DRAFT

Eastern Management Area Groundwater Sustainability Agency

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

Section 4 – Monitoring Networks

August 2, 2021

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

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GEI Consultants

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Abbreviations and Acronyms

Basin Plan	Water Quality Control Plan for the Central Coastal Basin
CASGEM	California Statewide Groundwater Elevation Monitoring
COGG	California Oil, Gas, and Groundwater
DDW	Division of Drinking Water
DMS	data management system
DWR	California Department of Water Resources
EPA	U.S. Environmental Protection Agency
GAMA	Groundwater Ambient Monitoring and Assessment Program
GDE	groundwater dependent ecosystem
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
HCM	hydrogeologic conceptual model
ID No. 1	Santa Ynez River Water Conservation District Improvement District No. 1
ILRP	Irrigated Lands Regulatory Program
InSAR	Interferometric Synthetic Aperture Radar
LOCSD	Los Olivos Community Service District
LUST	leaking underground storage tank
MTBE	methyl tert-butyl ether
NHD	National Hydrography Dataset
NWIS	National Water Information System
QA/QC	quality assurance and quality control
RMS	representative monitoring site
RP	reference point
RWQCB	Regional Water Quality Control Board
SGMA	Sustainable Groundwater Management Act
SWRCB	State Water Resources Control Board
USGS	U.S. Geological Survey

SECTION 4: **Monitoring Networks**

4.1 Introduction to Monitoring Networks

§354.32 Introduction to Monitoring Networks. This Subarticle describes the monitoring network that shall be developed for each basin, including monitoring objectives, monitoring protocols, and data reporting requirements. The monitoring network shall promote the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan.

This section describes existing monitoring networks and improvements to the monitoring networks that will be developed for the Santa Ynez River Valley Groundwater Basin (Basin) Eastern Management Area (EMA) as part of Groundwater Sustainability Plan (GSP) implementation. This section is prepared in accordance with the Sustainable Groundwater Management Act (SGMA) regulations §354.32, §354.34, §354.36, §354.38, and §354.40 and includes monitoring objectives, monitoring protocols, assessment and improvement of monitoring network, representative monitoring, and data reporting requirements.

The monitoring networks presented in this section are largely based on existing monitoring sites. During the 20-year GSP implementation period, it may be necessary to expand the existing monitoring networks and identify or install more monitoring sites to fully demonstrate sustainability and improve the GSP model. Monitoring networks and data gaps are described for each of the five applicable sustainability indicators. Identified data gaps will be addressed during GSP implementation to improve the Groundwater Sustainability Agency's (GSA's) ability to track progress and demonstrate sustainability.

The groundwater level monitoring network section of this GSP is largely based on historical groundwater data compiled by the U.S. Geological Survey (USGS) National Water Information System (NWIS) program, the California Statewide Groundwater Elevation Monitoring (CASGEM) program,[1] and semi-annual groundwater monitoring conducted by Santa Barbara County. The groundwater quality monitoring network section of this GSP is largely based on historical groundwater data compiled by the USGS Groundwater Ambient Monitoring and Assessment (GAMA) Program.[2]

[1] Available at NWIS, https://maps.waterdata.usgs.gov/mapper/index.html; CASGEM, https://water.ca.gov/Programs/Groundwater-Management/Groundwater-Elevation-Monitoring--CASGEM; and http://www.countyofsb.org/pwd/SYRVGWB.sbc; respectively. (Accessed May 20, 2021.)
[2] Available at GAMA, https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/. (Accessed May 20, 2021.)

4.2 Monitoring Network Objectives and Design Criteria

§354.34 Monitoring Network.

(a) Each Agency shall develop a monitoring network capable of collecting sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate Plan implementation.

(b) Each Plan shall include a description of the monitoring network objectives for the basin, including an explanation of how the network will be developed and implemented to monitor groundwater and related surface conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of Plan implementation. The monitoring network objectives shall be implemented to accomplish the following:

(1) Demonstrate progress toward achieving measurable objectives described in the Plan.

(2) Monitor impacts to the beneficial uses or users of groundwater.

(3) Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.

(4) Quantify annual changes in water budget components.

(d) The monitoring network shall be designed to ensure adequate coverage of sustainability indicators. If management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the basin setting and sustainable management criteria specific to that area.

(f) The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors:

(1) Amount of current and projected groundwater use.

(2) Aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow.

(3) Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal.

(4) Whether the Agency has adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response.

The SGMA regulations require monitoring networks be developed to promote the collection of data of sufficient quality, frequency, and spatial distribution to characterize groundwater and related surface water conditions in the basin and to evaluate changing conditions that occur through implementation of the GSP. The monitoring network should accomplish the following:

- Demonstrate progress toward achieving measurable objectives described in the GSP.
- Monitor impacts to the beneficial uses and users of groundwater.
- Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.
- Quantify annual changes in water budget components.

The density of monitoring sites and frequency of measurements are described in Sections 4.3.2, 4.4.2, 4.5.2, 4.6.2, and 4.7.

The minimum thresholds and measurable objectives monitored by the networks are described in Section 5.

4.2.1 Monitoring Networks

Monitoring networks have been developed for each of the five sustainability indicators that are applicable to the EMA:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon
- Significant and unreasonable reduction of groundwater storage
- Significant and unreasonable degraded water quality
- Significant and unreasonable land subsidence that substantially interferes with surface land uses
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

The EMA is isolated from the Pacific Ocean and is not threatened by seawater intrusion; therefore, this GSP does not provide monitoring for the seawater intrusion sustainability indicator.

The SGMA regulations allow the GSP to use existing monitoring sites for the monitoring network; however, some monitoring sites do not presently meet all SGMA requirements that include state well identification number, well location, ground surface elevation, well depth, and perforated intervals. Well information and data will be submitted to the SGMA Portal Monitoring Network Module (MNM). Currently, some wells in the groundwater level monitoring network do not have well construction information. Well construction information and other monitoring well information will be obtained during GSP implementation.

The approach for establishing the monitoring network for the EMA is to leverage historical or existing monitoring programs and incorporate, as needed, additional monitoring locations that have been made available by cooperating entities. The monitoring networks are limited to locations with data that are publicly available and not collected under confidentiality agreements. This section identifies data gaps in each monitoring network and proposes locations and methods for filling those data gaps.

4.2.2 Management Areas

The Santa Ynez River Valley Groundwater Basin is identified by the California Department of Water Resources (DWR) in Bulletin 118 as Basin No. 3-015 (DWR, 2018). The greater Santa Ynez River Valley Basin is located in the Central Coastal region of California. For the purposes of groundwater management and SGMA compliance, the Santa Ynez River Valley Groundwater Basin is divided into three separate management areas: the Western Management Area (WMA), the Central Management Area (CMA), and the EMA (County of Santa Barbara et al., 2016). Each management area has its own monitoring networks. The quantity and density of monitoring sites in the EMA is sufficient to evaluate conditions of the EMA and establish sustainable management criteria specific to the EMA.

4.3 Groundwater Level Monitoring Network

23 Cal. Code Regs. §354.34 Monitoring Network.

(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.

(g) Each Plan shall describe the following information about the monitoring network:

(1) Scientific rationale for the monitoring site selection process.

(2) Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.

(3) For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.

(h) The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.

(j) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.

The minimum thresholds and measurable objectives for the chronic lowering of groundwater levels sustainability indicator are evaluated by monitoring groundwater levels at groundwater wells identified as representative monitoring sites (RMSs). The SGMA regulations require a network of monitoring wells sufficient to demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features.

Groundwater well construction information and water level data were obtained from the following sources:

- USGS NWIS
- DWR CASGEM
- County of Santa Barbara
- City of Solvang
- Santa Ynez River Water Conservation District Improvement District No. 1 (ID No.1)
- DWR Online System for Well Completion Reports[3]

These data sources resulted in a data set of more than 600 wells, each analyzed using the following steps to assess whether they would be included in the groundwater level monitoring network:

[3] Available at DWR, https://water.ca.gov/Programs/Groundwater-Management/Wells/Well-Completion-Reports. (Accessed May 20, 2021.)

- **Include only currently measured wells:** To reduce the possibility of selecting a well that has not been monitored in many years or that may no longer be accessible, wells were excluded that could not be measured in 2021.
- **Remove wells for which access agreements were denied by well owners:** The monitoring agency (i.e., the County of Santa Barbara) was not able to obtain access agreements for some private wells included in the groundwater level monitoring program, and therefore these wells are excluded from the existing groundwater level monitoring network. An effort is ongoing to reach out to private and public well owners to discuss participation in the groundwater level monitoring network.

All wells in the groundwater level monitoring network presented in this GSP are RMSs, which are also referred to as representative wells. The representative wells are defined in the SGMA regulations as monitoring sites that are representative of groundwater conditions in each of the principal aquifers within the EMA. These representative wells are evaluated in terms of sustainable management criteria in Section 5. The groundwater level representative wells network is summarized in Tables 4-1 and 4-2. The distribution of both the representative wells and all the wells included in the Santa Barbara County's monitoring network within the EMA are shown on Figure 4-1.

Representative wells have the following characteristics:

- They are screened exclusively within a single principal aquifer.
- They are spatially distributed to provide information across most of the EMA.
- They have a reasonably long record of data (period of record) so that trends can be determined.
- They have hydrograph signatures that are representative of wells in the surrounding area.

The representative wells network for groundwater level consists of 24 wells (15 wells in the Paso Robles Formation and 9 wells in the Careaga Sand) that will be used to monitor groundwater levels and storage. Ten wells are production wells used for agricultural irrigation, seven wells are domestic drinking water wells, and seven wells are municipal drinking water wells. While not ideal for use as a monitoring well because they are production wells, these wells are currently included as representative wells because of their locations in the EMA, available well construction information, and a long period of record. Seventeen of the wells lack complete well construction information such as total depth and the top and bottom depths of perforations (see Tables 4-1 and 4-2). This is a data gap that will be addressed during GSP implementation.

