EXECUTIVE SUMMARY

Sustainability Goal:

to ensure that groundwater is managed to provide a water supply of adequate quantity and quality to support rural areas and communities, the agricultural economic base of the region, and environmental uses now and in the future.

Introduction

In 2014, the California legislature enacted the Sustainable Groundwater Management Act (SGMA) in response to continued overdraft of California's groundwater resources. SGMA provides for local control of groundwater resources while requiring sustainable management of the state's groundwater basins. Under the provisions of SGMA, local agencies must establish governance of their subbasins by forming Groundwater Sustainability Agencies (GSAs) within the authority to develop, adopt, and implement a Groundwater Sustainability Plan (GSP or Plan) for the Vina Groundwater Subbasin. Under the GSP, GSAs must adequately define and monitor groundwater conditions in the Vina Groundwater Subbasin and establish criteria to maintain or achieve sustainable groundwater management within 20 years of GSP adoption. Within the framework of SGMA, sustainability is generally defined as long-term reliability of the groundwater supply and the absence of undesirable results.

Critical Dates for the Vina Groundwater Subbasin	
2022	By January 31, submit GSP to DWR
2027	Evaluate GSP and update, if warranted
2032	Evaluate GSP and update, if warranted
2037	Evaluate GSP and update, if warranted
2042	Achieve sustainability for the subbasin

The Vina Groundwater Subbasin (Vina Subbasin) is identified by the California Department of Water Resources (DWR) as being in a high priority subbasin. For high priority basins, SGMA requires that preparation of the GSP by January 31, 2022.

The Vina Subbasin is managed by two GSAs, the Vina GSA and the Rock Creek Reclamation District (RCRD) GSA. The Vina GSA was formed through the execution of a Joint Powers Agreement (Agreement) by three member agencies - the County of Butte, City of Chico, and Durham Irrigation District. The Vina GSA Board of Directors (Board) is composed of five seats, each with equal and full voting rights, which consists of an elected official from each member agency, an agricultural groundwater user, and a domestic well user (non-agricultural); the latter two positions being appointed by the Butte County Board of Supervisors. The Vina GSA covers the portions of the Vina Subbasin outside of the RCRD GSA jurisdictional boundary. In addition, in 2017 Butte College withdrew GSA status and agreed to participate in the development of the GSP by way of a Memorandum of Understanding with the Vina GSA.

The RCRD provides flood control and groundwater sustainability services to approximately 4,625 acres of agricultural and single-family residential parcels in northern Butte County. On

October 18, 2016, the RCRD elected to become a GSA and sent notice to DWR of its intent to undertake sustainable groundwater management over its jurisdictional boundaries.

The Vina GSA and RCRD GSA has assumed all SGMA authorities. The GSAs entered into a Coordination Agreement for the purpose of developing and implementing a single GSP for the Vina Subbasin.

The purpose of the Coordination Agreement was to (a) develop, adopt, and implement a GSP for the Vina Subbasin to implement SGMA requirements and achieve the sustainability goals; and (b) involve the public and Vina Subbasin stakeholders through outreach and engagement in developing and implementing the GSP. At the heart of the Coordination Agreement is the focus to maximize local input and decision-making and address the different water demands and sustainability considerations in the municipal and rural areas of the Vina Subbasin.

The Agreement also defines three Management Areas (MAs) within the subbasin; Vina North, Vina Chico, and Vina South. An MA refers to an area within a basin for which a GSP may identify different minimum thresholds (MT), measurable objectives (MO), monitoring, and projects and actions based on unique local conditions or other circumstances as described in the GSP regulations. The interests and vulnerability of stakeholders and groundwater uses in these MAs vary based on the nature of the water demand (agricultural, domestic, municipal), numbers and characteristics of wells supplying groundwater, and to some degree the hydrogeology and mix of recharge sources. The RCRD GSA is part of the Vina North MA.

