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San Antonio Creek Valley Groundwater Basin

Groundwater Sustainability Plan 5-Year Periodic Evaluation

Sections 1 – 4

September 2026

Prepared for: San Antonio Basin Groundwater Sustainability Agency



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September 15, 2026

Prepared for:

San Antonio Creek Valley Groundwater Basin
San Antonio Basin Groundwater Sustainability Agency
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GSI Water Solutions, Inc., is pleased to submit this Groundwater Sustainability Plan Periodic Evaluation, prepared in accordance with California Code of Regulations, Title 23, Water, Division 2. Department of Water Resources, Chapter 1.5. Groundwater Management, Subchapter 2. Groundwater Sustainability Plans.

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Abbreviations and Acronyms

AF	acre-feet
AFY	acre-feet per year
Basin	San Antonio Creek Valley Groundwater Basin
Basin Plan	<i>Water Quality Control Plan for the Central Coastal Basin (RWQCB, 2019)</i>
BMP	Best Management Practice
CASGEM	California Statewide Groundwater Elevation Monitoring
CCR	California Code of Regulations
CGPS	Continuous Global Positioning System
COC	constituent of concern
DDW	Division of Drinking Water
DEHP	(2-ethylhexyl)phthalate
DMS	Data Management System
DWR	California Department of Water Resources
EPA	U.S. Environmental Protection Agency
ET	evapotranspiration
EVI	Enhanced Vegetation Index
ft/ft	feet per foot
GDE	groundwater-dependent ecosystem
gpm	gallons per minute
gpm/ft	gallons per minute per foot
GPS	global positioning system
GSA	Groundwater Sustainability Agency
GSI	GSI Water Solutions, Inc.
GSP	Groundwater Sustainability Plan
HCM	Hydrogeologic Conceptual Model
HWY	Highway
ILRP	Irrigated Lands Regulatory Program
InSAR	interferometric synthetic-aperture radar
LACSD	Los Alamos Community Services District
MCL	maximum contaminant level
MO	measurable objective
MT	minimum threshold
NAVD 88	North American Vertical Datum of 1988
NAVSTAR	Navigation System with Timing and Ranging
RCA	Recommended Corrective Action
RMS	Representative Monitoring Site
RPE	reference point elevation
RWQCB	Regional Water Quality Control Board

SABGSA	San Antonio Basin Groundwater Sustainability Agency
SACIM	San Antonio Creek Integrated Model
SBCWA	Santa Barbara County Water Authority
SGMA	Sustainable Groundwater Management Act
Slough	Barka Slough
SMC	sustainable management criterion
SMCL	secondary maximum contaminant level
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
UNAVCO	University Navigation System with Timing and Ranging Consortium
USGS	U.S. Geological Survey
VSFB	Vandenberg Space Force Base
WMAP	Well Metering Assistance Program
WQO	water quality objective
WY	water year

Executive Summary

To be completed at a later date.

1 Introduction

This Periodic Evaluation provides a comprehensive assessment of the early phases of implementation of the San Antonio Creek Valley Groundwater Basin (Basin) (Bulletin 118 Basin No. 3-014) Groundwater Sustainability Plan (GSP). This evaluation is prepared pursuant to the requirements of the Sustainable Groundwater Management Act (SGMA), including California Water Code § 10728.2 and the GSP Regulations (23 California Code of Regulations [CCR] § 356.4), which require Groundwater Sustainability Agencies (GSAs) to periodically evaluate implementation of their GSP and submit a written assessment to the California Department of Water Resources (DWR). This evaluation has been prepared to be consistent with DWR's *Groundwater Sustainability Plan Implementation: A Guide to Annual Reports, Periodic Evaluations, and Plan Amendments* (DWR, 2023) on behalf of the San Antonio Basin Groundwater Sustainability Agency (SABGSA).

In this evaluation, progress towards sustainability of the Basin will be analyzed through discussion of applicable advancements since adoption of the GSP, including new information collected that further informs the understanding of the Basin Hydrogeologic Conceptual Model (HCM), evaluation of the current groundwater conditions relative to the GSP's sustainable management criteria (SMCs) for each sustainability indicator, and a summary of the steps taken by the SABGSA to implement actions and address issues identified in the GSP and separately by DWR. As required by SGMA, this Periodic Evaluation covers the period since the GSP was adopted on December 7, 2021, by the SABGSA and approved by DWR in January 2024.

California enacted SGMA in 2014 to establish a statewide framework for achieving long-term groundwater sustainability in response to declining groundwater levels, chronic overdraft, land subsidence, and other adverse impacts in many basins across the state. To implement SGMA, local agencies in medium- and high-priority basins were required to form GSAs to develop and carry out GSPs with an aim to achieve local management of groundwater resources. The Basin is designated by DWR as a medium-priority basin under SGMA.

This Periodic Evaluation is organized as follows:

- **Section 1 – Introduction:** Provides an introduction to this 5-Year Periodic Evaluation, including a description of its purpose and contents.
- **Section 2 – New Information Collected:** Presents a summary of new information collected since GSP adoption.
- **Section 3 – Groundwater Conditions Relative to Sustainable Management Criteria.** Presents current conditions relative to the GSP's SMC for each sustainability indicator.
- **Section 4 – Status of Projects and Management Actions:** Presents the steps taken by the SABGSA to implement projects and management actions and address issues identified in the GSP and by DWR.
- **Section 5 – Basin Setting Based on New Information or Changes in Water Use:** Describes updates to the Basin setting based on new technical information, including geophysical survey results, refined hydrogeologic understanding, and changes in water use that may affect groundwater management.
- **Section 6 – Monitoring Networks:** Describes the monitoring networks used to track groundwater conditions, evaluates their adequacy, and summarizes efforts to expand and improve monitoring coverage for SGMA implementation.
- **Section 7 – GSA Authorities and Enforcement Actions:** Summarizes changes in governance, policies, funding mechanisms, and other administrative actions that affect implementation of the GSP.

- **Section 8 – Outreach, Engagement, and Coordination with Other Agencies:** Describes public outreach and engagement activities undertaken during preparation of this Periodic Evaluation and summarizes coordination with other agencies involved in GSP implementation.
- **Section 9 – Other Information:** Presents any additional information relevant to the Periodic Evaluation that is not addressed in the preceding sections.
- **Section 10 – Summary of Proposed or Completed Revisions to GSP Elements:** Summarizes proposed and completed revisions to the GSP elements based on new information, updated evaluations, and implementation progress.
- **Section 11 – References:** Lists the technical reports, plans, guidance documents, and other sources cited in this Periodic Evaluation.

As required by SGMA, this Periodic Evaluation presents these elements for the period that has occurred since GSP adoption, which includes the period of 7 water years between and including 2019 and 2025. This period was selected in coordination with efforts and management actions currently underway in the Basin. This Periodic Evaluation also presents some of the SABGSA's more recent activities that have occurred since GSP adoption through all of water year (WY) 2025 and also portions of WY 2026, as available. This Periodic Evaluation will be submitted to the DWR by January 21, 2027, within 5 years since the GSP was submitted in 2022.

DWR has used several terms to describe this type of document, including GSP Update, Five-Year Update, and Periodic Update. Following DWR's guidance and consistency with the GSP Regulations, this document is referred to as a Periodic Evaluation. The term Plan Amendment refers to "a revision made by a GSA to its previously adopted GSP, often to make warranted changes to ensure the GSP reflects the most current groundwater management approaches" (DWR, 2023).

2 New Information Collected (23 CCR § 356.4. (f))

This section presents an evaluation of the sustainable groundwater management activities that have occurred within the Basin (Figure 2-1) since adoption of the GSP in 2022. Specifically, this section provides a description of new information that affects groundwater management and the overall understanding of the HCM. Since GSP adoption, the SABGSA has actively implemented the plans and measures documented in the GSP, compiled and responded to new data, sought and engaged stakeholder input, and complied with ongoing regulatory guidance. Key categories of new information are described below.

2.1 Basin Setting Information

Updated Surface Water-Groundwater Interaction Evaluation: Since GSP adoption, the SABGSA has continued to refine its understanding of interconnected surface water and groundwater-dependent ecosystems through updates to the Enhanced Vegetation Index (EVI) analysis described in the GSP. The original analysis evaluated remotely sensed vegetation conditions for WYs 1990 through 2020 to assess groundwater-dependent vegetation within the Barka Slough (Slough). The analysis has been updated to include WY 2021 through 2025 and incorporates the Basin's recent drought and subsequent wet hydrologic conditions. Results remain consistent with those presented in the adopted GSP and provide an expanded technical basis for evaluating groundwater-dependent ecosystems (GDEs) and interconnected surface water conditions.

Updated Numerical Modeling and Technical Understanding: The U.S. Geological Survey (USGS) San Antonio Creek Integrated Model (SACIM) was completed in 2021 (USGS, 2021). In 2025, the USGS used the SACIM to evaluate future climate scenarios and their potential effects on groundwater recharge, groundwater flow, streamflow, groundwater discharge to the Slough, and riparian habitat conditions. The evaluation included extending the model through 2021. Results of the climate scenario simulations were presented to the SABGSA in June 2025, and the updated SACIM is publicly available online. These analyses contribute to the improvement in understanding of future groundwater conditions under changing climatic conditions in the Basin and provide an enhanced technical foundation for evaluating sustainable management actions, future monitoring needs, and potential impacts to interconnected surface water and GDEs.

In addition to SACIM updates, continued USGS investigations have further strengthened the Basin's hydrogeologic conceptual understanding through refinement of the hydrogeologic framework, groundwater flow system characterization, recharge estimates, water budget analyses, and groundwater age evaluations. Collectively, these studies have expanded the scientific basis supporting future Basin management decisions (Cromwell et al., 2022).

DWR Statewide Airborne Electromagnetic Surveys: DWR announced the results of the Survey Area 10 Airborne Electromagnetic surveys were available on November 8, 2024. The SABGSA plans to use the data to confirm or revise the Basin HCM (Figure 2-2).

Updated Hydrologic Conditions and Basin Evaluation: The SABGSA has continued to evaluate Basin hydrologic conditions through the collection and analysis of quarterly groundwater levels, annual groundwater extraction volumes, and hydrologic data documented in the Basin's Annual Reports. The additional monitoring data encompass a range of hydrologic conditions, including recent wet, below normal, and dry water years, providing further insight into the Basin's response to varying climatic conditions. Specifically, hydrologic conditions during WY 2020 through 2022 included a drought, yielding exceptionally dry conditions (with WYs 2021 and 2022 classified as critical water year types), followed by two wet water year types (WYs 2023 and 2024). The annual precipitation in the Basin ranged from approximately 8.4 inches during WY 2021 to 31.8 inches in WY 2023, resulting in a pronounced hydrologic variability.

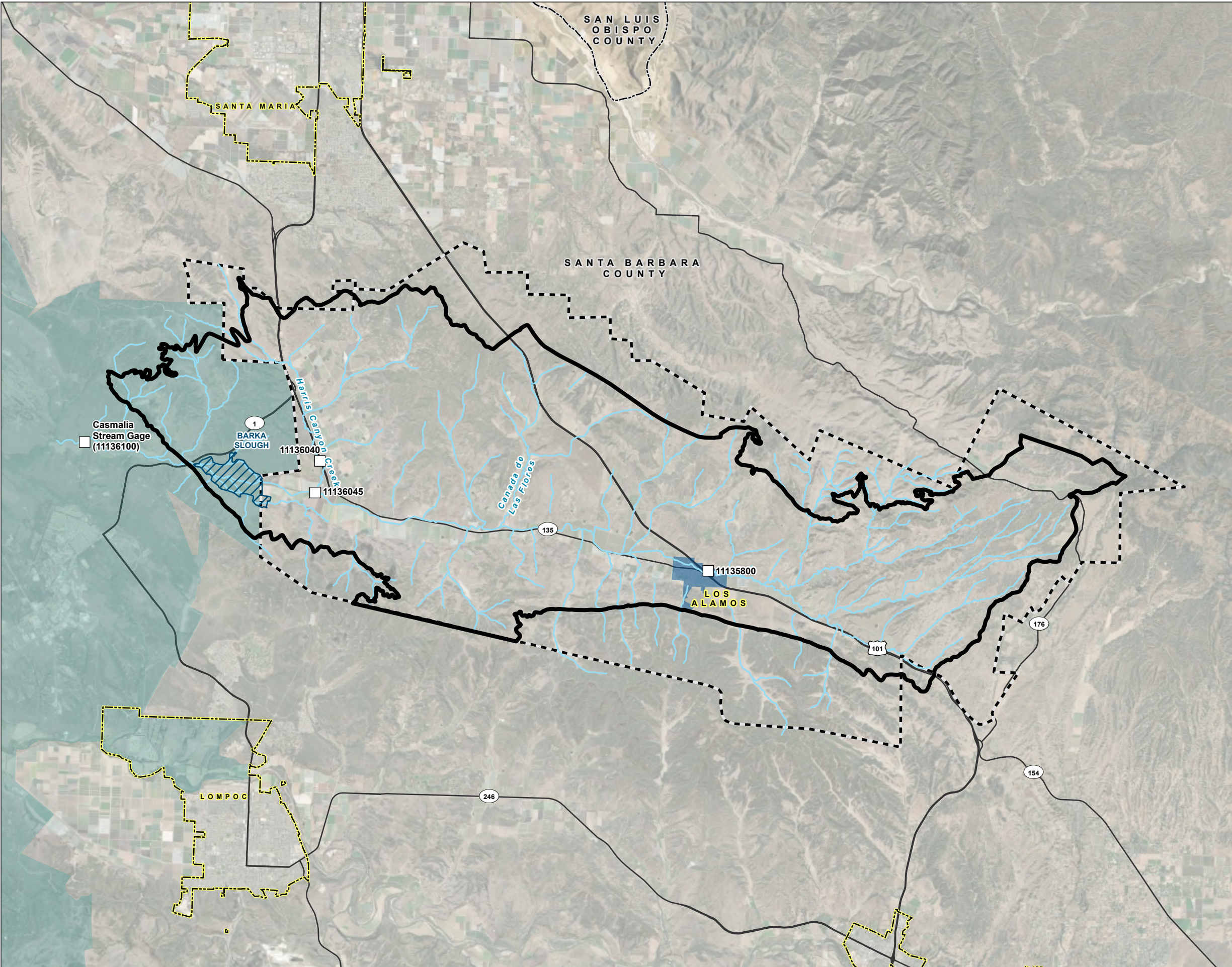
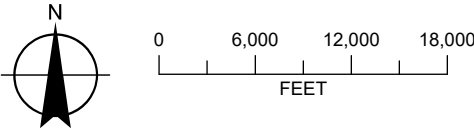


FIGURE 2-1
San Antonio Creek Valley
Groundwater Basin Plan Area
Groundwater Sustainability Plan
5-Year Periodic Evaluation
San Antonio Creek Valley
Groundwater Basin

- LEGEND**
- Stream Gage
 - Los Alamos Community Services District
 - Vandenberg Space Force Base
 - All Other Features**
 - San Antonio Creek Valley Groundwater Basin
 - Barka Slough
 - San Antonio Basin Water District
 - County Boundary
 - City Boundary
 - Major Road
 - San Antonio Creek or Tributary



NOTES
Casmalia Stream Gage USGS Site Number: 11136100
NAVD 88: North American Vertical Datum of 1988



Date: August 24, 2026
Data Sources: USGS, ESRI, DWR,
Maxar Imagery (4/10/2024)



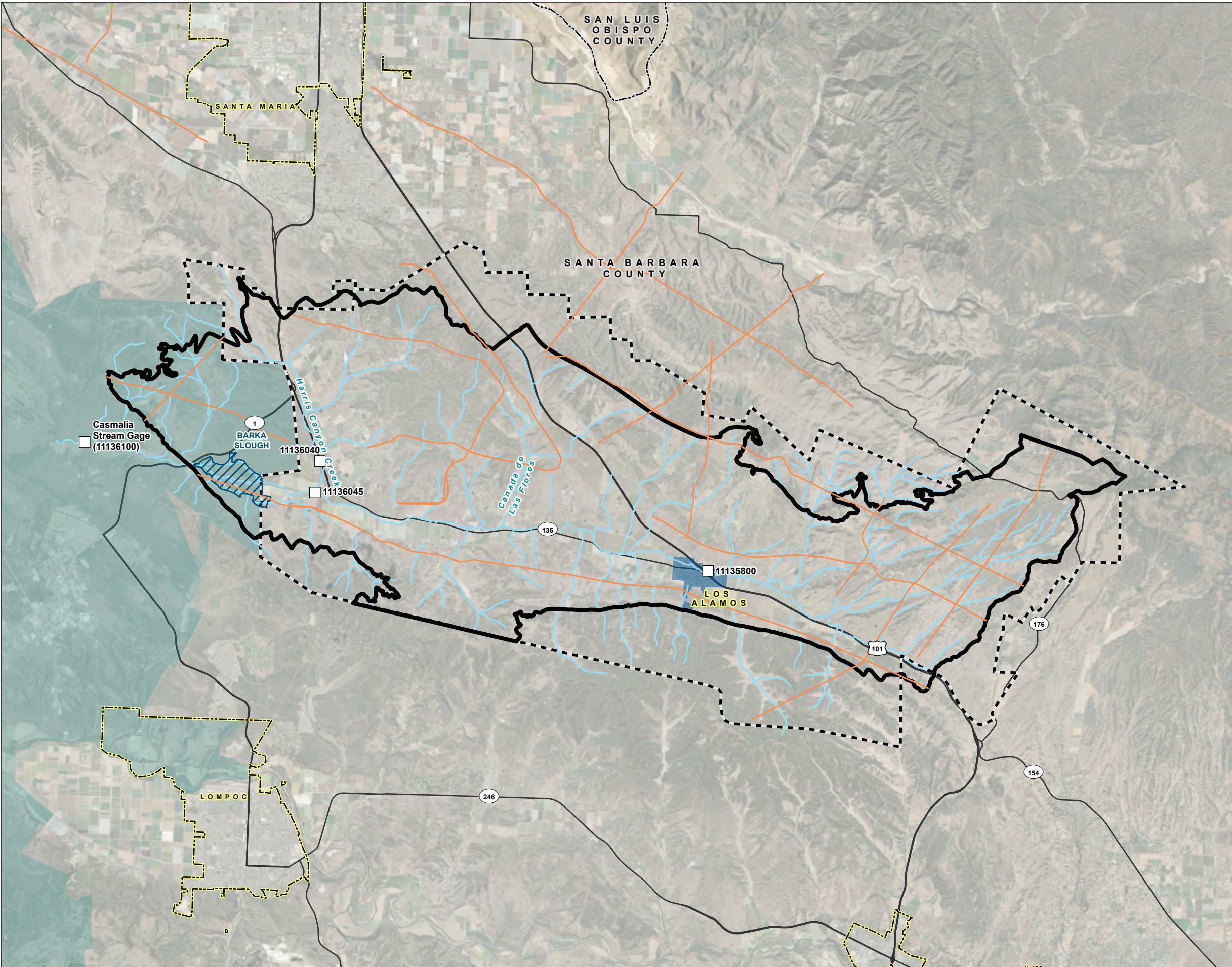
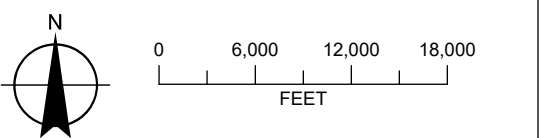


FIGURE 2-2
Survey Area 10 Aerial
Survey Flight Paths
Groundwater Sustainability Plan
5-Year Periodic Evaluation
San Antonio Creek Valley
Groundwater Basin

- LEGEND**
- Stream Gage
 - Flight Path
 - Los Alamos Community Services District
 - Vandenberg Space Force Base
- All Other Features**
- San Antonio Creek Valley Groundwater Basin
 - Barka Slough
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Date: August 24, 2026
Data Sources: USGS, ESRI, DWR,
Maxar Imagery (4/10/2024)



The expanded dataset has improved understanding of the Basin's groundwater elevation trends, seasonal aquifer responses, and groundwater extraction patterns from the Basin's principal aquifers. Annual groundwater level monitoring indicates that water levels are generally responsive to annual precipitation and groundwater pumping, with lower groundwater elevations observed following drier water years and increased groundwater pumping, and more stable conditions following wetter water years. For example, groundwater elevations during WY 2025 were generally lower than those observed during the preceding wet water year, reflecting below normal hydrologic conditions and increased groundwater pumping relative to WY 2023 and 2024. In general, the response in groundwater levels to climatic conditions is more rapid and apparent in Paso Robles Formation wells, and more delayed and muted in Careaga Sand wells.

Annual Reporting: Publicly available SGMA data tools are linked to the water level, pumpage, recharge, and associated data uploaded during the annual reporting process (including data collected during this evaluation period). Likewise, the DMS is regularly updated with newly collected data, which is then archived and used for analyses.

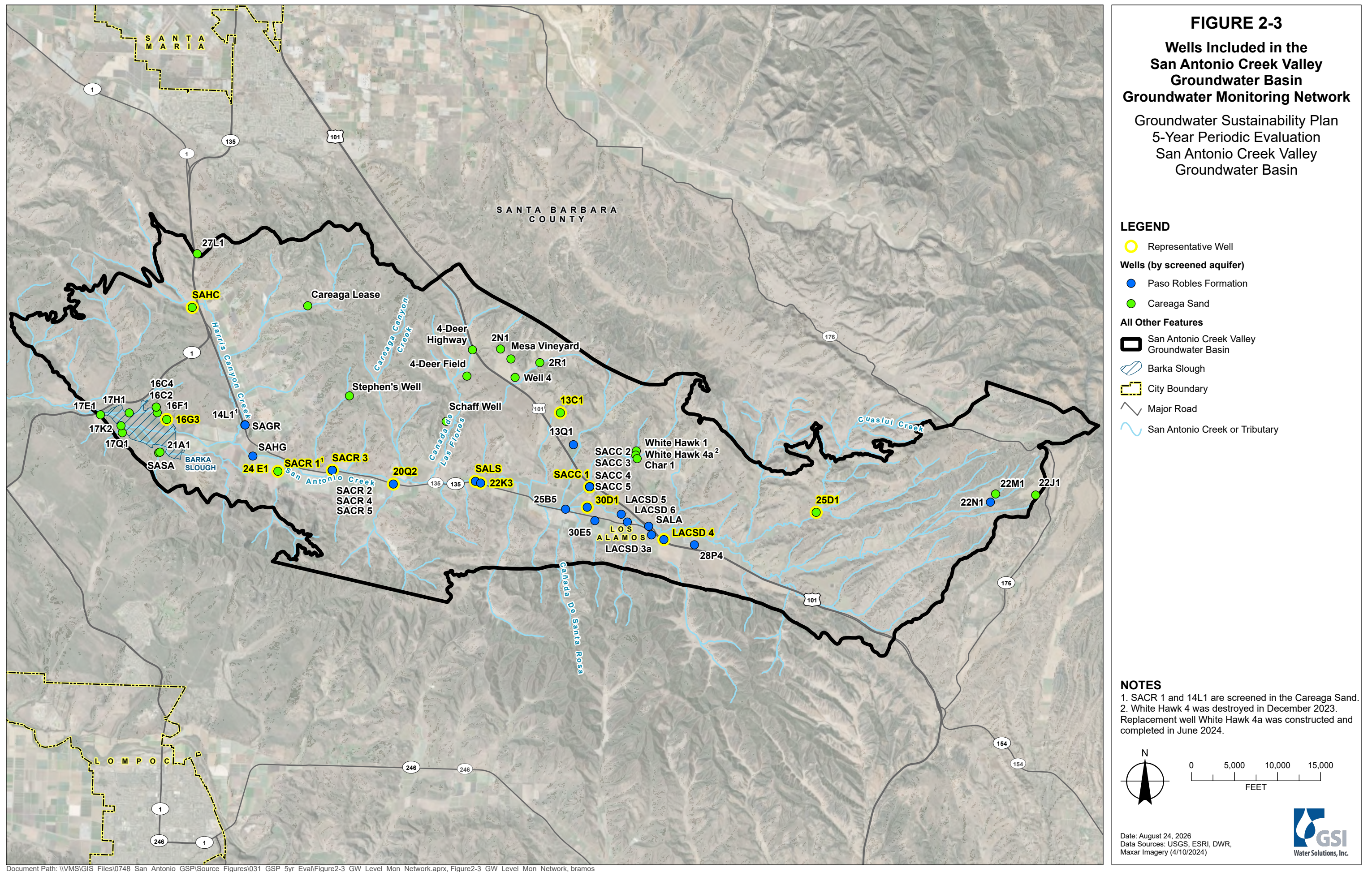
Additional Data Sources and Methodologies: Some technical studies and datasets have been completed or updated and are hereby incorporated by reference. These include:

- DWR's 2023 SGMA Implementation Guidance (clarifying reporting expectations for Periodic Evaluations and Plan Amendments).
- DWR's GSP Assessment Determination and Recommended Corrective Actions (RCA) issued in January 2024 for the entire Basin. The SABGSA's responses to the RCAs, which are addressed in Section 7 of this evaluation, have refined the data-gathering priorities mentioned above.

2.2 Groundwater Level Monitoring Network Information

Well Registration Data Review: Information collected through the SABGSA's Well Registration Program (see Section 2.4) has been reviewed to identify candidate wells for incorporation into the Basin's groundwater level monitoring network (Figure 2-3). Well construction information, screened intervals, and ownership records have improved understanding of monitoring network coverage throughout the Basin's principal aquifers. Public outreach efforts continue with private well owners to encourage voluntary participation in the monitoring network and aim to improve the spatial distribution of monitoring locations.

Installation of Continuous Monitoring Equipment: As part of ongoing groundwater level monitoring network enhancements, 10 additional pressure transducers have been installed in select monitoring wells, increasing the total number of continuously monitored wells equipped with transducers to 20. The expanded continuous monitoring network allows for better identification of seasonal groundwater elevation fluctuations, as well as long-term groundwater elevation trends and responses to changing hydrologic conditions.



Monitoring Network Expansion and Data Improvements: Since 2022, the SABGSA has improved its groundwater level monitoring network through securing access agreements to five wells and incorporating them into the monitoring network. Two wells, 13Q1 and 22K3, were included in the Basin's GSP groundwater level monitoring network with the access agreements stated as pending. The access agreement for Well 13Q1 was secured in 2020, but access for monitoring of Well 13Q1 was not granted until the first quarter of 2024. An access agreement for Well 22K3 was secured in June 2023 with quarterly water level monitoring beginning in the second quarter of 2023. White Hawk 4a was constructed in 2024 as a replacement well for White Hawk 4. White Hawk 4 was destroyed in December 2023. Char 1 was added to the groundwater level monitoring network following the securing of an access agreement in February 2024. Quarterly groundwater level monitoring of Char 1 began in the fourth quarter of 2024. Well 4 is an irrigation well that was added to the monitoring network in the fourth quarter of 2023. The License Agreements already established between the SABGSA and Premiere Coastal Vineyard were expanded to include Well 4 after it was constructed on the Premiere Coastal Vineyard property.

The SABGSA continues to refine its groundwater level monitoring network by evaluating existing monitoring network wells that are deficient in data or access or problematic to monitor. Monitoring network wells, primarily Representative Monitoring Site (RMS) wells with deficiencies, are being evaluated for replacement with wells that provide comparable spatial coverage of the Basin and have known well construction and aquifer completion data.

Two wells, 2M1 and 34P1, were removed from the groundwater level monitoring network during WY 2025. 2M1 was removed due to the risk of the sounder becoming stuck in the well during monitoring, which has occurred in past field events. Groundwater level monitoring at well 2M1 was originally halted pending the installation of a sounding tube; however, installation costs precluded completion of the work. Therefore, well 2M1 has been removed from the groundwater level monitoring network. A replacement RMS for 2M1 is discussed in Section 6.

An obstruction was encountered in 34P1 at approximately 72 feet below the reference point elevation (RPE) during the fourth quarter of 2023. Based on historical water levels, the well casing is suspected to have collapsed. 34P1 was removed from the groundwater level monitoring network and a discussion of a RMS replacement for well 34P1 is included in Section 6.

Monitoring Network Data Accuracy Improvements: The SABGSA completed an evaluation of monitoring network RPEs using DWR Best Management Practices (BMPs) and identified monitoring wells with insufficient or missing elevation survey information. Nine wells have no reported RPE and 15 wells have an insufficient elevation accuracy. However, the SABGSA does not currently have access agreements for 7 of these wells. The SABGSA plans to complete an RPE survey of these (accessible) wells by the end of the 2027–2028 Fiscal Year.

2.3 GSP Implementation / Governance and Policy

Well Verification Policy and Recission of Executive Orders N-7-22 and N-3-23: On July 19, 2022, the SABGSA adopted Resolution No. 22-001 establishing the Basin Well Verification Policy in response to Governor Newsom's Executive Order N-7-22 and Santa Barbara County Urgency Ordinance No. 5158. The policy established procedures for evaluating proposed new groundwater wells and alterations to existing wells for consistency with the Basin GSP and SGMA. Based on the Basin's documented groundwater conditions, including chronic lowering of groundwater levels and reductions in groundwater storage, the SABGSA determined that issuance of Well Verifications for new wells or alterations to existing wells would generally be inconsistent with the sustainability objectives of the adopted GSP unless specific findings could be made. Following adoption of the Well Verification Policy, the SABGSA adopted Resolution No. 22-002

establishing a Well Verification Request Fee and associated procedures necessary to evaluate Well Verification Requests.

On September 5, 2024, Governor Newsom issued Executive Order N-3-24 which terminated the drought state of emergency in Santa Barbara amongst 19 other counties. Related Executive Orders N-7-22 and N-3-23 (requiring written verifications from SABGSAs) were rescinded. The Urgency Ordinance for Santa Barbara County (No. 5158) was also terminated. The SABGSA's Resolution 22-001 Approving a Well Verification Policy and Resolution 22-002 Approving a Well Verification Fee & Deposit Agreement in compliance with EO-N-22 were both automatically terminated.

2.4 Projects and Management Actions

Well Registration Program and Well Meter Installation & Extraction Program: The Well Registration Program (Phase 1), implemented pursuant to Ordinance No. 2022-01 in partnership with Wallace Group Engineering, was completed in spring 2023. The Well Registration Program required all landowners within the Basin to complete a well registration form and file it with the SABGSA no later than March 31, 2023 and acted as a pre-cursor to the implementation of other projects and management actions vital to achieving sustainability. The data collected from well registration assisted the SABGSA in establishing the location and type of each well located within the Basin and helped the SABGSA gain an accurate count and a better understanding of the wells in active use. The SABGSA well registration form also queried landowners to identify which wells currently have meters and what type. This information was critical to designing a well metering and reporting program that meets the practical needs of landowners while also facilitating groundwater sustainability.

Adoption of Ordinance No. 25-001 occurred on March 18, 2025, requiring well owners within the Basin to install a flow meter equipped with a direct reading rate-of-flow indicator and a visual, volume-recording totalizer on their wells, submit documentation of installation and calibration compliance by April 1, 2026, and report monthly groundwater extraction readings to the SABGSA on a twice-a-year basis, through a form provided by the SABGSA (Phase 2).

Well Metering Assistance Program: The Santa Barbara County Water Agency implemented a Well Metering Assistance Program (WMA) designed to provide funding to offset up to \$500 of the equipment cost of qualifying water meters. The WMA is available to Basin landowners.

Table 2-1, below, summarizes new information collected during the evaluation period as described in the preceding sections.

Table 2-1. Summary of New Information Since GSP Adaption

Significant New Information	Description	Aspects of GSP Affected	Warrant Change to Any Aspects of the GSP
Basin Setting			
Updated Surface Water-Groundwater Interaction Evaluation	Updated Enhanced Vegetation Index (EVI) analysis incorporating WY 2021–2025 data.	Basin Setting	No
Updated Numerical Modeling and Technical Understanding	Updated SACIM and associated USGS technical investigations.	Basin Setting	No
DWR Statewide Airborne Electromagnetic Surveys	Results of Survey Area 10 Airborne Electromagnetic surveys will be used to inform/confirm HCM.	Basin Setting	No
Updated Hydrologic Conditions and Basin Evaluation	Updated hydrologic, groundwater level, and groundwater extraction datasets documenting aquifer response.	Basin Setting	No
Annual Reporting	Five years of annual reports from WYs 2021 through 2025 improve the SABGSA's understanding of groundwater conditions.	Basin Setting	No
Additional Data Sources and Methodologies	Updated technical guidance and supporting datasets incorporated into GSP implementation.	Basin Setting	No
Monitoring Networks			
Well Registration Data Review	Well Registration Program data reviewed to identify candidate monitoring wells and enhance coverage.	Basin Setting / Monitoring Networks	No
Installation of Continuous Monitoring Equipment	Expansion of continuous groundwater level monitoring.	Basin Setting / SMC	No
Monitoring Network Data Accuracy Improvements	Evaluation of monitoring well RPE deficiencies to support future monitoring network improvements.	Basin Setting / SMC	No

Significant New Information	Description	Aspects of GSP Affected	Warrant Change to Any Aspects of the GSP
GSP Implementation			
Well Verification Policy and Recission of Executive Orders N-7-22 and N-3-23	Adoption and termination of the Basin Well Verification Policy.	GSP Implementation	No
Projects and Management Actions			
Well Registration Program and Well Meter Installation & Extraction Program	Implementation of the Basin's Well Registration and Groundwater Extraction Reporting Programs.	Projects and Management Actions	No
Well Metering Assistance Program	Establishment of the WMAP to assist Basin landowners with meter installation costs.	Projects and Management Actions	No

Notes

DWR = California Department of Water Resources
 GSP = Groundwater Sustainability Plan
 HCM = Hydrogeologic Conceptual Model
 RPE = reference point elevation
 SABGSA = San Antonio Basin Groundwater Sustainability Agency
 SACIM = San Antonio Creek Integrated Model
 SMC = sustainable management criterion
 WMAP = Well Metering Assistance Program
 WY = water year

3 Groundwater Conditions Relative to Sustainable Management Criteria

Current conditions within the Basin are discussed in this section for each sustainability indicator in relation to the applicable measurable objectives (MOs) and minimum thresholds (MTs). This section includes analyses from WY 2019 to WY 2025, as a continuation of the analyses presented in the GSP which ended in WY 2018.

The Basin contains two principal aquifers: the Paso Robles Formation and the underlying Careaga Sand. The Paso Robles Formation is approximately 2,000 feet thick, with much of the formation saturated, and consists of alternating coarse and fine-grained sediments that create vertically heterogeneous groundwater conditions which yield water freely to wells. The coarse-grained zones are the primary water-bearing units and commonly produce well yields of up to 500 gallons per minute (gpm), with specific capacities ranging from approximately 5 to 15 gpm per foot (gpm/ft) of drawdown. The formation is recharged primarily by direct infiltration of precipitation across exposed upland areas, seepage from the alluvium present beneath the San Antonio Creek and its tributaries, and, in some locations, upward leakage from the underlying Careaga Sand. Hydrogeologic characterization by the USGS further subdivides the Paso Robles Formation into three members (unofficial geologic units), with the middle member acting as a regional confining unit that limits vertical groundwater movement. A storage coefficient of 0.15 was calculated for the Paso Robles Formation (Martin, 1985). Historically, artesian groundwater occurred locally in the Paso Robles Formation (Muir, 1964) and exist presently, although they are less frequently observed than in the past. Artesian conditions within the Basin are due to localized confining layers created by the synclinal structure of the Basin, the presence of overlying fine-grained deposits, and/or faults present within the Basin, such as the Los Alamos Fault and the Pezzoni-Casmalia Fault (Carlson, 2019; Cromwell et al., 2022).

The Careaga Sand is approximately 1,500 feet thick and is also largely saturated. It consists of a fine-grained lower member (Cebada member) and a coarse-grained upper member (Graciosa member). The upper Graciosa member provides highly productive water-bearing zones with reported well yields ranging from less than 100 gpm to more than 1,000 gpm and specific capacities of less than 10 to more than 30 gpm/ft of drawdown. A storage coefficient of 0.001 for the confined portion (the Slough area) of the Careaga Sand was calculated (Martin, 1985).

Recharge to the Basin aquifers occur primarily through mountain front recharge, streamflow percolation, deep percolation of direct precipitation at higher elevations, and agricultural irrigation return flow. Natural groundwater discharge occurs through springs and seeps, evapotranspiration (ET), and discharge to surface water bodies, although pumping of groundwater from wells is the dominant discharge component. Regional groundwater flow is generally from east to west, with the Basin's synclinal geologic structure limiting groundwater exchange with the adjacent basins. Most natural groundwater discharge ultimately occurs as baseflow to San Antonio Creek or as vertical flux from the Careaga Sand into the Slough due to the bedrock high underlying the western portion of the Slough.

The groundwater level monitoring network consists of aquifer-specific wells completed within one of the Basin's two principal aquifers: the Paso Robles Formation or the Careaga Sand. The network includes 15 representative monitoring sites (RMSs) selected to characterize groundwater conditions throughout the Basin. Wells were chosen based on several factors, including their geographic distribution across the Basin, the availability of sufficient historical groundwater level data to evaluate long-term trends, and whether their hydrographs are representative of groundwater conditions in the surrounding area. Although 15 RMS wells have been identified in the GSP, difficulties preventing regular monitoring of a few RMS wells have resulted in consideration by the SABGSA of potential RMS well replacements (see Section 2.2).

The *Water Quality Control Plan for the Central Coastal Basin* (Basin Plan) (RWQCB, 2019) was approved by DWR on January 18, 2024. Appendix A contains the approval and assessment of the GSP. In the DWR approval and assessment letter, five RCAs are presented for consideration by the SABGSA and are intended to be addressed by the time of the first Periodic Evaluation. Responses to the five RCAs are presented in Section 7 of this evaluation, and are considered throughout the document.

3.1 Evaluation of Current Groundwater Conditions for Each Sustainability Indicator

The following sections address current groundwater conditions related to each of the sustainability indicators identified in the GSP. Section 3.1.1 addresses groundwater levels with reference to current conditions, MOs, interim milestones, MTs, DWR RCAs, and progress towards sustainability. Of the six total sustainability indicators identified in SGMA (§10720(x); §354.28(c)), five are relevant to potential undesirable results in the Basin:

1. **Chronic Lowering of Groundwater Levels** indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon
2. Significant and Unreasonable **Reduction of Groundwater Storage**
3. Significant and Unreasonable **Degraded Water Quality**
4. Significant and Unreasonable **Land Subsidence** and
5. **Depletion of Interconnected Surface Water** that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

The sustainability indicator pertaining to seawater intrusion is not relevant in the Basin.

3.1.1 Chronic Lowering of Groundwater Levels

This section discusses groundwater elevations with particular emphasis on the recent groundwater conditions in the Basin since the end of the GSP analyses period (WYs 2018 through 2025), and their relation to the SMCs established in the GSP. Groundwater elevations provide a direct measure of aquifer response to climatic variability and groundwater extraction and serve as a proxy for evaluating progress toward achieving sustainability.

3.1.1.1 Current Conditions

Groundwater level conditions are monitored based on static (i.e., non-pumping) groundwater levels measured in wells belonging to the Basin's groundwater level monitoring network (shown in Figure 2-3) on a quarterly basis. Table 3-1 presents groundwater elevations in the RMS wells over the past 7 water years (2019 through 2025, inclusive), along with their respective MTs and MOs.

The wells included in the groundwater level monitoring network documented in the GSP are subject to change during the GSP implementation period. Specifics, including a discussion of wells that are that have been evaluated for removal from the groundwater level monitoring network, are included in Section 6.

Groundwater elevations at the Basin's RMSs were evaluated to assess current conditions relative to the SMCs established in the GSP.

Table 3-1. Groundwater Elevations, Minimum Thresholds, and Measurable Objectives of RMS Wells in the Groundwater Level Monitoring Network

Well ID	Principal Aquifer	Ground Surface Elevation	MT	MO	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021	Spring 2022	Fall 2022	Spring 2023	Fall 2023	Spring 2024	Fall 2024	Spring 2025	Fall 2025
LACSD 4	Paso Robles Formation	604.00	407	440	436.00	431.00	434.00	431.00	432.00	424.00	424.00	421.00	427.00	428.00	439.00	435.00	438.00	432.00
30D1 ¹	Paso Robles Formation	540.00	345	388	374.21	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
SACC 1	Paso Robles Formation	586.08	348	—	384.31	368.91	370.58	368.49	372.61	347.69	349.69	343.34	370.05	352.08	370.23	352.39	359.03	340.10
22K3 ²	Paso Robles Formation	453.18	344	370	370.58	371.97	371.93	362.04	372.62	372.57	375.37	NM	NM	370.74	374.42	377.51	382.09	NM
SALS	Paso Robles Formation	459.50	397	—	425.67	423.90	NM	NM	421.11	420.53	419.76	419.92	428.11	430.62	432.38	431.30	428.87	427.28
20Q2 ¹	Paso Robles Formation	406.38	298	335	325.35	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
SACR 3	Paso Robles Formation	362.98	233	—	260.09	252.74	264.05	250.37	266.08	247.91	259.56	238.98	NM	244.46	265.98	243.90	264.29	239.71
2M1	Paso Robles Formation	419.41	244	286	269.49	267.81	NM	267.63	269.91	265.88	265.46	NM	NM	NM	NM	NM	NM	NM
14L1 ³	Careaga Sand	328.72	—	—	268.89	NM	266.74	239.62	264.24	259.60	262.30	256.72	262.18	255.58	261.38	257.05	260.48	254.42
25D1 ¹	Careaga Sand	764.88	634	661	661.45	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
13C1	Careaga Sand	776.75	565	597	595.10	NM	NM	590.15	NM	NM	588.85	589.75	NM	591.37	592.36	592.17	592.65	NM
24E1 ¹	Careaga Sand	350.00	220	257	253.88	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
SACR 1	Careaga Sand	362.98	291	—	323.68	315.52	319.78	313.62	319.53	312.21	315.57	306.92	NM	308.08	313.14	307.76	314.28	308.27
34P1	Careaga Sand	452.46	361	386	385.41	NM	NM	384.26	385.46	386.36	382.30	384.16	388.46	387.31	NM	NM	NM	NM
SAHC	Careaga Sand	453.18	358	—	382.89	382.14	382.20	382.15	382.09	381.79	381.55	381.27	380.91	381.28	381.82	382.80	384.29	386.43
16G3	Careaga Sand	294.48	226	251	253.38	NM	NM	249.70	248.82	248.48	247.62	246.31	245.12	245.08	244.78	245.12	245.31	245.66

Notes

All elevations are in feet North American Vertical Datum of 1988

~~Strikethrough~~ indicates wells that have been removed from the groundwater level monitoring network.

¹ Well that does not currently have an active access agreement.

² 22K3 was monitored as part of the CASGEM program until March 2022.

³ 14L1 was not identified as an RMS well in the GSP, therefore it does not have established sustainable management criteria. Addressed in Section 6.

Teal text indicates values that are below the MT.

Blue text indicates values that are above the MO.

— = not established

CASGEM = California Statewide Groundwater Elevation Monitoring

MT = minimum threshold

MO = measurable objective

NM = no measurement

RMS = representative monitoring site

Groundwater levels remain variable across the Basin and between the two principal aquifers, the Paso Robles Formation and the Careaga Sand. Overall, groundwater levels in the Paso Robles Formation generally declined through the early 2020s, with stabilization or recovery during the wet WYs 2023 and 2024. During the below normal WY 2025, many wells stabilized or experienced slight declines, although responses varied spatially, with some areas showing continued long-term declines and others remaining generally stable. Groundwater levels in the Careaga Sand Formation similarly show long-term declines near the Slough and Careaga Canyon, but with stabilization or recovery in many wells during WY 2023 and 2024; these responses were generally maintained into 2025. Groundwater level conditions at the end of WY 2025 generally reflect stabilization or modest declines following two wet WYs in 2023 and 2024 (Figure 3-1). The declines observed in WY 2025 are a result of the below average WY type and, consequently, an increase in groundwater pumping compared to the previous two years and the resulting reduced hydrologic recharge (Figure 3-1).

The response to the increased precipitation in WYs 2023 and 2024 was more rapid and apparent in the Paso Robles Formation, while groundwater level changes in the Careaga Sand have demonstrated a more delayed and muted response. This pattern is also reflected in the responses of the aquifers to drier conditions, as seen in WY 2025, with a more pronounced response observed in the Paso Robles Formation with decreased groundwater levels and a more stable response from the Careaga Sand. Between both aquifers, one RMS well reported a groundwater elevation below the well's established minimum threshold twice in WY 2025. Well SACC 1, completed in the Paso Robles Formation, had a groundwater elevation of 346.92 feet North American Vertical Datum of 1988 (NAVD 88)¹ in the second quarter of 2025, which is approximately 1 foot below the minimum threshold for this RMS well (348 feet NAVD 88) and a groundwater elevation of 340.10 feet NAVD in the third quarter of 2025, which is approximately 8 feet below the minimum threshold. Between spring 2019 and fall 2025, there were two other instances in which groundwater elevation at well SACC 1 fell below the minimum threshold, both of which occurred during the 2020–2022 drought period (Table 3-1). All four minimum threshold exceedances occurred during the second and third quarters and groundwater levels were measured above the minimum threshold the following spring. The 2019 through 2025 average spring to fall change in groundwater levels at SACC 1 is approximately 13 feet.

Within the Basin, significant and unreasonable chronic lowering of groundwater levels may result in undesirable results, as described in Section 4.5.1 of the GSP. The GSP defines an undesirable result for chronic lowering of groundwater levels as groundwater elevations falling below the applicable minimum threshold in 50 percent of RMS wells in either the Paso Robles Formation or Careaga Sand for two consecutive years following periods of average or above-average precipitation. When this percentage of RMS wells is below 50 percent, the lowering of groundwater levels is unlikely to cause undesirable results. Table 3-2 shows the proportions of these wells in each principal aquifer that have had groundwater levels below the minimum threshold since the period covered by the GSP (through WY 2018). When 50 percent of the representative wells have water levels below the minimum thresholds, the cells in Table 3-2 are shaded tan.

The GSP also identifies potential significant and unreasonable impacts to GDEs associated with interconnected surface water and conditions that could prevent the Basin from producing its estimated sustainable yield, which was determined using the water budget method described in the GSP.

¹ NAVD 88 refers to the North American Vertical Datum of 1988, which is the vertical reference datum used to express elevations relative to an established national elevation reference surface.

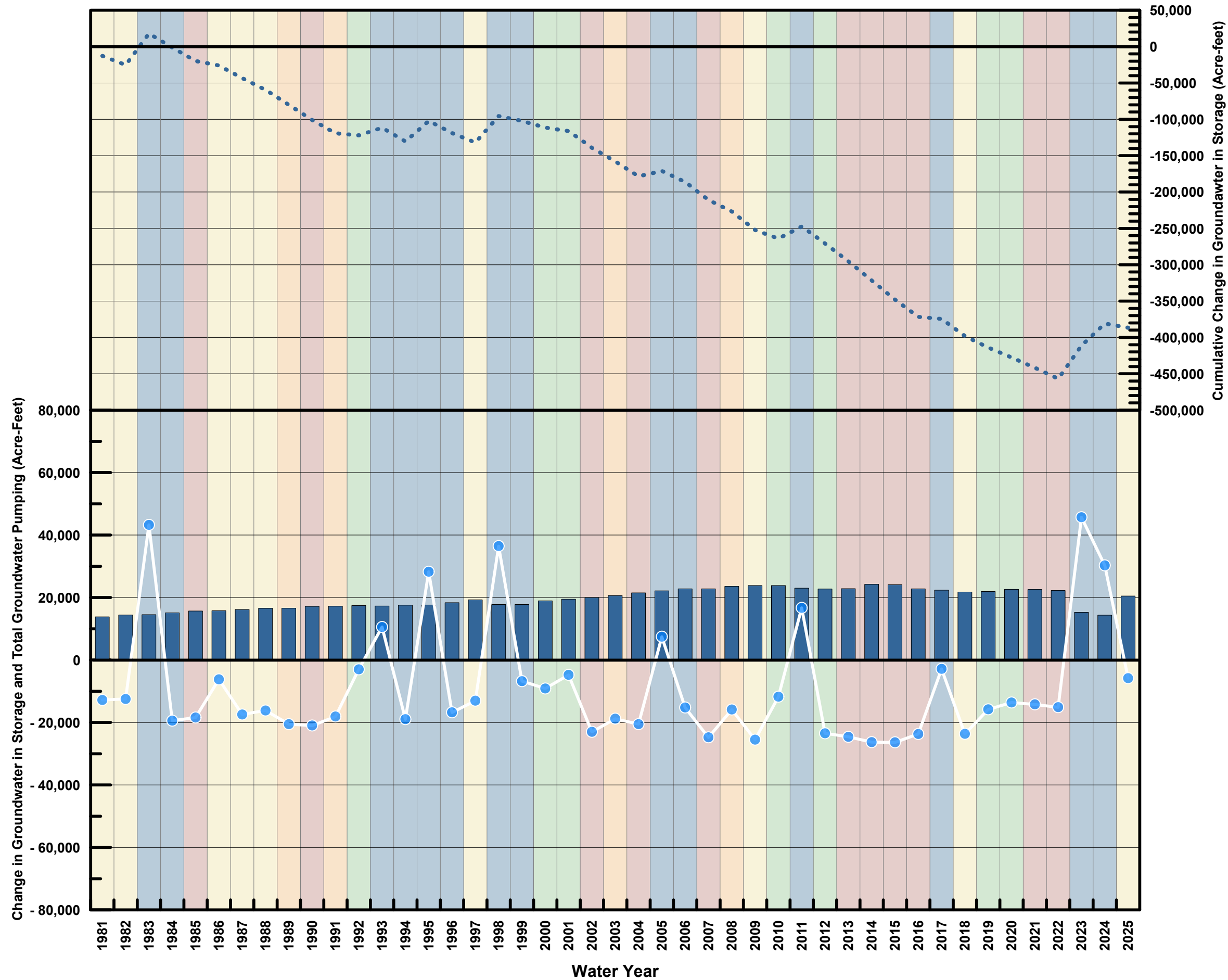


FIGURE 3-1

**Cumulative Change in
Groundwater in Storage**
Groundwater Sustainability Plan
5-Year Periodic Evaluation
San Antonio Creek Valley
Groundwater Basin

LEGEND

- ... Cumulative Change in Groundwater in Storage
- Annual Change in Groundwater in Storage
- Total Annual Groundwater Pumping

WATER YEAR TYPE

- Wet
- Above Normal
- Below Normal
- Dry
- Critical

Date: February 13, 2026

Table 3-2. Proportion of Representative Wells with Groundwater Levels Below the Minimum Threshold

Water Year	Water Year Type	Number of Representative Wells Measured	Period	Paso Robles Formation Wells	Careaga Sand Wells
2019	Above Normal	15	Spring	0%	0%
		7	Fall	0%	0%
2020	Above Normal	6	Spring	0%	0%
		10	Fall	0%	0%
2021	Critical	10	Spring	0%	0%
		10	Fall	10%	0%
2022	Critical	11	Spring	0%	0%
		9	Fall	11%	0%
2023	Wet	6	Spring	0%	0%
		10	Fall	0%	0%
2024	Wet	9	Spring	0%	0%
		9	Fall	0%	0%
2025	Below Normal	9	Spring	0%	0%
		7	Fall	14%	0%

Notes

Values represent percentage of representative wells below the minimum threshold.

Cells shaded green represent a proportion of representative wells less than 50% that exceeded the respective minimum threshold.

As shown in Table 3-2, measured water levels in 7 percent of RMS wells were below the respective minimum threshold in fall 2021, fall 2022, and fall 2025. No minimum threshold exceedances were measured in any spring period during the evaluation period. Each fall period that had a proportion of wells exceed the minimum threshold was categorized as either a critical WY or a below normal WY.

Groundwater Elevation Trends and Hydrographs

Groundwater elevation hydrographs are used to evaluate groundwater conditions over time and trends relative to sustainable management criteria.² Changes in groundwater elevation in the Basin can result from many influencing factors. Factors can include changing hydrologic trends, seasonal variations in precipitation, varying basin groundwater extractions, changing inflows and outflows, and influence from localized pumping conditions. Climatic variation can be one of the most significant factors affecting groundwater elevations over time. For this reason, the hydrographs also display DWR (2021) based water year type categorized as wet, above normal, below normal, dry, or critical.

Appendix B presents groundwater elevation hydrographs and associated location map for the RMS and non-RMS wells included in the Basin groundwater level monitoring network. These hydrographs include principal aquifer of completion, available well construction data, as well as measurable objectives and minimum

² Spring 2015 groundwater levels measured at the RMSs were selected as the measurable objectives, and minimum thresholds are set 25 feet below fall 2018 groundwater levels measured at RMSs (GSI and GEI, 2021).

thresholds for each RMS that were developed during the preparation of the GSP. A discussion of post-SGMA groundwater level trends in actively monitored groundwater wells by general area and principal aquifer is included, below.

As described in the GSP, the measurable objectives at the representative wells were selected as the groundwater levels measured during spring 2015, and minimum thresholds were set at 25 feet below fall 2018 groundwater levels at the respective sites.

The hydrographs provide a basis for evaluating changes in historical groundwater conditions, including the 2019–2025 evaluation period, by identifying temporal trends in each principal aquifer at individual monitoring locations within the Basin. Groundwater level trends vary across the Basin between the two principal aquifers, the Paso Robles Formation and Careaga Sand. The evaluation period includes above normal conditions for WYs 2019 and 2020, critical conditions during WYs 2021 and 2022, wet conditions during WYs 2023 and 2024, and below normal conditions for WY 2025. The magnitude and timing of these responses differ between the Paso Robles Formation and the Careaga Sand, reflecting the differing aquifer properties, recharge mechanisms, and hydraulic connection within the Basin.

Paso Robles Formation

Groundwater levels in the Paso Robles Formation generally respond relatively rapidly to changes in hydrologic conditions. During the dry portion of the evaluation period, WYs 2021 and 2022, groundwater levels generally declined or were stable at some RMS locations prior to increasing in response to the wet conditions observed in WYs 2023 and 2024.

Groundwater elevations in the Paso Robles Formation are higher in the eastern and northeastern portions of the Basin which generates a groundwater flow generally to the west, as shown in spring and fall groundwater elevation contour maps for the Paso Robles Formation presented in the Basin Annual Reports during the evaluation period (Appendix C). Groundwater flow in the Paso Robles Formation tends to converge toward San Antonio Creek, coincident with the axis of the valley and underlying synclinal structure, and ultimately the Slough before discharging from the Basin.

The hydraulic gradient in the Paso Robles Formation tends to be flatter east of the Slough and in Harris Canyon, and steeper gradients around Los Alamos where groundwater levels indicate a local groundwater depression, which is suspected to be a result of proximal groundwater pumping creating a localized depression in the groundwater surface. The pumping depression can become more pronounced in the dry season during reduced precipitation, streamflow, and increased irrigation (GSI, 2026). Groundwater elevations also fluctuated in response to typical seasonal trends, such as generally higher water levels in the spring, and lower water levels in the fall. A discussion of post-SGMA groundwater level trends in actively monitored groundwater wells by general area and principal aquifer is included, below.

- **Los Alamos.** Historical water levels in the LACSD water supply wells indicate a downward trend until WY 2023, when the water levels started to increase. Water levels increased during wet WYs 2023 and 2024. Water levels in the LACSD wells stabilized or showed some decline during the below normal WY 2025. Water levels in the shallow Basin monitoring wells near Los Alamos (SALA and SACC 5) have been generally stable over their period of record. Water levels in the deeper intervals of the nested monitoring well SACC (1-4) have declined over their period of record.
- **Highway (HWY) 101 (North-Northwest of Los Alamos).** Historical water levels in 13Q1 indicate a downward trend until WY 2023, when the water levels started to increase. Water levels increased during wet WYs 2023 and 2024. Water levels in the well stabilized during the below normal WY 2025.
- **HWY 135 (Between Los Alamos and Barka Slough).** Water levels in 22K3 and SALS have been generally stable over the last 5 to 10 years, with an increase during wet WYs 2023 and 2024 and a slight decline

during below normal WY 2025. Water levels in the SACR nested Basin monitoring wells (2-5) indicate a shallow decline in water levels and stabilization or some recovery during wet WYs 2023 and 2024, and a stabilization of water levels or continued decline during below normal WY 2025.