Table 4-1. Groundwater Level Monitoring Network – Paso Robles Formation Wells

Representative Well ID	Well Use	Well Depth (ft)	Screen Interval(s) (ft bgs)	Ground Elevation (ft NAVD 88)	Reference Point Elevation (ft NAVD 88)	First Date Measured	Last Date Measured	Years
6N/29W-07L01	Agricultural	–	–	868.9	870.7	1960	2021	62
6N/29W-08P01	Domestic	–	210 – ?	915.2	915.4	1934	2021	88
6N/29W-08P02	Domestic	–	–	896.0	897.0	1966	2021	56
6N/30W-07G05	Municipal	166	–	604.3	606.7	1962	2021	60
6N/30W-07G06	Municipal	566	305 – 410	602.3	604.3	1962	2021	60
6N/30W-11G04	Agricultural	400	130 – 390	681.1	683.1	2010	2021	12
6N/31W-01P03	Municipal	505	195 – 490	633.1	634.7	1967	2021	55
6N/31W-02K01	Domestic	–	–	619.6	620.8	1942	2021	80
6N/31W-13D01	Domestic	152	–	625.1	626.6	1941	2021	81
7N/30W-16B01	Agricultural	–	–	1,066.4	1,069.3	1950	2021	72
7N/30W-19H01	Agricultural	–	–	1,090.1	1,105.9	1954	2021	68
7N/30W-29D01	Agricultural	–	–	917.8	919.3	1905	2021	117
7N/30W-30M01	Agricultural	–	–	806.5	807.5	1905	2021	117
7N/30W-33M01	Agricultural	349	150–340	764.3	764.7	1954	2021	68
7N/31W-36L02	Domestic	–	–	722.6	723.6	1942	2021	80

Notes

-- = No data available
? = Unknown
bgs = below ground surface
ft = feet
NAVD 88 = North American Vertical Datum of 1988

Table 4-2. Groundwater Level Monitoring Network – Careaga Sand Wells

Representative Well ID	Well Use	Well Depth (ft)	Screen Interval(s) (ft bgs)	Ground Elevation (ft NAVD 88)	Reference Point Elevation (ft NAVD 88)	First Date Measured	Last Date Measured	Years
7N/31W-34M02	Agricultural	–	–	671.1	673.1	2014	2021	8
6N/31W-03A01	Domestic	–	–	738.5	740.0	1963	2021	59
6N/31W-04A01	Domestic	259	--	601.1	603.1	1956	2021	66
6N/31W-09Q02	Municipal	550	250 – 540	756.9	754.0	2011	2021	11
6N/31W-10F01	Agricultural	265	–	555.6	556.7	1966	2021	56
6N/31W-11D04	Agricultural	447	93 – ?	565.3	560.6	1955	2021	67
6N/31W-16N07	Municipal	145	99 – 127	479.3	478.2	2011	2021	11
6N/31W-xxxx[1]	Municipal	329	190 – 325	503.2	500.9	2011	2021	11
Solvang HCA[1]	Municipal	490	180 – 470	398.0	402.8	2011	2021	11

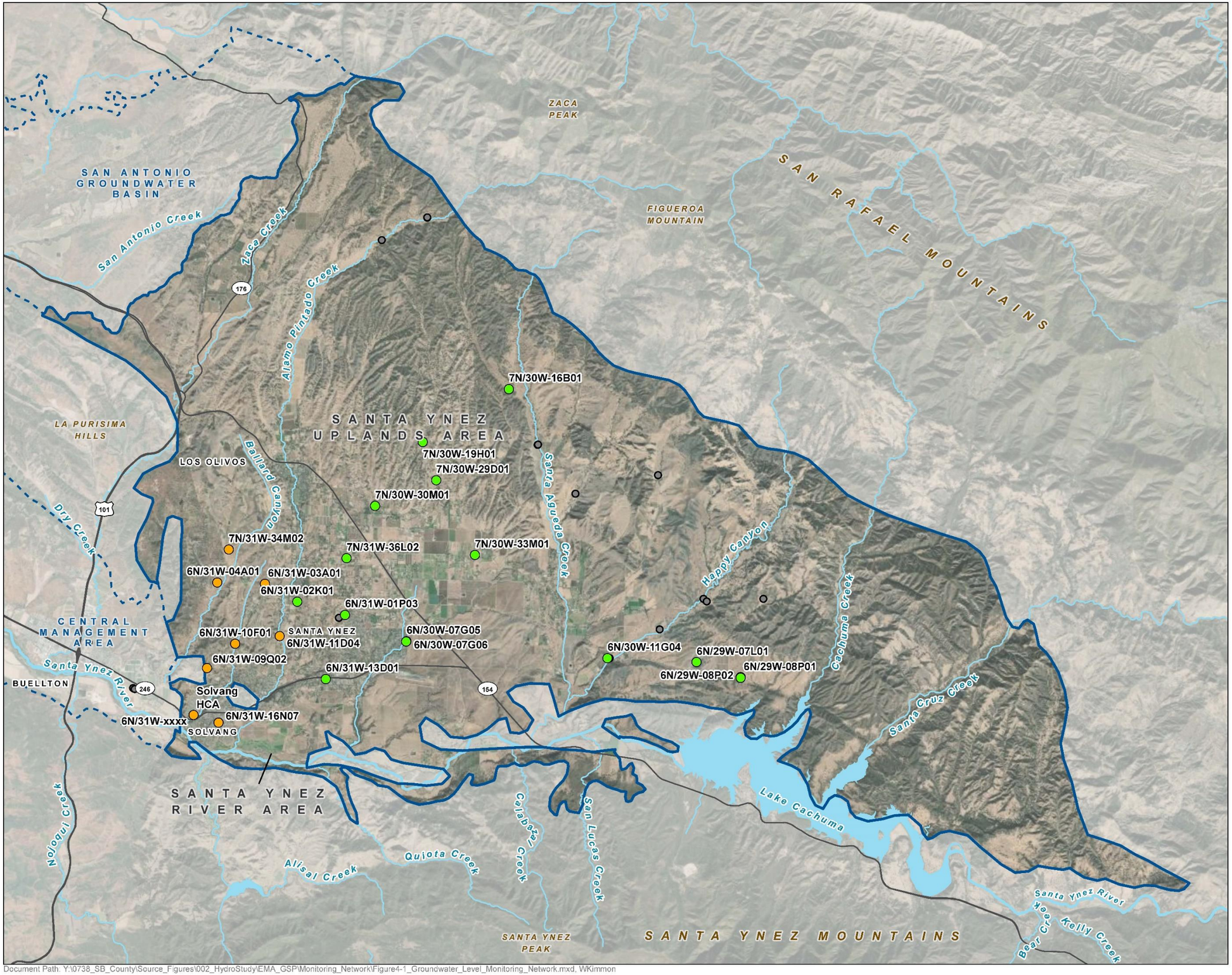
Notes

[1]: The State Well Number for these wells is not known at this time
-- = No data available
? = Unknown
bgs = below ground surface
ft = feet
NAVD 88 = North American Vertical Datum of 1988

FIGURE 4-1

Groundwater Level Monitoring Network

Groundwater Sustainability Plan
Eastern Management Area



LEGEND

Representative Well (by screened aquifer)

- Careaga Sand
- Paso Robles Formation

Other Wells

- Monitored by Santa Barbara County

All Other Features

- Eastern Management Area Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

Date: July 26, 2021
Data Sources: ESRI, USGS, Maxar 2020

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4.3.1 Monitoring Protocols

§354.34 Monitoring Network.

(i) The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.

The GSA adopted monitoring protocols using guidelines in the SGMA regulations and Best Management Practices (BMPs) published by DWR on monitoring protocols (DWR, 2016a). The following information or procedure is collected and documented for each monitoring site:

- Informal access agreements. Access agreements include semi-annual access to the site.
- A unique identifier that includes a general written description of the site location, date established, access instructions and point of contact, type of information to be collected, latitude, longitude, and elevation. The written description for each monitoring location also tracks all modifications to the site in a modification log.

The following considerations for groundwater level measuring protocols are considered:

- Groundwater level data are taken from the correct location
- Groundwater level data are accurate and reproducible
- Groundwater level data collection protocols are completed in accordance with the Data Quality Objectives process defined by the U.S. Environmental Protection Agency (EPA) *Guidance on Systematic Planning Using the Data Quality Objective Process* (EPA, 2006)
- All important information is recorded to correct, if necessary, and compare data
- A data collection and management quality assurance/quality control (QA/QC) program has been implemented to ensure data integrity

Water level data is collected under the following conditions:

- All groundwater levels are collected within as short a time as possible, preferably within a 1-to-2-week period.
- Depth to groundwater is measured relative to an established reference point (RP) on the well casing. The RP is usually identified with a permanent marker, paint spot, or a notch in the lip of the well casing. By convention, in open casing monitoring wells, the RP reference point is located on the north side of the well casing. If no mark is apparent, the person performing the measurement measures the depth to groundwater from the north side of the top of the well casing.
- The elevation of the RP of each well is surveyed to the North American Vertical Datum of 1988. The elevation of the RP is accurate to within 0.5 foot (ft).
- The sampler removes the appropriate cap, lid, or plug that covers the monitoring access point listening for pressure release. If a release is observed, the measurement follows a period of time to allow the water level to equilibrate.
- Depth to groundwater is measured to an accuracy of 0.1 ft below the RP.

- The water level meter is decontaminated before measuring domestic wells.

4.3.2 Assessment and Improvement of Monitoring Network

§354.38 Assessment and Improvement of Monitoring Network.

(a) Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.

(b) Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.

(c) If the monitoring network contains data gaps, the Plan shall include a description of the following:

(1) The location and reason for data gaps in the monitoring network.

(2) Local issues and circumstances that limit or prevent monitoring.

(d) Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.

(e) Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:

(1) Minimum threshold exceedances.

(2) Highly variable spatial or temporal conditions.

(3) Adverse impacts to beneficial uses and users of groundwater.

(4) The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.

§354.34 Monitoring Network.

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(1) Chronic Lowering of Groundwater Levels. Demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods:

(A) A sufficient density of monitoring wells to collect representative measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer.

(B) Static groundwater elevation measurements shall be collected at least two times per year, to represent seasonal low and seasonal high groundwater conditions.

This section summarizes several portions of the groundwater level monitoring network that constitute data gaps, focused primarily on those data gaps that that "could affect the ability of the Plan to achieve the sustainability goal" (§ 354.38 [a]) for the EMA. Table 4-3 compares the suggested attributes of a groundwater level monitoring network from the BMPs to the current network and identifies data gaps (DWR. 2016b).

Per the SGMA regulations, a data gap:

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

This section also presents estimates of uncertainty regarding the principal data relied upon for the GSP.

The SGMA regulations require a sufficient density of monitoring wells to characterize the groundwater table or potentiometric surface for each principal aquifer. Professional judgment is also used to determine an adequate level of monitoring density. The monitoring density should allow for the sustainable management of the groundwater resource.

The BMP suggests a range of 0.2 to 10 wells per 100 square miles, with a median of 5 wells per 100 square miles from various cited studies to be sufficient to adequately represent groundwater conditions within a basin. For this density to be considered sufficient, the distribution of the wells within the basin to "yield representative information and about groundwater conditions as necessary to evaluate Plan implementation" (§ 354.34). The EMA is approximately 156 square miles, and the groundwater level monitoring network consists of 15 wells in the Paso Robles Formation and 9 wells in the Careaga Sand; which equates to approximately 10 wells and 6 wells per 100 square miles for the well density in the Paso Robles Formation and Careaga Sand, respectively.