SGMA requires development of a GSP that achieves groundwater sustainability in the subbasin by 2042. A pragmatic approach to achieving sustainable groundwater management requires an understanding of 1) historical trends and current groundwater conditions in the subbasin, based on evaluating six sustainability indicators (SIs) that include groundwater levels, groundwater storage, groundwater quality, land subsidence, depletion of interconnected streams, and seawater intrusion; and 2) what must change in the future to ensure sustainability without causing undesirable results (described and defined in Section 3) or negatively impacting beneficial uses and users of groundwater, including groundwater dependent ecosystems.

The GSP is organized as follows and the various components of each section are summarized further below:

1. Section 1: Agency Information, Plan Area, Communication. This section includes agency information, description of the Plan Area, and applicable programs and data sources used to prepare the GSP as well as a description of beneficial users and uses within the Basin and a summary of stakeholder communications and engagement.
2. Section 2: Basin Setting. This section discusses the Hydrogeologic Conceptual Model (HCM), groundwater conditions and water budget.
3. Section 3: Sustainable Management Criteria (SMC). This section discusses undesirable results, identifies the MT, and MO for each of the six SIs.
4. Section 4: Monitoring Networks. This section describes the methods used to monitor the SIs.

5. Section 5: Project Management Actions. This section describes projects and management actions that will achieve sustainability within the subbasin.
6. Section 6: Plan Implementation. This section describes how the GSA will partner with other groundwater users to implement the GSP to achieve groundwater sustainability.

The GSP outlines the need to address overdraft and related conditions and has identified 15 projects for potential development that either replace groundwater use (offset) or supplement groundwater supplies (recharge) to meet current and future water demands. In addition, the GSP also identifies seven management actions that can be implemented to focus on reduction of groundwater demand. The estimated sustainable yield, or the amount of groundwater that can be withdrawn without causing undesirable results, for the subbasin is 233,000 acre-feet per year (AFY). This estimate is based on average annual historical groundwater pumping of 243,000 AFY and an annual decrease in storage of 10,000 AFY. As such, groundwater pumping offsets and/or recharge on the order of 10,000 AFY may be required to achieve sustainability although additional efforts are needed to confirm these levels. These efforts include collecting additional data and a review of the subbasin groundwater model, along with other efforts as outlined in the GSP.

A Public Draft GSP was prepared and made available for public review and comment on September 10, 2021, for 40 days, ending on October 19, 2021. The GSAs received numerous comments from the public, reviewed and prepared responses to comments, and revised the Draft GSP. Comment letters and responses are included as Appendix 1-F to this GSP.

