on the SYRWCD (SWRWCD.com) website. Groundwater in storage estimates utilize the data collected from the groundwater level monitoring network shown on **Figure 3a.2-1** and is summarized in Table 3a.2-1 and Table 3a.2-2.

3a.2-3 Groundwater Quality

Groundwater quality refers to the measurement of naturally occurring and anthropogenically influenced chemical compounds in groundwater. These compounds have the potential to adversely affect groundwater quality. As described in Chapter 2, the groundwater quality in the Lower Aquifer is, with few exceptions, generally of better quality than the groundwater quality in the Upper Aquifer which is present at shallower depths (closer to the ground surface). SYRA ~~subflow~~underflow water quality is measured and managed in accordance with the SWRCB Orders WR 73-37, 89-18, 2019-0148 and is not subject to SGMA, however the collected data are publicly available and will be considered by the WMA GSA in their sustainable groundwater management decision-making.

Groundwater quality data is currently collected from wells within the WMA as part of three programs. USGS directed water quality monitoring funded by County of Santa Barbara and the Santa Ynez River Water Conservation District. Public water systems report water quality to the State Water Resources Control Board, Division of Drinking Water. Safe Drinking Water Information System for all water sources as Public Water System Reporting. California Irrigated Lands Reporting Program (ILRP) which is for irrigated commercial lands. The SWRCB Groundwater Ambient Monitoring and Assessment (GAMA) website is one place where these data sets are made available. The WMA wells included in these programs and monitored for groundwater quality are shown on **Figure 3a.2-2** and summarized below in **Table 3a.2-3**.[159]

[159] Sites are included if there were at least one or more Total Dissolved Solids measurements during the period 2015-2021. ILRP are grouped by reporting site.

Table 3a.2-3
Summary of Existing WMA Groundwater Quality Monitoring Networks
Spring 2015 through Spring 2021

Monitoring Network	Monitoring Frequency	Upper Aquifer	Lower Aquifer	SYRA ~~Subflow~~Underflow	Total Participating Wells
USGS	Annual to Triennial	27	4	0	31
Public Water Systems Report	Monthly to Annual	11	12	0	23
Irrigated Lands Regulatory Program[160]	Annual or Biannual	65	44	22	131
Subtotal of Principal Aquifers:		**103**	**60**	**22**	**185**

Public water systems data includes the WMA GSA member agencies of City of Lompoc, MHCSD and VVCSD, as well as other small municipal water companies. In the WMA, the Public Water System wells provide representative data for both the Lower Aquifer and the Upper Aquifer. Commercially irrigated agricultural lands are required to periodically submit groundwater quality data to the ILRP and within the WMA there are participating wells that provide data for both the Lower Aquifer and the Upper Aquifer, as listed above in Table 3a.2-3.

3a.2-4 Seawater Intrusion

Seawater intrusion is not observed nor is it expected in the WMA, as described in Chapter 2 (both the HCM and GC portions of the basin setting). Water quality at several WMA wells is monitored by the USGS on contract with local agencies. Chloride, Sodium, and Total Dissolved Solids at are reported in the SYRWCD Annual Report, for the two wells shown on Figure 2a.2-2 (7N/35W-17K20 and 7N/35W-26F4). [161] As previously discussed in Section 2b and as shown on Figure 2b.4-3, the current monitoring of chloride identifies the chloride isocontour of 500 mg/L near the boundary the eastern boundary of the Santa Ynez River estuary and complies with the SGMA requirements.[162]

160 ILRP values here represent reporting groups.
161 Stetson (2021) Forty-Third Annual Engineering and Survey Report on Water Supply Conditions of the Santa Ynez River Water Conservation District 2020-2021.
162 23 CCR § 354.34(c)(3) Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.

Figure 3a.2-2

Current Water Quality Monitoring Programs

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3a.2-5 Land Subsidence

Land subsidence monitoring has been conducted recently (since 2015) for the WMA using remote sensing Interferometric Synthetic Aperture Radar (InSAR) data which tracks vertical elevation changes to an accuracy of approximately 0.61 inches[163] (Towill 2020). These satellite data are collected by the European Space Agency and processed by TRE ALTAMIRA Inc. under contract with the DWR. Since June 2015, data has been collected and made publicly available monthly (TRE ALTAMIRA 2020). These data are used to evaluate and estimate monthly and annual land surface elevation changes since data collection was initiated in 2015.

In addition to the available InSAR data, a USGS continuous global positioning system (CGPS) station (LOMP) was installed near Mission Hills and has been collecting vertical displacement data since May 15, 2015 as shown on **Figure 3a.2-3**. Land subsidence has not been observed within the WMA by any of the GSA member agencies; nor has subsidence affected any of the existing water infrastructure within the WMA, as indicated in Chapter 2 (HCM and GC).

3a.2-6 Surface Water Monitoring

Surface water monitoring within the Basin is conducted through stream gages placed along the Santa Ynez River and confluences of key tributaries. Currently there are two active USGS stream gages within the WMA boundaries, and an additional active USGS stream gage located on an upstream tributary (GC Figure 2b.6-~~1~~2) which allow for estimation of streamflow or surface water conditions within the WMA. **Table 3a.2-4** summarizes the existing stream gages that provide data contributing to the evaluation of WMA surface water conditions. Locations for USGS stream gages within the immediate vicinity of the WMA are shown in Chapter 2b, GC Figure 2b.6-~~1~~2.

[163] 95% Confidence of within 15.50 millimeters (0.05 feet) when compared to continuous global positioning system (CGPS) data for the period January 1, 2015 through September 19, 2019.

Table 3a.2-4
USGS Stream Gages Relevant to the WMA

Status	USGS Gage Name	Gage Number	Start Year	End Year	Upstream of or Within the WMA
Active	SALSIPUEDES C NR LOMPOC CA	11132500	1941	2020 (active)	Upstream
Active	SANTA YNEZ R A NARROWS NR LOMPOC CA	11133000	1952	2021 (active)	Within
Active	SANTA YNEZ R A H ST NR LOMPOC CA	11134000	1947	2021 (active)	Within

Additionally, as described in Chapters 1 and 2, SWRCB Orders WR 73-37, 89-18, 2019-0148 determined that water observed in the SYRA is Santa Ynez River ~~subflow~~underflow and is considered the same as surface water flows. Wells screened in the SYRA are considered ~~subflow~~underflow wells and are monitored by the USBR on a monthly basis. The data collected from the SYRA wells by the USBR are reported to the SYRWCD and used to manage surface water flows in accordance with the SWRCB Order WR 73-37 and subsequent orders.

A variety of data sources are available for the WMA. They are used to estimate current surface water conditions within the WMA, and to assist with compliance with SWRCB Orders WR 73-37, 89-18, 2019-0148The available data sources and their uses are listed below.

- Upstream conditions of Lake Cachuma and Bradbury Dam operations, including imports from State Water Project water, are monitored by USBR daily.
- The Central Coast Water Authority (CCWA) which operates the pipeline transporting State Water Project (SWP) water (HCM Figure 2a.3-9) to the Basin, monitors the SWP deliveries to the watershed.
- Precipitation in the WMA is measured at the Lompoc City Hall. Data for Water Year 1911-present (2021) and is published by the Santa Barbara County Flood Control & Water Conservation District (Figure 2a.3-2 and Figure 2a.3-3).

Figure 3a.2-3
Land Subsidence Monitoring Within Western Management Area

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3A.3 RECOMMENDED MONITORING NETWORKS

The recommended WMA monitoring network is discussed in the following subsections. The recommended monitoring network was developed to facilitate data collection to support early identification of groundwater changes that could potentially result in undesirable results and to guide the WMA GSA toward their established groundwater sustainability goals over the implementation horizon. The recommended monitoring network, including filling identified data gaps, is intended to identify temporal trends in groundwater conditions. The data collected from the recommended monitoring networks will support the established Sustainable Management Criteria (SMC) and guide the WMA GSA in decision making on projects and management actions within the WMA, as warranted.

3a.3-1 Groundwater Levels

As described above, the groundwater level monitoring network is focused on the Upper Aquifer and Lower Aquifer within the WMA but not the Santa Ynez River Alluvium, in accordance with SWRCB Order WR 2019-0148. [164] The existing wells monitored for groundwater levels by the various agencies will continue with a subset being selected as representative monitoring wells within the WMA, as discussed in Section 3a.1.

3a.3-1-1 Representative Monitoring Wells Selection

Existing groundwater level monitoring wells located within the WMA were evaluated for selection as representative monitoring wells using the tiered approach outlined below. Each well was evaluated for each tier of criteria. If Tier 1 data was known or available for a well, the well would then be screened for Tier 2 criteria, and so on for Tiers 3 and 4. If Tier 1 and 2 criteria were met, the well was considered potentially suitable for inclusion in the monitoring networks for the WMA. If Tiers 1 through 4 criteria were met, the well was evaluated for potential suitability as a representative monitoring well for one of the established SMCs. Tier 4 evaluation was only conducted if a well was determined potentially suitable to monitor multiple SMCs.

[164] SWRCB Order WR 73-37 and other orders and decisions of the SWRCB provide for the management of both River surface and subflow as surface water flows by the SWRCB.

The tiering criteria utilized to select WMA representative monitoring wells is shown below.

Tier 1

- part of an existing monitoring network
- access available for monitoring
- existing DWR databases (CASGEM, GAMA, SWIS, etc.)

Tier 2

- xyz well location data
- well boring log
- total boring depth
- well screen interval
- principal aquifer screened

Tier 3

- historical data
- spatial location and consideration of upgradient and downgradient conditions

Tier 4

- suitable to monitor multiple SMCs

Tier 1

- part of an existing monitoring network
- access available for monitoring
- existing DWR databases (CASGEM, GAMA, SWIS, etc.)

Tier 2

- xyz well location data
- well boring log
- total boring depth
- well screen interval
- principal aquifer screened

Tier 3

- historical data
- spatial location and consideration of upgradient and downgradient conditions

Tier 4

- suitable to monitor multiple SMCs

Table 3a.3-1 includes a list of the WMA representative monitoring wells (RMWs), and they are also shown on **Figure 3a.3-1.**

Table 3a.3-1
Representative Monitoring Wells in the WMA

RMW Name	Subarea	Principal Aquifer	Screen Interval [ft. bgs]	Well Completion Depth [ft. bgs]	Sustainability Indicator(s) Monitored
7N/34W-35K9	Lompoc Plain	UA	52-80; 112-124	124	GWL, GWS, Surface Water
Lompoc 11 (7N/34W-35)	Lompoc Plain	UA	Unknown	Unknown	Quality
7N/34W-26Q5	Lompoc Plain	UA	135-140	151	GWL, GWS
Lompoc 2 (7N/34W-34F6)	Lompoc Plain	UA	80-140	140	GWL, GWS
7N/34W-27F9	Lompoc Plain	UA	111.3-171.3	175	GWL, GWS
6N/34W-6C4	Lompoc Plain	UA	77-111	112	GWL, GWS
7N/34W-29N6	Lompoc Plain	UA	Unknown	160	GWL, GWS, Quality
7N/35W-26L01	Lompoc Plain	UA	Unknown	23	GWL, GWS, Quality
7N/35W-26L02	Lompoc Plain	UA	Unknown	82	GWL, GWS, Quality
7N/35W-24J4	Lompoc Plain	UA	165-170	171	GWL, GWS
7N/35W-21G2	Lompoc Plain	UA	Unknown	180	GWL, GWS, Quality, Seawater Intrusion, Surface Water
7N/35W-17M1	Lompoc Plain	UA	115-120	161	GWL, GWS
7N/34W-32H2	Lompoc Plain	UA	Unknown	220	GWL, GWS
7N/35W-23B2	Lompoc Plain	UA	Unknown	79	GWL, GWS
AGL020004874	Lompoc Plain	UA	90-390	400	Quality
Lompoc 6 (7N/34W-27K07)	Lompoc Plain	UA	Unknown	189	Quality
7N/34W-27K05	Lompoc Plain	UA	120-140	140	Quality
7N/34W-27K04	Lompoc Plain	UA	100-172	172	Quality
7N/35W-17K20	Lompoc Plain	UA	Unknown	123.9	Seawater Intrusion

RMW Name	Subarea	Principal Aquifer	Screen Interval [ft. bgs]	Well Completion Depth [ft. bgs]	Sustainability Indicator(s) Monitored
7N/34W-29F02	Lompoc Plain	UA	Unknown	60.5	Surface Water
7N/35W-26L04	Lompoc Plain	LA	Unknown	299	GWL, GWS
7N/34W-29N7	Lompoc Plain	LA	Unknown	420	GWL, GWS, Quality
7N/34W-24N1	Lompoc Plain	LA	Unknown	159	GWL, GWS
7N/34W-22J6	Lompoc Plain	LA	Unknown	135	GWL, GWS
7N/33W-28D3	Santa Rita Upland	LA	Unknown	600	GWL, GWS
7N/33W-21G2	Santa Rita Upland	LA	Unknown	Unknown	GWL, GWS
7N/33W-27G1	Santa Rita Upland	LA	Unknown	735	GWL, GWS
AGL020021642	Santa Rita Upland	LA	Unknown	Unknown	Quality
AGL020035942	Santa Rita Upland	LA	610-650	655	Quality
Vista Hills MWC #4	Santa Rita Upland	LA	605-825	830	Quality
7N/35W-27P01	Lompoc Terrace	LA	Unknown	582	GWL, GWS
7N/34W-15D3	Lompoc Upland	LA	458-683	683	GWL, GWS
7N/34W-14F4	Lompoc Upland	LA	Unknown	540	GWL, GWS
7N/33W-17M1	Lompoc Upland	LA	Unknown	290	GWL, GWS
7N/33W-19D1	Lompoc Upland	LA	228-264; 300-552	552	GWL, GWS
7N/34W-12E1	Lompoc Upland	LA	Unknown	385	GWL, GWS
VVCSD 3B (7N/34W-15E3)	Lompoc Upland	LA	200-340; 420-520	530	Quality
MH CSD 7	Lompoc Upland	LA	305-585	585	Quality

GWL = Chronic Groundwater Level Declines, GWS = Reduction of Groundwater in Storage, Quality = Degradation of Water Quality, Surface Water = Depletion of Interconnected Surface Water

UA = Upper Aquifer, LA = Lower Aquifer, RMW = Representative Monitoring Wells, bgs = below ground surface

Figure 3a.3-1

WMA Monitoring Network and Representative Monitoring Wells for Groundwater Levels and Groundwater Storage

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3a.3-1-2 Groundwater Levels Monitoring Improvements

Some alluvial canyons within the Lompoc Upland and Santa Rita Upland subareas of the WMA are not currently included in the existing Groundwater Level monitoring network, as shown by the polygons lacking well locations on Figure 3a.3-1. Obtaining access to existing groundwater wells in these areas and adding them to the recommended WMA groundwater level monitoring program could potentially provide additional supplemental data in these areas. Efforts to determine whether wells exist in these areas, and how public outreach would be conducted to gather well information is included in Chapter 5 (Plan Implementation). Because the 26 representative monitoring wells already provide adequate spatial distribution, additional monitoring wells are identified as an improvement, not a data gap.

3a.3-2 Groundwater Storage

The data collected from the Groundwater Level monitoring network will be used to evaluate changes in groundwater levels within the Upper Aquifer and Lower Aquifer and to estimate changes in groundwater in storage. Therefore, the Groundwater Level and Groundwater Storage monitoring networks are considered equivalent so the collected data will be used to evaluate both sustainability indicators for identification of potential undesirable results. If additional wells are added to the groundwater level network, the estimated groundwater in storage calculations will be modified to include those wells, as appropriate.

3a.3-3 Groundwater Quality

It is recommended to continue to use the existing Groundwater Quality well monitoring network, well monitored by the public water systems and by commercial irrigation within the WMA. The GSA will collect data from these programs annually to support evaluation of groundwater quality trends and tracking groundwater management progress to reach WMA sustainability goals. **Figure 3a.3-2** shows the representative monitoring wells along with all wells in the current monitoring network. The distribution of existing wells across the principal aquifer indicates sufficient monitoring is feasible by utilizing the existing wells. Because the monitoring wells already provide adequate spatial distribution, additional monitoring wells are identified as an improvement, not a data gap.

3a.3-4 Seawater Intrusion

Seawater intrusion is not currently observed within the WMA as presented and discussed in Chapter 2 (HCM and GC) and in Section 3a.2. Although, current groundwater quality monitoring is conducted in the Santa Ynez River Estuary and additional wells are recommended to be monitored for chloride, in accordance with the SGMA, to evaluate potential changes in groundwater quality and monitor for potential seawater intrusion. The existing wells monitored for chloride and the additional wells recommended for potential seawater intrusion monitoring are shown on the attached **Figure 3a.3-3**.

3a.3-5 Land Subsidence

As described in Section 2b, Groundwater Conditions, land subsidence has not been historically observed in the WMA, existing water infrastructure have not been affected by land subsidence, and geologic properties of the aquifer indicate that land subsidence due to groundwater withdrawal in the WMA is unlikely. Based on these findings, a direct-measurement monitoring network for potential land subsidence is not recommended within the WMA. However, a remote-sensing option for land subsidence monitoring using InSAR data will be implemented. Available InSAR coverage for the WMA are deemed sufficient and will be evaluated for indications of ongoing or permanent land subsidence. InSAR uses radar returns to measure total vertical displacement of the land surface.

In addition to the available InSAR data, a USGS continuous global positioning system (CGPS) station (LOMP) was installed near Mission Hills Community Services District (MHCSD) and has been collecting vertical displacement data since May 15, 2015, as shown on Figure 3a.2-3. Considering the vertical displacement observed in portions of the WMA, as shown on Figure 3a.2-3, additional areas within the WMA are identified for future potential CGPS stations as shown on **Figure 3a.3-4** and identified as potential improvements for land subsidence monitoring, to determine whether the InSAR measurements are reflective of land subsidence or regional tectonic activity as described in Chapter 2(HCM and GC). Because of the existing InSAR data and CGPS site, additional monitoring CGPS sites are identified as an improvement, not a data gap.

Figure 3a.3-2

WMA Monitoring Network and Representative Monitoring Wells for Water Quality

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Figure 3a.3-3

WMA Monitoring Network and Representative Monitoring Wells for Seawater Intrusion

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Figure 3a.3-4

WMA Supplemental Monitoring Network for Land Subsidence

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3a.3-6 Surface Water Depletions and Groundwater Dependent Ecosystems

The SGMA Regulations, 23 CCR §354.28 (b), states that,

> *(6) Depletions of interconnected surface water. The minimum threshold for depletions of interconnected surface water shall be the volume of surface water depletions caused by groundwater use that has significant and unreasonable adverse impacts on beneficial uses of the surface water. The minimum threshold established for depletions of interconnected surface water shall be supported by the following:*
>
> *(A) The location, quantity, and timing of depletions of interconnected surface water.*
>
> *(B) A description of the groundwater-surface water model used to quantify surface water depletion. If a numerical groundwater and surface water model is not used to quantify surface water depletion, the Plan shall identify and describe an equally effective method, tool, or analytical model to accomplish the requirements of this Paragraph.*

Item (6)(B) requires a numerical model to estimate the depletions of interconnected surface water, not the use of a monitoring network to measure depletions of interconnected surface water. Therefore, the Surface Water Depletion monitoring network will include two primary elements.

- Use of groundwater level monitoring as presented on **Figure 3a.3-5** as a proxy to evaluate potential Surface Water Depletions and potential impacts to Groundwater Dependent Ecosystems, and
- Continued use of existing stream gage data from within the WMA to measure surface water inflows and use of new streamflow measurements for surface water outflows to support numerical modeling estimates.

Additionally, data from ~~existing stream gages located in~~ the ~~CMA and WMA (Figure 2b.6-1, GC)~~Upper Aquifer groundwater levels will be utilized to assess potential surface water depletions and relationships to groundwater conditions changes~~.~~ to ensure there is no more surface water depletion due to groundwater extraction than prior to 2015. These monitoring data will be used to guide the WMA in groundwater management decisions to support the sustainability goals outlined in Section 3b.1.

For the entire Santa Ynez River Valley Groundwater Basin (all three management areas), a streamflow gage is proposed near the mouth of the Santa Ynez River near the estuary in order to measure the total surface water outflow from the entire system. Previously the USGS had a gage called "Santa Ynez River at Barrier near Surf" (USGS Gage ID 11135500) but this gage was discontinued in 1965. By restarting measurements at this historical site or nearby site, the total surface water budget can be tracked from Bradbury Dam to the Pacific Ocean.

Figure 3a.3-5

WMA Monitoring Network and Representative Monitoring for Interconnected Surface Water and Groundwater Dependent Ecosystems

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3A.4 MONITORING PROTOCOLS

To fulfill the additional monitoring recommended below, monitoring protocols will be conducted in accordance with DWR's *Monitoring Networks and Identification of Data Gaps BMP*, which uses DWR's 2010 publication of *California Statewide Groundwater Elevation Monitoring (CASGEM) Program Procedures for Monitoring Entity Reporting* (**Appendix 3a-A**) for the groundwater level sampling protocols. This publication includes protocols for equipment selection, setup, use, field evaluation, and sample collection techniques. The plan is to collect static groundwater elevation measurements for the representative groundwater level wells at least two times per year, to represent seasonal low and seasonal high groundwater conditions.[165]

3a.4-1 Identified WMA Data Gaps for Monitoring Network

Currently, data gaps exist on the well construction information for the representative monitoring wells. This data gap will be addressed in Chapter 4, Projects and Management Actions by performing video surveys in representative monitoring wells to confirm well construction.

No other data gaps within the WMA are identified for the monitoring network. Groundwater level and storage estimates would be improved by adding wells to the networks in the areas shown in Figure 3a3-1. The location of chloride isocontours indicating influence of seawater would be improved by collecting water quality at the suggested wells shown on Figure 3a.3-3. Land subsidence monitoring could also be improved by adding additional CGPS sits within the basin (Figure 3a.3-4).

3a.4-2 Plans to Fill Identified WMA Data Gaps in Monitoring Network

The first plan to fill data gaps in the WMA will be to perform video surveys in representative monitoring wells to confirm well construction (Chapter 5, Plan Implementation).

For the identified data gap regarding surface flows out of the WMA, a streamflow gage is proposed near the mouth of the Santa Ynez River near the estuary in order to measure the total surface water outflow

165 23 CCR § 354.34(c)(1)(B) Static groundwater elevation measurements shall be collected at least two times per year, to represent seasonal low and seasonal high groundwater conditions.

from the entire system. Previously the USGS had a gage called "Santa Ynez River at Barrier near Surf" (USGS Gage ID 11135500) but this gage was discontinued in 1965. By restarting measurements at this historical site or nearby site, the total surface water budget can be tracked from Bradbury Dam to the Pacific Ocean.

In addition, throughout the implementation of the GSP, if the selected WMA monitoring networks and representative monitoring wells are deemed ineffective at providing the anticipated data needed for the GSA to evaluate current groundwater conditions, future groundwater conditions, and support sustainable groundwater management decisions in alignment with the sustainability goals described in Section 3b, they will be evaluated for replacement as described in detail in Chapter 4, Projects and Management Actions, and briefly described below.

Generally, the project would identify parcels within the WMA where additional data would be useful to fill the identified data gaps. The project will describe outreach efforts to engage the parcel owners to better understand whether groundwater wells exist and verify their condition, in the target areas. If groundwater wells do exist, access to the well completion information will be requested from well owners. If well construction information is available, the tiered approached described in Section 3a.3-1-1 would be followed to determine whether the well was suitable for inclusion in the WMA monitoring networks. If the well records are unavailable and parcel owners agree, well inspection activities may be conducted to evaluate well construction details. If groundwater wells do not exist, or are not completed in a manner that would provide useful data, the GSA may consider the potential to install new groundwater wells in the target areas in an effort to close the identified data gaps.

Chapter 5 also includes identification of, and application for, grant funding to support projects that will address the identified WMA data gaps.

Section 3 B – SUSTAINABLE MANAGEMENT CRITERIA

The Western Management Area Groundwater Sustainability Agency (WMA GSA) has defined the sustainability goal with consideration of the beneficial uses and users and in coordination with the entire Santa Ynez River Valley Groundwater Basin (Basin or SYRVGB). This section of the GSP presents the sustainability goal for the WMA, including a description of how the sustainability goal was determined, how sustainability will be ~~achieved and~~ maintained, and how sustainability will be monitored and assessed through the 50-year planning and implementation horizon. Each component of the Sustainable Management Criteria (SMC) is presented below as it applies to the specific conditions of the WMA, beginning with the sustainability goal (Section 3b.1),[166] followed by the undesirable results pertaining to the sustainability indicators (Section 3b.2), minimum thresholds used as indicators of potentially undesirable conditions (Section 3b.3), and, where appropriate, measurable objectives marking specific benchmarks on the way to achieving sustainability (Section 3b.4), and the effects of sustainable management criteria on neighboring basins (Section 3b.5). The section concludes that due to absence of undesirable results for all sustainability indicators, the WMA basin is currently sustainable. The sustainable management criteria defined in this GSP will be periodically re-evaluated through the SGMA-required annual reports and periodic updates and adjusted as needed to achieve and maintain sustainability in accordance with the sustainability goal (Section 1a).