Although the existing groundwater level monitoring network satisfies the well density guidance cited in the BMP, there is one area identified within the EMA (see Figure 4-2) where the addition of monitoring wells would improve the hydrogeologic conceptual model (HCM) discussed in Section 3.2.

One area where the addition of monitoring wells would improve the HCM is in the Paso Robles Formation in the northwestern portions of the uplands from Los Olivos to the northern boundary of the basin, including the northern reaches of Zaca creek and Alamo Pintado Creek. A second area where the addition of monitoring wells would improve the HCM is in the Paso Robles Formation in the central portion of the basin, generally between Santa Agueda Creek and Happy Canyon (see Figure 4-2) An effort will be made during GSP implementation to contact owners of wells in these areas to determine if they can be included in the monitoring program. Including these additional wells in the groundwater level monitoring network would minimize the uncertainty of groundwater elevation trends and assist in sustainably managing the EMA.

Based on the State Water Resources Control Board (SWRCB) Irrigated Lands Regulatory Program (ILRP), private agricultural supply and domestic supply wells have been identified in the northwestern uplands and the central portion of the EMA. There are wells monitored by Santa Barbara County in these areas. However, most of these wells do not represent a single aquifer and therefore do not meet the criteria for a representative well. The Los Olivos Community Service District (LOCSD) is currently developing a monitoring plan for monitoring nitrate concentrations near Los Olivos. The nitrate monitoring plan will include the installation of at least one nested monitoring well completed in the Paso Robles Formation. This well (or wells) will be included in the EMA groundwater level monitoring network once completed. An effort will be made by the EMA to strategically coordinate with the LOCSD monitoring program.

There are currently informal well access agreements for wells in the monitoring network. The GSP will contact well owners to formalize well access agreements during GSP implementation. Additionally, well construction information for 14 of 24 wells included in the groundwater level monitoring network is unknown. Section 352.4 of the SGMA regulations states that the water level within a well must represent a single aquifer, requiring accurate well construction information of the well. The well construction information in the groundwater level monitoring network should be determined using either video logs of wells and/or encouragement of owners to provide any well construction information for wells included in the groundwater level monitoring network.

The current understanding of groundwater flow across the Baseline Fault, discussed in Section 3.1.2.1 is that the Baseline Fault is either permeable or semipermeable and does not constitute a barrier to groundwater flow. The addition of groundwater monitoring on either side of the fault would clarify the relationship of water levels across the fault and, by extension, its potential role in controlling groundwater flow. Selection of wells for this purpose should be considered when expanding the groundwater level monitoring network.

There may be opportunities to optimize the groundwater level monitoring network in the EMA. The number of wells included in the groundwater level monitoring network will be evaluated during each 5-year GSP interim review period. Hydrograph signatures from wells included in the groundwater level monitoring network will be compared for redundancy.

Table 4-3. Summary of Best Management Practices, Implementation Measures, and Data Gaps in the Groundwater Level Monitoring Network

Best Management Practice	Implementation Measures	Data Gap
Groundwater level data will be collected from each principal aquifer in the basin.	Groundwater level data is collected from 15 wells in the Paso Robles Formation and 9 wells in the Careaga Sand.	There are two areas of low density of monitoring points identified in the Paso Robles Formation. The GSA will contact well owners in these areas to determine if wells can be added to the network.
Groundwater level data must be sufficient to produce seasonal maps of groundwater elevations throughout the basin that clearly identify changes in groundwater flow direction and gradient (spatial density).	The groundwater level monitoring network is sufficient to produce seasonal maps of groundwater elevations throughout the EMA that clearly identify changes in groundwater flow direction and gradient (spatial density).	Some data used to prepare groundwater elevation maps (see Section 3.2) lack well construction information. Well construction information will be obtained from video surveys as funding allows.
Groundwater levels will be collected during the middle of October and March for comparative reporting purposes, although more frequent monitoring may be required (frequency).	All wells in the groundwater level monitoring network are monitored semi-annual basis in the spring and fall.	None Identified.
Data must be sufficient for mapping groundwater depressions, recharge areas, and along margins of basins where groundwater flow is known to enter or leave a basin.	The groundwater level monitoring network is sufficient for mapping groundwater depressions, recharge areas, and along margins of the EMA where groundwater flow is known to enter or leave the EMA, except in the vicinity of the Baseline Fault.	The addition of groundwater monitoring located on either side of the Baseline Fault would clarify the relationship of water levels across the fault and, by extension, its potential role in controlling groundwater flow. Selection of wells for this purpose will be considered when expanding the groundwater level monitoring network.

Best Management Practice	Implementation Measures	Data Gap
Well density must be adequate to determine changes in storage.	The groundwater level monitoring network is sufficiently distributed and meets California Department of Water Resources density requirements to determine changes in groundwater in storage.	The distribution of wells used to determine changes of storage would be optimized by including wells in the northwestern and central portions of the EMA. The GSA will contact well owners in these areas to determine if wells can be added to the network.
Long-term access agreements should be obtained for wells included in the monitoring network. Access agreements include year-round site access to allow for increased monitoring frequency.	There are currently informal well access agreement for wells included in the groundwater level monitoring network.	Formalized well access agreements will be obtained for wells in the groundwater level monitoring network. The GSA will contact well owners to formalize well access agreements during the GSP implementation period.

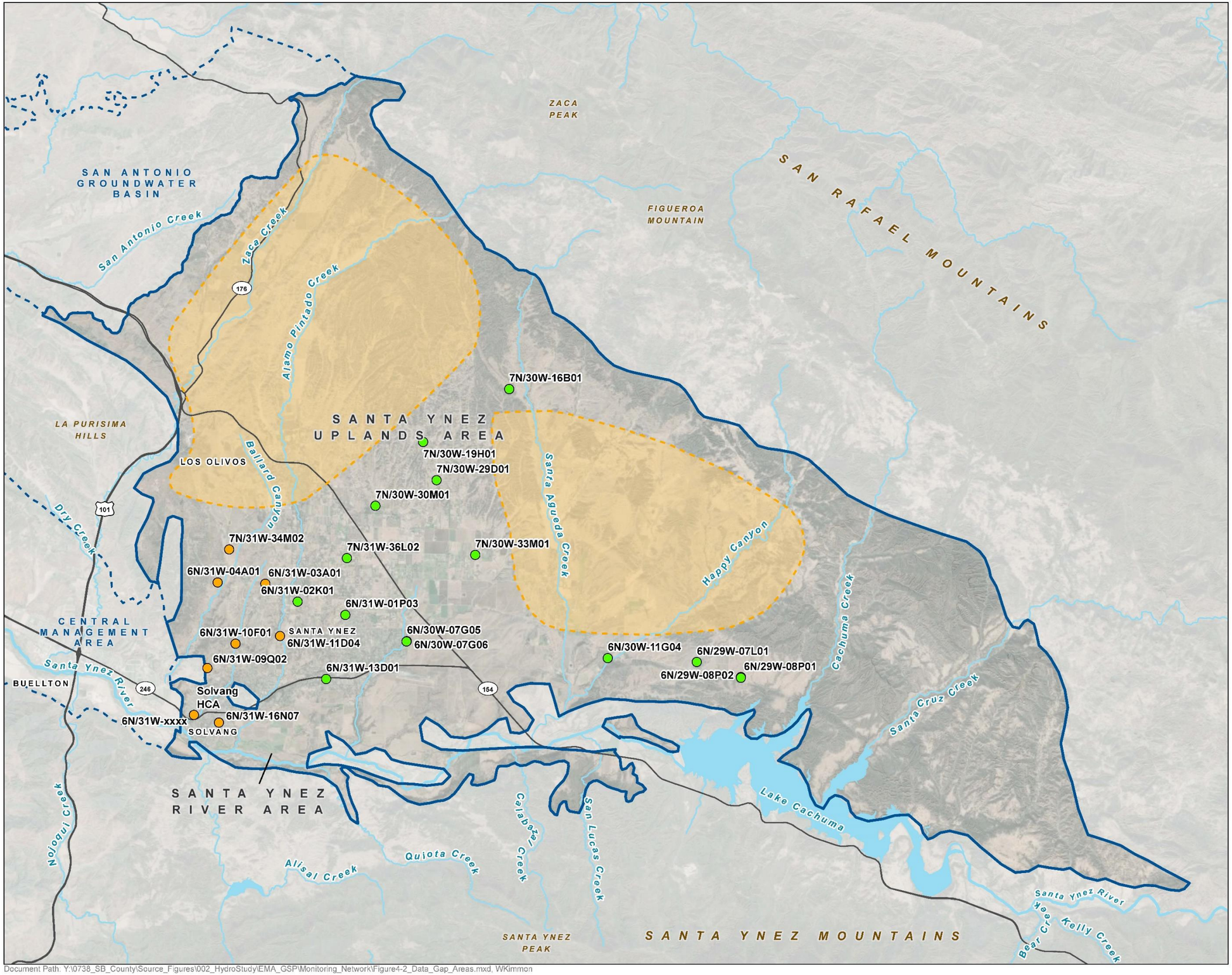
Notes

EMA = Santa Ynez River Valley Groundwater Basin Eastern Management Area

FIGURE 4-2

Groundwater Level Monitoring Network Low Well Density Areas

Groundwater Sustainability Plan
Eastern Management Area



LEGEND

- Data Gap Area

Well (by screened aquifer)

- Careaga Sand
- Paso Robles Formation

All Other Features

- Eastern Management Area Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

Date: July 19, 2021
Data Sources: ESRI, USGS, Maxar 2020

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4.4 Groundwater Storage Monitoring Network

§354.34 Monitoring Network.

(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.

(g) Each Plan shall describe the following information about the monitoring network:

(1) Scientific rationale for the monitoring site selection process.

(2) Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.

(3) For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.

(h) The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.

(j) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.

This GSP uses groundwater levels as a proxy for assessing change in groundwater in storage (see Section 5). The groundwater level monitoring network described in Section 4.3 will be used to create groundwater elevation contour maps and calculate change of groundwater in storage for each principal aquifer. The SYRWCD prepares annual reports, which present calculations of the change of groundwater in storage within the SYRWCD boundaries. To the extent possible, wells used for this purpose are included in this groundwater level monitoring network.

4.4.1 Monitoring Protocols

§354.34 Monitoring Network.

(i) The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.

The groundwater level monitoring network will be used as a proxy for the groundwater storage monitoring network. Therefore, the protocols described in Section 4.3.1 for the groundwater level monitoring network are representative of protocols for the groundwater storage monitoring network.

4.4.2 Assessment and Improvement of Monitoring Network

§354.38 Assessment and Improvement of Monitoring Network.