Groundwater Sustainability Plan Area

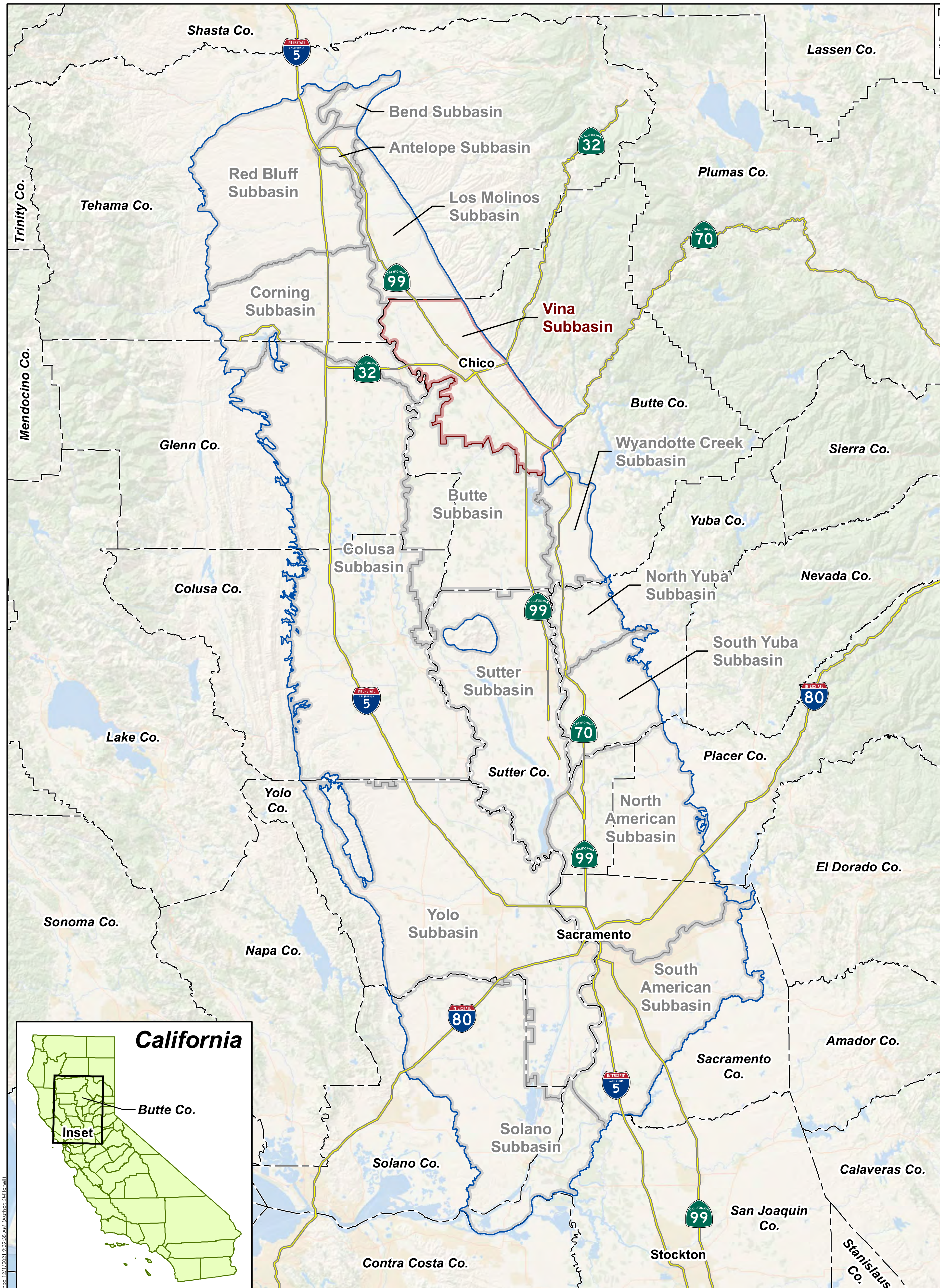
The Vina Subbasin is in Butte County within the Sacramento Valley, as shown in Figure ES-1. The Vina GSA jurisdictional area is defined by the boundaries of the Vina Subbasin in DWR's 2003 Bulletin 118 as updated in 2016 and 2018 except for the area overseen by the RCRD GSA. The RCRD GSA is defined as the jurisdictional boundaries of the RCRD. Figure ES-2 shows the boundaries of the Vina Subbasin, jurisdictional areas for both GSAs, and the three MAs.

Outreach Efforts

A stakeholder engagement strategy was developed to solicit and discuss the interests of all beneficial users of groundwater in the subbasin and Plan Area. The strategy included monthly meetings of the Vina GSA and RCRD Board of Directors and the Stakeholder Advisory Committee (SHAC), meetings of the Subbasin Technical Working Group, numerous public workshops and events and a website where all announcements, meeting dates, times, and materials were posted.

The Vina GSA also prepared and implemented a Communication and Engagement Plan to encourage involvement from diverse social, cultural, and economic elements of the population of the Vina Subbasin, in addition to meeting SGMA requirements for intrabasin coordination.

In addition, various sections of the GSP were available for preliminary review and comment prior to the final Public Draft version released on September 10, 2021.



Legend

Groundwater Basin[1]

Sacramento Valley Groundwater Basin

Groundwater Subbasins[1]

Vina Groundwater Subbasin

Other Sacramento Valley Groundwater Subbasins

Roads[2]

Highways

Boundaries[2]

County boundaries

Notes:
1) California Department of Water Resources (CA DWR).
2) TIGER/Line, U.S. Census Bureau.