166 A sustainability indicator refers to "any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results" (23 CCR § 351(ah)).
A minimum threshold means "a numeric value for each sustainability indicator used to define undesirable results" (23 CCR § 351(t)).
A measurable objective means "specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin" (23 CCR § 351(s)).

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3B.1 SUSTAINABILITY GOAL

In accordance with the Sustainable Groundwater Management Act (SGMA), the sustainability goal for the Santa Ynez River Valley Groundwater Basin (Basin) is to sustainably manage the groundwater resources in the Western, Central, and Eastern Management Areas to ensure that the Basin is operated within its sustainable yield for the protection of reasonable and beneficial uses and users of groundwater. The absence of undesirable results, as defined by SGMA and the Groundwater Sustainability Plans (GSPs), will indicate that the sustainability goal has been achieved. Sustainable groundwater management as implemented through the GSPs is designed to ensure that:

(1) Long-term groundwater elevations are adequate to support existing and future reasonable and beneficial uses throughout the Basin,
(2) A sufficient volume of groundwater storage remains available during drought conditions and recovers during wet conditions,
(3) Groundwater production, and projects and management actions undertaken through SGMA, do not degrade water quality conditions in order to support ongoing reasonable and beneficial uses of groundwater for agricultural, municipal, domestic, industrial, and environmental purposes.

Groundwater resources will be managed through projects and management actions implemented under the GSPs by the respective Groundwater Sustainability Agencies (GSAs). Management of the Basin will be supported by monitoring groundwater levels, groundwater in storage, groundwater quality, land surface elevations, interconnected surface water, and seawater intrusion. The GSAs will adaptively manage any projects and management actions to ensure that the GSPs are effective and undesirable results are avoided.

The sustainability criteria for the WMA was developed using historical data, including groundwater elevations, groundwater quality, and satellite imagery. These data are discussed in detail in Chapter 2b, Basin Setting.

3b.1-1 The Santa Ynez River Alluvium Subarea

Water in the Santa Ynez River Alluvium upstream of the Lompoc Narrows is recognized as ~~subflow~~underflow of the Santa Ynez River since SWRCB Decision D 886 and WR 73-37 and regulated and managed by SWRCB the same as surface flows. Because ~~subflow~~underflow of the Santa Ynez River is considered the same as surface water, the Santa Ynez River Alluvium would not be classified as a principal aquifer or managed by a GSP under SGMA. Rather, the Santa Ynez River Alluvium subarea is regulated by water rights orders and environmental regulations. These include supporting Santa Ynez River base flow to support rearing juvenile steelhead (*O. mykiss*), monitoring for specific surface water pool depths, groundwater dependent ecosystems (GDEs), and other beneficial uses of Santa Ynez River streamflow. As such, the sustainability indicators within the subarea are controlled by these State requirements and Cachuma Reservoir releases in accordance with applicable regulations. Although the Santa Ynez River Alluvium subarea is within the DWR defined Santa Ynez River Valley Groundwater Basin (DWR Basin No. 3-15), the WMA GSA has no authority to regulate conditions within the Subarea as they relate to the sustainability indicators as it is not considered groundwater as defined by SGMA.[167] Therefore, sustainable management criteria for the Santa Ynez River Alluvium Subarea have not been established in this GSP.

[167] CWC Section 10721 (g) "Groundwater" means water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water, but does not include water that flows in known and definite channels.

3B.2 UNDESIRABLE RESULTS

Under the Sustainable Groundwater Management Act (SGMA), undesirable results occur when groundwater conditions occurring throughout the WMA cause significant and unreasonable impacts to any of six sustainability indicators:

- Significant and Unreasonable Chronic Lowering of Groundwater Levels
- Significant and Unreasonable Reduction of Groundwater in Storage
- Significant and Unreasonable Seawater Intrusion
- Significant and Unreasonable Degradation of Water Quality Resulting from Groundwater Withdrawal
- Significant and Unreasonable Land Subsidence Resulting from Groundwater Withdrawal
- Significant and Unreasonable Reduction of Interconnected Surface Water and Groundwater Resulting from Groundwater Withdrawal

The WMA GSA is required to characterize undesirable results for each indicator unless "undesirable results to one or more sustainability indicators are not present and are not likely to occur in the basin."[168] Undesirable results associated with each of the six sustainability indicators are applicable to, but have not historically occurred within, the WMA. Because groundwater usage and conditions may lead to undesirable results, the WMA GSA has defined significant and unreasonable results for each sustainability indicator. Undesirable results associated with each sustainability indicator were defined using the data

168 23 CCR § 354.26 (d) An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.

and processes compiled for this GSP and with consideration of the beneficial uses and users within the WMA.

The WMA is composed of six subareas characterized distinctly by their topography and interactions with surface water: (i) Santa Ynez River Alluvium, (ii) Lompoc Plain, (iii) Burton Mesa, (iv) Lompoc Terrace, (v) Lompoc Upland, and (vi) Santa Rita Upland. The cause of undesirable results, corresponding groundwater conditions, and applicability of the six sustainability indicators to each subarea in the WMA are described in detail below. Undesirable results are not defined for the Santa Ynez River Alluvium because water stored in the alluvium of this subarea is considered surface water and not subject to SGMA. In addition, undesirable results are not defined for the Burton Mesa because groundwater in this subarea is primarily under the federal jurisdiction of the Vandenberg Space Force Base (formerly Vandenberg Air Force Base) and occurs under perched conditions with no hydrogeologic connection to the principal aquifers of the WMA (Section 2a, Hydrogeologic Conceptual Model).

3b.2-1 Chronic Lowering of Groundwater Levels – Undesirable Results

Chronic lowering of groundwater levels that indicate a depletion of supply[169] is an undesirable result applicable to the Lompoc Plain, Lompoc Upland, Santa Rita Upland, and Lompoc Terrace subareas of the WMA.

Approximately 85% of all groundwater extractions within the WMA occur in the Lompoc Plain (Section 2c; Water Budget; Table 2c.2-8). Within this subarea, groundwater in the Upper Aquifer has historically been encountered at elevations that range from 30 to 90 feet. NAVD88[170] (Section 2b; Groundwater Conditions; Figures 2b.1-4F and 2b.1-4G), with groundwater elevation lows corresponding to historical drought periods and groundwater elevation highs corresponding to periods of above normal and wet water years. In the Lower Aquifer, measured water levels in wells exhibit long-term declines that are not correlated to water year type or surface water availability (e.g., Section 2b.1; Groundwater Conditions; Figure 2b.1-4H). Along the western boundary of the Lompoc Plain, groundwater elevations have remained stable at an average elevation of approximately 5 to 10 ft NAVD88 since the 1970s.

169 23 CCR § 354.28(c)(1)
170 North American Vertical Datum of 1988 (NAVD88)

Approximately 10% and 5% of the total groundwater extractions from the WMA occurred within the Lower Aquifer in the Lompoc Upland and Santa Rita Upland, respectively. Since 1980, groundwater elevations have declined in the Lompoc Upland by 11 feet (Section 2b.1; Groundwater Conditions; Figure 2b.1-6B) and in the Santa Rita Upland by as much as 50 feet (Section 2b.1; Groundwater Conditions; Figure 2b.1-7B).

Groundwater extractions reported to the Santa Ynez River Water Conservation District indicate that approximately 320 to 340 groundwater wells actively extracted an average of 27,400 AFY from the WMA during the period from 2005 through 2018. This average annual groundwater extraction rate is approximately equal to the long-term historical average production rate (Section 2c-Water Budget). The similarity in production rates during 2005 through 2018, a period containing the latest drought of record and subsequent historical low water levels in the WMA, and the long-term historical record indicates that the historical low groundwater elevations have not resulted in significant and unreasonable impacts to beneficial users of groundwater. In addition to historical pumping data, historical well activity information (**Figure 3b.2-1**) indicates that the number of inactive wells in the WMA has also been relatively steady from 2005 to 2021 (present). Based on these historical data, undesirable results associated with chronic lowering of groundwater levels have not been observed, and are not currently occurring, in the WMA.

(b) (1) Cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results

Chronic lowering of groundwater levels in the WMA may occur if groundwater extractions exceed the sustainable yield over a period that contains both wet and dry water year types. In addition, chronic lowering of groundwater elevations may be caused by reductions in surface water releases from the Cachuma Reservoir and reduced surface flows in the Santa Ynez River at the Lompoc Narrows, which provide approximately 45% of the average annual recharge to the WMA (Section 2c-Water Budget). Surface water releases through the Cachuma reservoir through the WMA to the Pacific Ocean are managed by the State Water Resources Control Board under Order WR 2019-0148.

(b) (2) Criteria used to define when and where the effects of groundwater conditions cause undesirable results. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.

Undesirable results associated with chronic lowering of groundwater levels will be defined in the WMA by collecting semi-annual (spring and fall) groundwater elevation measurements at 13 representative monitoring wells completed in the Upper Aquifer of the Lompoc Plain and 13 representative monitoring wells completed in the Lower Aquifer of the Lompoc Plain, Lompoc Upland, Santa Rita Upland, and Lompoc Terrace (**Figure 3b.2-2**). Undesirable results associated with chronic declines in groundwater elevations will be characterized by comparing groundwater elevations at each well to established minimum threshold groundwater elevations. Spring groundwater elevations that drop below the established groundwater elevation minimum thresholds in more than 50% of the representative monitoring wells in the Upper Aquifer or 50% of the representative monitoring wells in the Lower Aquifer for two consecutive, non-drought[171] years would correspond to an undesirable result associated with chronic lowering of groundwater elevations. The criteria will apply to each principal aquifer separately: 50% of the representative monitoring wells in the Upper Aquifer and 50% of the representative monitoring wells in the Lower Aquifer. The criteria of 50% of the representative monitoring wells addresses the potential cumulative effects from pumping and GSA management on basin-scale water level conditions. Using the criteria of 50% focuses the efforts of GSA management on regional scale groundwater levels rather than localized groundwater levels (e.g. imbalance in water budget versus potential well interference). Requiring two or more consecutive non-drought years of minimum threshold exceedances provides confirmation that the chronic lowering of groundwater elevations is not drought related, making it more likely attributed to groundwater pumping.[172] GSA management actions (Chapter 4) will be planned to accommodate drought periods and ensure that short-term impacts can be offset by increases in groundwater levels or storage during normal or wet periods.

[171] Two or more consecutive years that are classified as Dry or Critically Dry (Section 2b) will be defined for this purpose as drought years. All other year types and combination of year types will be defined as non-drought years for the purpose of defining undesirable results under a groundwater sustainability plan.

[172] CWC 10721(x): “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.”

Figure 3b.2-1

Registered Active and Inactive Wells, District Zones B & F

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Figure 3b.2-2

WMA Representative Monitoring Wells for Groundwater Levels and Groundwater Storage

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(b) (3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur from undesirable results

Chronic lowering of groundwater elevations may lead to an undesirable result in the WMA if groundwater elevations drop to a level that significantly and unreasonably reduces the total volume of groundwater in storage, eliminates or reduces the ability of production wells to economically access groundwater, causes the landward migration of saline water into the Lompoc Plain, or causes a disconnection from surface water that sustains habitat or groundwater dependent ecosystems (GDEs). Conditions that threaten long-term groundwater accessibility for agricultural, municipal, and domestic supply correspond to static water levels that stabilize within the perforated sections of a groundwater extraction well. Static groundwater elevations that reside within the perforated sections of an extraction well may lead to pump failure from entrained air or insufficient net positive suction head (Driscoll, 1986; Roscoe Moss, 1990). Moreover, the resulting increase in dissolved oxygen in the water produces interferes with the City of Lompoc's water treatment plant processes prior to sending the water into the distribution system. Additionally, the introduction of entrained air may increase well screen fouling from increased biological activity and geochemical reactions that lead to mineral precipitation (Driscoll, 1986; Schneiders, 2003).

3b.2-2 Reduction of Groundwater in Storage – Undesirable Results

Reduction of groundwater in storage is an undesirable result applicable to Lompoc Plain, Lompoc Upland, Santa Rita Upland, and Lompoc Terrace subareas of the WMA. The undesirable result for decline in storage is less water available for beneficial users, meaning that the water is physically not present to be extracted for beneficial use. Reduction of groundwater in storage is also associated with undesirable results established for chronic lowering of groundwater levels and may be associated with undesirable results associated with land subsidence and seawater intrusion.

Groundwater is extracted from the WMA at an average annual rate of approximately 27,300 AFY (Section 2c Water Budget; Table 2c.2-8). Of this, approximately 85% of the average annual extractions occurred within the Lompoc Plain, 10% occurred within the Lompoc Upland, and the remaining 5% occurred within the Santa Rita Upland. The average annual production rate from the WMA of approximately 27,300 AFY is approximately 1,000 AFY higher than the estimated perennial yield for the WMA (Section 2c Water Budget; Table 2c.2-8). Throughout the historical record, groundwater in storage in the Lompoc Plain, Lompoc Upland, and Santa Rita Upland has declined at an average rate of approximately 640 AFY, 110 AFY, and 250 AFY, respectively.

The average annual reduction of groundwater in storage of 1,000 AFY in the WMA has not caused undesirable results associated with chronic lowering of groundwater levels and the beneficial use of groundwater for municipal, agricultural, and domestic supply (Section 3b.2-1). In addition, historical rates of reduction in groundwater in storage have not caused undesirable results associated with groundwater extraction-induced land subsidence (Section 3b.2-5), degradation of water quality (Section 3b.2-4), seawater intrusion (Section 3b.2-3), or a depletion of interconnected surface water (Section 3b.2-6). Based on this information, undesirable results associated with a reduction of groundwater in storage have not historically occurred, and are not currently occurring in, the WMA.

(b) (1) Cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results

Significant and unreasonable reduction of groundwater in storage may occur if groundwater production exceeds the sustainable yield of the WMA over a period containing both wet and dry water year types. In addition, chronic lowering of groundwater elevations may be caused by reductions in surface water releases from the Cachuma Reservoir and reduced surface flows in the Santa Ynez River at the Lompoc Narrows, which provide approximately 45% of the average annual recharge to the WMA (Section 2c; Water Budget). Surface water releases through the Cachuma reservoir to the WMA are managed under the State Water Resources Control Board Order WR 2019-0148.

(b) (2) Criteria used to define when and where the effects of groundwater conditions cause undesirable results. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.

The Sustainable Management Criteria for chronic lowering of groundwater levels protect against significant and unreasonable changes in groundwater storage. Undesirable results associated with a reduction of groundwater in storage will be defined in the WMA by collecting semi-annual (spring and fall) groundwater elevation measurements at 13 wells completed within the Upper Aquifer of the Lompoc Plain and 13 wells completed in the Lower Aquifer of the Lompoc Plain, Lompoc Upland, Santa Rita Upland, and Lompoc Terrace. Undesirable results associated with reduction of groundwater in storage will be characterized by comparing groundwater elevations at each well to established minimum threshold groundwater elevations. Spring groundwater elevations that drop below the established groundwater elevation minimum thresholds in more than 50% of the representative monitoring wells for two consecutive non-drought years would correspond to an undesirable result associated with a significant and unreasonable reduction of groundwater in storage. The criteria will apply to each principal aquifer separately: 50% of the representative monitoring wells in the Upper Aquifer and 50% of the representative monitoring wells in the Lower Aquifer.

(b) (3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur from undesirable results

Reduction of groundwater in storage can lead to an undesirable result in the WMA if the total volume in storage drops to levels that eliminates or reduces the ability of production wells to economically access or produce groundwater. Conditions that threaten long-term groundwater accessibility for agricultural, municipal, and domestic supply correspond to static water levels that stabilize within the perforated sections of a groundwater extraction well. Static groundwater elevations that reside within the perforated sections of an extraction well may lead to pump failure from entrained air or insufficient net positive suction head (Driscoll, 1986; Roscoe Moss, 1990). In addition, the introduction of entrained air may increase well screen fouling from increased biological activity and geochemical reactions that lead to mineral precipitation (Driscoll, 1986; Schneiders, 2003). Groundwater elevations that correspond to this reduction of groundwater in storage may also be associated with the landward migration of saline water into the Lompoc Plain or cause a disconnection from surface water that sustains habitat or groundwater dependent ecosystems (GDEs).

3b.2-3 Seawater Intrusion – Undesirable Results

Seawater Intrusion is an undesirable result applicable to but not occurring within, the WMA, including the Lompoc Terrace and Lompoc Plain subareas.

Groundwater production from the Lompoc Terrace is minimal and is under the federal jurisdiction of the Vandenberg Space Force Base. Seawater intrusion into the Lompoc Terrace is not a concern in the WMA (Section 2b.4; Groundwater Conditions).

Seawater is approximately 50 to 100 times more concentrated with salts and salinity and overall different dissolved chemical profile than groundwater in the Lompoc Plain (Groundwater Conditions, Section 2b.4). The undesirable result to be avoided from seawater intrusion is that as a result of movement of seawater or water that has mixed with seawater groundwater would become too salty for existing beneficial use.

Groundwater conditions along the coast in the western Lompoc Plain area are impacted by the Santa Ynez River estuary, which is a dynamic mixing zone between seawater, Santa Ynez River water, and underlying groundwater. The aquifer is only present as alluvial fill of the Santa Ynez River. This is an area where groundwater chemistry (both relative concentration of particular dissolved ions, and total concentration of dissolved ions) changes from similar to the Santa Ynez River fresh water to similar to the Pacific Ocean seawater.

In accordance with SGMA, undesirable results need to consider "projected sea levels."[173] As discussed in the Water Budget (Section 2c), there are several climate change scenarios depending on the amount of emissions, categorized by the Representative Concentration Pathway (RCP) number describing greenhouse gas concentrations which ranges from 1.9 (low) to 8.5 (high). Sea levels are in part a function of global temperatures and so projected general sea level rise depends on the emissions scenario.

The Ocean Protection Council provided guidance that under the high emissions scenario that for 2070 on average 1.2 feet of sea-level rise[174]. **Table 3b.2-1** summarizes projected sea-level rise over time (OPC 2018). The County of Santa Barbara (2017) sea level rise and coastal hazards vulnerability assessment included modeling of inundation for sea-level rise scenarios. In the worst modeled projections for 2100 of five foot (60.2 inch) sea level rise, the estuary will expand up to a quarter mile inland. However this would still be within the boundary of VSFB and not encroach on current farmland (County of Santa Barbara 2017). Habitat vulnerability assessment for the State of California found no potential impact to Santa Ynez River estuary habitat for a five foot sea level rise (Heady et al. 2018). Ongoing tectonic uplift, discussed in the context of land subsidence (Section 2a.1, HCM; Section 2b.5, Groundwater Conditions), is relatively insignificant over this period. As this is a dynamic estuary environment with sedimentation, higher sea

173 23 CCR § 354.28(c)(3)(b) A description of how the seawater intrusion minimum threshold considers the effects of current and projected sea levels.

174 Port San Luis approximately 35 miles north of the estuary, which is likely applicable to the month of the Santa Ynez River. Port San Luis, CA - Station ID: 9412110. NOAA Website.https://tidesandcurrents.noaa.gov/stationhome.html?id=9412110 Accessed 2021-12-07.

levels would result in some buildup of river sediments. Sedimentation depends on erosion in the watershed and surface water transport.

Table 3b.2-1
Projected Sea-Level Rise (in feet) for Port San Luis
Under High Emissions (RCP 8.5) Climate Change Scenarios

Year	Median	Likely Range (66% probability)	
~~Year~~	50% probability sea-level rise meets or exceeds (feet)	Low (17th Percentile) (feet)	High (83rd Percentile) (feet)
2030	0.3	0.2	0.5
2040	0.5	0.3	0.7
2050	0.7	0.5	1.0
2060	1.0	0.6	1.3
2070	1.2	0.8	1.7
2080	1.5	1.0	2.1

Source: OPC (2018) Sea-Level Rise Guidance. 2018 Update.
Note: Port San Luis is NOAA tidal gage 9412110, and is the closest gage to Santa Ynez River for which predictions were available.

SGMA requires that "seawater intrusion shall be defined by a chloride concentration isocontour."[175] Chloride, one chemical component of seawater, has few natural sources and generally stays in water once it has been added. Chloride can be an indicator of human activity. However, very high concentrations along the coast are indicators of the groundwater mixing with seawater.

Historical chloride concentrations within the groundwater near the estuary exceed 650 mg/L (Section 2b.4; Groundwater Conditions). Chloride concentrations measured at well 7N/35W-21G02, which is located approximately 2 miles east of the coast, have remained relatively stable since the mid-1990s; chloride concentrations in groundwater at 7N/35W-21G02 were most recently measured at a concentration of 490 mg/L (measured on 8/18/2020). These concentrations are reflective of natural estuarine conditions in the WMA and do not indicate historical groundwater extraction-induced seawater intrusion (Section 2b.4, Groundwater Conditions).

Historical impacts of elevated chloride concentrations near the coast in the Lompoc Plain were assessed using historical groundwater production data (Section 2c; Water budget – Figure 2c.2-2) and well activity information (Figure 3b.2-1). Rates of groundwater extraction within the WMA have not declined

175 23 CCR § 354.28(c)(3)

throughout the record of measurement, and the number of active wells in the WMA has slightly increased over time. This data indicates that seawater intrusion into the Lompoc Plain has not caused undesirable results in the WMA by impacting beneficial use of groundwater for municipal, agricultural, and domestic supply.

(b) (1) Cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results

Undesirable results associated with seawater intrusion may be caused by groundwater extractions that exceed the sustainable yield for a period containing both wet and dry water years. Groundwater production exceeding the sustainable yield may cause groundwater elevations within the Lompoc Plain to drop and remain below sea level, inducing a landward hydraulic gradient that causes saline water underlying the Santa Ynez River Estuary to migrate into the primary groundwater production zone of the Lompoc Plain.

(b) (2) Criteria used to define when and where the effects of groundwater conditions cause undesirable results. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.

Undesirable results associated with seawater intrusion will be quantified by collecting annual chloride concentrations measurements from four wells completed in the Upper Aquifer located in the western portion of the Lompoc Plain. Groundwater chloride concentrations measured in these wells will be contoured annually to track the potential landward migration of the chloride concentration isocontour into the Lompoc Plain. To differentiate between potential seawater intrusion and other potential increases from other sources of chloride, the chloride isocontours will be compared to time-series of chloride concentrations collected at wells 7N/35W-17K20, 7N/35W-21G2, 7N/35W-27F1, and 7N/35W-22A3 (**Figure 3b.2-3**). The landward migration of the chloride isocontours, along with increasing groundwater chloride concentrations measured at 7N/35W-17K20 and 7N/35W-21G2, can be indicative of potential undesirable results associated with seawater intrusion in the WMA.

Figure 3b.2-3
WMA Monitoring Network for Seawater Intrusion

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(b) (3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur from undesirable results

Seawater intrusion may impact the beneficial use of groundwater for agricultural and domestic supplies in the Lompoc Plain. While native chloride concentrations in the western portion of the Lompoc Plain exceed tolerances for some locally grown crops, historical agricultural usage in the WMA has not been significantly and unreasonably affected by chloride concentrations. For general municipal and domestic beneficial uses, the secondary maximum contaminant level has a recommended upper limit standard of 500 mg/L. Chloride concentrations that exceed 500 mg/L in the western portion of the WMA would impact beneficial use of groundwater for domestic supplies.

3b.2-4 Degradation of Water Quality – Undesirable Results

Degradation of water quality is an undesirable result applicable to the WMA. The WMA GSA will only be responsible for addressing degradation of groundwater quality caused by pumping and/or GSP implementation. Groundwater quality in the WMA is currently in a state of, “adverse salt balance because of municipal and agricultural discharges” (Central Coastal Basin Plan 2019). Primary salt and nutrients of concern in the WMA are Total Dissolved Solids (TDS), chloride, sulfate, boron, sodium, and nitrogen. Average 2015-2018 concentrations and Water Quality Objectives (WQOs) established in Central Coastal Basin Water Quality Control Plan (CCBWQCP) prepared by the California State Water Boards are summarized in **Table 3b.2-2**.

Average 2015-2018 concentrations of TDS, sulfate, chloride, and nitrate exceed the established WQOs throughout much of the WMA (Table 3b.2-2). During the 2015-2018 water quality sampling period, groundwater extractions and use within the WMA were similar to historical average groundwater extraction and usage rates (Section 2c, Water Budget). The similarity in beneficial use volumes between water years 2015 through 2018 compared to historical usage indicates that salt and nutrient concentrations within the WMA remain suitable for agricultural, municipal, and domestic use.