(a) Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.

(b) Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.

(c) If the monitoring network contains data gaps, the Plan shall include a description of the following:

(1) The location and reason for data gaps in the monitoring network.

(2) Local issues and circumstances that limit or prevent monitoring.

(d) Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.

(e) Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:

(1) Minimum threshold exceedances.

(2) Highly variable spatial or temporal conditions.

(3) Adverse impacts to beneficial uses and users of groundwater.

(4) The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.

§354.34 Monitoring Network.

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(2) Reduction of Groundwater Storage. Provide an estimate of the change in annual groundwater in storage.

The groundwater level monitoring network will be used as a proxy for the groundwater storage monitoring network. Therefore, the data gaps discussed in Section 4.3.2 for the groundwater level monitoring network are representative of data gaps in the groundwater storage monitoring network.

4.4 Seawater Intrusion Monitoring Network

§354.34 Monitoring Network.

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(3) Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.

(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.

(g) Each Plan shall describe the following information about the monitoring network:

(1) Scientific rationale for the monitoring site selection process.

(2) Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.

(3) For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.

(h) The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.

(i) The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.

(j) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.

§354.38 Assessment and Improvement of Monitoring Network.

(a) Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.

(b) Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.

(c) If the monitoring network contains data gaps, the Plan shall include a description of the following:

(1) The location and reason for data gaps in the monitoring network.

(2) Local issues and circumstances that limit or prevent monitoring.

(d) Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.

(e) Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:

(1) Minimum threshold exceedances.

(2) Highly variable spatial or temporal conditions.

(3) Adverse impacts to beneficial uses and users of groundwater.

(4) The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.

The EMA is isolated from the Pacific Ocean and is not threatened by seawater intrusion; therefore, this GSP does not provide monitoring for the seawater intrusion sustainability indicator.

4.5 Degraded Water Quality Monitoring Network

§354.34 Monitoring Network.

(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.

(g) Each Plan shall describe the following information about the monitoring network:

(1) Scientific rationale for the monitoring site selection process.

(2) Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.

(3) For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.

(h) The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.

(j) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.

The sustainability indicator for degraded water quality is evaluated by monitoring groundwater quality at a network of existing supply and monitoring wells. The SGMA regulations require sufficient spatial and temporal data from each principal aquifer to determine groundwater quality trends for water quality indicators to address known water quality issues.

Potential point sources of groundwater quality degradation were identified using the SWRCB GeoTracker data management system. Waste Discharge Requirement permits from the SWRCB GeoTracker data management system were also reviewed. Section 3.2.3.1.3 summarizes information from GeoTracker for open/active contaminated sites. Figure 3-25 shows the locations of these potential groundwater contaminant point sources and the locations of completed/case-closed sites. The single open/active case is Jim's Service Center (Site ID T0608300118) that was eligible for closure as of January 30, 2019, per the Central Coast Regional Water Quality Control Board (RWQCB) Low Threat Closure Policy (SBCPHD, 2019) and is included in the SWRCB leaking underground storage tank (LUST) Program. Site assessment reports indicate there are dissolved-phase benzene and methyl tert-butyl ether (MTBE) plumes in groundwater beneath the site. Alamo Pintado Creek was determined to be the sensitive downgradient receptor. Due to (1) the measured groundwater gradient in the area of the site, (2) the classification of Alamo Pintado Creek as a losing stream by the USGS National Hydrography Dataset (NHD), and (3) decreasing benzene and MTBE concentrations, a minimal threat to groundwater as a potable water source was determined (Flowline, 2018). Two monitoring sites (Well T0608300118-MW-8A and T0608300118-MW-4) are currently monitored at this site as part of the LUST program. However, these are shallow monitoring wells are completed in the

tributary alluvium, which is not one of the two principal aquifers and hence the wells are not included in monitoring plan.

According to the California Department of Conservation, Geologic Energy Management Division online Well Finder, or WellSTAR, tool, the Zaca Oil Field is the only oil and gas field located within or adjacent to the EMA. The USGS, in cooperation with SWRCB, initiated the California Oil, Gas, and Groundwater (COGG) Program in 2015[4]. The objective of the COGG Program is to determine where and to what extent groundwater quality may be adversely impacted by proximal oil and gas development activities (Davis, et al., 2018). Results and interpretations from the COGG Program are not yet available for review. If results and interpretations do become available during the implementation period of this GSP, the GSA will consider these findings during GSP review periods.

Existing groundwater quality monitoring programs in the EMA and groundwater quality distribution and trends are described in Section 3.2.3. Identified constituents of concern are based on state and federal regulatory standards (maximum contaminant levels [MCLs] and secondary MCLs [SMCLs]) for drinking water established by the SWRCB Division of Drinking Water (DDW)[5] and the EPA, respectively. For agricultural uses, constituents of concern are based on water quality objectives presented in the *Water Quality Control Plan for the Central Coastal Basin* (Basin Plan) (RWQCB, 2019). No minimum thresholds have been established for regulated contaminants because state regulatory agencies, including the RWQCB and the Department of Toxic Substances Control, have the responsibility and authority to regulate and direct actions that address contamination. Minimum thresholds and measurable objectives pertaining to concentrations of salts and nutrients (total dissolved solids [TDS], chloride, sulfate, boron, sodium, and nitrate) have been established based upon water quality objectives established in the Basin Plan by the RWQCB.

Constituents of concern for drinking water will be assessed at municipal water supply wells as part of the SWRCB DDW program. Constituents of concern for agricultural and domestic use will be assessed as part of the state ILRP and reported on the GeoTracker website. According to the RWQCB proposed Ag Order 4.0, beginning in 2022, all ranches enrolled in the ILRP must conduct annual sampling of all on-farm domestic drinking water supply and irrigation wells between March 1 and May 31 of each year. All groundwater samples must be collected by a qualified third party using proper sample collecting and handling method. All groundwater monitoring data sampled to meet the minimum groundwater monitoring requirements of the Order will be submitted electronically to the State Water Board's GeoTracker database by the testing laboratory. (SWCRB, 2021)

Wells included in the groundwater level monitoring network are listed in Tables 4-1 and 4-2 and shown on Figure 4-3. All of the wells from the GSP groundwater water quality monitoring network are RMS wells. Only wells completed in one of the two principal aquifers in the Santa Ynez Uplands are included in the groundwater quality monitoring network.

The groundwater quality monitoring network includes 26 municipal and other public water system wells that were identified by reviewing data available from the SWRCB DDW located in the SWRCB's GAMA database. Selected wells were sampled for at least one of the constituents of concern during 2015 or more recently. The 26 wells are listed in Table 4-4 and shown on Figure 4-3.

The agricultural supply wells and domestic supply wells included in the groundwater quality monitoring network were identified by reviewing data available from the ILRP located in the SWRCB's GAMA database. Selected wells were sampled in 2015 or more recently. There is a total of 35 ILRP wells in the groundwater

[4] Description available at https://webapps.usgs.gov/cogg/. (Accessed May 18, 2021.)
[5] Available at SWRCB, https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Chemicalcontaminants.html (Accessed May 21, 2021)

quality monitoring network; 10 wells were determined to be domestic supply wells based on their GAMA ID and 25 wells were determined to be agricultural supply wells. ILRP wells are listed in Table 4-3 and shown on Figure 4-3. All wells in Table 4-3 associated with an Agricultural or Domestic “Well Use” are part of the ILRP.

Table 4-4. Groundwater Quality Monitoring Network

Well ID	Well Use[1]	Well Depth (ft bgs)	Top of Screen (ft bgs)	First Date Measured	Last Date Measured[2]	Years Measured	Number of Sampling Events	Aquifer
4200531-010	Municipal	–	75	10/25/1999	12/10/2018	20	52	Unknown
4200612-006	Municipal	–	25	11/9/1999	2/7/2019	21	24	Unknown
4200616-004	Municipal	–	120	8/16/2000	12/2/2018	19	47	Unknown
4200800-001	Municipal	–	523	10/6/1987	2/14/2019	33	78	Unknown
4200802-001	Municipal	–	243	4/13/1988	12/1/2018	31	47	Unknown
4200802-002	Municipal	–	180	3/31/1999	12/1/2018	20	33	Unknown
4200804-006	Municipal	–	410	5/8/2002	10/17/2018	17	36	Unknown
4200804-008	Municipal	–	440	3/6/2003	10/17/2018	16	16	Unknown
4200807-006	Municipal	–	230	7/14/2000	12/1/2018	19	23	Unknown
4200807-009	Municipal	–	360	2/7/2001	12/2/2018	18	28	Unknown
4200837-003	Municipal	–	480	1/8/2001	10/10/2018	18	37	Unknown
4200837-004	Municipal	–	395	8/21/2002	10/10/2018	17	29	Unknown
4200881-002	Municipal	–	–	3/3/2003	12/1/2018	16	17	Unknown
4200881-005	Municipal	–	650	10/31/2001	12/1/2018	18	15	Unknown
4200893-002	Municipal	–	240	7/23/2003	5/16/2018	16	10	Unknown
4200893-003	Municipal	–	280	7/18/2005	5/16/2018	14	8	Unknown
4200895-001	Municipal	–	125	8/5/2002	11/12/2018	17	16	Unknown
4200915-001	Municipal	–	–	6/6/2000	3/25/2019	20	17	Unknown
4200931-002	Municipal	–	–	10/21/2010	7/31/2018	9	3	Unknown
4210013-001	Municipal	145	100	1/19/1984	11/14/2018	35	75	Tca
4210013-006	Municipal	550	250	6/12/1995	12/19/2018	24	39	Tca
4210013-015	Municipal	490	–	11/4/2014	12/19/2018	5	11	Tca
4210020-011	Municipal	–	–	7/24/1987	5/19/2015	29	39	Unknown
4210020-018	Municipal	–	130	3/22/1989	1/22/2019	31	53	Unknown
4210020-027	Municipal	–	540	11/8/2005	12/26/2018	14	28	Unknown