- **Harris Canyon (East of Barka Slough).** Water levels in Basin monitoring wells SAHG and SAGR have been stable.

Careaga Sand

Groundwater levels in the Careaga Sand generally indicate a delayed and more muted response to changes in hydrologic conditions. Groundwater elevations also fluctuated in response to typical seasonal trends, such as generally higher water levels in the spring, and lower water levels in the fall. However, the fluctuation of groundwater levels in Careaga Sand RMS wells is relatively subtle, and the overall trend is stable.

Groundwater elevations in the Careaga Sand are higher in the eastern portion of the Basin and lower toward the western Basin and the Slough (Appendix C). The resulting hydraulic gradient is generally towards the southwest. Groundwater flow in the Careaga Sand tends to converge toward San Antonio Creek, coincident with the axis of the valley and underlying synclinal structure, and ultimately the Slough before discharging from the Basin. Groundwater contours indicate steep groundwater gradients within Cañada de Las Flores and flatter groundwater gradients between the Slough and east of U.S. HWY 101 (GSI, 2026). The steep groundwater gradients are suspected to be controlled by the Basin's geological structure (localized anticlinal structure and confined aquifer conditions (Woodring et al., 1950; Carlson, 2019). A discussion of post-SGMA groundwater level trends in actively monitored groundwater wells by general area and principal aquifer is included, below.

- **HWY 101 (North-Northwest of Los Alamos).** Historical water levels in the White Hawk wells and 13C1 indicate a gradual downward trend until WY 2023. Water levels increased during wet WYs 2023 and 2024 and stabilized during the below normal WY 2025. Water levels have been stable in Well 4 over its limited period of record. The period of record in the Char 1 well is too brief to identify any trends. Groundwater levels in 2N1 had been stable from approximately WYs 2021 through 2024 when last measured. Groundwater levels indicate a gradient decline in well 2R1 until WY 2025, when water levels remained stable following wet WYs 2023 and 2024. Groundwater levels in Mesa Vineyard have remained generally stable over the period of record. Groundwater levels declined during critical WYs 2021 and 2022, and recovered during wet WYs 2023 and 2024.
- **Careaga Canyon (Between HWY 101 and HWY 135).** Groundwater levels in 4-Deer Field indicate a gradual decline over the period of record. Groundwater levels in 4-Deer Highway show a similar rate of decline however indicate a stabilization of groundwater levels during wet WYs 2023 and 2024, and continuing during WY 2025. Groundwater levels in Schaff Well and Stephen's Well indicate a more rapid decline over the respective periods of record.
- **Harris Canyon (East of Barka Slough).** Groundwater levels in SAHC have been stable over the period of record, indicating a minor low rate of decline until WY 2025, when the groundwater levels increased following wet WYs 2023 and 2024. Groundwater levels in 14L1 have declined over the period of record; however, the rate of decline decreased during wet WYs 2023 and 2024. Groundwater levels in SACR 1 indicate a decline prior to wet WYs 2023 and 2024, when groundwater levels stabilized, and continued during WY 2025.
- **Barka Slough.** Groundwater levels in the Slough have declined over the period of record. The rate of decline for well located on the west of the Slough are lower than well located on the east side of the Slough. This is suspected to be a result of the west side of the Slough being recharged by groundwater more than the east side. The magnitude of recovery and stabilization of groundwater levels in wells located on the east of the Slough is more apparent than in wells on the west side of the Slough.

Reported Dry and Replaced Wells

The DWR Dry Well Reporting System³ was used to assess whether any dry wells were reported within the Basin. For the period through WY 2025, there have been no reported dry wells in the Basin during the evaluation period.

3.1.1.2 Sustainable Management Criteria

The SMCs established in the GSP provide the benchmarks against which groundwater conditions and progress toward the Basin's sustainability goal are evaluated. This section evaluates groundwater conditions in the context of the chronic lowering of groundwater levels observed during the 2019–2025 evaluation period relative to the MOs, MTs, and interim milestones established for the Basin's RMS wells and assesses whether conditions indicate the occurrence of Undesirable Results. The evaluation considers both the magnitude and persistence of groundwater level changes and their potential effects on beneficial uses and users.

Measurable Objectives

Measurable Objectives are aspirational goals that the SABGSA and stakeholders have agreed are reasonable conditions that reflect sustainability in the Basin. There are no regulatory implications upon the SABGSA if MOs are not achieved at the 5-year evaluation milestone.

Measurable objectives for the RMS wells completed within the Paso Robles Formation and the Careaga Sand are defined as the groundwater levels measured in spring 2015 because it represents the groundwater conditions that the SABGSA intends to achieve over the 20-year implementation period.

As is discussed in Section 6 of this evaluation, based on well access issues, well condition, well construction, and the completion of the Basin Well Registration, the SABGSA is currently in process of revising the monitoring network. The SABGSA will visit the appropriateness of the SMCs for these wells upon completion.

At this time, with the GSAs implementing actions to achieve sustainability within the 20-year SGMA planning period, there are no proposed changes to these Measurable Objectives for the Chronic Lowering of Groundwater Levels sustainability indicator.

During the 2019–2025 evaluation period, groundwater elevations at the RMS wells generally remained below the respective Measurable Objectives, with water levels in some RMS wells demonstrating progress towards the objectives in response to the 2023 and 2024 wet water year types. However, the response was not uniform across the Basin, and some RMS wells continued to exhibit longer-term declining trends or remained below their Measurable Objectives through WY 2025.

RMS well 22K3, has had 10 instances within the evaluation period of exceeding the established Measurable Objective of 370 feet NAVD 88 (Table 3-1). RMS well 25D3, had one instance of exceeding the established Measurable Objective of 661 feet NAVD 88 in spring 2019. The SABGSA has been unable to secure a well access agreement for 25D3, consequently water levels have not been measured since this exceedance.

Water levels measured at well 34P1, a former RMS well, exceeded the established Measurable Objective of 386 feet NAVD 88 during the evaluation period prior to the well being removed from the groundwater level monitoring network in first quarter of 2024 (see Section 6).

³ The DWR Dry Well Reporting System is available at <https://mydrywell.water.ca.gov/report/publicpage>.

Minimum Thresholds

The GSP establishes a minimum threshold for chronic lowering of groundwater levels at each RMS well at 25 feet below the groundwater elevation measured at that RMS well during fall 2018. The thresholds were developed to identify groundwater level conditions below which significant and unreasonable effects to beneficial uses and users could potentially occur. The thresholds were established in consideration of well construction characteristics, well type, existing groundwater uses, and the potential for groundwater level declines to affect the ability of existing wells to produce groundwater. Accordingly, the minimum thresholds are intended to distinguish groundwater level fluctuations and declines that can occur without significant and unreasonable effects from conditions that could indicate a potential sustainability concern.

Groundwater level conditions during the 2019–2025 evaluation period were above the established minimum thresholds in most RMS wells. Only RMS well SACC 1 had reported groundwater levels below the minimum threshold of 348 feet NAVD 88 in four instances throughout the evaluation period. Two occurred during the critical water year types of WYs 2021 and 2022 and two during the below average water year type of WY 2025 (Table 3-1). All of the exceedances occurred in the second or third quarter.

At this time, with the GSAs implementing actions to achieve sustainability within the 20-year SGMA planning period, there are no proposed changes to these minimum thresholds for the Chronic Lowering of Groundwater Levels sustainability indicator.

Undesirable Results

Undesirable results were defined in the GSP as conditions in the Basin that could lead to significant and unreasonable lowering of groundwater levels. These conditions include:

- **Extended drought.** Extensive droughts may lead to excessively low groundwater levels and undesirable results. Short-term impacts due to drought are anticipated in the SGMA regulations with recognition that management actions need sufficient flexibility to accommodate drought periods and ensure short-term impacts can be offset by increases in groundwater levels or storage during normal or wet periods.

Water year types during the evaluation period included above normal conditions for WYs 2019 and 2020, critical conditions during WYs 2021 and 2022, wet conditions during WYs 2023 and 2024, and below normal conditions for WY 2025. Therefore, no extended drought period was observed and the consecutive critical year types were preceded and followed by above normal and wet water year types, respectively.

- **High rate of pumping in the Paso Robles Formation.** If the amount of pumping in the Paso Robles Formation exceeds the long-term rate of recharge derived from mountain front recharge, stream percolation, percolation of direct precipitation, septic return flow, irrigation return flow, and discharges from the Careaga Sand (in western portion of the Basin), then groundwater levels may decline, which could affect Paso Robles Formation well production, groundwater discharge into the Slough, and GDEs.
- **High rate of pumping in the Careaga Sand.** If the amount of pumping in the Careaga Sand exceeds the long-term rate of natural recharge derived from mountain front recharge, stream percolation, percolation of direct precipitation, septic return flow, irrigation return flow, and recharge from the Paso Robles Formation, then groundwater levels may decline, which could affect Careaga Sand well production, reduce groundwater discharge into the Slough, and GDEs. Increased pumping by VSFB would exacerbate this problem.

No extended periods of high rates of pumping were observed during the evaluation period. Average pumping during the evaluation period was approximately 19,900 acre-feet (AF), consistent with the average pumping for the GSP historical water budget period (19,500 AF) and current water budget period (23,200 AF).

The GSP describes lowering of groundwater levels that are likely to cause undesirable results as follows (Section 4.5.1 of the GSP):

- Groundwater levels in the Paso Robles Formation or Careaga Sand drop below the minimum threshold after periods of average and above-average precipitation in 50 percent of representative wells for 2 consecutive years. By disqualifying periods of below-average precipitation or periods of drought that result in lowering of groundwater levels, this approach focuses on periods when groundwater levels are expected to increase (due to average or above-average precipitation measured at the Los Alamos Fire Station gage) to identify groundwater level decline associated with groundwater pumping.
- The minimum threshold was exceeded in one RMS well during the evaluation period. All four exceedances in the well occurred during below normal or critical water year types and during the second or third quarter.
- An acute or chronic, measurable significant and unreasonable impact to GDEs associated with interconnected surface water, specifically Barka Slough, caused by groundwater pumping in the Basin (during periods of average or above-average precipitation measured at the Los Alamos Fire Station gage).
- The SABGSA updated the Enhanced Vegetation Index (EVI) analysis described in the Basin GSP (GSI and GEI, 2021). The GSP EVI analysis included the review of data from WY 1990 to 2020. The same analysis was updated to include WYs 2021 to 2025. Results of the EVI analysis for the Slough and a subset area, referred to as West Barka Slough, are consistent with those summarized in the Basin GSP. The EVI analysis indicates no discernable long-term trend in Slough vegetative health.
- Lowering of groundwater levels results in an inability to produce estimated annual volume of groundwater equal to the sustainable yield for the Basin determined using the water budget method described in the GSP.
- A chronic and significant lowering of groundwater levels has not been observed during the evaluation period. Likewise, no dry wells have been reported, and groundwater pumping is consistent with historical production rates.

Based on the criteria established in the GSP, no undesirable results were observed during the 2019–2025 evaluation period. One of DWR’s RCAs was for the SABGSA to reevaluate the SMCs for the chronic lowering of water levels. There are two parts to the RCA. A discussion of the DWR’s RCAs is presented in Section 7.

Interim Milestones

Interim milestones are intended to serve as interim goals to be evaluated at regular intervals of every five years during the 20-year SGMA implementation planning period to track progress toward sustainability. As such, it is generally intended that interim milestones lie between the MT and the MO for each RMS well in the groundwater level monitoring network, representative of interim conditions between the two sustainability indicators, as presented in Table 3-3.

Interim milestones were established for 2022, 2027, 2032, 2037, and 2042. The GSP allowed a 2-year planning period following GSP submittal for planning and funding of projects and management actions to be initiated.

The 2025 evaluation period provides the opportunity to assess progress relative to both the 2022 and 2027 interim milestones. Based on fall 2025 groundwater elevations, four of the eight RMS wells with fall 2025 groundwater level data were above their respective 2022 interim milestones, and two were above their respective 2027 interim milestones.

An RMS site falling below an interim milestone does not, by itself, constitute an undesirable result. The interim milestones provide an additional measure of whether groundwater conditions are progressing toward the GSP's long-term objectives and whether the current trajectory warrants continued implementation or potential adjustment of management actions. Interim milestones do not alone contribute to the determination of whether an undesirable result is occurring or is likely to occur.

Table 3-3. Chronic Lowering of Groundwater Levels Interim Milestones of RMS Wells in the Groundwater Level Monitoring Network

Well ID	Fall 2025 GWE	Interim Milestones (feet NAVD 88)				
		2022	2027	2032	2037	2042 ⁵
Paso Robles Formation						
LACSD 4	437	434	435	437	438	440
30D1 ¹	NM	374	377	381	384	388
SACC 1 ²	340	358	—	—	—	—
22K3 ¹	377 ⁴	362	364	366	368	370
SALS ²	427	420	—	—	—	—
20Q2 ¹	NM	322	325	328	332	335
SACR 3 ²	240	243	—	—	—	—
2M1	NM	268	271	276	281	286
Careaga Sand						
14L1 ³	254	—	—	—	—	—
25D1 ¹	NM	661	661	661	661	661
13C1	NM	583	586	589	593	597
24E1 ¹	NM	252	253	254	255	257
SACR 1 ²	308	314	—	—	—	—
34P1	NM	386	386	386	386	386
SAHC	386	382	—	—	—	—
16G3	246	249	249	250	250	251

Notes

~~Strikethrough~~ indicates wells that have been removed from the groundwater level monitoring network.

¹ Production well proposed to be replaced with subsequent observation well.

² Observation well proposed to replace RMS production well.

³ 14L1 is currently being evaluated as a replacement RMS for 2M1 and does not have established sustainable management criteria.

⁴ Groundwater elevation listed was measured in November 2025. No measurement is available for third quarter of 2025.

⁵ Value is equal to the measurable objective at the RMS for the respective sustainability indicator.

— = not established

GWE = groundwater elevation

NAVD 88 = North American Vertical Datum of 1988

NM = no measurement

RMS = representative monitoring site

3.1.1.3 DWR Recommended Corrective Actions

With regard to the Chronic Lowering of Groundwater Levels sustainability indicator, DWR provided a single recommendation in multiple parts to be addressed as part of this Periodic Evaluation.

Recommended Corrective Action 1

For this sustainability indicator, the relevant recommendation includes addressing the following items (the RCA number and letter [e.g., RCA 1a] correspond to DWR's GSP Determination Letter. In some instances, the RCAs have been divided further and are denoted numerically [e.g., RCA 1ai]):

- a. *i) Revise the definition of undesirable results and language pertaining to significant and unreasonable chronic lowering of groundwater levels to remove the average and above-average year condition and ii) discuss how extractions and recharge will be managed as necessary to ensure that reductions in groundwater levels or storage during dry years are offset by increases in groundwater levels or storage during other years within the sustainable management criteria for the chronic lowering of groundwater levels.*
- b. *Department staff recommend the GSA, through their well impact analysis, i) describe where the proposed minimum thresholds are set relative to well construction information that would indicate whether or not more substantial impacts to beneficial users are occurring. ii) This assessment would include evaluating how the sustainable management criteria may affect production wells relative to the depth of pump intake, bottom of the screen interval, and well dewatering, as applicable. This information should be clearly reported in the Plan for the entire Basin including quantities of wells that may be impacted and the approximate locations of where any potential impacts may occur.*

RCA 1ai Discussion. The average and above-average year condition was included in the Chronic Lowering of Groundwater Levels SMC based on the definition of “undesirable results” as defined in California Water Code Section 10721(x [Undesirable result])(1), *Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.* The minimum thresholds and undesirable results were developed based on historical trends over a base period (WYs 1981–2018) representative of long-term conditions (including varying climatic conditions). Regardless of WY type, mitigation would be required if pumping continued to exceed the sustainable yield and Basin stakeholders were observing undesirable results with respect to the Chronic Lowering of Groundwater Levels Sustainability Indicator.

The removal of the contingency based on non-drought conditions may be considered pending the direction of the SABGSA. Specifically, the SABGSA may remove the contingency of undesirable results occurring “after 2 consecutive years of average and above-average precipitation.” The effects of removing the non-drought condition contingency are unknown pending completion of a further analysis. This analysis would include an estimate of the effects of two years of drought on each of the representative wells and subsequent recovery during normal and wet periods, which would be used to estimate revised minimum threshold values for each well, as warranted. This suggested evaluation could be further supported with an updated well impact analysis. However, because the SABGSA is currently revising the monitoring network due to well access, well condition, and the recently completed well registration effort, the SABGSA will finalize revisions to the groundwater level monitoring network prior to completing these analyses. Any resulting changes from the analyses would be included in a GSP amendment prior to the 10-year periodic evaluation.

As observed during the evaluation period, 2019 and 2020 were above normal water year types, 2021 and 2022 were critical (dry) water year types, followed by a wet water year type in 2023 and 2024, and a below

normal water year type in 2025. During this period, a minimum threshold was exceeded in 1 RMS well a total of four times during second or third quarter monitoring events. The exceedances were measured during the 2021 and 2022 critical water year type years and 2025 below normal water year type. WYs 2021 to 2023 may serve as an interim, rudimentary proxy indicating removal of the “after 2 consecutive years of average and above-average precipitation” contingency would likely not result in significant revisions to the SMC. Therefore, SABGSA will adopt the recommended revised definition of undesirable results for the chronic lowering of groundwater levels sustainability indicator. A GSP amendment is anticipated to be completed prior to the 10-year periodic evaluation and will include findings/results of the aforementioned analyses.

RCA 1aii Discussion. This comment is addressed by the Projects and Management Actions (Section 6) described in the GSP in accordance with GSP Emergency Regulations (354.44.b.9), *A description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods.* However, DWR states, *The Plan (GSP) does not provide sufficient detail on how these projects and management actions, in conjunction with the proposed chronic lowering of groundwater levels sustainable management criteria, will offset drought-related groundwater reductions and avoid significant and unreasonable impacts when groundwater level minimum thresholds are potentially exceeded for an extended period in the absence of two consecutive non-dry years.*

Because the Basin has not been experiencing undesirable results and the SABGSA has been making progress implementing Tier I projects and management actions, the RCA likely does not warrant a GSP amendment, although this will be addressed with revisions to Section 6 of the GSP when a GSP amendment is completed prior to the 10-year periodic evaluation.

RCA 1bi Discussion. A well impact analysis was completed using available well construction information for the Basin. “Fall 2018 groundwater elevations were compared with top of well screen elevations for agricultural, municipal, and domestic wells screened in principal aquifers within the Basin. The percentage of wells with water levels below top of screen was calculated in 5-foot increments, starting with fall 2018 water levels.” The percent of wells with water levels below top of screen were presented in Figure 3-23 of the GSP and the location of the municipal, agricultural, and domestic wells included in the analysis, as well as the groundwater elevation in comparison to the wells’ top of screen, were presented in Figures 3-24, 3-25, and 3-26, respectively. The SABGSA collected more well location and construction data through implementation of the Well Registration Program. However, the construction information is limited to well depth. The SABGSA will evaluate expanding the well impact analysis pursuant to DWRs recommendation, but because Basin stakeholders have not reported dry wells or increased substantial impacts, this RCA does not warrant immediate action and will be completed during a GSP amendment prior to the 10-year periodic evaluation.

RCA 1bii Discussion. The well impact analysis presented in the GSP was completed using available top of screen information. “The analysis was performed to help identify conditions that could result in a significant and unreasonable depletion of supply... Groundwater levels that consistently fall below the top of the well screen are likely to result in increased well clogging from biological growth and mineral precipitation, cascading water, sand pumping, and reduced well yield. These conditions are considered by the SABGSA to be undesirable. The magnitude of this impact on well production differs depending on well type: agricultural, municipal, or domestic. For example, agricultural wells often are deeper and have longer well screens that can tolerate the loss of efficiency and greater drawdown that can result from water levels falling below top of screen. Municipal wells serve drinking water to residents living in the Basin and therefore supply reduction cannot be easily addressed. Likewise, domestic wells tend to be shallower and may be more sensitive to water levels falling within the screen interval.”

Although the recommended additional analyses (i.e., groundwater levels relative to the depth of pump intake, bottom of the screen interval, and well dewatering) would provide more data relative to various well components, the SABGSA may prioritize funding for projects and management actions or addressing data gaps. The SABGSA will evaluate expanding the well impact analysis pursuant to DWR's recommendation, but because Basin stakeholders have not reported dry wells or increased substantial impacts, this RCA does not warrant immediate action and will be completed during a GSP amendment prior to the 10-year periodic evaluation.

Changes to the Sustainability Criteria

Changes to the sustainability criteria based on DWR's corrective actions for groundwater level decline are recommended to both maintain compliance with DWR requirements and recommendations for corrective actions, and also to maintain responsive local groundwater management.

No changes to the Sustainability Criteria are proposed at this time, other than the removal of the contingency based on drought conditions, per DWR RCA #1a for the Basin. The outstanding revisions and analyses, as well as any warranted resulting revisions to SMC, described in DWR RCA #1a will be completed as a GSP amendment prior to the 10-year periodic evaluation.

3.1.1.4 Progress Toward Sustainability

The 2019–2025 evaluation period represents the first five years of implementation of the GSP within the Basin's 20-year SGMA planning horizon. In addition to the data presented in the preceding subsections, Sections 4, 5, and 9 document the progress the SABGSA has made toward sustainable management of the Basin. The SABGSA has implemented groundwater management actions, policies, ordinances, and projects described in the GSP, and continues efforts toward the goal of filling identified data gaps. Proceeding in accordance with the GSP is resulting in demonstrable progress for reaching sustainability within the 20-year SGMA implementation timeline.

The documentation of a minimum threshold exceedance in one well, the absence of observed undesirable results, and the measured recovery of groundwater levels following the critically dry period of WYs 2021 and 2022 indicate that the Basin remains within the range of anticipated conditions consistent with the SABGSA approach to setting SMC (see GSP, Figure 4-1).

Adaptive Management Approaches

The status of projects and management actions are presented in Section 4.

Impacts to Beneficial Uses and Users of Groundwater

Beneficial uses and users of groundwater in the Basin include agricultural, environmental, domestic, municipal, and commercial users. Groundwater elevations that remain above the MTs are anticipated to improve beneficial uses of each of the principal aquifers by avoiding significant and unreasonable lowering of groundwater elevations. No undesirable results have occurred within the Basin since groundwater elevations are higher than the MTs in more than 50 percent of the RMS wells.

3.1.2 Reduction of Groundwater in Storage

This section of the evaluation addresses the Reduction of Groundwater in Storage sustainability indicator.

This section focuses on the relevant sustainability goal objective in the Basin as presented in the GSP, "Maintain sufficient groundwater volumes in storage to sustain current and planned groundwater use in prolonged drought conditions while avoiding impacts to the Slough resulting from groundwater pumping." (GSI and GEI, 2021).

3.1.2.1 Current Conditions

In each Annual Report, calculations of the change of groundwater in storage for each principal aquifer are presented as change in groundwater elevation contour maps (change in groundwater elevation contour maps during the evaluation period are included in Appendix C). Groundwater level data from the Basin's groundwater level monitoring network are collected each quarter and are used to evaluate changes in groundwater elevations across each aquifer and, together with the applicable aquifer storage coefficients (S), estimate changes in groundwater storage. The spatial distribution and availability of groundwater level data vary between the two aquifers and through time as monitoring wells have been added, removed, or become inaccessible. Consequently, estimates of changes in groundwater storage are subject to the spatial coverage of the available groundwater level monitoring network for each water year.

Changes in groundwater elevations are used as an indicator of changes in groundwater storage within the Basin. The volume of groundwater released from or added to storage is estimated by applying the applicable aquifer storage coefficient to the change in groundwater elevation over the appropriate area. The storage coefficient represents the portion of space within the sedimentary layers (i.e., pore space) in the aquifer that can be utilized for groundwater storage. The storage coefficient is a unitless factor that is multiplied by the total volume of change between water years to derive the change in groundwater storage. Based on work completed for the GSP (GSI and GEI, 2021) and Martin, 1985, S is estimated to be 0.15 for the Paso Robles Formation and 0.001 for the confined portion (the Slough area) of the Careaga Sand.

For each Basin Annual Report, annual changes in groundwater elevation are derived from the contour maps, that are generated for fall groundwater elevations from a well array belonging to each principal aquifer. The current year's fall contour map for one aquifer is subtracted from the previous year's fall contour map for the same aquifer. This results in a change map depicting the changes in groundwater elevations that occurred during that year for that particular aquifer. The same is done for the other aquifer. The change maps represent a volume change within the Paso Robles Formation and Careaga Sand during a particular water year.

Contour maps and annual groundwater storage calculations are presented in the WY 2025 Annual Report for the Basin (GSI, 2026). During the 2019–2025 evaluation period, changes in groundwater in storage fluctuated as a response to varying climatic conditions, groundwater recharge rates, and groundwater pumping. From 2019 to 2025, the cumulative change in groundwater in storage was 11,500 acre-feet (AF).

Groundwater conditions are based on the available groundwater elevation data for both aquifers, although well construction information is incomplete for some wells. These data were uploaded to DWR's Monitoring Network Module, which has replaced the California Statewide Groundwater Elevation Monitoring (CASGEM) Program.

The contour maps presented in the Annual Reports for the Basin were developed using data collected by GSI as part of the SGMA-required quarterly groundwater level monitoring described in the GSP.

3.1.2.2 Paso Robles Formation

Groundwater in the Paso Robles Formation generally flows towards the west, which is consistent with the groundwater flow direction described in the GSP. The horizontal groundwater gradient during these periods has remained relatively unchanged since the analyses performed for the GSP. As stated in the WY 2025 Annual Report for the Basin, the Paso Robles Formation has a horizontal groundwater gradient of approximately 0.003 feet per foot (ft/ft) along the San Antonio Creek between Los Alamos and the Slough in the spring and fall (GSI, 2026). This is a difference of 0.001 ft/ft when compared to the gradient described in the GSP (0.004 ft/ft) for the same area.

Groundwater elevations within the Paso Robles Formation generally decreased during the early portion of the evaluation period relative to fall 2018 conditions (end of the Basin GSP current water budget period), with declines most apparent during critical WYs 2021 and 2022. Water levels subsequently increased during the wet WYs 2023 and 2024, resulting in partial recovery from the earlier declines. Groundwater elevations experienced another decline in WY 2025 relative to the previous spring in response to the below normal water year and resulting increase in groundwater pumping. Specifically, the groundwater elevations in the Paso Robles Formation RMS wells have declined by an average of 2.35 feet between the spring periods of 2024 and 2025. During this period, water elevations in the Paso Robles Formation RMS wells declined in four wells (LACSD 4, SALS, SACC 1, and SACR 3) by a maximum of 11.20 feet and increased in one well (22K3) by 7.67 feet. However, relative to WY 2018, groundwater elevations in the Paso Robles Formation during the final water year of this evaluation period (WY 2025) have generally risen.

As is represented by the contour maps prepared for the Basin Annual Reports, the spring period for both aquifers represents the seasonal high for groundwater levels in the Basin, and the fall period represents the seasonal low for groundwater levels in the Basin. Although the existing groundwater level monitoring network satisfies the well density guidance cited in the DWR BMPs guidance for monitoring networks developed by DWR (DWR, 2016a, 2016b), there are areas identified within the Basin (see GSP, Figure 5-3) where the addition of monitoring wells would improve the HCM. Two areas with low well density were identified for the Paso Robles Formation in the Basin: the eastern uplands and the central to northwestern uplands. The SABGSA has pursued opportunities to address these gaps through outreach to well owners, efforts to secure access to existing wells, and proposals for construction of dedicated monitoring wells. Because the accuracy of using this method is dependent on the lateral extent of the water level data, there is a degree of uncertainty associated with using this method for the Paso Robles Formation. Increased data density and spatial coverage will improve accuracy with the generated groundwater elevation contour maps and the calculation of change in groundwater storage. The SABGSA is currently working to address these identified data gaps, contact landowners, and review potential additions to the groundwater level monitoring network through management actions, such as well registration (see Section 2.2).

3.1.2.3 Careaga Sand

Groundwater in the Careaga Sand flows generally towards the southwest, which is consistent with the groundwater flow direction described in the GSP. The horizontal groundwater gradient during these periods has remained relatively unchanged since the analyses performed for the GSP. As stated in the WY 2025 Annual Report for the Basin, the Careaga Sand has a horizontal groundwater gradient of approximately 0.01 ft/ft along the San Antonio Creek between U.S. HWY 101 northwest of Los Alamos and the Slough in the spring and fall (GSI, 2026).

Groundwater elevations within the Careaga Sand have generally decreased during the early portion of the evaluation period relative to fall 2018 conditions, with declines occurring during critical WYs 2021 and 2022. Groundwater elevations subsequently stabilized or increased during wet WYs 2023 and 2024, with several wells showing partial recovery from earlier declines. Water levels generally increased in WY 2025 relative to the previous spring. Specifically, the groundwater elevations in the Careaga Sand RMS wells have increased by an average of 1.11 feet between the spring periods of 2024 and 2025. During this period, water elevations in the Careaga Sand RMS wells increased in all four wells (SAHC, SACR 1, 16G3, 13C1) by a maximum of 2.47 feet. Relative to WY 2018, groundwater elevations in the Careaga Sand during WY 2025 generally declined.

As is represented by the contour maps prepared for the Basin Annual Reports, the spring period for both aquifers represents the seasonal high for groundwater levels in the Basin, and the fall period for represents the seasonal low for groundwater levels in the Basin.

Although the existing groundwater level monitoring network satisfies the well density guidance cited in the DWR BMPs guidance for monitoring networks developed by DWR (DWR, 2016a, 2016b), there are areas identified within the Basin (see GSP, Figure 5-3) where the addition of monitoring wells would improve the HCM. Two areas with low well density were identified for the Careaga Sand in the Basin: the eastern uplands and the central to northwestern uplands.

SABGSA has pursued opportunities to address these gaps through outreach to well owners, efforts to secure access to existing wells, and proposals for construction of dedicated monitoring wells. Because the accuracy of using this method is dependent on the lateral extent of the water level data, there is a degree of uncertainty associated with using this method for the Careaga Sand. Increased data density and spatial coverage will improve accuracy with the groundwater elevation contour maps and the calculation of change in groundwater storage. The SABGSA is currently working to address these identified data gaps, contact landowners, and review potential additions to the groundwater level monitoring network through management actions (see Section 2.2).

3.1.2.4 Sustainable Management Criteria

Because groundwater elevations are used as a proxy for changes in groundwater in storage in the Basin, the SMCs established for Chronic Lowering of Groundwater Levels also serve as the SMC for evaluating Reduction in Groundwater Storage. Accordingly, the evaluation of changes in groundwater in storage is based on groundwater level conditions relative to the established MOs, interim milestones, and MTs, supplemented by estimates of changes in groundwater in storage in the Basin.

No changes in the SMC for the Reduction in Groundwater in Storage sustainability indicator are proposed at the time of this evaluation.

3.1.2.5 Annual and Cumulative Change in Groundwater Storage Calculations

The calculated annual changes in groundwater in storage calculated for WYs 2019 through 2025 are presented in Table 3-4. The volume of groundwater in storage decreased by approximately 5,800 AF during the 2025 WY due to the below normal water year type and resulting increase in groundwater pumping. Comparatively, the average change of groundwater in storage during below normal water years throughout the GSP historical water budget period is a decrease of approximately 15,000 AF (Figure 3-1).

Table 3-4. Change in Groundwater in Storage, Water Years 2019 to 2025

Water Year	Water Year Type	Paso Robles Formation (AF)	Careaga Sand (AF)	Total Annual Change in Groundwater in Storage (AF)
2019	Above Normal	-15,200	-550	-15,800
2020	Above Normal	-13,200	-440	-13,600
2021	Critical	-13,700	-540	-14,200
2022	Critical	-14,900	-200	-15,100
2023	Wet	45,700	10	45,700
2024	Wet	30,300	40	30,300
2025	Below Normal	-5,800	-30	-5,800
Cumulative Change in Groundwater in Storage ¹		13,200	-1,700	11,500

— = not calculated

AF = acre-feet

3.1.3 Degraded Water Quality

This section summarizes groundwater quality conditions and trends in the Basin in the context of the Degraded Water Quality sustainability indicator and the potential effects of groundwater quality on beneficial uses and users. The GSP does not establish the SABGSA as the primary regulatory agency responsible for addressing groundwater contamination. Rather, the GSP recognizes that existing regulatory programs administered by other agencies provide the primary framework for monitoring and addressing groundwater quality. The GSP evaluates groundwater quality in accordance with the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) standards for municipal drinking water supply wells and Irrigated Lands Regulatory Program (ILRP) requirements for agricultural and domestic wells. The GSP identifies total dissolved solids (TDS), iron, manganese, sodium, chloride, sulfate, arsenic, nitrate, boron, and di(2-ethylhexyl)phthalate (DEHP) as constituents of concern (COCs) with the potential to effect beneficial users. Identified COCs are based on state and federal regulatory standards (maximum contaminant levels [MCLs] and secondary MCLs [SMCLs]) for drinking water established by the SWRCB DDW and the U.S. Environmental Protection Agency (EPA),⁴ respectively. For agricultural uses, COCs are based on Basin water quality objectives (WQOs) presented in the Basin Plan (RWQCB, 2019).

Potential point sources causing groundwater quality degradation were identified in the GSP. Following adoption of the GSP, an additional point source in the Basin was identified via SWRCB's GeoTracker Groundwater Ambient Monitoring and Assessment (GAMA) program. The point source was identified as a Cleanup Program Site and is in the northern portion of the Basin, west of HWY 101. The COCs identified at the Cleanup Program Site include polynuclear aromatic hydrocarbons and total petroleum hydrocarbons. Soil and soil vapor have been identified as the potential media of concern. The current status of the Cleanup

⁴ The list of MCLs and SMCLs is available at https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Chemicalcontaminants.html. (Accessed September 1, 2026.)

Program Site is “Open – Site Assessment” as of January 8, 2025. Based on available information, there are no known impacts to principal aquifers associated with the identified cases.

The evaluation presented below focuses on groundwater quality conditions and trends during this evaluation period. Current conditions are evaluated relative to the SMCs established in the GSP. Where applicable, changes in constituent concentrations are considered in the context of beneficial uses, existing regulatory standards, and the potential relationship between observed groundwater quality conditions and groundwater pumping or GSP implementation.

3.1.3.1 Baseline Conditions

The Basin’s groundwater quality monitoring network relies on existing monitoring programs administered by SWRCB and ILRP. The network established in the GSP includes eight municipal drinking water supply wells identified through the SWRCB DDW database and 81 wells monitored through the ILRP, including 21 wells identified as domestic supply wells and 60 wells identified as agricultural supply wells. All wells included in the GSP groundwater quality monitoring network are designated as RMS wells and are shown in Figure 3-2.

The principal aquifer of completion is not known for 81 of the 89 wells in the groundwater quality monitoring network. At the time of GSP development, well construction information was available for 12 wells, and depth of well completion was known for 8 wells. Of the 8 wells with known depth of completion, four wells are completed in the Paso Robles Formation and 4 are completed in the Careaga Sand. The wells completed in the Paso Robles Formation are owned and operated by the Los Alamos Community Services District (LACSD) and located near Los Alamos. The wells completed in the Careaga Sand are owned and operated by Vandenberg Space Force Base (VSFB) and located on the north side of the Slough. Construction information regarding the representative monitoring network for water quality has not been improved during this evaluation cycle. Therefore, all water quality presented in this evaluation, including baseline and current conditions, is treated as representative of both the Careaga and Paso Robles aquifers.

3.1.3.2 Current Conditions

Current conditions are defined by January 1, 2019 through December 31, 2025 for the representative network and focuses on groundwater quality conditions within the Basin during this GSP evaluation period, including groundwater quality trends, comparison to applicable standards and the SMC established in the GSP, and recent progress toward sustainability. Current conditions during WY 2025 are also evaluated to assess the adequacy of the groundwater quality monitoring network and progress toward addressing DWR RCAs #2 and #4. A summary of the average water quality for each of the six constituents during the pre-SGMA baseline period (January 2015) and the current period (WYs 2019 through 2025) is presented in Table 3-5.

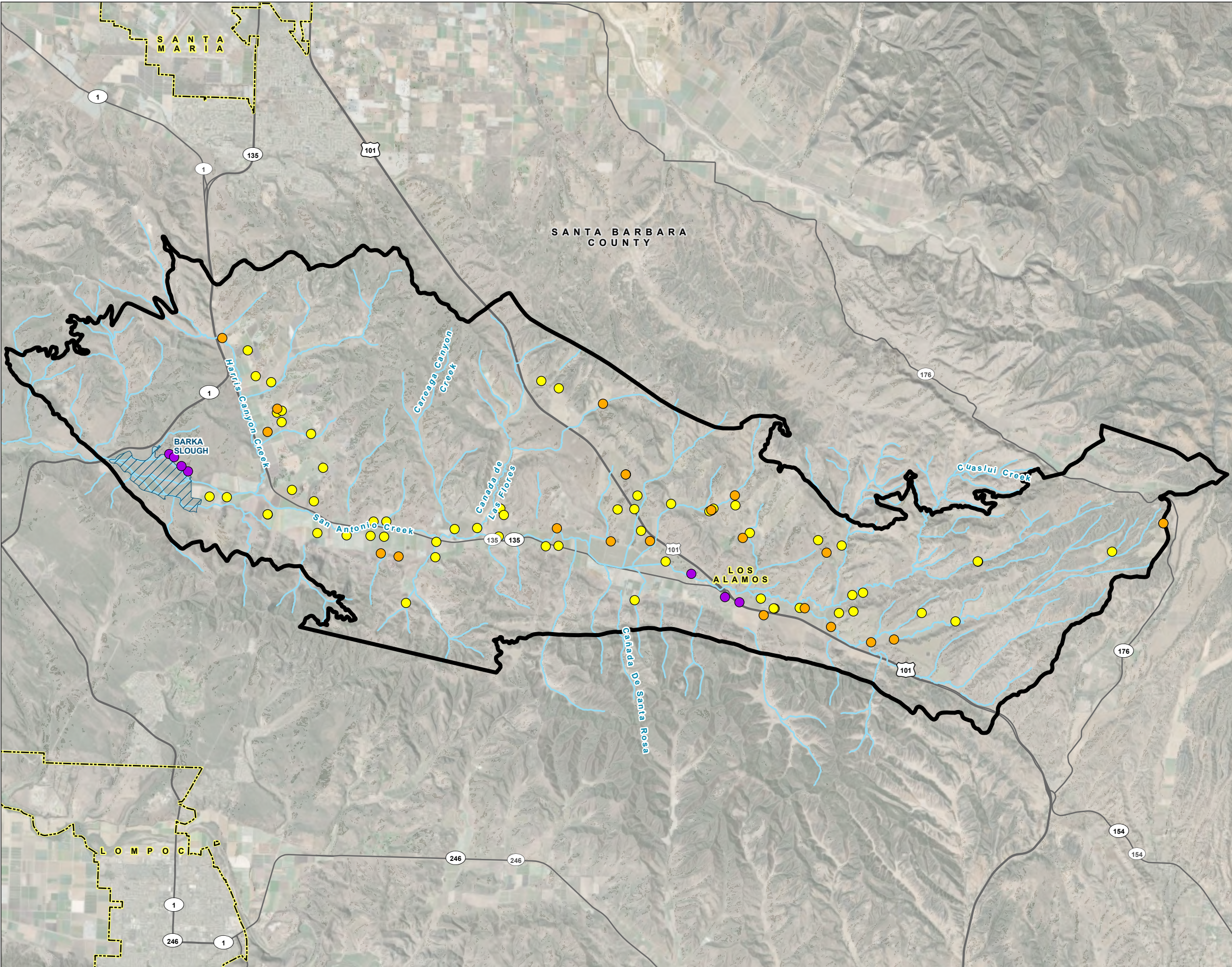


FIGURE 3-2

**Groundwater Quality
Monitoring Network**

Groundwater Sustainability Plan
5-Year Periodic Evaluation
San Antonio Creek Valley
Groundwater Basin

LEGEND

Well Type

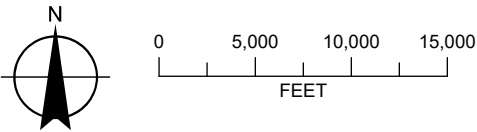
- Agricultural
- Domestic
- Municipal

All Other Features

- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary
- Major Road
- ~ San Antonio Creek or Tributary

NOTE

San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.



Date: August 24, 2026
Data Sources: USGS, ESRI, DWR,
Maxar Imagery (4/10/2024)



Table 3-5. Summary of Water Quality in RMS Wells for Current Conditions (2019–2025)

Constituent	Minimum Threshold (mg/L)	Baseline Conditions (Pre-SGMA ¹)		Current Conditions (2019–2025)		
		No. Of Wells	Average (mg/L)	No. Of Wells	Average (mg/L)	Undesirable Results ²
Total Dissolved Solids	600	60	581	61	580	No
Chloride	150	60	98	39	79	No
Sulfate	150	60	126	39	127	No
Boron	0.2	7	0.09	8	0.12	No
Sodium	100	60	93	39	64	No
Nitrate (as N)	5	55	3	63	1.9	No

Notes

¹ Pre-SGMA refers to ambient groundwater quality data prior to the implementation of SGMA (January 2015).

² The definition of undesirable results for the Degradation of Water Quality sustainability indicator as defined in the GSP is presented in Section 3.1.3.3 below.

mg/L = milligram per liter

No. = number

RMS = Representative Monitoring Site

SGMA = Sustainable Groundwater Management Act

In comparison to reported pre-SGMA conditions, the number of wells with average concentrations of COCs exceeding their respective WQO increased during the post-SGMA period for chloride, sodium, sulfate, and TDS. Specifically, exceedances increased by 4 wells for chloride, 2 wells for sodium, 5 wells for sulfate, and 9 wells for TDS.

For ILRP wells, average concentrations generally remained similar between the pre- and post-SGMA periods. Sodium and sulfate concentrations increased slightly, while chloride, nitrate, and TDS concentrations decreased slightly.

- **TDS.** The number of wells with average concentrations of TDS exceeding the WQO increased by 9 wells during the post-SGMA period. Among ILRP wells, the average TDS concentration increased slightly from 594.35 to 596.80 mg/L. TDS exceeded the SMCL in 4 wells during the pre-SGMA period and 5 wells during the post-SGMA period.
- **Chloride.** The number of wells with average concentrations exceeding the WQO increased by 4 wells during the post-SGMA period. Among ILRP wells, the average chloride concentration decreased slightly from 98.97 to 98.56 mg/L. Chloride exceeded the SMCL in 1 well during both the pre- and post-SGMA periods
- **Boron.** No increase in wells exceeding the WQO was reported during the post-SGMA period.
- **Nitrate.** Nitrate was the only COC with reported concentrations exceeding the primary MCL of 10 mg/L. The number of wells exceeding the MCL increased from 1 well during the pre-SGMA period to 3 wells during the post-SGMA period. However, among ILRP wells, the average nitrate concentration decreased from 2.68 to 2.24 mg/L.

- **Sulfate.** The number of wells with average concentrations exceeding the WQO increased by 5 wells during the post-SGMA period. Among ILRP wells, the average sulfate concentration increased slightly from 129.66 to 132.45 mg/L.
- **Sodium.** The number of wells with average concentrations exceeding the WQO increased by 2 wells during the post-SGMA period. Among ILRP wells, the average sodium concentration increased slightly from 68.13 to 70.93 mg/L.

While the post-SGMA data indicate an increase in the number of wells exceeding the applicable WQOs for several COCs, these exceedances do not constitute undesirable results under the GSP's SMC.

3.1.3.3 Sustainable Management Criteria

The SMCs established in the GSP provide the benchmarks against which groundwater conditions and progress toward the Basin's sustainability goal are evaluated. This section evaluates groundwater conditions in the context of the degradation of groundwater quality observed during the 2019–2025 evaluation period relative to the MOs, MTs, and interim milestones established for the Basin's RMS wells and assesses whether conditions indicate the occurrence of Undesirable Results.

Measurable Objectives

Measurable objectives for groundwater quality degradation include categories relating to both non-point source contaminants (relevant to potable water wells) and salts and nutrients (relevant to agricultural and domestic [private] wells) within the groundwater quality monitoring network.

With regard to the COCs (TDS, iron, manganese, sodium, chloride, sulfate, arsenic, nitrate, boron, and DEHP) established by the GSP, the measurable objective is to protect water quality from any further degradation due to groundwater production or GSA activity, and to maintain groundwater quality equal to or below regulatory standards or, equal to or below concentrations present in groundwater when SGMA was enacted. Improving water quality is not a requirement under SGMA; however, protecting it from degradation is vital to the beneficial users and uses of the resource in the Basin so that pumping can be maintained at desired levels.

With regard to salts and nutrients (i.e., TDS, chloride, sulfate, boron, sodium, and nitrate) the measurable objective is to maintain groundwater quality equal to or below water quality objectives (WQOs) presented in the Basin Plan, or equal to or below concentrations present in groundwater when SGMA was enacted in 2015.

As discussed for the individual components, no significant or unreasonable results have been observed in the Basin in association with degraded groundwater quality.

Minimum Thresholds

Table 3-6 presents the minimum thresholds for (*revised*) degraded groundwater quality in the Basin pertaining to salts and nutrients described in the GSP. The Basin GSP establishes the WQOs identified in Table 4-3 of the GSP as the minimum thresholds for TDS, chloride, sulfate, boron, sodium, and nitrate (see response to DWR RCA 2 in Section 3.1.3.4). These minimum thresholds are evaluated using groundwater quality data collected through the SWRCB ILRP and DDW monitoring programs.

The GSP also accounts for groundwater quality that was already degraded prior to implementation of SGMA. Where ambient groundwater quality prior to January 2015 exceeds the applicable WQO, the (*revised*) minimum threshold is established at 110 percent of the ambient concentration (see response to DWR RCA 2 in Section 3.1.3.4). The intent of this approach is to avoid increased degradation of groundwater quality from baseline conditions measured since enactment of SGMA in January 2015.

Table 3-6. Minimum Thresholds for Selected Constituents of Concern

Constituent	MCL (mg/L)	SMCL ² (mg/L)	WQO (mg/L)
Nitrate ¹	10	--	5
Boron	--	--	0.2
Chloride	--	500	150
Sodium	--	--	100
Sulfate	--	500	150
Total Dissolved Solids	--	1,000	600

Notes

¹ Nitrate concentrations measured as nitrogen (U.S. Environmental Protection Agency MCL).

² Upper consumer acceptance level.

³ State of California DDW MCL.

-- = no value

mg/L = milligram per liter

MCL = maximum contaminant level (drinking water)

SMCL = secondary maximum contaminant level (drinking water)

WQO = water quality objective (median groundwater objective)

Sources: SWRCB, 2019 and RWQCB, 2019.

Interim Milestones

No significant and unreasonable results that significantly impact beneficial uses have been observed in the Basin in association with degraded groundwater quality. Therefore, no interim milestones were proposed in the GSP.

Undesirable Results

The undesirable result for degraded groundwater quality as a significant and unreasonable increase in COCs that results in exceedances of applicable water quality standards or objectives and adversely affects beneficial uses of groundwater. For salts and nutrients, the (revised) undesirable result is groundwater pumping or GSA activities cause concentrations of TDS, chloride, sulfate, boron, sodium, and nitrate to increase and exceed minimum thresholds in 20 percent of the well monitored (see response to DWR RCA 2 in Section 3.1.3.4).

3.1.3.4 DWR Recommended Corrective Actions 2 and 4

With regard to the Degraded Water Quality sustainability indicator, DWR provided two recommendations to be addressed as part of this Periodic Evaluation.

Recommended Corrective Action 2

The GSP should reevaluate the quantitative definition of undesirable results related to degradation of water quality. The quantitative definition of an undesirable result should incorporate a combination of minimum threshold exceedances and clearly explain how that quantitative criteria represent significant and unreasonable conditions occurring throughout the Basin.

Recommended Corrective Action 4

Define the data collection frequency in tabular format for the degraded water quality monitoring network in the GSP.

RCA 2 Discussion. Specific to salts and nutrients, as written, the minimum threshold and the undesirable result were conflated in the GSP. The minimum threshold currently reads, “The WQOs presented in Table 4-3

(of the GSP) are the minimum thresholds for TDS, chloride, sulfate, boron, sodium, and nitrate as measured by SWRCB ILRP and DDW programs in 20 percent of wells monitored. In cases where the ambient (prior to January 2015) water quality exceeds the WQO, the minimum threshold concentration is 110 percent of the ambient water quality in 20 percent of the wells.” While the undesirable result is stated as, “Groundwater pumping or SABGSA activities cause concentrations of TDS, chloride, sulfate, boron, sodium, and nitrate to increase and exceed WQOs since SGMA was enacted in January 2015.”

The 20 percent qualifier should be included as part of the undesirable result, not the minimum threshold. The revised minimum threshold and undesirable results are:

- **Minimum Threshold.** The WQOs presented in Table 4-3 (of the GSP) are the minimum thresholds for TDS, chloride, sulfate, boron, sodium, and nitrate as measured by SWRCB ILRP and DDW programs. In cases where the ambient (prior to January 2015) water quality exceeds the WQO, the minimum threshold concentration is 110 percent of the ambient water quality.
- **Undesirable Results.** Groundwater pumping or GSA activities cause concentrations of TDS, chloride, sulfate, boron, sodium, and nitrate to increase and exceed minimum thresholds in 20 percent of the wells monitored.

Regarding contaminants, as stated in the GSP, “No minimum thresholds have been established for 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.” Likewise, undesirable results for contaminants are also determined and regulated by regulatory agencies. Therefore, no revisions to the Degraded Water Quality SMC with respect to contaminants is proposed.

The SABGSA will incorporate these revisions into the SMC definitions for the Degraded Water Quality sustainability indicator. However, because these revisions are consistent with how the SABGSA is currently evaluating undesirable results, and no undesirable results have occurred, this RCA does not warrant immediate action and will be completed during a GSP amendment prior to the 10-year periodic evaluation.

RCA 4 Discussion. Table 3-7 summarizes the data collection frequency for each well in the degraded groundwater quality monitoring network. 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. Beginning in 2022, ILRP data began to be collected under Central Coast Regional Water Quality Control Board (RWQCB) Ag Order 4.0. The frequencies presented in Table 3-7 represent the governing program frequency and should not be interpreted to mean that every constituent is analyzed at every monitoring event, as constituent-specific analytical requirements may vary among monitoring programs and sites.

Table 3-7. Data Collection Frequency for Monitoring Network RMS Wells

Well ID	Well Type	Monitoring Program	Data Collection Frequency
4210002-004	Municipal	DDW	Constituent/site-specific per DDW
4210002-007	Municipal	DDW	Constituent/site-specific per DDW
4210002-009	Municipal	DDW	Constituent/site-specific per DDW

Well ID	Well Type	Monitoring Program	Data Collection Frequency
4210002-012	Municipal	DDW	Constituent/site-specific per DDW
4210700-001	Municipal	DDW	Constituent/site-specific per DDW
4210700-002	Municipal	DDW	Constituent/site-specific per DDW
4210700-003	Municipal	DDW	Constituent/site-specific per DDW
4210700-016	Municipal	DDW	Constituent/site-specific per DDW
AGC100000001-CCGC_0581	Agricultural	ILRP	Annual
AGL020000787-OFFICE_D	Domestic	ILRP	Annual
AGL020000787-WELL2_WH	Agricultural	ILRP	Annual
AGL020000788-#1 OLD	Agricultural	ILRP	Annual
AGL020000788-#2 NEW	Agricultural	ILRP	Annual
AGL020000976-DW1	Domestic	ILRP	Annual
AGL020000976-IW3	Agricultural	ILRP	Annual
AGL020000990-AG WELL	Agricultural	ILRP	Annual
AGL020000990-DOMESTIC WELL	Domestic	ILRP	Annual
AGL020001186-CARRARI	Agricultural	ILRP	Annual
AGL020001186-DANS HOUSE	Domestic	ILRP	Annual
AGL020001194-LOS ALAMOS	Agricultural	ILRP	Annual
AGL020001197-DON MIGUEL	Agricultural	ILRP	Annual
AGL020001199-RONS HOUSE	Domestic	ILRP	Annual
AGL020001230-DOMESTIC WELL	Domestic	ILRP	Annual
AGL020001230-WELL #6	Agricultural	ILRP	Annual
AGL020003431-DOM/IRR	Domestic	ILRP	Annual

Well ID	Well Type	Monitoring Program	Data Collection Frequency
AGL020003506-RANCH11_IR	Agricultural	ILRP	Annual
AGL020003593-WELL 1	Agricultural	ILRP	Annual
AGL020003826-BEVENS WELL	Agricultural	ILRP	Annual
AGL020003826-BEVENS WELL 2	Agricultural	ILRP	Annual
AGL020003826-MONIGHETTI	Agricultural	ILRP	Annual
AGL020004324-GEOFFREY_D	Domestic	ILRP	Annual
AGL020004324-GEOFFREY_I	Agricultural	ILRP	Annual
AGL020004328-MISSIONP_I	Agricultural	ILRP	Annual
AGL020004330-MISSIONT_D	Domestic	ILRP	Annual
AGL020004330-MISSIONT_I	Agricultural	ILRP	Annual
AGL020004333-JFWNEELY_I	Agricultural	ILRP	Annual
AGL020004334-SAINZ_DOM	Domestic	ILRP	Annual
AGL020004336-BARHAMV_D	Domestic	ILRP	Annual
AGL020004336-BARHAMV_I	Agricultural	ILRP	Annual
AGL020004336-BARHAMV2_D	Domestic	ILRP	Annual
AGL020004388-DW	Domestic	ILRP	Annual
AGL020004388-WELL 1	Agricultural	ILRP	Annual
AGL020004388-WELL 3	Agricultural	ILRP	Annual
AGL020004388-WELL 4	Agricultural	ILRP	Annual
AGL020004396-DW	Domestic	ILRP	Annual
AGL020004507-3207_I	Agricultural	ILRP	Annual
AGL020004507-3507_I	Agricultural	ILRP	Annual
AGL020004512-LOS ALAMOS #1	Agricultural	ILRP	Annual
AGL020004512-LOS ALAMOS #5	Agricultural	ILRP	Annual

Well ID	Well Type	Monitoring Program	Data Collection Frequency
AGL020004520-LOMA VERDE #1	Agricultural	ILRP	Annual
AGL020004541-EL CAMINO #1	Agricultural	ILRP	Annual
AGL020004541-EL CAMINO DW #1	Domestic	ILRP	Annual
AGL020004845-RANCH1_IRR	Agricultural	ILRP	Annual
AGL020004945-WELL 1	Agricultural	ILRP	Annual
AGL020004945-WELL 2	Agricultural	ILRP	Annual
AGL020004975-RANCH7_IRR	Agricultural	ILRP	Annual
AGL020007205-DOMESTIC	Domestic	ILRP	Annual
AGL020007472-MAIN WELL	Agricultural	ILRP	Annual
AGL020007578-DOMESTIC	Domestic	ILRP	Annual
AGL020007578-PRIMARY AG	Agricultural	ILRP	Annual
AGL020008902-DOMESTIC	Domestic	ILRP	Annual
AGL020008902-WELL 4	Agricultural	ILRP	Annual
AGL020008902-WELL 5	Agricultural	ILRP	Annual
AGL020010504-WELL 1	Agricultural	ILRP	Annual
AGL020010504-WELL 2	Agricultural	ILRP	Annual
AGL020011702-DOMESTIC	Domestic	ILRP	Annual
AGL020012002-WELL 13	Agricultural	ILRP	Annual
AGL020014928-IRRIGATION	Agricultural	ILRP	Annual
AGL020020322-ALISOS_IRR	Agricultural	ILRP	Annual
AGL020022802-RANCH9_IRR	Agricultural	ILRP	Annual
AGL020026466-WELL6_IRR	Agricultural	ILRP	Annual
AGL020026804-R4-W-1	Agricultural	ILRP	Annual
AGL020027576-AW GLAD	Agricultural	ILRP	Annual

Well ID	Well Type	Monitoring Program	Data Collection Frequency
AGL020027596-PH #1	Agricultural	ILRP	Annual
AGL020027597-WELL 1	Agricultural	ILRP	Annual
AGL020027908-R2 W1 MONIG	Agricultural	ILRP	Annual
AGL020027908-R2 W2 MONIG	Agricultural	ILRP	Annual
AGL020027910-GLAD_WELL_3	Agricultural	ILRP	Annual
AGL020027955-RANCH36_D	Domestic	ILRP	Annual
AGL020028062-3RAN2701_I	Agricultural	ILRP	Annual
AGL020028148-WHITE48	Agricultural	ILRP	Annual
AGL020028151-HARRIS51	Agricultural	ILRP	Annual
AGL020028275-SHOKV DOM	Domestic	ILRP	Annual
AGL020028275-SHOKV IRR	Agricultural	ILRP	Annual
AGL020028322-GLAD_WELL_11	Agricultural	ILRP	Annual
AGL020029934-WELL 1 IRR	Agricultural	ILRP	Annual
AGL020033821-NOLANAG#1_IRR	Agricultural	ILRP	Annual
AGL020033821-NOLANAG#5_IRR	Agricultural	ILRP	Annual
AGL020033821-NOLANAG#6_IRR	Agricultural	ILRP	Annual

Notes

DDW = Division of Drinking Water
 ILRP = Irrigated Lands Regulatory Program
 RMS = Representative Monitoring Site

The SABGSA will incorporate the data collection frequency for each well in the degraded groundwater quality monitoring network during a GSP amendment prior to the 10-year periodic evaluation. However, because this additional data does not impact current monitoring or evaluation of undesirable results, this RCA does not warrant immediate action

Changes to the Sustainability Criteria

Changes to the sustainability criteria for degraded groundwater quality are recommended to address DWR's corrective actions and clarify how groundwater quality conditions are being evaluated.