Table 3b.2-2
Median Groundwater Quality Objectives (mg/L) and
Average 2015-2018 Salt and Nutrient Concentrations (mg/L) in the WMA

Basin/Subarea	**Salinity as Total Dissolved Solids (TDS)**		**Chloride**		**Sulfate**		**Boron**		**Sodium**		**Nitrate as N**	
	Objective (mg/L)	**Avg 2015-2018**	**Objective (mg/L)**	**Avg 2015-2018**	**Objective (mg/L)**	**Avg 2015-2018**	**Objective (mg/L)**	**Avg 2015-2018**	**Objective (mg/L)**	**Avg 2015-2018**	**Objective (mg/L)**	**Avg 2015-2018**
Lompoc Plain	1250	1600	250	285	500	518	0.5	0.7	250	190	2	9.9
Lompoc Upland	600	756	150	157	100	174	0.5	0.3	130	89	2	1.9
Lompoc Terrace	750	-	210	-	100	-	-	-	100	-	1	-
Santa Rita Upland	1500	583	150	95	700	149	0.5	0.2	100	68	1	1.5

(b) (1) Cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results

Adverse water quality conditions in the WMA are driven by the use and discharge of treated wastewater[176] within the Basin (RWQCB 2019), local agricultural practices, and Santa Ynez River water quality (Bright et al 1992). Historically, groundwater extractions from the Upper Aquifer in the Lompoc Plain have mobilized low-quality water from the Santa Ynez River Alluvium to the main production zone of the Upper Aquifer (Bright et al 1992). However, more recent water quality assessments of the WMA indicate that water quality trends are variable (Haas et. al 2019) and the current degree to which groundwater production in the WMA impacts water quality and the basin-wide salt balance is not well constrained. For example, during the last forty years pumping has been relatively constant in the WMA, but recent trends indicate increasing nitrate, arsenic, and total dissolved solids in 22% to 36% of all wells in the Lompoc Plain (Haas et. al 2019). Possible causes of these recent trends included wastewater treatment, agricultural, and industrial sources (Haas et. al 2019). The WMA GSA will only be responsible for addressing degradation of groundwater quality caused by pumping and/or GSP implementation. Because there could be multiple causes for possible future degraded water quality besides groundwater pumping, including wastewater treatment and agricultural and industrial sources (Haas et. al. 2019), a study will be conducted on the cause(s), if and when the water quality thresholds are exceeded, in order to address appropriately.

(b) (2) Criteria used to define when and where the effects of groundwater conditions cause undesirable results. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.

Undesirable results associated with degradation of water quality will be quantified by collecting annual TDS, chloride, sulfate, boron, sodium, and nitrate concentration measurements from 19 wells completed in the Upper Aquifer of the Lompoc Plain and the Lower Aquifer of the Lompoc Plain, Lompoc Upland, and Santa Rita Upland (**Figure 3b.2-4**). Salt and nutrient concentration measurements collected at each well will be compared to the established salt and nutrient concentration minimum thresholds (Section 3b.3-

176 Municipal suppliers responsible for wastewater operations are working closely with the Regional Water Quality Control Board to limit ongoing release of low-quality water into the Basin. The Central Coast Basin Plan identifies that following municipalities as point sources contributing to the degradation of water quality within the Basin: City of Lompoc, Mission Hills Community Services District, Vandenberg Space Force Base, United States Department of Justice, Bureau of Prison, Buellton Community Services District, City of Solvang, and Cachuma County Sanitation District.

4). Groundwater management decisions and pumping can influence local well water quality. Hence, minimum threshold exceedances for individual constituents in more than 50% of the representative monitoring wells for two or more consecutive years is considered an undesirable result associated with degradation of water quality in the WMA. The criteria of 50% of the representative monitoring wells addresses the potential cumulative effects from management decisions and pumping on basin-scale water quality conditions. Requiring two or more consecutive non-drought years of minimum threshold exceedances provides confirmation that the degraded water quality is not drought related, making it more likely attributed to groundwater pumping and/or management actions. Because there could be multiple causes for possible future degraded water quality besides groundwater pumping, including wastewater treatment and agricultural and industrial sources (Haas et. al. 2019), a study will be conducted on the cause(s), if and when the water quality thresholds are exceeded, in order to address appropriately.

(b) (3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur from undesirable results

Water quality degradation beyond current conditions in the WMA may impact municipal, domestic, and agricultural usage by exceeding salt and nutrient crop tolerances and drinking water standards and increase treatment costs by municipalities (Section 2b.3, GC). Undesirable results associated with point sources of contamination is overseen by the State Water Resources Control Board (Section 2b.3, GC) and are not established as part of this GSP.

3b.2-5 Land Subsidence – Undesirable Results

Inelastic land subsidence is an undesirable result not occurring or likely to occur in the future within the WMA. Undesirable results due to land subsidence are damage to surface infrastructure and collapsed pore space meaning reduced aquifer storage and hydraulic conductivity. There is little to no evidence of land subsidence within the WMA that has disrupted infrastructure, land use, or beneficial use of groundwater (Section 2b.5, Groundwater Conditions). Areas where land-subsidence has been measured by remote sensing data are generally located in the Lompoc Upland and Santa Rita Upland~~,~~ (**Figure 3b.2-5**), where there is little to no reported groundwater use (Section 2b.5, Groundwater Conditions).

Figure 3b.2-4

WMA Representative Monitoring Wells for Water Quality

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Figure 3b.2-5

WMA Supplemental Monitoring Network for Land Subsidence

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(b) (1) Cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results

Groundwater production in excess of the sustainable yield may result in significant and unreasonable land subsidence if the subsidence, "substantially interferes with surface land uses." [177] Subsidence related to groundwater extraction can occur with groundwater elevations maintained below previous historical low water levels and in the presence of extensive fine-grained sediments. Groundwater Conditions (Section 2b.5) found that extensive fine-grained sediments are not documented as occurring in the WMA.

(b) (2) Criteria used to define when and where the effects of groundwater conditions cause undesirable results. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.

Groundwater production is not expected to induce land subsidence within the WMA. Land surface elevations will be continuously monitored using InSAR data and continuous GPS monitoring data (Figure 3a.2-3, Monitoring Network). Land subsidence associated with groundwater production that exceeds half of a foot from 2015 conditions may impact infrastructure and land usage in the WMA.

(b) (3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur from undesirable results

Land subsidence from groundwater extraction is not expected to become an undesirable result within the WMA due to hydrogeologic conditions that are not conducive to land subsidence and because SMCs for other sustainability indicators will preclude the lowering of groundwater levels below the historical low elevation. Based on the potential for land subsidence resulting from groundwater withdrawal in the WMA, the undesirable result is defined as land subsidence resulting from groundwater extraction that causes half of a foot of subsidence from 2015 conditions and interferes with land use or infrastructure.

3b.2-6 Interconnected Surface and Groundwater – Undesirable Results

Depletion of interconnected surface water ~~and groundwater~~ is potentially an undesirable result applicable to the WMA. Depletion of interconnected surface water is potentially an undesirable result applicable to

[177] CWC Section 10721(x)(5) Significant and unreasonable land subsidence that substantially interferes with surface land uses.

the WMA. This potentially occurs when ~~potential~~ surface flow ~~instead~~ enters the aquifer and replaces ~~missing~~ groundwater that has been pumped or when baseflow contribution of groundwater to the surface flows are reduced, resulting in streamflow depletion. Undesirable results are evaluated relative to groundwater pumping and management and a 2015 baseline,[178] and are considered occurring if streamflow depletion due to groundwater pumping and management under SGMA exceeds the streamflow depletion due to groundwater pumping and management prior to 2015. The Santa Ynez River is the predominant interconnected surface water and groundwater system in the WMA the River and associated vegetation and extends from the ~~eastern edge of~~CMA in the ~~WMA~~east to the Pacific Ocean (Figure ~~3b~~2a.4-4, HCM). However upstream of the Lompoc Narrows, the Santa Ynez River and underflow flows through a bedrock channel (Figure 2a.2-~~6).~~

~~Underflow within~~2, HCM), with this upstream area designated as the Santa Ynez River Alluvium Subarea ~~(upstream of the Lompoc Narrows) is~~.

Santa Ynez River underflow is primarily influenced and replenished by releases from Cachuma Reservoir. SWRCB manages and regulates this river ~~subflow~~underflow no different than river surface flows in accordance with SWRCB Order WR 2019-0148.[179] Because all groundwater in the Santa Ynez River Alluvium ~~would~~subarea is entirely underflow of the Santa Ynez River and considered flows of the Santa Ynez River it does not ~~be~~contain groundwater as defined by SGMA and is not classified as a principal aquifer or managed by a GSP under SGMA~~, interconnected~~ (Appendix 1b-B). Interconnected surface and groundwater, and the groundwater dependent ecosystems (GDEs) within the Santa Ynez River Alluvium Subarea is not within the purview of the WMA GSA. Therefore, sustainable management criteria have not been set for the depletion of interconnected surface water or GDEs in the Santa Ynez River Alluvium Subarea.

178 Groundwater management is currently only part of the overall watershed conditions that impact the flows of the Santa Ynez River. Surface water rights and groundwater rights are not determined or altered as part of this groundwater management plan, as per CWC Section 10720.5.

179 SWRCB Order WR 73-37 and other orders and decisions of the SWRCB provide for the management of both River surface and subflow as surface water flows by the SWRCB.

3b.2-6-1 Groundwater Dependent Ecosystems

For Groundwater Dependent Ecosystems (GDEs) undesirable results occur when groundwater no longer supports the ecosystem, such as when groundwater levels fall below the root zone. If the ecosystem relies on groundwater discharge to surface water, the lowering of groundwater levels beneath the stream bottom would eliminate groundwater discharge to the stream.

The portion of the Santa Ynez River that extends from the Lompoc Narrows to the Pacific Ocean is seasonally connected with groundwater (Section 2b.6, GC). Within this stretch of the Santa Ynez River, the Natural Communities Commonly Associated with Groundwater Dataset mapped approximately Riparian Mixed Hardwood, Coast Live Oak, Willow, and seasonally flooded wetland (Figure 2a.4-4, HCM). In addition to these habitats, surface water flows in this portion of the Santa Ynez River also sustain endangered steelhead trout (Section 2a.4-6-1, HCM). Potential GDEs were screened to eliminate wetland and vegetation identified in the database that were not GDEs (Figure 2b.6-~~3~~4, GC). Screening was based, in part, on hydrographs from existing monitoring wells in which the depth to groundwater has historically exceeded the 30-feet depth identified by the Nature Conservancy as representative of groundwater conditions that may sustain common phreatophytes and wetland ecosystems (Rohde et al. 2018). The resulting locations of potential GDEs, those communities that could not definitely be eliminated from the NCCAG database, are shown on **Figure 3b.2-6**.

Groundwater conditions along this reach of the Santa Ynez River are not considered vulnerable to groundwater production due to operations of the Cachuma Project that maintain these habitats (Section 2b.6, GC). Based on this information, undesirable results associated with a depletion of interconnected surface water by groundwater pumping in the WMA has not historically occurred and is not currently occurring.

As discussed in Section 2a.4-6 (HCM) two key species in the WMA[180] have habitat that includes the WMA portion of the Santa Ynez River: Southwestern willow flycatcher (*Empidonax traillii extimus*) and Southern California steelhead (*O. mykiss*).

180 California tiger salamander's critical habitat has been identified in the CMA tributaries; however, due to depths to groundwater greater than 30 feet (Section 2b.6), this habitat will not be affected by management under SGMA.

(b) (1) Cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results

Undesirable results associated with a depletion of interconnected surface water and groundwater in the WMA may be caused by groundwater production in excess of the sustainable yield over a period that contains wet and dry water years. Extended periods of groundwater production in excess of the sustainable yield may lead to groundwater elevations that drop below historical low water levels in the Upper Aquifer of the Lompoc Plain. The lowering of groundwater elevations may also be caused by increases in upstream diversions, or by reductions in water rights or other releases from the Cachuma Reservoir and reduced surface flows in the Santa Ynez River at the Lompoc Narrows, which provide approximately 45% of the average annual recharge to the WMA (Section 2c; Water Budget). Surface water releases through the Cachuma Reservoir to the WMA are managed by SWRCB under Order WR 2019-0148. The lowering of groundwater levels below historical lows in the Upper Aquifer potentially impacts habitat and ecosystem health along the Santa Ynez River.

(b) (2) Criteria used to define when and where the effects of groundwater conditions cause undesirable results. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.

Using groundwater levels adjacent to the Santa Ynez River in the Upper Aquifer, undesirable results associated with a depletion of interconnected surface water and groundwater will be quantified by measuring groundwater elevations semi-annually at three representative monitoring points located adjacent to the Santa Ynez River (Figure 3b.2-6) and maintaining water levels above historical low groundwater levels. Significant and undesirable results are defined as groundwater elevations in the Upper Aquifer that drop to 10 feet below 2020 groundwater elevations in two out of the three representative monitoring wells for two consecutive non-drought[181] years (Section 3b.3-6). Groundwater elevations measured at these wells will be compared to minimum threshold groundwater elevations (Section 3b.3-6) to characterize whether groundwater production from the Lompoc Plain is causing significant and unreasonable depletion of interconnected surface water.

181 Two or more consecutive years that are classified as Dry or Critically Dry (Section 2b, GC) will be defined as drought years. All other year types and combination of year types will be defined as non-drought years for the purpose of defining undesirable results under a groundwater sustainability plan.

(b) (3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur from undesirable results

Potential effects on beneficial uses and users of the surface water in the Santa Ynez River include reduction in flows relative to pre-2015 flow conditions. Undesirable results associated with a depletion of

Figure 3b.2-6

WMA Representative Monitoring for Interconnected Surface Water and Groundwater Dependent Ecosystems

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interconnected surface water would be groundwater elevations that impact habitat health and enhance surface water depletion rates along the Santa Ynez River. ~~Groundwater conditions that may lead to this would be groundwater elevations in the Upper Aquifer that drop to the maximum of 10 feet below 2020 groundwater elevations in two out of the three representative monitoring wells for two consecutive non-drought years (Section 3b.3-6).~~

The effects can further be categorized into potential effects on water needs for all life history stages by key species. As discussed in Section 2a.4-6 (HCM) two key species in the WMA[182] along the Santa Ynez River include Southwestern willow flycatcher (*Empidonax traillii extimus*) and Southern California steelhead (*O. mykiss*).

For the Southwestern willow flycatcher (Figure 2a.4-6, HCM), impacts would be related to the vegetation that the groundwater dependent ecosystem supports as described in the Final Environmental Impact Report of the Cachuma Project (SWRCB, 2011):

> The southwestern willow flycatcher nests in thickets of trees and shrubs approximately 10-25 feet or more in height, with dense foliage from approximately 0 - 15 feet aboveground, and often a high canopy cover percentage. In addition, nesting willow flycatchers virtually always nest near surface water or saturated soil. At some nest sites, surface water may be present early in the breeding season but only damp soil is present by late June or early July.

The potential undesirable result for Southwestern willow flycatchers would be if management under SGMA caused groundwater tables to lower to pre-2015 levels which cause either a decrease in quantity and density of trees and shrubs used by the willow flycatcher or a decrease in surface water habitat during the willow flycatcher nesting season.

For the Southern California steelhead (*O. mykiss*), the life history flow requirements that could potentially be affected are adult migration, juvenile migration, spawning, and rearing (SWRCB, 2011). Groundwater

182 California tiger salamander's and Vandenberg monkey flower critical habitat has been identified in the WMA upland tributaries; however, due to depths to groundwater greater than 30 feet (Section 2b.6), this habitat will not be affected by management under SGMA. The La Graciosa thistle has not been observed since 1958 within the Santa Ynez River basin, and the U.S. Fish and Wildlife Service listed the status of likely locally extirpated (U.S. Fish and Wildlife Service 2020).

levels lower than pre-2015 conditions may cause potential undesirable results due to a decrease in surface flow. Several processes that relate particularly to potential effects of groundwater management on steelhead in the WMA are related to: 1) the use of the Santa Ynez River as a migratory corridor to upstream habitat; and 2) use of the Santa Ynez River estuary for rearing and staging to the seawater life history phase of the steelhead. The SWRCB Order 2019-0148 describes the steelhead migration life history as follows:

> In the Santa Ynez River system, anadromous adult steelhead migrate and spawn in the wettest months, generally January through March. (MU-224, p 2.) The migration seldom begins earlier than December and may extend into May if late storms develop. (FEIR, Vol. II, p. 4.7-3.) In dry years, upstream migration can be impeded by low flows at critical locations (e.g., riffles). (Ibid.) Adult steelhead require deep pools as resting areas and refuges from high flows and water temperatures. (CT-12, pp. 13-14.).... Typically, smolts emigrate to the ocean from February through May, but the timing of migration is dependent upon stream flows. (FEIR, Vol. II, p. 4.7-3.) Smolts need sufficient flow and connectivity to migrate downstream to the ocean, and therefore flow is one of the most important considerations in providing for downstream migration. (Id., p. 2.0-25; MU-226, p. 33.) Early closure of lagoons by sandbars due to low river flow may adversely affect out-migration of smolts. (MU-224, p. 3.)

The Southern California Steelhead Recovery Plan (NMFS, 2012) notes the following regarding steelhead rearing in the estuary as follows:

> Larger size generally enhances survival in the ocean, and the lagoon-reared fish represented a large majority of the returning adult spawning population (Hayes et al. 2008, Bond 2006). Steelhead populations in the SCS Recovery Planning area have not been investigated to determine whether or to what extent they may exhibit this life history strategy.

Because the exact surface flow requirements of the Southern California steelhead for passage and estuarine dynamics are complex and not completely understood, it is important that management under SGMA not cause depletions in interconnected surface water greater than impacts due to groundwater extraction prior to 2015 to avoid significant and unreasonable undesirable results.

3B.3 MINIMUM THRESHOLD

This section describes the minimum thresholds established for chronic lowering of groundwater levels, significant and unreasonable reduction of groundwater in storage, degraded water quality, disconnected surface and groundwater, seawater intrusion, and land subsidence related to groundwater withdrawals that substantially interferes with surface land uses. The minimum thresholds described below avoid undesirable results related to the beneficial uses within the WMA. **Table 3b.3-1** summarizes the minimum thresholds established for each applicable sustainability indicator at the 39 representative monitoring wells (RMWs). ~~Because undesirable results are not currently occurring within the WMA, and interim milestones are not relevant to maintaining sustainability or avoiding undesirable results and therefore interim milestones are not established.~~

3b.3-1 Chronic Lowering of Groundwater Levels – ~~Measurable~~Minimum Thresholds

Minimum threshold groundwater elevations at the 26 RMWs (Figure 3b.2-2, Table 3b.3-1, **Appendix 3b-A**) were established to: (i) protect municipal, agricultural, and domestic groundwater users and supply, (ii) prevent landward migration of brackish water from the Santa Ynez River Estuary into the main production area of the Lompoc Plain, and (iii) maintain surface water-groundwater connection along the Santa Ynez River. The rationale in choosing the minimum thresholds to prevent significant and unreasonable results in the WMA has two major components: 1) the minimum threshold water level will be set to limit the impact on existing groundwater well screen intervals; and 2) the minimum threshold should not be more than 20-feet below basin-wide historical low water levels. The more conservative minimum threshold shall be used as described below.

Table 3b.3-1
Minimum Thresholds

RMW Name	Subarea	Principal Aquifer	Chronic Decline in Groundwater Levels and Groundwater in Storage (ft. NAVD88)	Depletion of Interconnected Surface Water (ft. NAVD88)	Water Quality MT (mg/L) (TDS/Cl/SO_4/B/Na/NO_3)
7N/34W-35K09	Lompoc Plain	UA	67	67	-
Lompoc 11 (7N/34W-35)	Lompoc Plain	UA	-	-	1200/150/450/0.55/130/1
7N/34W-26Q5	Lompoc Plain	UA	44	-	-
Lompoc 2 (7N/34W-34F06)	Lompoc Plain	UA	34	-	-
7N/34W-27F09	Lompoc Plain	UA	37	-	-
6N/34W-6C4	Lompoc Plain	UA	22	-	-
7N/34W-29N6	Lompoc Plain	UA	26	-	3000/275/1250/1.1/275/
7N/35W-26L01	Lompoc Plain	UA	20	-	3000/550/1100/0.75/300/60
7N/35W-26L02	Lompoc Plain	UA	18	-	800/175/150/0.2/90/1
7N/35W-24J4	Lompoc Plain	UA	20	-	-
7N/35W-21G2	Lompoc Plain	UA	0	0	2000/500/500/0.5/300/1
7N/35W-17M1	Lompoc Plain	UA	0	-	-
7N/34W-32H2	Lompoc Plain	UA	28	-	-
7N/35W-23B2	Lompoc Plain	UA	0	-	-
AGL020004874	Lompoc Plain	UA	-	-	2400/300/600/0/150/3
Lompoc 6 (7N/34W-27K07)	Lompoc Plain	UA	-	-	1100/100/400/0.5/90/1
7N/34W-27K05	Lompoc Plain	UA	-	-	1180/125/450/0.5/100/ -
7N/34W-27K04	Lompoc Plain	UA	-	-	1100/100/400/0.45/90/2
7N/35W-17K20	Lompoc Plain	UA	-	-	-
7N/34W-29F02	Lompoc Plain	UA	-	31	-
7N/35W-26L04	Lompoc Plain	LA	6	-	1000/200/200/0.2/80/1
7N/34W-29N7	Lompoc Plain	LA	15	-	1200/175/350/0.65/130/1

RMW Name	Subarea	Principal Aquifer	Chronic Decline in Groundwater Levels and Groundwater in Storage (ft. NAVD88)	Depletion of Interconnected Surface Water (ft. NAVD88)	Water Quality MT (mg/L) ($TDS/Cl/SO_4/B/Na/NO_3$)
7N/34W-24N1	Lompoc Plain	LA	29	-	-
7N/34W-22J6	Lompoc Plain	LA	28	-	-
7N/34W-27K06	Lompoc Plain	LA	-	-	1250/150/350/0.45/130/ -
7N/33W-28D3	Santa Rita Upland	LA	25	-	-
7N/33W-21G2	Santa Rita Upland	LA	46	-	-
7N/33W-27G1	Santa Rita Upland	LA	31	-	-
AGL020021642	Santa Rita Upland	LA	-	-	800/125/250/ - /100/ -
AGL020035942	Santa Rita Upland	LA	-	-	- /- /- /- /- / -
Vista Hills MWC #4	Santa Rita Upland	LA	-	-	550/75/150/0.35/60/3
7N/35W-27P01	Lompoc Terrace	LA	20	-	-
7N/34W-15D3	Lompoc Upland	LA	31	-	-
7N/34W-14F4	Lompoc Upland	LA	23	-	-
7N/33W-17M1	Lompoc Upland	LA	31	-	-
7N/33W-19D1	Lompoc Upland	LA	28	-	-
7N/34W-12E1	Lompoc Upland	LA	35	-	-
VVCSD 3B (7N/34W-15E3)	Lompoc Upland	LA	-	-	600/175/125/0.175/100/1
MH CSD 7	Lompoc Upland	LA	-	-	550/125/125/0.2/70/1

GWL = Chronic Groundwater Level Declines, GWS = Reduction of Groundwater in Storage, Quality = Degradation of Water Quality, Surface Water = Depletion of Interconnected Surface Water

UA = Upper Aquifer, LA = Lower Aquifer

TDS = Total Dissolved Solids, Cl = Chloride, SO_4 = Sulfate, Na = Sodium, NO_3 = Nitrate

Groundwater elevation measurements collected from the WMA indicate that groundwater historically occurred at depths 40-feet below current conditions in the Upper Aquifer and up to 20-feet below current conditions in the Lower Aquifer. Available groundwater production and well activity data indicates that beneficial use of groundwater for domestic, municipal, and agricultural supply has remained relatively stable since the 1980s (Figure 2a.4-1, HCM), which implies that historical low groundwater conditions in the basin did not correspond to a significant and unreasonable depletion of supply (Section 3b.2-1). In addition to this, historical time-series of chloride concentration measurements collected at wells 7N/35W-17K20 and 7N/35W-21G2 show that historical low water levels have not induced seawater intrusion into the WMA. Historical groundwater elevations in the Upper Aquifer of the WMA were sufficient to support habitat and ecosystem health along the Santa Ynez River (Jones and Stokes, 2000), and groundwater elevations along the Santa Ynez River have risen 25 feet since 2015 (Section 2b, Groundwater Conditions, Figure 2b.1-4g).

To assess potential impacts of water level declines on municipal, agricultural, and domestic supply, a well impact analysis was performed to determine static groundwater elevations associated with the top of well screens (**Appendix 3b-B**). This analysis was performed for both the Upper Aquifer and Lower Aquifer in the WMA and characterized groundwater levels associated with top of well screens for municipal, domestic, and agricultural water supply wells (**Figures 3b.3-1 and 3b.3-2**). This analysis is based on well drillers logs filed with DWR and the Santa Barbara County Environmental Health Services. The category noted as "other" are wells in which the water use of the well is either monitoring or unknown. Domestic wells are typically the most vulnerable to water level decline below the top of well screen because they are often drilled shallower due to lower water use requirements (e.g., de minimis use) and budget constraints. In the lower aquifer, results from the impact analysis indicate that 2020 static groundwater elevations are currently at, or below, the top of well screens in approximately 34% of domestic wells, 21% of municipal wells, and 25% of agricultural supply. In the Upper Aquifer, results from the impact analysis indicate that 2020 static groundwater elevations are currently at, or below, the top of well screens in approximately 10% of domestic wells, 15% of municipal supply wells, and 2% of the agricultural supply wells.