Well ID	Well Use[1]	Well Depth (ft bgs)	Top of Screen (ft bgs)	First Date Measured	Last Date Measured[2]	Years Measured	Number of Sampling Events	Aquifer
4210020-031	Municipal	–	640	8/13/2008	12/27/2018	11	23	Unknown
AGL020000786-ROBLAR_D/I	Domestic/ Agricultural	–	–	12/9/2013	11/29/2017	5	4	Unknown
AGL020000888-CLMWC	Agricultural	–	–	10/15/2012	9/7/2018	7	4	Unknown
AGL020000888-FAITH WELL	Agricultural	–	–	10/15/2012	9/7/2018	7	4	Unknown
AGL020001203-BW DOM	Domestic	–	–	10/10/2012	10/25/2017	6	4	Unknown
AGL020001203-WELL BW1	Agricultural	–	–	10/10/2012	10/25/2017	6	4	Unknown
AGL020002508-WELL	Agricultural	–	–	6/25/2015	11/10/2017	3	3	Unknown
AGL020003217-J BLOCK	Agricultural	–	–	11/21/2014	10/18/2017	4	4	Unknown
AGL020003217-WINERY	Agricultural	–	–	11/21/2014	10/18/2017	4	4	Unknown
AGL020003217-XRDS	Agricultural	–	–	4/25/2017	10/18/2017	1	2	Unknown
AGL020003684-TIERRA ALTA AG	Agricultural	–	–	11/28/2012	10/26/2017	6	4	Unknown
AGL020003684-TIERRA ALTA DOM	Domestic	–	–	11/28/2012	10/26/2017	6	4	Unknown
AGL020003688-FOX AG/DOMESTIC	Domestic/ Agricultural	–	–	3/27/2013	10/26/2017	5	3	Unknown
AGL020003701-STAG CANYON DOM	Domestic	–	–	11/28/2012	10/26/2017	6	4	Unknown
AGL020004012-ESTELLE 8 & 9	Agricultural	–	–	3/27/2013	10/26/2017	5	3	Unknown
AGL020004012-ESTELLE VINEYAR	Agricultural	–	–	11/28/2012	10/26/2017	6	4	Unknown

Well ID	Well Use[1]	Well Depth (ft bgs)	Top of Screen (ft bgs)	First Date Measured	Last Date Measured[2]	Years Measured	Number of Sampling Events	Aquifer
AGL020004744-PRIMARY	Agricultural	–	–	9/19/2012	12/4/2017	6	4	Unknown
AGL020006120-COGVIN_D/I	Domestic/ Agricultural	–	–	12/4/2013	8/1/2017	5	4	Unknown
AGL020007172-VINEYARD WELL	Agricultural	–	–	10/15/2012	10/20/2017	6	4	Unknown
AGL020007556-WDVINEYARD	Agricultural	–	–	6/21/2015	12/12/2017	3	3	Unknown
AGL020007594-MIDDLE WELL	Agricultural	–	–	6/12/2017	12/29/2017	1	2	Unknown
AGL020012024-CAMP4_DOM	Domestic	–	–	12/3/2013	8/1/2017	5	3	Unknown
AGL020012024-CAMP4_IRR	Agricultural	–	–	12/3/2013	8/1/2017	5	3	Unknown
AGL020012024-CMP4NEW_I	Agricultural	–	–	8/1/2017	8/1/2017	1	1	Unknown
AGL020014886-SANGER RANCH A	Domestic	–	–	11/28/2012	10/26/2017	6	4	Unknown
AGL020023842-CCGC_0520	Agricultural	–	–	8/1/2017	8/1/2017	1	1	Unknown
AGL020027368-WELL	Agricultural	–	–	6/7/2016	9/15/2016	1	2	Unknown
AGL020027634-EDISON WELL	Agricultural	–	–	8/12/2015	11/19/2015	1	2	Unknown
AGL020027634-IRRIGATION WELL	Agricultural	–	–	8/12/2015	11/19/2015	1	2	Unknown
AGL020027994-SYV#1	Agricultural	–	–	6/15/2017	6/15/2017	1	1	Unknown
AGL020027994-SYV#2	Agricultural	–	–	12/1/2017	12/1/2017	1	1	Unknown

Well ID	Well Use[1]	Well Depth (ft bgs)	Top of Screen (ft bgs)	First Date Measured	Last Date Measured[2]	Years Measured	Number of Sampling Events	Aquifer
AGL020028004-AG WELL 1	Agricultural	–	–	12/26/2017	1/16/2018	2	2	Unknown
AGL020028294-PEGASUS DOM	Domestic	–	–	4/12/2018	4/12/2018	1	1	Unknown
AGL020028294-PEGASUS IRR	Agricultural	–	–	11/20/2017	4/11/2018	2	2	Unknown
AGL020028389-VINE WELL	Agricultural	–	–	4/28/2017	10/26/2017	1	2	Unknown
AGL020028425-RODNEYSVYD	Domestic	–	–	12/20/2017	4/12/2018	2	2	Unknown

Notes

[1] Municipal designation includes municipal wells and other public water supply wells.

[2] Based on data available at the time of this analysis.

-- = No data available

? = Unknown

bgs = below ground surface

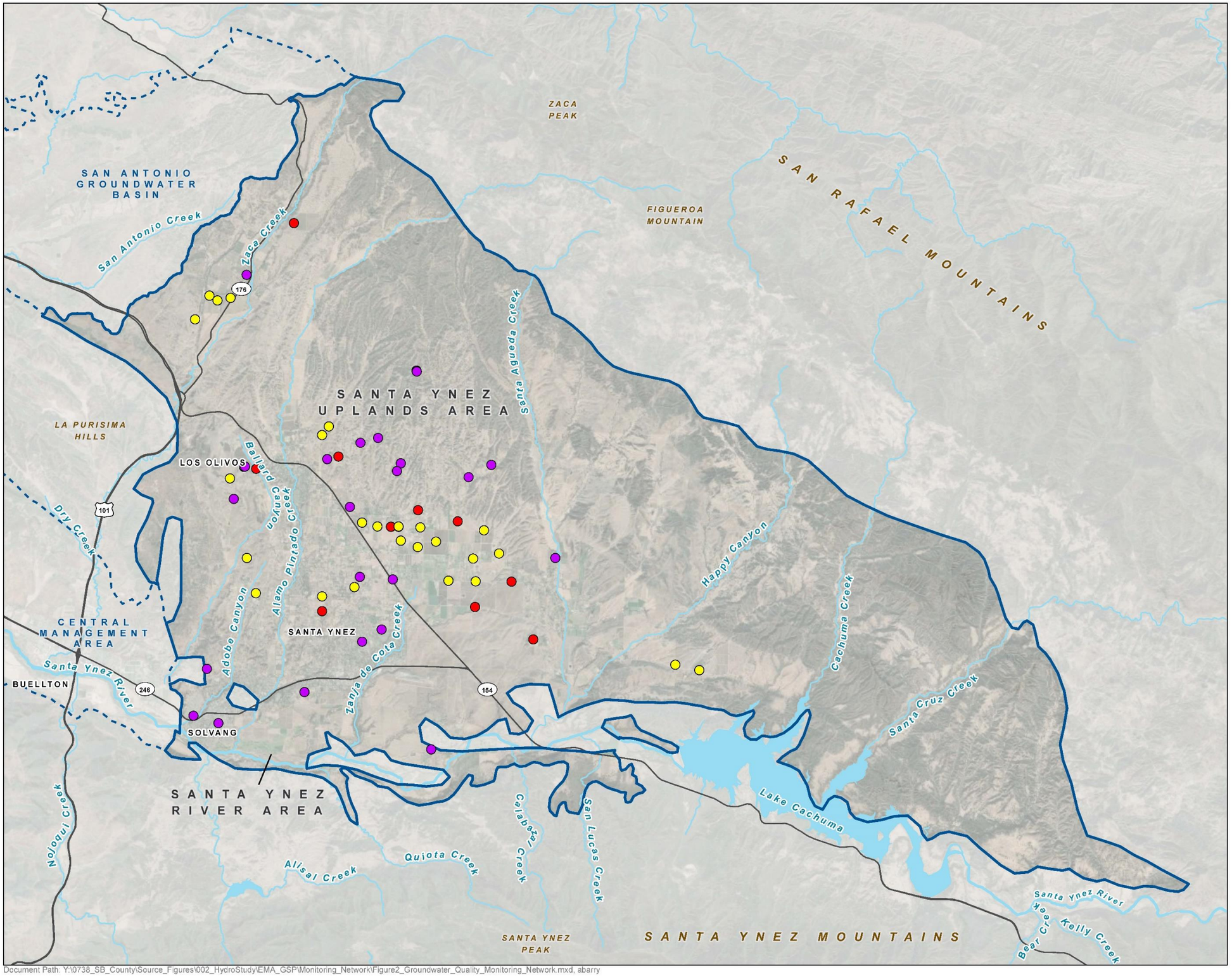
Tca = Careaga Sand

Data available at: https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/

FIGURE 4-3

Groundwater Quality Monitoring Network

Groundwater Sustainability Plan
Eastern Management Area



LEGEND

Well Type

- Agricultural
- Domestic
- Municipal

All Other Features

- Eastern Management Area Basin Boundary
- Major Road
- Watercourse
- Waterbody

N

0 5,000 10,000 15,000
Feet

Date: May 21, 2021
Data Sources: ESRI, USGS, Maxar 2020

GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\Monitoring_Network\Figure2_Groundwater_Quality_Monitoring_Network.mxd, abarry

4.5.1 Monitoring Protocols

§354.34 Monitoring Network.

(i) The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.

Water quality samples are currently being collected in accordance with the SWRCB DDW for municipal drinking water supply wells and ILRP requirements for agricultural and domestic wells. The ILRP data are currently collected under Central Coast RWQCB Agricultural Order 3.0 (see Section 2). The ILRP samples are collected under the Tier 1, Tier 2, or Tier 3 monitoring and reporting programs. Beginning in 2022, ILRP water quality data will be collected under Central Coast RWQCB Ag Order 4.0. Copies of these monitoring and reporting programs are included in Appendix G and incorporated herein as monitoring protocols. These protocols will continue to be followed during GSP implementation for the groundwater quality monitoring.

4.5.2 Assessment and Improvement of Monitoring Network

§354.38 Assessment and Improvement of Monitoring Network.

(a) Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.

(b) Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.

(c) If the monitoring network contains data gaps, the Plan shall include a description of the following:

(1) The location and reason for data gaps in the monitoring network.

(2) Local issues and circumstances that limit or prevent monitoring.

(d) Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.

(e) Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:

(1) Minimum threshold exceedances.

(2) Highly variable spatial or temporal conditions.

(3) Adverse impacts to beneficial uses and users of groundwater.

(4) The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.

§354.34 Monitoring Network.

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(4) Degraded Water Quality. Collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues.

Groundwater quality data do not indicate a need for additional monitoring locations and that current programs provide adequate spatial and temporal coverage for the purposes of the GSP. There is adequate spatial coverage in the groundwater quality monitoring network to assess impacts, if any, to beneficial uses and users Table 4-5 summarizes the recommendations for groundwater quality monitoring from DWR BMPs, the current network, and identified data gaps. For 40 of 61 wells in the monitoring network, well

construction information is unknown and will be addressed during GSP implementation by using DWR Online System for Well Completion Reports data and continued outreach by the GSA to groundwater users in EMA.