Progress Toward Achieving Sustainability

No potential degradation of water quality caused by groundwater pumping or implementation of projects and management actions has occurred in the Basin. These activities are detailed in Sections 4 and 6

3.1.4 Land Subsidence Sustainability Indicator

The land subsidence sustainability indicator will be addressed in this section, with emphasis on the sustainability goal established in the GSP to maintain groundwater conditions such that land subsidence does not cause significant and unreasonable effects to groundwater supply, land uses (including agricultural, residential, rural residential, and town buildings), infrastructure (including LACSD wells, wastewater treatment plant, and associated infrastructure), and property interests.

3.1.4.1 Current Conditions

Land subsidence in the Basin is monitored at the University NAVSTAR Consortium (UNAVCO) Continuous Global Positioning System (CGPS) Station ORES in the town of Los Alamos, near Los Alamos Park. Land subsidence in the Basin is also measured using interferometric synthetic-aperture radar (InSAR) data collected using microwave satellite imagery provided by DWR (Figure 3-3).

Annual assessments conducted during the 2019–2025 evaluation period indicate (1) land subsidence rates have not exceeded rates observed from 2000 through 2020 at the UNAVCO CGPS ORES (average of 0.04 feet per year);⁵ and (2) land subsidence has not occurred that causes significant and unreasonable damage to groundwater supply, land uses, infrastructure, and property interests. InSAR and UNAVCO CGPS Station ORES measured land subsidence data for June 2016 to October 2025 is presented as Figure 9 in the Basin GSP WY 2025 Annual Report (GSI, 2026).

InSAR raster data from October 2024 to October 2025 indicate a vertical displacement of land surface elevation of plus or minus 0.0591 feet.⁶ Although less than the Basin's minimum threshold for the land subsidence sustainability indicator, InSAR data for June 2016 to October 2025 indicates areas of greater negative vertical displacement primarily within a few mile radius of Los Alamos. There are also areas of greater negative vertical displacement west of Los Alamos along California State HWY 135 and in the central uplands between Harris Canyon and U.S. HWY 101. The maximum negative vertical displacement in the Basin is up to approximately 0.319 feet (over the available InSAR period of record).

⁵ DWR provided InSAR and UNAVCO CGPS subsidence data is available at <https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#landsub>. (Accessed September 1, 2026.)

⁶ InSAR data accurately models vertical displacement in ground surface elevation to an accuracy tested to be 18 millimeters (0.7086 inches or 0.0591 feet) at 95 percent confidence (Towill, 2023).

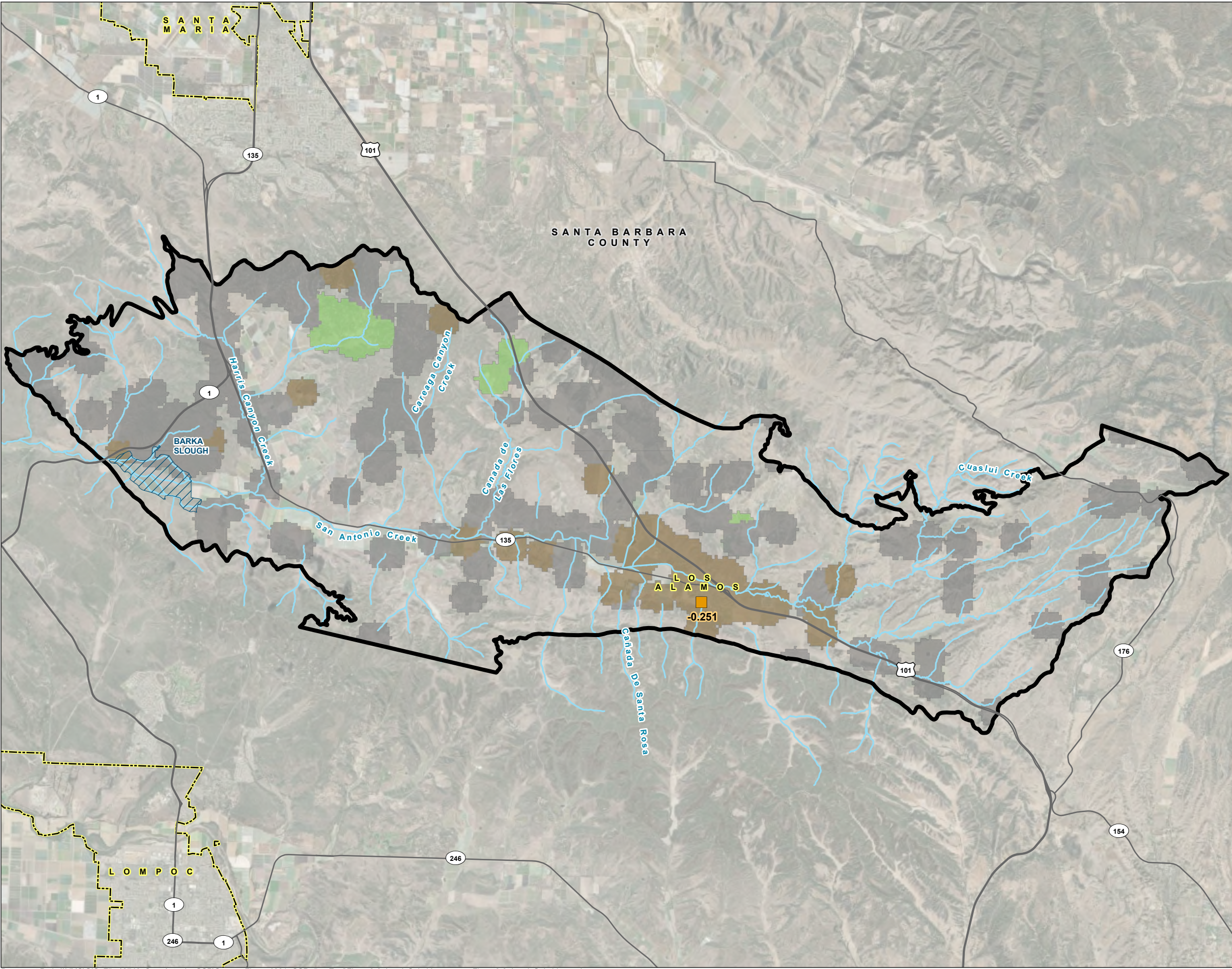


FIGURE 3-3
InSAR Measured Land Subsidence
June 2016 to October 2025
Groundwater Sustainability Plan
5-Year Periodic Evaluation
San Antonio Creek Valley
Groundwater Basin

LEGEND

UNAVCO CGPS Station ORES
Vertical Displacement in Feet

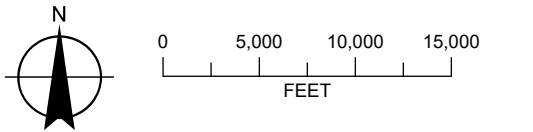
Land Subsidence
Vertical Displacement (InSAR)

0.0591 to 0.2109
-0.0591 - 0.0591
-0.319 to -0.0591

All Other Features

San Antonio Creek Valley Groundwater Basin
Barka Slough
City Boundary
Major Road
San Antonio Creek or Tributary

NOTE
InSAR data accurately models vertical displacement in ground surface elevation to an accuracy tested to be 18 mm (0.7086 inches or 0.0591 feet) at 95% confidence (Towill, 2023).



3.1.4.2 Sustainable Management Criteria

Land subsidence that does not exceed the minimum threshold value established in the GSP and does not cause significant and unreasonable effects to groundwater supply, land uses, water supply infrastructure, or property interests is not considered a significant and unreasonable condition in the Basin. The SABGSA will continue to monitor and report annually on any subsidence.

Undesirable results for the land subsidence sustainability indicator (disjunctively) include the following:⁷

1. Groundwater extraction results in subsidence that substantially interferes with surface land uses (including agricultural, residential, rural residential, and town buildings) and property interests.
2. Groundwater extraction results in subsidence that causes land surface deformation that impacts the use of critical infrastructure (including LACSD wells, wastewater treatment plant, and associated infrastructure) and roads.
3. Groundwater extraction results in land subsidence greater than minimum thresholds at the UNAVCO CGPS Station ORES.

Total measured negative change in land surface elevation at the UNAVCO CGPS Station ORES has remained below the minimum threshold. The minimum threshold for subsidence, as measured at the UNAVCO CGPS Station ORES, is a rate of subsidence that does not exceed 0.05 feet (0.6 inches) per year for three consecutive years. This threshold represents an increased rate of subsidence relative to the average rate of 0.04 feet (0.5 inches) per year measured at the station from 2000 through 2020.

3.1.4.3 DWR Recommended Corrective Actions

With regard to the land subsidence sustainability indicator, DWR provided a single recommendation to be addressed as part of this Periodic Evaluation.

Recommended Corrective Action 5

Expand the land subsidence monitoring network to provide sufficient coverage of the Basin. The GSA may consider the use of additional GPS stations, extensometers, or publicly available remote sensing data (e.g., InSAR) to expand the land subsidence monitoring network in the Basin.

RCA 5 Discussion. InSAR data is already reported on annually, however is not included in the defined SMC. The SABGSA will revise the SMC to include InSAR data.

DWR also states GSP does not include a quantitative definition of minimum thresholds that would constitute an undesirable result. The minimum threshold and the undesirable results were conflated in the GSP. The minimum threshold and undesirable results, as they currently read, are included above (Section 3.1.4.2). The qualifier of three consecutive years should be included as part of the undesirable result, not the minimum threshold. The revised minimum threshold and undesirable results are:

- **Minimum Threshold.** The rate of subsidence does not exceed 0.05 feet (0.6 inches) per year measured at the UNAVCO CGPS Station ORES.
- **Undesirable Results.** 1) Groundwater extraction results in subsidence that substantially interferes with surface land uses (including agricultural, residential, rural residential, and town buildings) and property interests. 2) Groundwater extraction results in subsidence that causes land surface deformation that impacts the use of critical infrastructure (including LACSD wells, wastewater treatment plant, and

⁷ The listed criteria for ground surface subsidence undesirable results only apply if groundwater levels are below historical low groundwater levels during the period of ground surface subsidence in question.

associated infrastructure) and roads. **3)** Groundwater extraction results in land subsidence greater than minimum thresholds for three consecutive years.

Changes to the Sustainability Criteria

The SABGSA will incorporate these revisions into the SMC definitions for the Land Subsidence sustainability indicator. However, because these revisions are consistent with how the SABGSA is currently evaluating undesirable results, and no undesirable results have occurred, this RCA does not warrant immediate action and will be completed during a GSP amendment prior to the 10-year periodic evaluation.

Progress Toward Maintaining Sustainability

Implementation of the GSP to date has been effective in avoiding significant and unreasonable groundwater elevation declines and, by extension, has prevented groundwater-related land subsidence in the Basin.

No undesirable results caused by groundwater pumping or implementation of projects and management actions have occurred in the Basin.

3.1.5 Depletion of Interconnected Surface Water Sustainability Indicator

The Depletion of Interconnected Surface Water sustainability indicator is discussed in this section with particular emphasis on maintaining groundwater conditions that avoid significant and unreasonable adverse impacts to beneficial uses of interconnected surface water in the Basin. The GSP identifies Barka Slough as an area of interconnected surface water in the Basin, where groundwater discharge from the Paso Robles Formation and Careaga Sand contribute to surface water flow. The GSP also identifies the discharge of groundwater to the Slough as an important component of the Basin's natural discharge and recognizes the importance of the Slough and associated surface water system to beneficial uses, including aquatic and riparian habitat.

The GSP evaluates depletion of interconnected surface water based on streamflow measured at the USGS Casmalia stream gage (Station 11136100). The interim minimum threshold for this sustainability indicator is an average streamflow of 0.15 cubic feet per second (cfs) measured at the Casmalia stream gage over three consecutive months between June and September. The minimum threshold for this sustainability indicator is considered interim until the water budget of the Slough is better understood. The measurable objective is based on maintaining streamflow conditions sufficient to support beneficial uses of interconnected surface water.

In cooperation with the Santa Barbara County Water Authority (SBCWA) and VSFB, the USGS completed a study evaluating the effects of future climate scenarios on the Slough. As part of this effort, a stream gage was installed on San Antonio Creek upstream of the Slough at San Antonio Road and a previously inactive stream gage on Harris Canyon Creek was reactivated. The San Antonio Creek at San Antonio Road and Harris Canyon Creek gages were placed into service in March 2023 and January 2023, respectively. These gages provide information on surface water inflows to the Slough and support the SABGSA's ability to evaluate surface water conditions and potential depletion within the Basin. The SABGSA will continue to coordinate with the USGS and VSFB regarding continued operation of these gages and will evaluate the feasibility of additional stream gages upstream or downstream of the Slough, recognizing that access to private property may limit opportunities for additional installations.

3.1.5.1 Current Conditions

During the 2019–2025 evaluation period, streamflow at the USGS Casmalia stream gage remained above the minimum threshold established for depletion of interconnected surface water.

3.1.5.2 Sustainable Management Criteria

At the time of this evaluation, the interconnected surface water monitoring network has improved through the installation of the San Antonio Creek stream gage at San Antonio Road and reactivation of the Harris Canyon Creek stream gage. These gages, together with the existing Casmalia stream gage, provide additional data to evaluate surface water conditions and potential interactions with the Slough. SABGSA will continue to collect and evaluate data from the monitoring network and will consider the feasibility of additional monitoring, including shallow piezometers within the Slough, to further characterize groundwater and surface water interactions. SABGSA will also consider applicable DWR guidance, once finalized, regarding methods for evaluating the rate, timing, and volume of depletions of interconnected surface water. Based on the available information and continued monitoring, SABGSA does not propose to develop new sustainable management criteria for depletion of interconnected surface water at this time.

3.1.5.3 DWR Recommended Corrective Actions

With regard to the depletion of interconnected surface water sustainability indicator, DWR provided a single, multi-part recommendation for SABGSA to address as part of this Periodic Evaluation.

Recommended Corrective Action 3

For this sustainability indicator, the relevant recommendation includes addressing the following:

- a. *Consider utilizing the interconnected surface water guidance, as appropriate, when issued by the Department to establish quantifiable minimum thresholds, measurable objectives, and management actions.*
- b. *Continue to fill data gaps, collect additional monitoring data, and implement the current strategy to manage depletions of interconnected surface water and define segments of interconnectivity and timing.*
- c. *Prioritize collaborating and coordinating with local, state, and federal regulatory agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion within the GSA's jurisdictional area.*

RCA Discussion 3a. The SABGSA will consider the DWR guidance documents on depletion of interconnected surface, once finalized, when evaluating interconnected surface water and potential depletions associated with groundwater pumping in the Basin, including review of quantifiable minimum thresholds, measurable objectives, and management actions.

RCA Discussion 3b. SABGSA will continue to collect and evaluate data from the monitoring network and will consider the feasibility of additional monitoring, including shallow piezometers within the Slough, to further characterize groundwater and surface water interactions. The SABGSA will also consider use of the SACIM and review of Airborne Electromagnetic (AEM) data to define segments of interconnectivity and timing.

RCA Discussion 3c. The SABGSA will continue to collaborate with local, state, and federal regulatory agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping-induced surface water depletion within the Basin. Existing partnerships have included the LACSD, SBCWA, VSFB, and the USGS.

Changes to the Sustainability Criteria

The SABGSA will incorporate these recommendations when evaluating the existing SMC for the Depletion of Interconnected Surface Water sustainability indicator. However, because these recommendations include guidance that has not yet been finalized or directive to continue the current strategy, and no undesirable

results have occurred, this RCA does not warrant immediate action and will be completed during a GSP amendment prior to the 10-year periodic evaluation.

Progress Toward Maintaining Sustainability

Implementation of the GSP to date has been effective in avoiding significant and unreasonable depletion of interconnected surface water in the Basin.

No undesirable results caused by groundwater pumping or implementation of projects and management actions have occurred in the Basin.

4 Status of Projects and Management Actions

The SABGSA developed a portfolio of project and management actions (PMAs) to implement to help the SABGSA progress toward the Basin's sustainability goal. These PMAs can be implemented in a phased manner as the conditions in the Basin dictate and in accordance with the SGMA regulations (§354.42 and §354.44). In this section, groundwater management actions generally refer to activities that support groundwater sustainability through policy and regulations without infrastructure; projects are defined as activities supporting groundwater sustainability that require infrastructure.

The SABGSA developed a tiered system of PMAs to be implemented in a phased manner as the conditions in the Basin dictate:

- **Tier 1 PMAs** were to be initiated within 1 year of GSP adoption. These management actions are focused primarily on filling identified data gaps, developing funding for SABGSA operations and future basin monitoring, registering and metering wells, and developing new and expanding existing water use efficiency programs for implementation within the Basin.
- **Tier 2 PMAs** were to be initiated within 3 years of GSP adoption but promptly became available for implementation to allow time for funding to be secured and for implementation of Tier 1 management actions that are necessary to effectively implement Tier 2 actions (e.g., metering program).
- **Tier 3 PMAs** include priority projects that the SABGSA member agencies may initiate within 5 years of GSP adoption and will be available for implementation if the management actions implemented previously either fail to be implemented or do not avoid undesirable results.
- **Tier 4 PMAs** were identified as non-priority projects. The SABGSA does not plan to initiate the construction of any Tier 4 project infrastructure, for the specific goal of achieving basin sustainability, until such time that evidence exists that the effects of the implemented management actions are proving insufficient.

Table 4-1 presents the PMAs established in the GSP and updated implementation information and status for each one.

Table 4-1. Projects, Management Actions, and Governance Summary

Project or Management Action Name	Description	Target Sustainability Indicator(s)	Implementation Tier Level	Status	Implementation Date	Benefits Observed to Date or Anticipated Benefits	Estimated Accrued Benefits at Completion
Management Actions							
Address Data Gaps - Expand Monitoring Well Network in the Basin	Expand the monitoring network to improve spatial coverage and well density, particularly in areas with identified data gaps.	Groundwater Levels, Reduction in Storage	1	Ongoing	September 25, 2025	Augment groundwater monitoring	Improved spatial monitoring coverage
Address Data Gaps - Perform Reference Point Elevation and Video Surveys in Representative Wells That Currently Do Not Have Adequate Construction Records to Confirm Well Construction	Survey reference point elevations and well construction information at representative wells lacking adequate records.	Groundwater Levels, Reduction in Storage	1	Planning	May 13, 2022	Improve understanding and accuracy of groundwater level monitoring network	Improved groundwater level data quality
Address Data Gaps - Install Stream Gages and Shallow Piezometers at Barka Slough	Install and maintain stream gages to characterize surface water inflows and conditions at Barka Slough.	Interconnected Surface Water	1	Planning	April 1, 2025	Improve surface water monitoring	Improved understanding of Barka Slough hydrology
Address Data Gaps - LACSD Wellfield Pumping Coordination/Offsite Well Impact Mitigation	Coordinate LACSD wellfield pumping and evaluate potential impacts to nearby wells.	Groundwater Levels, Reduction in Storage	1	No Update	NA	Support coordinated pumping management	Reduced pumping depression and improved static water levels
Address Data Gaps - Review/Update Water Usage Factors, Crop Acreages, and Water Budget	Update agricultural water-use estimates and Basin water budget inputs using current land-use and water-use information.	Reduction in Storage	1	Completed	April 1, 2022	Continued increase in accuracy of agricultural water use estimates and Basin water budget	Continued increase in accuracy of agricultural water use estimates and Basin water budget
Address Data Gaps - Survey and Investigate Potential GDEs in the Basin and further characterize Barka Slough	Investigate GDEs and improve understanding of hydrologic conditions affecting Barka Slough.	Interconnected Surface Water	1	Ongoing	April 1, 2025	Improved Barka Slough management and included update of the SACIM and Barka Slough Zone Water Budget	Improved understanding of GDE conditions
Address Data Gaps - Review USGS Groundwater Model/Update Hydrologic Conceptual Model, Develop Water Budget for Barka Slough	Update the groundwater model/HCM and develop a Barka Slough water budget to support Basin management.	All	1	Ongoing	April 1, 2025	Improved groundwater and surface water management and included update of the SACIM and Barka Slough Zone Water Budget	Improved Basin modeling

Project or Management Action Name	Description	Target Sustainability Indicator(s)	Implementation Tier Level	Status	Implementation Date	Benefits Observed to Date or Anticipated Benefits	Estimated Accrued Benefits at Completion
Well Registration and Well Meter Installation Programs	Register wells and require measurement/reporting of groundwater extraction from applicable wells.	All	1	Ongoing	February 18, 2025	The Program aided the SABGSA's efforts to identify wells and landowners that could be included in the Basin's groundwater level monitoring network.	Improved Basin-wide pumping management
Groundwater Pumping Fee Program	Establish a pumping fee to fund GSA implementation and encourage reductions in groundwater extraction.	All	1	No Update	NA	Support GSA funding and management	Reduced groundwater demand
Water Use Efficiency Programs	Promote urban and agricultural conservation, irrigation efficiency, best practices, incentives, education, and technical assistance.	All	1	Ongoing	April 1, 2026	No significant increase in water use because of a change in urban water use or irrigation practices.	Promote efficient water use and reduce groundwater demand
Groundwater Base Pumping Allocation Program	Develop an allocation system that establishes annual groundwater pumping volumes and ramps pumping toward the Basin's sustainable yield.	All	2	No Update	NA	Controlled groundwater extraction and sustainable Basin management.	Controlled groundwater extraction
Groundwater Extraction Credit Marketing and Trading Program	Establish a mechanism for transferring groundwater extraction credits among Basin users to provide flexibility while reducing overall extraction.	All	2	No Update	NA	Flexible Basin-wide groundwater extraction management.	Flexible Basin-wide pumping management
Voluntary Agricultural Crop Fallowing Programs	Provide a voluntary mechanism to reduce groundwater demand by temporarily or permanently fallowing irrigated agricultural acreage.	All	2	No Update	NA	Flexible Basin-wide groundwater extraction management.	Reduced agricultural groundwater demand
Non-Native/Invasive Species Eradication	Remove invasive/non-native vegetation in areas affecting Barka Slough and groundwater/surface water conditions.	Groundwater Levels, Reduction in Storage, Interconnected Surface Water, Subsidence	3	No Update	NA	Reduced groundwater consumption by non-native/invasive species in sensitive areas.	Reduced groundwater consumption in sensitive areas
Barka Slough Augmentation Project with Groundwater Supplies Using Existing Wells	Provide groundwater to augment surface water conditions and support Barka Slough GDEs.	Groundwater Levels, Reduction in Storage, Interconnected Surface Water, Subsidence	3	No Update	NA	Supplemental water for Barka Slough.	Supplemental water for Barka Slough

Project or Management Action Name	Description	Target Sustainability Indicator(s)	Implementation Tier Level	Status	Implementation Date	Benefits Observed to Date or Anticipated Benefits	Estimated Accrued Benefits at Completion
Watershed Management Projects, Including Controlled Burns	Implement watershed management measures, including controlled burns, to influence recharge and watershed conditions.	All	3	No Update	NA	Enhanced groundwater recharge and watershed resilience.	Increased watershed recharge potential
Distributed Stormwater Managed Aquifer Recharge (DSW – MAR) Basins (In-Channel and Off-Stream Basins)	Develop in-channel and off-stream facilities to capture stormwater for groundwater recharge.	All	4	No Update	NA	Increased groundwater recharge and stormwater capture.	Increased groundwater recharge and storage
LACSD WWTF Recycled Water and Reuse in Lieu of Groundwater Pumping or Indirect Potable Reuse	Use recycled water from the LACSD WWTF in lieu of groundwater pumping or for indirect potable reuse.	Groundwater Levels, Reduction in Storage, Interconnected Surface Water, Subsidence	4	No Update	NA	Reduced groundwater pumping and water supply diversification.	Reduced groundwater demand
SABGSA to Become Funding Partner to Santa Barbara County Precipitation Enhancement Program	SABGSA participation in a County precipitation enhancement program intended to increase precipitation/recharge.	All	4	No Update	NA	Increased precipitation and recharge potential.	Increased precipitation and recharge potential
VSFB Groundwater Pumping Reduction Capital Project Participation (Desalination and/or Recharge and Recovery)	Participate in VSFB projects involving desalination and/or recharge and recovery to reduce groundwater pumping.	Groundwater Levels, Reduction in Storage, Interconnected Surface Water, Subsidence	4	No Update	NA	Reduced groundwater pumping and increased water supply reliability.	Increased alternative water supplies
Barka Slough Augmentation Project with SWP or Banked Supplemental Water Supplies	Use SWP or banked supplemental water supplies to augment Barka Slough.	Groundwater Levels, Reduction in Storage, Interconnected Surface Water, Subsidence	4	No Update	NA	Enhanced Barka Slough flows and habitat protection.	Supplemental water for Barka Slough
In Lieu Recharge Projects to Deliver Unused and Surplus Imported Water to Offset Groundwater Extractions from LACSD and Agricultural Pumpers	Deliver unused or surplus imported water to offset groundwater extraction by LACSD and agricultural pumpers.	Groundwater Levels, Reduction in Storage, Interconnected Surface Water, Subsidence	4	No Update	NA	Reduced groundwater pumping and increased water supply reliability.	Reduced groundwater demand and increased recharge
SABGSA to Provide Technical Assistance and Financial Incentives for High Tunnel (“Hoop Houses”) Rainwater Harvesting Projects for Supplemental Irrigation Water Supplies and/or Groundwater Recharge	Provide technical assistance and financial incentives for rainwater harvesting for supplemental irrigation and/or groundwater recharge.	Groundwater Levels, Reduction in Storage, Interconnected Surface Water, Subsidence	4	No Update	NA	Reduced irrigation demand and increased recharge.	Reduced irrigation demand and increased recharge

Project or Management Action Name	Description	Target Sustainability Indicator(s)	Implementation Tier Level	Status	Implementation Date	Benefits Observed to Date or Anticipated Benefits	Estimated Accrued Benefits at Completion
Development of Water Supply Wells in Bedrock Formations	Evaluate/develop bedrock groundwater supplies as an additional water source.	All	4	No Update	NA	Expanded groundwater supply and water supply reliability.	Increased alternative water supplies
Use of Treated Oilfield Produced Water for Irrigation	Evaluate use of treated oilfield-produced water as an alternative irrigation supply.	All	4	No Update	NA	Alternative irrigation supply and reduced groundwater pumping.	Increased alternative irrigation supplies
Water Exchanges to Secure Other Agency SWP Allocations	Pursue water exchanges to obtain supplemental SWP allocations.	All	4	No Update	NA	Increased supplemental water supplies and reduced groundwater pumping.	Increased supplemental water supplies

Notes

GDE = groundwater dependent ecosystem
GSA = Groundwater Sustainability Agency
HCM = Hydrogeologic Conceptual Model
LACSD = Los Alamos Community Services District
NA = not applicable
SABGSA = San Antonio Basin Groundwater Sustainability Agency
SACIM = San Antonio Creek Integrated Model
SWP = State Water Project
USGS = U.S. Geological Survey
VSFB = Vandenberg Space Force Base
WWTF = wastewater treatment facility

4.1 Management Actions

The following is a summary of the status of implementation of management actions during the 5-year evaluation period. Management actions described herein are activities that support groundwater sustainability through policy and regulations without infrastructure.

4.1.1 Expand Monitoring Well Network in the Basin

The SABGSA completed a well registration program in 2023 in partnership with Wallace Group Engineering. The SABGSA reviewed 256 registered wells to identify existing wells in the Basin that may be incorporated into the Basin Monitoring Network, enabling the SABGSA to fill existing data gaps identified in the Basin GSP. The location of the wells determined to be completed in the Paso Robles Formation and the Careaga Sand were compared to the Basin's existing monitoring network wells. Other screening criteria included proximity to:

- Low well density areas
- Existing monitoring network wells with denied access, inability to monitor (e.g., collapsed casing or need for retrofitting), and difficult to monitor (e.g., wells requiring maintenance or constructed without a sounding tube)
- Areas of historically identified groundwater depressions and concentrated groundwater pumping
- Areas of potential interconnected surface water and faults

The wells were further screened by giving preference to wells registered as active, non-domestic, non-de minimis, and not located on parcels where access has been previously denied.

Expected Benefits and Evaluation of Benefits

This effort is strengthening groundwater monitoring coverage in areas where data has historically been limited. Expanded monitoring will improve the spatial representation of groundwater level conditions, support evaluation of sustainability indicators, and provide additional data for future assessments of groundwater conditions and management actions.

4.1.2 Reference Point Elevation Survey and Video Surveys

The SABGSA, in consultation with Santa Barbara County, worked to identify wells in the Basin groundwater level monitoring network with RPEs that do not meet accuracy standards based on DWR BMPs, including wells that have no reference elevation data available. Acquiring accurate reference elevations will benefit the Basin and stakeholders by providing more accurate groundwater elevation data, which will result in more accurate groundwater elevation contours and change in storage calculations included in annual reports. The SABGSA has solicited bids to complete the survey. The SABGSA plans to complete an RPE survey following revisions to the Basin Groundwater Level Monitoring Network (see Section 6).

Well construction information (total depth and screened intervals) for 24 wells in the Basin groundwater level monitoring network is unknown.⁸ Performing well video surveys of wells included in the Basin groundwater level monitoring network with outstanding well construction information could benefit the Basin and stakeholders by enabling development of a more accurate Basin HCM. It is important to note, however, that due to the age of many of the wells included in the Basin groundwater level monitoring network, the

⁸ Well completion reports could not be located for these well using DWR's Online System for Well Completion Reports (OSWCR) database, which is available at: <https://water.ca.gov/Programs/Groundwater-Management/Wells/Well-Completion-Reports>.

results of well video surveys may be inconclusive because of either poor downhole visibility, pervasive encrustation or biofilm on the inside of the casing, or downhole obstructions within the well.

Expected Benefits and Evaluation of Benefits

This action supports improved groundwater monitoring and data reliability. Completion of the survey would improve confidence in groundwater level elevations and well construction information used to evaluate groundwater conditions and sustainability criteria.

4.1.3 Install Stream Gages and Shallow Piezometers at Barka Slough

In April 2025, USGS, SBCWA, and VSFB assessed the effects of future climate scenarios in the Basin on the Slough. This assessment extended the SACIM 3 years from WYs 2019 through 2021. Two 30-year future climate scenarios (WYs 2022 through 2051) were simulated using the updated SACIM. USGS used the results to evaluate potential climate effects on streamflow, groundwater flow, recharge, and other hydrologic conditions in the Slough, and potential effects on riparian species. The study also included the reactivation of two stream gages in the Basin. The SABGSA plans to coordinate with the USGS and VSFB to keep the gages active following completion of the study.

Expected Benefits and Evaluation of Benefits

These efforts are improving understanding of the Slough and associated GDE. The updated information provides a stronger basis for evaluating potential effects of groundwater management, evaluating SMCs, and developing or refining future projects and management actions.

4.1.4 LACSD Wellfield Pumping Coordination / Offsite Well Impact Mitigation

There is no update for this management action because LACSD and nearby well owners have not reported interference during recent water years.

4.1.5 Review/Update Water Usage Factors, Crop Acreages, and Water Budget

The first Basin Annual Report (WYs 2019 through 2021; GSI and GEI, 2021) and the Basin Annual Report for WY 2022 (GSI, 2023) included estimates of groundwater extraction for agricultural irrigation from the crop-specific water use factors. The Basin Annual Report for WY 2022 (GSI, 2023) also included a satellite-based method using OpenET and Land IQ datasets. The similarity in results between the methods demonstrated the utility of the satellite-based method. The satellite-based method is considered more accurate because it directly measures actual ET as it varies spatially and temporally throughout the Basin and throughout the year, thereby capturing nuances in crop irrigation practices, such as deficit irrigation. The similarity in results between the methods also indicates the determined crop-specific water use factors are representative of the Basin at a basin scale; however, the accuracy of the agricultural extraction calculation using this method can only be implemented with an accurate land use dataset. The crop-specific water use factors method is a more limited approach that does not capture ET variability in the Basin and does not fully capture the actual climatic variability or nuanced crop irrigation practices that may occur each year. Based on the similarity in results and the stated benefits of the satellite-based method, the SABGSA has adopted the satellite-based method for estimating groundwater extractions for irrigated agriculture.

Expected Benefits and Evaluation of Benefits

This action improves the accuracy of agricultural water use estimates and the Basin water budget. Continued refinement of water use estimates is expected to improve the SABGSA's ability to track groundwater demand and evaluate Basin conditions.

4.1.6 Survey and Investigate Potential GDEs in the Basin

In April 2025, USGS, SBCWA, and VSFB assessed the effects of future climate scenarios in the Basin on the Slough. This assessment extended the SACIM 3 years from WYs 2019 through 2021. Two 30-year future climate scenarios (WYs 2022 through 2051) were simulated using the updated SACIM. USGS used the results to evaluate potential climate effects on streamflow, groundwater flow, recharge, and other hydrologic conditions in the Slough, and potential effects on riparian species (a biological survey was not completed as part of the assessment). The study also included the reactivation of two stream gages in the Basin. The SABGSA plans to coordinate with the USGS and VSFB to keep the gages active following completion of the study.

A complete biological survey of the Slough has not been completed nor made available for review. Listed plant species (see GSI and GEI, 2021, Table 3-9) that likely occur in the Slough are based on the plant species identified during surveys completed as part of the biological assessment for the Vandenberg Dunes Golf Courses Project (AECOM, 2019) and plant species identified during an unpublished survey that was completed after the Harris Fire (2000) (ManTech, 2010).

Expected Benefits and Evaluation of Benefits

These efforts are improving understanding of the Slough and associated GDE. The updated information provides a stronger basis for evaluating potential effects of groundwater management and for developing or refining SMCs and future projects and management actions.

4.1.7 Review USGS Groundwater Model/Update HCM

In April 2025, USGS, in cooperation with the Santa Barbara County Water Agency and VSFB, assessed the effects of future climate scenarios in the Basin on the Slough. This assessment extended the SACIM 3 years from WYs 2019 through 2021. Two 30-year future climate scenarios (WYs 2022 through 2051) were simulated using the updated SACIM.

USGS presented the future climate scenarios at the SABGSA Board meeting on June 17, 2025. The SACIM is publicly available. USGS used the results from the future climate scenarios to evaluate potential climatic effects on streamflow, groundwater flow, recharge, and other hydrologic conditions in the Slough, and potential effects on riparian species.

Expected Benefits and Evaluation of Benefits

For future reporting and analysis, the SABGSA may consider use of the SACIM for the purpose of modeling proposed Basin project and management actions (e.g., recharge projects, allocation programs, water market, varying climate scenarios), revising the Basin HCM, or calculating change in groundwater in storage for the Basin GSP annual reporting.

4.1.8 Well Registration Program and Well Meter Installation Program

During the evaluation period, the SABGSA implemented its Well Registration Program and subsequently developed a groundwater metering program. The Well Registration Program was completed prior to 2025

and improved the SABGSA's inventory of wells and landowners throughout the Basin. In 2025, the SABGSA adopted Ordinance No. 25-001 establishing groundwater extraction metering and reporting requirements. The ordinance became effective in April 2025, with compliance forms due in April 2026 and monthly extraction readings beginning in April 2026, with the first extraction reports due in November 2026.

Expected Benefits and Evaluation of Benefits

The programs are improving the completeness of groundwater well and extraction information and improving the foundation empirical data that are beneficial for Basin-wide groundwater management. Well registration has also helped identify wells that may be suitable for inclusion in the Groundwater Level Monitoring Network. The metering program is expected to provide more complete spatial and temporal extraction data and support future evaluation of pumping allocations and management actions.

4.1.9 Groundwater Pumping Fee Program

There is no update for this management action. Implementation of a pumping fee program may be evaluated by the GSA following implementation of the Well Metering Program, analysis of collected data, and progress toward reducing the Basin average annual pumping to less than the Basin sustainable yield.

Expected Benefits and Evaluation of Benefits

The program is intended to provide a sustainable funding source for GSP implementation and support groundwater management activities.

4.1.10 Water Use Efficiency Programs

During the evaluation period, the SABGSA continued to promote existing urban and agricultural water use efficiency programs and provide information on water conservation practices. These efforts are intended to encourage efficient water use and maintain or reduce groundwater demand. No quantifiable groundwater savings have been attributed to the programs during the evaluation period.

Expected Benefits and Evaluation of Benefits

There has been no significant increase in water use as a result of a change in urban water use or irrigation practices.

4.1.11 Groundwater Base Pumping Allocation Program

There is no update for this management action. Implementation of a Groundwater Base Pumping Allocation Program may be evaluated by the SABGSA following implementation of the Well Metering Program, analysis of collected data, and progress toward Basin average annual pumping less than the Basin sustainable yield.

Expected Benefits and Evaluation of Benefits

The program is intended to establish a framework for controlling groundwater extraction and aligning pumping with sustainable Basin conditions. Implementation is expected to support controlled groundwater extraction and improve long-term management of groundwater levels and storage.

4.1.12 Groundwater Extraction Credit Marketing and Trading Program

There is no update for this management action. Implementation of a Groundwater Extraction Credit Marketing and Trading Program may be evaluated by the SABGSA following implementation of the Well

Metering Program, analysis of collected data, and progress toward Basin average annual pumping less than the Basin sustainable yield.

Expected Benefits and Evaluation of Benefits

The program is intended to provide flexibility for managing groundwater extraction while maintaining overall control of Basin pumping. Implementation is expected to support flexible, Basin-wide management of groundwater extraction.

4.1.13 Voluntary Agricultural Crop Fallowing Program

There is no update for this management action. The SABGSA will consider implementation of this management action if previous management actions do not achieve the sustainability goals.

Expected Benefits and Evaluation of Benefits

The program is intended to provide flexibility for managing groundwater extraction while maintaining overall control of Basin pumping. Implementation is expected to support flexible, Basin-wide management of groundwater extraction.

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APPENDIX A

California Department of Water Resources Statement of
Findings Regarding the Groundwater Sustainability Plan



CALIFORNIA DEPARTMENT OF WATER RESOURCES

SUSTAINABLE GROUNDWATER MANAGEMENT OFFICE

715 P Street, 8th Floor | Sacramento, CA 95814 | P.O. Box 942836 | Sacramento, CA 94236-0001

January 18, 2024

Stephanie Bertoux
San Antonio Basin GSA
P.O. Box 196
Solvang, CA 93464
admin@sanantoniobasingsa.org

RE: San Antonio Creek Valley Basin - 2022 Groundwater Sustainability Plan

Dear Stephanie Bertoux,

The Department of Water Resources (Department) has evaluated the groundwater sustainability plan (GSP or Plan) submitted for the San Antonio Creek Valley Basin and has determined the GSP is approved. The approval is based on recommendations from the Staff Report, included as an exhibit to the attached Statement of Findings, which describes that the San Antonio Basin GSP satisfies the objectives of the Sustainable Groundwater Management Act (SGMA) and substantially complies with the GSP Regulations. The Staff Report also proposes recommended corrective actions that the Department believes will enhance the GSP and facilitate future evaluation by the Department. The Department strongly encourages the recommended corrective actions be given due consideration and suggests incorporating all resulting changes to the GSP in future updates.

Recognizing SGMA sets a long-term horizon for groundwater sustainability agencies (GSAs) to achieve their basin sustainability goals, monitoring progress is fundamental for successful implementation. GSAs are required to evaluate their GSPs at least every five years and whenever the Plan is amended, and to provide a written assessment to the Department. Accordingly, the Department will evaluate approved GSPs and issue an assessment at least every five years. The Department will initiate the first periodic review of the San Antonio Basin GSP no later than January 21, 2027.

Please contact Sustainable Groundwater Management staff by emailing sgmps@water.ca.gov if you have any questions related to the Department's assessment or implementation of your GSP.

Thank You,

Paul Gosselin

Paul Gosselin
Deputy Director
Sustainable Groundwater Management

Attachment:

1. Statement of Findings Regarding the Approval of the San Antonio Creek Valley Basin Groundwater Sustainability Plan

**STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES**

**STATEMENT OF FINDINGS REGARDING THE
APPROVAL OF THE
SAN ANTONIO CREEK VALLEY BASIN
GROUNDWATER SUSTAINABILITY PLAN**

The Department of Water Resources (Department) is required to evaluate whether a submitted groundwater sustainability plan (GSP or Plan) conforms to specific requirements of the Sustainable Groundwater Management Act (SGMA or Act), is likely to achieve the sustainability goal for the basin covered by the Plan, and whether the Plan adversely affects the ability of an adjacent basin to implement its GSP or impedes achievement of sustainability goals in an adjacent basin. (Water Code § 10733.) The Department is directed to issue an assessment of the Plan within two years of its submission. (Water Code § 10733.4.) This Statement of Findings explains the Department's decision regarding the Plan submitted by the San Antonio Basin Groundwater Sustainable Agency (GSA or Agency) for the San Antonio Creek Valley Basin (Basin No. 3-014).

Department management has discussed the Plan with staff and has reviewed the Department Staff Report, entitled Sustainable Groundwater Management Program Groundwater Sustainability Plan Assessment Staff Report, attached as Exhibit A, recommending approval of the GSP. Department management is satisfied that staff have conducted a thorough evaluation and assessment of the Plan and concurs with staff's recommendation and all the recommended corrective actions. The Department therefore **APPROVES** the Plan and makes the following findings:

- A. The Plan satisfies the required conditions as outlined in § 355.4(a) of the GSP Regulations (23 CCR § 350 et seq.):
 - 1. The Plan was submitted within the statutory deadline of January 31, 2022. (Water Code § 10720.7(a); 23 CCR § 355.4(a)(1).)
 - 2. The Plan was complete, meaning it generally appeared to include the information required by the Act and the GSP Regulations sufficient to warrant a thorough evaluation and issuance of an assessment by the Department. (23 CCR § 355.4(a)(2).)
 - 3. The Plan, either on its own or in coordination with other Plans, covers the entire Basin. (23 CCR § 355.4(a)(3).)
- B. The general standards the Department applied in its evaluation and assessment of the Plan are: (1) "conformance" with the specified statutory requirements, (2) "substantial compliance" with the GSP Regulations, (3) whether the Plan is likely

to achieve the sustainability goal for the Basin within 20 years of the implementation of the Plan, and (4) whether the Plan adversely affects the ability of an adjacent basin to implement its GSP or impedes achievement of sustainability goals in an adjacent basin. (Water Code § 10733.) Application of these standards requires exercise of the Department's expertise, judgment, and discretion when making its determination of whether a Plan should be deemed "approved," "incomplete," or "inadequate."

The statutes and GSP Regulations require Plans to include and address a multitude and wide range of informational and technical components. The Department has observed a diverse array of approaches to addressing these technical and informational components being used by GSAs in different basins throughout the state. The Department does not apply a set formula or criterion that would require a particular outcome based on how a Plan addresses any one of SGMA's numerous informational and technical components. The Department finds that affording flexibility and discretion to local GSAs is consistent with the standards identified above; the state policy that sustainable groundwater management is best achieved locally through the development, implementation, and updating of local plans and programs (Water Code § 113); and the Legislature's express intent under SGMA that groundwater basins be managed through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner. (Water Code § 10720.1(h)) The Department's final determination is made based on the entirety of the Plan's contents on a case-by-case basis, considering and weighing factors relevant to the particular Plan and Basin under review.

- C. In making these findings and Plan determination, the Department also recognized that: (1) the Department maintains continuing oversight and jurisdiction to ensure the Plan is adequately implemented; (2) the Legislature intended SGMA to be implemented over many years; (3) SGMA provides Plans 20 years of implementation to achieve the sustainability goal in a Basin (with the possibility that the Department may grant GSAs an additional five years upon request if the GSA has made satisfactory progress toward sustainability); and, (4) local agencies acting as GSAs are authorized, but not required, to address undesirable results that occurred prior to enactment of SGMA. (Water Code §§ 10721(r); 10727.2(b); 10733(a); 10733.8.)
- D. The Plan conforms with Water Code §§ 10727.2 and 10727.4, substantially complies with 23 CCR § 355.4, and appears likely to achieve the sustainability goal for the Basin. It does not appear at this time that the Plan will adversely affect the ability of adjacent basins to implement their GSPs or impede achievement of sustainability goals.

Statement of Findings
San Antonio Creek Valley Basin (No. 3-014)

January 18, 2024

1. The sustainable management criteria and goal to maintain groundwater levels in the Basin at levels within 25 feet of the fall 2018 levels appears to be a reasonable approach that will help avoid a significant and unreasonable depletion and is sufficiently justified and explained. The Plan relies on credible information and science to quantify the groundwater conditions that the Plan seeks to avoid and provides an objective way to determine whether the Basin is being managed sustainably in accordance with SGMA. (23 CCR § 355.4(b)(1).)
2. The Plan demonstrates a reasonable understanding of where data gaps exist and demonstrates a commitment to eliminate those data gaps. For example, expanding the monitoring network to improve basin characterization, updating the integrated hydrologic model with new collected data, and increasing understanding of surface water and groundwater interaction, with respect to interconnected surface water depletion, groundwater dependent ecosystems, and the water budget. Filling these known data gaps, and others described in the Plan, should lead to refinement of the GSA's monitoring networks and sustainable management criteria and help inform and guide future adaptive management strategies. (23 CCR § 355.4(b)(2).)
3. The projects and management actions proposed are designed to help achieve the sustainable management goals in the Basin and avoid undesirable results. Projects and management actions are largely focused on expanding the monitoring network, groundwater demand reduction and supply augmentation. The projects and management actions are reasonable and commensurate with the level of understanding of the Basin setting. The projects and management actions described in the Plan provide a feasible approach to achieving the Basin's sustainability goal and should provide the GSA with greater versatility to adapt and respond to changing conditions and future challenges during GSP implementation. (23 CCR § 355.4(b)(3).)
4. The Plan provides a detailed explanation of how the varied interests of groundwater uses and users in the Basin were considered in developing the sustainable management criteria and how those interests, including domestic wells, would be impacted by the chosen minimum thresholds. (23 CCR § 355.4(b)(4).)
5. The Plan's projects and management actions appear feasible at this time and capable of preventing undesirable results and ensuring that the Basin is operated within its sustainable yield within 20 years. The Department will continue to monitor Plan implementation and reserves the right to change its determination if projects and management actions are not

Statement of Findings
San Antonio Creek Valley Basin (No. 3-014)

January 18, 2024

implemented or appear unlikely to prevent undesirable results or achieve sustainability within SGMA timeframes. (23 CCR § 355.4(b)(5).)

6. The Plan includes a reasonable assessment of overdraft conditions and includes reasonable means to mitigate overdraft, if present. (23 CCR § 355.4(b)(6).)
7. At this time, it does not appear that the Plan will adversely affect the ability of an adjacent basin to implement its GSP or impede achievement of sustainability goals in an adjacent basin. The Plan includes an analysis of potential impacts to adjacent basins related to the established minimum thresholds for each sustainability indicator. The Plan does not anticipate any impacts to adjacent basins resulting from the minimum thresholds defined in the Plan. (23 CCR § 355.4(b)(7).)
8. Because a single plan was submitted for the Basin, a coordination agreement was not required. (23 CCR § 355.4(b)(8).)
9. The GSA's member agencies and their history of groundwater management provide a reasonable level of confidence that the GSA has the legal authority and financial resources necessary to implement the Plan. (23 CCR § 355.4(b)(9).)
10. Through review of the Plan and consideration of public comments, the Department determines that the GSA adequately responded to comments that raised credible technical or policy issues with the Plan, sufficient to warrant approval of the Plan at this time. The Department also notes that the recommended corrective actions included in the Staff Report are important to addressing certain technical or policy issues that were raised and, if not addressed before future, subsequent plan evaluations, may preclude approval of the Plan in those future evaluations. (23 CCR § 355.4(b)(10).)

E. In addition to the grounds listed above, DWR also finds that:

1. The Department developed its GSP Regulations consistent with and intending to further the State's human right to water policy through implementation of SGMA and the Regulations, primarily by achieving sustainable groundwater management in a basin. By ensuring substantial compliance with the GSP Regulations, the Department has considered the state policy regarding the human right to water in its evaluation of the Plan. (Water Code § 106.3; 23 CCR § 350.4(g).)
2. The Plan acknowledges and identifies interconnected surface waters within the Basin. The GSA proposes initial sustainable management criteria to manage this sustainability indicator and measures to improve

Statement of Findings

San Antonio Creek Valley Basin (No. 3-014)

January 18, 2024

understanding and management of interconnected surface water. The GSA acknowledges, and the Department agrees, many data gaps related to interconnected surface water exist. The GSA should continue filling data gaps, collecting additional monitoring data, and coordinating with resources agencies and interested parties to understand beneficial uses and users that may be impacted by depletions of interconnected surface water caused by groundwater pumping. Future periodic evaluations of the Plan and amendments to the Plan should aim to improve the initial sustainable management criteria as more information and improved methodology becomes available.

3. Projections of future basin extractions are likely to stay within current and historic ranges, at least until the next periodic evaluation by the GSA and the Department. Basin groundwater levels and other SGMA sustainability indicators are unlikely to substantially deteriorate while the GSA implements the Department's recommended corrective actions. State intervention is not necessary at this time to ensure that local agencies manage groundwater in a sustainable manner. (Water Code § 10720.10(h).)
4. The California Environmental Quality Act (Public Resources Code § 21000 *et seq.*) does not apply to the Department's evaluation and assessment of the Plan.

Statement of Findings

San Antonio Creek Valley Basin (No. 3-014)

January 18, 2024

Accordingly, the GSP submitted by the Agency for the San Antonio Creek Valley Basin is hereby **APPROVED**. The recommended corrective actions identified in the Staff Report will assist the Department's future review of the Plan's implementation for consistency with SGMA and the Department therefore recommends the Agency address them by the time of the Department's periodic review, which is set to begin on January 21, 2027, as required by Water Code § 10733.8. Failure to address the Department's recommended corrective actions before future, subsequent plan evaluations, may lead to a Plan being determined incomplete or inadequate.

Signed:

_____

Karla Nemeth, Director

Date: January 18, 2024

Exhibit A: Groundwater Sustainability Plan Assessment Staff Report – San Antonio Creek Valley Basin

State of California
Department of Water Resources
Sustainable Groundwater Management Program
Groundwater Sustainability Plan Assessment
Staff Report

Groundwater Basin Name:	San Antonio Creek Valley Basin (No. 3-014)
Submitting Agency:	San Antonio Basin Groundwater Sustainability Agency
Submittal Type:	Initial GSP Submission
Submittal Date:	January 21, 2022
Recommendation:	Approved
Date:	January 18, 2024

The San Antonio Basin Groundwater Sustainability Agency (GSA or Agency) submitted the San Antonio Creek Valley Groundwater Basin Groundwater Sustainability Plan (GSP or Plan) for the San Antonio Creek Valley Basin (Basin) to the Department of Water Resources (Department) for evaluation and assessment as required by the Sustainable Groundwater Management Act (SGMA)¹ and GSP Regulations.² The GSP covers the entire Basin for the implementation of SGMA.

After evaluation and assessment, Department staff conclude that the Plan includes the required components of a GSP, demonstrates a thorough understanding of the Basin based on what appears to be the best available science and information, sets well explained, supported, and reasonable sustainable management criteria to prevent undesirable results as defined in the Plan, and proposes a set of projects and management actions that will likely achieve the sustainability goal defined for the Basin.³ Department staff will continue to monitor and evaluate the Basin's progress toward achieving the sustainability goal through annual reporting and future periodic evaluations of the GSP and its implementation.

- ***Based on the current evaluation of the Plan, Department staff recommend the GSP be approved with the recommended corrective actions described herein.***

This assessment includes five sections:

- **Section 1 – Summary:** Provides an overview of Department staff's assessment and recommendations.

¹ Water Code § 10720 *et seq.*

² 23 CCR § 350 *et seq.*

³ 23 CCR § 350 *et seq.*

- [**Section 2 – Evaluation Criteria**](#): Describes the legislative requirements and the Department's evaluation criteria.
- [**Section 3 – Required Conditions**](#): Describes the submission requirements, Plan completeness, and basin coverage required for a GSP to be evaluated by the Department.
- [**Section 4 – Plan Evaluation**](#): Provides an assessment of the contents included in the GSP organized by each Subarticle outlined in the GSP Regulations.
- [**Section 5 – Staff Recommendation**](#): Includes the staff recommendation for the Plan and any recommended or required corrective actions, as applicable.

1 SUMMARY

Department staff recommend approval of the San Antonio Creek Valley Groundwater Basin GSP. The GSA has identified areas for improvement of its Plan (e.g., addressing data gaps related to the hydrogeological conceptual model and the water budget, updating the data management system, and refining projects and management actions). Department staff concur that those items are important and recommend the GSA address them as soon as possible. Department staff have also identified additional recommended corrective actions within this assessment that the GSA should consider addressing by the first periodic evaluation of the Plan. The recommended corrective actions generally focus on the following:

1. Further assessing the potential impact of established minimum thresholds for chronic lowering of groundwater levels on supply wells, including domestic wells.
2. Continuing to fill data gaps, collecting additional monitoring data, coordinating with resources agencies and interested parties to understand beneficial uses and users that may be impacted by depletions of interconnected surface water caused by groundwater pumping, and potentially refine sustainable management criteria.
3. Adding information related to the data and reporting standards.
4. Expanding the land subsidence monitoring network to provide sufficient coverage of the Subbasin.

Addressing the recommended corrective actions identified in [Section 5](#) of this assessment will be important to demonstrate, on an ongoing basis, that implementation of the Plan is likely to achieve the sustainability goal.

2 EVALUATION CRITERIA

The GSA submitted a single GSP to the Department to evaluate whether the Plan conforms to specified SGMA requirements⁴ and is likely to achieve the sustainability goal for the San Antonio Creek Valley Basin.⁵ To achieve the sustainability goal for the basin, the GSP must demonstrate that implementation of the Plan will lead to sustainable groundwater management, which means the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.⁶ Undesirable results must be defined quantitatively by the GSA.⁷ The Department is also required to evaluate whether the GSP will adversely affect the ability of an adjacent basin to implement its GSP or achieve its sustainability goal.⁸

For the GSP to be evaluated by the Department, it must first be determined that the Plan was submitted by the statutory deadline,⁹ and that it is complete and covers the entire basin.¹⁰ If these conditions are satisfied, the Department evaluates the Plan to determine whether it complies with specific SGMA requirements and substantially complies with the GSP Regulations.¹¹ Substantial compliance means that the supporting information is sufficiently detailed and the analyses sufficiently thorough and reasonable, in the judgment of the Department, to evaluate the Plan, and the Department determines that any discrepancy would not materially affect the ability of the Agency to achieve the sustainability goal for the basin, or the ability of the Department to evaluate the likelihood of the Plan to attain that goal.¹²

When evaluating whether the Plan is likely to achieve the sustainability goal for the basin, Department staff reviewed the information provided and relied upon in the GSP for sufficiency, credibility, and consistency with scientific and engineering professional standards of practice.¹³ The Department's review considers whether there is a reasonable relationship between the information provided and the assumptions and conclusions made by the GSA, including whether the interests of the beneficial uses and users of groundwater in the basin have been considered; whether sustainable management criteria and projects and management actions described in the Plan are commensurate with the level of understanding of the basin setting; and whether those projects and management actions are feasible and likely to prevent undesirable results.¹⁴

⁴ Water Code §§ 10727.2, 10727.4.