20 10 0 20 Miles

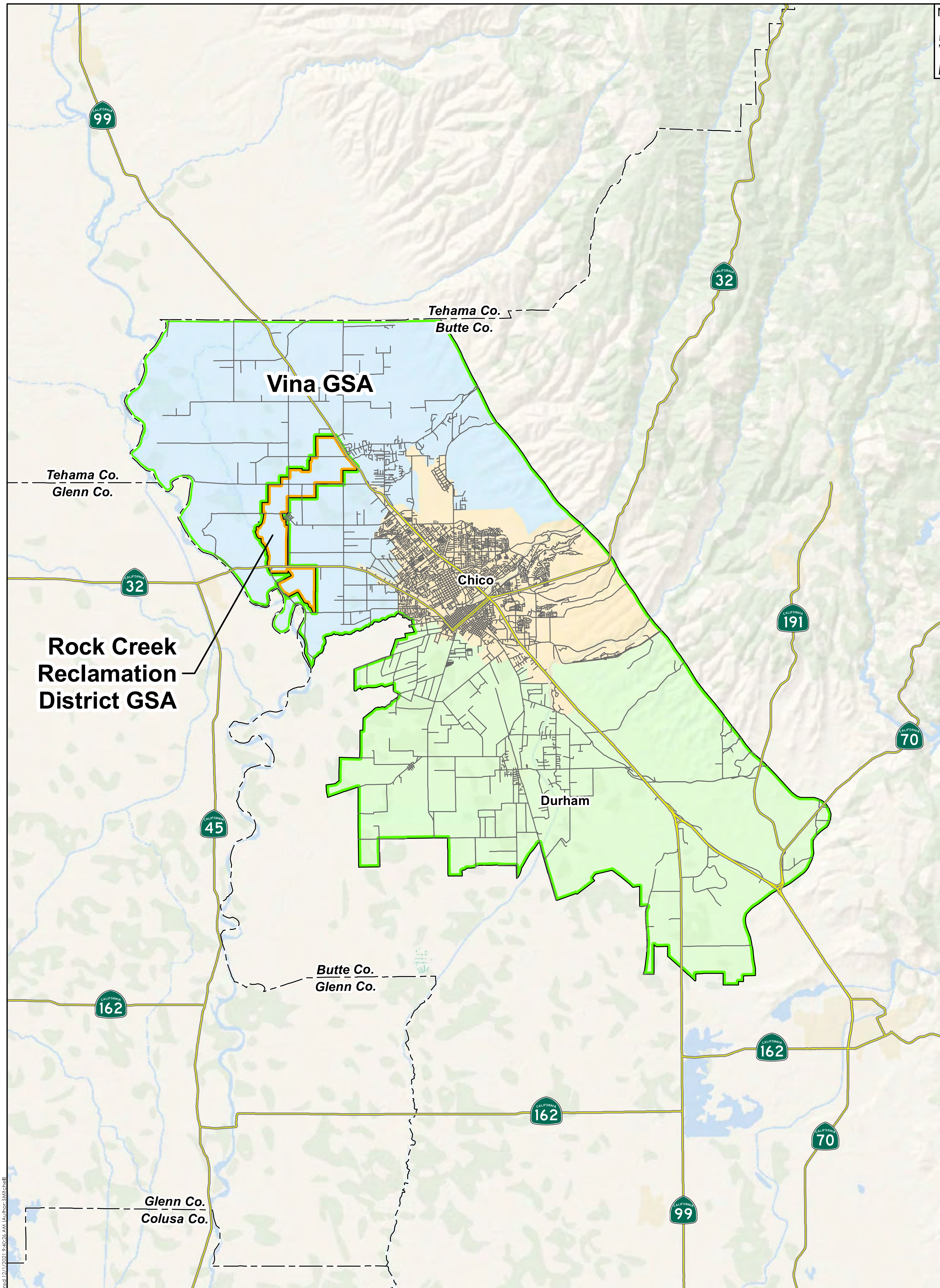
Sacramento Valley Groundwater Basin
Vina Groundwater Subbasin GSP