The LOCSD is currently developing a monitoring plan for monitoring nitrate concentrations near Los Olivos, including constructing new wells. An effort will be made by the EMA to strategically coordinate with the LOCSD monitoring program and include the Los Olivos monitoring wells into the EMA monitoring program.

Table 4-5. Summary of Best Management Practices, Implementation Measures, and Data Gaps in the Water Quality Monitoring Network

Best Management Practice	Implementation Measure	Data Gap
Monitor groundwater quality data from each principal aquifer in the basin that is currently, or may be in the future, impacted by degraded water quality. The spatial distribution must be adequate to map or supplement mapping of known contaminants. Monitoring should occur based upon professional opinion, but generally correlate to the seasonal high and low groundwater level, or more frequent as appropriate.	Public databases provide adequate spatial and temporal water quality data to identify and evaluate water quality trends in principal aquifers in the EMA.	The current groundwater quality monitoring network is of adequate spatial distribution to map or supplement mapping of any known contaminants. Due to a lack of well construction information, aquifers are not assigned to 58 of 61 wells in the water quality monitoring network. Well construction information will be included as available, and aquifers will be assigned as funding allows.
Collect groundwater quality data from each principal aquifer in the basin that is currently, or may be in the future, impacted by degraded water quality. Agencies should use existing water quality monitoring data to the greatest degree possible. For example, these could include ILRP, GAMA, existing RWQCB monitoring and remediation programs, and drinking water source assessment programs.	The water quality monitoring network within the EMA includes 26 municipal wells (monitored by the SWRCB DDW program) and 35 agricultural and domestic wells (monitored by the SWRCB ILRP) within principal aquifers that have been regularly sampled since at least 2015 for groundwater quality.	The current monitoring network utilizes existing water quality monitoring data from the SWRCB DDW and ILRP. Wells included in these programs provide adequate spatial distribution to map water quality in principal aquifers in the EMA. Well construction information will be developed as funding allows
Define the three-dimensional extent of any existing degraded water quality impact.	The water quality monitoring network provides adequate spatial distribution and coverage of principal aquifers to define the three-dimensional extent of any existing degraded water quality impact.	Well construction information for 40 of 61 wells in the groundwater quality monitoring network is unknown. Well construction information will be developed as funding allows
Data should be sufficient to assess groundwater quality impacts to beneficial uses and users.	The water quality monitoring network provides sufficient water quality data, spatial distribution, and coverage of principal aquifers to assess potential impacts to beneficial uses and users of groundwater in the EMA.	Well construction information for 40 of 61 wells in the groundwater quality monitoring network is unknown. Well construction information will be developed as funding allows.

Best Management Practice	Implementation Measure	Data Gap
Data should be adequate to evaluate whether management activities are contributing to water quality degradation.	Projects and management actions proposed for implementation by the GSA will be evaluated for potential impacts to all five sustainability indicators applicable to the EMA. Existing groundwater quality monitoring programs (SWRCB DDW, ILRP, and LUST program), spatial distribution of monitored wells, and coverage of principal aquifers will provide adequate data to evaluate whether management activities are contributing to water quality degradation throughout the GSP implementation period. Additionally, select projects and management actions (e.g., recharge of treated wastewater) may be subject to further regulatory review such as the California Environmental Quality Act.	None identified.

Notes

DDW = Division of Drinking Water
GSA = Groundwater Sustainability Agency
GSP = Groundwater Sustainability Plan
ILRP = Irrigated Lands Regulatory Program
InSAR = Interferometric Synthetic-Aperture Radar
LUST = leaking underground storage tank
RWQCB = Regional Water Quality Control Board
SWRCB = State Water Resources Control Board

4.6 Land Subsidence Monitoring Network

§354.34 Monitoring Network.

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(5) Land Subsidence. Identify the rate and extent of land subsidence, which may be measured by extensometers, surveying, remote sensing technology, or other appropriate method.

(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.

(g) Each Plan shall describe the following information about the monitoring network:

(g) Each Plan shall describe the following information about the monitoring network:

(1) Scientific rationale for the monitoring site selection process.

(3) For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.

(h) The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.

(j) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.

Locally defined significant and unreasonable conditions for land subsidence are (1) land subsidence rates exceeding rates estimated by using Interferometric Synthetic Aperture Radar (InSAR) data that are collected by the European Space Agency Sentinel-1A satellite and processed by TRE ALTAMIRA, Inc. for the period from June 13, 2015, through September 19, 2019 (TRE ALTAMIRA, Inc., 2020) and the National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory (JPL) for the period between spring of 2015 and summer of 2017 (NASA JPL, 2018); and (2) land subsidence that causes significant and unreasonable damage to or substantially interferes with groundwater supply, land uses, infrastructure, and property interests. InSAR measured subsidence in the EMA are presented on Figure 3-33. The dark blue areas are areas with measured ground surface rise of between 0 feet (ft) and 0.25 ft. The teal area on Figure 3-33 is the area with measured ground surface drop of 0 ft to 0.25 ft. Random sampling of the 100-meter by 100-meter (328-ft by 328-ft) calculation grid cells indicates the greatest amount of subsidence in the EMA has occurred in the wedge-shaped area that is bound by and includes Los Olivos, State Highway 154, and the base of the San Rafael Mountains. Total measured subsidence in the area from June 13, 2015, through September 19, 2019, is less than 0.06 ft, or 0.015 ft per year. This is a minor rate of subsidence and is relatively insignificant and not a major concern for the EMA. However, ongoing subsidence over many years could add up to a more significant ground surface drop. Recorded subsidence could be due to tectonic activity, groundwater extraction, oil and gas extraction, or a combination of the three. The EMA will continue to monitor annual subsidence.

4.6.1 Monitoring Protocols

§354.34 Monitoring Network.

(g) Each Plan shall describe the following information about the monitoring network:

(2) Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.

(i) The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.

The DWR BMP notes that no standard operating procedures exist for collecting land subsidence data. DWR InSAR data will continue to be monitored annually throughout the GSP implementation period. If additional relevant data sets become available, they will be evaluated and incorporated into the monitoring program.

Should potential land subsidence be observed at rates exceeding the minimum threshold (see Section 5), the GSA will first assess whether the subsidence may be due to (1) groundwater pumping and (2) elastic processes (subsidence that will recover with rising groundwater). If subsidence is observed, approaches the minimum threshold, causes undesirable results, and appears to be related to pumping, the GSA will undertake a program to install land surface elevation benchmarks at critical infrastructure locations, and monitor subsidence with measured land surface elevations on an annual basis.

4.6.2 Assessment and Improvement of Monitoring Network

§354.38 Assessment and Improvement of Monitoring Network.

(a) Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.

(b) Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.

(c) If the monitoring network contains data gaps, the Plan shall include a description of the following:

(1) The location and reason for data gaps in the monitoring network.

(2) Local issues and circumstances that limit or prevent monitoring.

(d) Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.

(e) Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:

(1) Minimum threshold exceedances.

(2) Highly variable spatial or temporal conditions.

(3) Adverse impacts to beneficial uses and users of groundwater.

(4) The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.

The subsidence minimum thresholds are set to avoid significant and unreasonable subsidence that could substantially interfere with groundwater supply, land uses, infrastructure, and property interests. Available data indicate that there is currently little subsidence occurring in the EMA that affects groundwater supply, land uses, infrastructure, and property interests. If an undesirable result occurs, the land subsidence monitoring network may be expanded to include additional monitoring stations near areas identified as having critical infrastructure, oil and gas extraction, or significant groundwater pumping.

4.7 Depletion of Interconnected Surface Water Monitoring Network

§354.34 Monitoring Network.

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(6) Depletions of Interconnected Surface Water. Monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions. The monitoring network shall be able to characterize the following:

(A) Flow conditions including surface water discharge, surface water head, and baseflow contribution.

(B) Identifying the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable.

(C) Temporal change in conditions due to variations in stream discharge and regional groundwater extraction.

(D) Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.

(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.

(g) Each Plan shall describe the following information about the monitoring network:

(1) Scientific rationale for the monitoring site selection process.

(2) Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.

(3) For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.

(h) The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.

(j) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.

The classification of the streams within the EMA using the USGS NHD are presented in Section 3.2.5 (USGS, 2020). Stream classifications in the EMA include perennial, intermittent, and streams that are perennial in some segments and intermittent in other segments.

According to the NHD, the entire Santa Ynez River is defined as a perennial stream, as are several of its tributaries. Upstream of Bradbury Dam, perennial creeks include both Santa Cruz Creek and Cachuma Creek, which flow into Lake Cachuma. Below Bradbury Dam, the other creeks classified as perennial include the following (in order from upstream to downstream): San Lucas Creek, Zanja de Cota Creek, Quiota Creek, and Alisal Creek. The entirety of three creeks are classified as intermittent: Happy Canyon Creek, Alamo Pintado Creek, and Ballard Canyon. The upstream portions of Santa Agueda Creek and Zaca Creek are perennial and become intermittent downstream.

Diversions from the Santa Ynez River alluvium are regulated by the SWRCB because it is considered underflow associated with the Santa Ynez River. Therefore, the EMA GSA will not be responsible for managing any aspect of the Santa Ynez River.

A significant source of recharge to the Paso Formation occurs within the shallow alluvial sand and gravel beds of tributaries where they are in direct contact with the underlying Paso Robles Formation. Percolating water moves readily through the alluvium in the Santa Ynez Uplands (USGS, 1968). In these areas, the tributaries are losing streams, contributing to the groundwater in the underlying Paso Robles Formation (and Older Alluvium). Further south, near the distal ends of the tributaries, the streams draining the Santa Ynez Uplands discharge into the north side of the Santa Ynez River. Groundwater in the tributary alluvium at these locations encounters relatively impermeable bedrock underlying the Santa Ynez River, which forces the groundwater to discharge to surface water (Upson and Thomasson, 1951).

Where the valleys are narrow and the cross-sectional area of tributary alluvium is decreased, groundwater may be forced to the surface and at times become intermittent or perennial flow in the stream channels. Such narrowing occurs where stream channels have cut through the consolidated rocks that form the south boundary of the Santa Ynez Uplands area. This causes the re-emergence of streamflow typically during the spring and early summer months within Alamo Pintado, Santa Agueda, Zanja de Cota, and Zaca Creeks (Figure 3-34). The entirety of Cachuma and Santa Cruz Creeks as well as the lower end of Zanja De Cota Creek and the upper portion of Santa Agueda Creek are perennial. All other groundwater that discharges naturally from the EMA is either transpired by plants or discharged as underflow through thin, narrow strands of alluvium that line the valley's tributaries to the Santa Ynez River.