Figure 3b.3-1

Well Perforations Relative to Upper Aquifer, Spring 2020 Water Depth (Top 50 Ft)

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Figure 3b.3-2

Well Perforations Relative to Lower Aquifer, Spring 2020 Water Depth (Top 50 Ft)

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Based on the above considerations, the minimum threshold for chronic lowering of groundwater levels in the Lower Aquifer in the Santa Rita Upland, Lompoc Terrace, Lompoc Upland, and Lompoc Plain was chosen by the WMA GSA at 20 feet below 2020 groundwater levels (Table 3b.3-2). Groundwater elevations 20 feet below 2020 levels corresponds to the top of well screens in approximately 22% of municipal supply wells, 39% of domestic supply wells, and 30% of agricultural supply wells completed in the Lower Aquifer. While there are currently no undesirable results associated with current groundwater levels and there is still groundwater storage available below the 20 feet level below 2020 groundwater levels[183], the WMA GSA chose 20 feet level based on keeping impacts to domestic wells below 40% (Figure 3b.3-2) and to maintain water levels close to historical water levels in order to avoid potential significant and unreasonable undesirable results for other sustainable management criteria[184] including water quality, land subsidence, surface water depletions, and groundwater dependent ecosystems.

The minimum threshold groundwater elevations for the Upper Aquifer were established 10-feet below the 2020 groundwater elevation (Table 3b.3-1). The WMA GSA chose this minimum threshold to be more conservative than the Lower Aquifer because municipal wells are more sensitive to water level decline in the Upper Aquifer (Figure 3b.3-2). Groundwater elevations 10 feet below the 2020 levels correspond to the groundwater elevations at or below top of well screens in approximately 15% of municipal supply wells, 15% of domestic supply wells, and 10% of agricultural supply wells. In addition, groundwater elevations 10 feet below 2020 levels maintain groundwater elevations near the Santa Ynez River (at RMWs 7N/34W-29F02, 7N/34W-35K09, and 7N/35W-21G02) above historical low water levels, maintaining the historical range in depths to water near along the Santa Ynez River.

Groundwater elevations 10-feet below 2020 conditions at RMWs 7N/35W-17M1 and 7N/35W-21G2 would cause groundwater elevations to drop below mean sea level and potentially induce seawater intrusion into the WMA. To avoid undesirable results associated with seawater intrusion caused by chronic lowering of groundwater levels, minimum threshold groundwater elevations established at 7N/35W-17M1 and 7N/35W-21G2 were set equal to mean sea level (Table 3b.3-1).

183 Due to the Santa Rita Syncline, the Lower Aquifer thickness is up to 1000 feet (Section 2a, HCM).
184 23 CCR § 354.28 (c)(1)(B) Potential effects on other sustainability indicators.

3b.3-1-1 Chronic Lowering of Groundwater Levels Trigger Point

To allow adequate time for the implementation of projects and management actions to address declining water levels prior to the occurrence of minimum thresholds, an early warning "trigger point" has been established. The trigger point is activated with groundwater levels reaching five feet above the established water level minimum thresholds in half of the RMWs for a period of one year, (minimum thresholds are reported in Table 3b.3-1). In addition, another early management trigger will be when the capacity of municipal water supplies is impacted by greater than 20%. For example, for the Upper Aquifer, this will occur when the City of Lompoc's municipal total well pumping capacity is reduced by 20% due to groundwater level decline. This will trigger early management actions such as requesting water rights releases from the Cachuma Reservoir (see Section 4 for more details and discussion).

3b.3-2 Reduction in Groundwater Storage – ~~Measurable~~Minimum Thresholds

There is a direct correlation between the volume of groundwater in storage and groundwater levels at the RMWs. Therefore, groundwater levels in the Upper Aquifer and Lower Aquifer will be used as a proxy for significant and unreasonable loss of groundwater in storage (Table 3b.3-1). As with chronic lowering of groundwater levels, undesirable results associated with reduction of groundwater in storage will occur if spring groundwater elevations that drop below the minimum threshold water levels in more than 50% of the RMWs for two consecutive years.

3b.3-2-1 Reduction in Groundwater Storage Trigger Point

As with the undesirable result of the chronic lowering of groundwater levels, a trigger point for the reduction of groundwater in storage has been established. The trigger point is activated with groundwater levels reaching five feet above the established water level minimum thresholds in half of the RMWs for a period of one year (Table 3b.3-1).

3b.3-3 Seawater Intrusion – ~~Measurable~~Minimum Thresholds

As part of the preparation of this GSP, chloride isocontours were delineated down to a concentration of 500 mg/L. The current location of the 500 mg/L isocontour is within the jurisdictional boundary of the Vandenberg Space Force Base (VSFB); groundwater underlying the VSFB is not subject to the SGMA. To protect beneficial uses of groundwater as a source of agricultural and domestic supply, the minimum threshold for seawater intrusion is the migration of the 500 mg/L chloride isocontour from a mile west of the Vandenberg Space Force Base boundary, to an eighth of a mile east of Vandenberg Space Force Base boundary and into the primary production zone of the Lompoc Plain (Figure 3b.2-3). **Figure 3b.3-3** is a cross-~~-~~ section of the minimum threshold chloride concentration isocontour.[185] This minimum threshold is inland of the current isocontour which would allow for potential sea level rise which may result in the estuary expanding inland.

The 500 mg/L chloride isocontour will be generated as part of the GSP implementation annually using groundwater chloride concentrations collected at wells 7N/35W-17M1, 7N/35W-21G2, 7N/35W-22A1, and 7N35W-22A3 (**Appendix 3b-C**). Because sources of chloride in the Lompoc Plain are variable, the 500 mg/L chloride isocontour location will be compared to time-series of concentration data from 7N/35W-17M1 and 7N/35W-21G2 to determine whether chloride concentrations in the western Lompoc Plain are indicative of the landward migration of seawater into the WMA or the result localized sources.

3b.3-4 Degraded Water Quality – ~~Measurable~~Minimum Thresholds

Minimum threshold for salt and nutrient concentrations are based largely on the Groundwater Quality Objectives (WQOs) from the CCWQCP. The average 2015-2018 salt and nutrient concentrations in the Lompoc Terrace and Santa Rita Upland are currently lower than the WQOs established in the CCWQCP. Except for nitrate, the minimum threshold salt and nutrient concentrations for these subareas are established at the Median WQOs from the CCWQCP (Table 3b.2-1).

Table 3b.3-2
Average Minimum Threshold Salt and Nutrient Concentrations (mg/L)

Subarea	TDS	CL	SO_4	B	Na	NO_3 as N
Lompoc Upland	1470	214	471	0.5167	145	7
Lompoc Plain	575	150	125	0.1875	85	10
Santa Rita Upland	675	100	200	0.3500	80	3

TDS = Total Dissolved Solids, Cl = Chloride, SO_4 = Sulfate, Na = Sodium, NO_3 as N= Nitrate as Nitrogen

185 23 CCR § 354.28.(c)(3)

Salt and nutrient concentrations in the Lompoc Plain and Lompoc Upland currently exceed the WQOs in the CCWQCP. To support ongoing efforts by the RWQCB to improve groundwater quality within the WMA and provide operational flexibility for beneficial users of groundwater, the minimum threshold concentrations are established near current salt and nutrient concentrations (**Appendix 3b-D**). **Table 3b.3-2** shows the average minimum threshold concentration for each salt and nutrient~~ with an established WQO. The average minimum threshold concentrations for each subarea in the WMA are below the WQO's established in the CCWQCP.~~.

3b.3-4-1 Nitrate Minimum Threshold

The maximum contaminant level (MCL) for nitrate in drinking water is 10 mg/L for nitrate as nitrogen. Nitrate is considered to be undesirable for other uses, including watering of livestock and sensitive crop irrigation, at concentrations exceeding 100 mg/L and 5 to 30 mg/L, respectively (Section 2b, GC). The CCWQCP WQO is for nitrate and nitrite as nitrogen ranges from 1 to 2 mg/L across the WMA. Because the most sensitive use of groundwater within the WMA is potentially untreated groundwater served through domestic wells, the minimum threshold established for nitrate concentrations in groundwater is 10 mg/L (Table 3b.2-1). The average nitrate concentration in the Lompoc Plain Subarea was 2 mg/L from 2015 to 2018, below the 10 mg/L threshold.

3b.3-5 Land Subsidence – Minimum Thresholds

Minor changes in land surface elevations since the SGMA benchmark of 2015 likely result from forces unrelated to groundwater production because both land subsidence and rise have been noted and the subsurface materials do not include areas of thick, extensive clay that is typically prone to dewatering and compression. Localized lowering of land surface elevation may occur from causes other than land subsidence, including slope failure, hydrocompaction, excavation or grading for construction, and agricultural activities. In addition, the minimum threshold established for decline of water levels would preclude substantial land subsidence because thresholds are near historical low water elevations. The GSA proposes to monitor publicly available land subsidence satellite and continuous GPS data and report changes on an annually (Section 3a.3-5, Monitoring Networks). The land subsidence minimum threshold is a decline of six inches from the 2015 land surface elevation resulting from groundwater extractions and that interferes with land uses or infrastructure. Land use and infrastructure disruption will be determined by communication with relevant agencies and beneficial use representatives including the City of Lompoc,

Figure 3b.3-3

Western Management Area, Aquifer Cross Section A-A' Chloride Advancement Front Measurable Objective and Minimum Threshold

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Santa Ynez River Water Conservation District, CalTrans, and the Central Coast Water Authority. Exceedances of the minimum threshold will be investigated to confirm changes in land surface elevation are not attributed to grading due to land development, routine agricultural practices, or plate tectonics.

3b.3-6 Depletion of Interconnected Surface and Groundwater – ~~Measurable~~Minimum Thresholds

Minimum thresholds for depletion of interconnected surface and groundwater were established to preserve historical ranges in connection between the Santa Ynez River and the Upper Aquifer of the Lompoc Plain (Figure 3b.2-6). As noted in Section 3b.2-6, surface water flows, and the connection between surface water and groundwater, along the Santa Ynez River sustains native GDEs and seasonal flows of endangered steelhead trout (*O. mykiss*). Previous investigations of groundwater-surface water connection along the Santa Ynez River indicate that historical groundwater usage in the WMA has not threatened health of these ecosystems (Jones and Stokes 2000).

To ensure that these conditions persist in the future, the minimum thresholds for depletion of interconnected surface water are groundwater elevations measured at wells 7N/34W-35K9, 7N/34W-29F2, and 7N/35W-21G2 that are 10 feet below the 2020 groundwater elevation (Table 3b.3-1 and **Appendix 3b-E**). Groundwater elevations 10-feet below spring 2020 levels would allow the water table to drop within historical conditions in the WMA (Appendix 3b-E), thereby ensuring maximum depletions within historical conditions, while maintaining water levels within the typical rooting depths of the GDEs that exist on the banks of the Santa Ynez River. Groundwater elevations have historically rebounded in the Upper Aquifer from levels approximately equal to the established minimum thresholds to groundwater elevations equal to the Santa Ynez River channel thalweg. The established minimum threshold groundwater elevations maintain the hydraulic communication between the Santa Ynez River and the underlying groundwater aquifer within historical conditions.

3b.3-7 Relationship between Minimum Thresholds for all Sustainability Indicators

Groundwater stored in the Upper Aquifer of the WMA provides a source of water supply for municipal, domestic, and agricultural users, as well as native phreatophytes that sustain habitats along the Santa Ynez River. In addition, surface water and groundwater interact dynamically within the WMA along the

Santa Ynez River. Santa Ynez River flows are controlled by surface water releases under WR 2019-0148. Groundwater elevation minimum thresholds are established in this GSP to maintain historical conditions between groundwater and surface water.

As noted in Section 3b.3-1, long-term accessibility and availability of groundwater supplies in the Upper Aquifer of the WMA are preserved by establishing minimum threshold groundwater elevations 10 feet below the 2020 groundwater level. These groundwater elevation minimum thresholds protect municipal, agricultural, and domestic groundwater users by preventing significant and unreasonable increases in the number of aerated well screens in the WMA (Section 3b.3-1). In addition, groundwater elevation minimum threshold near the Santa Ynez River maintains water levels within the rooting zone of the vegetation that line the banks of the River and keeps groundwater elevations within historically observed ranges (Section 3b.3-6). Lastly, groundwater elevation minimum thresholds ensure that groundwater elevations do not drop below mean sea level to protect against potential seawater intrusion that would impact water quality and beneficial users in the WMA.

The understanding of the relationship between groundwater elevations and groundwater quality in the WMA has evolved over time. As noted in Section 3b.2-4, groundwater quality in the WMA was historically impacted by pumping that caused low-quality Santa Ynez River water to migrate into the primary production area of the Upper Aquifer (Bright et al 1992). However, more recent evaluations of water quality trends in the WMA indicate that there may be limited correlation between groundwater elevations and groundwater quality in the Upper Aquifer (Haas et al 2019). If undesirable results associated with degradation of water quality occur in the WMA, an examination of the relationship between groundwater elevations, groundwater quality, and the established minimum thresholds will be conducted through projects and management actions (Chapter 4, Projects and Management Actions).

3B.4 MEASURABLE OBJECTIVES

Measurable objectives are "quantifiable goals for the maintenance and improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin." [186] Based on the sustainability goal (Section 3b.1) and undesirable results (Section 3b.2) for the WMA, measurable objectives were established for the relevant sustainability indicators.

3b.4-1 Chronic Lowering of Groundwater Levels – Measurable Objectives

The measurable objective established for chronic lowering of groundwater levels in both principal aquifers (Upper and Lower) is the spring 2011 groundwater elevation. Groundwater elevations in spring 2011 preceded recent drought conditions and followed a ten-year period of near normal climate (Chapter 2c, Water Budget). Measurable objectives are achieved when the 2011 groundwater elevation is reached in half of the representative monitoring wells (RMWs).

In the Upper Aquifer of the Lompoc Plan, 2011 water levels are 5 to 10 feet lower than historical high groundwater elevations. Current (2020) groundwater elevations are at, or near, the 2011 measurable objective in 8 out of the 13 RMWs (or 62%) completed in the Upper Aquifer. In the Lower Aquifer of the Lompoc Plan, 2011 water levels generally do not correspond to historical high groundwater elevations. Current groundwater elevations are at, or near, the 2011 measurable objective in 1 out of the 13 RMWs (or 8%) completed in the Lower Aquifer. In the remaining RMWs, current groundwater elevations are 5 to 15 feet below the established measurable objectives.

~~Interim milestones are not established for groundwater elevations because the sustainability goal is currently being met within the WMA (Section 3b.1) and the WMA is not experiencing undesirable results associated with any of the six sustainability indicators identified as part of SGMA.~~

186 23 CCR § 351(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.

3b.4-2 Reduction of Groundwater in Storage – Measurable Objectives

Groundwater elevation is used as a proxy for groundwater in storage. Undesirable results for reduction of groundwater in storage have not been documented within the WMA even during historical drought periods (Section 3b.2-2). The measurable objective for groundwater in storage is the same as that for decline in groundwater levels, the 2011 groundwater level occurring in half of the RMWs (**Table 3b.4-1**). ~~Interim milestones for the reduction of groundwater in storage have not been established because the sustainability goal for the WMA is currently being met (Section 3b.4-1).~~

Table 3b.4-1
Measurable Objectives

RMW Name	Subarea	Principal Aquifer	Chronic Decline in Groundwater Levels and Groundwater In Storage (ft. NAVD88)	Depletion of Interconnected Surface Water (ft. NAVD88)	Water Quality (mg/L) ($TDS/Cl/SO_4/B/Na/NO_3$)
7N/34W-35K09	Lompoc Plain	UA	80	67	-
Lompoc 11 (7N/34W-35)	Lompoc Plain	UA	-	-	1000/100/400/0.4/90/1
7N/34W-26Q5	Lompoc Plain	UA	68	-	-
7N/34W-34F06	Lompoc Plain	UA	57	-	-
7N/34W-27F09	Lompoc Plain	UA	56	-	-
6N/34W-6C4	Lompoc Plain	UA	42	-	-
7N/34W-29N6	Lompoc Plain	UA	41	-	1500/250/600/1/225/ -
7N/35W-26L01	Lompoc Plain	UA	30	-	1500/250/600/0.5/200/10
7N/35W-26L02	Lompoc Plain	UA	32	-	500/125/110/0.1/60/1
7N/35W-24J4	Lompoc Plain	UA	30	-	-
7N/35W-21G2	Lompoc Plain	UA	8	0	1500/450/400/0.4/225/1
7N/35W-17M1	Lompoc Plain	UA	5	-	-
7N/34W-32H2	Lompoc Plain	UA	45	-	-
7N/35W-23B2	Lompoc Plain	UA	8	-	-
AGL020004874	Lompoc Plain	UA	-	-	1500/200/500//100/2
Lompoc 6 (7N/34W-27K07)	Lompoc Plain	UA	-	-	1000/75/250/0.4/70/1
7N/34W-27K05	Lompoc Plain	UA	-	-	1000/80/250/0.4/75/ -
7N/34W-27K04	Lompoc Plain	UA	-	-	1000/90/250/0.4/80/1
7N/35W-17K20	Lompoc Plain	UA	-	-	-
7N/34W-29F02	Lompoc Plain	UA	-	31	-
7N/35W-26L04	Lompoc Plain	LA	28	-	500/150/150/0.125/70/1
7N/34W-29N7	Lompoc Plain	LA	43	-	1000/150/250/0.5/110/1

RMW Name	Subarea	Principal Aquifer	Chronic Decline in Groundwater Levels and Groundwater In Storage (ft. NAVD88)	Depletion of Interconnected Surface Water (ft. NAVD88)	Water Quality (mg/L) (TDS/Cl/SO_4/B/Na/NO_3)
7N/34W-24N1	Lompoc Plain	LA	56	-	-
7N/34W-22J6	Lompoc Plain	LA	55	-	-
7N/35W-26L04	Lompoc Plain	LA	28	-	500/150/150/0.125/70/1
7N/34W-27K06	Lompoc Plain	LA	-	-	1000/125/250/0.4/110/
7N/33W-28D3	Santa Rita Upland	LA	42	-	-
7N/33W-21G2	Santa Rita Upland	LA	65	-	-
7N/33W-27G1	Santa Rita Upland	LA	56	-	-
AGL020021642	Santa Rita Upland	LA	-	-	500/75/100/ - /60/ -
AGL020035942	Santa Rita Upland	LA	-	-	- /- /- /- /- / -
Vista Hills MWC #4	Santa Rita Upland	LA	-	-	450/40/125/0.2/50/2
7N/35W-27P01	Lompoc Terrace	LA	43	-	-
7N/34W-15D3	Lompoc Upland	LA	58	-	-
7N/34W-14F4	Lompoc Upland	LA	50	-	-
7N/33W-17M1	Lompoc Upland	LA	62	-	-
7N/33W-19D1	Lompoc Upland	LA	56	-	-
7N/34W-12E1	Lompoc Upland	LA	62	-	-
VVCSD 3B (7N/34W-15E3)	Lompoc Upland	LA	-	-	500/150/100/0.1/90/1
MH CSD 7	Lompoc Upland	LA	-	-	500/100/100/0.1/50/1

GWL = Chronic Groundwater Level Declines, GWS = Reduction of Groundwater in Storage, Quality = Degradation of Water Quality, Surface Water = Depletion of Interconnected Surface Water

UA = Upper Aquifer, LA = Lower Aquifer

TDS = Total Dissolved Solids, Cl = Chloride, SO_4 = Sulfate, Na = Sodium, NO_3 = Nitrate

3b.4-3 Seawater Intrusion – Measurable Objectives

Chloride concentrations in wells adjacent to the estuary are reflective of natural conditions in the WMA (Section 2b.4, Groundwater Conditions) and have not caused significant and unreasonable impacts to the beneficial use of groundwater for municipal, agricultural, and domestic supply (Section 3b.2-3) in the western Lompoc Plain. Because current chloride concentrations in the western portion of the WMA are suitable for agricultural, domestic, and municipal supply, the measurable objective for seawater intrusion is the current location of the 500 mg/L chloride isocontour (Figure 3b.2-3). With these current conditions the measurable objective would additionally support the current types of wildlife habitat in the estuary.

3b.4-4 Degraded Water Quality – Measurable Objectives

The measurable objectives for degradation of water quality are equal to the minimum of the secondary maximum contaminant level (where applicable) and the 2015 groundwater concentration (Table 3b.4-1; Appendix 3b-B). ~~Because groundwater quality in the WMA is currently suitable for agricultural, domestic, and municipal supply (Section 3b.2-4), interim milestones are not established for water quality as part of this GSP.~~

3b.4-5 Land Subsidence– Measurable Objectives

Undesirable results related to land subsidence have not occurred historically and are not likely to occur within the WMA. Land subsidence monitoring will rely on publicly available InSAR and continuous GPS data (Section 3b.2-5). The measurable objective is land subsidence of less than two inches as compared to 2015 InSAR data resulting from groundwater extraction.

3b.4-6 Depletions of Interconnected Surface Water and Groundwater – Measurable Objectives

Measurable objectives for depletion of interconnected surface and groundwater were established to preserve long-term connection between the Santa Ynez River and the Upper Aquifer of the Lompoc Plain (Appendix 3b-C). As noted in Section 3b.2-6, surface water flows, and the connection between surface water and groundwater, along the Santa Ynez River sustains native GDEs and seasonal flows of endangered steelhead trout. Previous investigations of groundwater-surface water connection along the

Santa Ynez River indicate that historical groundwater usage in the WMA has not caused undesirable results to the GDEs (Jones and Stokes 2000).

To ensure that these conditions persist in the future, the measurable objective established for depletion of interconnected surface water are groundwater elevations measured at wells 7N/35W-21G02, 7N/34W-29F02, and 7N/34W-35K09 equal to five feet below the channel thalweg of the Santa Ynez River. Groundwater elevations five feet below the channel thalweg would ensure that the soil would be wet and be able to provide water for the GDEs along the riparian corridor.

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3B.5 INTERIM MILESTONES

"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.[187] The objective of setting interim milestones is establishing progress steps "to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon."[188] The sustainability goal is currently being met within the WMA (Section 3b.1) and the WMA is not experiencing undesirable results associated with any of the six SGMA sustainability indicators.

Interim milestones coincide with the five-year plan assessments (Section 5a.5), and will be evaluated and updated as part of the five-year plan assessment process.

3b.5-1 Groundwater Elevation Milestones

The sustainability goal is currently being met within the WMA (Section 3b.1) and the WMA is not experiencing undesirable results associated with chronic groundwater level decline (Section 3b.2-1). The interim milestones for groundwater elevation are therefore set to be the same as the measurable objectives, that is with the 5-year (2027), 10-year (2032), and 15-year (2037) having groundwater levels at the 2011 groundwater level or higher in half of the representative monitoring wells (RMWs).

3b.5-2 Groundwater Storage Milestones

The sustainability goal for groundwater storage is currently being met (Section 3b.4-1). The interim milestones for storage are therefore set to be the same as the measurable objectives., that is with the 5-year (2027), 10-year (2032), and 15-year (2037) having groundwater levels at the 2011 groundwater level or higher in half of the representative monitoring wells (RMWs).

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187 23 CCR § 351(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.

188 23 CCR § 354.30(a) Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.

3b.5-3 Seawater Intrusion Milestones

Seawater intrusion (Figure 2b.4-3, GC) relates to the amount of seawater intrusion and mixing in the Santa Ynez estuary that may impact groundwater. Sea level rise related to climate change (Section 3b.2-3, Undesirable Results) is not expected to adversely affect beneficial uses of groundwater.[189] The interim milestones for seawater intrusion are therefore set to be the same as the measurable objectives with the 5-year (2027), 10-year (2032), and 15-year (2037) isocontour of chloride the same as the measurable objective.

3b.5-4 Water Quality Milestones

Groundwater quality in the WMA is currently suitable for agricultural, domestic, and municipal supply purposes (Section 3b.2-4). The interim milestones are therefore set to be the same as the measurable objectives with the 5-year (2027), 10-year (2032), and 15-year (2037).

3b.5-5 Land Subsidence Milestones

Inelastic land subsidence is not occurring or likely to occur in the future within the WMA (see Section 2b.5, GC; Section 3b.2-5, Section 3b.3-5). Land subsidence includes rapid changes in land surface elevation, and differential settling which can damage or destroy infrastructure.

The interim milestones for land subsidence are therefore set as a rate of change of no more than three inches in a five-year period. That is a 5-year (2027) of no more than three inches since 2022, 10-year (2032) of no more than three inches since 2027, and 15-year (2037) of no more than three inches since 2032.