Geosyntec consultants

Project No.: SAC282

December 2021

Figure **ES-1**



Legend

Groundwater Sustainability Agencies (GSAs)[1]

- Vina GSA
- Rock Creek Reclamation District GSA

Roads[2]

- Highways
- Other roads

Vina Groundwater Subbasin Management Areas

- Vina North
- Vina Chico
- Vina South

Boundaries[2]

- County boundaries

Notes:
1) California Department of Water Resources (CA DWR).
2) TIGER/Line, U.S. Census Bureau.

5 2½ 0 5 Miles

Groundwater Sustainability Agencies
Vina Groundwater Subbasin GSP

Geosyntec consultants

Project No.: SAC282 | December 2021

Figure
ES-2

Comments received on preliminary draft sections were incorporated as deemed appropriate and helped guide and shape the Public Draft. As part of the 40-day public review period initiated on September 10, 2021, with issuance of the Public Draft of the GSP, the GSA Management Committee worked with numerous entities to inform them about the plan and encourage their involvement. In addition, a special GSP Advisory Committee meeting was held after the 40-day public comment period on November 4, 2021, to solicit comments. All comments received via the comment form, letter, or email were provided to the SHAC and Vina GSA Board in agenda packets for review.

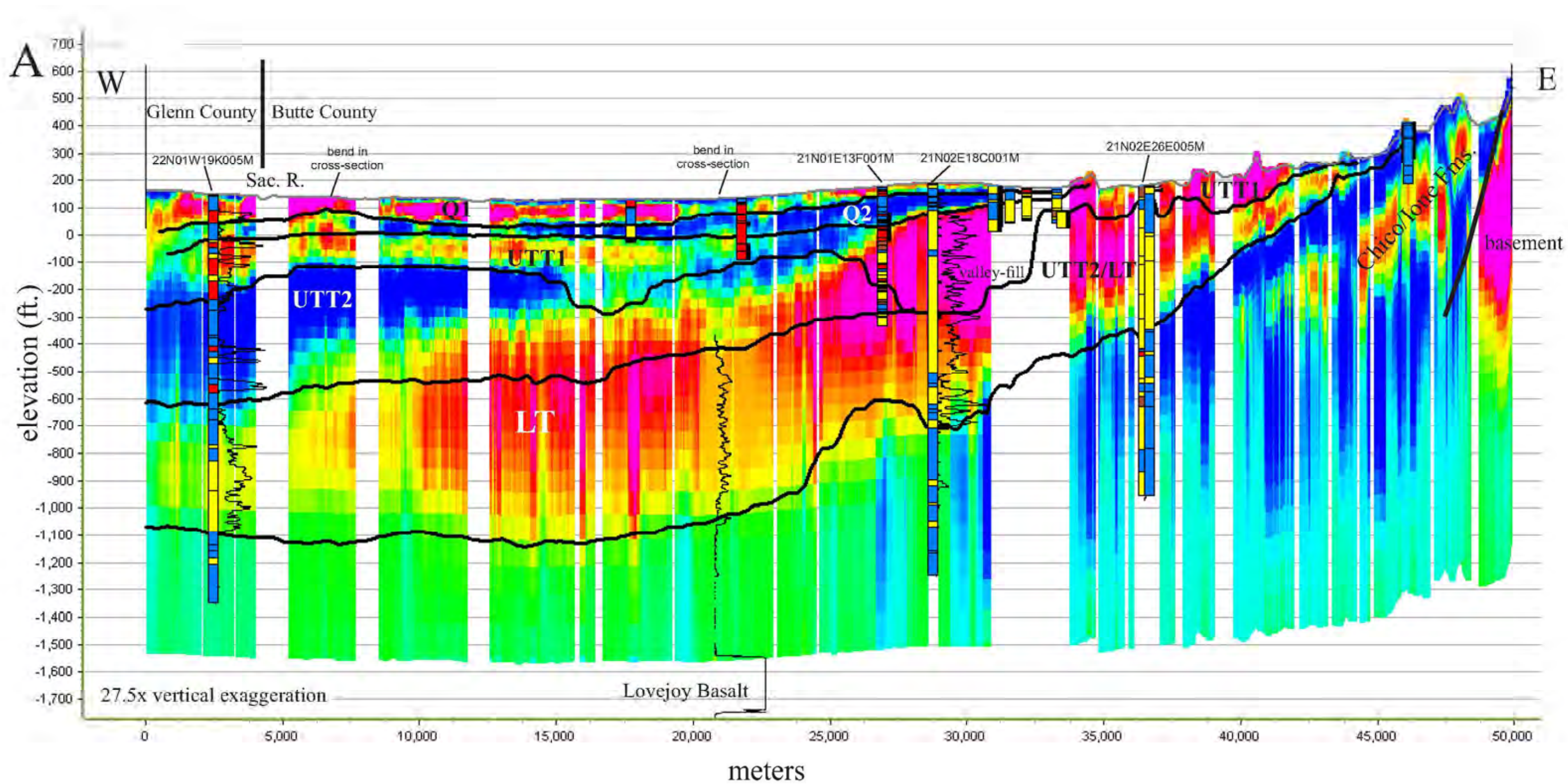
On November 15, 2021, the Vina and RCRD GSAs conducted a joint public hearing where the GSA Management Committee provided an overview of public comments and the methods for responding to these comments. In addition, three proposed revisions to the Public Draft were presented to the GSA Boards. The GSA Boards reviewed the revisions and took action for functional changes to the Public Draft GSP. Additional public comments were received and recorded for each of the proposed revisions and to the overall Public Draft GSP. A revised GSP based on the public comments was provided to the GSAs on December 9, 2021. The GSA Boards reviewed the recommended changes and took action to approve the functional changes to the Public Draft GSP on December 15, 2021.