Santa Agueda Creek and Ballard Canyon Creek have had streamflow gauging stations, which have been removed. Streamflow gauges remain in the tributaries to the Santa Ynez River within Alamo Pintado Creek and Santa Cruz Creek. Surface water flow has been estimated for Alisal, Santa Agueda, Zanja de Cota, Alamo Pintado, and Zaca Creeks for the period between 1941 and 2019 based on correlations with documented streamflow in Salsipuedes Creek and the prior stream gages that no longer exist (Stetson, 2008).

As discussed in Section 3.2, an analysis was completed to identify potential groundwater dependent ecosystems (GDEs) within the Santa Ynez Uplands (identified as Category A GDEs). To avoid impacts to Category A GDEs, construction of shallow monitoring wells, or piezometers, are proposed within the Category

A GDE areas identified near the confluence of Alamo Pintado and Zanja de Cota Creeks with the Santa Ynez River (see Figure 4-4). Piezometers will be constructed in accordance with SGMA requirements (§ 352.4). Avoiding adverse impacts on beneficial uses of interconnected surface water present in the EMA and preserving existing habitat are the focus of the depletion of interconnected surface sustainability indicator (see Section 5.10). The sustainability criterion for depletion of interconnected surface water is focused on avoiding significant and unreasonable adverse impacts to GDEs and sensitive species.

There is no intention at this time, nor a regulatory requirement, to create new habitat or restore habitat that existed prior to the enactment of SGMA in January of 2015. In conjunction with the Natural Communities Commonly Associated with Groundwater data set available from DWR, measured groundwater elevation data was used to identify locations in the EMA where groundwater levels were within 30 ft of ground surface. The Nature Conservancy guidelines suggest that areas overlying groundwater by more than 30 ft may be removed from the GDE category, as the depth is too great to support habitat (The Nature Conservancy, 2019). The evaluation mapped GDEs in the watershed include both aquatic and riparian habitat types located in Alamo Pintado and Zanja de Cota Creek.

Groundwater elevation near the potential GDEs discussed in Section 3.2 will be used as a proxy for the depletion of interconnected surface water sustainability indicator. The existing condition supports significant habitat values. As a result, significant and unreasonable effects to Category A GDEs include the following:

- Permanent loss or significant degradation of existing native riparian or aquatic habitat due to lowered groundwater levels caused by pumping
- Temporary acute loss of aquatic habitat in specific locations critical to sensitive aquatic species due to lowered groundwater levels caused by pumping
- Groundwater levels will be used as a proxy for the depletion of interconnected surface water sustainability indicator. Groundwater levels measured below the maximum rooting depth of GDEs along with an aforementioned loss of habitat would be significant and unreasonable

Monitoring of groundwater levels near the confluence of Alamo Pintado and Zanja de Cota Creek with the Santa Ynez River will be conducted by the GSA as part of the EMA interconnected surface water monitoring program to assess whether there is potential for a long-term decline in the health of the vegetation and eventual permanent habitat loss. Minimum thresholds and measurable objectives for the surface water depletion indicator have been established at these locations

4.7.1 Monitoring Protocols

§354.34 Monitoring Network.

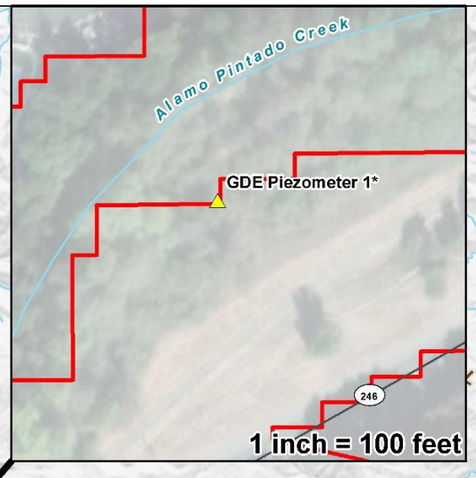
(i) The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.

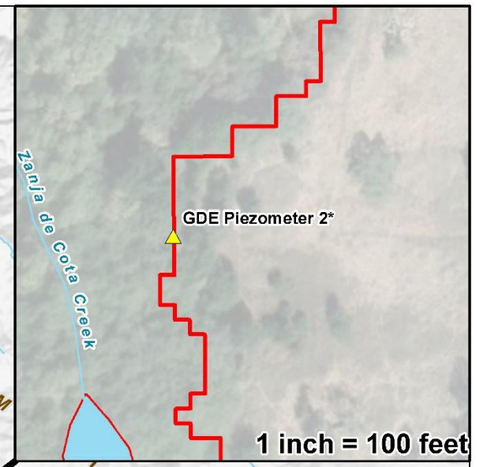
Groundwater level measurements from piezometers will be used for the interconnected surface water monitoring network. Pressure transducers will continuously monitor groundwater levels in the piezometers. When there is time of drought/reduced surface water flow, data will be collected from the transducers in the piezometers monthly. Manual measurements will be used to calibrate the pressure transducers. Therefore, the protocols described for the groundwater level monitoring network are representative of protocols for the interconnected surface water network.

FIGURE 4-4

Interconnected Surface Water Monitoring Network

Groundwater Sustainability Plan
Eastern Management Area





SAN ANTONIO GROUNDWATER BASIN
San Antonio Creek
Zaca Creek
ZACA PEAK
176
LA PURISIMA HILLS
SANTA YNEZ UPLANDS AREA
Santa Agueda Creek
LOS OLIVOS
101
Dry Creek
Ballard Canyon
Adobe Canyon
Alamo Pintado Creek
Zanja de Cota Creek
CENTRAL MANAGEMENT AREA
BUELLTON
SOLVANG
SANTA YNEZ
246
154
Santa Ynez River
Nojoqui Creek
SANTA YNEZ RIVER AREA
Happy Canyon
Cachuma Creek
Santa Cruz Creek
Hilton Creek
Lake Cachuma
Calabazas Creek
San Lucas Creek
Alisal Creek
Quiota Creek
SANTA YNEZ PEAK
SANTA YNEZ MOUNTAINS
Santa Ynez River
Bear Creek
Kelly Creek

LEGEND

- Piezometer Location

Natural Communities Commonly Associated with Groundwater (NCCAG)

- Category A – Potential GDE Associated with a Principal Aquifer (184 acres[2])
- Category B – Potential GDE Unlikely to be Affected by Groundwater Management Activities (1,546 acres[2])
- Eastern Management Area Basin Boundary
- Santa Ynez River Area
- Chumash Reservation Boundary

All Other Features

- Major Road
- Watercourse
- Waterbody

NOTE

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

* The proposed piezometers locations are generalized. Exact locations of the piezometers will be determined following access approval and site reconnaissance.

N

0 5,000 10,000 15,000
Feet

Date: June 8, 2021
Data Sources: ESRI, USGS, Maxar 2019, USFWS

GSI Water Solutions, Inc.

Document Path: Y:\0738_SB_County\Source_Figures\002_HydroStudy\EMA_GSP\Monitoring_Network\Figure4_4_Interconnected_Surface_Water_Monitoring_Network.mxd, WKimmon

4.8 Representative Monitoring Sites

§354.36 Representative Monitoring. Each Agency may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin, as follows:

(a) Representative monitoring sites may be designated by the Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined.

(b) Groundwater elevations may be used as a proxy for monitoring other sustainability indicators if the Agency demonstrates the following:

(1) Significant correlation exists between groundwater elevations and the sustainability indicators for which groundwater elevation measurements serve as a proxy.

(2) Measurable objectives established for groundwater elevation shall include a reasonable margin of operational flexibility taking into consideration the basin setting to avoid undesirable results for the sustainability indicators for which groundwater elevation measurements serve as a proxy.

(c) The designation of a representative monitoring site shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area.

All the wells in the EMA groundwater level monitoring network are RMSs. Representative wells for the groundwater level monitoring network were selected based on criteria presented in Section 4.3. Minimum thresholds and measurable objectives for chronic groundwater level decline are presented in Sections 5.5.2 and 5.5.3, and minimum thresholds and measurable objectives for reduction of groundwater in storage are presented in Sections 5.6.2 and 5.6.3.

The RMS wells are included in the broader EMA groundwater quality monitoring program that includes municipal wells monitored for DDW compliance and agricultural and domestic wells that are sampled as part of the ILRP. Data from RMS wells are evaluated in terms of the sustainable management criteria presented in Section 5.8. The groundwater quality RMS network is indicated in Table 4-4 and shown in Figure 5-3. Minimum thresholds and measurable objectives for degraded groundwater quality are presented in Sections 5.8.2 and 5.8.3.

The potential for impacts to interconnected surface water and GDEs are discussed in Section 5.10.1. Minimum thresholds and measurable objectives for interconnected surface water and GDEs are presented in Sections 5.10.2 and 5.10.3.

4.9 Reporting Monitoring Data to the Department (Data Management System)

§354.40 Reporting Monitoring Data to the Department. Monitoring data shall be stored in the data management system developed pursuant to Section 352.6. A copy of the monitoring data shall be included in the Annual Report and submitted electronically on forms provided by the Department.

The SGMA regulations provide broad requirements on data management, stating that a GSP must adhere to the following guidelines for a data management system (DMS):

- Article 3, Section 352.6: Each Agency shall develop and maintain a data management system that is capable of storing and reporting information relevant to the development or implementation of the GSP and monitoring of the Basin.
- Article 5, Section 354.40: Monitoring data shall be stored in the DMS developed pursuant to Section 352.6. A copy of the monitoring data shall be included in the Annual Report and submitted electronically on forms provided by the Department.

SGMA-related data for the EMA will be incorporated into the DMS. Entities in the EMA that collect and report data will have access and authorization to enter their data into the DMS. The data and information stored in the DMS will be presented on a web-based map viewer that displays data relevant to SGMA implementation, GSP development, and annual reporting to the DWR. The map viewer accommodates data within and outside of GSA monitoring networks. The types of data visualized on the map and available via the map's navigation menu are listed in Table 4-6. Details of the DMS are included in Appendix H.

Data sources used to populate the DMS are listed on Table 4-7. Details of the data sources are included in Appendix H. Data templates are used to standardize the format of the data going into the DMS to support data consistency and provide for QA/QC of the data. The templates are Excel documents that include rules restricting formatting and alphanumeric properties. The templates include pop-up windows to describe the type of data that should be entered in each column. As a second level of QA/QC, the compiled data is reviewed by the DMS development team before they are migrated into the database. This review is focused and limited in scope. It includes the following checks:

- Identifying outliers that may have been introduced during the original data entry process
- Removing or flagging questionable data
- Visualizing data in various software platforms outside the DMS to further assess the quality of the data

The automated and manual data checks above make sure data is in an appropriate range but do not confirm the quality of the data for a single observation.