3b.5-6 Interconnected Surface Water Milestones

Conditions of the Santa Ynez River surface water and river underflow are primarily influenced and maintained by operation of upstream reservoirs. Management of these reservoirs and diversions from river surface water and river underflow includes as inputs local watershed runoff, water exports to the

189 Other planning and management efforts would be suited and empowered to address surface water and surface water beneficial use on federal land in the context of global climate change sea level rise.

south coast, and imports through the CCWA pipeline from the State Water Project and other sources (see Appendix 1d-B).

The interim milestones for interconnected surface water are established as the same as the measurable objective. That is a 5-year (2027), 10-year (2032), and 15-year (2037) interim milestones of water levels at 5 feet below the channel thalweg elevation.

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3B.6 EFFECTS OF SUSTAINABLE MANAGEMENT CRITERIA ON NEIGHBORING BASINS

The WMA of the Santa Ynez River Valley Groundwater Basin is bounded to the north by the Purisima Hills and Purisima Anticline, which limits connectivity between the principal aquifers in the WMA and the San Antonio Creek Valley Groundwater Basin to the north (Section 1d, Plan Area, and Section 2a, HCM). Along the southern and western boundary of the WMA the Santa Ynez River Valley Groundwater Basin is bordered by the White Hills and Pacific Ocean (Section 1d, Plan Area, and Section 2a, HCM). There are no groundwater basins that border the WMA along the southern boundary of the Basin. The WMA has limited connectivity to the CMA along the eastern boundary of the Santa Rita Upland and through the Santa Ynez River Alluvium (Section 2a, Hydrogeologic Conceptual Model). Interactions between the WMA and CMA through the Santa Ynez River Alluvium is considered surface water interactions, and therefore is not within the jurisdiction of the WMA GSA (Section 3b.1-1).

The WMA is downgradient from the CMA along the northeastern boundary of the Santa Rita Upland. Because the WMA is downgradient of the CMA, and the established minimum thresholds maintain the direction of this gradient in the future, groundwater conditions in the Santa Rita Upland will therefore not negatively impact that of the CMA.

Groundwater elevations have historically occurred several hundred feet lower in the Santa Rita Upland compared to the Buellton Upland subarea of the CMA (e.g., well 7N/33W-27G1 vs. 7N/33W-36J1; see Chapter 2b, Groundwater Conditions). This difference in groundwater levels indicates a potential hydrogeologic barrier to groundwater movement between the Santa Rita Upland and Buellton Upland. The extent and nature of this barrier is a data gap, which is currently being assessed with the Airborne Electromagnetic (AEM) geophysical survey performed in November 2020 (SkyTEM study). Because the groundwater elevation minimum threshold differences are within the observed groundwater elevation differences across the WMA-CMA boundary, future operations and management in the WMA will not impact the sustainability of the CMA.

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CHAPTER 4: PROJECTS AND MANAGEMENT ACTIONS

~~4A.1 INTRODUCTION~~

SECTION 4A – SUMMARY OF PROJECT AND MANAGEMENT ACTIONS

As established in Chapters 2 and 3, based on historical and current data, undesirable results associated with excessive lowering of groundwater levels have not been observed, and are not currently occurring, within the WMA. Due to absence of undesirable results for all sustainability indicators, the WMA basin is currently sustainable. Groundwater pumping estimates for current conditions (2011 through 2018) indicate that annual groundwater production within the WMA is within 10% of the estimated perennial yield of the WMA (26,000 to 27,000 AFY). However, future water demands are projected to increase due to climate change and increases in population (Section 2c- Water Budget). Additionally, the Lower Aquifer of the WMA, primarily in the Lompoc Upland and Santa Rita Upland, indicates a long-term water level decline. While not currently producing undesirable results, groundwater level declines in the Lompoc Upland and Santa Rita Upland should be managed with Projects and Management Actions (PMAs) as soon as practical to maintain sustainability into the future. Overall, based on the Water Budget presented in Section 2c, PMAs are planned for the WMA to address drought-related declining groundwater level trends and to achieve a net gain of approximately 500 AFY in the Water Budget. Otherwise, groundwater storage could continue to decline by 500 AF each year, and water levels in some Representative Monitoring Sites may fall beneath their Minimum Thresholds. Similarly, additional PMAs are identified to adaptively address possible changes in water demand, climate changes, and achieve a net gain of up to 3,000 AFY in the Water Budget by the year 2072.

PMAs are employed to avoid or mitigate undesirable results. As stated in SGMA Regulations, the GSP must include "*a description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing* *conditions in the basin*."[190] Implementation of the management actions and projects presented below are intended to respond to possible changes in basin conditions, and maintain operation of the WMA within its sustainable yield.

PMAs described in this chapter are designed to support sustainability goals, measurable objectives, and address undesirable results identified for the Basin (Chapter 3). In general, there are two different categories of PMAs: PMAs that address water demand and PMAs that address water supply. Chapter 4 presents four groups of water demand and water supply PMAs, and implementation of each group is determined by current and projected future conditions. As explained below, the need and timing of a particular project within each group is determined by early warning triggers.

1. **General Management PMAs (Group 1 PMAs)**. Group 1 PMAs are planned under current and future Basin conditions. The primary objective of Group 1 PMAs is management of groundwater extractions and recharge to ensure that excessive lowering of groundwater levels during periods of drought is sufficiently offset by increases in groundwater levels and storage during the other periods. An additional Group 1 PMAs objective is to protect current water quality, groundwater dependent ecosystems, avoid impacts from land subsidence and depletion of surface water due to groundwater pumping. Implementation activities related to monitoring and initially identified data gaps are described in detail in the next Chapter, Plan Implementation (Chapter 5).

2. **Early Warning PMAs (Group 2 PMAs)**. The early warning trigger was established by the WMA GSA to act as an advisory indicator that conditions in the Basin are approaching Minimum Thresholds. Group 2 PMAs are implemented when the early warning trigger is reached, and at the latest if a Minimum Threshold has been reached (see Chapter 3b). Implementation of Group 2 PMAs also initiates planning for potential Group 3 PMAs to ensure timely project start-up should they be needed.

190 23 CCR §354.44 (a) Each Plan shall include a description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.

3. **Minimum Threshold PMAs (Group 3 PMAs)**. Group 3 PMAs are implemented if conditions in the basin do not meet the Minimum Threshold for one or more of the six Sustainability Indicators (see Chapter 3b).

4. **Other PMAs (Group 4 PMAs).** Group 4 PMAs have been identified for use if the Groups 1, 2, and 3 PMAs are insufficient to maintain the sustainability goal for the Basin. In the future, additional PMAs may be identified and added to this list of PMAs as part of future GSP evaluations and updates. Additionally, the GSA may elect to implement one or more the projects in Group 4 PMAs at any time to achieve the sustainability goal for the Basin.

Table 4a.1-1 provides a list of the PMAs organized by the four groups and their supply/demand categories. Section ~~4a.4-2~~4b discusses the General Management PMAs (Group 1 PMAs) planned for implementation under current conditions: Water Conservation Management Action, Tiered Fees and Well Meter Management Action, the Recycled Water Project, Increased Stormwater Recharge Project, and a Ban on Self-regenerating Water Softeners Management Action. Section ~~4a.4.3~~4c discusses PMAs that would be implemented if the Early Warning Triggers or Minimum Thresholds are reached (Group 2 and 3 PMAs), including: Cachuma Reservoir Water Rights Releases Management Action, Supplemental Conditions on New Wells Management Action, the Annual Pumping Allocation Plan, and Voluntary Fallowing Management Action. Section ~~4a.4.4~~4d discusses the other PMAs identified to date (Group 4 PMAs), including a Supplemental Imported Water Project, a Non-native Vegetation Removal Project, and Agricultural Land Retirement.

Table 4a.1-1
Summary of Project and Management Actions in the WMA to Achieve Current and Future Groundwater Sustainability

	Demand	Supply
Group 1	Water Conservation	Recycled Water Project
	~~Tiered~~Groundwater Extraction Fees and Well Meters	Increased Stormwater Recharge
		Ban on Water Softeners
Group 2	Supplemental Conditions on New Wells	Water Rights Releases Request
Group 3	Annual Pumping Allocation Plan	
Group 4	Non-native Vegetation Removal	Supplemental Imported Water Program

	Agricultural Land Retirement/ Pumping Allowance	Santa Ynez River Lompoc Plain Recharge Pond Project~~Well-head pre-treatment to soften~~
	Well-head pre-treatment to soften~~Santa Ynez River Lompoc Plain Recharge Pond Project~~	Drought Mitigation - by Pumping Optimization and Deepen Existing Wells

With the implementation of the Group 1 PMAs, it is anticipated that WMA groundwater production will be maintained at sustainable levels primarily through demand management. Combined, the Water Conservation and ~~Tiered~~Groundwater Extraction Fees and the Well Meters Management Actions are anticipated to meet the needs of the current and future WMA Water Budget which are estimated to be an additional 500 to 3,000 AFY. These programs will reduce the annual pumping demands on the WMA Principal Aquifers (Upper and Lower).

The SGMA Regulations[191] state the GSP shall include a description of the projects and management actions that include the following:

1. **A list of projects and management actions** proposed in the GSP with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent. The GSP shall include the following:
    a. A description of the circumstances under which projects or management actions shall be implemented, the criteria that would trigger implementation and termination of projects or management actions, and the process by which an agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.
    b. The process by which an agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken.
2. If overdraft conditions are identified through the analysis required by Section 354.18, the GSP shall describe projects or management actions is being considered or has been implemented, including a description of the actions to be taken.

191 23 CCR §354.44. Projects and Management Actions

3. A summary of the **permitting and regulatory process** required for each project and management action.
4. The status of each project and management action, including a **time table** for expected initiation and completion, and the accrual of expected benefits.
5. An **explanation of the benefits** that are expected to be realized from the project or management action, and how those benefits will be evaluated.
6. An explanation of how the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of an agency, an explanation of the source and reliability of that water shall be included.
7. A description of the **legal authority** required for each project and management action, and the basis for that authority within an agency.
8. A description of the **estimated cost** for each project and management action and a description of how the Agency plans to meet those costs.
9. A description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or deletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods.

The proposed PMAs are supported by the best available information and best available science and have considered the level of uncertainty associated with the WMA setting during development. A summary of proposed PMAs and other potential PMAs that are planned for the WMA are discussed in the subsections below. The GSP is a planning document, and consequently, the level of detail provided for the proposed Projects and Management Actions reflect the necessary level of specificity. After the PMAs are fully developed, specific design and/or implementation plans will be prepared, as applicable and necessary. These plans will be made available to the public prior to any Board action for implementation. If one, or more, of the planned PMAs cannot be implemented, the WMA GSA will consider additional actions to reach sustainability. **Table 4a.1-2** provides a summary sustainability benefits, timetable, permits required, estimated benefit and cost ratio for all PMAs.

Table 4a.1-2
Summary of Project and Management Actions in the WMA- Sustainability Benefits and Implementation Process

Timetable	Project and Management Action Title	Relevant Sustainability Indicators Affected						Required Permits	Estimated Additional Water (AFY)	Estimated Benefit : Cost Ratio
		Groundwater Levels	Reduction in Storage	Seawater Intrusion	Water Quality	Land Subsidence	Interconnected Surface Water			
Group 1- Initiated in first three years (see Table ~~4a.2~~4b.1-1)	Water Conservation	x	x	x	x	x	x	None	1,000-2,000	High
	~~Tiered~~Groundwater Extraction Fees and Well Meters	x	x	x	x	x	x	Proposition 26 / 218 or Local Ballot Initiative	1,000-2,000	High
	Recycled Water Project	x	x	x	x	x	x	Santa Barbara County, RWQCB, DWR, CEQA, SWRCB	2,500 - 3,500	Low to Medium
	Increased Stormwater Recharge	x	x	x	x	x	x	Santa Barbara County, USACE, DWR, CDFW, CEQA	50-500	Low to Medium
	Ban on Water Softeners				x			None	0; minimal	High
Group 2 - Initiated if Early Warning Triggers	Water Rights Releases Request	x	x	x	x	x	x	None	0; minimal	High
	Supplemental Conditions on New Wells	x	x	x	x	x	x	None	50-500	High
Group 3 - Initiated if Minimum Thresholds Reached	Annual Pumping Allocation Plan	x	x	x	x	x	x	Proposition 26 / 218 or Local Ballot Initiative	500-3,000	Medium to High

Timetable	Project and Management Action Title	Relevant Sustainability Indicators Affected						Required Permits	Estimated Additional Water (AFY)	Estimated Benefit : Cost Ratio
		Groundwater Levels	Reduction in Storage	Seawater Intrusion	Water Quality	Land Subsidence	Interconnected Surface Water			
Group 4 - Pending further decision by GSA to initiate	**Non-native Vegetation Removal**	x	x	x		x		Santa Barbara County, USACE, DWR, CDFW, CEQA	100 -1,000	Low to Medium
	Agricultural Land Retirement/ Pumping Allowance	x	x	x	x	x	x	CEQA	500-5,000	Low to Medium
	Santa Ynez River Lompoc Plain Recharge Pond Project	x	x	x	x	x	x	Santa Barbara County, USACE, DWR, CDFW, CEQA	500-3,000	Low to Medium
	Supplemental Imported Water Program	x	x	x	x	x	x	Santa Barbara County, DWR, CEQA	500-1,000	Low to Medium
	Well-head pre-treatment to soften				x			Santa Barbara County, RWQCB, DWR, CEQA	0	Low to Medium
	Drought Mitigation - Pumping Optimization and Deepen Existing Wells				x			Santa Barbara County, DWR, CEQA	0	Low to Medium

USACE = United States Army Corps of Engineers, DWR = Department of Water Resources, CDFW = California Department of Fish and Wildlife, CEQA = California Environmental Quality Act, RWQCB = Regional Water Quality Control Board

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~~4A.2~~SECTION 4B – PLANNED PROJECTS ~~AND~~AND MANAGEMENT ACTIONS ~~– GENERAL MANAGEMENT~~ (GROUP 1)

Project and Management Actions (PMAs) in Group 1 will be implemented under current conditions. This section does not cover monitoring, addressing data gaps, or the annual reporting, which are addressed in further detail in Chapter 5 Implementation.

The ongoing implementation of Group 1 PMAs, including groundwater pumping demand reductions through the Water Conservation and the ~~Tiered~~Groundwater Extraction Fee and Well Meter Programs, will maintain the sustainability of the Basin by balancing the possible future Water Budget deficits of up to 3,000 AFY resulting from demand increases and climate change. Additionally, Group 1 PMAs can also begin to increase groundwater recharge with recycled water projects and stormwater capture and infiltration projects. **Table ~~4a.2~~4b.1-1** provides a summary of a proposed timeline for the completion of major milestones related to this group of projects.

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Table ~~4a.2~~ 4b.1-1
5-Year Timeline of Sustainability Project and Management Actions – General Management (Group 1)

Water Year	2022			2023				2024				2025				2026				'27
Fiscal Year	2021-22		2022-23				2023-24				2024-25				2025-26				2026-27	
Calendar Year	2022				2023				2024				2025				2026			
Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Water Conservation Plan																				
Strategic Plan																				
Implementation																				
~~Tiered~~Metering/ Extraction Plan																				
Water Rates Study																				
Implementation																				
Recycled Water Reuse																				
Feasibility Study and Design																				
Permitting and Construction																				
Ongoing Implementation																				
Lompoc Bioretention Bioswale																				
Study and Design																				
Permitting and Construction																				
Ongoing Implementation																				
Water Softener Ban																				

~~4a.2-~~4b.1 Project and Management Action No. 1: Basin-Wide Conservation Efforts

~~4a.2-~~4b.1-1 Project Description

The municipalities and agricultural landowners in the WMA have previously adopted conservation measures within their respective service areas. For example, Senate Bill 7 of Special Extended Session 7 (SBX7- 7) of 2009 requires that all water suppliers increase water use efficiency with the overall goal to decrease per-capita water consumption within the state by 20% by the year 2020. The City of Lompoc has successfully met this goal and reduced per-capita water consumption to 86 gallons per capita per day (gpcd) (City of Lompoc 2021). Similarly, agricultural water users in the WMA have participated in existing conservation management programs as provided by the Cachuma Resource Conservation District (CRCD). For example, the CRCD's Mobile Irrigation Lab helps farmers and managers of schools and parks save water, energy, and money through onsite irrigation system analysis and technical assistance to improve water use efficiency.[192]

The WMA GSA will coordinate with the existing agencies and programs, and develop additional voluntary~~,~~ or rebate-based~~, or mandatory~~ conservation efforts for domestic, municipal, and agricultural beneficial uses within the WMA. A Water Conservation Strategic Plan, or similar document, will be developed that considers WMA GSA stakeholder concerns, integrates with existing conservation programs, and meets the health and safety water requirements for communities that rely on groundwater within the WMA. As part of plan development, the WMA GSA will confer with domestic and municipal groundwater producers (namely the City of Lompoc, Vandenberg Village CSD, Mission Hills CSD, and the mutual water companies) to discuss historical and current conservation measures governing landscape irrigation, wash-downs, and other potential savings as a guide to establish new voluntary conservation measures on a basin-wide level. The WMA GSA will utilize the Strategic Plan to promote and coordinate priority conservation projects for implementation. The Water Conservation Strategic Plan will supplement and augment existing conservation programs. For municipal and domestic uses throughout the WMA, a goal in the Strategic Plan may be developed to achieve per-capita water consumption levels similar to the City of Lompoc and groundwater pumping from the Upper Aquifer in the Lompoc Plain, as shown in **Table ~~4a.2-2~~4b.1-2**. This

192 Irrigation Evaluations. Cachuma Resource Conservation District. Web site. https://www.rcdsantabarbara.org/irrigation-evaluations Accessed 2021-08-10.

water use data in Table 4b.1-2 demonstrates that Lompoc and its citizens have proactively taken the steps necessary to achieve significant water conservation. The Water Conservation Strategic Plan should take into account the past and present actions that Lompoc and other groups and individuals have taken action on already. The Water Conservation Strategic Plan is recommended to create an inventory and accounting of conservation practices for each user in order to receive possible future credits in order to provide incentives for conservation.

Table ~~4a.~~4b.1-2~~-~~
Current Year (2020) Per Capita Water Use

-	Per Capita Water Use (Gallons per Capita per Day)	
-	Based on Total M & I	Based on Residential Water
City of Lompoc	81	60
Mission Hills CSD	124	118
Vandenberg AFB	64	27
Vandenberg Village CSD	147	114

Source: Santa Barbara County Water Agency. Website. http://waterwisesb.org Accessed 2021-08-18.
*** Per Capita Use is shown as (a) total Municipal & Industrial (M&I) water divided by population and (b) Single & Multi-Family Residential use divided by population.
Lot size and landscape water usage are major factors affecting Gallons/Person/Day

The programs listed below may assist or expand urban water conservation in the WMA GSA, including within Severely Disadvantaged Communities in the City of Lompoc:

1. High Water Use Outreach (High Use Reports)
2. Meter Audits to Proactively Detect Leaks (Leak Reports) and Leak Repair Programs
3. Rebates on Water-Saving Fixtures (e.g., clothes washers)
4. Rebates on Sustainable Landscape Conversion Programs
5. Water Awareness Outreach Events (Library/Outdoor Market events)

The WMA GSA can coordinate with Santa Barbara County to investigate the potential for, and feasibility of, water conservation in the industrial water uses in the WMA. ~~For example, in conjunction with County~~

~~staff, the WMA GSA can explore whether industrial water demands can be met by alternative non-potable supplies (e.g., recycled water and/or brackish water).~~

The WMA GSA can also coordinate with agricultural groundwater users to investigate the potential for, and feasibility of, additional water conservation in irrigation practices. The WMA GSA can coordinate with the existing agricultural conservation programs of the CRCD and the USDA Natural Resources Conservation Service (NRCS) Conservation Technical Assistance (CTA) Program. In particular funding sources may be identified to support the free services of CRCD's Mobile Irrigation Lab that performs irrigation audits and promotes enhanced efficient irrigation. Best management practices for conservation can be implemented basin wide (e.g., conversion to non-water intensive methods for frost protection and increased use of soil amendments to reduce water use and improve crop yields). The WMA GSA can seek to partner with other programs to support new weather and crop water use monitoring stations, and employ remote sensing data acquisition and analysis to optimize irrigation scheduling and deliveries.

~~4a.2~~ 4b.1-2 Project Benefits

Increased water conservation has a direct benefit by reducing groundwater production. The decrease in demand from baseline conditions is estimated to be approximately 10% to 20% of current groundwater production, when considered together with well production metering (see Section 5a) and the new groundwater extraction fees (see Project and Management Action No. 2 – ~~Tiered~~Groundwater Extraction Fees and Metering). Based on 2018 groundwater pumping for agricultural uses (20,000 AFY), the potential yield from water conservation is expected to be 2,000 to 4,000 AFY. This would meet the goal of achieving an additional 500 to 3,000 AFY needed to bring the water budget for the WMA into balance currently and in the future (Water Budget, Section 2c).

Management action benefits due to the reduction of groundwater pumping are anticipated to include the following:

- Increase in groundwater storage as compared to current trends and baseline conditions;
- Improved and rising groundwater levels;
- Improvements to water quality are due to reduction of irrigation return flows;
- Prevent depletions of surface water; ~~and~~

- Prevent degradation of groundwater dependent ecosystems,and
- Prevention of land subsidence conditions.

These benefits protect all beneficial uses of groundwater for agricultural, municipal, domestic, industrial, and environmental purposes. The measures for assessing this management action's benefits, relative to the measurable objectives and minimum thresholds established in Section 3b, will be monitored groundwater levels, groundwater quality, and changes in groundwater storage in the WMA. Additionally, water savings can be documented for the water conservation efforts implemented.

~~4a.2~~ 4b.1-3 Justification

Due to the current lack of supplemental water supplies, conservation efforts are a necessary tool to achieve the WMA's sustainability goal. Furthermore, contrary to water conservation programs, there is a high cost to acquire and convey supplemental water supplies. When implemented, basin-wide conservation measures will reduce groundwater production and therefore reduce the necessity of supplemental water.

~~4a.2~~ 4b.1-4 Project Costs

WMA conservation efforts if implemented, are expected to cost $50,000 to plan and approximately $30,000 annually to implement. Tasks needed to develop a conservation plan include: evaluating current conservation measures, methods to augment existing conservation programs, determining opportunities for additional conservation, conducting public outreach, meeting with groundwater producers, and drafting and adopting conservation related ordinances.

The costs for implementing a conservation program may increase if rebate programs are also implemented. These costs include advertising, marketing, customer service, processing rebate applications, purchasing water-conserving fixtures and appliances, vendor coordination, and issuing rebates. Optional water audits for existing irrigation would include additional costs for expanding CRCD's Mobile Irrigation Lab, which performs irrigation audits and promotes enhanced efficient irrigation.

Costs may be funded through fees, grants, and pumping assessments, or combinations thereof.

~~4a.2-~~4b.1-5 Permitting and Regulatory Process

This management action currently does not require the WMA GSA to obtain approved permits.

~~4a.2-~~4b.1-6 Public Notice

Public Notices will be issued prior to the WMA GSA's adoption of any new conservation programs Additionally, materials will be available to the public describing opportunities for voluntary conservation and available rebate programs sponsored by the WMA GSA.

~~4a.2-~~4b.1-7 Implementation Process and Timetable

Prior to implementing basin-wide conservation measures, the WMA GSA will determine acceptable conservation measures based on an analysis of historical and current conservation measures enforced by the WMA member agencies. Commencing in 2022, the WMA GSA will coordinate with existing water conservation program activities managed by the City of Lompoc, Vandenberg Village CSD, Mission Hills CSD, and the Cachuma Resource Conservation District (CRCD) to assess the potential to expand or modify existing conservation programs to achieve the Basin's sustainability goal.

The WMA GSA will develop a Water Conservation Strategic Plan which will be implemented over the GSP planning and implementation horizon.

~~4a.2-~~4b.1-8 Legal Authority

As the sole GSA for the WMA, the WMA GSA has the legal authority to manage groundwater within the WMA pursuant to SGMA~~.~~ (Section 1b.1-3, Administrative Information). As such, SGMA grants the WMA GSA broad powers, including the legal authority to: conduct investigations; adopt rules, regulations, ordinances and resolutions; require registration of groundwater extraction facilities and measurement of groundwater extractions by a water-measuring device satisfactory to the GSA; enter into written agreements and funding with private parties to assist in, or facilitate the implementation of, a GSP or any elements of the GSP; provide for the measurement of groundwater extractions; regulate groundwater extractions; impose fees on the extraction of groundwater and to fund the costs of groundwater management; and perform any act necessary or proper to carry out the purposes of SGMA.[193]

In accordance with SGMA "Nothing in this part, or in any groundwater management plan adopted pursuant to this, part determines or alters surface water rights or groundwater rights under common law or any provision of law that determines or grants surface water rights." [194] Accordingly, this GSP does not determine or alter such surface water or groundwater rights.