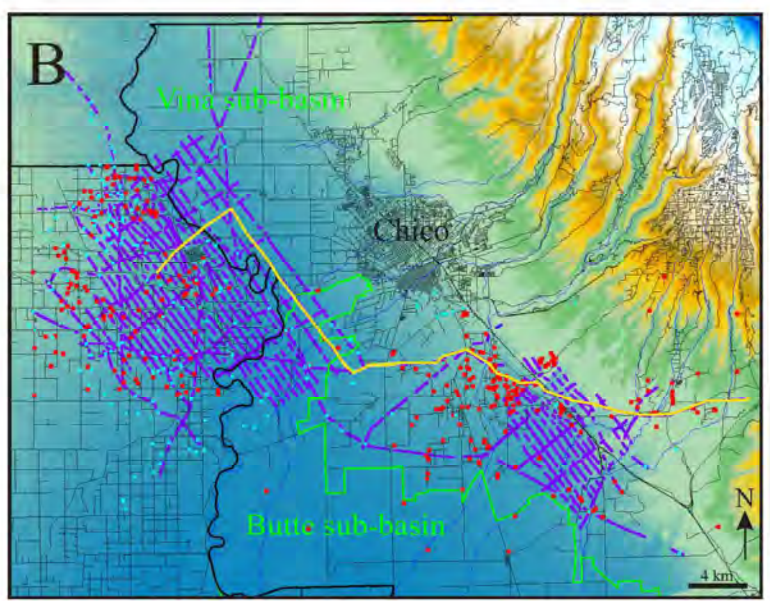
Basin Setting

The Vina Subbasin lies in the eastern central portion of the Sacramento Groundwater Basin. The northern boundary is the Butte-Tehama County line, the western boundary is the Butte-Glenn County line, the southern boundary is a combination of the property boundaries owned by the M&T Ranch, the service area boundaries of RD 2106 and Western Canal Water District, and the eastern boundary is the edge of the alluvium as defined by DWR Bulletin 118 Update 2003. It is bounded by the following subbasins: Los Molinos to the north; Corning to the west; and Butte to the south. The lateral boundaries of the subbasin are jurisdictional in nature, and it is recognized that groundwater flows across each of the defined boundary lines to some degree.