⁵ Water Code § 10733(a).

⁶ Water Code § 10721(v).

⁷ 23 CCR § 354.26 *et seq.*

⁸ Water Code § 10733(c).

⁹ 23 CCR § 355.4(a)(1).

¹⁰ 23 CCR §§ 355.4(a)(2), 355.4(a)(3).

¹¹ 23 CCR § 350 *et seq.*

¹² 23 CCR § 355.4(b).

¹³ 23 CCR § 351(h).

¹⁴ 23 CCR §§ 355.4(b)(1), (3), (4), and (5).

The Department also considers whether the GSA has the legal authority and financial resources necessary to implement the Plan.¹⁵

To the extent overdraft is present in a basin, the Department evaluates whether the Plan provides a reasonable assessment of the overdraft and includes reasonable means to mitigate the overdraft.¹⁶ The Department also considers whether the Plan provides reasonable measures and schedules to eliminate identified data gaps.¹⁷ Lastly, the Department's review considers the comments submitted on the Plan and evaluates whether the GSA adequately responded to the comments that raise credible technical or policy issues with the Plan.¹⁸

The Department is required to evaluate the Plan within two years of its submittal date and issue a written assessment of the Plan.¹⁹ The assessment is required to include a determination of the Plan's status.²⁰ The GSP Regulations define the three options for determining the status of a Plan: Approved,²¹ Incomplete,²² or Inadequate.²³

Even when review indicates that the GSP satisfies the requirements of SGMA and is in substantial compliance with the GSP Regulations, the Department may recommend corrective actions.²⁴ Recommended corrective actions are intended to facilitate progress in achieving the sustainability goal within the basin and the Department's future evaluations, and to allow the Department to better evaluate whether the Plan adversely affects adjacent basins. While the issues addressed by the recommended corrective actions do not, at this time, preclude approval of the Plan, the Department recommends that the issues be addressed to ensure the Plan's implementation continues to be consistent with SGMA and the Department is able to assess progress in achieving the sustainability goal within the basin.²⁵ Unless otherwise noted, the Department proposes that recommended corrective actions be addressed by the submission date for the first periodic assessment.²⁶

The staff assessment of the GSP involves the review of information presented by the GSA, including models and assumptions, and an evaluation of that information based on scientific reasonableness, including standard or accepted professional and scientific methods and practices. The assessment does not require Department staff to recalculate or reevaluate technical information provided in the Plan or to perform its own geologic or

¹⁵ 23 CCR § 355.4(b)(9).

¹⁶ 23 CCR § 355.4(b)(6).

¹⁷ 23 CCR § 355.4(b)(2).

¹⁸ 23 CCR § 355.4(b)(10).

¹⁹ Water Code § 10733.4(d); 23 CCR § 355.2(e).

²⁰ Water Code § 10733.4(d); 23 CCR § 355.2(e).

²¹ 23 CCR § 355.2(e)(1).

²² 23 CCR § 355.2(e)(2).

²³ 23 CCR § 355.2(e)(3).

²⁴ Water Code § 10733.4(d).

²⁵ Water Code § 10733.8.

²⁶ 23 CCR § 356.4 *et seq.*

engineering analysis of that information. The staff recommendation to approve a Plan does not signify that Department staff, were they to exercise the professional judgment required to develop a GSP for the basin, would make the same assumptions and interpretations as those contained in the Plan, but simply that Department staff have determined that the assumptions and interpretations relied upon by the submitting GSA are supported by adequate, credible evidence, and are scientifically reasonable.

Lastly, the Department's review and approval of the Plan is a continual process. Both SGMA and the GSP Regulations provide the Department with the ongoing authority and duty to review the implementation of the Plan.²⁷ Also, GSAs have an ongoing duty to provide reports to the Department, periodically reassess their plans, and, when necessary, update or amend their plans.²⁸ The passage of time or new information may make what is reasonable and feasible at the time of this review to not be so in the future. The emphasis of the Department's periodic reviews will be to assess the progress toward achieving the sustainability goal for the basin and whether Plan implementation adversely affects the ability of adjacent basins to achieve their sustainability goals.

3 REQUIRED CONDITIONS

A GSP, to be evaluated by the Department, must be submitted within the applicable statutory deadline. The GSP must also be complete and must, either on its own or in coordination with other GSPs, cover the entire basin.

3.1 SUBMISSION DEADLINE

SGMA required basins categorized as high- or medium-priority and not subject to critical conditions of overdraft to submit a GSP no later than January 31, 2022.²⁹

The GSA submitted its Plan on January 21, 2022.

3.2 COMPLETENESS

GSP Regulations specify that the Department shall evaluate a GSP if that GSP is complete and includes the information required by SGMA and the GSP Regulations.³⁰

The GSA submitted an adopted GSP for the entire Basin. After an initial, preliminary review, Department staff found the GSP to be complete and appearing to include the

²⁷ Water Code § 10733.8; 23 CCR § 355.6.

²⁸ Water Code §§ 10728 *et seq.*, 10728.2.

²⁹ Water Code § 10720.7(a)(2).

³⁰ 23 CCR § 355.4(a)(2).

required information, sufficient to warrant a thorough evaluation by the Department.³¹ The Department posted the GSP to its website on January 31, 2022.³²

3.3 BASIN COVERAGE

A GSP, either on its own or in coordination with other GSPs, must cover the entire basin.³³ A GSP that is intended to cover the entire basin may be presumed to do so if the basin is fully contained within the jurisdictional boundaries of the submitting GSAs.

The GSP intends to manage the entire San Antonio Creek Valley Basin and the jurisdictional boundary of the submitting GSA fully contains the Basin.³⁴

4 PLAN EVALUATION

As stated in Section 355.4 of the GSP Regulations, a basin “shall be sustainably managed within 20 years of the applicable statutory deadline consistent with the objectives of the Act.” The Department’s assessment is based on a number of related factors including whether the elements of a GSP were developed in the manner required by the GSP Regulations, whether the GSP was developed using appropriate data and methodologies and whether its conclusions are scientifically reasonable, and whether the GSP, through the implementation of clearly defined and technically feasible projects and management actions, is likely to achieve a tenable sustainability goal for the basin. The Department staff’s evaluation of the likelihood of the Plan to attain the sustainability goal for the Basin is provided below.

4.1 ADMINISTRATIVE INFORMATION

The GSP Regulations require each Plan to include administrative information identifying the submitting Agency, its decision-making process, and its legal authority;³⁵ a description of the Plan area and identification of beneficial uses and users in the Plan area;³⁶ and a description of the ability of the submitting Agency to develop and implement a Plan for that area.³⁷

The San Antonio Basin Groundwater Sustainability Agency (SABGSA) was formed in 2017 via a Joint Exercise of Powers Agreement (JPA) between the Cachuma Resource Conservation District (CRCD) and the Los Alamos Community Services District (LACSD).

³¹ The Department undertakes a preliminary completeness review of a submitted Plan under section 355.4(a) of the GSP Regulations to determine whether the elements of a Plan required by SGMA and the Regulations have been provided, which is different from a determination, upon review, that a Plan is “incomplete” for purposes of section 355.2(e)(2) of the Regulations.

³² <https://sgma.water.ca.gov/portal/gsp/preview/87>.

³³ Water Code § 10727(b); 23 CCR § 355.4(a)(3).

³⁴ San Antonio Creek Valley GSP, Section 2.2.1, pp. 58-59.

³⁵ 23 CCR § 354.6 *et seq.*

³⁶ 23 CCR § 354.8 *et seq.*

³⁷ 23 CCR § 354.6(e).

In 2020, The San Antonio Basin Water District (SABWD) was formed as a California Water District and met the JPA requirements to substitute membership of CRCD with SABWD membership in the SABGSA. The SABWD was formed to sustainably manage, protect, and enhance groundwater resources and preserve the productivity of agricultural lands within its service area. The LACSD was formed in 1956 to provide water treatment and distribution services, and subsequently expanded to maintain water, wastewater, and recreational facilities in the unincorporated community of Los Alamos. The GSP states “the SABGSA is not an exclusive agency,” however, then states it has the legal authority to implement the GSP with no authority needed from any other GSA or agency, but no other GSAs or agencies are identified. Department staff note the agency is listed in the SGMA Portal as an exclusive GSA so it is unclear why the GSP includes this language. Department staff encourage the GSA to provide additional context about the exclusivity of the GSA in future updates to the Plan to resolve the confusion.

The SABGSA is governed by an eight-member Board of Directors. Seven directors are appointed from the CRCD with a specific director appointed representing various agricultural crop types common to the Basin.³⁸ One director is appointed from the LACSD.

The Basin encompasses 123 square miles in western Santa Barbara County, near the intersection of the Coastal Ranges and Transverse Ranges. The Basin is long and narrow in shape, approximately 30 miles long and 7 miles wide. The Basin is bounded by the Casmalia Hills and Solomon Hills to the north and the Purisima Hills, Burton Mesa and adjoining Santa Ynez River Valley Basin to the south.³⁹ A map showing the location of the Basin and adjacent basins is presented as Figure 1 below.

³⁸ San Antonio Creek Valley GSP, Appendix A, pp. 476-477.

³⁹ San Antonio Creek Valley GSP, Executive Summary, p. 23; Section 1.2, p. 52; Figure 2-1, p. 57; Section 3.1.1, p. 82; Section 3.1.2.1, p. 91.

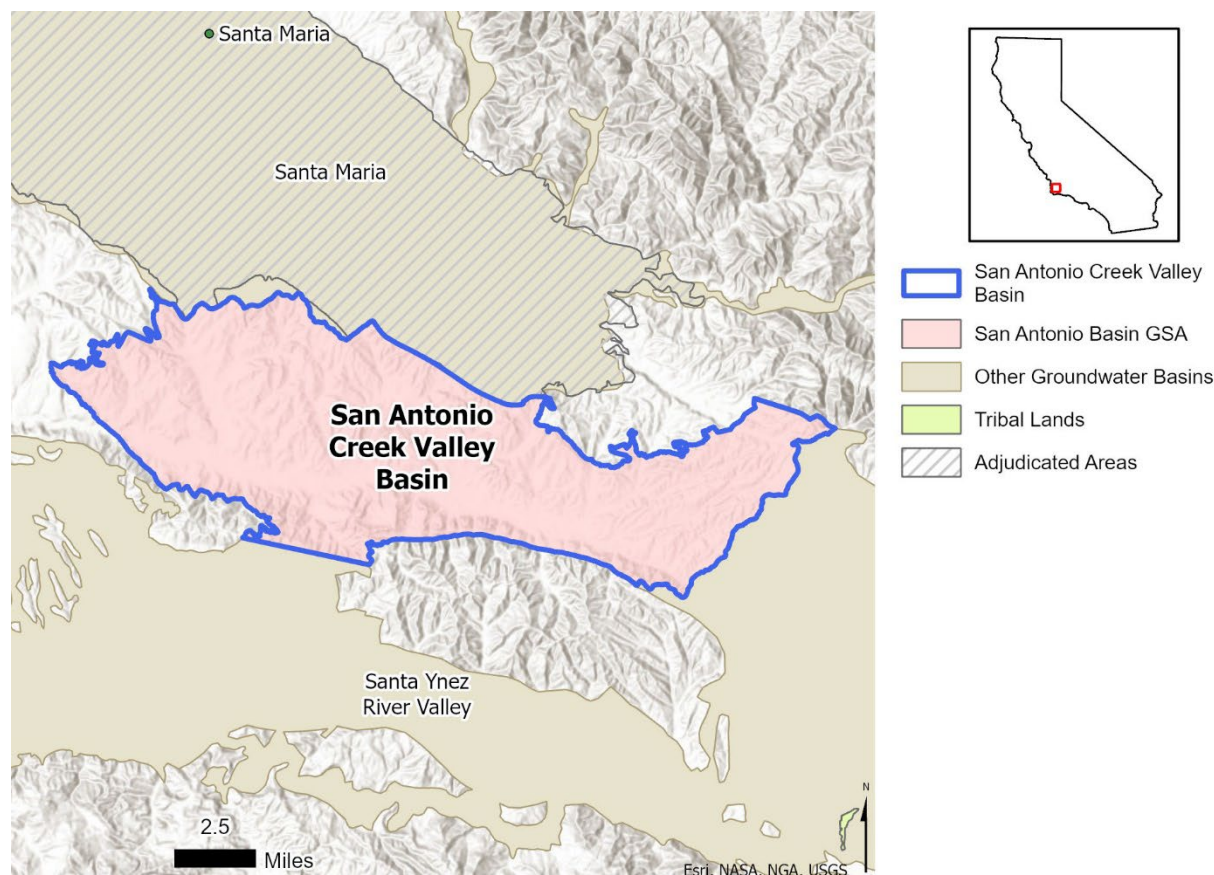


Figure 1: San Antonio Creek Valley Location Map.

The dominant land use in the Basin is agricultural use, with approximately 16% of the agriculture land used for cultivation. Less than one percent of the Basin has residential, commercial, and recreational land uses which are attributed to the community of Los Alamos. Additionally, there are several oil and gas fields present in the Basin, however, the percentage of Basin land use occupied by these fields is not quantified. There are no Disadvantaged Communities (DACs) or tribal lands in the Basin.^{40,41}

The Plan identifies the primary uses of groundwater as municipal, agricultural, rural residential, and some environmental use via groundwater dependent ecosystems.⁴² Agricultural use is the largest water use sector in the Basin, approximately 95 percent of all water use, followed by Vandenberg Space Force Base (VSFB) at approximately 3 percent, and then by a small volume of water use attributed to the LACSD and rural domestic users.

⁴⁰ San Antonio Creek Valley GSP, Section 2.2.2.6, p. 63.

⁴¹ San Antonio Creek Valley GSP, Appendix C, p. 596.

⁴² San Antonio Creek Valley GSP, Section 2.3.1, pp. 71-72.

Domestic, municipal, and agricultural water demands rely entirely on groundwater.⁴³ The Plan includes three figures showing the density of municipal,⁴⁴ agricultural,⁴⁵ and domestic⁴⁶ pumping wells in the Plan area. The information provided on the figures indicate there are 253 water supply wells, 149 agricultural wells, 96 domestic wells, and 8 municipal wells in the Basin. The Plan notes that the location and status of these wells is from Department databases and has not been verified by the SABGSA.⁴⁷

The GSP includes a discussion of the water resource monitoring and management plans in the Plan area. Several programs monitoring groundwater elevation, groundwater quality, stream flows, and precipitation are ongoing in the Basin.⁴⁸

The GSP describes in sufficient detail the organizational structure of the GSA and its legal authority to manage groundwater in the Basin and finance projects and management actions. The GSP also provides the GSA's funding strategy to support their GSP implementation activities; costs range from approximately \$367,000 to \$567,000 per year.⁴⁹ The GSP describes funding mechanisms that the GSA will consider for meeting the GSP implementation costs, which include a combination of contributions from landowners, grant funding, and rate payers (if available).⁵⁰

Additionally, the SABGSA Stakeholder Outreach and Engagement Plan includes a stakeholder identification list identifying the following stakeholders: Santa Barbara County (which has land use planning authority), holders of overlying groundwater rights (including domestic and agricultural well owners), LACSD (which owns municipal wells), environmental users, surface water users, environmental justice interests, and VSFB.⁵¹

Department staff conclude that the administrative information included in the GSP substantially complies with the requirements outlined in the GSP Regulations.

4.2 BASIN SETTING

GSP Regulations require information about the physical setting and characteristics of the basin and current conditions of the basin, including a hydrogeologic conceptual model; a description of historical and current groundwater conditions; and a water budget accounting for total annual volume of groundwater and surface water entering and leaving the basin, including historical, current, and projected water budget conditions.⁵²

⁴³ San Antonio Creek Valley GSP, Section 2.3.1, p. 71.

⁴⁴ San Antonio Creek Valley GSP, Figure 2-2, p. 67.

⁴⁵ San Antonio Creek Valley GSP, Figure 2-3, p. 68.

⁴⁶ San Antonio Creek Valley GSP, Figure 2-4, p. 69.

⁴⁷ San Antonio Creek Valley GSP, Section 2.2.3.3, p. 66.

⁴⁸ San Antonio Creek Valley GSP, Section 2.2.2, pp. 60-61.

⁴⁹ San Antonio Creek Valley GSP, Section 7.6, p. 453.

⁵⁰ San Antonio Creek Valley GSP, Section 6.4, pp. 388-390, Section 7.6, p. 453.

⁵¹ San Antonio Creek Valley GSP, Appendix C, pp. 591-599.

⁵² 23 CCR § 354.12.

4.2.1 Hydrogeologic Conceptual Model

The hydrogeologic conceptual model is a non-numerical model of the physical setting, characteristics, and processes that govern groundwater occurrence within a basin, and represents a local agency's understanding of the geology and hydrology of the basin that support the geologic assumptions used in developing mathematical models, such as those that allow for quantification of the water budget.⁵³ The GSP Regulations require a descriptive hydrogeologic conceptual model that includes a written description of geologic conditions, supported by cross sections and maps,⁵⁴ and includes a description of basin boundaries and the bottom of the basin,⁵⁵ principal aquifers and aquitards,⁵⁶ and data gaps.⁵⁷

The Plan provides a comprehensive description of the hydrogeologic conceptual model that provides details based on the available information to describe the groundwater systems in the Basin. The Plan utilizes prior technical studies, maps, and cross-sections to describe the hydrogeologic conceptual model, and expands on these prior works using additional available data.⁵⁸

The Plan describes that the Basin is a trough, shaped like an elongated bowl, located in western Santa Barbara County, near the intersection of the Coastal Ranges and Transverse Ranges Geomorphic Provinces.⁵⁹ The Basin was formed by downward-folding rock units and is structurally controlled by a northwest-trending geologic unit made of two parallel synclines called the Los Alamos and San Antonio Synclines.⁶⁰ The Basin boundary is structurally controlled by upward folding of rock units outcropped at ground surface along the topographic divides of the Solomon and Casmalia Hills on the north and the Purisima Hills and Burton Mesa on the south in a tectonically active region.⁶¹ Topographical highs occur along the ridgelines of the Casmalia, Solomon, and Purisima Hills while topographical lows occur along the long, flat, and narrow valley floor along the axis of the Los Alamos Syncline.⁶²

The San Antonio Creek drains the valley from east to west.⁶³ The Basin terminates on the downgradient western end where groundwater and surface water from the Basin and

⁵³ DWR Best Management Practices for the Sustainable Management of Groundwater: Hydrogeologic Conceptual Model, December 2016: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-3-Hydrogeologic-Conceptual-Model_ay_19.pdf.

⁵⁴ 23 CCR §§ 354.14 (a), 354.14 (c).

⁵⁵ 23 CCR §§ 354.14 (b)(2-3).

⁵⁶ 23 CCR § 354.14 (b)(4) *et seq.*

⁵⁷ 23 CCR § 354.14 (b)(5).

⁵⁸ San Antonio Creek Valley GSP, Section 3.1 through 3.1.3.5, pp. 81-108.

⁵⁹ San Antonio Creek Valley GSP, Executive Summary, p. 23; Section 1.2, p. 52; Figure 2-1, p. 57; Section 3.1.1, p. 82; Section 3.1.2.1, p. 91.

⁶⁰ San Antonio Creek Valley GSP, Section 3.1.2.1, p.91.

⁶¹ San Antonio Creek Valley GSP, Section 3.1.1.1, p.82; Figure 3-1, p.83; Section 3.1.2.1, pp.91-92; Section 3.1.2.3, p. 93.

⁶² San Antonio Creek Valley GSP, Section 3.1.2, p.82.

⁶³ San Antonio Creek Valley GSP, Section 2.2.1, pp. 58-59.

San Antonio Creek respectively, discharge into Barka Slough wetland.⁶⁴ The GSP defines the Basin boundaries in accordance with California's Groundwater Bulletin 118 as the Casmalia and Solomon Hills and Santa Maria Valley groundwater adjudication boundary on the north; the San Rafael Mountains and a watershed divide with the adjacent Santa Ynez River Valley Basin on the east; the Purisima Hills and Burton Mesa on the south; and the western edge of Barka Slough on the west.⁶⁵ Because of faulting on the west end of the basin, bedrock pushed to the surface formed a barrier to westward groundwater flow.⁶⁶ A preliminary United States Geological Survey (USGS) numerical model evaluated subsurface groundwater inflow on the eastern boundary with the adjoining Eastern Management Area of the Santa Ynez River Valley Basin and found the inflow to be negligible.⁶⁷ However, the GSP also notes that there is a small segment on the east end of the Basin "where there could be groundwater interaction with an adjacent groundwater subbasin" and that the "rate of flow was equal to the difference in hydraulic head".⁶⁸ While currently the flow is considered "negligible", given the GSA's plan to allow the groundwater levels to fall below historical lows in the Basin (see [Section 4.3 Sustainable Management Criteria](#)), Department staff are concerned that the rate of flow may change. Department staff encourage the GSA to clearly identify this as a data gap and work to fill this gap in understanding groundwater conditions in the Basin.

Older, impermeable consolidated bedrock formations both surround and underlie the Basin, which prevents movement of groundwater into the Basin from surrounding groundwater basins and out of the Basin to underlying consolidated bedrock.⁶⁹ The GSP states the bottom of the Basin is a vertical barrier to groundwater flow generally underlying the base of the Pliocene-age Careaga Sand.⁷⁰ The Plan describes the geologic units underlying the base of the Careaga Sand as the Foxen Mudstone, Sisquoc Formation, and Monterey Formation.⁷¹ The GSP includes a cross-section depicting depths to the bottom of the Basin ranging from approximately 80 feet below ground surface west of Barka Slough to more than 3,000 feet below ground surface at the mid-section of the Basin, east of the Pezzoni-Casmalia and Los Alamos Faults.⁷² A generalized regional geologic cross-section depicts the full stratigraphic section of the Basin based on oil and gas well exploratory drilling information published by the California Division of Oil, Gas, and Geothermal Resources.⁷³ Hence, the extent of unconsolidated water-bearing units

⁶⁴ San Antonio Creek Valley GSP, Section 3.1.4.1, p. 108; Section 3.2.1.4, p. 137; Figure 3-31, p. 140.

⁶⁵ San Antonio Creek Valley GSP, Section 1.2, p. 52; Section 2.2, pp. 58-59; Figure 3.1, p. 83; Section 3.1.1.1, p. 82; Section 3.1.3.2, pp.97-98; Section 5.11, p. 367.

⁶⁶ San Antonio Creek Valley GSP, Section 3.1.3.2, p. 99.

⁶⁷ San Antonio Creek Valley GSP, Section 3.1.3.2, p. 99.

⁶⁸ San Antonio Creek Valley GSP, Section 3.1.3.2, p. 99.

⁶⁹ San Antonio Creek Valley GSP, Section 3.1.2.3, p. 93; Section 3.1.3.2, p. 99.

⁷⁰ San Antonio Creek Valley GSP, Section 3.1.3.2, p. 97.

⁷¹ San Antonio Creek Valley GSP, Section 3.1.2.2, p. 92; Figure 3-5, p. 90.

⁷² San Antonio Creek Valley GSP, Figure 3-5, p. 90.

⁷³ San Antonio Creek Valley GSP, Figure 3-7, p. 95; Section 3.1.2.3, p. 93.

was differentiated across the Basin from deeper, older, consolidated non-water-bearing units based primarily on available stratigraphic data.⁷⁴

The GSP states the Basin consists of two principal aquifers, defined as the Paso Robles Formation and the Careaga Sand. The GSP differentiates the Paso Robles Formation from the underlying Careaga Sand by the Paso Robles Formation's alternating coarse-grained beds and non-water-yielding fine-grained beds, lack of marine megafossils, and local presence of artesian conditions. The Careaga Sand is loosely consolidated, permeable, and consists of fine-grained to medium-grained sand, abundant well-rounded pebbles, and the presence of marine megafossils.⁷⁵

The Paso Robles Formation is up to 2,000 feet thick and characterized by its vertical heterogeneity in the water-bearing properties. Based on the USGS San Antonio Creek Geohydrologic Framework Model and aquifer hydraulic and lithologic properties, the Paso Robles Formation is divided into upper, middle, and lower members. The GSP identifies the middle member as a confining layer and a barrier to vertical movement between the upper and lower members.⁷⁶ Principal hydraulic properties attributed to the Paso Robles Formation are wells producing 500 gallons per minute and specific capacities of 5-15 gallons per minute per foot of drawdown.⁷⁷

The Careaga Sand is 1,500 feet thick and characterized by an upper coarse-grained member (Cebada) and a lower fine-grained (Graciosa) member.⁷⁸ Well yields in the Careaga Sand range from 100 to 1000 gallons per minute, and specific capacities range from fewer than 10 to more than 30 gallons per minute per foot of drawdown.⁷⁹

According to the GSP, the primary uses of the Basin include municipal, agricultural, domestic, environmental, and operations of the VSFB.⁸⁰ The annual groundwater pumping volume of each sector for the current period is shown in Table 2-1.⁸¹ The GSP provides maps showing all well types and the respective well density of each well type.⁸²

The GSP recognizes multiple data gaps in the hydrogeologic conceptual model and states that the GSA will make efforts to address them but does not identify measures or schedules to eliminate the data gaps. Data gaps include unknown conditions in surface water flow entering and leaving Barka Slough; spatial data gaps in both aquifers in the eastern and central to northwestern upland areas of the Basin;⁸³ lack of well construction

⁷⁴ San Antonio Creek Valley GSP, Section 3.1.2.3, p. 93.

⁷⁵ San Antonio Creek Valley GSP, Section 3.1.3.1, pp. 96-97; Section 3.1.2.2, p. 92.

⁷⁶ San Antonio Creek Valley GSP, Section 3.1.2.2, p. 92; Figure 3-5, p. 90.

⁷⁷ San Antonio Creek Valley GSP, Section 3.1.3.1, pp. 96-97.

⁷⁸ San Antonio Creek Valley GSP, Section 3.1.2.2, p. 92.

⁷⁹ San Antonio Creek Valley GSP, Section 3.1.3.1, p. 97.

⁸⁰ San Antonio Creek Valley GSP, Section 3.1.3.5, pp. 107-108.

⁸¹ San Antonio Creek Valley GSP, Section 2.2.1.3, p.59; Table 2-1, p.60; Section 3.1.3.5, pp. 107-108.

⁸² San Antonio Creek Valley GSP, Section 2.2.3.3, p.66; Figures 2-2 through 2-4, pp. 67-69; Section 3.1.3.5, pp. 107-108; Table 3-22, p. 227.

⁸³ San Antonio Creek Valley GSP, Section 3.1.4.2, p. 109; Figure 5-3, p. 338; Section 5.3.2, p. 335.

information and corresponding principal aquifer that supplies the respective wells;⁸⁴ limited data for estimates of hydraulic conductivity and specific yield of individual members in both the Paso Robles Formation and the Careaga Sand.⁸⁵ Department staff encourage the GSA to provide a plan and schedule to address the data gaps, discuss whether the data gaps are critical to GSP implementation, and discuss how filling data gaps will impact achieving sustainability.

Department staff conclude that the information provided to characterize the hydrogeologic conceptual model substantially complies with the requirements outlined in the GSP Regulations. In general, the Plan's descriptions of the regional geologic setting, the basin's physical characteristics, the principal aquifer, and hydrogeologic conceptual model appear to utilize the best available information and science. Department staff are aware of no significant inconsistencies or contrary technical information to that presented in the Plan.

4.2.2 Groundwater Conditions

The GSP Regulations require a written description of historical and current groundwater conditions for each of the applicable sustainability indicators and groundwater dependent ecosystems (GDEs) that includes the following: groundwater elevation contour maps and hydrographs,⁸⁶ a graph depicting change in groundwater storage,⁸⁷ maps and cross-sections of the seawater intrusion front,⁸⁸ maps of groundwater contamination sites and plumes,⁸⁹ maps depicting total subsidence,⁹⁰ identification of interconnected surface water systems and an estimate of the quantity and timing of depletions of those systems,⁹¹ and identification of GDEs.⁹²

The GSP provided a total of 56 hydrographs that depict long-term groundwater elevations for the principal aquifers.⁹³ The period of records for hydrographs provided in the GSP vary, but generally begin in the 1980s and extend through 2020. Hydrographs representing groundwater conditions indicate an overall downward trend. The Plan states that instances of greatest groundwater level decline have occurred in the Paso Robles Formation within the last 5 years since 2016 and in the Careaga Sand within the last 6 years since 2015.⁹⁴ The GSP associates these declines with increased groundwater pumping attributed to agricultural irrigation growth from 1981 to 2009 and 2009 level

⁸⁴ San Antonio Creek Valley GSP, Section 5.3.2, p. 339; Section 6.3, p. 380.

⁸⁵ San Antonio Creek Valley GSP, Section 3.1.4.3, p. 109.

⁸⁶ 23 CCR §§ 354.16 (a)(1-2).

⁸⁷ 23 CCR § 354.16 (b).

⁸⁸ 23 CCR § 354.16 (c).

⁸⁹ 23 CCR § 354.16 (d).

⁹⁰ 23 CCR § 354.16 (e).

⁹¹ 23 CCR § 354.16 (f).

⁹² 23 CCR § 354.16 (g).

⁹³ San Antonio Creek Valley GSP, Section 3.2.1.2, pp. 118-127; Appendix D-5, pp. 820-876; Table 5-2, p. 336.

⁹⁴ San Antonio Creek Valley GSP, Section 3.2.1.2, pp. 123, 127.

groundwater pumping through 2018.⁹⁵ The Basin groundwater level changes since 1981 are reflected in the changes in groundwater in storage through 2018.⁹⁶ In the deep aquifer historical low groundwater levels generally occurred in 2015 to 2016, with historical highs in 1976 to 1977. Historical lows in the shallow aquifer generally occurred in 2019 with historical highs in 1978. Hydrographs of groundwater levels are closely associated with storage. Although periods of above-average precipitation are reflected in the hydrographs, groundwater elevations continue to decline as shown in all the hydrographs included in the GSP.

The GSP includes a description of the change in groundwater storage and graphs depicting the change in storage demonstrating the annual and cumulative change in volume of groundwater storage.⁹⁷ The GSP states that the historical total average estimated groundwater storage loss is approximately 10,600 acre-feet per year since water year 1981.⁹⁸

The GSP includes a description of current and historical groundwater quality issues including maps and has identified general minerals, major-ions, total dissolved solids (TDS), arsenic, nitrate, di(2-ethylhexyl)phthalate, iron, manganese, boron, sodium, and chloride as the water quality constituents of interest from previous studies in the Basin.⁹⁹ The GSP states that groundwater quality is “of widely varying quality and generally decreases in quality from east to west coincident with the groundwater flow direction”.¹⁰⁰ Poor groundwater quality within the Basin is associated with historical MCL exceedances of nitrate, arsenic, and di(2-ethylhexyl)phthalate in drinking water occurring in 1989, 1990, and 2011 and SMCL exceedances of total dissolved solids, iron, manganese, and chloride in drinking and agricultural irrigation water.¹⁰¹

The GSP states that the Basin is located far from coastal areas and that seawater intrusion is not relevant in the Basin.¹⁰²

The GSP includes a description of current and historical land subsidence conditions, along with maps, in the Basin.¹⁰³ The maps of current land subsidence cover the extent, cumulative total, and annual rate of subsidence in the Basin. Analysis described in the GSP estimated total potential subsidence on the order of one to two feet over the historical

⁹⁵ San Antonio Creek Valley GSP, Section 3.3.3.2, p. 226; Table 3-22, p. 227; Section 3.3.2.4, pp. 215-216; Appendix E, p. 926.

⁹⁶ San Antonio Creek Valley GSP, Figure 3-63, p. 225; Section 4.5.2.2, p. 279.

⁹⁷ San Antonio Creek Valley GSP, Section 3.3.3.2, pp. 222, 226; Table 3-21, p. 223; Figures 3-62 through 3-63, pp. 224-225.

⁹⁸ San Antonio Creek Valley GSP, Section 3.3.3.2, p. 228.

⁹⁹ San Antonio Creek Valley GSP, Section 3.1.3.4, p. 107; Section 3.2.3, pp. 141-173; Table 3-5, p. 142; Figures 3-32, p. 146; Section 4.8.2.1, pp. 296-297; Section 4.8.4, p. 302.

¹⁰⁰ San Antonio Creek Valley, Section 3.2.3.2, p. 143.

¹⁰¹ San Antonio Creek Valley GSP, Table 3-5, p. 142; Section 3.2.3.1, p. 143.

¹⁰² San Antonio Creek Valley GSP, Executive Summary, p. 36; Section 5.5, p. 343.

¹⁰³ San Antonio Creek Valley GSP, Executive Summary, pp. 41-42; Section 3.2.4, pp. 174-179; Section 4.3.3.4, p. 271.

period which appears relatively consistent with the estimated subsidence rate of 0.5 inches per year reported for a UNAVCO CGPS Station located in the town of Los Alamos.¹⁰⁴ The GSP states that current and historical subsidence monitoring data collected in the Basin suggest that groundwater extraction induced inelastic subsidence has not occurred.¹⁰⁵

The GSP identifies surface water bodies¹⁰⁶ in the basin, which include Barka Slough and intermittent streams such as San Antonio Creek, but states that the “[e]phemeral surface water flows make it difficult to assess the interconnectivity of surface water and groundwater and to quantify the degree to which surface water depletion have occurred.”¹⁰⁷ in the Basin. To fill this data gap, the GSAs plan to investigate the relationship between groundwater pumping in the Basin and groundwater flow into Barka Slough as a management action.¹⁰⁸ The GSP also includes a description of possible GDEs in the Basin along with a map.¹⁰⁹ The GDE assessment was developed and cross referenced with multiple datasets including, but not limited to, the Natural Communities Commonly Associated with Groundwater (NCCAG) dataset, U.S. Fish and Wildlife Service (USFWS), the California Department of Fish and Wildlife (CDFW), The Nature Conservancy (TNC), and local groundwater elevation data.¹¹⁰ The GSP describes threatened/endangered species within the Basin and categorizes their groundwater dependence as direct, indirect, or unknown.¹¹¹ The aquatic and vegetation GDEs identified in the work group were integrated into a single potential GDE map.¹¹² The GSP acknowledges that potential GDE units should be further studied and verified.¹¹³ Department staff agree with the GSA that potential GDE units should be verified through assessment of shallow groundwater data, updated field methodologies, and field verification.

Department staff conclude that, overall, the Plan sufficiently describes the historical and current groundwater conditions in the Basin, based on the best available science and information. Additionally, the information included in the Plan substantially complies with the requirements outlined in the GSP Regulations.

4.2.3 Water Budget

GSP Regulations require a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and

¹⁰⁴ San Antonio Creek Valley GSP, Section 3.2.4.3, p. 177; Appendix D-6, p. 882.

¹⁰⁵ San Antonio Creek Valley GSP, Section 3.2.4.3, p. 177.

¹⁰⁶ San Antonio Creek Valley GSP, Section 3.1.1.3, p. 86.

¹⁰⁷ San Antonio Creek Valley GSP, Section 3.2.5, p. 180.

¹⁰⁸ San Antonio Creek Valley GSP, Section 3.1.4.1, p. 108.

¹⁰⁹ San Antonio Creek Valley GSP, Section 3.2.6.1, pp. 185-186; Figure 3-56, p. 191.

¹¹⁰ San Antonio Creek Valley GSP, Section 3.2.6, p. 185; Section 3.1.3.3, p. 104; Figure 3-10, p. 106; Section 3.2.6.1, p. 188; Section 3.2.6.2, p. 193.

¹¹¹ San Antonio Creek Valley GSP, Table 3-12, p. 194.

¹¹² San Antonio Creek Valley GSP, Section 3.2.6.1, pp. 188-189; Figure 3-56, p. 191.

¹¹³ San Antonio Creek Valley GSP, Section 3.2.6.3, pp. 196-197.

leaving the basin, including historical; current; and projected water budget conditions,¹¹⁴ and the sustainable yield.¹¹⁵

The GSP provides a historical water budget for water year (WY) 1981 through WY 2018, which is an accounting of the total annual volume of surface water and groundwater entering and leaving the basin and the change in the volume of water stored. The GSP utilizes inflow and outflow term estimates and a spreadsheet tool to develop the model budget.¹¹⁶ The water budget information is provided in tabular and graphical form for the surface water^{117, 118} and groundwater systems.^{119, 120} Individual water budget components were developed utilizing publicly available datasets and former studies of Basin hydrological conditions, and given qualitative data rating assessments as summarized in Table 3-14.¹²¹ Many of the water budget inputs are based upon the USGS Basin Characterization Model (BCM), including precipitation, areal recharge, mountain-front recharge, evapotranspiration, and surface runoff (and then adjusted based upon observed data correction factors).¹²² The GSP states “[a] groundwater model developed by the USGS is currently being calibrated as part of a multi-year groundwater basin study¹²³ therefore , “it is necessary to use a spreadsheet tool to develop the water budgets for the Basin.”¹²⁴ Once the study is complete, the GSA expects to utilize the groundwater flow model for basin management purposes.¹²⁵ The GSP also indicates that the water budget will be updated via management actions¹²⁶ and there is a Tier 1 (to be initiated within 1 year of GSP adoption)¹²⁷ management action to address data gaps, which includes reviewing and utilizing the USGS groundwater model. However, the process by which the USGS groundwater model information will be incorporated into the existing water budgets is not described in the Plan.

The GSP states that the average annual change in storage over the historical water budget period (WY 1981-2018) is calculated to be a deficit of 10,600 acre-feet (AF).¹²⁸ The basin yield is estimated at 8,900 acre-feet per year (AFY) based upon the average annual groundwater pumping of 19,500 AF and the average storage deficit. In the Executive Summary the GSA suggests that “basin yield” is synonymous with “safe yield”, where “basin yield” is represented – incorrectly – as being defined by SGMA as “as the

¹¹⁴ 23 CCR §§ 354.18 (a), 354.18 (c) *et seq.*

¹¹⁵ 23 CCR § 354.18 (b)(7).

¹¹⁶ San Antonio Creek Valley GSP, Section 3.3.1, p. 201.

¹¹⁷ San Antonio Creek Valley GSP, Table 3-16 and Table 3-17, pp. 217-218.

¹¹⁸ San Antonio Creek Valley GSP, Figure 3-61, p. 219.

¹¹⁹ San Antonio Creek Valley GSP, Table 3-21, p. 223.

¹²⁰ San Antonio Creek Valley GSP, Figure 3-62 and Figure 3-63, pp. 224-225.

¹²¹ San Antonio Creek Valley GSP, Table 3-14, pp. 208-210.

¹²² San Antonio Creek Valley GSP, Appendix E, Section 2.3-3.1.3, pp. 931-938.

¹²³ San Antonio Creek Valley GSP, Section 3.3.2, p. 206.

¹²⁴ San Antonio Creek Valley GSP, Section 3.3.2, p. 206.

¹²⁵ San Antonio Creek Valley GSP, Section ES-2, p. 26.

¹²⁶ San Antonio Creek Valley GSP, Section 6.1, p. 370.

¹²⁷ San Antonio Creek Valley GSP, Section 6.1, p. 368.

¹²⁸ San Antonio Creek Valley GSP, Section 3.3.3.2, p. 222.

maximum quantity of water that can be continuously withdrawn from a groundwater basin without adverse effect.”¹²⁹ The Plan then defines “basin yield” as “the volume of pumping that can be extracted from the basin on a long-term basis without creating a chronic and continued lowering of groundwater levels and the volume of groundwater in storage.”¹³⁰ The Plan does not include an analysis demonstrating that undesirable results are not occurring, or expected to occur, at the proposed sustainable yield. Department staff note that the cumulative storage change shows a declining trend and encourage the GSA to provide additional information demonstrating that undesirable results are currently not occurring, or expected to occur, in the Basin. The GSP provides a current water budget based on WY 2011 through WY 2018. The Plan states that “[t]his period represents a very dry period overall, which...is considered representative of the current drought conditions.”¹³¹ The current average precipitation and precipitation-related percolation are approximately 77 percent (13,500 AF compared to 17,500 AF) and 66 percent (5,700 AF compared to 8,600 AF) of the historical average, respectively.¹³² The GSP utilizes inflow and outflow term estimates and a spreadsheet tool to develop the current model budget.¹³³ The water budget information is provided in tabular and graphical form for the surface water^{134, 135} and groundwater systems.^{136, 137} During the current water budget period, agricultural groundwater pumping comprised approximately 95 percent of the total pumping and increased by approximately 27 percent when compared to the historical period.¹³⁸ The average annual change in storage associated with the current water budget is a deficit of 17,000 AF.¹³⁹

The GSP provides projected water budgets based upon 50 water years of historical hydrology, to represent WY 2020 through WY 2070 conditions. The hydrogeological framework, geometry, and parameters are the same as those developed for the historic and current water budgets and water budget terms were developed utilizing publicly available datasets and projected into the future utilizing the methodologies summarized in Table 3-14.¹⁴⁰ The projected water budget is provided in tabular and graphical form for the groundwater system.^{141, 142} The projected water budget is provided only in tabular form for the surface water system.¹⁴³

¹²⁹ San Antonio Creek Valley GSP, Section ES-2.6 p. 33.

¹³⁰ San Antonio Creek Valley GSP, Section ES-2.6 p. 33, Section 3.3.1, p. 201.

¹³¹ San Antonio Creek Valley GSP, Section 3.3.1, p. 206.

¹³² San Antonio Creek Valley GSP, Section 3.3.4, p. 229, Table 3-18, p. 221, Table 3-25, p. 232.

¹³³ San Antonio Creek Valley GSP, Section 3.3.1, p. 201.

¹³⁴ San Antonio Creek Valley GSP, Table 3-23 and Table 3-24, pp. 229-230.

¹³⁵ San Antonio Creek Valley GSP, Figure 3-64, p. 230.

¹³⁶ San Antonio Creek Valley GSP, Table 3-21, p. 223.

¹³⁷ San Antonio Creek Valley GSP, Figure 3-65 and Figure 3-66, pp. 235-236.

¹³⁸ San Antonio Creek Valley GSP, Section 3.3.4.2, p. 234.

¹³⁹ San Antonio Creek Valley GSP, Figure 3-65, p. 235.

¹⁴⁰ San Antonio Creek Valley GSP, Table 3-14, pp. 208-210.

¹⁴¹ San Antonio Creek Valley GSP, Table 3-30 to Table 3-31, p. 244.

¹⁴² San Antonio Creek Valley GSP, Figure 3-69 and Figure 3-70, pp. 250-251.

¹⁴³ San Antonio Creek Valley GSP, Table 3-28 to Table 3-29, pp. 242-243.

Projected water budgets were developed through water years 2042 and 2072 using estimated future land uses and related pumping volumes and repeating factors associated with observed historical climatic conditions.¹⁴⁴ The effects of climate change were evaluated using Department-provided climate change factors for the 2030 and 2070 climate change scenarios. It is unclear if 2030 and 2070 factors were combined for the 2042 projected water budget and only 2070 factors were used for the 2072 projected water budget (WY 2043 through WY 2072). Precipitation, evapotranspiration, and streamflow climate change factors were applied to the 50 water years of historic hydrology, which were comprised of water years 1981-2011, 1984-1992, and 1998-2001.

The GSP predicts the basin will be in a state of overdraft without the implementation of projects and management actions stating the average annual change in storage over the projected water budget periods is calculated to be -15,300 AFY and -16,200 AFY for the 2042 and 2072 water budgets, respectively¹⁴⁵.

The estimated “basin yield”¹⁴⁶ for the 2042 and 2072 projected periods are 10,700 AFY and 10,400 AFY, respectively.¹⁴⁷ These estimates are approximately 1,800 AFY and 1,500 AFY higher, respectively, than the estimated safe yield for the historical period. The GSP attributes the differences to increased agricultural return flow and streamflow percolation despite climate change modifiers and increased pumping.¹⁴⁸ The GSP does not make mention of the safe yield being considerate of the sustainable management criteria or it being equal to the sustainable yield as was described regarding the historical water budget safe yield calculations.

The GSP identifies data gaps (identified as assumptions and uncertainty) that the GSA acknowledges need to be addressed to improve the reliability of the water budgets and reduce uncertainty.¹⁴⁹ Department staff encourage the GSA to address the relevant data gaps to reduce uncertainty in the model results as soon as possible, including updating the sustainable yield discussion to demonstrate that undesirable results are not occurring, or expected to occur, at the proposed sustainable yield estimate, especially considering that cumulative changes in groundwater storage show a declining trend over the historical period.¹⁵⁰

Department staff conclude the Plan provides the majority of the required historical, current, and future accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the Basin and projected future water demands, using the best available tools and information available at the time of preparation of the Plan. Department staff recommend the GSA work to understand the reliability of the

¹⁴⁴ San Antonio Creek Valley GSP, Section 3.3.5.1, p. 238.

¹⁴⁵ San Antonio Creek Valley GSP, Table 3-21, p. 223.

¹⁴⁶ San Antonio Creek Valley GSP, Section 3.3.3.2, p. 228.

¹⁴⁷ San Antonio Creek Valley GSP, Section 3.3.5.3, p. 254.

¹⁴⁸ San Antonio Creek Valley GSP, Section 3.3.5.3, p. 254.

¹⁴⁹ White Wolf GSP, Section 9.5.3, pp. 199-200.

¹⁵⁰ San Antonio Creek Valley GSP, Figure 3-63, p. 225.

surface water supply to the Basin in order to develop a projected water surface water budget and revise the estimate of the sustainable yield of the Basin as more data becomes available.

4.2.4 Management Areas

The GSP Regulations provide the option for one or more management areas to be defined within a basin if the GSA has determined that the creation of the management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives, provided that undesirable results are defined consistently throughout the basin.¹⁵¹

This GSP has not defined management areas for the Basin.¹⁵²

4.3 SUSTAINABLE MANAGEMENT CRITERIA

GSP Regulations require each Plan to include a sustainability goal for the basin and to characterize and establish undesirable results, minimum thresholds, and measurable objectives for each applicable sustainability indicator, as appropriate. The GSP Regulations require each Plan to define conditions that constitute sustainable groundwater management for the basin including the process by which the GSA characterizes undesirable results and establishes minimum thresholds and measurable objectives for each applicable sustainability indicator.¹⁵³

4.3.1 Sustainability Goal

GSP Regulations require that GSAs establish a sustainability goal for the basin. The sustainability goal should be based on information provided in the GSP's basin setting and should include an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation.¹⁵⁴

The GSP states the sustainability goal for the Basin is “to sustainably manage the groundwater resources of the Basin for current and future beneficial uses of groundwater, including Barka Slough (Slough), through an adaptive management approach that builds on best available science and monitoring and considers economic, social, and other objectives of Basin stakeholders.”¹⁵⁵

The GSA describes their approach to achieve the sustainability goal through “implementing a number of projects and management actions, including a pumping allocation program, after the GSP is adopted (see Section 6) that will result in basin pumping within the sustainable yield and avoidance of undesirable results within the next 20 years.”¹⁵⁶ The Plan states that it is “intended to be an adaptive plan that allows for

¹⁵¹ 23 CCR § 354.20.

¹⁵² San Antonio Creek Valley GSP, Section 5.2.2, p 326.

¹⁵³ 23 CCR § 354.22 *et seq.*

¹⁵⁴ 23 CCR § 354.24.

¹⁵⁵ San Antonio Creek Valley GSP, Section 4.2, p. 266.

¹⁵⁶ San Antonio Creek Valley GSP, Section 4.2, p. 266.

consideration of observed basin conditions and adaptive management actions through the planning horizon.”¹⁵⁷

The Plan states that the general criteria used to define undesirable results in the Basin is that “there must be significant and unreasonable effects caused by pumping, a minimum threshold is exceeded in a specified number of representative monitoring sites over a prescribed period, [and] significant and unreasonable impacts to beneficial uses occur, including to GDEs and/or threatened or endangered species.”¹⁵⁸

The Plan states that the “[m]inimum thresholds, measurable objectives, and interim milestones have been established to measure sustainability and to assess progress toward meeting the sustainability goal over the next 20 years.”¹⁵⁹

Based on the information provided in the Plan relating to the sustainability goal, Department staff conclude that the Plan substantially complies with the GSP Regulations.

4.3.2 Sustainability Indicators

Sustainability indicators are defined as any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results.¹⁶⁰ Sustainability indicators thus correspond with the six undesirable results – 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 seawater intrusion, significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies, land subsidence that substantially interferes with surface land uses, and depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water¹⁶¹ – but refer to groundwater conditions that are not, in and of themselves, significant and unreasonable. Rather, sustainability indicators refer to the effects caused by changing groundwater conditions that are monitored, and for which criteria in the form of minimum thresholds are established by the agency to define when these effects become significant and unreasonable, constituting an undesirable result.

GSP Regulations require that GSAs provide descriptions of undesirable results including defining what are significant and unreasonable potential effects to beneficial uses and users for each sustainability indicator.¹⁶² GSP Regulations also require GSPs provide the criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based

¹⁵⁷ San Antonio Creek Valley GSP, Section 4.2, p. 266.

¹⁵⁸ San Antonio Creek Valley GSP, Section 4.3.2, p. 268.

¹⁵⁹ San Antonio Creek Valley GSP, Section 4.2, p. 266.

¹⁶⁰ 23 CCR § 351(ah).

¹⁶¹ Water Code § 10721(x).

¹⁶² 23 CCR §§ 354.26 (a), 354.26 (b)(c).

on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.¹⁶³

GSP Regulations require that the description of minimum thresholds include the information and criteria relied upon to establish and justify the minimum threshold for each sustainability indicator.¹⁶⁴ GSAs are required to describe how conditions at minimum thresholds may affect beneficial uses and users,¹⁶⁵ and the relationship between the minimum thresholds for each sustainability indicator, including an explanation for how the GSA has determined conditions at each minimum threshold will avoid causing undesirable results for other sustainability indicators.¹⁶⁶

GSP Regulations require that GSPs include a description of the criteria used to select measurable objectives, including interim milestones, to achieve the sustainability goal within 20 years.¹⁶⁷ GSP Regulations also require that the measurable objectives be established based on the same metrics and monitoring sites as those used to define minimum thresholds.¹⁶⁸

The following subsections thus consolidate these three facets of sustainable management criteria: undesirable results, minimum thresholds, and measurable objectives. Information, as presented in the Plan, pertaining to the processes and criteria relied upon to define undesirable results applicable to the basin, as quantified through the establishment of minimum thresholds, are addressed for each applicable sustainability indicator. A submitting agency is not required to establish criteria for undesirable results that the agency can demonstrate are not present and are not likely to occur in a basin.¹⁶⁹

4.3.2.1 Chronic Lowering of Groundwater Levels

In addition to components identified in 23 CCR §§ 354.28 (a-b), for the chronic lowering of groundwater, the GSP Regulations require the minimum threshold for chronic lowering of groundwater levels to be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results that is supported by information about groundwater elevation conditions and potential effects on other sustainability indicators.¹⁷⁰

The GSP provides a qualitative objective to “help stakeholders understand the overall purpose for sustainably managing groundwater resources (e.g., Avoid Chronic Lowering of Groundwater Levels) and reflect the local economic, social, and environmental values within the Basin.”¹⁷¹ For chronic lowering of groundwater levels, the qualitative objective

¹⁶³ 23 CCR § 354.26 (b)(2).

¹⁶⁴ 23 CCR § 354.28 (b)(1).

¹⁶⁵ 23 CCR § 354.28 (b)(4).

¹⁶⁶ 23 CCR § 354.28 (b)(2).

¹⁶⁷ 23 CCR § 354.30 (a).

¹⁶⁸ 23 CCR § 354.30 (b).

¹⁶⁹ 23 CCR § 354.26 (d).

¹⁷⁰ 23 CCR § 354.28(c)(1) *et seq.*

¹⁷¹ San Antonio Creek Valley GSP, Section 4.2.1, p. 266.

is to “[m]aintain groundwater levels that continue to support current and future groundwater uses and sustain the health of Barka Slough in the Basin.”¹⁷² The GSP characterizes significant and unreasonable groundwater declines as:

- “An acute or chronic, measurable significant and unreasonable impact to GDEs associated with interconnected surface water, specifically Barka Slough, caused by groundwater pumping in the Basin (during periods of average or above-average precipitation measured at the Los Alamos Fire Station gage).
- Lowering of groundwater levels results in an inability to produce estimated annual volume of groundwater equal to the sustainable yield for the Basin determined using the water budget method described in this GSP.”¹⁷³

The GSP states that significant or unreasonable effects associated with groundwater decline have not occurred based on groundwater users’ input. The GSP describes conditions that may cause an undesirable result such as an extended drought or high rates of pumping in both principal aquifers (i.e., the Paso Robles Formation or the Careaga Sand aquifers).¹⁷⁴ The GSP also acknowledges that if groundwater extraction rates continue at historic rates and drought conditions persist, undesirable results may occur in the future.¹⁷⁵ The GSP adds that overpumping could affect well production and discharge to Barka Slough and associated GDEs.

The GSP quantitatively defines undesirable results from chronic lowering of groundwater levels to occur when levels in the Paso Robles Formation or Careaga Sand drop below the minimum threshold after periods of average and above-average precipitation¹⁷⁶ in 50 percent of representative wells for 2 consecutive years.¹⁷⁷ However, the GSP does not provide rationale for why the minimum threshold would need to be exceeded at fifty percent of the wells to be considered an undesirable result. Department staff encourage the GSA to disclose this rationale or revise the definition to be based on what is considered to be adverse effects of depletion of supply to beneficial uses and users.

The Plan describes the criteria used to establish undesirable results for chronic lowering of groundwater as being based on information gathered at public meetings, historic groundwater level data plotted versus time, depths and locations of existing wells, maps of current and historic groundwater levels, mapped locations of GDEs, analysis of the

¹⁷² San Antonio Creek Valley GSP, Section 4.2.1, p. 266.

¹⁷³ San Antonio Creek Valley GSP, Section 4.5.1, p. 275.

¹⁷⁴ San Antonio Creek Valley GSP, Section 4.5.1, p. 274.

¹⁷⁵ San Antonio Creek Valley GSP, Section 4.5.1, p. 275.

¹⁷⁶ As noted in the GSP: For the purposes of the Chronic Lowering of Groundwater Levels Sustainability Indicator Minimum Threshold, the total recorded precipitation from the preceding 3 water years will be used to determine if periods of average or above precipitation have occurred. Because climate change will likely have an effect on precipitation, a 20-year moving average will be utilized to determine average precipitation.

¹⁷⁷ San Antonio Creek Valley GSP, Section 4.5.1, p. 275.

potential impact of lowered groundwater levels, and projected future water budget “to estimate the amount of pumping that can be sustained annually.”¹⁷⁸

The minimum thresholds for chronic lowering of groundwater levels are set 25 feet below fall 2018 water levels.¹⁷⁹ The GSA’s rationale for the minimum threshold is based on the GSA’s well impact analysis and stakeholder feedback that “setting the minimum threshold for water levels at 25 feet below fall 2018 water levels will not result in depletion of supply or undesirable results... [and] allows time for project and management actions to be implemented before minimum thresholds are reached.”¹⁸⁰ The minimum thresholds for the Basin are presented in Table 4.1 of the GSP.¹⁸¹ The well impact analysis used 61 of the 423 well completion reports, selecting a combination of agricultural, municipal, and domestic wells screened in principal aquifers within the Basin based on known location and well construction information.¹⁸² The Plan states that “groundwater elevations in fall 2018 were below top of screen in 20 percent of domestic wells, 12 percent of agricultural wells, and no municipal supply wells. As expected, the analysis indicates that as water levels decline further, the number of wells and percentages of the different types of wells with water level below top of screen increase, but not significantly.”¹⁸³ The Plan goes on to state that the “well impact analysis presented in Section 3.2 indicates that the majority of the agricultural and domestic wells can tolerate additional groundwater level decline without experiencing undesirable results.