More specifically, SGMA grants the WMA GSA authority to "control groundwater extractions by regulating, limiting, or suspending extractions from individual groundwater wells." [195] SGMA statute authorizes the WMA GSA[196] to "propose and update fees" and to "monitoring compliance and enforcement" of the GSP. Accordingly, SGMA grants the WMA GSA the legal authority to implement basin-wide conservation measures as a GSP management action. The legal authority granted to the WMA GSA under SGMA statutes does not preclude other governing agencies from participating in or contributing to the implementation of basin-wide conservation measures. As such, the WMA GSA will coordinate and cooperate with the appropriate stakeholders and governing agencies in implementing basin-wide conservation measures.

~~**4a.2**~~

193 CWC Section 10725, 10725.2, 10725.4, 10725.6, 10725.8, 10726.2, 10726.4, 10726.5, 10730, 10730.2
194 CWC Section 10720.5 (b)
195 CWC Section 10726.4 Additional Authorities of Groundwater Sustainability Agency
196 CWC Section 10725 Powers and Authorities

4b.2 Project and Management Action No. 2: Implement ~~Tiered~~ Groundwater Extraction Fees with Mandatory Well Metering and Update Well Registration

~~4a.2~~ 4b.2-1 Management Action Description

Well metering, or acceptable alternative (i.e. power records) and up-to-date well registrations are necessary to accurately track and manage groundwater production (see Section 5a.3). Plans for a well metering program and update to well registrations will begin development during the first year of GSP implementation. Well metering will support the Groundwater Fee management action to promote voluntary water conservation and track performance of the Water Conservation actions. SGMA does allow de-minimis well users to be exempt from metering, but the WMA GSA may elect to require de-minimis users to report their water usage using other methods. The WMA GSA can develop additional guidelines for possible alternatives to well meters, including correlating energy usage with the volume of water pumped.

A charges framework is the fundamental structure for managing groundwater pumping and funding. A pump charge is just one of many things the GSA will consider in the future (e.g. parcel charge/ fee or both). By charging fees for various levels of pumping, the WMA GSA can both promote voluntary pumping reductions and provide a source of funding for GSA operations, monitoring, additional projects and management actions.

The charges framework can be developed in the first year of GSP implementation. Program details will be developed by the GSA with input from Basin Stakeholders, and multiple funding pathways can be utilized as permitted by SGMA regulations (e.g., parcel tax or pumping fees). Exempt groundwater users could include de-minimis pumpers or other classes of pumpers that are not managed by this GSP, who can be required to provide an alternate method to account for pumping.

If a pumping fee is established in the WMA, its rates and structure may be modified in the future and/or may be adjusted depending on groundwater conditions and program effectiveness.

~~Alternatively, a tiered fee structure would promote conservation and voluntary pumping reductions, and~~Groundwater extraction fees and water meters would work in tandem with the water conservation measures. Groundwater users would have incentives to switch to less water-intensive activities, or implement water use efficiencies. Alternatively, a groundwater user may instead opt to pay higher ~~tier~~ groundwater extraction rates in order to produce more groundwater.

~~***Implementation Actions Related to Tiered Groundwater Extraction Fees***~~

~~Objectives for tiered extraction fees are to utilize well metering and up-to-date well registrations to accurately track and manage groundwater production (see Section 5a.3). Plans for a well metering program and update to well registrations will begin development during the first year of GSP implementation. Well metering will support the Tiered Fee management action to promote voluntary water conservation and track performance of the Water Conservation actions. SGMA does allow de-minimis well users to be exempt from metering, but the WMA GSA may elect to require de-minimis users to report their water usage using other methods. The WMA GSA can develop additional guidelines for possible alternatives to well meters, including correlating energy usage with the volume of water pumped.~~

~~4a~~4b.2-2~~-2 Project~~ Management Action Benefits

The effect of tiered fees will reduce groundwater production and reduce the likelihood of triggering minimum thresholds. In conjunction with metering and water conservation, demand is expected to be reduced by 10% to 20% from the current groundwater production[197]. Based on 2018 total groundwater pumping for agriculture (20,000 AFY), the potential reduction of 2,000 to 4,000 AFY may be expected. These measures alone would meet the goal of saving 500 to 3,000 AFY which are needed to balance current and future water budgets (Water Budget, Section 2c). Management action benefits are anticipated to be the same as water conservation (Section ~~4a.2~~ 4b.1) including improved and rising groundwater levels due to reduction in groundwater pumping.

The corresponding cumulative gain of groundwater in storage, compared to no action conditions over the 50-year planning horizon, is estimated to be approximately 100,000 to 200,000 acre-feet. Additionally, the proposed management action will decrease the probability of requiring Group 3 or Group 4 PMAs. The combination of metering, conservation and ~~tiered~~ fees can potentially ~~achieve~~maintain the

[197] Research at the Irrigation Technology Center at Texas A&M University has demonstrated that water measurement by itself can reduce crop irrigation water use by 10 percent. When measurement was combined with education about proper on-farm irrigation management, water use was reduced by 20 to 40 percent (TWRI, 2001).

sustainability goal by reducing groundwater production in the WMA and reducing the potential for undesirable results.

The measures for assessing this management action's benefits, relative to the measurable objectives and minimum thresholds established in Section 3b, will be monitored groundwater levels and groundwater quality within the WMA. Additionally, groundwater production by groundwater users will be reported to the WMA GSA to monitor anticipated reductions in production.

~~4a.2~~ 4b.2-3 Justification

Due to the current unavailability of supplemental water supplies, providing incentives for voluntary reduction of groundwater pumping with ~~tiered~~ groundwater extraction fees, in tandem with metering, and expanding current conservation efforts can potentially maintain groundwater sustainability in the Basin. Furthermore, compared to the relatively low costs of water conservation, meters and ~~tiered~~ extraction fees, the high cost to acquire and convey supplemental water supplies would significantly impact all water users in the WMA.

~~4a~~4b.2-~~2~~-4 Costs

The WMA GSA will incur costs to develop the initial ~~tiered~~ groundwater extraction fee management action. The costs would include hiring a water rate and utility fee specialist to evaluate options and policies for the WMA GSA. Costs will include stakeholder outreach and conducting public workshops on what type and details of a groundwater extraction fee program the WMA should have. The administration overhead for these management actions combined (~~tiered~~ fees, well meters, and well registration) is estimated at $150,000 to $250,000 in the first year of GSP implementation. After the initial set-up in the first year, administrative costs to run all program components are estimated to be $50,000 to $80,000 annually. The costs to set up groundwater extraction fees will be funded through imposition of applicable fees and to the extent they can be obtained, grants, or a combination thereof.

~~4a.2~~4b.2-5 Permitting and Regulatory Process

Development and implementation of the ~~tiered~~ groundwater extraction fees would be developed in accordance with all applicable laws. The WMA GSA will follow all regulatory requirements associated with the environmental processes including public noticing and review requirements.

~~4a.2~~4b.2-6 Public Notice

Development of the groundwater extraction fees will include stakeholder outreach, public workshops, and public hearings to receive input from the Basin groundwater users. The public and interested parties will be given the opportunity to provide input to the WMA GSA. The WMA GSA will provide sufficient public notice of a public hearing to adopt the groundwater extraction fees and required well meter policies, as required by California Law.

~~4a.2~~4b.2-7 Implementation Process and Timetable

Prior to implementing ~~tiered~~ groundwater extraction fees, the WMA GSA will determine an acceptable fee structure based in part on an analysis of historical and current water production volumes. Commencing in 2022, the WMA GSA will compile pertinent information to use in the development of a ~~tiered~~ groundwater extraction fees structure. The WMA GSA will also develop a Water Rates Study with different alternatives. It is anticipated that the Water Rates Study could be completed by April 2023. After completion of the rate study, public hearings will be held such that the GSA can consider implementing the new groundwater extraction fee management action by October 2023 for water year 2024.

~~4a~~4b.2-~~2~~8 Legal Authority

As explained in Section ~~4a.2~~1b.1-~~8,~~3 (Administrative Information), SGMA grants the WMA GSA, as a groundwater sustainability agency, broad powers including the authority to "perform any act necessary or proper" to implement SGMA regulations and allows the WMA GSA to adopt rules, regulations, ordinances, and resolutions necessary for SGMA implementation.[198] Specifically, SGMA statue authorizes the WMA GSA to "propose and update fees" and to "monitoring compliance and enforcement" of the

[198] CWC Section 10725.2 Authority of Groundwater Sustainability Agency

GSP.[199] Moreover, SGMA statue authorizes the imposition of fees on the extraction of groundwater to fund costs of groundwater management.[200] Accordingly, SGMA grants the WMA GSA the legal authority to implement the GSP management action set forth above.

~~4a.2~~

199 CWC Section 10725.4 Investigations
200 CWC Section 10730 and 10730.2

4b.3 Project No. 3: Optimize Use of Recycled Water

~~4a.2~~ 4b.3-1 Project Description

The WMA GSA, working with the City of Lompoc (City), will optimize the use of recycled water supplies in the WMA. The City currently operates an existing 5.5 million gallon per day (MGD) Lompoc Regional Wastewater Reclamation Plant (LRWRP)[201]. From 2016 to 2020, total wastewater influent at LRWRP ranged from 3,133 to 3,845 AFY (Table 2a.3-4, HCM).

Because of the high level of treatment at the LRWRP (tertiary treatment), the treated wastewater produced can be used a recycled water. The City currently has one active recycled water user, and used approximately 20,000 gallons or 0.06 AFY in 2020 for non-potable[202] use (Water Systems Consulting, 2021). Because current recycled water use is very small (0.06 AFY), there is additional opportunity to recycle and expand reuse of the treated water from the LRWRP such as:

1. New non-potable uses upstream of the LRWRP, including within City of Lompoc, Vandenberg Village CSD, and Mission Hills CSD service areas;
2. New non-potable uses downstream of the LRWRP, including existing agriculture;
3. New indirect potable use upstream of the LRWRP; and
4. Current operations that include incidental groundwater recharge downstream of the LRPW and abatement of potential seawater intrusion.

Currently, State regulations do not allow for the use of recycled water for direct potable reuse, so this option is not further discussed at this time. However, the WMA GSA may choose to reevaluate once a clear State public health regulatory and guidance framework has been established for direct potable reuse.

Regarding non-potable use upstream of the LRWRP, there have been several related previous studies, including the City of Lompoc's "Recycled Water Feasibility Study," (Lee and Ro, November 2010) and USGS's groundwater recharge alternative (Bright et al. 1997). Neither of these studies recommended

201 The LRWRP was upgraded in 2009 and has an average dry-weather flow design capacity of 5.5 MGD, with a peak dry-weather flow of 9.5 MGD. The peak wet-weather capacity is 15 MGD.
202 Non-potable water is water that is not used for drinking and does not meet drinking water quality standards.

taking next steps to use the treated LRWRP for the non-potable uses that were evaluated at the time. For the example, the City's 2010 feasibility found the capital and annual costs to build and maintain the infrastructure to deliver the recycled water were prohibitive, and as a result, the City currently does not have plans for facilitating the installation of dual distribution systems to deliver recycled water (City of Lompoc 2021). The groundwater recharge alternative, evaluated by the USGS in 1997, found that decreased groundwater head and increased salinity in the Upper and Lower aquifers downstream of the LRWRP made any benefits upstream of the LRWRP ineffective. [203]

New non-potable uses downstream of the LRWRP, including existing agriculture, has not yet been studied in detail. As part of the implementation of this GSP, the WMA GSA will hire an engineering consultant to prepare a feasibility study regarding the use of recycled water from the LRWRP for agriculture downstream of the LRWRP. Different agricultural areas downstream of the LRWRP will be considered, including lands that are currently served by wells with relatively poor water quality, in addition to other wells located in the area downstream of the LRWRP. Lands currently served by the Lower Aquifer will also be considered in the recycled water study. The greatest project benefit could occur by supplying recycled water to the lands served by the poorest water quality in the Basin, which are typically lands served by the Upper Aquifer further west. However, these lands might also be the most expensive to serve with recycled water. The feasibility study will analyze multiple possible service areas for the use of recycled water, to assess which area will maximize the benefit to cost ratio of using non-potable recycled water downstream of the LRWRP for agriculture.

The feasibility study for recycled water delivery to downstream agriculture will also compare potential project costs and benefits with the current operations. The project alternatives and current operations will be evaluated with the groundwater model developed for this GSP to determine potential impacts from the recycled water project. The current operations include the discharge of the treated wastewater into Miguelito Creek near the confluence with the Santa Ynez River. The City's 2020 Urban Water Management Plan states this is "a valuable source of incidental recharge for the Lompoc Plain and for users downstream of the City, including agricultural interest, domestic uses and the environment.

203 For example, USGS study concludes: "The movement of the LRWTP discharge point will decrease the dissolved-solids concentration of the main zone by as much as 150 mg/L in the southern part of the northeastern plain compared to the no action alternative, but it will increase the dissolved-solids concentration in the main zone by as much as 150 mg/L in parts of the northwestern, central, and western plains." (Bright et al. 1997)

Additionally, the return flows to the river provide added protection to abate the potential for seawater intrusion in the lower reaches of the Santa Ynez River and the groundwater basin." (City of Lompoc 2021). A stream gauge at the Santa Ynez River estuary about 8.5 river miles downstream of the LRWRP will be implemented as part the GSP (see Chapter 5a2-4, GSP Implementation), and the data used to determine the quantity and timing of surface water flows in relation to current discharge levels of the LRWRP.

The first action by the WMA GSA will be to conduct a feasibility study on using recycled water from the LRWRP for agriculture downstream of the LRWRP. Other recycled water projects may be developed after the GSP is adopted and could be subsequently developed into the final recycled water project for implementation.

~~4a.2-~~4b.3-2 Project Benefits

The proposed Recycled Water Project downstream of the LRWRP will directly reduce groundwater pumping for agriculture by up to 3,845 AFY (the current discharge volume from LRWRP to the Santa Ynez River). The benefits to the groundwater levels and storage of this reduced groundwater pumping will be offset to some extent by the reduced recharge from the surface flow in the Santa Ynez River. Therefore, the net benefit needs to be determined comprehensively with a feasibility study.

~~4a.2-~~4b.3-3 Justification

Although technical feasibility will need to be studied further, there is a potential to reduce consumptive use of water and improve groundwater quality in the area downstream of the LRWRP. For example, a potential benefit of the recycled water project might include less leaching requirements and less overall water consumptive use, because the treated recycled water will have lower salinity than the water pumped from the Upper Aquifer in the western portion of the Lompoc Plain. Potential detriments associated with the recycled water project may include reduced flows for the Santa Ynez River and estuary, and reduced recharge from surface water flows.

~~4a.2-~~4b.3-4 Project Costs

The WMA GSA can initiate a detailed feasibility study of a Recycled Water Project downstream of the LRWRP for use by agriculture by evaluating four alternatives, including a No-action Alternative. Costs for this project could be as great as $100,000, and may be funded through fees, grants, pumping assessments, or combinations thereof. The three potential project alternatives will estimate engineering capital and annual costs to deliver treated recycled water to downstream agricultural fields in lieu of existing agricultural pumping. Based on these estimated costs, project benefits and potential detriments, the next steps and configuration of the recycled water project will be decided upon by the WMA GSA and additional public input.

~~4a.2-~~4b.3-5 Permitting and Regulatory Process

The preparation of a feasibility study of a Recycled Water Project downstream of the LRWRP for use by agriculture does not require any permits.

The feasibility study will include a description of all additional permits and regulations that the Recycled Water Project will need if ~~implement~~implemented. These permits are expected to include new NPDES, Waste Discharge Requirements/Water Reclamation Requirements, ~~and~~ Title 22 permits~~.~~, and approval by the. State Water Resources Control Board. Additionally, due to the reduction in surface water flow downstream of the LRWRP and endangered species in the Santa Ynez River, CEQA environmental regulations would require the preparation of environmental studies. The WMA GSA will follow all regulatory requirements associated with the environmental processes including public noticing and review requirements.

~~4a.2-~~4b.3-6 Public Notice

This project will require significant stakeholder outreach to determine the recycled water market. The public and other interested entities will be given the opportunity and time to participate in and provide feedback on the optimization of recycled water supplies through the project's environmental review processes and review of the feasibility study by the WMA GSA.

~~4a.2-~~4b.3-7 Implementation Process and Timetable

The feasibility study of a Recycled Water Project will benefit from the data provided by the proposed streamflow gauge at the Santa Ynez River Estuary (streamflow gauge to be established in the first year of GSP implementation; Section 5a.2-4). The data can be used to refine the seasonal quantity and timing of surface water flows in relation to the current discharge levels of the LRWRP. A feasibility study on downstream agricultural use of water from the LRWRP cannot begin until at least the third year of GSP implementation (2024), after the gauge has been in place operating for at least two years.

~~4a.2-~~4b.3-8 Legal Authority

As explained in Section ~~4a.2-~~1b.1-~~8,~~3 (Administrative Information), SGMA grants the WMA GSA, as a groundwater sustainability agency, broad powers including the authority to "perform any act necessary or proper" to implement SGMA regulations and allows the WMA GSA to adopt rules, regulations, ordinances, and resolutions necessary for SGMA implementation.[204] Specifically, SGMA statue grants the WMA GSA authority to "transport, reclaim, purify, desalinate, treat, or otherwise manage and control polluted water, wastewater, or other waters for subsequent use in a manner that is necessary or proper to carry out the purposes of this part."[205] Accordingly, SGMA grants the WMA GSA the legal authority to implement the optimization of recycled water supplies as a GSP management action. The legal authority granted to the WMA GSA under SGMA statute does not preclude other governing agencies from participating in or contributing to the implementation of the recycled water subprojects.

~~4a.2-~~4b.3-9 Source and Reliability

The WMA GSA's recycled water subprojects will rely on the availability of treated effluent generated at the City of Lompoc's regional wastewater treatment facility (LRWRP). The LRWRP has provided the Santa Ynez River continuously four to five cubic feet per second (cfs) of water flow each month during the last five years and this supply is considered very reliable.

~~4a.2-~~

[204] CWC Section 10725.2 Authority Of Groundwater Sustainability Agency; Notice
[205] CWC Section 10726.2 Additional Authorities Of Groundwater Sustainability Agency Relating To Acquisitions; Augmentation Of Local Water Supplies; Transfers And Exchanges Of Water; And Treatment

4b.4 Project Management Action No. 4: Increase Stormwater Recharge

~~4a.2~~ 4b.4-1 Project Description

The Water Quality, Supply, and Infrastructure Improvement Act (Proposition 1) was approved on November 4, 2014 to provide $200 million from the Stormwater Grant Program (SWGP) for matching grants to public agencies (among other stakeholders) to implement multi-benefit stormwater management projects in California. As part of this program, the Santa Barbara County Water Agency worked with local agencies to produce the "Santa Barbara County-Wide Integrated Stormwater Resource Plan" (2018 County Stormwater plan) (Geosyntec et al, 2018). This plan studied potential stormwater capture and infiltration projects as an option for recharging local groundwater supplies for use in Santa Barbara County GSPs.

As part of the implementation of this GSP, the WMA GSA can consider partnering with the Santa Barbara County Water Agency to fund the next steps in implementing two stormwater capture and infiltration projects.

1. Vandenberg Village Infiltration Basin Project
2. City of Lompoc Bioretention Bioswale Network Project, including along Miguelito Creek

Because the 2018 County Stormwater plan already determined the conceptual project design and benefits of the Vandenberg Village Infiltration Basin project, the next step is to develop the conceptual project design ~~and~~ with multi-benefits for a bioswale network project in the City of Lompoc, and then submit the project for inclusion in the County's clean water stormwater program. The WMA GSA can then partner with County to help permit and build both projects more swiftly than acting independently. It is recommended that any stormwater recharge project in the WMA, past, present, or future, be tracked and documented in an inventory for each user in order to receive possible future credits in order to provide incentives for recharge projects.

~~4a.2~~ 4b.4-2 Project Benefits

The Vandenberg Village Infiltration Basin Project was estimated to provide 73 AFY of recharge on average and provide water quality benefits including reducing the nitrogen loading by 270 lbs/year. A bioswale project in the City of Lompoc would be expected to provide similar benefits ~~(~~(approximately 100 AFY on average). With the increased precipitation intensity predicted under climate change, the benefits of slowing urban runoff and increasing infiltration into the groundwater table would be greater than under current conditions. Projects that increase stormwater recharge will also be designed as multiple-benefit projects including water supply, water quality and elements to support wildlife and aquatic species.

~~4a.2-~~4b.4-3 Justification

Developing and expanding local water supply availability is the most cost-effective approach to increase groundwater supplies without extreme changes, alterations to the character of the community, loss of livelihoods, and great financial costs, among other negative impacts. Additionally, the high cost to acquire and convey supplemental water supplies from outside the basin can impact the financial status of the WMA's residents and local entities. Accordingly, the WMA GSA will benefit working with the County on the Proposition 1 clean water initiatives that include these stormwater capture and infiltration projects.

~~4a.2-~~4b.4-4 Project Costs

An initial estimated cost to develop a conceptual project design and benefits study for a City of Lompoc Bioretention Bioswale Network Project is $30,000. The conceptual design study would include areas along Miguelito Creek and planned for submittal to the County's master Stormwater Resources plan list. After all the projects have been submitted and accepted by the County, the WMA GSA can consider partnering with the County to develop a design build document.

~~4a.2-~~4b.4-5 Permitting and Regulatory Process

The preparation of a conceptual project design and benefits study for a stormwater capture and infiltration project does not require permits. In the design build document development phase, the WMA GSA can work with the County to identify and meet the regulatory requirements associated with stormwater capture and infiltration projects.

~~4a.2-~~4b.4-6 Public Notice

The public and other interested parties will be given the opportunity and time to participate in and provide feedback on the stormwater capture and infiltration projects through the project's environmental review processes.

~~4a.2-~~4b.4-7 Implementation Process and Timetable

The conceptual project design and benefits study for a City of Lompoc Bioretention Bioswale Network Project can be initiated in the first year of GSP implementation (Water Year 2022), and scheduled so that it can be submitted for inclusion in the County's master Stormwater Resources plan list. After all projects have been accepted by the County, the WMA GSA can partner with the County on the next phase of developing a design build document that also addresses the permit and environmental regulation requirements. Construction of the infrastructure for the proposed stormwater capture and infiltration projects could begin as early as the second year of implementation (Water Year 2023), pending partnership with the County program.

~~4a.2-~~4b.4-8 Legal Authority

As explained in Section ~~4a.2-~~1b.1-~~8,~~3 (Administrative Information), SGMA grants the WMA GSA, as a groundwater sustainability agency, broad powers including the authority to "perform any act necessary or proper" to implement SGMA regulations and allows the WMA GSA to adopt rules, regulations, ordinances, and resolutions necessary for SGMA implementation.[206] Specifically, SGMA statue grants the WMA GSA authority to conserve and store waters by "spreading, storing, retaining, or percolating into the soil of the waters for subsequent use" and "transport, reclaim, purify, desalinate, treat, or otherwise manage and control polluted water, wastewater, or other waters for subsequent use in a manner that is necessary or proper to carry out the purposes of this part."~~-~~[207] Accordingly, SGMA grants the WMA GSA the legal authority to implement stormwater capture and infiltration projects as a GSP management action. The legal authority granted to the WMA GSA under SGMA statute does not preclude other

206 CWC Section 10725.2 Authority Of Groundwater Sustainability Agency; Notice

207 CWC Section 10726.2 Additional Authorities Of Groundwater Sustainability Agency Relating To Acquisitions; Augmentation Of Local Water Supplies; Transfers And Exchanges Of Water; And Treatment

governing agencies from participating in or contributing to the implementation of stormwater capture and infiltration projects.

~~4a.2-~~4b.4-9 Source and Reliability

The WMA GSA's stormwater capture and infiltration projects will rely on the availability of local precipitation.

~~4a.2-~~

4b.5 Project No. 5: Uniform Ban on Water Softeners

~~4a.2~~ 4b.5-1 ~~Project~~Management Action Description

Use of self-regenerating water softeners is the most significant controllable source of saline water entering the local municipalities' wastewater system. Currently, each municipal water supplier (City of Lompoc, Vandenberg Village CSD, and Mission Hills CSD) has different ordinances that prohibit the installation of self-regenerating water softeners. Some allow water softeners that increase chloride ion loads in wastewater return flows. A complete and uniform ban on self-regenerating water softeners by all three water agencies in the WMA would simplify and communicate an easy-to-understand and consistent message to all residents within the WMA.

~~4a.2~~ 4b.5-2 ~~Project~~Management Action Benefits and Justification

Self-regenerating water softeners produce high saline wastewater concentrations that contribute significantly to the elevated concentration levels of total dissolved solids, chlorides, and sodium in wastewater effluent. By prohibiting these water softeners, the daily maximum load of total dissolved solids, chlorides, and sodium in potential return flows to groundwater can be significantly lowered.

~~4a.2~~ 4b.5-3 ~~Project~~ Costs

There are no capital costs anticipated to be borne by the GSA with implementing a basin-wide complete and uniform ban on self-regenerating water softeners.

~~4a.2~~ 4b.5-4 Permitting and Regulatory Process

This management action currently does not require the WMA GSA to obtain approved permits.