Data stored in the DMS are separated by categories into tables. Each field within the tables hold a specific type of data, such as a number, text, or date, as shown in Figure 4-5. The figure is color-coordinated to show the relationship between tables:

- Main tables (shown in blue) include point data with a unique identification and unique point location to be added to database (e.g., Well_Info and Site_Info).
- Sub-tables (shown in green) are related to the main table and hold additional details about the well or unique identifier (e.g., correlation of a well point with a water level or water quality)

A brief description of the main tables and sub tables is provided as Table 4-8.

Table 4-6. Summary of Data Available for Sustainability Indicators

Sustainability Indicator	Data Types
Groundwater Levels	Water level data and well construction information
Groundwater in storage	Groundwater storage monitoring network sites
Water Quality	Water quality well and station data as reported by GAMA, including the DDW, ILRP, and LUST programs
Land Subsidence	Land elevation data from the UNAVCO CGPS ORES and InSAR data.
Interconnected Surface Water	Groundwater levels, stream gages, and precipitation stations.

Notes

CGPS = continuous global positioning system
DDW = Division of Drinking Water
GSA = Groundwater Sustainability Agency
GAMA = Groundwater Ambient Monitoring and Assessment Program
ILRP = Irrigated Lands Regulatory Program
InSAR = Interferometric Synthetic-Aperture Radar
LUST = leaking underground storage tank
UNAVCO = University NAVSTAR Consortium

Table 4-7. Summary of Data Sources

Data Type	Source	Coverage	Period of Record
Well and Site Info	DWR, ID No. 1, SYRWCD, Cities, local agencies, mutual water companies	Entire EMA	Current
Aquifer Properties	Participating Agencies Aquifer Testing (forthcoming)	Southern	
Water Level Data	USGS (NWIS) includes CASGEM, local agencies and Santa Barbara County data	583 wells within and surrounding EMA	1905 to present
Water Level Data	City of Solvang	Solvang	2008 to present
Water Level Data	ID No. 1	ID No. 1 within EMA	Pending
Water Level Data	Mutual water companies	Uplands	Recent years
Water Quality Data	GeoTracker Groundwater Ambient Monitoring & Assessment (GAMA) 1	Entire EMA	Historical and current
Precipitation Data	Santa Barbara County	EMA and surrounding	1910 to present (Mostly 1950 to present)
Land Use and Groundwater Pumpage	SYRWCD	SYRWCD	1979 to present
Oil and gas well geophysical logs	California Geologic Energy Management Division (CalGEM)	117 wells within EMA	Complete
Ground surface elevation	USGS	1 Meter Lidar	2018
Land Subsidence	UNAVCO CGPS ORES and InSAR data	Entire watershed and EMA	2001 to present (UNAVCO) 2015 – 2019 (InSAR)
Pumping data (including injections for recharge)	SYRWCD and State Water Resources Control Board (SWRCB)	SYRWCD and some outlying portions of EMA	Various years through 2019

Notes

[1] Available at https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/

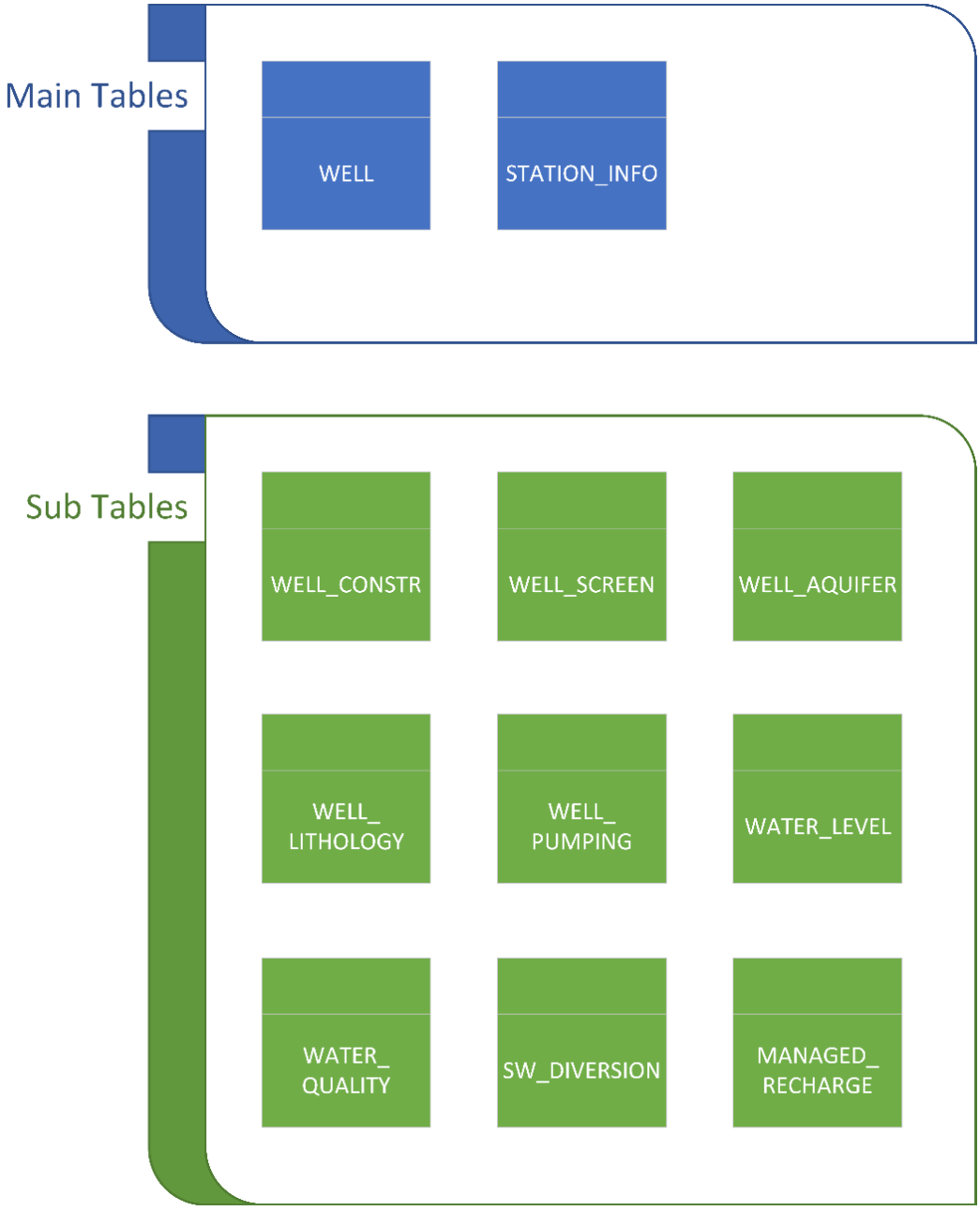
CASGEM = California Statewide Groundwater Elevation Monitoring CGPS = continuous global positioning system DWR = California Department of Water Resources
GAMA = Groundwater Ambient Monitoring and Assessment Program InSAR = Interferometric Synthetic Aperture Radar NWIS = National Water Information System
SWRCB = State Water Resources Control Board USGS = U.S. Geological Survey UNAVCO = University NAVSTAR Consortium

Table 4-8. Data Management System Table Descriptions

Table	Description
Main Tables	
Station Info	Information about type of station (well, recharge site, diversion, gage, extensometer, GSP) and location information
Well Info	General information about well, including identifiers used by various agencies
Sub Tables	
Agencies	Agency associated with the well or site
Sustainability Indicators	Minimum thresholds and measurable objectives set for monitoring network sites tracking sustainable management criteria for SGMA compliance
Well Construction	Well construction information, including depth, diameter, etc.
Well Construction Screen	Supplements 'Well Construction' with well screen information (one well can have many screens)
Well Geologic Aquifer	Information about the aquifer parameters of the well such as pumping test information, confinement, and transmissivity
Well Geologic Lithology	Lithologic information at a well site (each well may have many lithologies at different depths)
Water Level	Water level measurements for wells
Well Pumping	Pumping measurements for wells, annual or monthly
Managed Recharge	Recharge measurements for a recharge site, annual or monthly
SW Diversion	Diversion volume measurements for a diversion site, annual or monthly
Water Quality	Contains water quality data for wells or any other type of site

Notes
GSP = Groundwater Sustainability Plan
SGMA = Sustainable Groundwater Management Act

Figure 4-5. Santa Ynez Groundwater Basin Eastern Management Area Data Management System Tables



4.10 References and Technical Studies

§354.4 General Information.

(b) Each Plan shall include the following general information: A list of references and technical studies relied upon by the Agency in developing the Plan. Each Agency shall provide to the Department electronic copies of reports and other documents and materials cited as references that are not generally available to the public.

County of Santa Barbara et al. 2016. Draft Memorandum of Understanding for Implementation of the Sustainable Groundwater Management Act in the Santa Ynez River Valley Groundwater Basin. Executed by the County of Santa Barbara; Santa Ynez River Water Conservation District; Santa Ynez River Water Conservation District, ID No. 1; City of Solvang, City of Buellton; City of Lompoc; Vandenburg Village Community Services District.

Davis, T.A, M.K Landon, and G.L Bennett. 2018. Prioritization of Oil and Gas Fields for Regional Groundwater Monitoring Based on Preliminary Assessment of Petroleum Resource Development and Proximity to California's Groundwater Resources. Scientific Investigation Report 2018-5065.

DWR. 2016a. Best Management Practices for the Sustainable Management of Groundwater – Monitoring Protocols, Standards, and Sites.

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DWR. 2018. Santa Ynez River Valley Groundwater Basin Bulletin 118 Update 2016. Prepared by the California Department of Water Resources.

EPA. 2006. Guidance on Systematic Planning Using the Data Quality Objective Process. Prepared by the U.S. Environmental Protection Agency.

Flowline. 2018. Fourth Quarter 2018 Monitoring Report and Request for Case Closure.

NASA JPL. 2018. InSar Land Surveying and Mapping Services in Support of the DWR SGMA Program Technical Report.

RWQCB. 2019. Water Quality Control Plan for the Central Coastal Basin. June.

RWQCB. 2021. Proposed General Waste Discharge Requirements for Discharges from Irrigated Lands. April.

Stetson. 2008. Description and Documentation for Santa Ynez River RiverWare Model Task 2: Operation Model.

The Nature Conservancy. 2019. Identifying GDEs Under SGMA, Best Practices for using the NC Dataset.

TRE ALTAMIRA, Inc. 2020. InSar Land Surveying and Mapping Services in Support of the DWR SGMA Program Technical Report.

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USGS. 1968. Ground-Water Resources of the Santa Ynez Upland Ground-Water Basin. Prepared by the U.S. Department of the Interior Geological Survey.

Upson and Thomasson. 1951. Geology and Water Resources of the Santa Ynez River Basin, Santa Barbara County, California. Prepared by the U.S. Department of the Interior Geological Survey.