The measurable objectives for chronic lowering of groundwater levels are set at the groundwater level measured in spring 2015 at each RMS.¹⁸⁴ The Plan states that the “measurable objective levels were set so that: (1) declining water level trends caused by pumping do not continue to occur and (2) water levels stabilize with no chronic decline that continues during average and above-average rainfall conditions. With stakeholder input, the measurable objective groundwater elevation at representative wells was set at spring 2015 elevations when SGMA was enacted.”¹⁸⁵ The measurables objectives for the Basin are presented in Table 4.1 of the GSP.¹⁸⁶

The Plan states that interim milestones are established “to show how the [GSA] would move from current conditions to meeting the measurable objectives in the 20-year GSP implementation horizon.

The GSP states “there is no adjacent downstream groundwater basin; therefore, this section of the SGMA regulations [Effects of Minimum Thresholds on Neighboring Basins]

¹⁷⁸ San Antonio Creek Valley GSP, Section 4.3.3.1, pp. 269-270.

¹⁷⁹ San Antonio Creek Valley GSP, Section 4.5.2.1, p. 279.

¹⁸⁰ San Antonio Creek Valley GSP, Section 4.5.2, p. 277.

¹⁸¹ San Antonio Creek Valley GSP, Table 4-1, p. 278.

¹⁸² San Antonio Creek Valley GSP, Section 4.5.2, p. 277.

¹⁸³ San Antonio Creek Valley GSP, Section 4.5.2, p. 277.

¹⁸⁴ San Antonio Creek Valley GSP, Section 4.5.3.2, p. 283.

¹⁸⁵ San Antonio Creek Valley GSP, Section 4.5.3.1, p. 283.

¹⁸⁶ San Antonio Creek Valley GSP, Table 4-1, p. 278.

is not applicable to the Basin or this GSP.”¹⁸⁷ The Plan also states “[t]he minimum thresholds set for chronic groundwater level decline are protective of all beneficial uses and do not result in undesirable effects for the other sustainability indicators.”¹⁸⁸ However, as discussed in Section 4.2.1 Hydrogeologic Conceptual Model, Department staff encourage the GSA investigate the groundwater interaction with adjacent groundwater basins given the planned groundwater management in the Basin.

Department staff conclude that the sustainable management criteria for groundwater levels are generally commensurate with the understanding of the basin setting, responsive to interested party feedback, and reasonably consider the groundwater uses and users in the Basin. However, Department staff have identified components of the sustainable management criteria that should be reevaluated and revised by the first periodic evaluation of the Plan, as discussed below and highlighted in the recommended corrective actions identified in section 5.

The Plans includes only average and above-average precipitation years (i.e., excludes dry and critically dry years) in the definition of undesirable results even though the Plan recognizes undesirable results due to chronic lowering of groundwater levels may occur if groundwater pumping exceeds the sustainable yield regardless of water year type.¹⁸⁹ Department staff note that SGMA includes a provision which states, “overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.”¹⁹⁰ If the GSA intends to incorporate this concept into their definition of the undesirable result for chronic lowering of groundwater levels, the GSP must identify specific extraction and groundwater recharge management actions the GSA would implement or otherwise describe how the Basin would be managed to offset – by increases in groundwater levels or storage during non-drought periods – dry year reductions of groundwater storage.¹⁹¹ The GSP identifies potential management actions and projects that, once implemented, may lead to the elimination of long-term overdraft conditions in the Basin. However, the GSP states that only a select number of management actions described as Tier 1 and Tier 2 will be implemented within three years of GSP adoption. The Plan does not provide sufficient detail on how these projects and management actions, in conjunction with the proposed chronic lowering of groundwater levels sustainable management criteria, will offset drought-related groundwater reductions and avoid significant and unreasonable impacts when groundwater level minimum thresholds are potentially exceeded for an extended period in the absence of two consecutive non-dry years. Department staff recommend

¹⁸⁷ San Antonio Creek Valley GSP, Section 4.5.2.3, p. 281.

¹⁸⁸ San Antonio Creek Valley GSP, Section 4.5.2.2, p. 280.

¹⁸⁹ San Antonio Creek Valley GSP, Section 4.5.1, pp. 274-275.

¹⁹⁰ Water Code § 10721(x)(1).

¹⁹¹ 23 CCR § 354.44 (b)(9).

the GSA revise their definition of undesirable results to include all water year types and further evaluate how the proposed projects and management actions may offset any potential overdraft conditions (see [Recommended Corrective Action 1a](#)).

The GSA conducted a well impact analysis to determine where to establish the minimum thresholds for groundwater levels and how those groundwater levels may impact beneficial uses and users. The well impact analyses compared fall 2018 water levels to available well infrastructure. As documented in the Plan and discussed above, the well impact analyses predicted various percentages of agricultural wells, municipal wells, and domestic wells that would have their water levels fall below the top of the well screens at minimum threshold levels. However, the Plan does not describe or explicitly assess the quantity, percentage, or location of wells that may experience more permanent impacts such as lowering of water levels below pump intakes or wells going completely dry. Department staff recommend the GSA analyze where the proposed minimum thresholds are set relative to well construction information that would indicate whether or not more substantial impacts to beneficial users are occurring (i.e., depth of pump intake, bottom of the screen interval, well dewatering) (see [Recommended Corrective Action 1b](#)).

Department staff conclude that the established minimum thresholds and measurable objectives for chronic lowering of groundwater levels appear commensurate with the GSAs' understanding of the Basin's current and historical groundwater level conditions and considers beneficial use and users in the Basin. Staff also conclude that in general, the Plan adequately addresses the specific requirements of in the GSP Regulations. However, as highlighted in the recommended corrective actions above, the Plan should include additional supporting technical details that provides further description and disclosure regarding how the minimum thresholds and related definition of undesirable results for groundwater levels will help the GSA achieve its sustainability goal and avoid a depletion of supply.

4.3.2.2 Reduction of Groundwater Storage

In addition to components identified in 23 CCR §§ 354.28 (a-b), for the reduction of groundwater storage, the GSP Regulations require the minimum threshold for the reduction of groundwater storage to be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.¹⁹²

The Plan states that “[based] on well-established hydrogeologic principles, maintaining long-term stability in groundwater levels above the minimum threshold for chronic

¹⁹² 23 CCR § 354.28(c)(2).

lowering of groundwater levels will limit continued depletion of groundwater from storage.”¹⁹³

The Plan’s proposed minimum thresholds for the reduction of groundwater storage uses groundwater levels as a proxy.¹⁹⁴ The Plan states that “minimum threshold for reduction of groundwater in storage is based on the groundwater level minimum thresholds established for chronic groundwater level decline at RMSs.”¹⁹⁵

The GSP provides a description of the potential causes of reduction of groundwater storage undesirable results and the possible effects on beneficial uses and users in the Basin.

Being that groundwater levels are used as a proxy for reduction in groundwater storage, the GSP should be revised to reflect any modifications to the chronic lowering of groundwater levels sustainable management criteria (see Recommended Corrective Action 2).

4.3.2.3 Seawater Intrusion

In addition to components identified in 23 CCR §§ 354.28 (a-b), for seawater intrusion, the GSP Regulations require the minimum threshold for seawater intrusion to be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results.¹⁹⁶

The GSP states that the “Basin is located approximately 8 miles inland from the Pacific Ocean and a bedrock high is located at the western end of the Basin...Consequently, the seawater intrusion sustainability indicator is not applicable in the Basin,”¹⁹⁷ Therefore, sustainable management criteria were not developed for seawater intrusion.

As the Basin is located inland, away from the ocean, Department staff concur with the GSP’s rationale for not defining sustainable management criteria for seawater intrusion.

4.3.2.4 Degraded Water Quality

In addition to components identified in 23 CCR §§ 354.28 (a-b), for degraded water quality, the GSP Regulations require the minimum threshold for degraded water quality to be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin.

¹⁹³ San Antonio Creek Valley GSP, Section 4.6.2, p. 289.

¹⁹⁴ San Antonio Creek Valley GSP, Section 4.6.2, p. 289.

¹⁹⁵ San Antonio Creek Valley GSP, Section 4.6.2, p. 289.

¹⁹⁶ 23 CCR § 354.28(c)(3).

¹⁹⁷ San Antonio Creek Valley GSP, Section 5.5, p 343.

In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.¹⁹⁸

The GSP provides a qualitative objective of avoiding degraded groundwater quality as to “[m]aintain access to drinking water supplies, [m]aintain access to agricultural water supplies, [and m]aintain quality consistent with current ecosystem uses.”¹⁹⁹ The GSP characterizes significant and unreasonable results for groundwater quality as when:

- “Concentrations of regulated contaminants in untreated groundwater from private domestic wells, agricultural wells. or municipal wells exceed regulatory thresholds as a result of pumping or SABGSA activities.
- Groundwater pumping or SABGSA activities cause concentrations of TDS, chloride, sulfate, boron, sodium, and nitrate to increase and exceed WQOs since SGMA was enacted in January 2015.”²⁰⁰

The GSP does not explicitly establish a quantitative definition of undesirable results related to the degradation of water quality. Rather, the GSA intends to “avoid increased degradation of groundwater quality from baseline concentrations since enactment of SGMA in January 2015.”²⁰¹ The GSP currently establishes a minimum threshold for degraded groundwater quality as WQOs for “TDS, chloride, sulfate, boron, sodium, and nitrate as measured by SWRCB ILRP and DDW programs in 20 percent of wells monitored. In cases where the ambient (prior to January 2015) water quality exceeds the WQO, the minimum threshold concentration is 110 percent of the ambient water quality in 20 percent of the wells.”²⁰² It appears to Department staff that the GSA is conflating the establishment of minimum thresholds with defining quantitative criteria for undesirable results. Department staff do not believe this oversight should preclude GSP approval at this time, because the GSP states the goal of the GSA's management is to avoid increased degradation of groundwater quality beyond January 2015 conditions and incorporates the Basin Plan WQOs as sustainable management criteria. Department staff suggest that the GSA revisit the quantitative definition of an undesirable result and provide a quantitative description of the combination of minimum threshold exceedances that would be expected to cause significant and unreasonable effects in the Basin, as required by the GSP Regulations²⁰³ (see [Recommended Corrective Action 2](#)).

The GSP states that the purpose of the “minimum thresholds for constituents of concern in this Basin is to avoid increased degradation of groundwater quality from baseline concentrations measured since enactment of SGMA in January 2015.”²⁰⁴ The GSP states that the degraded water quality minimum thresholds will not negatively impact beneficial

¹⁹⁸ 23 CCR § 354.28(c)(4).

¹⁹⁹ San Antonio Creek Valley GSP, Section 4.2.1, p. 267.

²⁰⁰ San Antonio Creek Valley GSP, Section 4.8.1, p. 294.

²⁰¹ San Antonio Creek Valley GSP, Section 4.8.2, p. 295.

²⁰² San Antonio Creek Valley GSP, Section 4.8.2.2, p. 297.

²⁰³ 23 CCR § 354.26(b)(2).

²⁰⁴ San Antonio Creek Valley GSP, Section 4.8.2, p. 295.

uses and users as they are based on the Water Quality Objectives (WQOs) established in the Basin Plan and are conducive to water quality suitable for each beneficial user.²⁰⁵ The GSA plans to assess the minimum thresholds through direct measurement for the existing or new municipal, domestic and agricultural wells. The Plan states that “[e]xceedances of regulatory standards and WQOs will be assessed on an annual basis in accordance with the monitoring program.”²⁰⁶

The Plan states that the measurable objective for “salts and nutrients (TDS, chloride, sulfate, boron, sodium, and nitrate) is to maintain groundwater quality equal to or below WQO presented in the Basin Plan, or equal to or below concentrations present in groundwater when SGMA was enacted.”²⁰⁷ The GSP states that interim milestones were not established for degraded water quality because no significant or unreasonable results have been observed in the Basin.²⁰⁸

Department staff conclude that the sustainable management criteria for the degradation of water quality are generally commensurate with the understanding of the basin setting and reasonably consider the groundwater uses and users in the Basin. However, Department staff have identified components of the sustainable management criteria that should be revised and reevaluated by the first Periodic Evaluation, as discussed below and highlighted in the recommended corrective actions included in Section 5.

4.3.2.5 Land Subsidence

In addition to components identified in 23 CCR §§ 354.28 (a-b), the GSP Regulations require the minimum threshold for land subsidence to be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results.²⁰⁹ Minimum thresholds for land subsidence shall be supported by identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency’s rationale for establishing minimum thresholds in light of those effects and maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum thresholds and measurable objectives.²¹⁰

The GSP states that the qualitative objective for land subsidence is to “[p]revent land subsidence that causes significant and unreasonable effects to groundwater supply, land uses, infrastructure, and property interests.”²¹¹ The GSP characterizes significant and unreasonable results for land subsidence as:

²⁰⁵ San Antonio Creek Valley GSP, Section 4.8.2.5, p. 299.

²⁰⁶ San Antonio Creek Valley GSP, Section 4.8.2.7, p 300.

²⁰⁷ San Antonio Creek Valley GSP, Section 4.8.2, p 301.

²⁰⁸ San Antonio Creek Valley GSP, Section 4.8.4, p 302.

²⁰⁹ 23 CCR § 354.28(c)(5).

²¹⁰ 23 CCR §§ 354.28(c)(5)(A-B).

²¹¹ San Antonio Creek Valley GSP, Section 4.2.1, p. 267.

- “Groundwater extraction results in subsidence that substantially interferes with surface land uses (including agricultural, residential, rural residential, and town buildings) and property interests.
- Groundwater extraction results in subsidence that causes land surface deformation that impacts the use of critical infrastructure (including LACSD wells, WWTP, and associated infrastructure) and roads.
- Groundwater extraction results in land subsidence greater than minimum thresholds at the UNAVCO CGPS Station ORES.”²¹²

The GSP explains that InSAR and UNAVCO data were used to evaluate land surface elevation changes throughout the Plan area. The Plan states that InSAR data show “that meaningful (greater than the range of uncertainty of InSAR data) land subsidence did not occur during the period between June 2015 and June 2019).”²¹³ UNAVCO GPS Stations estimated that land surface elevations declined approximately 0.82 feet from 2000 to 2020.²¹⁴ The GSA conducted an additional evaluation to supplement the InSAR and UNAVCO data by assessing the long-term land surface elevation changes caused by groundwater extraction.²¹⁵ The GSP states that an undesirable result would occur if “...subsidence caused by groundwater extraction exceeds the minimum threshold and causes damage to structures and infrastructure and substantially interferes with land uses.”²¹⁶ The GSP does not include a quantitative definition of minimum thresholds that would constitute an undesirable result; however, since the GSP only proposes to have one representative monitoring point, Department staff assume any exceedance at this location would be considered an undesirable result.

The GSP sets the minimum threshold for land subsidence to “not exceed 0.05 feet (0.6 inches) per year for 3 consecutive years measured at the UNAVCO CGPS Station ORES.”²¹⁷ The Plan explains that this “minimum threshold was selected because undesirable results have not been observed in the last 20 years and this rate of subsidence would indicate an increased rate of subsidence compared to the average rate of subsidence measured at the UNAVCO CGPS Station ORES from 2000 to 2020 (0.04 feet or 0.5 inches per year).” The minimum thresholds for the Basin are presented in Table 4.4 of the GSP.²¹⁸

Department staff question whether one representative monitoring point for the entire basin is sufficient to adequately represent conditions throughout the basin. For more

²¹² San Antonio Creek Valley GSP, Section 4.2.1, p. 267.

²¹³ San Antonio Creek Valley GSP, Section 4.9.1, p 303.

²¹⁴ San Antonio Creek Valley GSP, Section 4.9.1, p 303.

²¹⁵ San Antonio Creek Valley GSP, Appendix D, pp. 877-916.

²¹⁶ San Antonio Creek Valley GSP, Section 4.9.1, p 303.

²¹⁷ San Antonio Creek Valley GSP, Section 4.9.2, p 305.

²¹⁸ San Antonio Creek Valley GSP, Table 4-4, p 306.

information on recommendations related to the land subsidence monitoring network, see [Section 4.6 Monitoring Network](#).

The GSP states that the measurable objectives “are set based on maintaining current conditions and changes and are measured by UNAVCO CGPS station data.”²¹⁹ The measurable objectives for the Basin are presented in Table 4.5 of the GSP.²²⁰ The interim milestone for land subsidence is not established because no significant or unreasonable conditions have been observed.²²¹

Department staff conclude that the GSP adequately describes the sustainable management criteria and approach to managing land subsidence. Department staff also believe the Agency used the best information and science available at the time of Plan development. Department staff have also identified components of the sustainable management criteria for subsidence that should be revised or clarified by the first Periodic Evaluation, as discussed above and highlighted in the recommended corrective action.

4.3.2.6 Depletions of Interconnected Surface Water

SGMA defines undesirable results for the depletion of interconnected surface water as those that have significant and unreasonable adverse impacts on beneficial uses of surface water and are caused by groundwater conditions occurring throughout the basin.²²² The GSP Regulations require that a Plan identify the presence of interconnected surface water systems in the basin and estimate the quantity and timing of depletions of those systems.²²³ The GSP Regulations further require that minimum thresholds be set based on the rate or volume of surface water depletions caused by groundwater use, supported by information including the location, quantity, and timing of depletions, that adversely impact beneficial uses of the surface water and may lead to undesirable results.²²⁴

The Plan acknowledges the presence of interconnected surface waters in the Basin and identifies their location at the Barka Slough. The GSP states interconnected surface water was identified through an “analysis of surface water discharges leaving Barka Slough at the Casmalia stream gage and results from the water budget computations.”²²⁵ The GSP appears to consider only the Barka Slough area as an interconnected surface water system and does not provide a figure specifically identifying interconnected surface water or potential interconnected surface water locations.²²⁶ Several locations outside of Barka

²¹⁹ San Antonio Creek Valley GSP, Section 4.9.3.1, p 308.

²²⁰ San Antonio Creek Valley GSP, Table 4-5, p 309.

²²¹ San Antonio Creek Valley GSP, Section 4.9.4, p 309.

²²² Water Code § 10721(x)(6).

²²³ 23 CCR § 354.16 (f).

²²⁴ 23 CCR § 354.28 (c)(6).

²²⁵ San Antonio Creek Valley GSP, Section 4.10.2, p. 314.

²²⁶ San Antonio Creek Valley GSP, Section 3.2.5, p. 181.

Slough area are known to be fed by springs or seeps²²⁷ and support GDEs;²²⁸ however, the GSP appears to discount these areas as potential ISW locations as it is “unknown whether the groundwater source of these springs or seeps is from the underlying principal aquifer or from perched water.”²²⁹

The GSP does not quantify the rate or volume of surface water depletions due to groundwater pumping as the sustainable management criteria as required by the GSP Regulations.²³⁰ Instead, the GSP proposes to set minimum thresholds using surface water discharge at stream gages.²³¹ The GSP states “[b]ecause the USGS model for the Basin is still under development and could not be used to estimate depletion.”²³² Instead, the GSP used other methods “including analysis of surface water discharges leaving Barka Slough at the Casmalia stream gage and results from the water budget computations.”²³³ The sustainable management criteria developed by the GSP are “based on the best available information, focusses on avoiding depletion and maintaining surface water and groundwater flow entering and leaving the Slough.”²³⁴ The GSP states this is an interim approach “[u]ntil more is known about the relationship between groundwater and surface water in the vicinity of the Slough and depletion can be quantified and monitored.”²³⁵ The lack of data does not amount to a technical justification for the use of groundwater contributions to instream flows instead of depletions of interconnected surface water due to pumping as required by GSP Regulations. Department staff note the GSP does not demonstrate, with adequate evidence, that the use of this alternate method based on a surface water balance is sufficient to quantify the location, quantity, and timing of depletions.

For depletion of interconnected surface water, the qualitative objective is to “[a]void significant and unreasonable effects to beneficial uses, including GDEs, caused by groundwater extraction [and m]aintain sufficient groundwater levels to maintain areas of interconnected surface water as of January 2015 when SGMA was enacted.”²³⁶ The GSP states, “significant and unreasonable depletion of surface water and reduction of groundwater flowing into the Slough causing impacts to GDEs at the Slough would include the following undesirable result: Permanent loss or significant degradation of existing native riparian or aquatic habitat due to lowered groundwater levels and reduced surface water flow into Barka Slough caused by groundwater pumping.”²³⁷

²²⁷ San Antonio Creek Valley GSP, Section 3.2.5, p. 181.

²²⁸ San Antonio Creek Valley GSP, Section 3.2.6, p. 189.

²²⁹ San Antonio Creek Valley GSP, Section 3.2.5, p. 180.

²³⁰ 23 CCR § 354.28 (c)(6).

²³¹ San Antonio Creek Valley GSP, Section 4.10.2, p. 317.

²³² San Antonio Creek Valley GSP, Section 4.10.2, pp. 313-314.

²³³ San Antonio Creek Valley GSP, Section 4.10.2, pp. 313-314.

²³⁴ San Antonio Creek Valley GSP, Section 4.10.2, p. 317.

²³⁵ San Antonio Creek Valley GSP, Section 4.10.2, p. 317.

²³⁶ San Antonio Creek Valley GSP, Section 4.2.1, p. 267.

²³⁷ San Antonio Creek Valley GSP, Section 4.10.1, p. 311.

The GSP describes conditions that may cause an undesirable result for interconnected surface water such as an extended drought or high rates of pumping in both principal aquifers (i.e., the Paso Robles Formation or the Careaga Sand aquifers).²³⁸ The GSP adds that overpumping could affect well production and discharge to Barka Slough and associated groundwater dependent ecosystems. As the GSP states, increased pumping due to proposed golf course would exacerbate this problem.²³⁹

The GSP set the minimum threshold for interconnected surface water to an average based flow²⁴⁰ of “0.15 cfs of surface water flow measured at the Casmalia stream gage west of the Slough.”²⁴¹ The Plan acknowledges the “[s]lough exhibits a diverse and complex interaction between surface water and groundwater and determination of what portions of the Slough are sustained by surface water flows and areas sustained by groundwater is not straightforward” and the minimum threshold is “based on the best available information, focusses on avoiding depletion and maintaining surface water and groundwater flow entering and leaving the Slough.”²⁴² The minimum thresholds for the Basin are presented in Table 4.6 of the GSP.²⁴³

The GSP states that the measurable objective “is surface water flow measured at the Casmalia stream gage equal to the geometric mean flow (0.5 cfs) between 2015 and 2018 (since enactment of SGMA through the end of the historical and current water budget).”²⁴⁴ The measurable objectives for the Basin are presented in Table 4.7 of the GSP.^{245, 246}

The GSP discusses the relationship between the interconnected surface water minimum thresholds and the other sustainability indicators applicable to the Plan area.²⁴⁷ The GSP also discusses the impact of the minimum thresholds on neighboring basins and management areas. The Plan states the interconnected surface water minimum thresholds are not anticipated to negatively impact beneficial uses and users, however it is not clear to Department staff whether the GSP has fully evaluated the potential impacts of future climate change on the establishment of the minimum threshold and what actions will take place if these impacts occur.

The interim milestone for interconnected surface water is not established because no significant or unreasonable conditions have been observed.²⁴⁸ While the GSP concludes

²³⁸ San Antonio Creek Valley GSP, Section 4.10.1, p 310.

²³⁹ San Antonio Creek Valley GSP, Section 4.5.1, p. 274.

²⁴⁰ As noted in the GSP: Measured over 3 consecutive months from June to September.

²⁴¹ San Antonio Creek Valley GSP, Section 4.10.2, p. 317.

²⁴² San Antonio Creek Valley GSP, Section 4.10.2, p. 317.

²⁴³ San Antonio Creek Valley GSP, Table 4-6, p 317.

²⁴⁴ San Antonio Creek Valley GSP, Section 4.10.3, p. 321.

²⁴⁵ San Antonio Creek Valley GSP, Table 4-7, p 322.

²⁴⁶ As noted in the GSP: The measurable objective value is reported as geometric mean daily discharge measured in cubic feet per second at the Casmalia stream gage between 2015-2018.

²⁴⁷ San Antonio Creek Valley GSP, Section 4.10.2.1, p. 319.

²⁴⁸ San Antonio Creek Valley GSP, Section 4.10.4, p 322.

that significant and unreasonable impacts are not anticipated to occur, Department staff encourage the GSA to consider establishing interim milestones for interconnected surface water.

Department staff understand that quantifying depletions of surface water from groundwater extractions is a complex task that likely requires developing new, specialized tools, models, and methods to understand local hydrogeologic conditions, interactions, and responses. During the initial review of GSPs, Department staff have observed that most GSAs have struggled with this new requirement of SGMA. However, staff believe that most GSAs will more fully comply with regulatory requirements after several years of Plan implementation that includes projects and management actions to address the data gaps and other issues necessary to understand, quantify, and manage depletions of interconnected surface waters. Accordingly, Department staff believes that affording GSAs adequate time to refine their Plans to address interconnected surface waters is appropriate and remains consistent with SGMA's timelines and local control preferences.

The Department will continue to support GSAs in this regard by providing, as appropriate, financial and technical assistance to GSAs, including the development of guidance describing appropriate methods and approaches to evaluate the rate, timing, and volume of depletions of interconnected surface water caused by groundwater extractions. Once the Department's guidance related to depletions of interconnected surface water is publicly available, the GSA, where applicable, should consider incorporating appropriate guidance approaches into their future periodic updates to the GSP (see [Recommended Corrective Action 3a](#)). GSAs should consider availing themselves of the Department's financial or technical assistance, but in any event must continue to fill data gaps, collect additional monitoring data, and implement strategies to better understand and manage depletions of interconnected surface water caused by groundwater extractions and define segments of interconnectivity and timing within their jurisdictional area (see [Recommended Corrective Action 3b](#)). Furthermore, GSAs should coordinate with local, state, and federal resources agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion (see [Recommended Corrective Action 3c](#)).

4.4 MONITORING NETWORK

The GSP Regulations describe the monitoring network that must be developed for each sustainability indicator including monitoring objectives, monitoring protocols, and data reporting requirements. Collecting monitoring data of a sufficient quality and quantity is necessary for the successful implementation of a groundwater sustainability plan. The GSP Regulations require a monitoring network 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.²⁴⁹

²⁴⁹ 23 CCR § 354.32.

Specifically, a monitoring network must be able to monitor impacts to beneficial uses and users,²⁵⁰ monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds,²⁵¹ capture seasonal low and high conditions,²⁵² include required information such as location and well construction and include maps and tables clearly showing the monitoring site type, location, and frequency.²⁵³ Department staff encourage GSAs to collect monitoring data as specified in the GSP, follow SGMA data and reporting standards,²⁵⁴ fill data gaps identified in the GSP prior to the first periodic evaluation,²⁵⁵ update monitoring network information as needed, follow monitoring best management practices,²⁵⁶ and submit all monitoring data to the Department's Monitoring Network Module immediately after collection including any additional groundwater monitoring data that is collected within the Plan area that is used for groundwater management decisions. Department staff note that if GSAs do not fill their identified data gaps, the GSA's basin understanding may not represent the best available science for use to monitor basin conditions.

The GSP has identified 50 wells to include in the groundwater level monitoring network.²⁵⁷ All wells in the monitoring network are screened within the principal aquifers of the Basin.²⁵⁸ A total of 15 representative monitoring wells are used as representative monitoring sites in the Basin.²⁵⁹ There are a total of 51 wells uploaded to the Department's Sustainable Groundwater Management Act Portal's Monitoring Network Module (MNM). The MNM is consistent with the GSP regarding the 15 representative monitoring sites in the monitoring network. The Department's review of the groundwater level monitoring network is based on information provided in the MNM rather than the information provided in the GSP. The GSP identifies the principal aquifer that each well is monitoring—27 wells are screened in the Careaga Sand, and 23 wells are screened in the Paso Robles Formation.²⁶⁰

The GSP states that 10 wells in the groundwater level monitoring network are equipped with pressure transducers that measure groundwater levels every four hours and that are calibrated each quarter. For the remaining wells in the network, the GSP measures groundwater levels semi-annually to quarterly.²⁶¹ The GSP does not include information regarding how semi-annual or quarterly data collection is frequent enough to characterize

²⁵⁰ 23 CCR § 354.34(b)(2).

²⁵¹ 23 CCR § 354.34(b)(3).

²⁵² 23 CCR § 354.34(c)(1)(B).

²⁵³ 23 CCR §§ 354.34(g-h).

²⁵⁴ 23 CCR § 352.4 *et seq.*

²⁵⁵ 23 CCR § 354.38(d).

²⁵⁶ Department of Water Resources, 2016, [Best Management Practices and Guidance Documents](#).

²⁵⁷ San Antonio Creek Valley GSP, Executive Summary, p. 41; Section 5.3, p. 328; Table 5-1, pp. 329-330; Figure 3-11, p. 111; Figure 5-1, p. 331.

²⁵⁸ San Antonio Creek Valley GSP, Table 5-1, pp. 329-330.

²⁵⁹ San Antonio Creek Valley GSP, Section 4.4, p. 272; Table 5-1, pp. 329-330; Figure 5-1, p. 331.

²⁶⁰ San Antonio Creek Valley GSP, Section 3.1.3, p. 96; Table 5-1, pp. 329-330.

²⁶¹ San Antonio Creek Valley GSP, Section 5.3, p. 328; Figure 5-2, p. 332.

the seasonal high and seasonal low within the Basin. Department staff encourage the GSA to provide further information to ensure that the proposed semi-annual and quarterly data collection frequency will accurately represent seasonal high and low groundwater conditions, such as an analysis of historical groundwater level measurements.

The GSP proposes to use the groundwater level monitoring network as a proxy for the groundwater storage monitoring network because changes in groundwater storage are directly dependent on changes in groundwater levels.²⁶²

The GSP concludes that seawater intrusion is not applicable because the Basin is approximately eight miles inland from the Pacific Ocean; the presence of a bedrock high on the west end creates a barrier to groundwater flow; groundwater discharges to surface water at the western end of the Basin.²⁶³ Thus, the GSP does not intend to monitor seawater intrusion.

The groundwater quality monitoring network consists of 89 wells, all of which are representative wells. The network includes eight municipal drinking water supply wells and 81 wells are sampled annually as part of the State Water Resource Control Board (SWRCB) Irrigated Lands Regulatory Program; of these wells, 21 are domestic supply wells, and 60 are agricultural supply wells.²⁶⁴ Thirteen of the wells in the monitoring network are included in the SWRCB Division of Drinking Water program with data ranging back to 1984.²⁶⁵ Constituents of concern for the Basin are shown in Table 4-3 and will be monitored at these public supply wells.²⁶⁶ While the GSP does provide a description and maps identifying the location of the representative monitoring sites for the degraded water quality monitoring network, Department staff have determined additional information should be provided in the GSP regarding the monitoring network for degraded water quality. The GSP did not report, in tabular format, the measurement frequency for each site in the degraded water quality monitoring network as required by the GSP Regulations.²⁶⁷ Including this information will provide the Department additional clarity on how monitoring in the Basin will comply with the requirements of the GSP Regulations and SGMA (see [Recommended Corrective Action 4](#)).

The GSP states that in addition to utilizing Interferometric Satellite Aperture Radar (InSAR) data, one continuous GPS site will be included in the land subsidence monitoring network.²⁶⁸ The Plan's proposal to use one representative monitoring point for the entire Basin is insufficient. Department staff recommend the GSA expand the land subsidence

²⁶² San Antonio Creek Valley GSP, Executive Summary, p. 41; Section 4.5.2.2, p. 279; Section 4.6.2, p. 289; Section 5.4.1, p. 340.

²⁶³ San Antonio Creek Valley GSP, Executive Summary, p. 36; Table ES-2, p. 39; Section 3.2, p. 109; Section 4, p. 263; Section 4.2.1, p. 267; Section 5.2.1, p. 326; Section 5.5, p. 343.

²⁶⁴ San Antonio Creek Valley GSP, Executive Summary, p. 41; Section 5.6, p. 345; Table 5-3, pp. 346-348.

²⁶⁵ San Antonio Creek Valley GSP, Section 3.2.3.1, p. 141.

²⁶⁶ San Antonio Creek Valley GSP, Section 5.6, p. 345; Table 4-3, p. 297.

²⁶⁷ 23 CCR §§ 354.34 (h).

²⁶⁸ San Antonio Creek Valley GSP, Section 5.7.1, pp. 356-357.

monitoring network to include additional representative monitoring locations that will be utilized in the assessment of sustainable management criteria to provide sufficient coverage of the Basin. The GSA may consider the use of additional GPS stations, extensometers, or publicly available remote sensing data (e.g., InSAR) to expand the land subsidence monitoring network in the Basin (see [Recommended Corrective Action 5](#)).

The interconnected surface water monitoring network consists of one streamflow gage, located more than two miles west of the downgradient end of the Basin,²⁶⁹ and two nested wells that are continuously monitored using pressure transducers. The nested wells will be used to calculate the vertical gradient of groundwater.²⁷⁰ There are no streamflow gages within the Basin boundary but the GSA intends to install two streamflow gages on San Antonio Creek—one upstream and one downstream of Barka Slough to measure surface water inflow and outflow and to assess surface water depletion and potential impacts to Barka Slough.²⁷¹

Department staff have determined the proposed density of monitoring sites is reasonable, in most areas of the Plan, for most of the sustainability indicators. Department staff agree with the GSP regarding improvements to the spatial density of the monitoring networks for groundwater levels and surface water that would provide more data to better quantify and understand conditions and effects of Plan implementation on Basin sustainability.²⁷²

While a recommended corrective action is identified, the description of the monitoring network included in the Plan substantially complies with the requirements outlined in the GSP Regulations. Overall, the Plan describes in sufficient detail a monitoring network that promotes 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 Plan implementation. The monitoring network appears to be supported by the best available information and data and is designed to ensure adequate coverage of sustainability indicators. The Plan also describes existing data gaps and the steps that will be taken to fill data gaps and improve the monitoring network. Department staff will evaluate the GSA's progress of filling data gaps through review of Annual Reports and Periodic Evaluations of the GSP.

4.5 PROJECTS AND MANAGEMENT ACTIONS

The GSP Regulations require a description of the projects and management actions the submitting Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.²⁷³ Each Plan's description of projects and management actions must include

²⁶⁹ San Antonio Creek Valley GSP, Figure 4-4, p. 318.

²⁷⁰ San Antonio Creek Valley GSP, Section 5.8, pp. 359-360; Section 5.8.1, p. 361; Figures 5-1 and 5-2, pp. 331-332.

²⁷¹ San Antonio Creek Valley GSP, Section 5.8, p. 360.

²⁷² San Antonio Creek Valley GSP, Section 6.3, pp. 378-381.

²⁷³ 23 CCR § 354.44 (a).

details such as: how projects and management actions in the GSP will achieve sustainability, the implementation process and expected benefits, and prioritization and criteria used to initiate projects and management actions.²⁷⁴

The GSP states that the projects and management actions discussed in the Plan were “developed to address sustainability goals, measurable objectives, and undesirable results identified for the Basin.”²⁷⁵ The Plan further states that the GSA “plan[s] to continually monitor and assess the sustainable management criteria (SMCs) (see Section 4) and under conditions where minimum thresholds are projected to be reached, the SABGSA will perform assessments to determine if the trends are caused by groundwater pumping, caused by drought conditions, or both.”²⁷⁶

The GSP states that the GSA “will perform annual assessments of the effectiveness of the implemented projects and management actions and utilize adaptive management strategies to re-evaluate the implementation sequencing and priorities, as deemed appropriate.”²⁷⁷ The Plan classifies the identified “management actions and potential future projects” using a four-tiered system.²⁷⁸ Tier 1 and Tier 2 consist of management actions while Tier 3 and 4 consist of projects and management actions. The Plan states that because of the GSA’s desire “to begin addressing the observed water level declines and the storage deficit soon after adoption of the GSP” both the Tier 1 and 2 management actions will be initiated within one and three years of GSP adoption, respectively.²⁷⁹ The implementation of the Tier 3 and 4 priority projects and management actions are to be considered “in the future as conditions in the Basin dictate, and as the effectiveness of the lower tiered initiatives are assessed.”²⁸⁰

The management actions and projects are itemized by tier, indicate relevant measurable objective benefits, required permits, pumping reduction outcome reliability, estimated implementation cost and benefit:cost ratio.²⁸¹

The Plan adequately describes proposed projects and management actions in a manner that is generally consistent and substantially complies with the GSP Regulations. The projects and management actions are directly related to the sustainable management criteria and present a generally feasible approach to achieving the sustainability goal of the Basin.

²⁷⁴ 23 CCR § 354.44 (b) *et seq.*

²⁷⁵ San Antonio Creek Valley GSP, Section 6.1, p. 368.

²⁷⁶ San Antonio Creek Valley GSP, Section 6.1, p. 369.

²⁷⁷ San Antonio Creek Valley GSP, Section 6.1, p. 371.

²⁷⁸ San Antonio Creek Valley GSP, Section 6.1, p. 368.

²⁷⁹ San Antonio Creek Valley GSP, Section 6.1, p. 368.

²⁸⁰ San Antonio Creek Valley GSP, Section 6.1, p. 368.

²⁸¹ San Antonio Creek Valley GSP, Table 6.1, pp. 372-374.

4.6 CONSIDERATION OF ADJACENT BASINS/SUBBASINS

SGMA requires the Department to "...evaluate whether a groundwater sustainability plan adversely affects the ability of an adjacent basin to implement their groundwater sustainability plan or impedes achievement of sustainability goals in an adjacent basin."²⁸² Furthermore, the GSP Regulations state that minimum thresholds defined in each GSP be designed to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.²⁸³

The San Antonio Basin has one adjacent Basin: the Santa Ynez River Valley Basin. The Plan includes an analysis of potential impacts to adjacent basins with the defined minimum thresholds for each sustainability indicator. The Plan does not anticipate any impacts to adjacent basins resulting from the minimum thresholds defined in the Plan.²⁸⁴

Department staff will continue to review periodic updates to the Plan to assess whether implementation of the San Antonio Creek Valley GSP is potentially impacting adjacent basins.

4.7 CONSIDERATION OF CLIMATE CHANGE AND FUTURE CONDITIONS

The GSP Regulations require a GSA to consider future conditions and project how future water use may change due to multiple factors including climate change.²⁸⁵

Since the GSP was adopted and submitted, climate change conditions have advanced faster and more dramatically. It is anticipated that the hotter, drier conditions will result in a loss of 10% of California's water supply. As California adapts to a hotter, drier climate, GSAs should be preparing for these changing conditions as they work to sustainably manage groundwater within their jurisdictional areas. Specifically, the Department encourages GSAs to:

1. Explore how their proposed groundwater level thresholds have been established in consideration of groundwater level conditions in the basin based on current and future drought conditions.
2. Explore how groundwater level data from the existing monitoring network will be used to make progress towards sustainable management of the basin given increasing aridification and effects of climate change, such as prolonged drought.
3. Take into consideration changes to surface water reliability and that impact on groundwater conditions.
4. Evaluate updated watershed studies that may modify assumed frequency and magnitude of recharge projects, if applicable, and

²⁸² Water Code § 10733(c).

²⁸³ 23 CCR § 354.28(b)(3).

²⁸⁴ San Antonio Creek Valley GSP, Section 4.5.2.3, p. 281.

²⁸⁵ 23 CCR § 354.18.

5. Continually coordinate with the appropriate groundwater users, including but not limited to domestic well owners and state small water systems, and the appropriate overlying county jurisdictions developing drought plans and establishing local drought task forces to evaluate how their Plan's groundwater management strategy aligns with drought planning, response, and mitigation efforts within the basin.

5 STAFF RECOMMENDATION

Department staff recommend approval of the GSP with the recommended corrective actions listed below. The San Antonio Valley Creek GSP conforms with Water Code Sections 10727.2 and 10727.4 of SGMA and substantially complies with the GSP Regulations. Implementation of the GSP will likely achieve the sustainability goal for the San Antonio Creek Valley Basin. The GSA has identified several areas for improvement of its Plan and Department staff concur that those items are important and should be addressed as soon as possible. Department staff have also identified additional recommended corrective actions that should be considered by the GSA for the first periodic assessment of its GSP. Addressing these recommended corrective actions will be important to demonstrate that implementation of the Plan is likely to achieve the sustainability goal.

The recommended corrective actions include:

RECOMMENDED CORRECTIVE ACTION 1

The GSA should reevaluate the sustainable management criteria for the chronic lowering of water levels:

- a. Revise the definition of undesirable results and language pertaining to significant and unreasonable chronic lowering of groundwater levels to remove the average and above-average year condition and discuss how extractions and recharge will be managed as necessary to ensure that reductions in groundwater levels or storage during dry years are offset by increases in groundwater levels or storage during other years within the sustainable management criteria for the chronic lowering of groundwater levels.
- b. Department staff recommend the GSA, through their well impact analysis, describe where the proposed minimum thresholds are set relative to well construction information that would indicate whether or not more substantial impacts to beneficial users are occurring. This assessment would include evaluating how the sustainable management criteria may affect production wells relative to the depth of pump intake, bottom of the screen interval, and well dewatering, as applicable. This information should be clearly reported in the Plan for the entire Basin including quantities of wells that may be impacted and the approximate locations of where any potential impacts may occur.

RECOMMENDED CORRECTIVE ACTION 2

The GSP should reevaluate the quantitative definition of undesirable results related to degradation of water quality. The quantitative definition of an undesirable result should incorporate a combination of minimum threshold exceedances and clearly explain how

that quantitative criteria represent significant and unreasonable conditions occurring throughout the Basin.

RECOMMENDED CORRECTIVE ACTION 3

Department staff understand that estimating the location, quantity, and timing of stream depletion due to ongoing, basin-wide pumping is a complex task and that developing suitable tools may take additional time; however, it is critical for the Department's ongoing and future evaluations of whether GSP implementation is on track to achieve sustainable groundwater management. The Department plans to provide guidance on methods and approaches to evaluate the rate, timing, and volume of depletions of interconnected surface water and support for establishing specific sustainable management criteria in the near future. This guidance is intended to assist GSAs to sustainably manage depletions of interconnected surface water.

In addition, the GSA should work to address the following items by the first periodic update:

- a. Consider utilizing the interconnected surface water guidance, as appropriate, when issued by the Department to establish quantifiable minimum thresholds, measurable objectives, and management actions.
- b. Continue to fill data gaps, collect additional monitoring data, and implement the current strategy to manage depletions of interconnected surface water and define segments of interconnectivity and timing.
- c. Prioritize collaborating and coordinating with local, state, and federal regulatory agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion within the GSA's jurisdictional area.

RECOMMENDED CORRECTIVE ACTION 4

Define the data collection frequency in tabular format for the degraded water quality monitoring network in the GSP.

RECOMMENDED CORRECTIVE ACTION 5

Expand the land subsidence monitoring network to provide sufficient coverage of the Basin. The GSA may consider the use of additional GPS stations, extensometers, or publicly available remote sensing data (e.g., InSAR) to expand the land subsidence monitoring network in the Basin.

APPENDIX B

Groundwater Elevation Hydrographs

APPENDIX C

Groundwater Elevation Contour Maps from the 2022 – 2025
Annual Reports

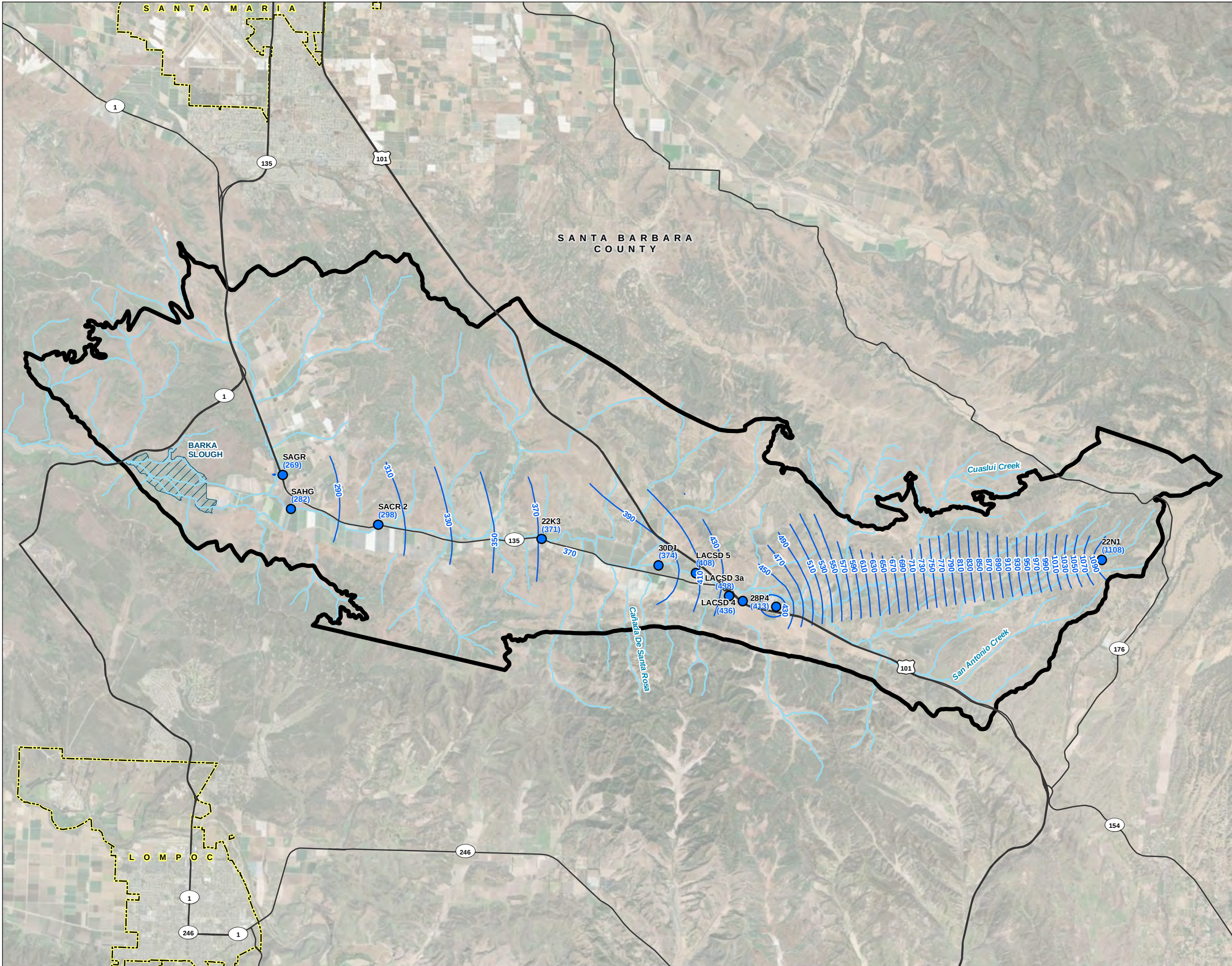
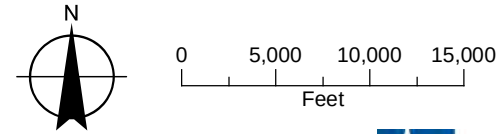


FIGURE 7
Paso Robles Formation
Groundwater Elevation Contours
Spring 2019
Groundwater Sustainability Plan
2021 Annual Report
San Antonio Creek Valley
Groundwater Basin

- LEGEND**
- Paso Robles Formation Well
Groundwater Elevation (NAVD88)
 - Groundwater Elevaton Contours, ft NAVD88
 - All Other Features**
 - San Antonio Creek or Tributary
 - Major Road
 - San Antonio Creek Valley Groundwater Basin
 - Barka Slough
 - City Boundary

NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



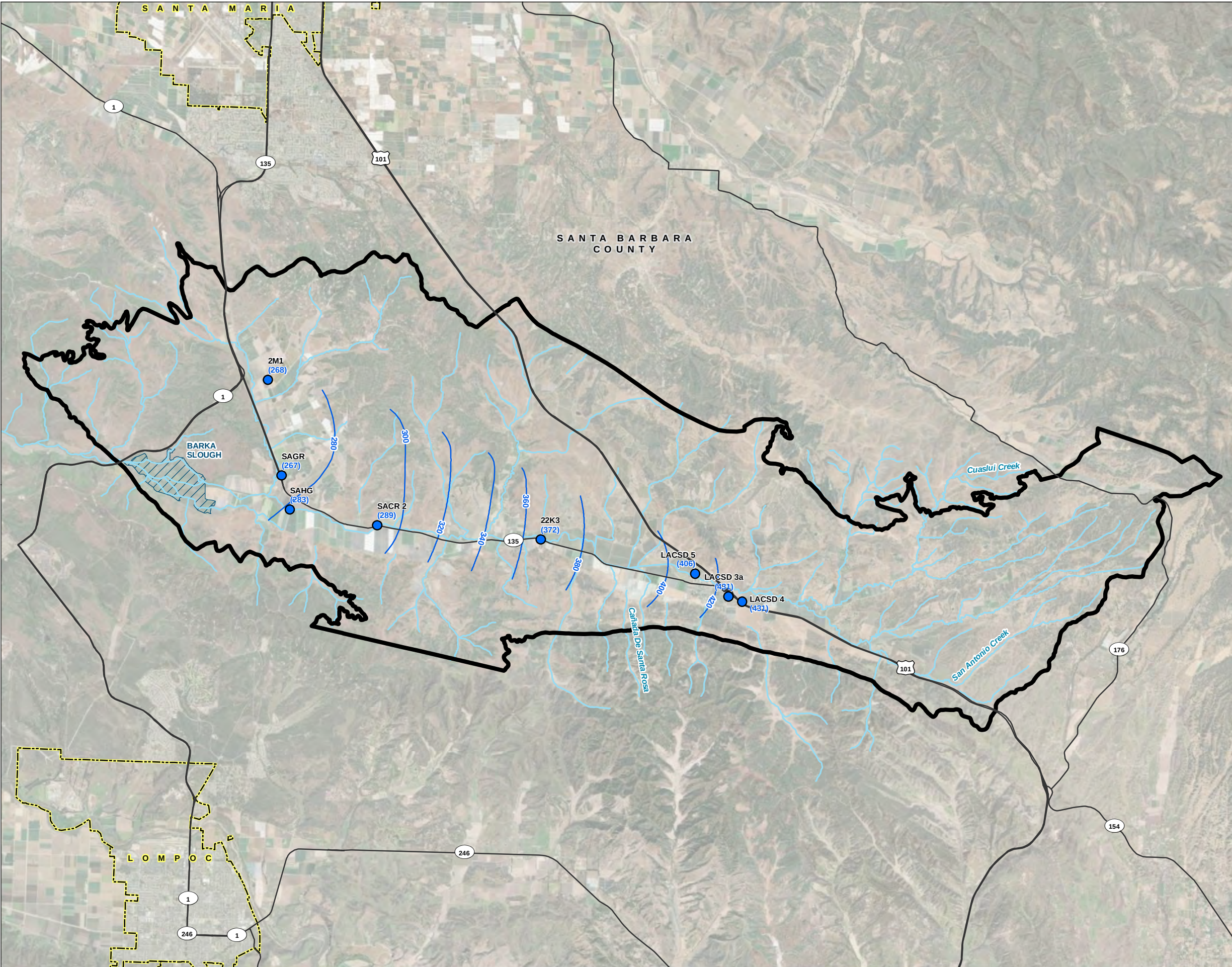


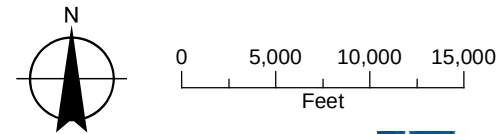
FIGURE 8
Paso Robles Formation
Groundwater Elevation Contours
Fall 2019
Groundwater Sustainability Plan
2021 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

- Paso Robles Formation Well
Groundwater Elevation (NAVD88)
- Groundwater Elevaton Contours, ft NAVD88
- All Other Features**
- San Antonio Creek or Tributary
- Major Road
- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary

NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



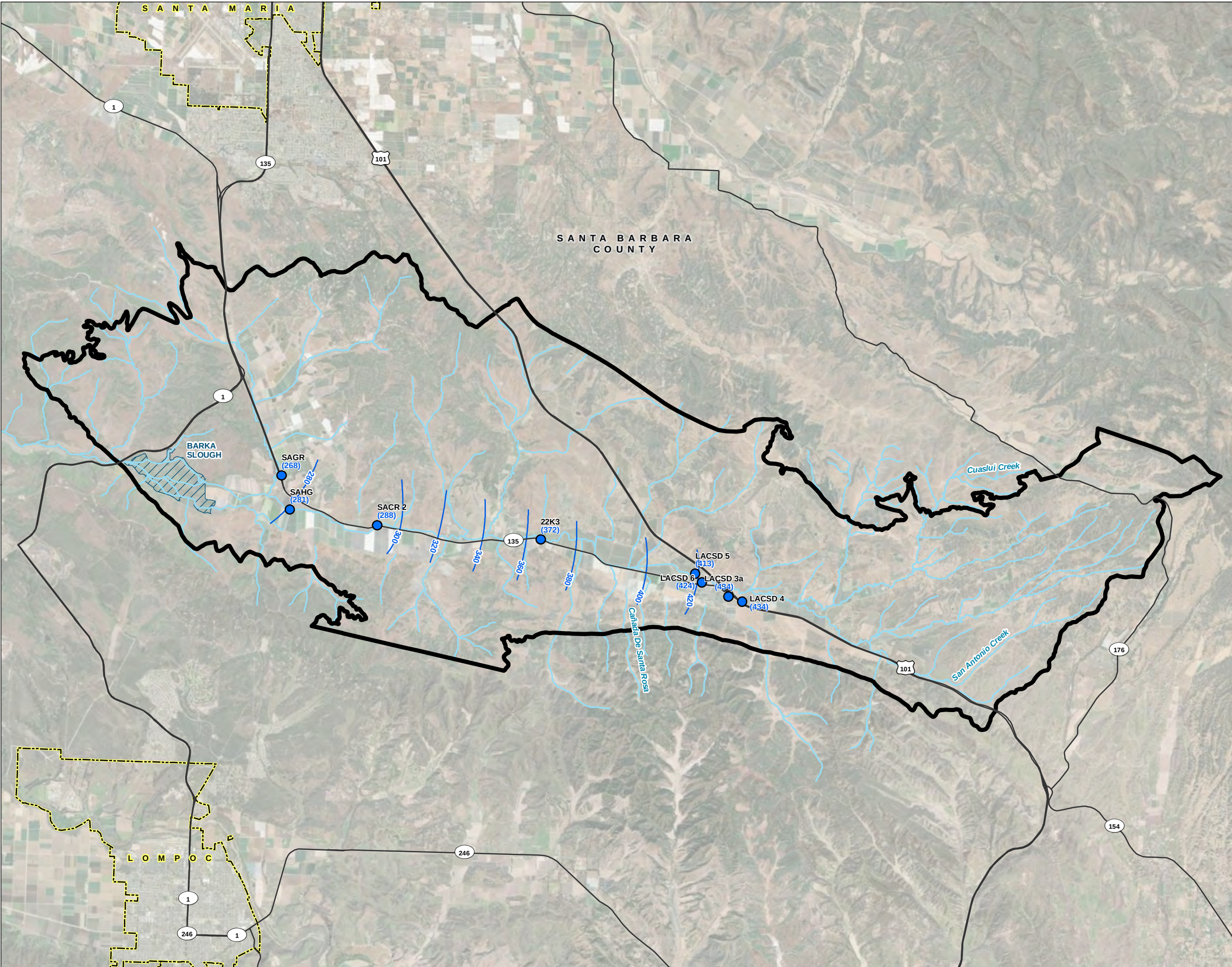
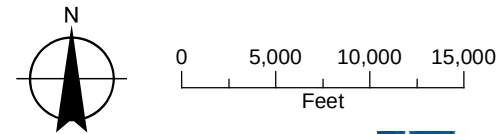


FIGURE 9
Paso Robles Formation
Groundwater Elevation Contours
Spring 2020
Groundwater Sustainability Plan
2021 Annual Report
San Antonio Creek Valley
Groundwater Basin