~~4a.2~~ 4b.5-5 Public Notice

The public and interested parties will be given notice of the WMA GSA's complete and uniform ordinance prohibiting the installation and replacement of self-regenerating water softeners.

~~4a.2-~~4b.5-6 Implementation Process and Timetable

This policy by the WMA GSA could be voted and implement in the first year of GSP implementation (Water Year 2022), after language is drafted that each agency can agree upon.

~~4a.2-~~4b.5-7 Legal Authority

As explained in Section ~~4a.2-~~1b.1-~~8,~~3 (Administrative Information), SGMA grant the WMA GSA, as a groundwater sustainability agency, broad powers including the authority to "perform any act necessary or proper" to implement SGMA regulations and allows the WMA GSA to adopt rules, regulations, ordinances, and resolutions necessary for SGMA implementation.[208] Moreover, SGMA statute grants the ~~CMA~~WMA GSA authority to "transport, reclaim, purify, desalinate, treat, or otherwise manage and control polluted water, wastewater, or other waters for subsequent use in a manner that is necessary or proper to carry out the purposes of this part."[209]

208 CWC Section 10725.2 Authority Of Groundwater Sustainability Agency; Notice

209 CWC Section 10726.2 Additional Authorities Of Groundwater Sustainability Agency Relating To Acquisitions; Augmentation Of Local Water Supplies; Transfers And Exchanges Of Water; And Treatment

Section 4c – Responsive

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~~4A.3 PLANNED~~ PROJECTS AND MANAGEMENT ACTIONS~~ – IF EARLY WARNING AND MINIMUM THRESHOLD EXCEEDED~~ (GROUPS 2 AND 3)

Group 2 and 3 Project and Management Actions (PMAs) can be implemented when the early warning and Minimum Threshold triggers have been reached (see Chapter 3). If 50% of Representative Monitoring Wells reach the early warning trigger for low groundwater levels, the early warning Group 2 PMAs will be implemented. The Group 3 PMAs should also be developed at this stage to ensure timely implementation if and when needed. If 50% of Representative Monitoring Wells (RMWs) reach the Minimum Threshold in two consecutive non-drought years, then the Group 3 Annual Pumping Allocation management action will be implemented. The WMA GSA can also decide to implement the Groups 2 and 3 PMAs before reaching the early warning and Minimum Thresholds, if desired. Earlier implementation can improve groundwater conditions to reach the measurable objectives more quickly and ensure that the Minimum Thresholds for the Basin are not reached. Additional PMAs (Group 4 PMAs) can also be included into Groups 2 and 3 PMAs as needed for potential drought management in the future.

It is not expected that the Group 2 PMAs will be necessary to implement. The ongoing implementation of PMA's in Group 1, including groundwater pumping demand reductions up to 3,000 AFY through the Water Conservation and the ~~Tiered~~ Fee and Well Meter Programs, will maintain the current groundwater conditions and maintain the sustainability of the Basin by balancing the projected future Water Budget deficits (up to 3,000 AFY). If the projects and management actions required for maintaining sustainability in Group 1 PMAs either fails to be implemented or does not achieve expected results, the Annual Pumping Allocation (PMA No. 8 described below) can be implemented. This management action does not alter existing water rights but will provide a clear structure and strong incentive to reduce groundwater pumping to within the sustainable yield of the basin while funding potential replacement water if the basin users decide to pump more than the sustainable yield.

~~4a.3-~~4c.1 Project and Management Action No. 6: Water Rights Release Request

~~4a.3-~~4c.1-1 Project Management Description

If the early Minimum Threshold triggers are reached, the WMA GSA can make a request to the SYRWCD, a WMA member agency, for a water rights releases from upstream Cachuma Reservoir (Section 1d.5-6). For the WMA, the only type of water rights releases that would provide groundwater recharge benefit is referred to as a "Below Narrows Account" (BNA) releases. This WMA GSA action can only be a request to the SYRWCD because the SWRCB Order 2019-0148 gives the SYRWCD the authority to request BNA releases subject to and in accordance with the requirements of WR 2019-0148. The BNA releases would be subject to availability of BNA credits in storage in Cachuma Reservoir.

~~4a.3-~~4c.1-2 Project Benefits and Justification

Percolation from the Santa Ynez River channel is the most important source of recharge for the Upper Aquifer in the WMA. During BNA releases, water is delivered to the USGS Narrows gauge (USGS gauge 11133000 shown on HCM Figure 2a.3-7) and releases infiltrate into the forebay to the east of the City of Lompoc which recharges the Upper Aquifer. BNA releases have averaged about 1,800 AFY since 1990, and this has become a valuable source of recharge to groundwater during periods of drought.

~~4a.3-~~4c.1-3 Project Costs

There are no capital costs to the WMA anticipated with requesting water rights releases.

~~4a.3-~~4c.1-4 Permitting and Regulatory Process and Public Notice

This management action currently does not require the WMA GSA to obtain approved permits or provide public notice. The SYRWCD is the party responsible for notifying the public.

~~4a.3-~~4c.1-5 Implementation Process and Timetable

This policy by the WMA GSA could be voted and implemented in the first year of GSP implementation (2022).

~~4a.3-~~4c.1-6 Legal Authority

As explained in Section ~~4a.2-~~1b.1-~~8,~~3 (Administrative Information), SGMA grants the WMA GSA, as a groundwater sustainability agency, broad powers including the authority to "perform any act necessary or proper" to implement SGMA regulations and allows the WMA GSA to adopt rules, regulations, ordinances, and resolutions necessary for SGMA implementation.[210] Accordingly, the GSA has sufficient authority to make said request to SYRWCD.

~~**4a.3-**~~

[210] CWC Section 10725.2 Authority Of Groundwater Sustainability Agency; Notice

4c.2 Management Action No. 7: Supplemental Conditions on New Well

~~4a.3-~~4c.2-1 Management Action Description

If the early Minimum Threshold triggers of low groundwater levels are reached, the WMA GSA can require supplemental conditions that would apply to new wells. The WMA GSA could create an ordinance limiting uses for new wells during times of extraordinary droughts and low groundwater levels.

~~4a.3-~~4c.2-2 Project Benefits and Justification

If more than 50% of the representative monitoring wells have reached the early warning trigger (five feet above the Minimum Thresholds), the WMA GSA can take actions to reduce groundwater pumping demands. New uses of groundwater would further exacerbate the lowering of the groundwater levels at the expense of existing groundwater users. The benefits would be an increase in groundwater storage as compared to baseline conditions due to reduction in groundwater pumping

~~4a.3-~~4c.2-3 Project Costs

There are no capital costs anticipated with establishing an ordinance temporarily prohibiting new wells for new projects during times of extraordinary droughts and low groundwater levels.

~~4a.3-~~4c.2-4 Permitting and Regulatory Process and Public Notice

This management action does not require the WMA GSA to obtain approved permits. The public and relevant entities will be given notice of the WMA GSA's ordinance temporarily prohibiting new wells for new projects during times of extraordinary droughts and low groundwater levels.

~~4a.3-~~4c.2-5 Implementation Process and Timetable

This policy, if implemented by the WMA GSA, could be voted on and implemented in a year in which groundwater levels in more than 50% of the representative monitoring wells are within five feet of the GSP Minimum Thresholds (early warning triggers).

~~4a.3-~~4c.2-6 Legal Authority

As explained in Section ~~4a.2-~~1b.1-~~8,~~3 (Administrative Information), SGMA grants the WMA GSA, as a groundwater sustainability agency, broad powers including the authority to "perform any act necessary or proper" to implement SGMA regulations and allows the WMA GSA to adopt rules, regulations, ordinances, and resolutions necessary for SGMA implementation.[211]

~~**4a.3-**~~

[211] CWC Section 10725.2 Authority Of Groundwater Sustainability Agency; Notice

4c.3 Management Action No. 8: Implement Annual Pumping Allocation Plan, Transient Pool and Fallowing Program (If Necessary)

~~4a~~4c.3-~~3-~~1 Project Description

The Group 1 PMAs, including groundwater pumping demand reductions up to 3,000 AFY through the Water Conservation and the ~~Tiered~~Groundwater Extraction Fee and Well Meter Programs are expected to maintain sustainability of groundwater conditions. So, Group 2 PMAs are not expected to be necessary. However, if the Group 1 PMAs fail to be implemented or do not achieve the expected results, the GSA may elect to implement additional management actions to improve groundwater conditions above Minimum Thresholds. This could include the establishment of annual groundwater pumping allocations (Annual Pumping Allocations) based on the sustainable yield of the WMA[212]. These Annual Pumping Allocations could be used for the purpose of assigning pumping fees (Augmentation Fees). The Augmentation Fees would in turn provide the funding for the development of supplemental water supplies and other projects and management actions to achieve sustainability. Accordingly, these Annual Pumping Allocations are not a determination of water rights in that they do not prohibit the pumping of groundwater. Rather, all groundwater pumpers continue to possess the right to produce groundwater provided they pay the Augmentation Fee. Groundwater production in excess of Annual Pumping Allocations would be subject to an Augmentation Fee in an amount that is determined to be sufficient for the acquisition of supplemental water supplies pursuant to this pumping allocation plan.

The details of this management action still need to be developed through public workshops by the GSA. Some optional components of this management action could include a transient pool and voluntary fallowing program which is used to phase out groundwater production over time.

[212] The current estimate of the sustainable yield, defined by SGMA as the maximum quantity of water that can be withdrawn annually without causing undesirable results, is currently estimated to be 26,400 AFY for the WMA. Of this amount, 21,000 AFY is the estimated sustainable yield for the Upper Aquifer and 5,400 AFY for the Lower Aquifer. The sustainable yield may change as projects and management actions are implemented that increase basin recharge and increase the volume of water that can be withdrawn annually without causing undesirable results.

~~4a.3-~~4c.3-2 Project Benefits

The proposed management action will directly result in significantly less groundwater production and will help alleviate and mitigate any potential overdraft conditions if Minimum Thresholds are exceeded. Management action benefits due to reduced groundwater pumping are anticipated to include the following:

- Increase in groundwater storage as compared to current trends and baseline conditions;
- Improved and rising groundwater levels;
- Improvements to water quality are due to reduction of irrigation return flows;
- Prevent depletions of surface water; and
- Prevention of land subsidence conditions.

The measurements for assessing the benefits of the proposed management actions, relative to the measurable objectives and minimum thresholds established in Chapter 3, will be monitored groundwater levels and groundwater quality in the WMA. Additionally, groundwater production by groundwater users will be reported to the WMA GSA to monitor anticipated reductions in production.

~~4a.3-~~4c.3-3 Justification

The Annual Pumping Allocation Program would be necessary to reach sustainability in the future if the Group 1 PMAs do not yield 500 to 3,000 AFY due to the current unavailability of a supplemental water supplies and the costs of obtaining the supplemental supplies if/when they become available. The estimated current sustainable yield of 26,400 AFY does not entirely support projected future groundwater production. Under this management action, the WMA GSA will work with groundwater users in the WMA to determine an equitable process for assigning allocations. ~~The beneficial uses of groundwater will subsequently be evaluated based on water rights priorities. Accordingly, all groundwater users and uses will be equitably considered and prioritized, as required by SGMA.~~ The details of this management action still need to be developed through public workshops by the GSA.

~~4a.3-~~4c.3-4 Costs

The WMA GSA will incur costs to develop the Annual Pumping Allocations and the Augmentation Fees. There will also be administrative costs and engineering costs for conducting hearings, verifying pumping documentation, and preparing the final report to the WMA GSA governing body with the recommendations, among other implementation tasks. The preliminary cost estimate for developing these allocation and fee programs is $300,000.

The WMA GSA will also incur administrative costs to implement and manage the Fallowing Program. Additionally, the WMA GSA may incur costs to purchase Transient Pool Allocations from groundwater pumpers electing to enroll in the Fallow Program estimated to be up to $1 million. Administrative costs to run all program components are estimated to be $50,000 annually.

The Annual Pumping Allocation Program costs will be funded through imposition of applicable fees and to the extent they can be obtained, grants, or a combination thereof.

~~4a.3-~~4c.3-5 Permitting and Regulatory Process

Implementation of the Annual Pumping Allocation Program may be subject to environmental regulations and could require the preparation of environmental studies. The WMA GSA will follow all regulatory requirements associated with the environmental processes including public noticing and review requirements.

~~4a.3-~~4c.3-6 Public Notice

Development of the Annual Pumping Allocation Plan will include stakeholder outreach, public workshops, and public hearings to receive input from the basin groundwater users. The public and relevant entities will be given the opportunity and time to present historical pumping documentation provided to the WMA GSA. The WMA GSA will provide sufficient public notice of a public hearing to adopt the Annual Pumping Allocation.

~~4a.3-~~4c.3-7 Implementation Process and Timetable

The WMA GSA would determine each groundwater pumper's Annual Pumping Allocation and/or Transient Pool Allocation no later than when the Group 2 PMAs are in effect after early warning triggers have been reached. The WMA GSA could also decide to preemptively explore this management action earlier, if desired. All groundwater pumpers will be asked to submit records of their historical pumping and other relevant material to the WMA GSA. The WMA GSA Water Resources Manager would review the materials and provide a draft recommended Annual Pumping Allocation and/or Transient Pool Allocation of each groundwater pumper who submitted materials to the WMA GSA. All groundwater pumpers would submit comments on the draft recommendation to the Water Resources Manager. The Water Resources Manager would consider these comments and present a final report and recommendation to the WMA GSA Board for consideration. Those receiving a Transient Pool Allocation may elect to join the Fallowing Program.

~~4a~~4c.3-~~3-~~8 Legal Authority

As explained in Section ~~4a.2-~~1b.1-~~8,~~3 (Administrative Information), SGMA grants the WMA GSA, as a groundwater sustainability agency, broad powers including the authority to "perform any act necessary or proper" to implement SGMA regulations and allows the WMA GSA to adopt rules, regulations, ordinances, and resolutions necessary for SGMA implementation.[213] Specifically, CWC Sections 10726.2 and 10726.4 provide the WMA GSA with the authority to develop and implement an Annual Pumping Allocation Plan, Transient Pool and Fallowing Program to meet the needs of the Basin. CWC Section 10725.4 authorizes the WMA GSA to "propose and update fees" and to "monitoring compliance and enforcement" of the GSP. CWC Sections 10730 and 10730.2 authorize the GSA to impose fees on extraction of groundwater to fund the costs of groundwater management. Accordingly, SGMA grants the WMA GSA the legal authority to implement the GSP management action set forth above.

Draft recommendations of each groundwater pumper's Annual Pumping Allocation will be prepared in accordance with existing California water rights laws, with consideration to beneficial uses of water in the WMA.

[213] CWC Section 10725.2 Authority Of Groundwater Sustainability Agency; Notice

~~4A.4~~

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SECTION 4D – OTHER PROJECTS ~~AND~~AND MANAGEMENT ACTIONS (GROUP 4)

Group 4 Project and Management Actions (PMAs) are not current commitments by the WMA GSA for implementation. Group 4 PMAs will be considered in the future by the WMA GSA for further study and development. However, if one of the Project and Management Actions required for sustainability in Groups 1-3 either fails to be implemented or does not have the expected results, further actions will be required to achieve sustainability. In that case, appropriate projects and/or management actions will be chosen from those listed under Group 4. As work on supplemental water supply and resource management efforts is ongoing, it may be the case that additional projects will be identified and added to the Group 4 list in future GSP updates (see Table 4a.1-1).

The current Group 4 PMAs include the following supply-related PMAs:

- Supplemental State Project Water Imported Water Program;
- Santa Ynez River Lompoc Plain Recharge Pond Project;
- Regional Desalinization Project; and
- Well-head pre-treatment to soften local groundwater.

The current Group 4 PMAs include the following demand-related PMAs:

- Non-native Vegetation Removal
- Agricultural Land Retirement/ Pumping Allowance
- Drought Mitigation by Pumping Optimization and Deepen Existing Wells

An example Group 4 PMA is the use of supplemental State Water Project (SWP) water imported to the basin. With the exception of the Federal VSFB, the WMA GSA does not currently import SWP water from the CCWA. The local community has historically voted against purchasing imported State Water Project water. However, because the CCWA pipeline runs through or nearby the municipal water suppliers of the WMA (City of Lompoc, Vandenberg Village CSD, and Mission Hills CSD), the capital costs associated with delivering water from the CCWA pipeline to the local distribution system could be relatively low. Accordingly, the WMA GSA could focus on future negotiations with existing CCWA contractors in Santa Barbara County to purchase only supplemental water supplies to prolong the yield of the basin.

The hydrologic variability of SWP and other external water supplies may be addressed through water banking. The WMA GSA may store wet-year deliveries of its purchased water supplies in a groundwater banking program and arrange for the stored deliveries to be withdrawn or exchanged for use in the WMA. Participation in a groundwater banking program would improve the reliability of the WMA GSA's purchased water supplies during dry years, periods of high demand, and disruptions in water deliveries. Participation in a groundwater banking program may also allow the WMA GSA to purchase additional water supplies during wet periods.

The WMA GSA is taking an adaptive management approach to WMA management over the planning horizon. Consequently, potential projects and management actions will continuously be considered and evaluated over the planning horizon to ensure that the most beneficial and economically feasible projects and management actions are implemented to reach sustainability in the WMA. Proposed projects and management actions may be modified, as necessary, if the intended project benefits are not realized in the intended timeframe.

CHAPTER 5: PLAN IMPLEMENTATION

This Chapter describes proposed and planned projects and tasks associated with implementation of the GSP for the WMA. The implementation projects and tasks are planned to be undertaken over a four-year implementation timeline (by 2026), for inclusion in the Five-Year Plan Assessments due in 2027. As previously described in Section 3b, undesirable results are not identified as occurring presently within the WMA. The projects identified for implementation are designed to meet SGMA requirements, including reporting and addressing data gaps, and will act to ensure the current conditions of the Basin are maintained or improved into the future.

Preliminary costs estimates are provided for the proposed implementation projects and tasks. The preliminary cost estimates are based on 2021-dollar amounts. The current inflation rate in 2021 is 5.39%, the second year it has been over 5% since 1981 and the highest it has been since 1990.[214] Prior to this general inflation, construction and material costs were already rapidly increasing due to the 2018 tariffs of 25% on steel and 10% on aluminum. The WMA GSA will be adaptive towards inflation and changes in inflation rates in future budgeting decisions.

214 Consumer Price Index (CPI) inflation was 5.39% for the period June 2020-June 2021. U.S. Bureau of Labor Statistics. https://www.bls.gov/cpi/ (Accessed 2021-07-22). Labor costs and construction costs are rising more rapidly.

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Section 5 A – IMPLEMENTATION PROJECTS

This section describes project and tasks to implement the WMA GSP. **Table 5a.1-1** summarizes the implementation projects.

Table 5a.1-1
Summary of Implementation Projects

Project Category	Task	Type	Completion
Completing Ongoing Field Investigations	Surveying Representative Wells	One Time	WY ~~2023~~2022
	SkyTEM Airborne Geophysics	One Time	WY ~~2023~~2022
Monitoring Network Gaps	Video Logging and Sounding Wells	One Time	WY 2023
	Groundwater Level Monitoring Wells (Outreach)	One Time	WY 2022
	WQ Seawater Monitoring	Annual	Ongoing
	SW Gage Installation (planning)	One Time	WY 2023
Projects and Management Actions	Water Conservation	Annual	WY 2022
	Groundwater Extraction Fee Study	5 Year	WY 2022
	Feasibility Study for Recycled Water Project	One Time	WY 2023
	Feasibility Study for Bioswale Stormwater Retention	One Time	WY 2023
	Ban on Water Softeners	One Time	WY 2022
Improved Data Collection for Management	Update Well Registration Program	One Time	FY 2023-2024
	Well Metering Requirement	One Time	CY ~~2023~~2024
Data Management	Data Updates	Annual	Ongoing
Reporting and Plan Updates	SMGA WY Annual Reports	Annual	Ongoing
	SGMA Five Year Plan Assessment	5 Year	Ongoing

WQ = Water Quality, SW = Surface Water, WY = water year (October 1 – September 30), FY = fiscal year (July 1 – June 30), CY = calendar year (January 1 – December 31)

5a.1 COMPLETING ONGOING FIELD INVESTIGATIONS

Certain field investigations commenced during the development of this GSP following preliminary review of potential data gaps. Full implementation of the WMA GSP includes completing these projects (described below).

5a.1-1 Surveying Representative Wells

During the summer of 2020, wells that were part of the existing groundwater monitoring programs conducted by the County of Santa Barbara were surveyed to improve vertical accuracy of well elevations. As part of the development of this project, including the Representative Monitoring Program, several additional wells were suggested for ground surveying due to uncertainty in actual locations. This implementation project would improve the location information for these wells to an accuracy of better than plus or minus (±) half a foot (±0.5 feet). Wells with elevation data uncertainly of greater than ±0.5 feet were indicated in the Appendices 3b-A and 3b-E with a "±" designation attached to the elevation.

Currently, surveying for well 7N/35W-21G2 is needed because the existing well elevation is only known to a vertical accuracy ±20 feet. The surveying work for this particular well is expected to take a two-person team less than a day of work to meet this precision requirement. Expected costs for completion are $2,000 to $4,000. A completion target date to perform the work is set for the end of ~~water~~calendar year ~~2023 (September 30, 2023~~2022 (December 31, 2022).

5a.1-2 SkyTEM Airborne Geophysics Results

During the Summer and Fall of 2019, the WMA GSA applied for a California Proposition 68 grant for an Airborne Electromagnetic (AEM) geophysical survey of the WMA, with the intent to capture a coherent three-dimensional regional scale geophysical data set of the majority of the WMA, including areas lacking information on historical wells. Electrical geophysical methods are highly effective at detecting changes in electrical conductivity in water caused by salinity, and therefore, the results of this survey are expected to improve extents of seawater intrusion and provide an improved baseline for future seawater intrusion estimates.

The overall intent of the AEM data set would be to improve the three-dimensional geologic model and subsequent groundwater modeling. The groundwater model is used to calculate the water budget and projections about future conditions. Additionally, this geophysical data may provide a regional snapshot of the existing groundwater levels.

Grant funding for the project was awarded in the Spring of 2020. However, due to pandemic SARS-CoV-2 (COVID-19) conditions (Section 1c.1, Appendix 1c-A), the international team conducting the survey was prevented from entering the country which delayed the survey of the first AEM flight into November 2020. Data processing of the November 2020 geophysical data is ongoing and may include recent published USGS geophysics data and maps (Sweetkind et al. 2021).

Implementation of the AEM data into the GSP to improve management of the basin is a multi-phase process that likely will take up to two years to complete. The funding for the AEM Project included plans for completion of the following remaining phases of work, as deemed necessary after review of the data and initial results.

I. Complete processing of the raw geophysical point data into three-dimensional data.
II. Using this geophysical data, update the three-dimensional geological model.
III. Incorporate the updates from the three-dimensional geological model into the groundwater model. Run groundwater model calibration checks.
IV. Use the updated groundwater model to update water budget and other projections.

Proposition 68 grant funding (see Section 5c) for the SkyTEM AEM survey was designated for the SkyTEM AEM survey in 2020. However, with the recent unexpected inflation, additional funding may need to be acquired. The Phase I work is planned to have a completion date by the end of water year 2022 (September 30, 2022), with the Phase II-IV task being updated during water year 2023 (September 30, 2023).

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5a.2 MONITORING NETWORK DATA GAPS

In addition to filling the preliminary data gaps partially addressed above in Section 5a.1, additional data gaps have been identified in the earlier chapters of this GSP. Projects included here address data gaps to improve management of the WMA groundwater. Land subsidence is also a consideration for improving monitoring data. However, the locations for additional land subsidence monitoring are not included as part of the implementation projects, and can be reviewed for further consideration the annual updates of this WMA GSP.

5a.2-1 Video Logging and Sounding of Representative Wells

During implementation of the GSP, additional data may be collected for wells that were identified as representative wells in the basin that have missing well completion information. Missing well completion information includes the depth of perforation intervals and the total current depth of the well. This implementation project will require conducting field investigations to collect information about these wells. **Table 5a.3-1** lists the wells that were identified as partially lacking needed information. Video Logging Representative Wells project consists of conducting video logs to identify perforation or screen intervals in each of wells. This would be supplemented by sounding of the well bottom, and the depth to water.

Table 5a.2-1
WMA Representative Wells with Unknown Depths or Screened Intervals

SGMA Indicator(s)	DBID	State Id	Well Depth	Perforations / Screen Intervals
GWL, SW-GDE	39	7N/35W-21G2	known	TBD
GWL	40	7N/35W-23B02	known	TBD
GWL	15	7N/35W-26L1	known	TBD
GWL	16	7N/35W-26L2	known	TBD
GWL	27	7N/34W-29N6	known	TBD
GWL	31	7N/34W-32H2	known	TBD
GWL	17	7N/35W-26L4	known	TBD
GWL	28	7N/34W-29N7	known	TBD
GWL	22	7N/34W-22J6	known	TBD
GWL	23	7N/34W-24N1	known	TBD
GWL	44	7N/35W-27P1	known	TBD
GWL	52	7N/34W-14F4	known	TBD
GWL	51	7N/34W-12E1	known	TBD
GWL	47	7N/33W-17M1	known	TBD
GWL	81	7N/33W-28D3	known	TBD
GWL	78	7N/33W-21G2	TBD	TBD
GWL	80	7N/33W-27G1	known	TBD
SW-GDE	39	7N/34W-29F2	known	TBD

GWL = Groundwater Level; SW-GDE = Surface Water and Groundwater Dependent Ecosystems; TBD = To Be Determined

Each well is expected to cost approximately $1,250 to $2,000 for video logging per well. Expected cost for completion of 18 wells would be approximately $22,500 to $36,000in additional funding. This is a project that falls within the scope of the DWR Technical Support Services (TSS) program. The TSS program may be able to provide this at a lower cost to the WMA GSA. A target date for completing the video logging and sounding of representative wells is end of water year 2023 (September 30, 2023).

5a.2-2 Drill Dedicated Groundwater Level Monitoring Wells

The Monitoring Network (Section 3a) identified four areas where groundwater level monitoring would improve the quality of the groundwater level and groundwater storage monitoring. All four of these areas are within subareas of the Santa Rita Upland and Lompoc Upland. The Santa Rita Upland is of particular concern, because calculations of storage using the limited available groundwater monitoring wells show a long-term decline since 1982 (Figure 2b.2-1, Groundwater Conditions). The two locations identified for monitoring wells within Santa Rita Upland are within private lands, with the exception of road right of ways.

Two other recommended locations for monitoring wells are within the Lompoc Upland and both of those locations partially overlap public lands. The western location partially overlaps the La Purísima Mission State Historic Park (Figure 1d.2-2, Plan Area). The eastern location at Vandenberg Village overlaps public properties (Figure 1d.2-1 and Figure 1d.2-2, Plan Area) including the Burton Mesa Ecological Reserve, County of Santa Barbara general services, and Lompoc Unified School District (Cabrillo High School, and Buena Vista Elementary School). Mapped critical habitat (Figure 2a.4-5) for the Vandenberg monkeyflower (*Diplacus vandenbergensis*) includes La Purísima Mission State Historic Park and Burton Mesa Ecological Reserve, which may add additional permitting costs.

As a preliminary step the WMA GSA is conducting outreach to parcel owners about potential existing wells that could be used for the purposes of groundwater monitoring. The WMA GSA would coordinate with local land owners to secure rights to drill dedicated monitoring wells in these areas.

Nested monitoring wells installed at these locations would provide data to evaluate hydraulic gradients in these areas. Each of the nested wells will be installed submersible water level logger or pressure transducers to collect groundwater level throughout the year. The preliminary cost estimate for constructing a single well that partially penetrates the aquifer is $175,000, with the cost in part depending on the final well site and design details. The cost estimate for all four wells is approximately $700,000. These wells would only be necessary if the outreach to utilize existing wells is not successful.

Due to expense of drilling and installing the proposed nested wells, the plan is to conduct outreach to the community to locate any potential lower cost alternatives. This outreach is expected to run through the end of water year 2022 (September 30, 2022), and the WMA GSA may revisit this issue at that time.

5a.2-3 Expand Water Quality Monitoring for Seawater Intrusion

The Groundwater Conditions Section of this WMA GSP (Section 2b.4) identified that seawater intrusion is unlikely to occur. The results of AEM geophysical survey are expected to improve the three-dimensional understanding of salinity related to the freshwater-seawater interface. The Monitoring Network (Section 3a) identified additional wells that would help confirm that groundwater quality is not being degraded by seawater intrusion. Four wells that are part of groundwater level monitoring in the Santa Ynez estuary and western Lompoc Plain were identified as suggested wells for annual sampling for water quality constituents.

Laboratory analysis of water sampling for general mineral water quality, including the key constituents of chloride, total dissolved solids, sodium, and sulfate, are estimated to cost approximately $175 per sample. Collecting the samples, including equipment costs, is expected to be approximately $450 to $700 per well. Annual costs from implementing these monitoring wells are expected to be $2,500 to $4,000 and the first year of implementation is expected to be Water Year 2022.

5a.2-4 Install Surface Water Gage

For the benefit of the entire Santa Ynez River Valley Groundwater Basin (all three management areas), a streamflow gage is proposed near the mouth of the Santa Ynez River near the estuary in order to measure the total surface water outflow from the entire system. Previously, the USGS operated a stream gage named "Santa Ynez River at Barrier near Surf" (USGS Gage ID 11135500) near the mouth of the Santa Ynez River. However, this stream gage was discontinued in 1965. The location of this historical USGS stream gage is shown on Figure 2b.6-~~1~~2 (Groundwater Conditions). By reestablishing stream measurements at this historical site, the total surface water budget can be tracked from Bradbury Dam to the Pacific Ocean. Additionally, a stream gage at this site would help understand the dynamics of the Santa Ynez River estuary which would in turn help with an understanding of potential sea level intrusion and the effects of sea level rise.

Due to the sensitivity of steelhead (*O. mykiss*) and other wildlife, a weir or control structure across the entire river may not be feasible as it could be a barrier for any potential anadromous fish. It would be preferable for a new stream gage consisting of a water level elevation sensor, and a rating table calculated by periodic surveys of the channel cross section every five years or following particularly wet years. A study would be developed with a target date of end of Water Year 2022 (September 30, 2022) to determine a preliminary design.

The proposed location of new stream gage may also require potentially lengthy permitting and coordination processes. The proposed stream gage location is within the boundaries of the Vandenberg Space Force Base (e.g., Figure 1a.~~3-~~1-2, Introduction), and therefore would require permission and coordination with the United States Space Force to install and maintain the steamflow gage. The proposed location is also within the California Coastal Zone (Figure 1d.6-~~3~~4, Plan Area) requiring coordination with the California Coastal Commission. Installation and field work would need to avoid particularly sensitive times of the year for nesting birds or other wildlife.

A target date for completion of this permitting and coordination would be by the end of water year 2023 (September 30, 2023), pending the ability to obtain matching grant funding. Installation costs would depend on direction from the WMA GSA and how robust the system would need to be to accommodate peak flood conditions. Costs would also need to take into consideration the agency responsible for installing, operating, and maintaining the gage.

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5a.3 IMPROVED MANAGEMENT INFORMATION

The following implementation projects would improve the WMA GSA's tracking effectiveness for the progress of GSP implementation.

5a.3-1 Update Well Registration Program

Currently all wells within the WMA are part of SYRWCD registry of all water-producing facilities within its jurisdiction. Property owners must register any new water-producing facility within 30 days or be guilty of a misdemeanor.[215] Figure 3b.2-1 (Sustainable Management Criteria) shows that, as of March 2021, there are 425 wells (368 active and 57 inactive) identified in SYRWCD Zones B and F which are approximately representative of the aquifers of the WMA.

Additional information is needed on production wells in the Lompoc Plain. Specifically, information is needed that identifies the aquifer from which wells extract water. The Hydrogeologic Conceptual Model (Section 2a) described an Upper Aquifer consisting of Santa Ynez River sediments, and a folded Lower Aquifer with older regional sediments. Groundwater modeling (Water Budget, Section 2c) further subdivided this aquifer system into model layers. More accurate data about the three-dimensional location of wells and pumping would allow the GSA to provide better information about likely well interactions and interference, water quality, and water levels.

The following additional information would be requested for all current registered wells, and any new well that is registered in the WMA.

- Location of the well to within 103 feet[216] or better. Consumer mobile phones are typically able to provide accuracy to within 16 feet and would be sufficient for this purpose.
- Well log information, such as Well Completion report "Driller's Log" or geophysical logs, if available.

215 CWC Section 75640

216 Locations reported in degrees minutes seconds (format like 34° 36' 33" N) indicates accuracy of ±103 feet. Locations reported in decimal degrees to four digits (i.e. 34.6092° N) indicates accuracy of ±37 feet.

- Well information in the Irrigated Land Regulatory Program, which includes the site name and location identifier for the well on the property.
- Well metering, as described in section 5a.5-2.

Implementation is expected to involve relatively minor costs to the well owners and to the well registration program administration. A target date for the completion of the updates to the well registration is by end of the SYRWCD Fiscal Year 2023-2024 (June 30, 2024).

5a.3-2 Well Metering Requirement

This implementation project involves assessments of groundwater production where metered water usage for wells is estimated based on crop acres, population, livestock, landscape use, and pond evaporation. These factors for estimating usage are from the SYRWCD instructions pamphlet (SYRWCD, 2010) and currently "applied as published and are not to be altered for wet or dry reporting periods or irrigation methods." The recommendation of the GSP is that the use of static factors be phased out and replaced by water meter installations at wells provide well owners and incentive for efficient water use.

Metering would also help with verifying crop water use. Crops can be irrigated using various methods and variable efficiency. Irrigation improvements may include changes to reduce evaporation, like changes to the timing of irrigation application, replacing sprinkler systems with drip irrigation systems, and so forth. The benefits from these improvements in terms of increased water use efficiency are variable, and can require capital expenditures that are not compensated or incentivized under a single crop requirement system. Using well water meters for irrigation in combination with management actions described in Chapter 4 involving groundwater extraction fees would allow well owners to be incentivized for moving to more efficient water use with existing crops.

The GSP would also have benefit from more accurate measurements of the water that is being produced from the groundwater basin, which could better inform accurate estimates of sustainable yield and management decisions as part of the overall goal of ensuring future water availability.

Demand management measures from the Urban Water Management Act (UWMA) require that urban water suppliers not yet fully operating with proper water meters explain plans for installing water meters. While the WMA GSA is not subject to the UWMA, the GSA should give similar considerations as water metering requirements specified in UWMPs.

Installation costs for well water meters are dependent on the size and flow rate required. In 2021, low flow water meters (<35 gallons per minute [gpm]) suitable for domestic use cost as little as $200, while high flow meters (up-to 600 gpm) suitable for large scale agriculture use can cost upwards of $800 or more. Full water meter installation would include labor costs, which could easily be double or more the cost of the meter.

In recognition of the costs involved for water meter installations, it is recommended that metering be phased in over two years, with a target date of completion by end of calendar year ~~2023~~2024 (December 31, ~~2023~~2024). The GSA may provide financial incentives to help encourage and offset the metering costs.

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5a.4 DATA MANAGEMENT SYSTEM MAINTENANCE

The Data Management System (DMS) was previously described in Section 1e.1 of this WMA GSP. The DMS is a centralized source for water information regarding the WMA. Aspects of the WMA DMS include a database with water data, geographic information system (GIS) files, a map server to make the information available, electronic copies of reports, and a web interface to view these various data sets. The DMS Web interface includes interactive mapping and graphing, including a specific interface to track how the WMA is meeting the Sustainable Management Criteria (SMCs).

Costs related to maintain the DMS include rental costs for the server space, and registration of the domain name. Because the DMS utilizes a computer system located on the internet, the sever software requires periodic updates and software patches to ensure security. To keep the DMS as a relatively up-to-date resource, data and reports must be periodically added as they become available. With data that is collected and transmitted through telemetry, an automated update system can be developed to lessen the labor involved. Total annual costs to the WMA GSA for updating the DMS are expected to be around $10,000 to $15,000 per year, mostly in labor to update data and reports. Some of this cost may be counted in the annual reporting estimate.

If new features or updates are needed for the DMS, these items can involve additional labor costs to develop which can be highly dependent on the specifics of the feature needed.

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5a.5 REPORTING AND PLAN UPDATES

SGMA regulations require that the GSA periodically update DWR on the status of the WMA including process of the GSP implementation, and periodically assessing the GSP for potential improvements, or as a result of changing conditions. Ongoing communication with groundwater users and the entire community will also be key for the process of GSP implementation. The following sub-sections describe how these required SGMA tasks plan to be accomplished.

5a.5-1 Annual Reports

In accordance with SGMA, the WMA is required to provide an annual report for the water year (October 1 to September 30 the following year) within six months following the end of the water year, and no later than "April 1 of each year following the adoption of the Plan."[217] These annual reports are to include general information about the Basin, groundwater elevations, contour maps, groundwater extraction data, surface water availability, total water use, and progress made towards GSP implementation.

Data on the first half of the water year[218] is compiled annually in the Santa Ynez River Water Conservation District's required "Engineering Investigation and Report upon Ground Water Conditions"[219] (Stetson 2021, and previous annual reports) based on a July 1 to June 30 year.[220] A preliminary report is published in March,[221] and a final investigation, including spring conditions data collected in March, is published at the end of April. The engineering investigation provides information for the SYRWCD's Board of Directors to consider regarding overdraft, water production, and obligated water purchases. Other annual reports on water resources are published throughout the year. Additional reports include the Santa Barbara County Hydrology report,[222] and the Annual Monitoring Summary for Biological Opinion. Other annual reporting is provided in Consumer Confidence Reports which are a federal requirement that larger public

217 23 CCR § 356.2 Annual Reports
218 See the discussion regarding Water Year in the front matter.
219 CWC Section 75560 The district shall annually cause to be made an engineering investigation and report upon ground water conditions of the district.
220 CWC Section 75507 (a) "Water year" means July 1st of one calendar year to June 30th of the following calendar year.
221 CWC Section 75570 On or before the day of the regular meeting of the board in March of each year, the engineering investigation and report shall be delivered to the secretary in writing.
222 Santa Barbara County Hydrology reports use a September 1st -August 31st water year.

water systems (e.g. City of Lompoc and CCWA) publish general information regarding their drinking water quality. Annual SGMA updates will commence with the inclusion of information compiled from these various annual reports, and address the additional required elements of the SGMA annual reporting.

The general schedule for completion of the GSP annual reports is based on collecting data representing the fall season or end of the water year conditions which are typically collected through the end of October. Data would be updated into the DMS at that time. Following the data collection and compilation, the updated GSP document would be drafted and compiled in November and December of the year with presentation to the GSA committee expected for January or February. The January and February presentation would include a public newsletter (see Section 1c and Appendix 1c-D). The final version of the annual GSP report would be submitted to DWR in mid-March.

The first of these GSP annual reports is for the water year ending September 30, 2021, prior to adoption and submittal of the GSP in January 2022. The first annual report is due by April 1, 2022.[223] This first annual report is to include updates about conditions in the basin since the previous year described in the GSP.

The first two years of developing the annual report will likely involve development time. Starting with the third year (report on water year 2023), preparation of the annual report is expected to be relatively less time intensive. The SYRWCD annual engineering investigation report costs approximately $18,000 each year, on average, to update and produce.[224] Once the annual report is mature, reproducing it in subsequent years will likely be similar in terms of costs.

5a.5-2 Five-Year Plan Assessment

In accordance with SGMA, the WMA is required to provide a written assessment of the GSP at least every five years.[225] This includes an updated description of current groundwater conditions, discussion of project or management actions, any potential GSP updates, evaluation of any significant new information or change in water use, and a general assessment of monitoring. Each of the Group 1 PMAs should have

223 Personal Com. Anita Regmi, DWR Rep., 2021-05-25

224 Costs for producing the 2021 SYRWCD report which was representative average year. Inflation at the current 5.39% CPI annual rate means the same level of effort will cost around $19,000 in 2022 dollars, and $20,000 in 2023 dollars.

225 23 CCR § 356.4. Periodic Evaluation by Agency

been enacted and have some data available to evaluate the PMAs for further development or to move Group 4 PMAs to Group 1 for implementation.

The UWMPs are planning documents for municipal and retail supplies who serve more than 3,000 customers or serving more than 3,000 acre-feet annually. These documents are also updated on five- year cycles. Information from any 2025 UWMA plans (due in 2026) may be incorporated into the 2025 plan assessment. UWMPs include discussion of how a water supplier is planning for water supply reliability in normal, single dry, and multiple dry water years, and under future droughts, groundwater overdraft, regulatory revisions, and changing climatic conditions. UWMPs also include updates to population projections and future water demands. Both the City of Lompoc and CCWA are currently required to produce an UWMP.

Other data that may be updated in the Five-Year Plan Assessments include census population data, agricultural land use, and pumping data. Agricultural uses of land may also change over this five-year time frame. Particular crops that are planted depend on local and global demand and trade including emerging crops, such as cannabis, which may become more prevalent.

The expected schedule for completion of the Five-Year Plan Assessment (due in 2027) is expected to be a two-year process with updates starting in July 2025. This timeline should take into consideration the WMA GSA committee needs and would allow for periods of WMA GSA member agency staff, committee, and public review on the draft and resolution of comments prior to submittal of the Five-Year Plan Assessment to DWR. It is expected there will be additions and updates that will have occurred as a result of implementation.

In addition to updating the Five-Year Plan Assessment, to incorporate all requirements, this implementation project is expected to have outreach and engagement components including several presentations to the WMA GSA Committee and newsletters to inform the public.

Several of the Planning and Management Actions (Chapter 4) may rely on findings about conditions within the WMA, including population, agricultural lands, and sustainable yield. The Five-Year Plan Assessment would update these numbers, and provide the GSA an opportunity to update management actions as a result of any changes made within the WMA.

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Section 5 B – IMPLEMENTATION TIMELINE

The WMA GSA plans to start implementation of the GSP after adoption and submittal of the GSP by the WMA Committee in January 2022. **Table 5b.1-1** is a timeline summarizing the projects and actions planned and described in Section 5a. The Project and Management Actions described in Chapter 4 are primarily driven due to trigger conditions within the basin, and may occur simultaneously with the projects identified and listed here.

Table 5b.1-1
5-Year Implementation Timeline of WMA GSP

Water Year	2022			2023				2024				2025				2026				'27
Fiscal Year	2021-22		2022-23				2023-24				2024-25				2025-26				2026-27	
Calendar Year	2022				2023				2024				2025				2026			
Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Surveying Representative Wells																				
SkyTEM Airborne Geophysics																				
Raw Data Processing																				
Update 3D Geologic Model																				
Update Groundwater Model																				
Logging and Sounding Wells																				
New GW Level Wells (outreach)																				
Seawater WQ Monitoring																				
SW Gage Installation																				
Access, Permitting, Design																				
Installation																				
Well Registration Update																				
Well Metering Requirement																				
Data Updates																				
SMGA WY Annual Reports																				
Five-Year Plan Assessment																				
Data Updates																				
Document Updates																				
Public Comments																				
Finalizing Plan Assessment																				

SECTION 5C – PLAN FUNDING

This section describes funding for this WMA GSP, as well as opportunities for funding from State and Federal sources. This expands on the administrative details introduced in Section 1b.

5C.1 FUNDING FOR DEVELOPMENT OF THIS GSP

Development of this GSP and associated work activities required for development, preparation and submittal of the Groundwater Sustainability Plan (GSP) for the Santa Ynez River Valley Basin (SYRVGB) was funded by a combination of local contributions from member agencies and state grants.[226] State funding that contributed to the development of this GSP included the following grant programs~~.~~ **(Table 5c.1-1).**

Table 5c.1-1
State of California Grant Contributions to
Development of this Groundwater Sustainability Plan

Management Areas	Grant Program	Funding Amount	Award Date	Project Title
WMA, CMA, EMA	Proposition 1, Round 2, Sustainable Groundwater Planning Grant Program	$1,000,000	2018	Santa Ynez River Valley Basin GSP Planning and Preparation
WMA, CMA	Prop. 68, Round 3, Sustainable Groundwater Planning Grant Program	$296,000	2019	Airborne Electromagnetic Survey of the WMA and CMA of the Santa Ynez River Valley Basin

The four voting WMA member agencies (City of Lompoc, Vandenberg Village Community Services District, Mission Hills Community Services District, and Santa Ynez River Water Conservation District) funded the remainder of the costs through a cost sharing agreement. The Santa Barbara County Water Agency (SBCWA), as a non-voting member, is not responsible for any other costs related to the WMA GSP development. All member agencies are responsible for their own costs to attend and participate in the WMA GSA committee.

226 Project: Santa Ynez River Valley Basin GSP Planning and Preparation. Reference number 3860-PM-285. Bond Accountability. California Natural Resources Agency.

5C.2 FUNDING FOR FUTURE WMA GSA ACTIVITIES

In accordance with SGMA[227], the WMA GSA has a financial plan to implement future costs of this GSP. These costs include the implementation projects (Section 5a) needed to resolve data gaps and improve management, and project and management actions (Chapter 4) as needed to improve groundwater conditions in the Basin.

GSP implementation costs are expected to require a broad variety of funding sources, from State, and local sources. As described in the Plan Area (Section 1d) a substantial portion of the WMA is considered disadvantaged, including the City of Lompoc considered a disadvantaged community (DAC).

The WMA GSA is currently funded by a cost sharing agreement between the four voting WMA GSA member agencies. Future costs are anticipated to be funded through fees created by the GSA, and or continuing cost-sharing between agencies. In addition, the exact governance structure of the Santa Ynez River Valley Groundwater Basin may change in the future to a Joint Powers Authority (JPA), in which there maybe cost-sharing between the management areas (WMA, CMA, and EMA). There also may be opportunities to obtain implementation grants from the State of California.

Under SGMA[228] following adoption of this GSP, the WMA GSA will have the authority to directly collect fees on the extraction of groundwater from the basin to fund costs of groundwater management including, but not limited to, fees that increase based on the quantity of groundwater produced annually, the year in which the production of groundwater commenced from a groundwater extraction facility, and impacts to the Basin. The exact mechanisms and structure of obtaining funding from the local community to manage the local groundwater resources still needs to go through additional planning including stakeholder outreach, public workshops and GSA hearings. The local funding mechanisms may include a combination of assessments, property related fees, and/or non-tax fees based on property acres, number of wells, and/or amount of groundwater extracted.

[227] 23 CCR § 355.4 (b)(9) "Whether the Agency has the legal authority and financial resources necessary to implement the Plan."

[228] CWC Section 10730.2

5c.2-1 Potential State of California Grant Programs

As the WMA GSA is eligible for Technical Assistance (TA) Funding Program. The City of Lompoc is a considered a disadvantaged community,[229] and both VVCSD and MHCSD are small communities.[230] Projects that TA funds include improvement of drinking water, wastewater, groundwater quality, and storm water programs.

Other state of California sources of funding includes State Water Resource Control Board loans and Grants. Following state grant programs may be applicable:

- Clean Water State Revolving Fund (CWSRF)
- Drinking Water State Revolving Fund (DWSRF)
- Small Community Grant Fund
- Groundwater Grant Fund (Chapter 10, Prop 1)
- Parks and Water Bond (Chapter 11, Prop 68)

DWR is providing additional financial assistance to initiate GSPs under the Proposition 1- Integrated Regional Water Management (IRWM) Implementation Grant Program.[231] Approximately $403 million in grant funding is being made available for implementation projects with at least $51 million being made available for projects that provide benefits specifically to Disadvantaged Communities (DAC). DWR also provides Technical Support Services (TSS)[232] to support GSAs. The TSS offered support includes: monitoring well installation, geophysical logging, borehole video logging and other field activities.

229 Median household income (MHI) < 80% of the statewide MHI
230 Defined as a population of less than 10,000,
231 Implementation Grant Program. Integrated Regional Water Management. Department of Water Resources. Web site. https://water.ca.gov/Work-With-Us/Grants-And-Loans/IRWM-Grant-Programs/Proposition-1/Implementation-Grants Accessed 2021-09-01.
232 Assistance and Engagement. Department of Water Resources. Web site. https://water.ca.gov/programs/groundwater-management/assistance-and-engagement Accessed 2021-09-01.

5c.2-~~1~~2 Potential Federal Grant Programs

Federal grant programs that may be applicable to the WMA. Several grants include support for defense communities like the WMA which in part is a bedroom community for the Vandenberg Space Force Base, a critical Department of Defense installation.

- Water Infrastructure Financing and Integration Act (WIFIA)
- Reclamation Integration Financing and Integration Act (RIFIA)
- Bureau of Reclamation – WaterSMART Program
- Department of Defense
  - Defense Communities Infrastructure Program
  - Readiness and Environmental Protection Integration Act (REPI)
- Water Resources Development Act (WRDA)
- U.S. Department of Agriculture
  - Community Facilities program
  - Regional Conservation Program

Surface and ~~subflows~~underflows of the Santa Ynez River are managed through releases of the Federal Bureau of Reclamation operated Cachuma Project under the State Water Resources Control Board. National Oceanographic and Atmospheric Administration (NOAA) through comments indicated interest in the additional plan element[233] discussing local groundwater dependent ecosystems. NOAA Fisheries provides grants[234] for management, research, monitoring, and outreach activities that have direct conservation benefits for listed species under the Endangered Species Act, as well as the pacific salmon and steelhead.

233 CWC Section 10727.4 Additional Plan Elements: "where appropriate […] (l) Impacts on groundwater dependent ecosystems."

234 Funding & Financial Services. National Oceanographic and Atmospheric Administration. Website. https://www.fisheries.noaa.gov/funding-opportunities/ Accessed 2021-08-31.

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No External Citations.

Section 5c: Plan Funding

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