- LEGEND**
- Paso Robles Formation Well
Groundwater Elevation (NAVD88)
 - Groundwater Elevaton Contours, ft NAVD88
 - All Other Features**
 - San Antonio Creek or Tributary
 - Major Road
 - San Antonio Creek Valley Groundwater Basin
 - Barka Slough
 - City Boundary

NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



Date: January 31, 2022
Data Sources: USGS (2020a), ESRI, DWR (2018),
Maxar imagery (2020)



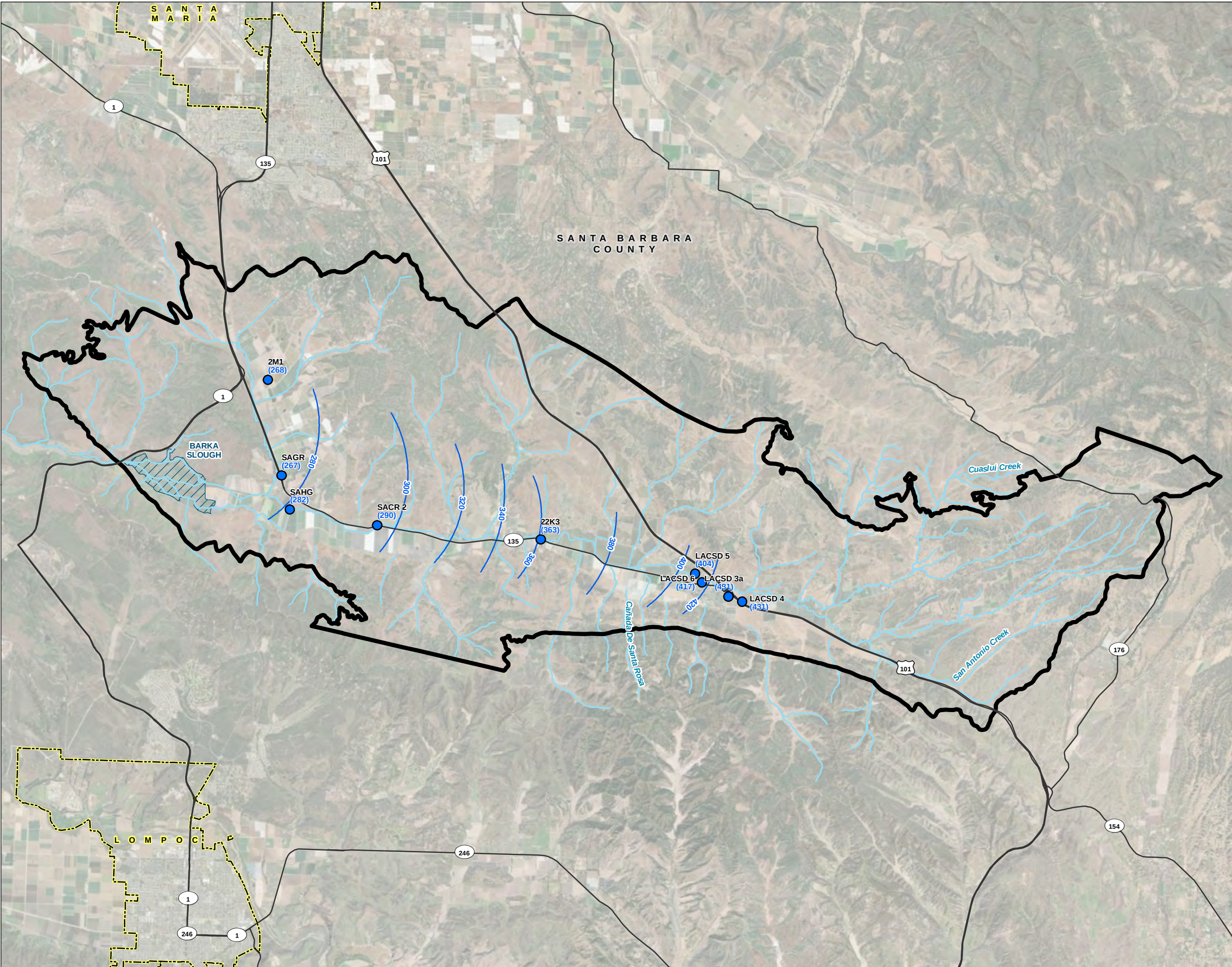
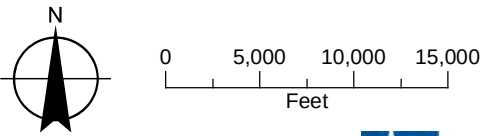


FIGURE 10
Paso Robles Formation
Groundwater Elevation Contours
Fall 2020
Groundwater Sustainability Plan
2021 Annual Report
San Antonio Creek Valley
Groundwater Basin

- LEGEND**
- Paso Robles Formation Well
Groundwater Elevation (NAVD88)
 - Groundwater Elevaton Contours, ft NAVD88
 - All Other Features**
 - San Antonio Creek or Tributary
 - Major Road
 - San Antonio Creek Valley Groundwater Basin
 - Barka Slough
 - City Boundary

NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



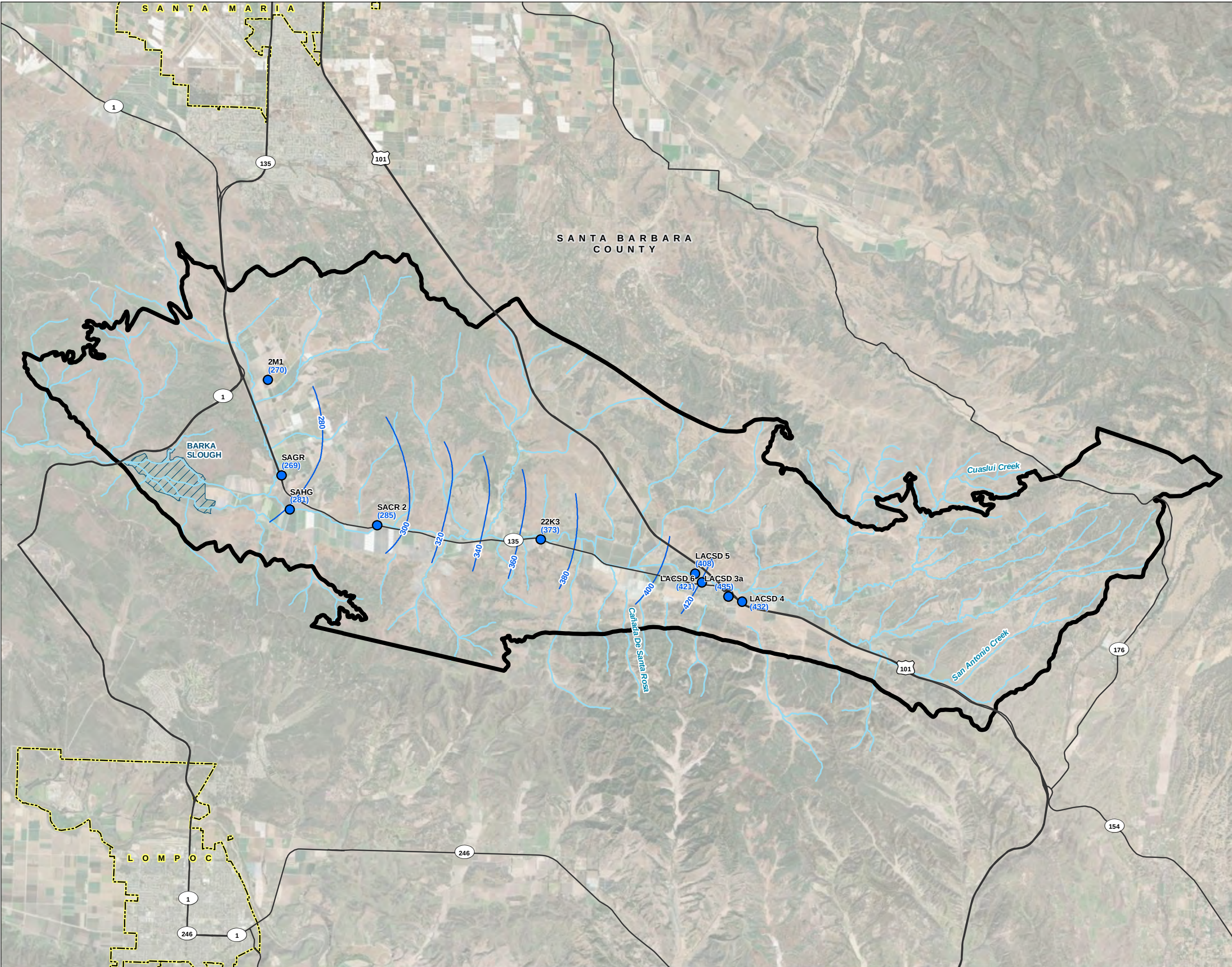


FIGURE 11
Paso Robles Formation
Groundwater Elevation Contours
Spring 2021
Groundwater Sustainability Plan
2021 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

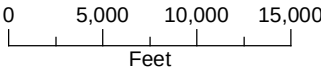
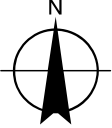
- Paso Robles Formation Well
Groundwater Elevation (NAVD88)
- Groundwater Elevaton Contours, ft NAVD88

All Other Features

- San Antonio Creek or Tributary
- Major Road
- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary

NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988





Date: January 31, 2022
Data Sources: USGS (2020a), ESRI, DWR (2018),
Maxar imagery (2020)

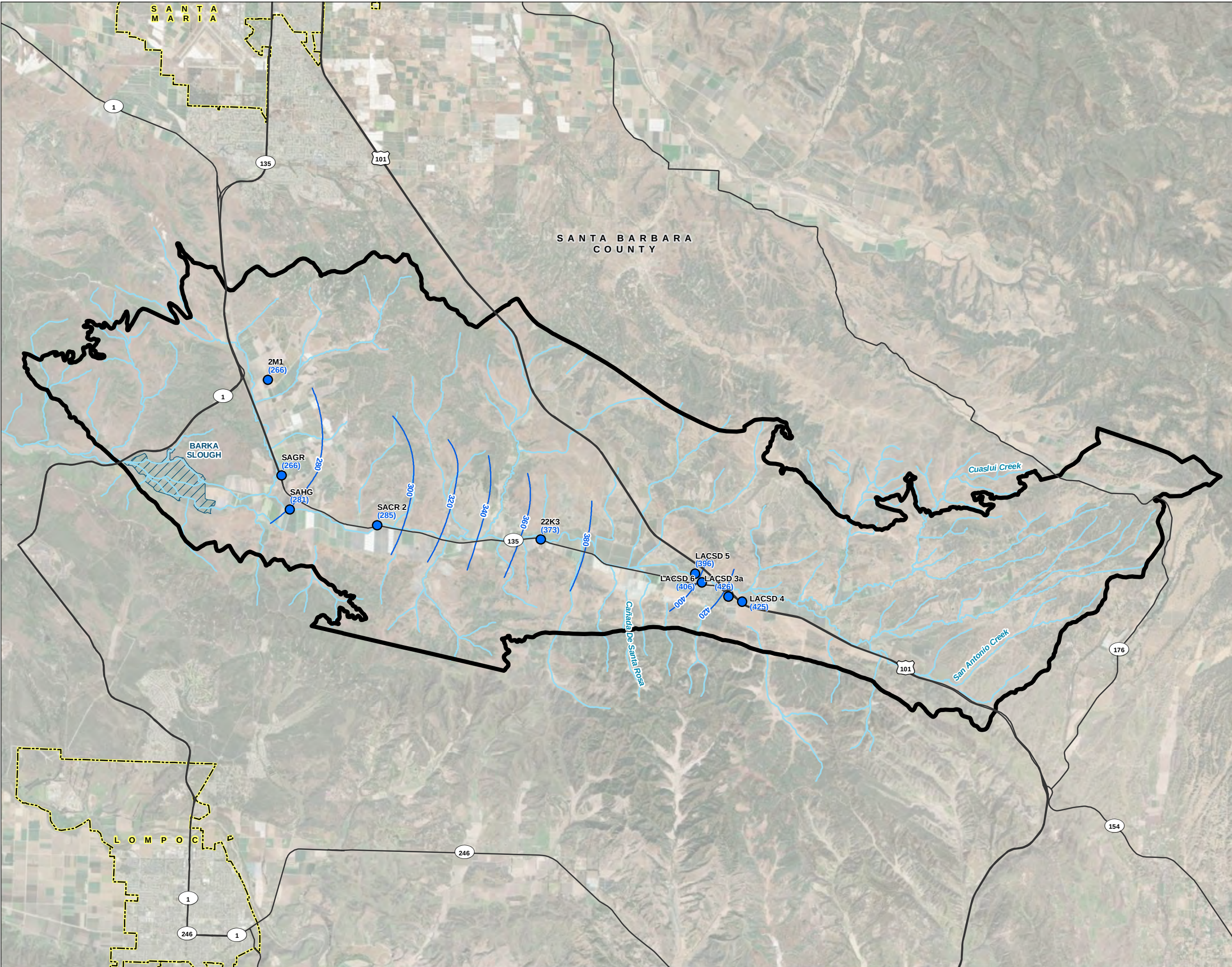


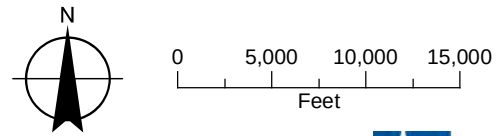
FIGURE 12
Paso Robles Formation
Groundwater Elevation Contours
Fall 2021
Groundwater Sustainability Plan
2021 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

- Paso Robles Formation Well
Groundwater Elevation (NAVD88)
- Groundwater Elevaton Contours, ft NAVD88
- All Other Features**
- San Antonio Creek or Tributary
- Major Road
- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary

NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



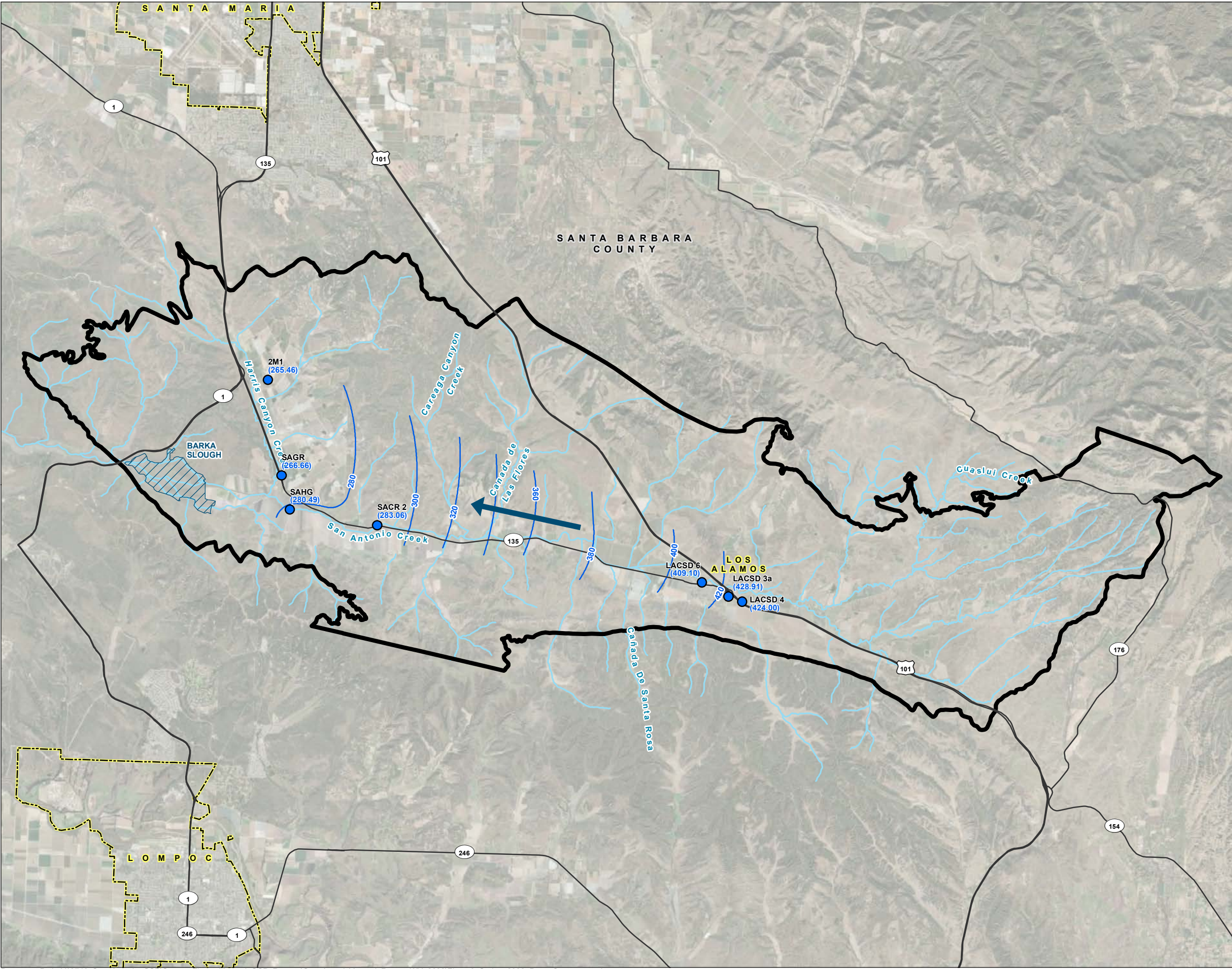


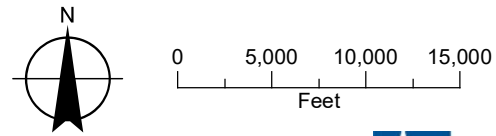
FIGURE 9
Paso Robles Formation
Groundwater Elevation Contours
Spring 2022
Groundwater Sustainability Plan
2022 Annual Report
San Antonio Creek Valley
Groundwater Basin

- LEGEND**
- Paso Robles Formation Well
Groundwater Elevation (NAVD88)
 - Groundwater Elevaton Contours, ft NAVD88
 - Groundwater Flow Direction
 - All Other Features**
 - San Antonio Creek or Tributary
 - Major Road
 - San Antonio Creek Valley Groundwater Basin
 - Barka Slough
 - City Boundary



NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



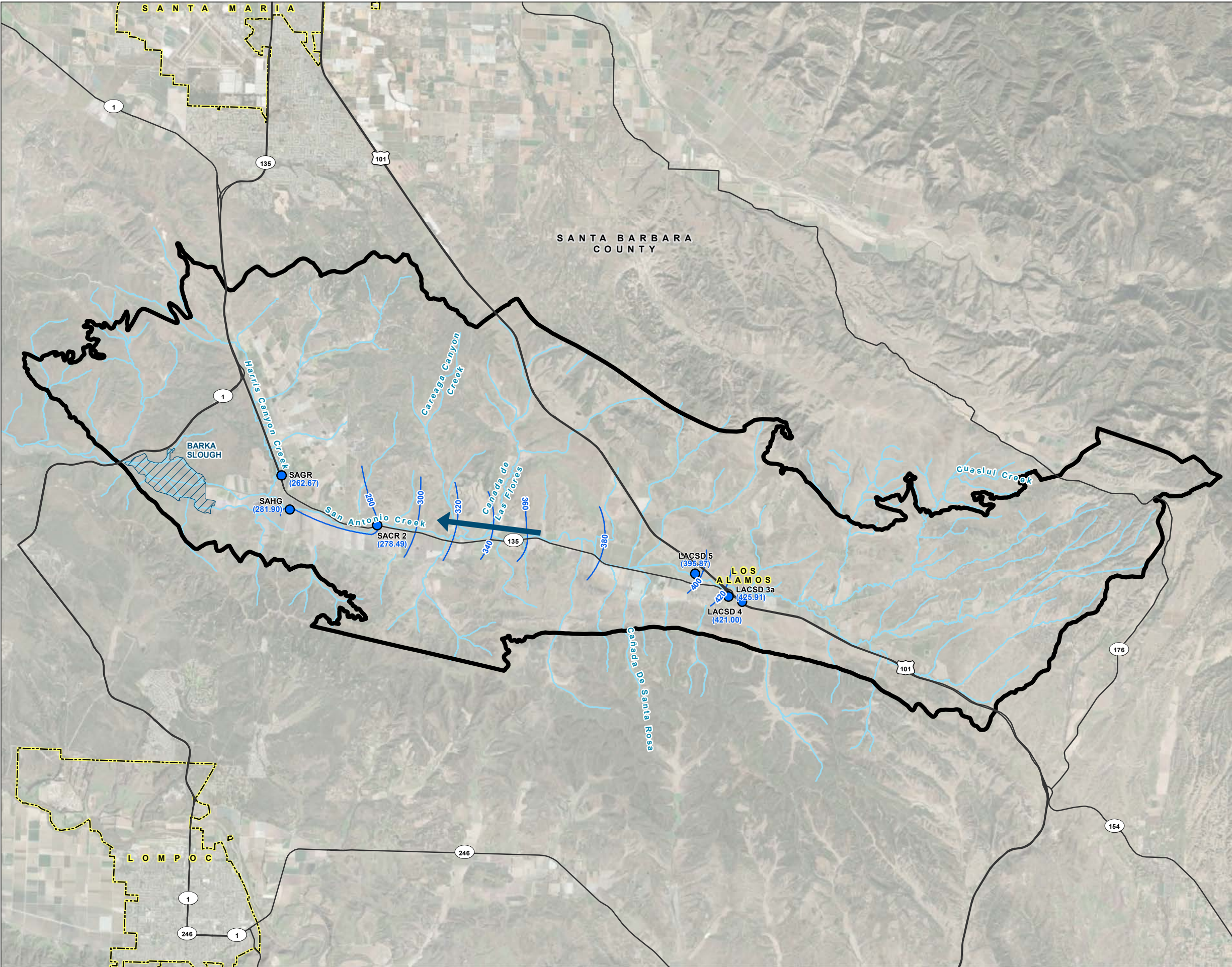


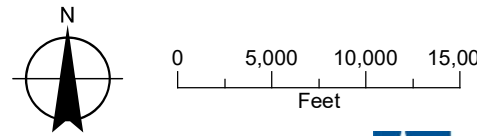
FIGURE 10
Paso Robles Formation
Groundwater Elevation Contours
Fall 2022
Groundwater Sustainability Plan
2022 Annual Report
San Antonio Creek Valley
Groundwater Basin

- LEGEND**
- Paso Robles Formation Well
Groundwater Elevation (NAVD88)
 - Groundwater Elevaton Contours, ft NAVD88
 - Groundwater Flow Direction
 - All Other Features**
 - San Antonio Creek or Tributary
 - Major Road
 - San Antonio Creek Valley Groundwater Basin
 - Barka Slough
 - City Boundary



NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



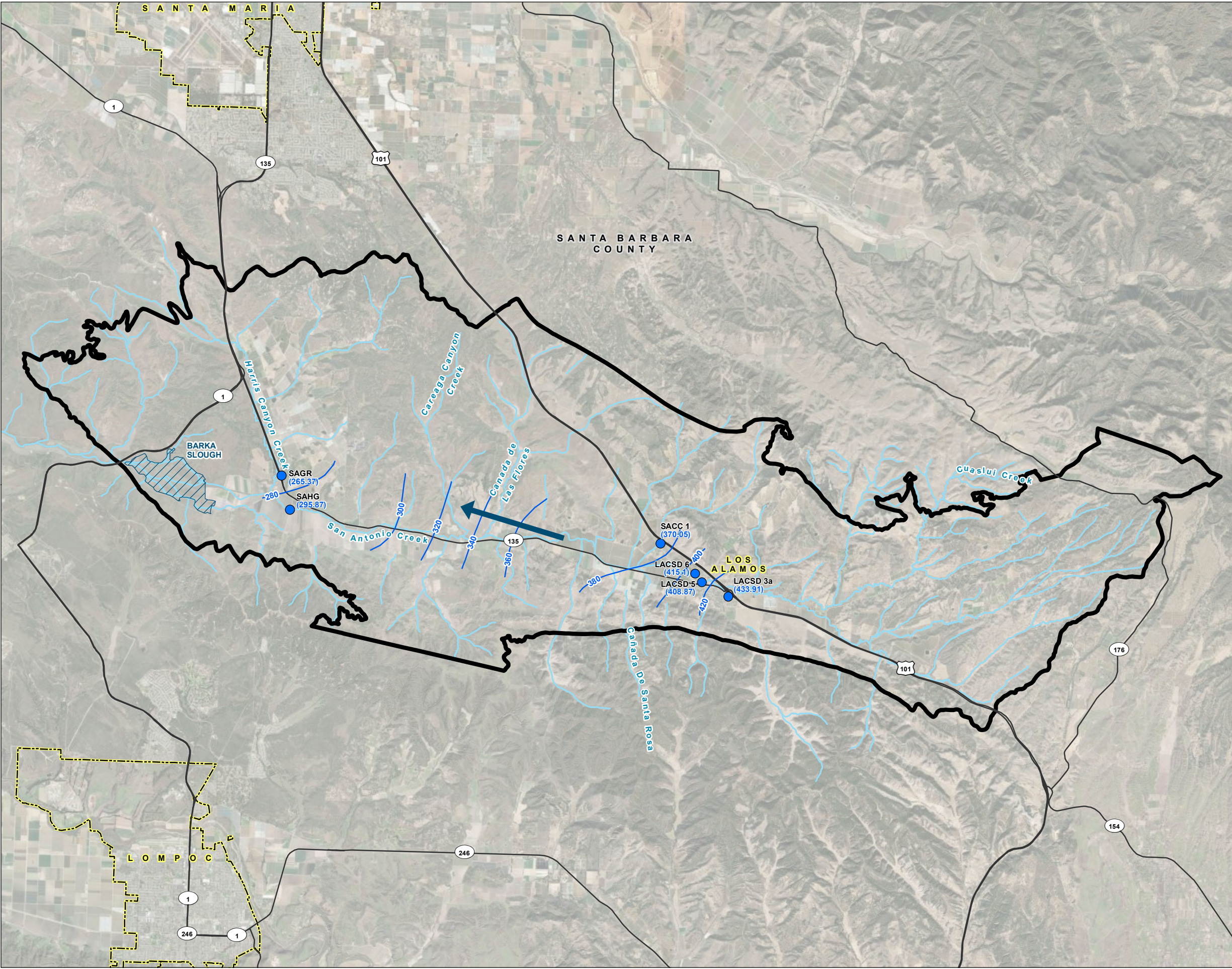


FIGURE 10
Paso Robles Formation
Groundwater Elevation Contours
Spring 2023

Groundwater Sustainability Plan
2023 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

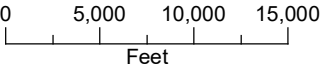
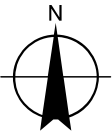
- Paso Robles Formation Well
Groundwater Elevation (NAVD 88)
- Groundwater Elevaton Contours, ft NAVD 88
- Groundwater Flow Direction
- All Other Features**
- San Antonio Creek or Tributary
- Major Road
- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary



NOTES

San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



Date: February 15, 2024
Data Sources: USGS (2020a), ESRI, DWR (2018),
Maxar imagery (2020)



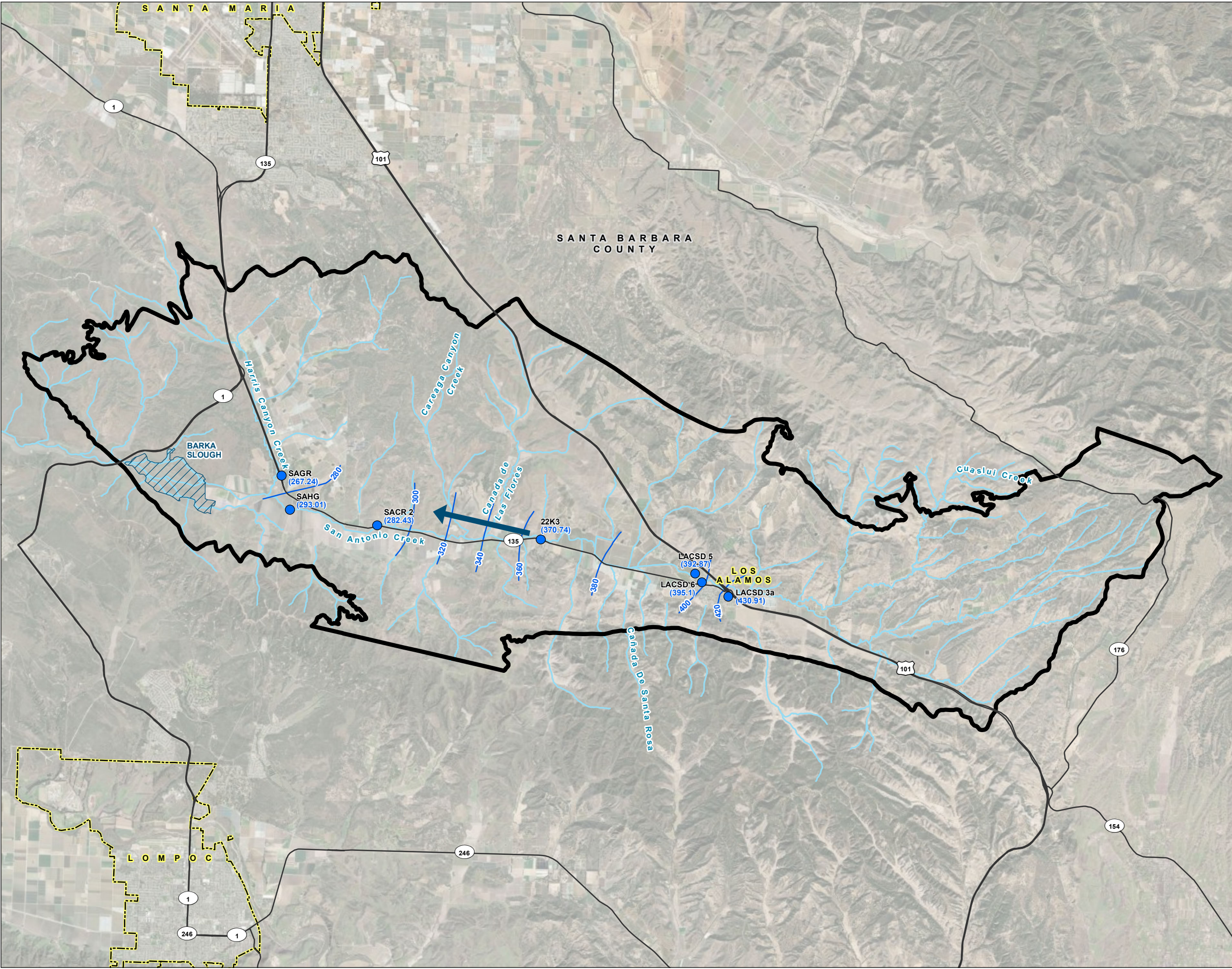


FIGURE 11
Paso Robles Formation
Groundwater Elevation Contours
Fall 2023

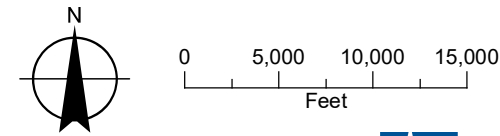
Groundwater Sustainability Plan
2023 Annual Report
San Antonio Creek Valley
Groundwater Basin

- LEGEND**
- Paso Robles Formation Well
Groundwater Elevation (NAVD 88)
 - Groundwater Elevaton Contours, ft NAVD 88
 - Groundwater Flow Direction
 - All Other Features**
 - San Antonio Creek or Tributary
 - Major Road
 - San Antonio Creek Valley Groundwater Basin
 - Barka Slough
 - City Boundary



NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



Date: February 15, 2024
Data Sources: USGS (2020a), ESRI, DWR (2018),
Maxar imagery (2020)



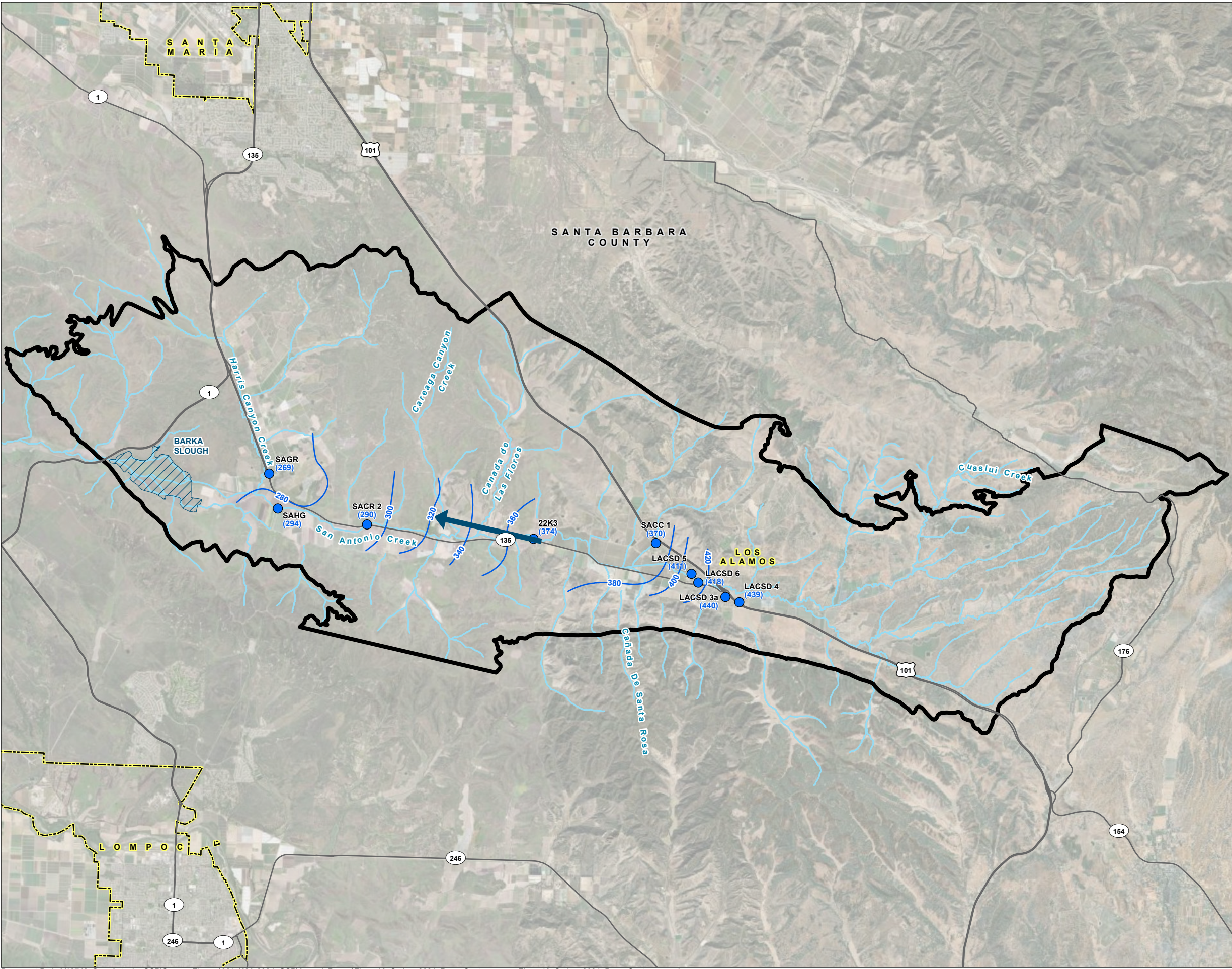


FIGURE 10
Paso Robles Formation
Groundwater Elevation Contours
Spring 2024

Groundwater Sustainability Plan
2024 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

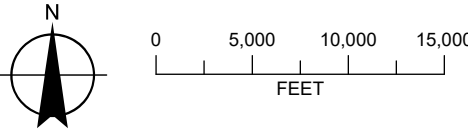
- Paso Robles Formation Well
Groundwater Elevation (NAVD 88)
- Groundwater Elevaton Contours, ft NAVD 88
- General Direction of Groundwater Flow

All Other Features

- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary
- Major Road
- San Antonio Creek or Tributary

NOTES
San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



Date: February 12, 2025
Data Sources: USGS, ESRI, DWR,
Maxar Imagery (4/10/2024)



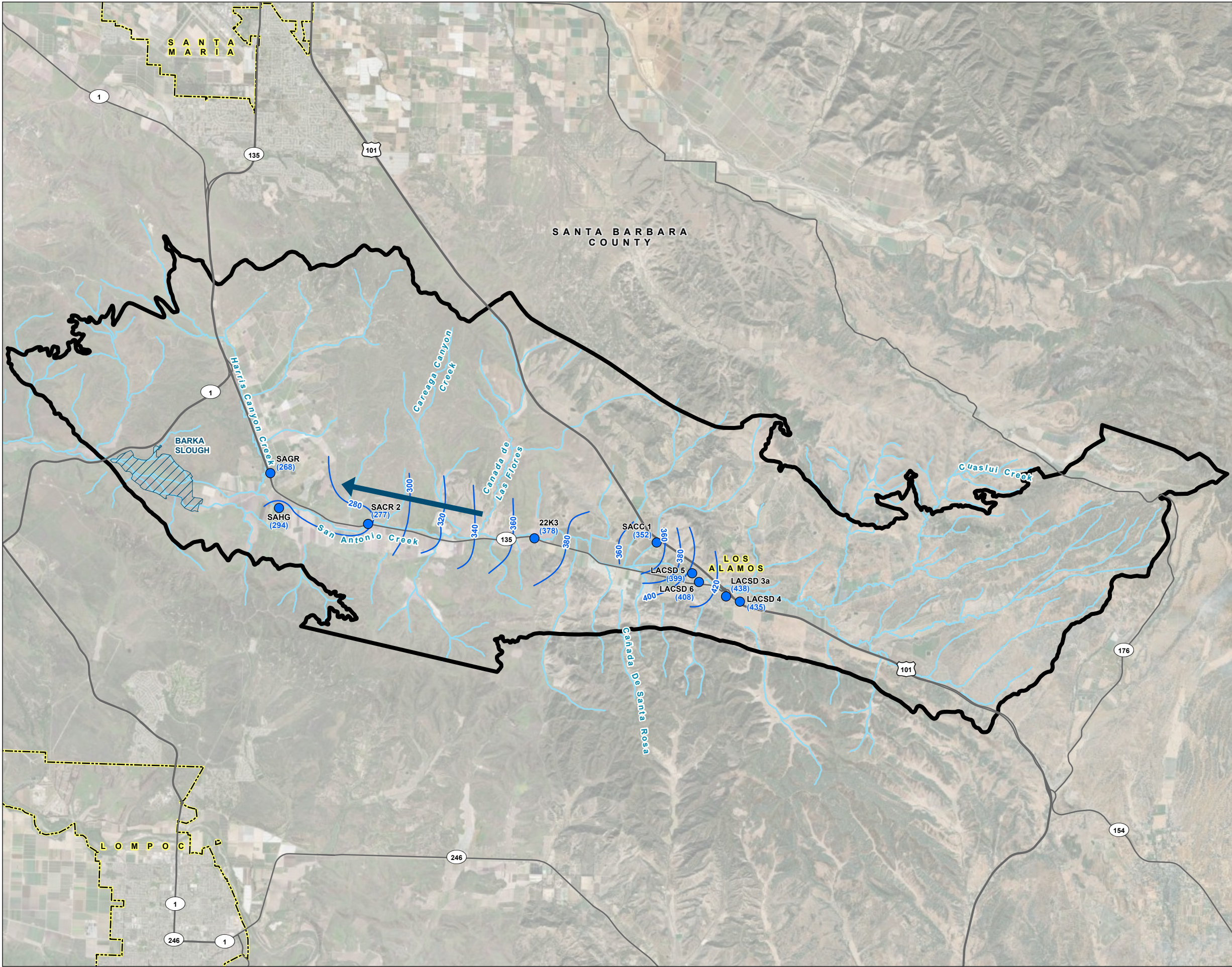


FIGURE 11
Paso Robles Formation
Groundwater Elevation Contours
Fall 2024

Groundwater Sustainability Plan
2024 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

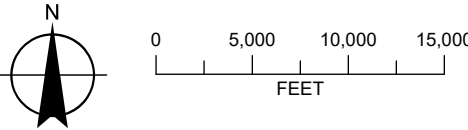
- Paso Robles Formation Well
Groundwater Elevation (NAVD 88)
- Groundwater Elevaton Contours, ft NAVD 88
- General Direction of Groundwater Flow

All Other Features

- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary
- Major Road
- San Antonio Creek or Tributary

NOTES
San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



Date: February 12, 2025
Data Sources: USGS, ESRI, DWR,
Maxar Imagery (4/10/2024)



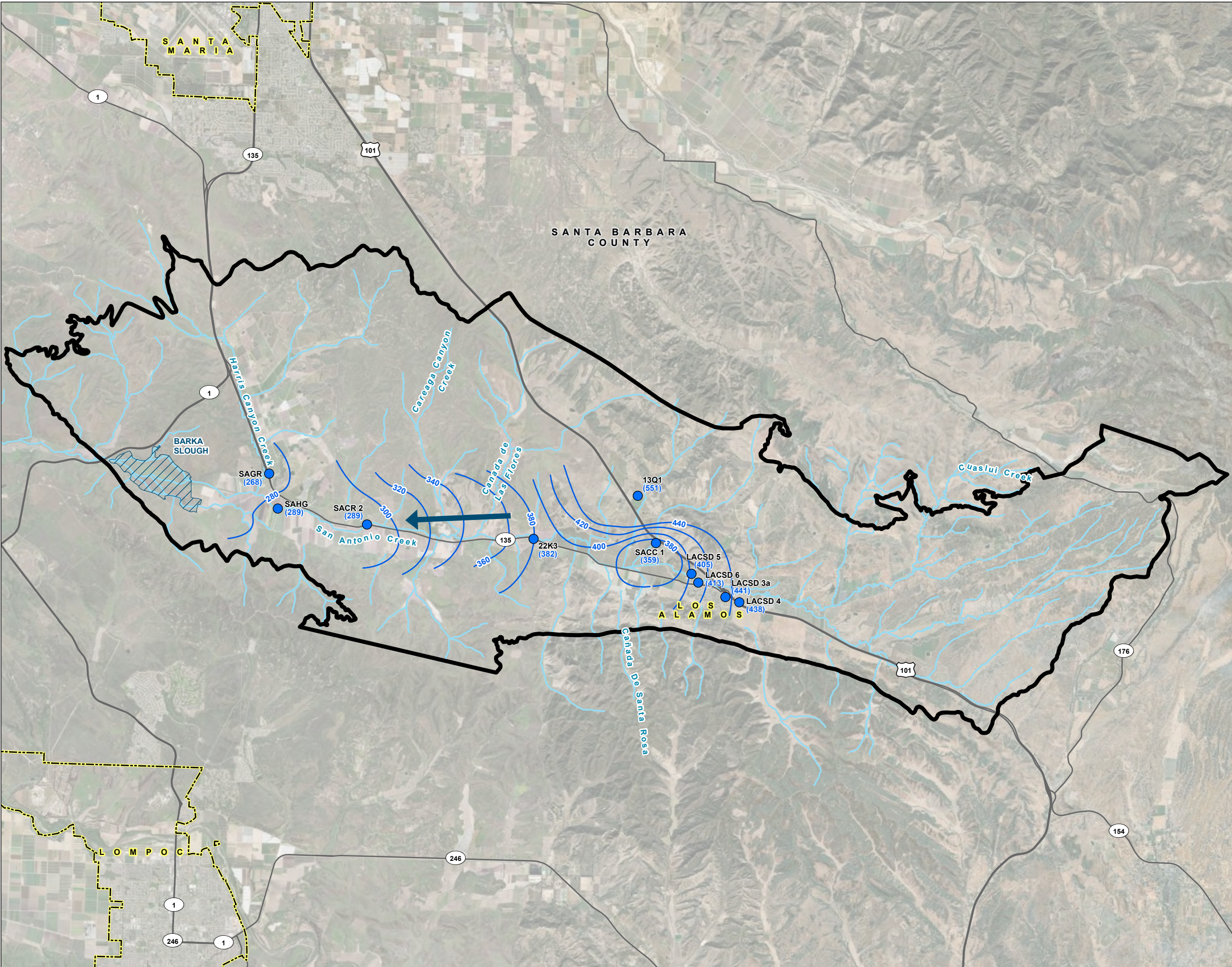


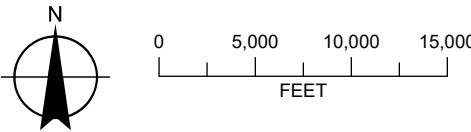
FIGURE 10
Paso Robles Formation
Groundwater Elevation Contours
Spring 2025

Groundwater Sustainability Plan
2025 Annual Report
San Antonio Creek Valley
Groundwater Basin

- LEGEND**
- Paso Robles Formation Well
Groundwater Elevation (feet NAVD 88)
 - Groundwater Elevaton Contours, feet NAVD 88
 - General Direction of Groundwater Flow
- All Other Features**
- San Antonio Creek Valley Groundwater Basin
 - Barka Slough
 - City Boundary
 - Major Road
 - San Antonio Creek or Tributary

NOTES
San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



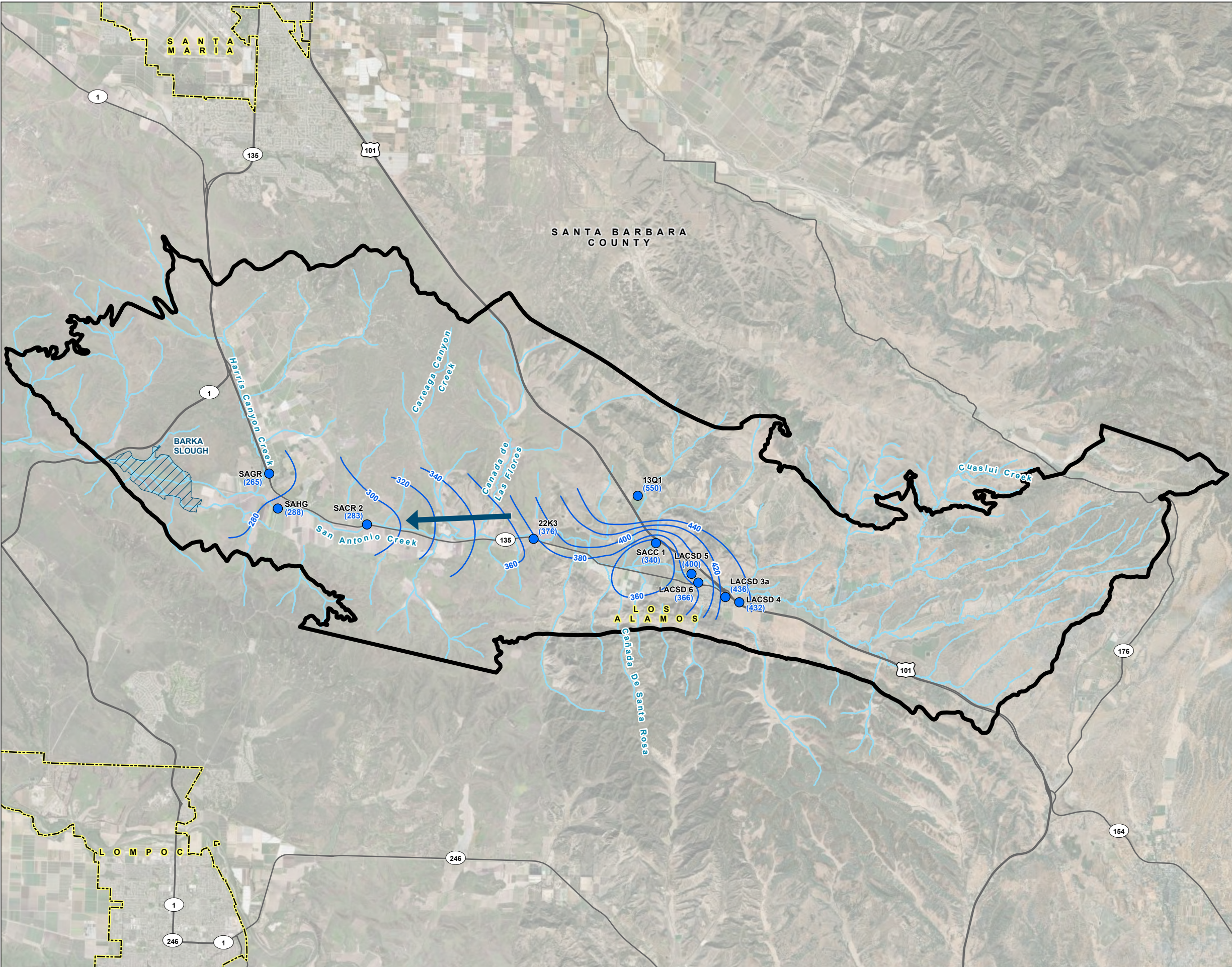


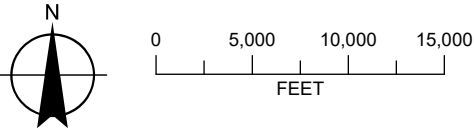
FIGURE 11
Paso Robles Formation
Groundwater Elevation Contours
Fall 2025

Groundwater Sustainability Plan
2025 Annual Report
San Antonio Creek Valley
Groundwater Basin

- LEGEND**
- Paso Robles Formation Well
Groundwater Elevation (feet NAVD 88)
 - Groundwater Elevaton Contours, feet NAVD 88
 - General Direction of Groundwater Flow
- All Other Features**
- San Antonio Creek Valley Groundwater Basin
 - Barka Slough
 - City Boundary
 - Major Road
 - San Antonio Creek or Tributary

NOTES
San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



Date: February 16, 2026
Data Sources: USGS, ESRI, DWR,
Maxar Imagery (4/10/2024)



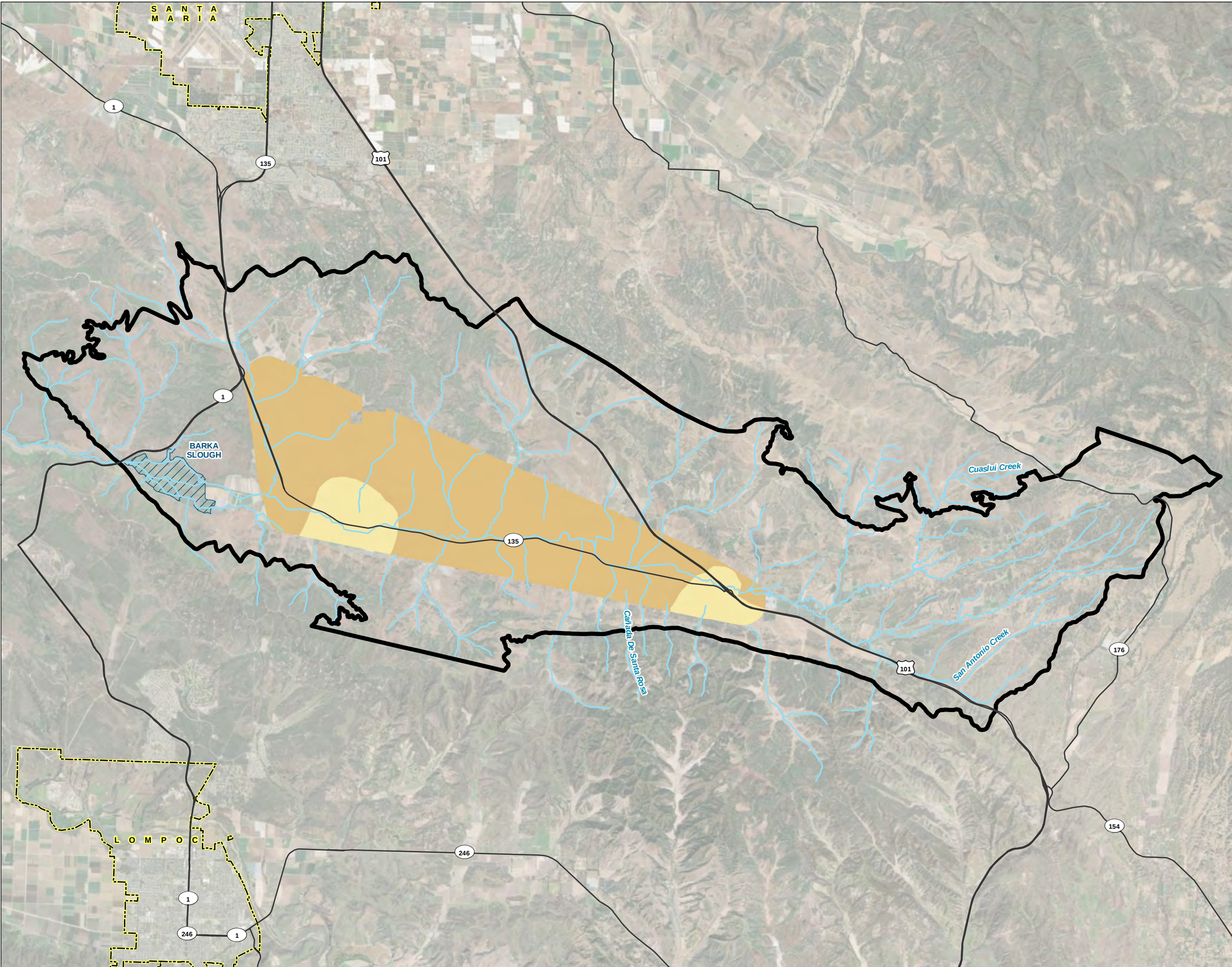


FIGURE 20

**Paso Robles Formation
Annual Change in
Groundwater Elevation
Fall 2019 to Fall 2020**
Groundwater Sustainability Plan
2021 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

Change in Groundwater Elevation (feet NAVD88)¹

- > 50
- 40 - 50
- 30 - 40
- 20 - 30
- 10 - 20
- 0 - 10
- 10 - 0
- 20 - -10
- 30- -20
- 30

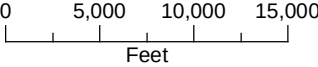
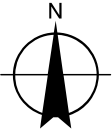
All Other Features

- San Antonio Creek or Tributary
- Major Road
- San Antonio Creek Valley Groundwater Basin²
- Barka Slough
- City Boundary

NOTES

- The change in groundwater elevation extents are bound by the lateral limits of the subject aquifer (see Figure 2) and available groundwater elevation data.
- San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



Date: March 9, 2022
Data Sources: USGS (2020a), ESRI, DWR (2018),
Maxar imagery (2020)



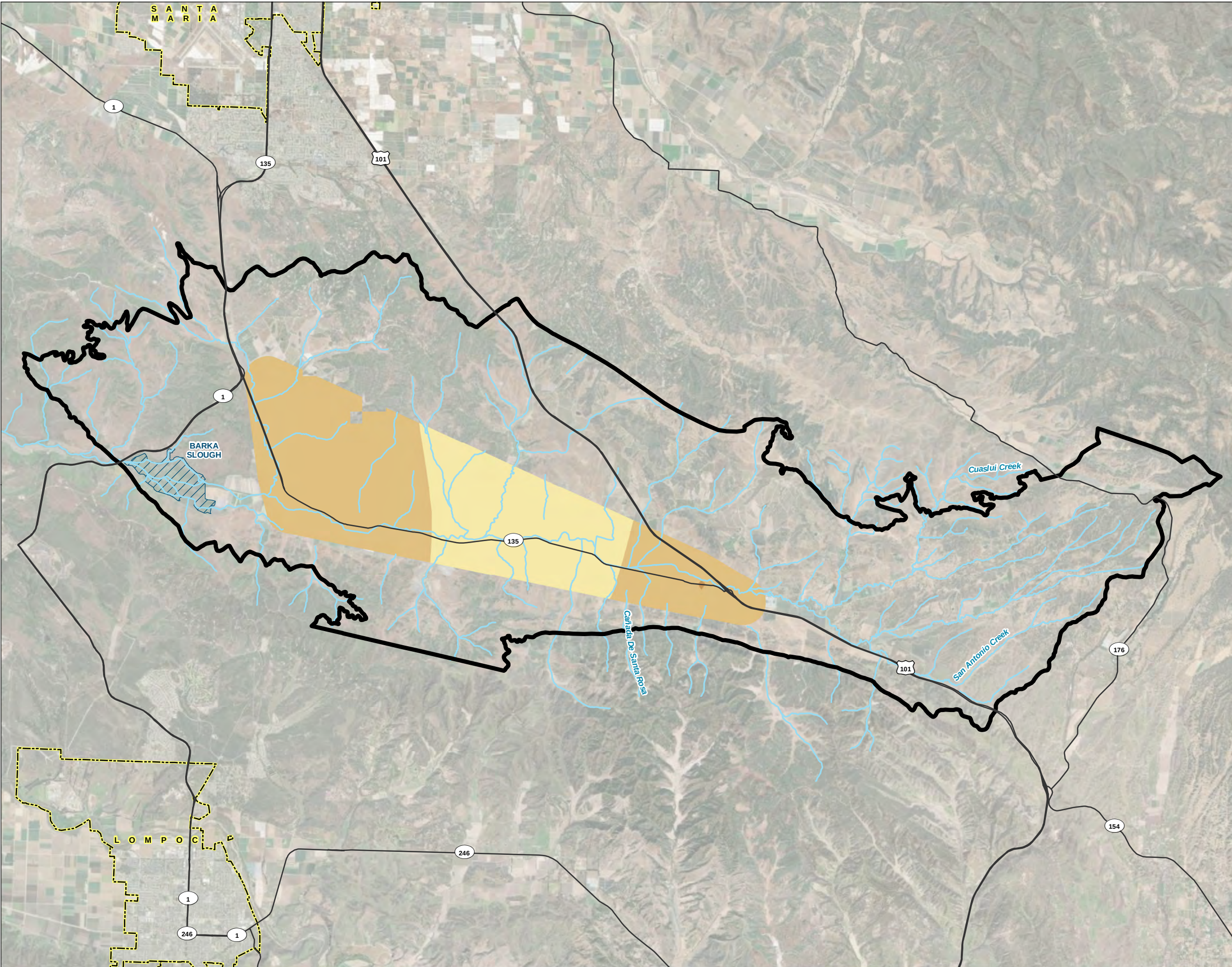


FIGURE 21

**Paso Robles Formation
Annual Change in
Groundwater Elevation
Fall 2020 to Fall 2021**
Groundwater Sustainability Plan
2021 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

Change in Groundwater Elevation (feet NAVD88)¹

- > 50
- 40 - 50
- 30 - 40
- 20 - 30
- 10 - 20
- 0 - 10
- 10 - 0
- 20 - -10
- 30 - -20
- 30

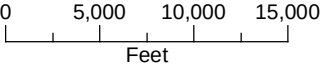
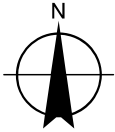
All Other Features

- San Antonio Creek or Tributary
- Major Road
- San Antonio Creek Valley Groundwater Basin²
- Barka Slough
- City Boundary

NOTES

- The change in groundwater elevation extents are bound by the lateral limits of the subject aquifer (see Figure 2) and available groundwater elevation data.
- San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



Date: March 9, 2022
Data Sources: USGS (2020a), ESRI, DWR (2018),
Maxar imagery (2020)



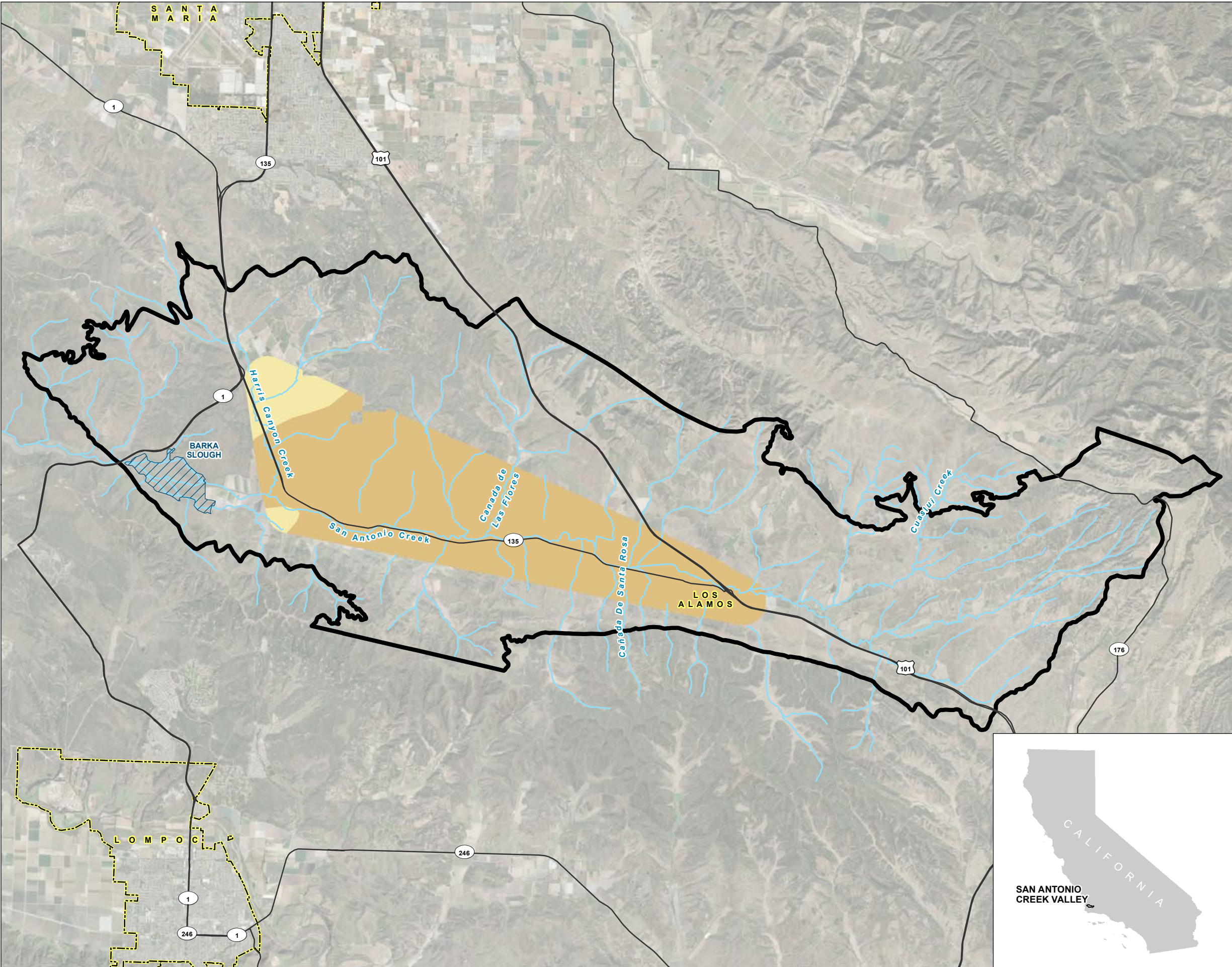


FIGURE 14

**Paso Robles Formation
Annual Change in
Groundwater Elevation
Fall 2021 to Fall 2022**
Groundwater Sustainability Plan
2022 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

Change in Groundwater Elevation (feet NAVD88)¹

- > 50
- 40 - 50
- 30 - 40
- 20 - 30
- 10 - 20
- 0 - 10
- 10 - 0
- 20 - -10
- 30 - -20
- 30

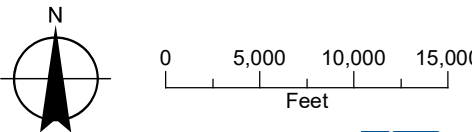
All Other Features

- San Antonio Creek or Tributary
- Major Road
- San Antonio Creek Valley Groundwater Basin²
- Barka Slough
- City Boundary

NOTES

- The change in groundwater elevation extents are bound by the lateral limits of the subject aquifer (see Figure 2) and available groundwater elevation data.
- San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



Date: February 20, 2023
Data Sources: USGS (2020a), ESRI, DWR (2018),
Maxar imagery (2020)



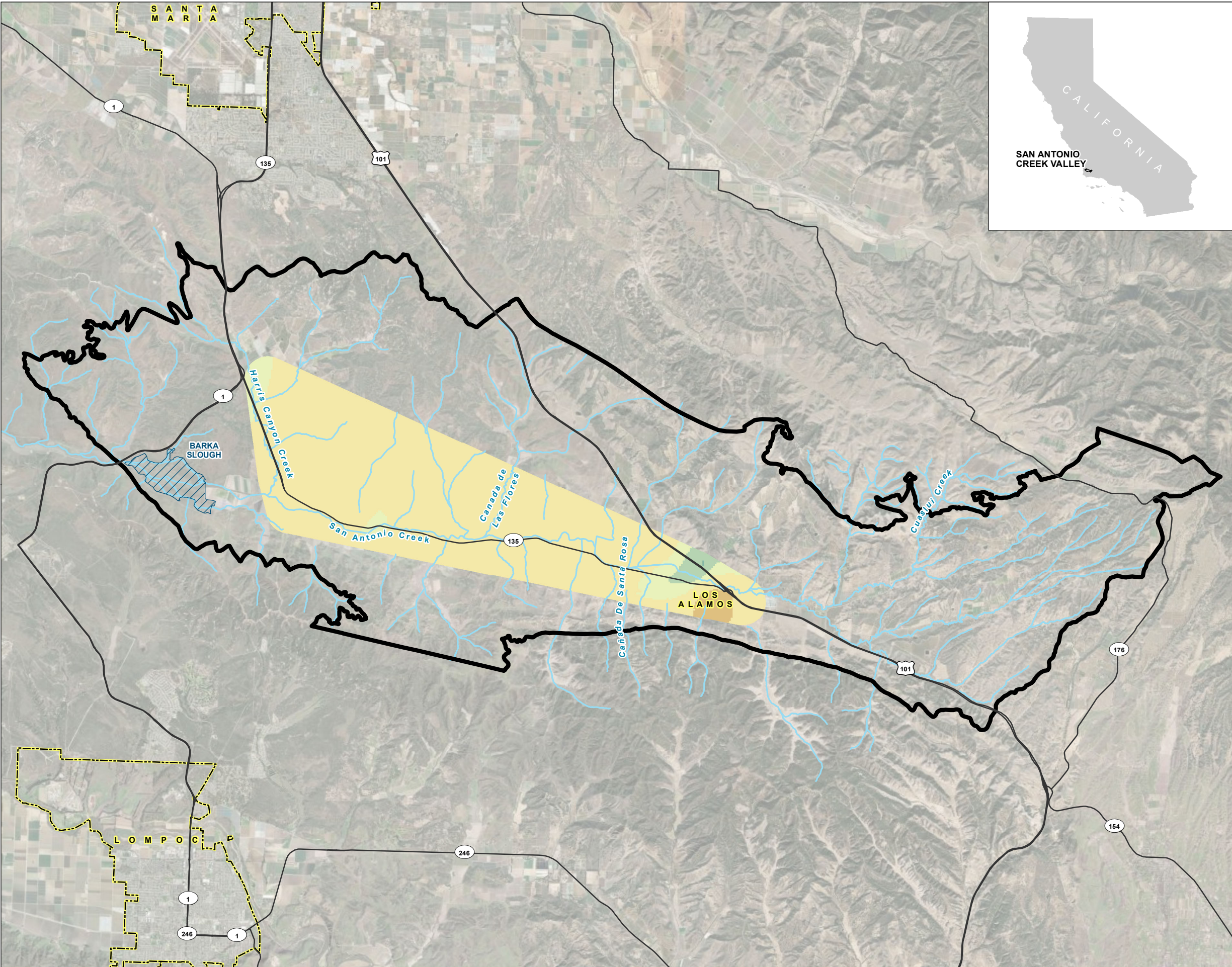


FIGURE 15

**Paso Robles Formation
Annual Change in
Groundwater Elevation
Fall 2022 to Fall 2023**

Groundwater Sustainability Plan
2023 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

Change in Groundwater Elevation (feet NAVD 88)¹

- > 50
- 40 - 50
- 30 - 40
- 20 - 30
- 10 - 20
- 0 - 10
- 10 - 0
- 20 - -10
- 30 - -20
- 30

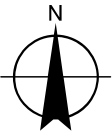
All Other Features

- San Antonio Creek or Tributary
- Major Road
- San Antonio Creek Valley Groundwater Basin²
- Barka Slough
- City Boundary

NOTES

- The change in groundwater elevation extents are bound by the lateral limits of the subject aquifer (see Figure 2) and available groundwater elevation data.
- San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



0 5,000 10,000 15,000
Feet

Date: February 15, 2024
Data Sources: USGS (2020a), ESRI, DWR (2018),
Maxar imagery (2020)



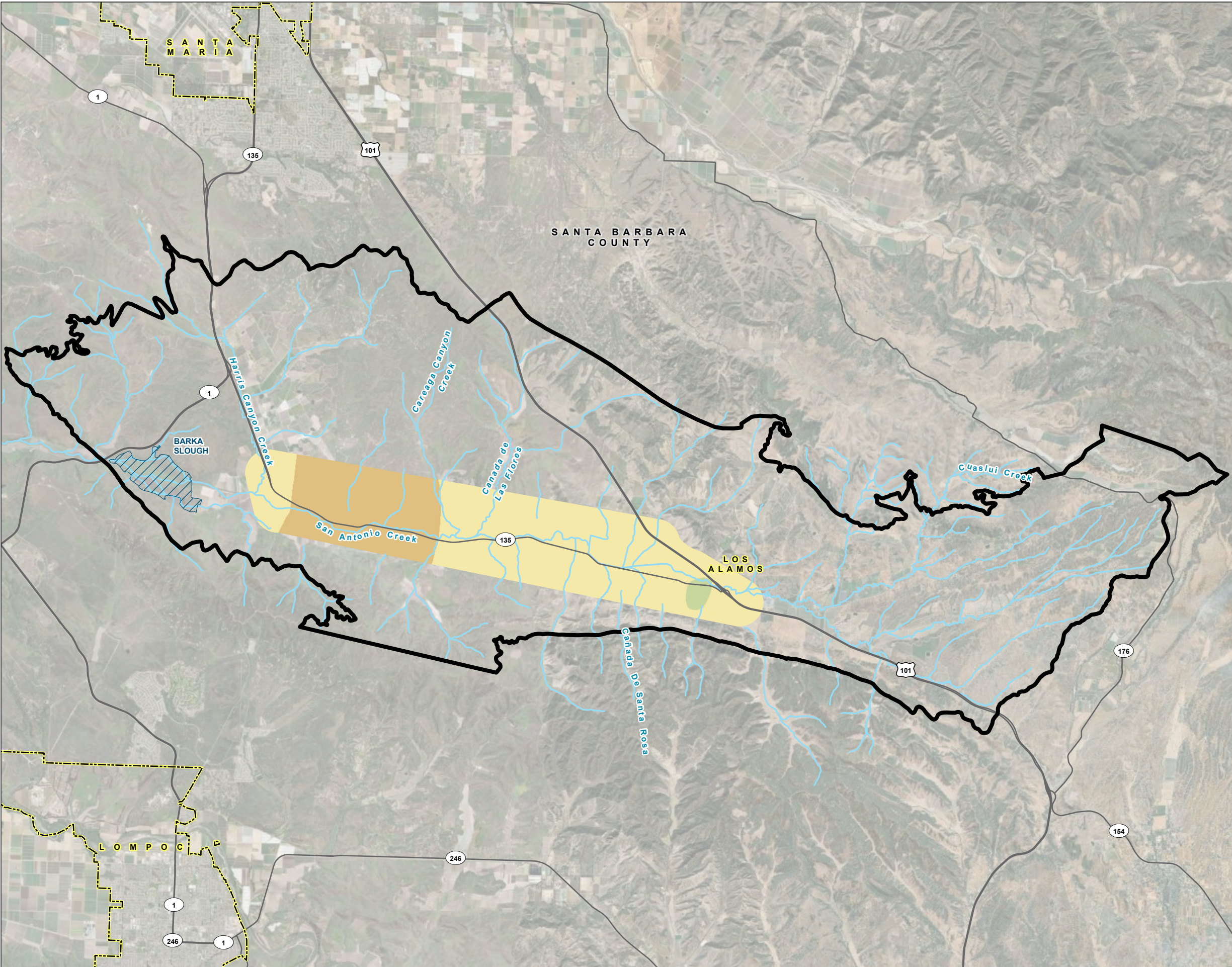


FIGURE 15

**Paso Robles Formation
Annual Change in
Groundwater Elevation
Fall 2023 to Fall 2024**

Groundwater Sustainability Plan
2024 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

Change in Groundwater Elevation (feet NAVD 88)¹

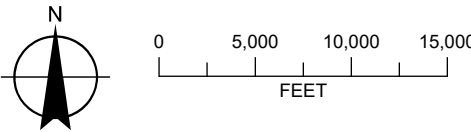
- 10 to 20
- 0 to 10
- 10 to 0

All Other Features

- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary
- Major Road
- San Antonio Creek or Tributary

- NOTES**
1. The change in groundwater elevation extents are bound by the lateral limits of the subject aquifer (see Figure 2) and available groundwater elevation data.
 2. San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



Date: February 18, 2025
Data Sources: USGS, ESRI, DWR,
Maxar Imagery (4/10/2024)



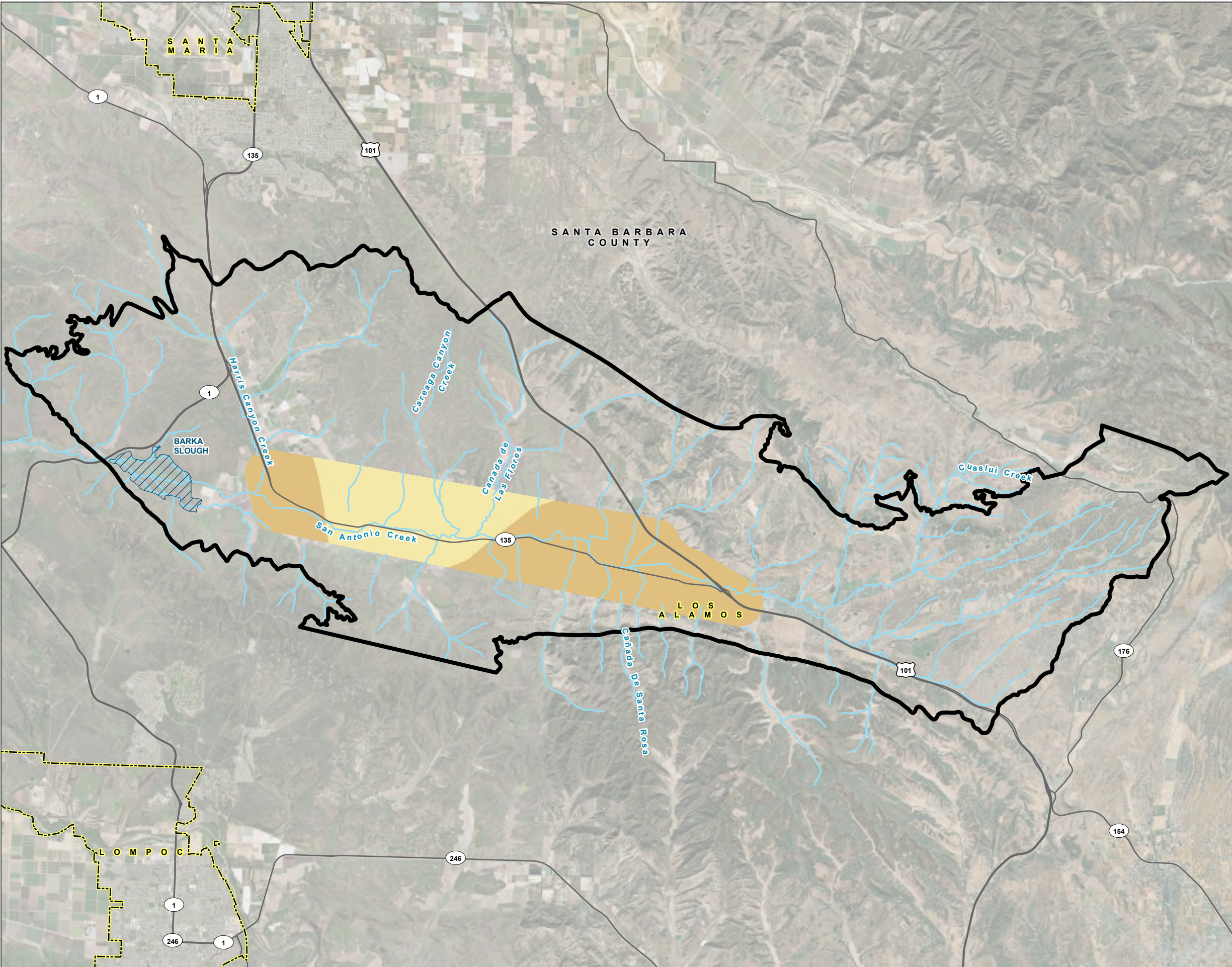


FIGURE 15

**Paso Robles Formation
Annual Change in
Groundwater Elevation
Fall 2024 to Fall 2025**

Groundwater Sustainability Plan
2025 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

Change in Groundwater Elevation (feet NAVD 88)¹

- 0 to 10
- 10 to 0

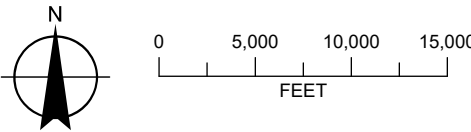
All Other Features

- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary
- Major Road
- San Antonio Creek or Tributary

NOTES

- The change in groundwater elevation extents are bound by the lateral limits of the subject aquifer (see Figure 2) and available groundwater elevation data.
- San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



Date: February 12, 2026
Data Sources: USGS, ESRI, DWR,
Maxar Imagery (4/10/2024)



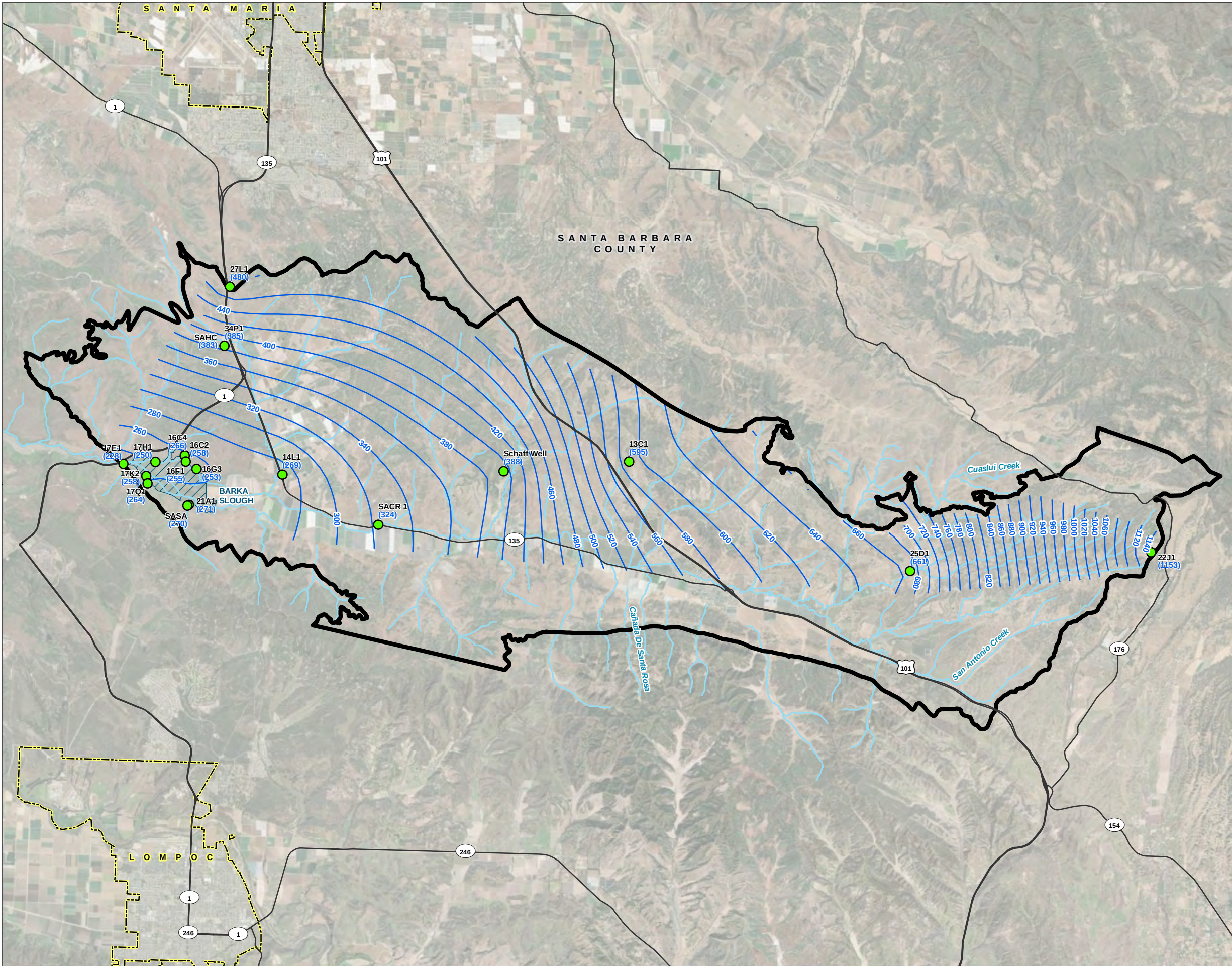


FIGURE 13
Careaga Sand
Groundwater Elevation Contours
Spring 2019
Groundwater Sustainability Plan
2021 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

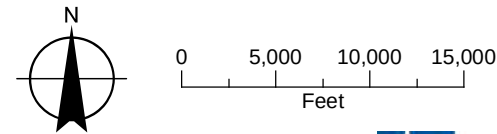
- Careaga Sand Well
- Groundwater Elevation (NAVD88)
- Groundwater Elevaton Contours, ft NAVD88

All Other Features

- San Antonio Creek or Tributary
- Major Road
- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary

NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



Date: January 31, 2022
Data Sources: USGS (2020a), ESRI, DWR (2018),
Maxar imagery (2020)



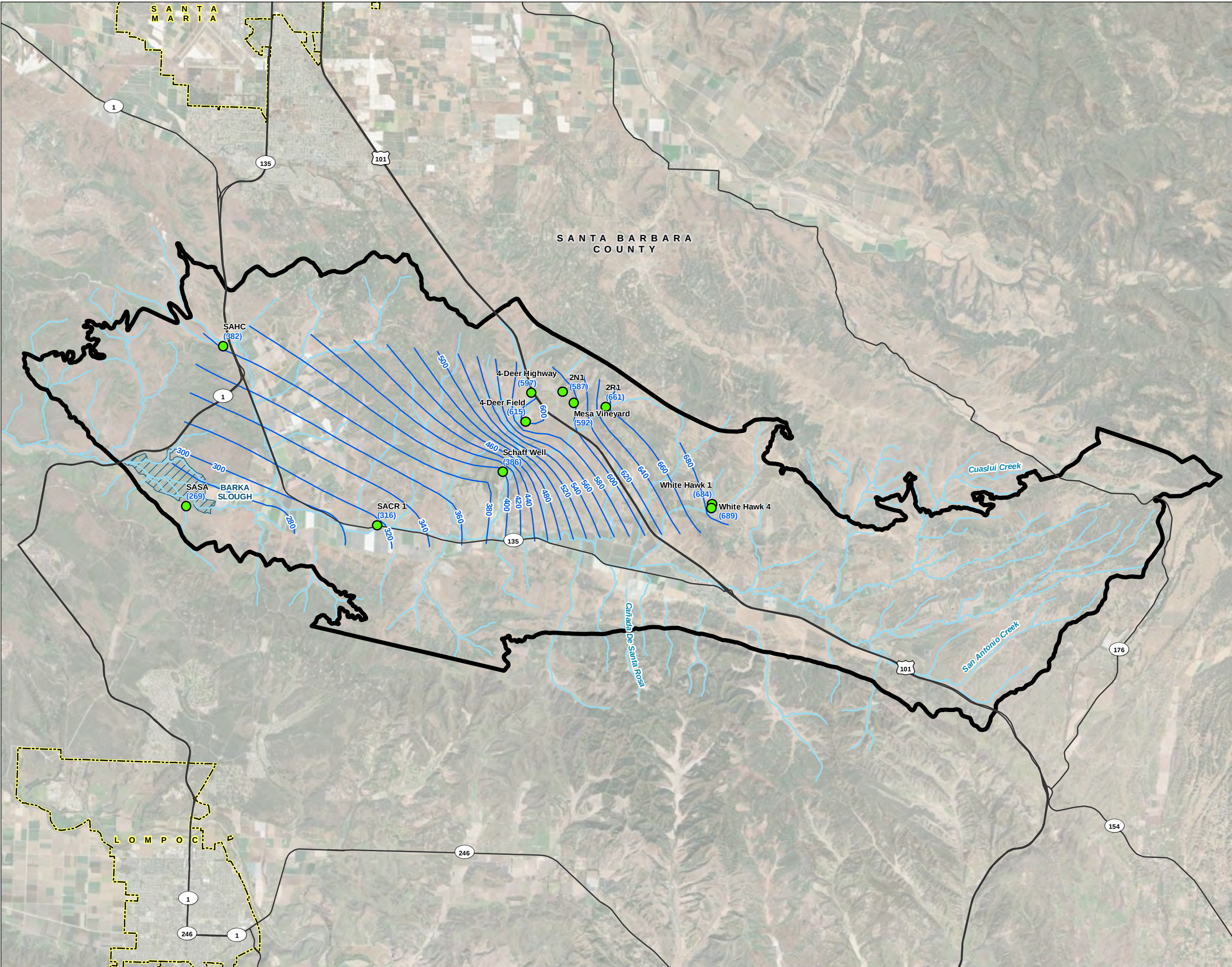


FIGURE 14
Careaga Sand
Groundwater Elevation Contours
Fall 2019
Groundwater Sustainability Plan
2021 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

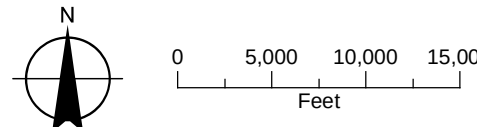
- Careaga Sand Well
- Groundwater Elevation (NAVD88)
- Groundwater Elevaton Contours, ft NAVD88

All Other Features

- San Antonio Creek or Tributary
- Major Road
- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary

NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



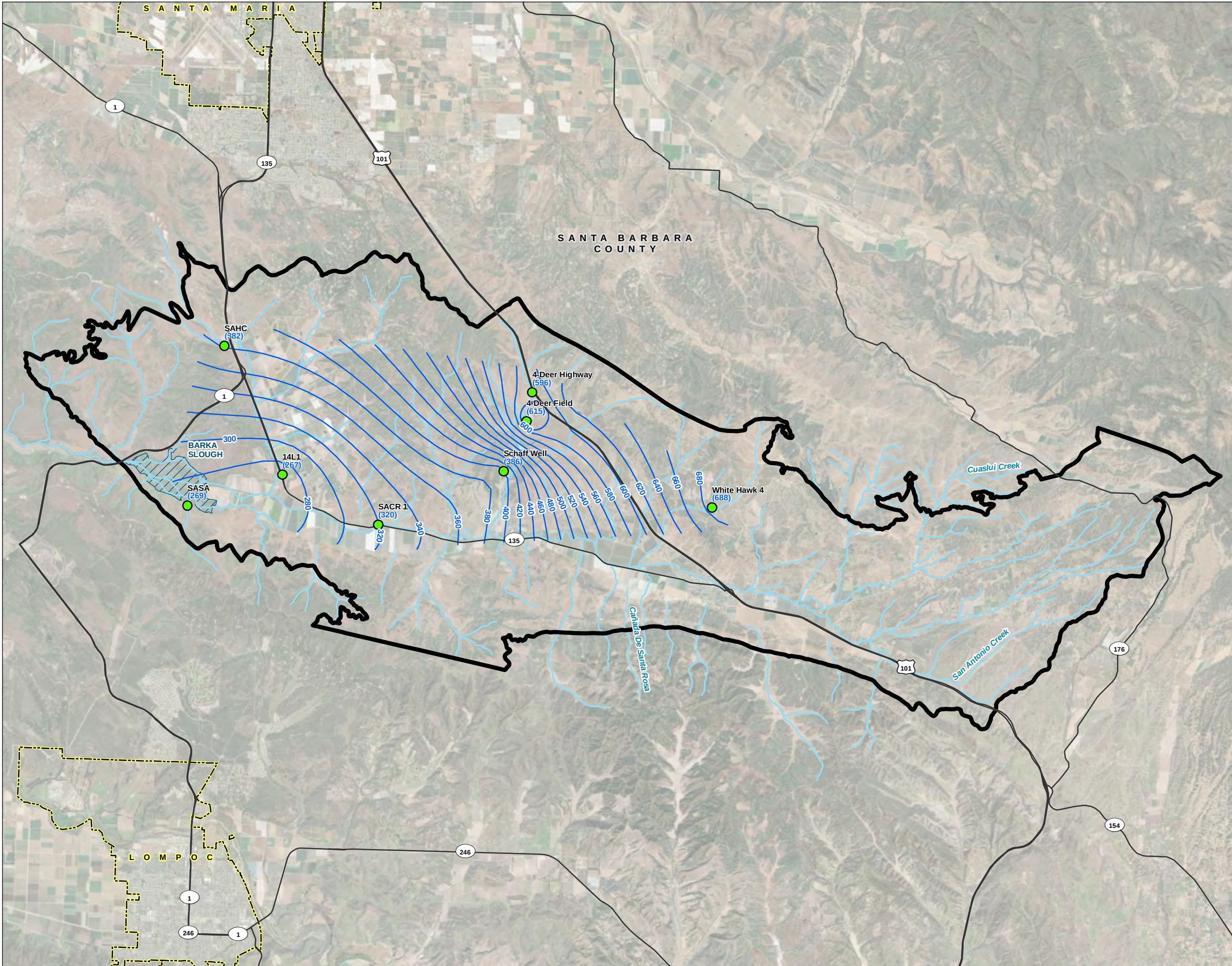


FIGURE 15
Careaga Sand
Groundwater Elevation Contours
Spring 2020
Groundwater Sustainability Plan
2021 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

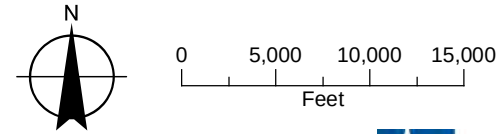
- Careaga Sand Well
- Groundwater Elevation (NAVD88)
- Groundwater Elevaton Contours, ft NAVD88

All Other Features

- San Antonio Creek or Tributary
- Major Road
- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary

NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



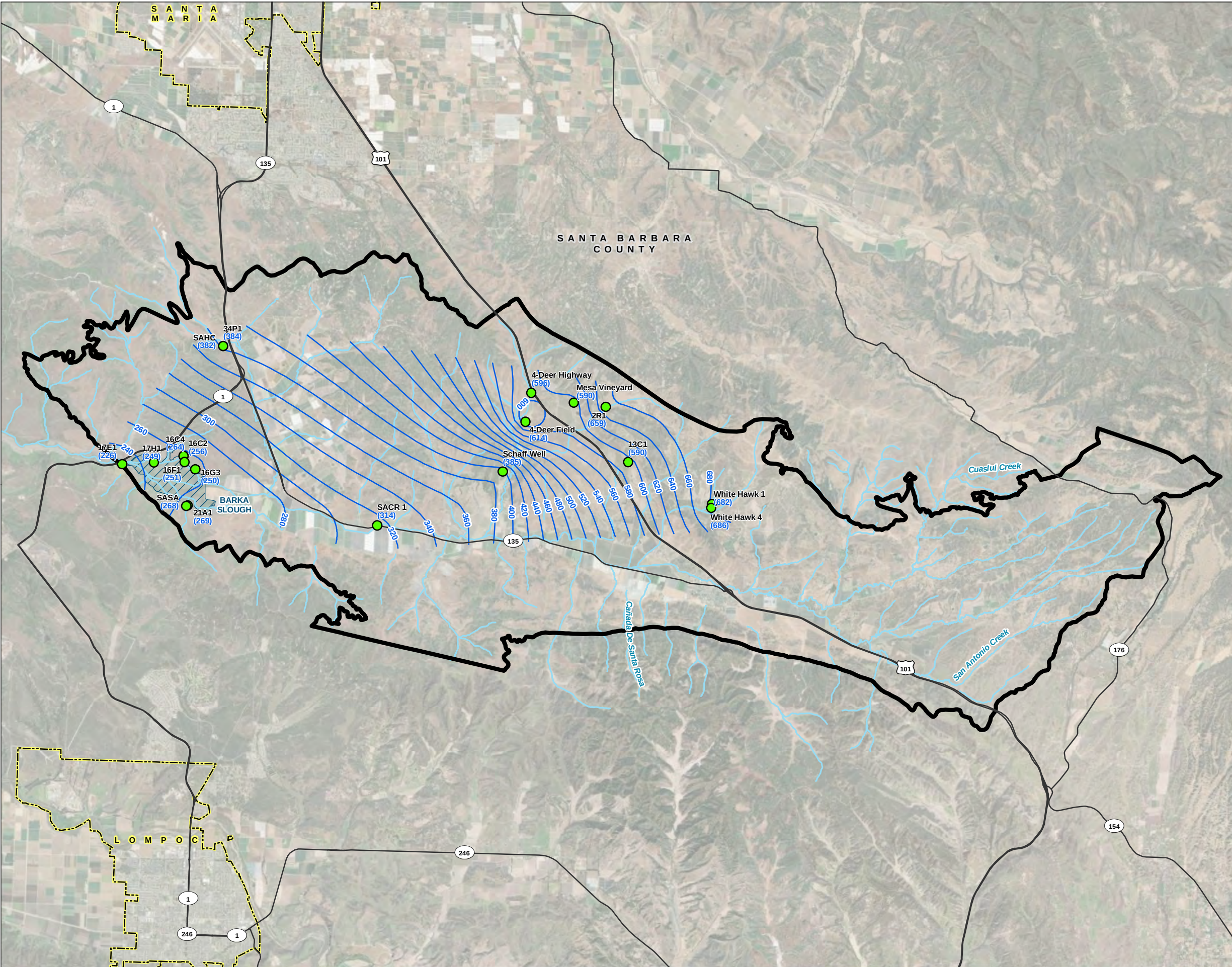


FIGURE 16
Careaga Sand
Groundwater Elevation Contours
Fall 2020
Groundwater Sustainability Plan
2021 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

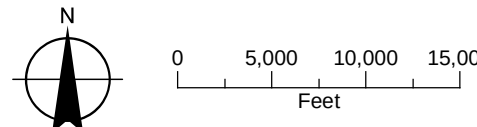
- Careaga Sand Well
- Groundwater Elevation (NAVD88)
- Groundwater Elevaton Contours, ft NAVD88

All Other Features

- San Antonio Creek or Tributary
- Major Road
- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary

NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



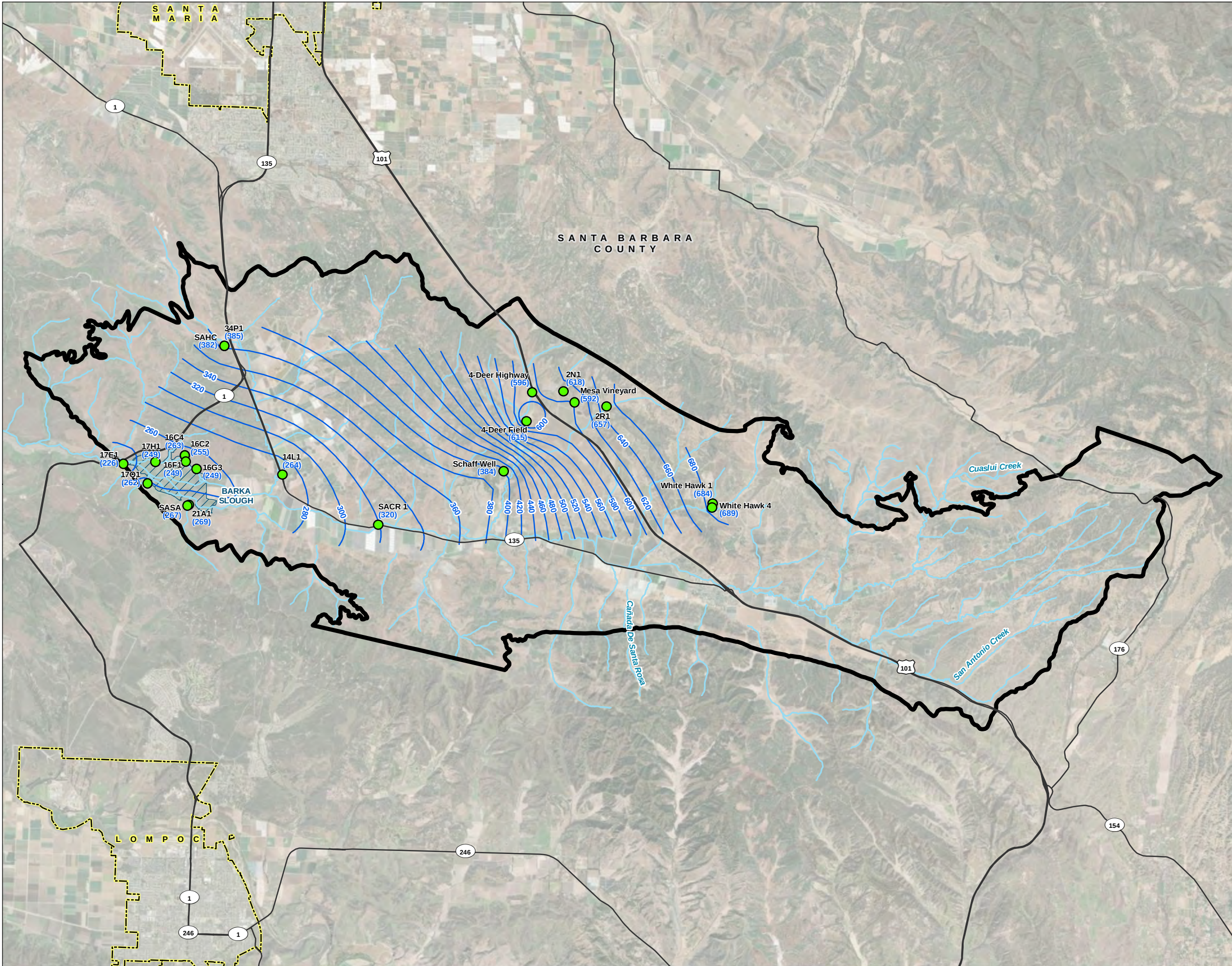
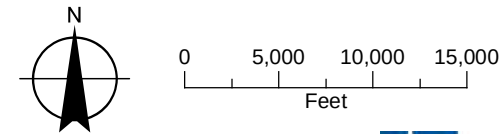


FIGURE 17
Careaga Sand
Groundwater Elevation Contours
Spring 2021
Groundwater Sustainability Plan
2021 Annual Report
San Antonio Creek Valley
Groundwater Basin

- LEGEND**
- Careaga Sand Well
 - Groundwater Elevation (NAVD88)
 - Groundwater Elevaton Contours, ft NAVD88
- All Other Features**
- San Antonio Creek or Tributary
 - Major Road
 - San Antonio Creek Valley Groundwater Basin
 - Barka Slough
 - City Boundary

NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



Date: January 31, 2022
Data Sources: USGS (2020a), ESRI, DWR (2018),
Maxar imagery (2020)



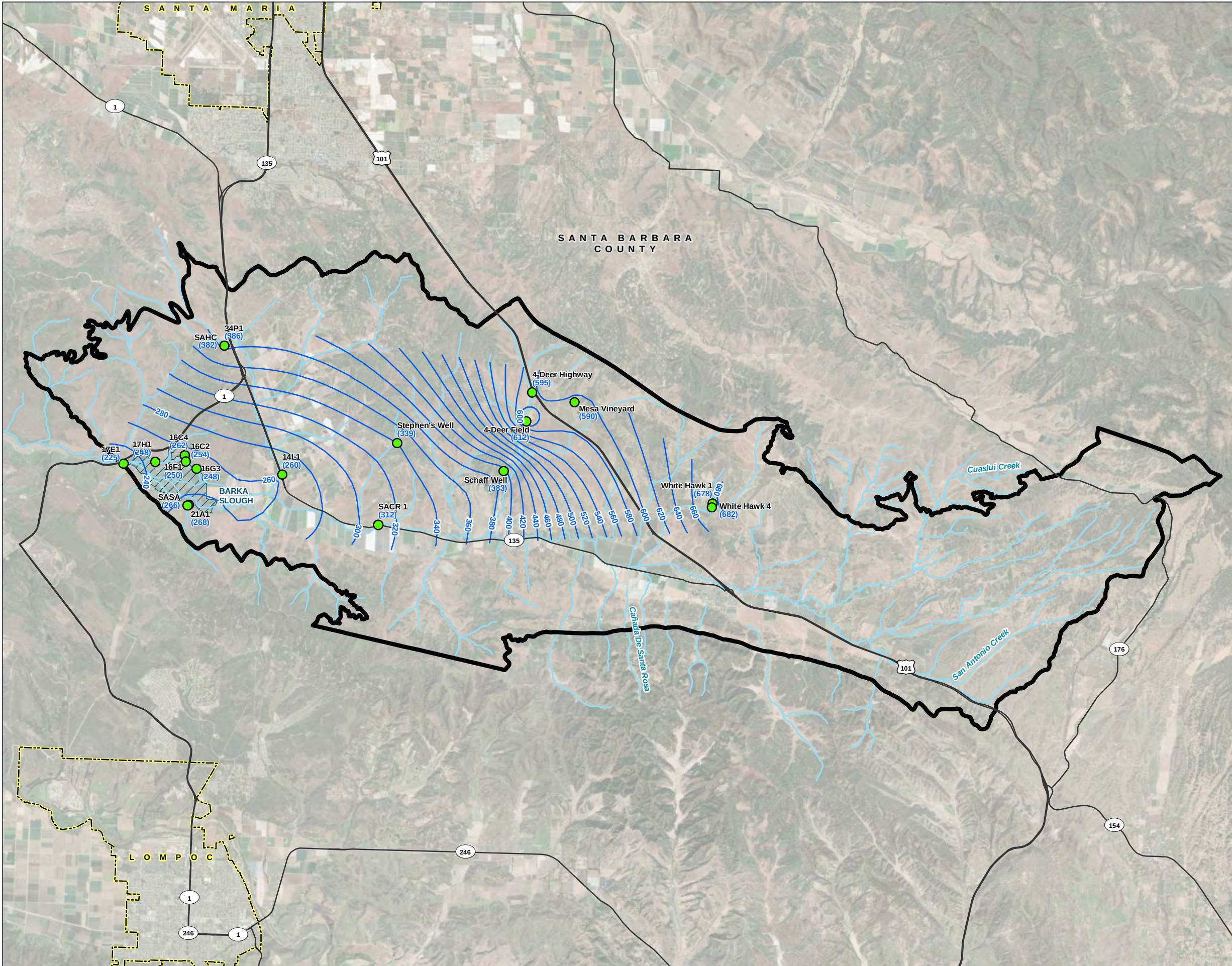
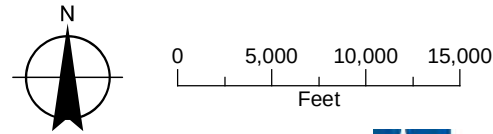


FIGURE 18
Careaga Sand
Groundwater Elevation Contours
Fall 2021
Groundwater Sustainability Plan
2021 Annual Report
San Antonio Creek Valley
Groundwater Basin

- LEGEND**
- Careaga Sand Well
 - Groundwater Elevation (NAVD88)
 - Groundwater Elevaton Contours, ft NAVD88
 - San Antonio Creek or Tributary
 - Major Road
 - San Antonio Creek Valley Groundwater Basin
 - Barka Slough
 - City Boundary

NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



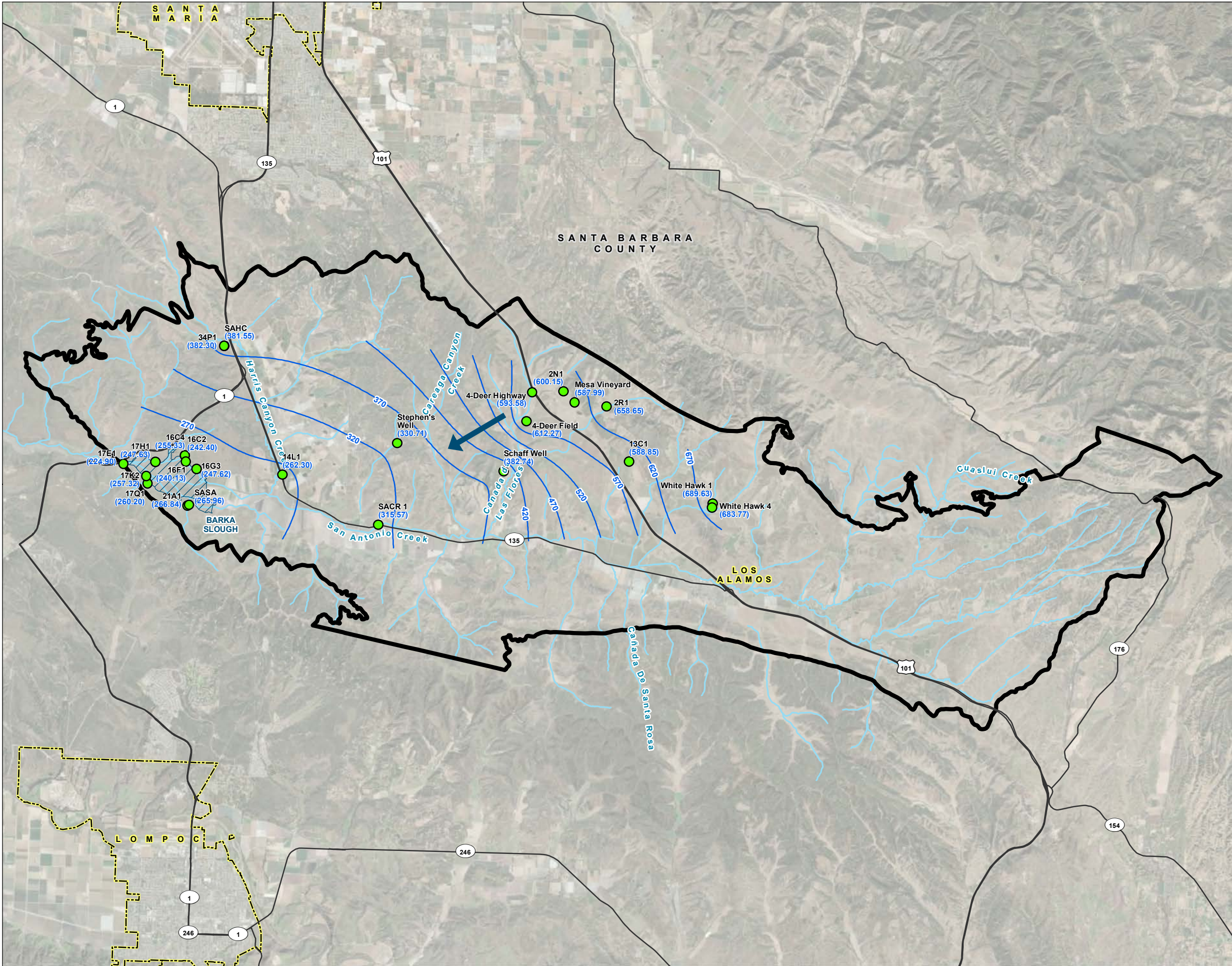


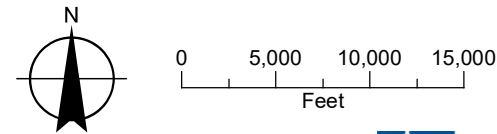
FIGURE 11
Careaga Sand
Groundwater Elevation Contours
Spring 2022
Groundwater Sustainability Plan
2022 Annual Report
San Antonio Creek Valley
Groundwater Basin

- LEGEND**
- Careaga Sand Well
 - Groundwater Elevation (NAVD88)
 - Groundwater Elevaton Contours, ft NAVD88
 - Groundwater Flow Direction
 - All Other Features**
 - San Antonio Creek or Tributary
 - Major Road
 - San Antonio Creek Valley Groundwater Basin
 - Barka Slough
 - City Boundary



NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



Date: February 20, 2023
Data Sources: USGS (2020a), ESRI, DWR (2018),
Maxar imagery (2020)



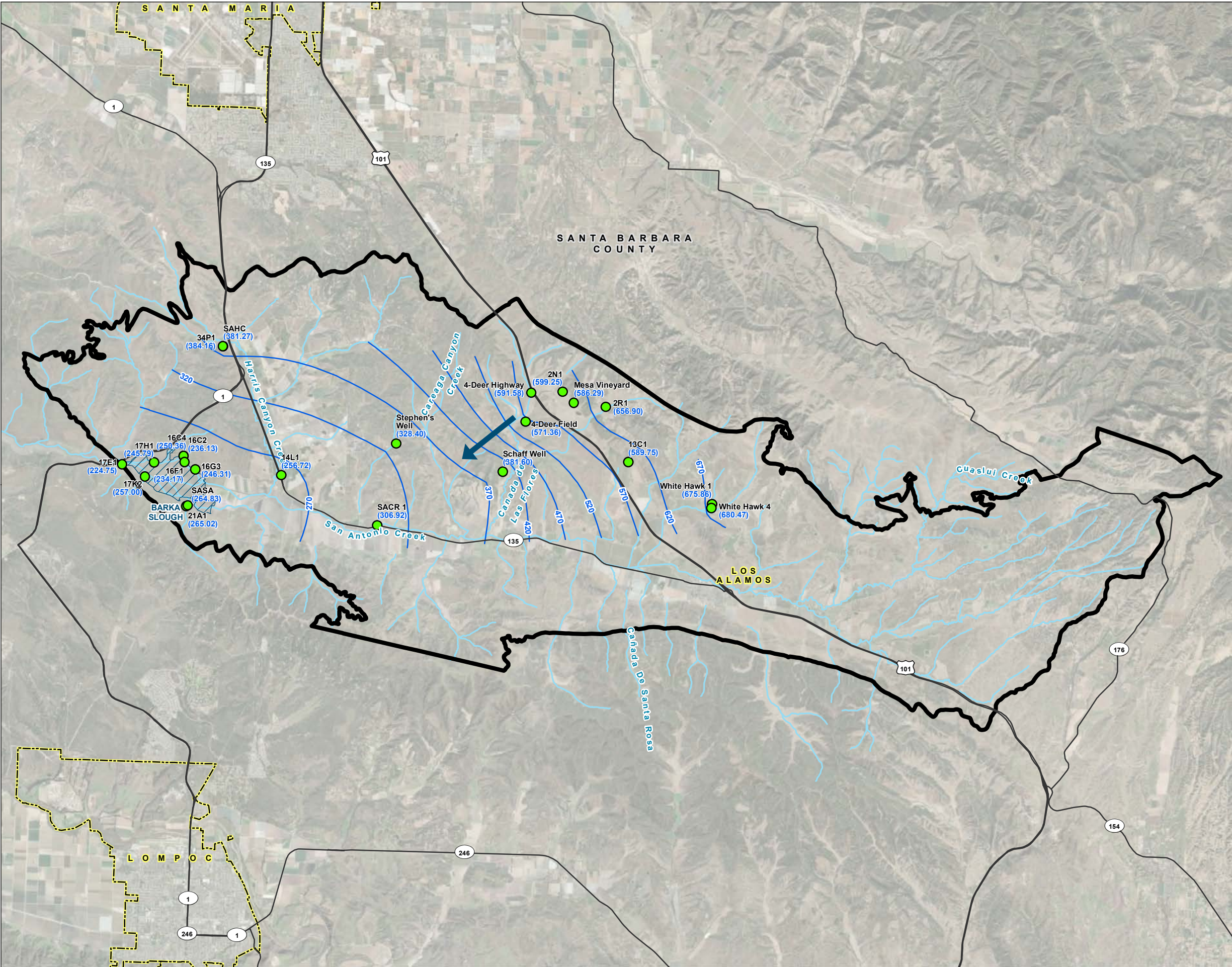


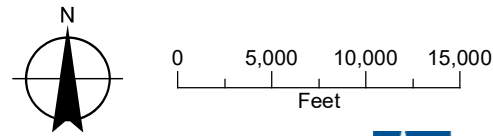
FIGURE 12
Careaga Sand
Groundwater Elevation Contours
Fall 2022
Groundwater Sustainability Plan
2022 Annual Report
San Antonio Creek Valley
Groundwater Basin

- LEGEND**
- Careaga Sand Well
 - Groundwater Elevation (NAVD88)
 - Groundwater Elevaton Contours, ft NAVD88
 - Groundwater Flow Direction
 - All Other Features**
 - San Antonio Creek or Tributary
 - Major Road
 - San Antonio Creek Valley Groundwater Basin
 - Barka Slough
 - City Boundary



NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



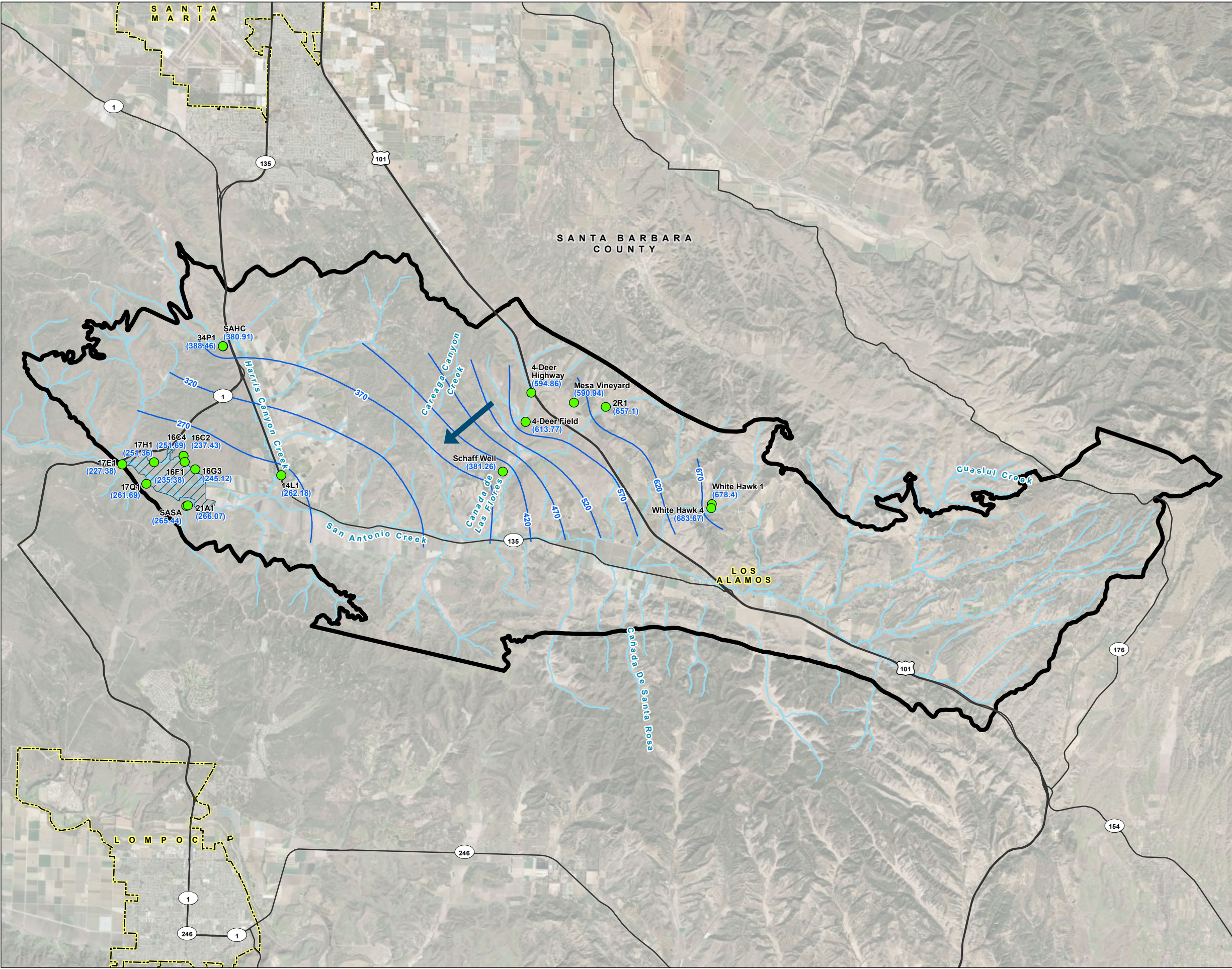


FIGURE 12
Careaga Sand
Groundwater Elevation Contours
Spring 2023

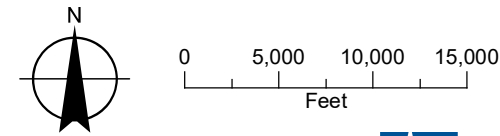
Groundwater Sustainability Plan
2023 Annual Report
San Antonio Creek Valley
Groundwater Basin

- LEGEND**
- Careaga Sand Well
 - Groundwater Elevation (NAVD 88)
 - Groundwater Elevaton Contours, ft NAVD 88
 - Groundwater Flow Direction
- All Other Features**
- San Antonio Creek or Tributary
 - Major Road
 - San Antonio Creek Valley Groundwater Basin
 - Barka Slough
 - City Boundary



NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



Date: February 15, 2024
Data Sources: USGS (2020a), ESRI, DWR (2018),
Maxar imagery (2020)



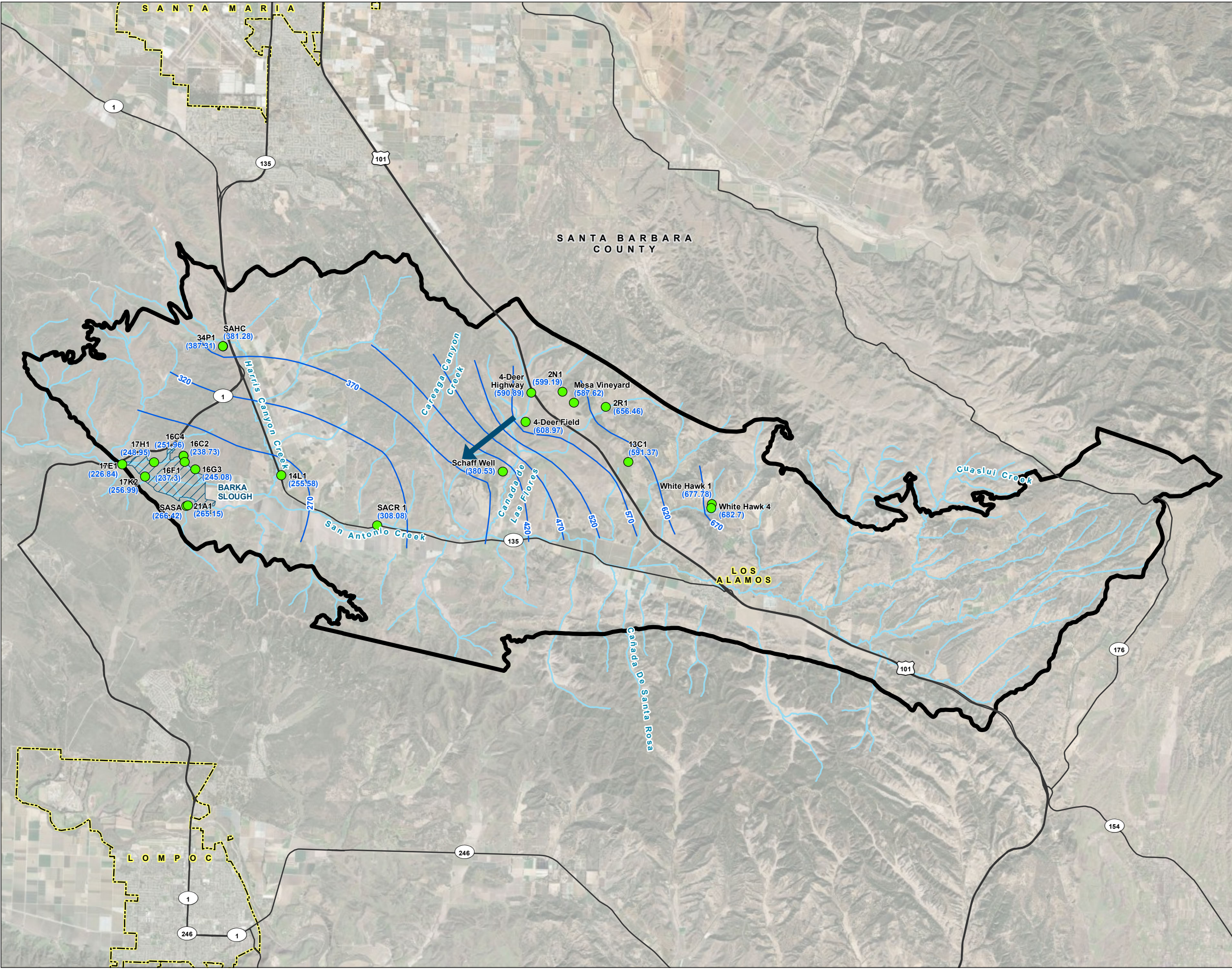


FIGURE 13
Careaga Sand
Groundwater Elevation Contours
Fall 2023

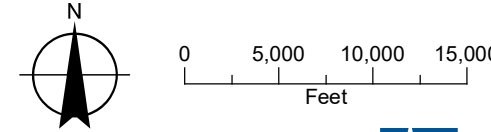
Groundwater Sustainability Plan
2023 Annual Report
San Antonio Creek Valley
Groundwater Basin

- LEGEND**
- Careaga Sand Well
 - Groundwater Elevation (NAVD 88)
 - Groundwater Elevaton Contours, ft NAVD 88
 - Groundwater Flow Direction
 - All Other Features**
 - San Antonio Creek or Tributary
 - Major Road
 - San Antonio Creek Valley Groundwater Basin
 - Barka Slough
 - City Boundary



NOTES
San Antonio Creek Valley Groundwater Basin
Boundary as defined in the California
Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



Date: February 15, 2024
Data Sources: USGS (2020a), ESRI, DWR (2018),
Maxar imagery (2020)



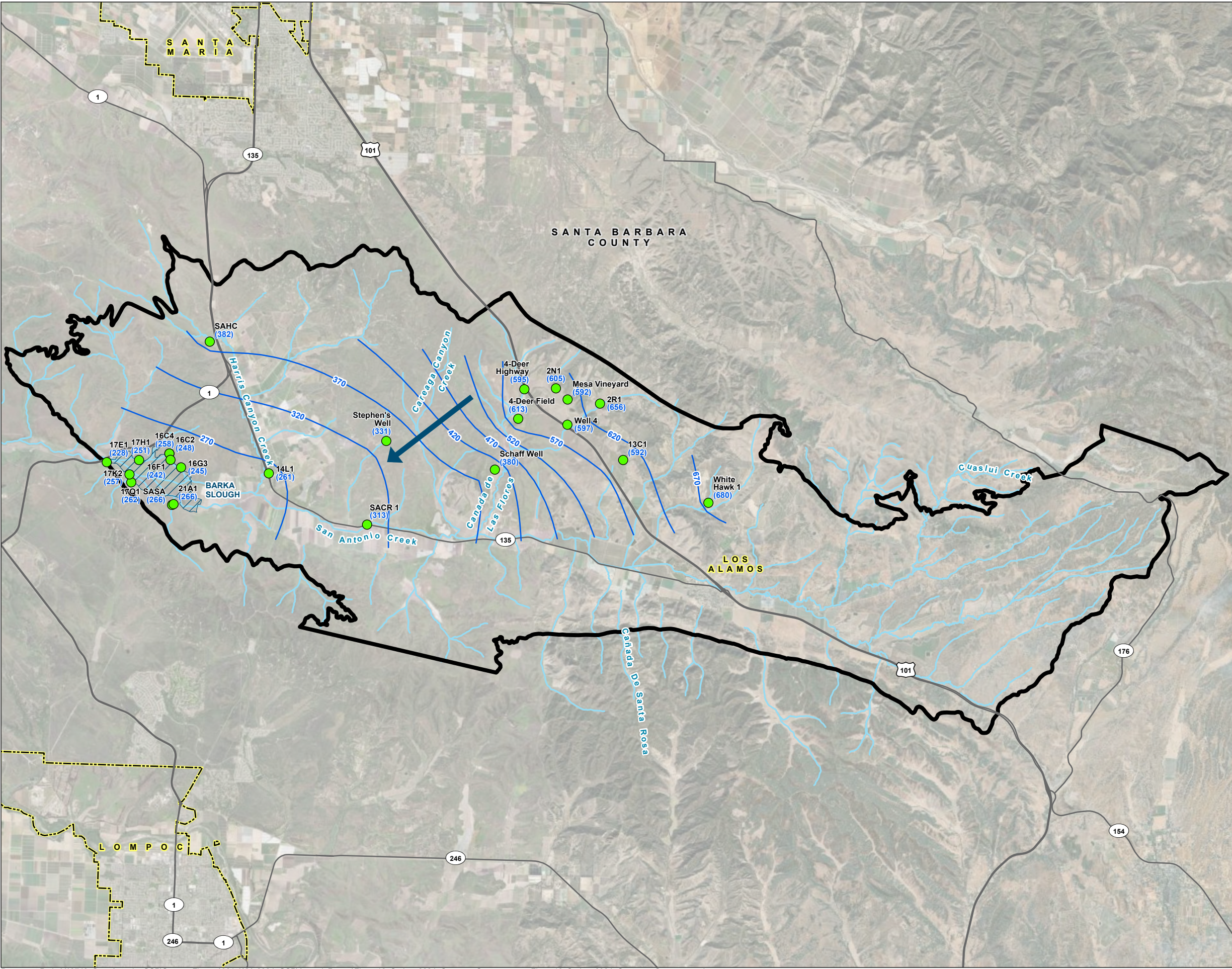


FIGURE 12
Careaga Sand
Groundwater Elevation Contours
Spring 2024

Groundwater Sustainability Plan
2024 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

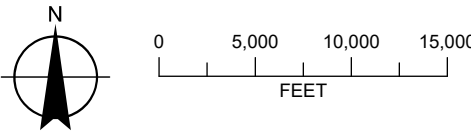
- Careaga Sand Well
- Groundwater Elevation (NAVD 88)
- Groundwater Elevaton Contours, ft NAVD 88
- General Direction of Groundwater Flow

All Other Features

- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary
- Major Road
- San Antonio Creek or Tributary

NOTES
San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



Date: February 12, 2025
Data Sources: USGS, ESRI, DWR,
Maxar Imagery (4/10/2024)



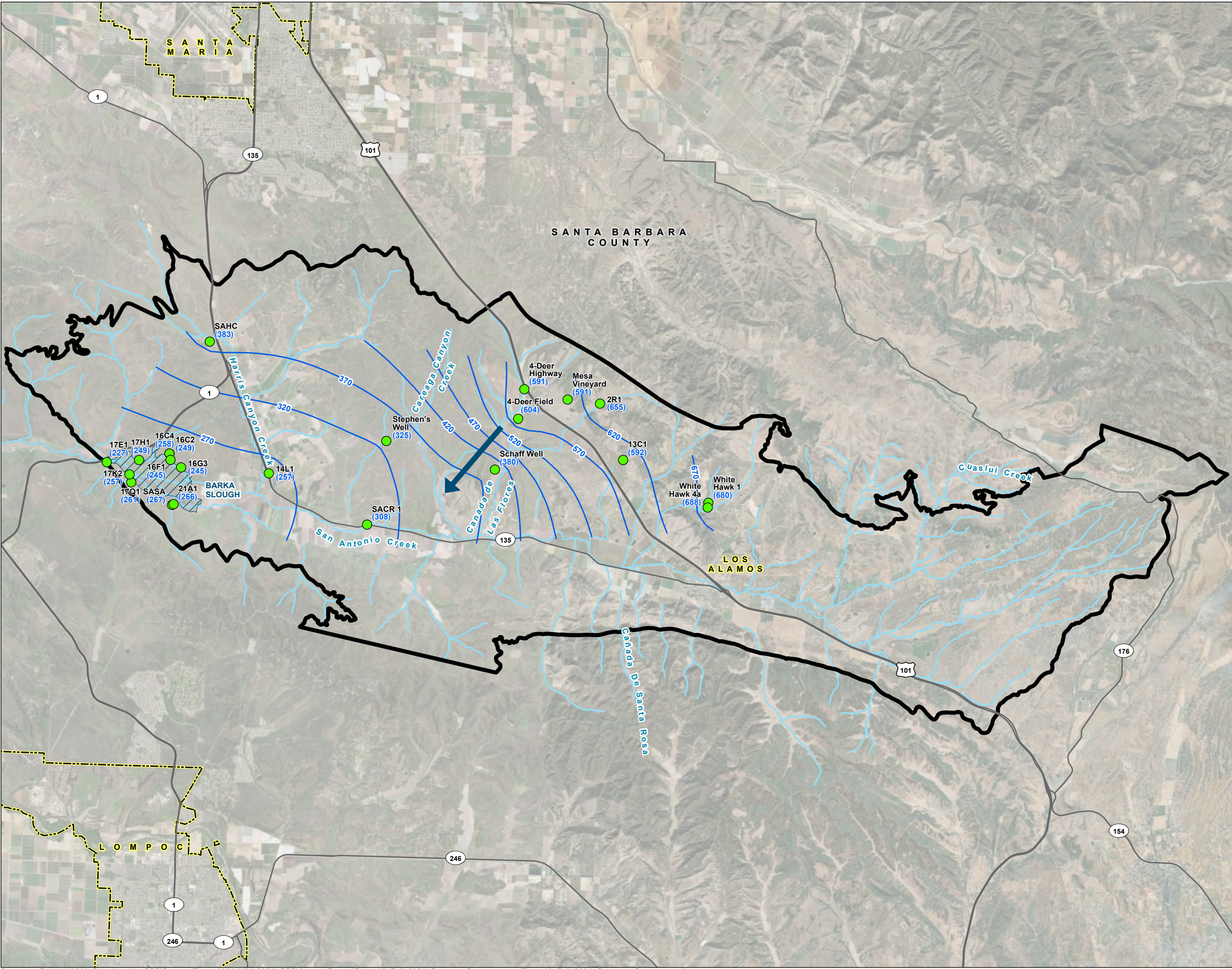


FIGURE 13
Careaga Sand
Groundwater Elevation Contours
Fall 2024

Groundwater Sustainability Plan
2024 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

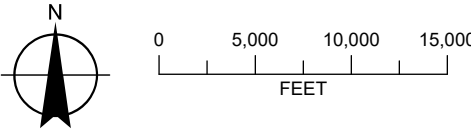
- Careaga Sand Well
- Groundwater Elevation (NAVD 88)
- Groundwater Elevaton Contours, ft NAVD 88
- General Direction of Groundwater Flow

All Other Features

- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary
- Major Road
- San Antonio Creek or Tributary

NOTES
San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



Date: February 12, 2025
Data Sources: USGS, ESRI, DWR,
Maxar Imagery (4/10/2024)



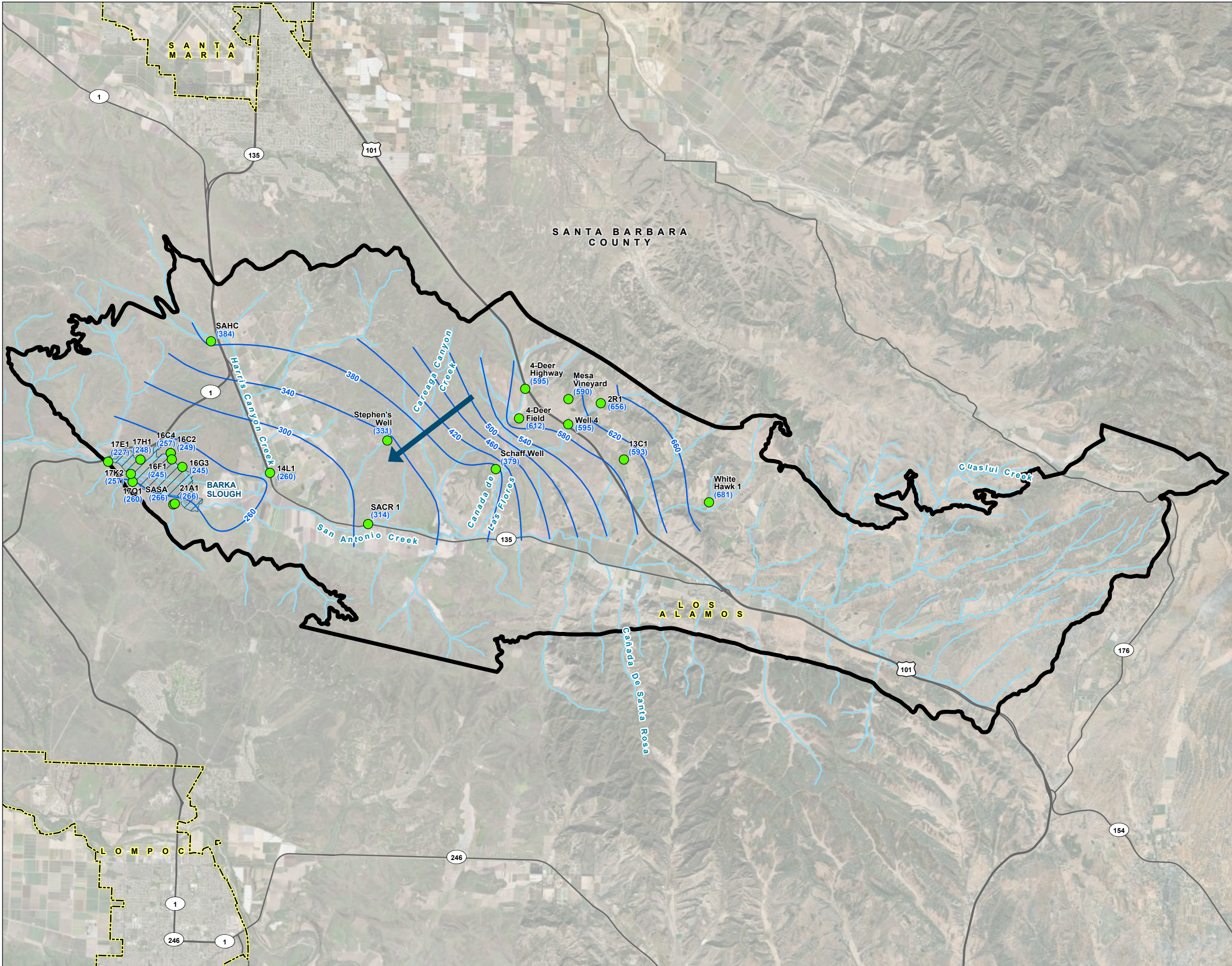


FIGURE 12
Careaga Sand
Groundwater Elevation Contours
Spring 2025

Groundwater Sustainability Plan
2025 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

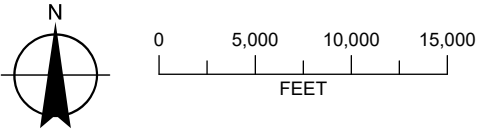
- Careaga Sand Well
- Groundwater Elevation (feet NAVD 88)
- Groundwater Elevaton Contours, feet NAVD 88
- General Direction of Groundwater Flow

All Other Features

- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary
- Major Road
- San Antonio Creek or Tributary

NOTES
San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



Date: February 16, 2026
Data Sources: USGS, ESRI, DWR,
Maxar Imagery (4/10/2024)



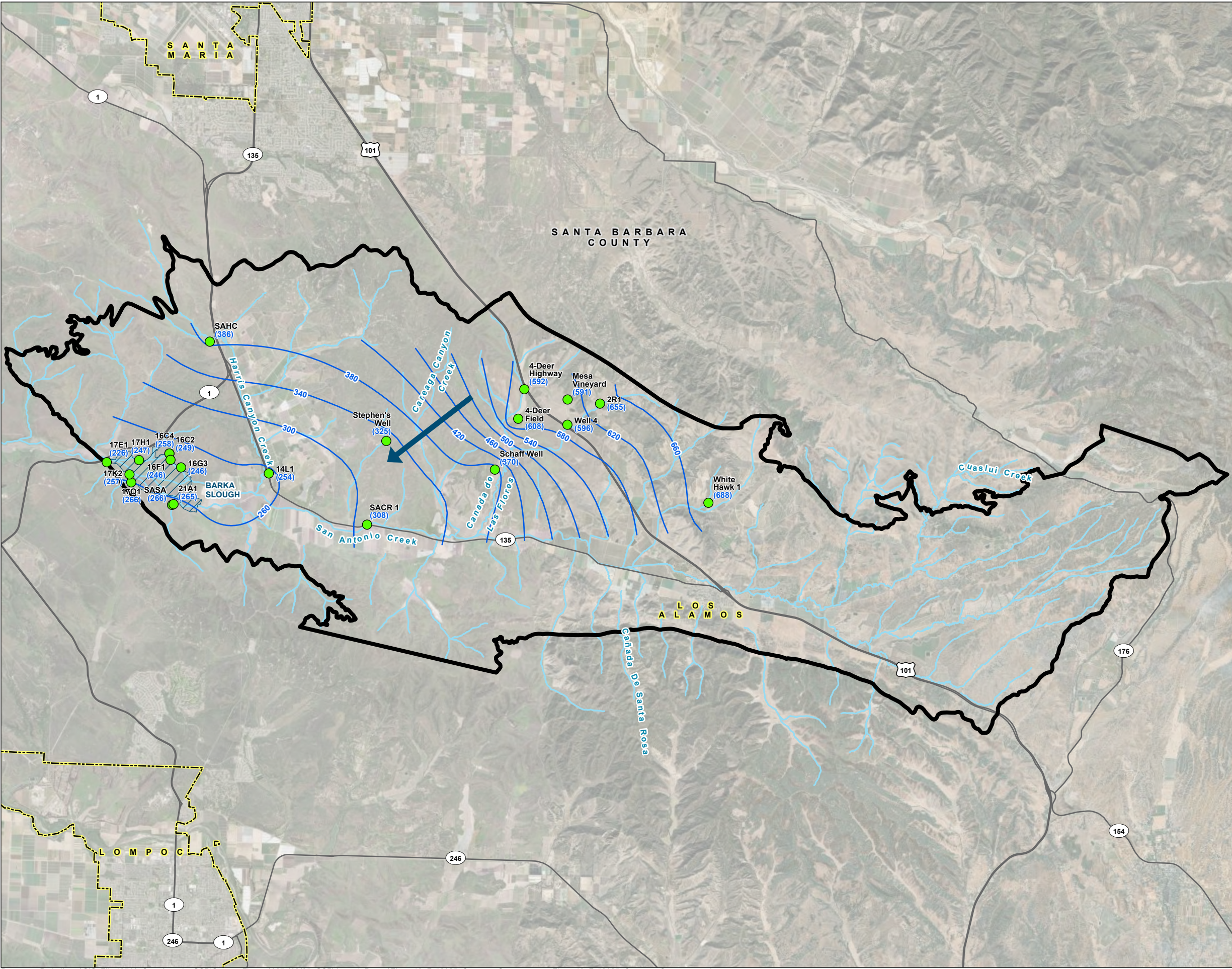


FIGURE 13
Careaga Sand
Groundwater Elevation Contours
Fall 2025

Groundwater Sustainability Plan
2025 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

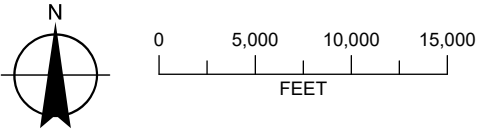
- Careaga Sand Well
- Groundwater Elevation (feet NAVD 88)
- Groundwater Elevaton Contours, feet NAVD 88
- General Direction of Groundwater Flow

All Other Features

- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary
- Major Road
- San Antonio Creek or Tributary

NOTES
San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



Date: February 16, 2026
Data Sources: USGS, ESRI, DWR,
Maxar Imagery (4/10/2024)



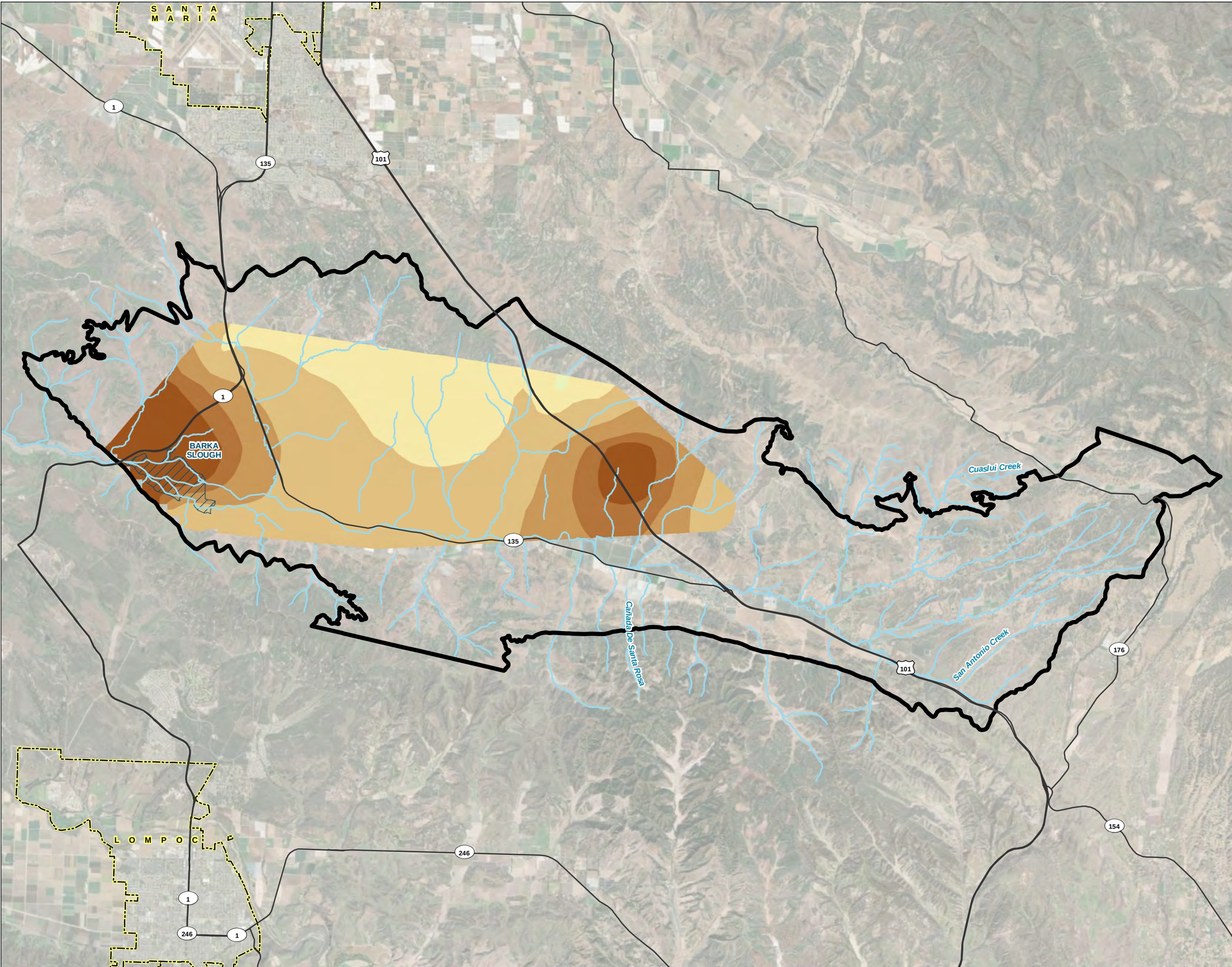


FIGURE 22

**Careaga Sand
Annual Change in
Groundwater Elevation
Fall 2019 to Fall 2020**
Groundwater Sustainability Plan
2021 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

Change in Groundwater Elevation (feet NAVD88)¹

- > 50
- 40 - 50
- 30 - 40
- 20 - 30
- 10 - 20
- 0 - 10
- 10 - 0
- 20 - -10
- 30 - -20
- 30

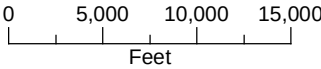
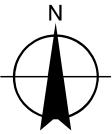
All Other Features

- San Antonio Creek or Tributary
- Major Road
- San Antonio Creek Valley Groundwater Basin²
- Barka Slough
- City Boundary

NOTES

- The change in groundwater elevation extents are bound by the lateral limits of the subject aquifer (see Figure 2) and available groundwater elevation data.
- San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



Date: March 9, 2022
Data Sources: USGS (2020a), ESRI, DWR (2018),
Maxar imagery (2020)



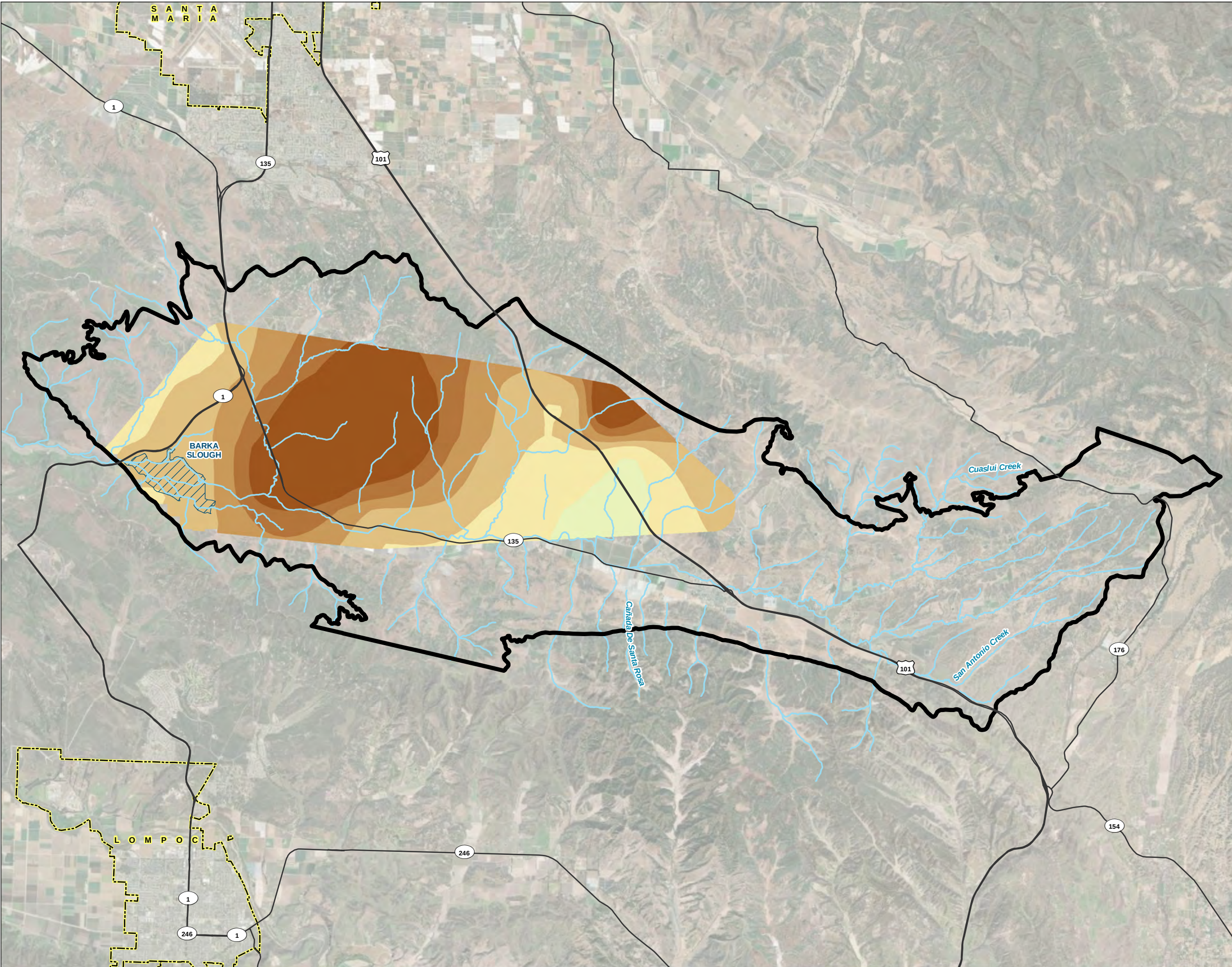


FIGURE 23
Careaga Sand
Annual Change in
Groundwater Elevation
Fall 2020 to Fall 2021
Groundwater Sustainability Plan
2021 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

Change in Groundwater Elevation (feet NAVD88)¹

- > 50
- 40 - 50
- 30 - 40
- 20 - 30
- 10 - 20
- 0 - 10
- 10 - 0
- 20 - -10
- 30- -20
- 30

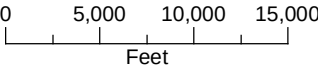
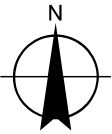
All Other Features

- San Antonio Creek or Tributary
- Major Road
- San Antonio Creek Valley Groundwater Basin²
- Barka Slough
- City Boundary

NOTES

- The change in groundwater elevation extents are bound by the lateral limits of the subject aquifer (see Figure 2) and available groundwater elevation data.
- San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



Date: March 9, 2022
Data Sources: USGS (2020a), ESRI, DWR (2018),
Maxar imagery (2020)



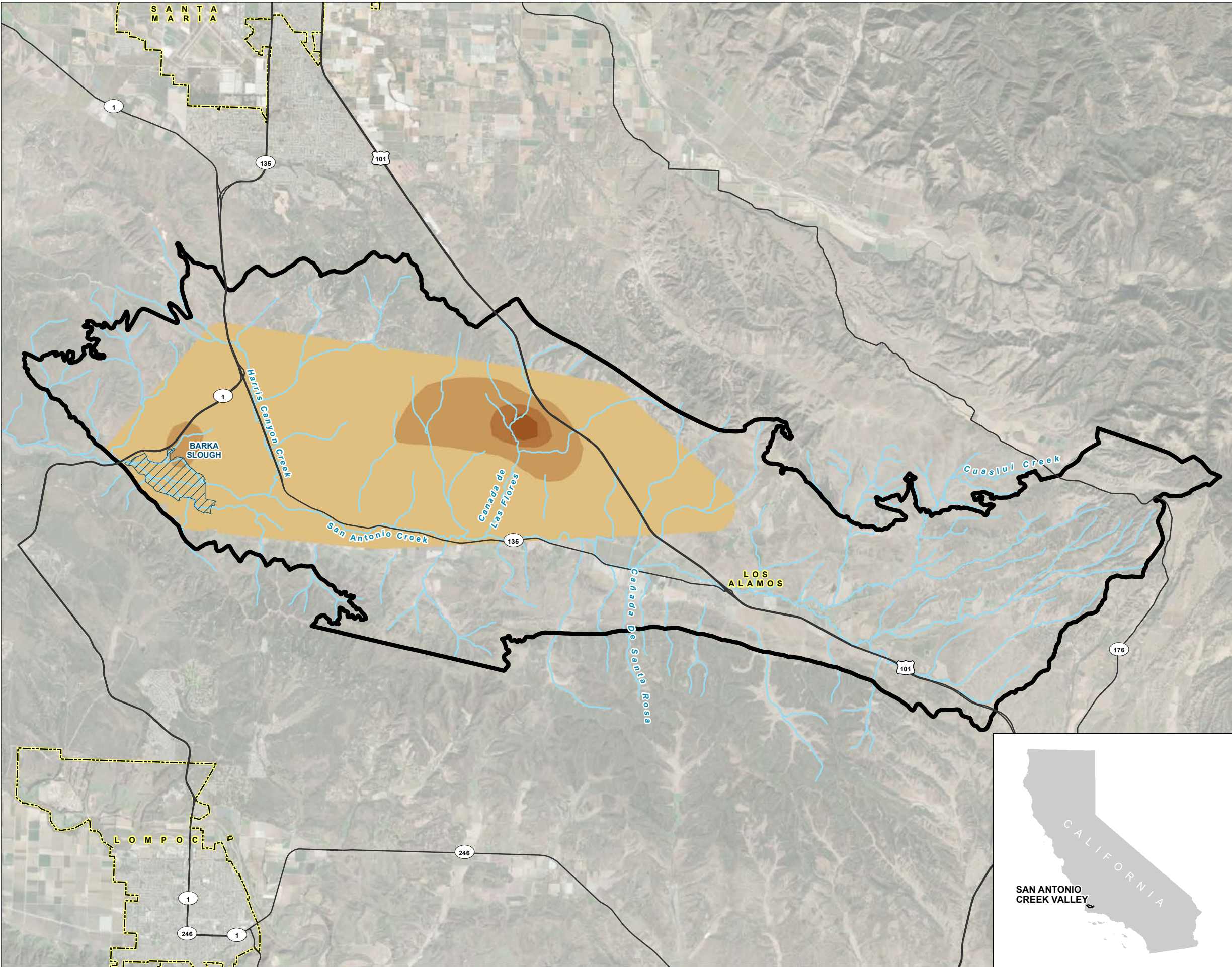


FIGURE 15
Careaga Sand
Annual Change in
Groundwater Elevation
Fall 2021 to Fall 2022
Groundwater Sustainability Plan
2022 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

Change in Groundwater Elevation (feet NAVD88)¹

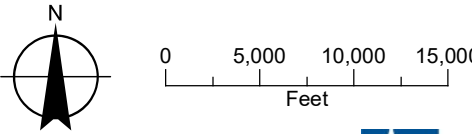
> 50
40 - 50
30 - 40
20 - 30
10 - 20
0 - 10
-10 - 0
-20 - -10
30 - -20
-30

All Other Features

- San Antonio Creek or Tributary
- Major Road
- San Antonio Creek Valley Groundwater Basin²
- Barka Slough
- City Boundary

- NOTES**
- The change in groundwater elevation extents are bound by the lateral limits of the subject aquifer (see Figure 2) and available groundwater elevation data.
 - San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD88: North American Vertical Datum of 1988



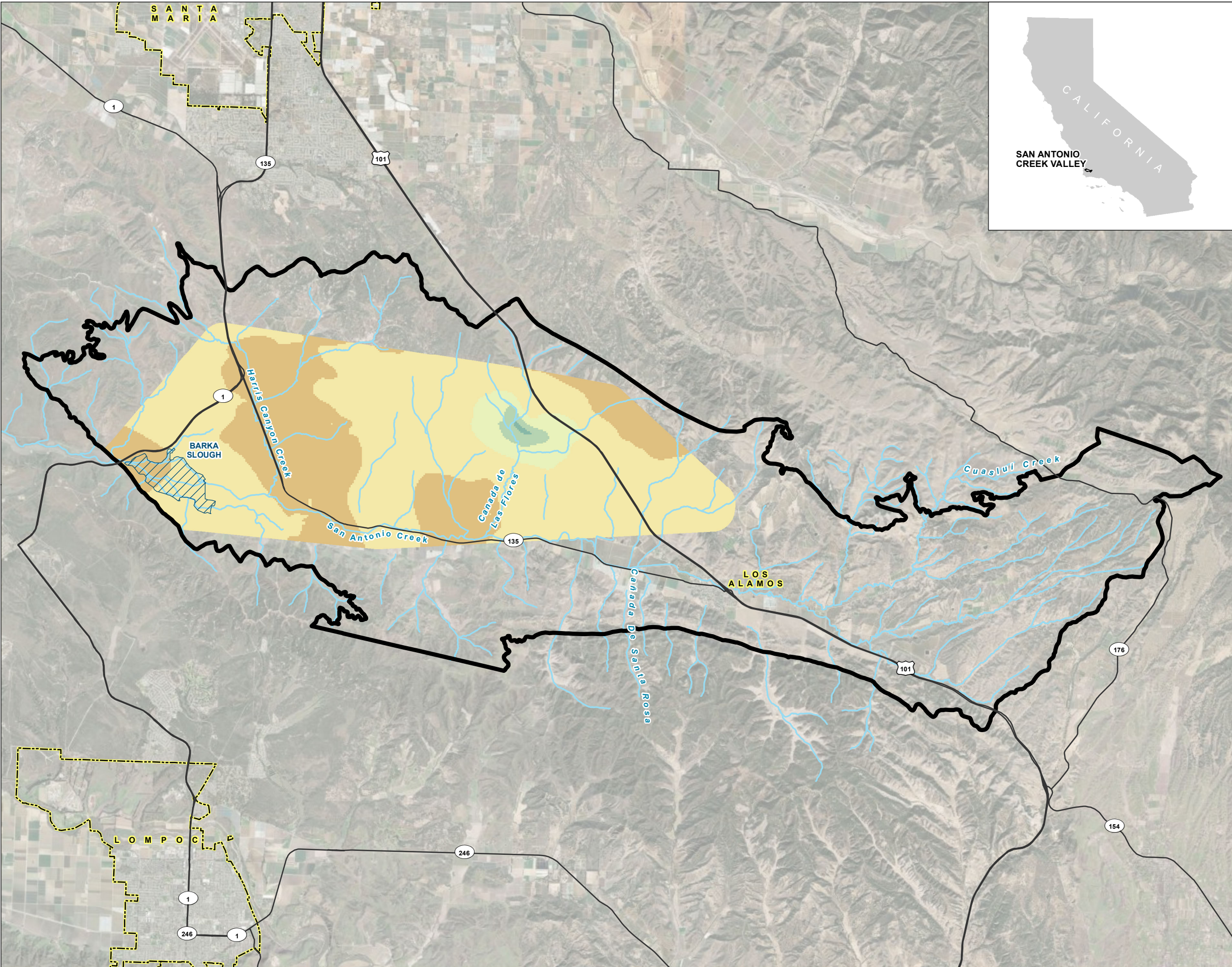


FIGURE 16
Careaga Sand
Annual Change in
Groundwater Elevation
Fall 2022 to Fall 2023

Groundwater Sustainability Plan
2023 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

Change in Groundwater Elevation (feet NAVD 88)¹

- > 50
- 40 - 50
- 30 - 40
- 20 - 30
- 10 - 20
- 0 - 10
- 10 - 0
- 20 - -10
- 30 - -20
- 30

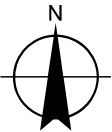
All Other Features

- San Antonio Creek or Tributary
- Major Road
- San Antonio Creek Valley Groundwater Basin²
- Barka Slough
- City Boundary

NOTES

- The change in groundwater elevation extents are bound by the lateral limits of the subject aquifer (see Figure 2) and available groundwater elevation data.
- San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



0 5,000 10,000 15,000
Feet

Date: February 15, 2024
Data Sources: USGS (2020a), ESRI, DWR (2018),
Maxar imagery (2020)



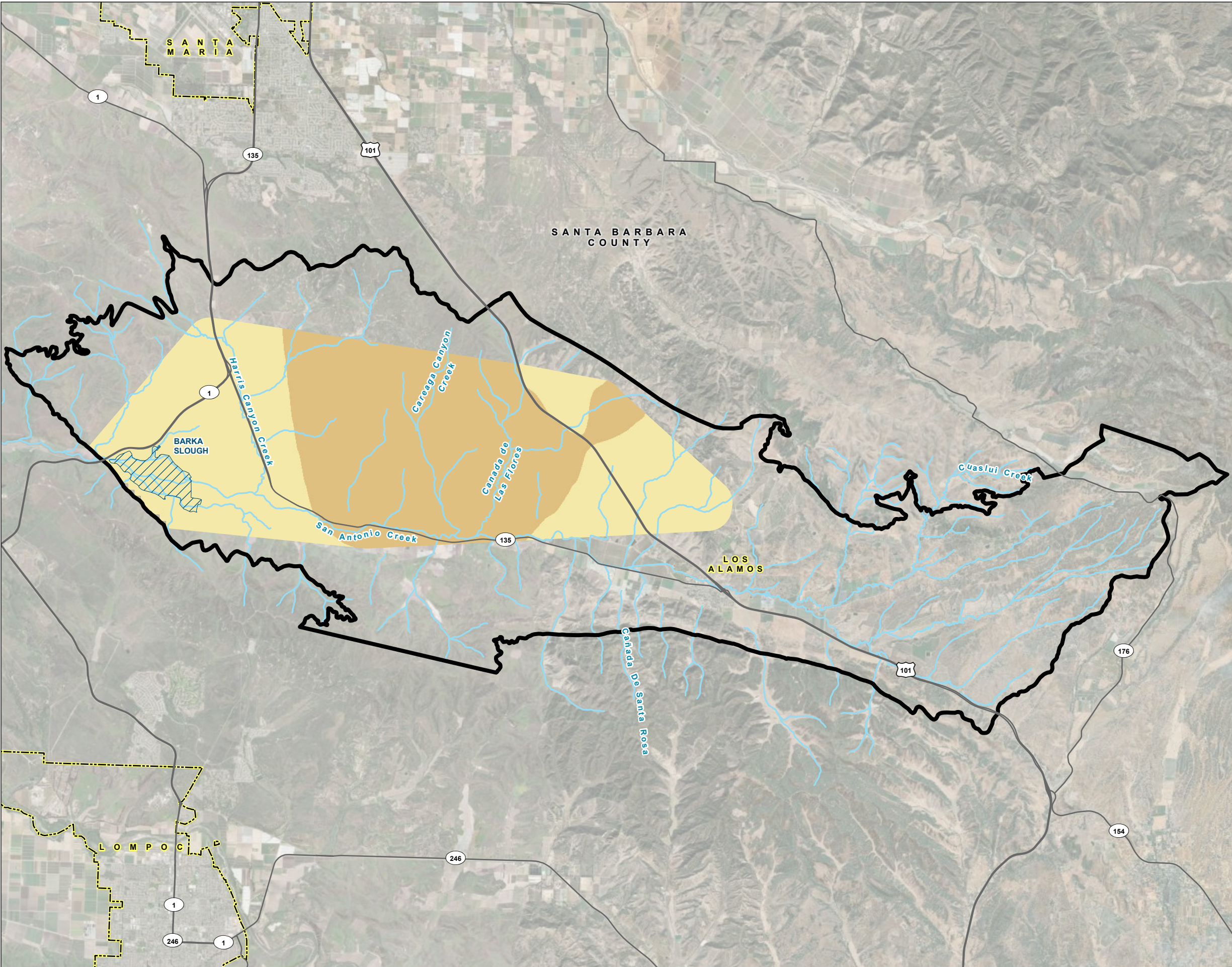


FIGURE 16
Careaga Sand
Annual Change in
Groundwater Elevation
Fall 2023 to Fall 2024

Groundwater Sustainability Plan
2024 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

Change in Groundwater Elevation (feet NAVD 88)¹

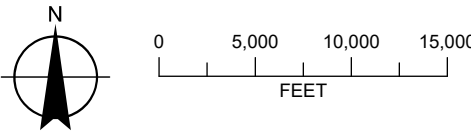
- 0 to 10
- 10 to 0

All Other Features

- San Antonio Creek Valley Groundwater Basin
- Barka Slough
- City Boundary
- Major Road
- San Antonio Creek or Tributary

- NOTES**
1. The change in groundwater elevation extents are bound by the lateral limits of the subject aquifer (see Figure 2) and available groundwater elevation data.
 2. San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



Date: February 12, 2025
Data Sources: USGS, ESRI, DWR,
Maxar Imagery (4/10/2024)



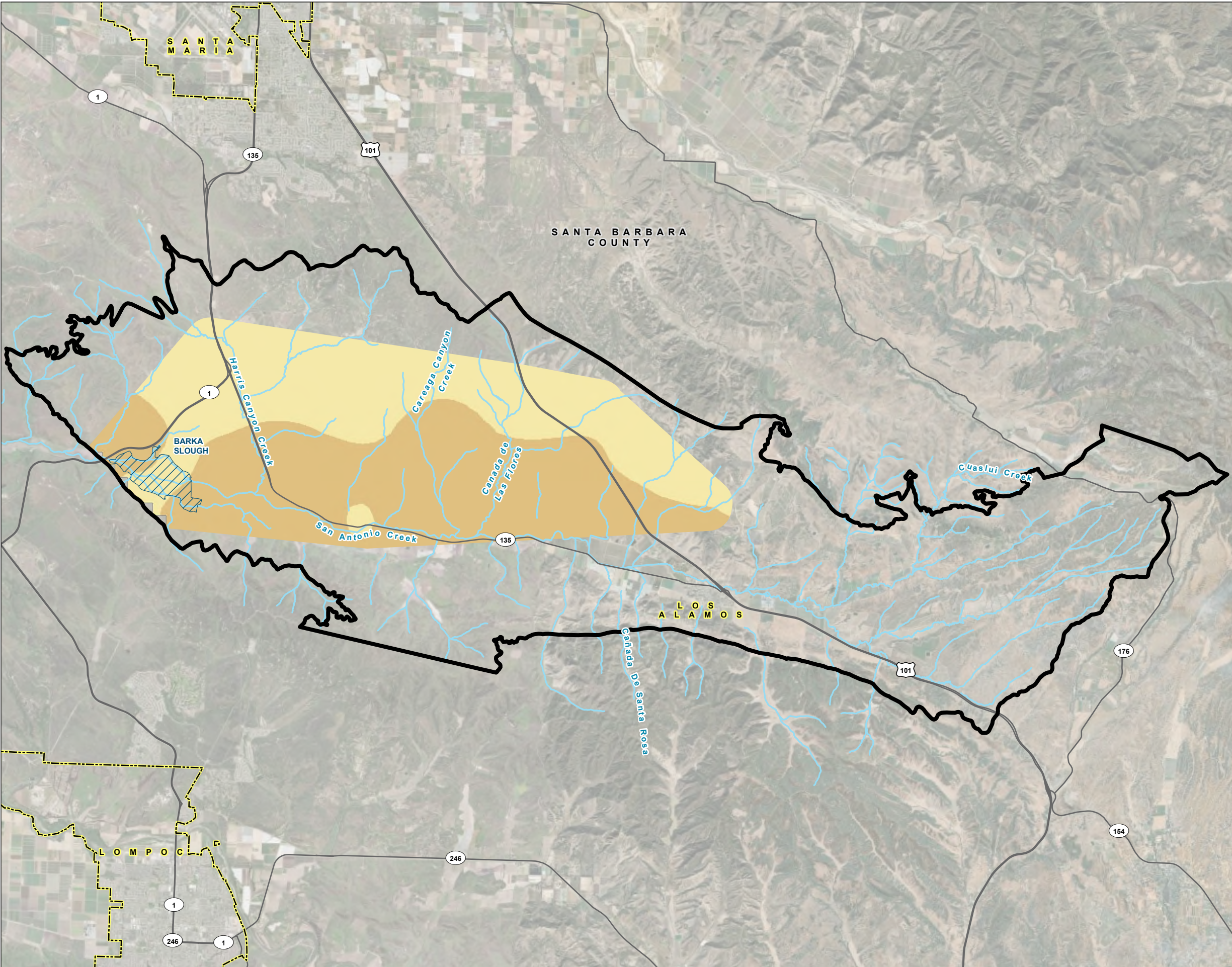


FIGURE 16
Careaga Formation
Annual Change in
Groundwater Elevation
Fall 2024 to Fall 2025

Groundwater Sustainability Plan
2025 Annual Report
San Antonio Creek Valley
Groundwater Basin

LEGEND

Change in Groundwater Elevation (feet NAVD 88)¹

0 to 10

-10 to 0

All Other Features

San Antonio Creek Valley Groundwater Basin

Barka Slough

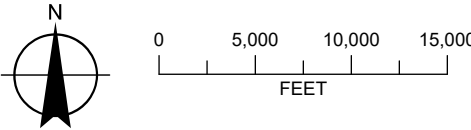
City Boundary

Major Road

San Antonio Creek or Tributary

- NOTES**
1. The change in groundwater elevation extents are bound by the lateral limits of the subject aquifer (see Figure 2) and available groundwater elevation data.
 2. San Antonio Creek Valley Groundwater Basin Boundary as defined in the California Department of Water Resources Bulletin 118.

NAVD 88: North American Vertical Datum of 1988



Date: February 12, 2026
Data Sources: USGS, ESRI, DWR,
Maxar Imagery (4/10/2024)