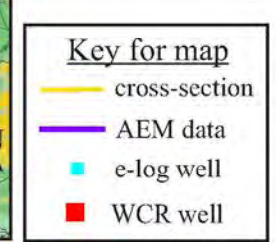
Continental sediments of the Tehama, Tuscan, and Laguna Formation compose the major fresh groundwater-bearing formations in the valley with the Tuscan Formation and, to a lesser degree, the Tehama Formation compose the major fresh groundwater-bearing formations in the subbasin. Figure ES-3 shows a cross section within the subbasin using data from an Airborne Electromagnetic (AEM) survey conducted in 2018 funded through a grant from DWR. The base of these continentally derived formations is generally accepted as the base of fresh water in the northern Sacramento Valley. Locally, the base of fresh groundwater fluctuates depending on local changes in the subsurface geology and geologic formational structure, especially in the southeastern area of the Vina Subbasin. Generally, it ranges from 800 to 1,200 feet below ground surface (bgs).

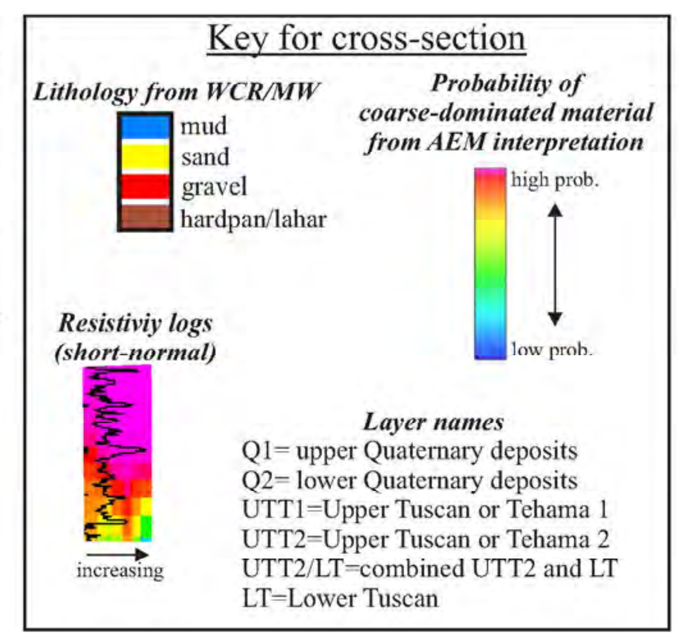
Groundwater flows from the north toward the southwestern corner of the subbasin. While groundwater elevations are lower in the fall than spring, the general direction and gradient of flow are similar during both periods. The Sacramento River borders the Vina Subbasin on its western side and flows from north to south. The larger surface water bodies generally flow from east to west towards the Sacramento River and include Big Chico Creek and Butte Creek.





A) AEM and well-based hydrogeologic layering through AEM-acquired data areas. AEM interpretation shows probability (cold colors=low; warm colors=high) of encountering coarse-dominated material along the cross-section (from Kang et al., in prep.). Monitoring wells (MW) are denoted by the State's well number ID; B) Location map of cross-section, AEM data, and well data. Background colors are relative elevation.





Vina Subbasin East-West AEM Cross Section
Vina Groundwater Subbasin GSP

Project No.: SAC282 | December 2021

Figure
ES-3

Other smaller or ephemeral streams also generally flow from east to west and include Pine Creek, Rock Creek, Mud Creek, Sycamore Creek, Little Chico Creek, Hamlin Slough, Little Dry Creek, and Clear Creek. The location of the Vina Subbasin along with surface water features is shown in Figure ES-4.

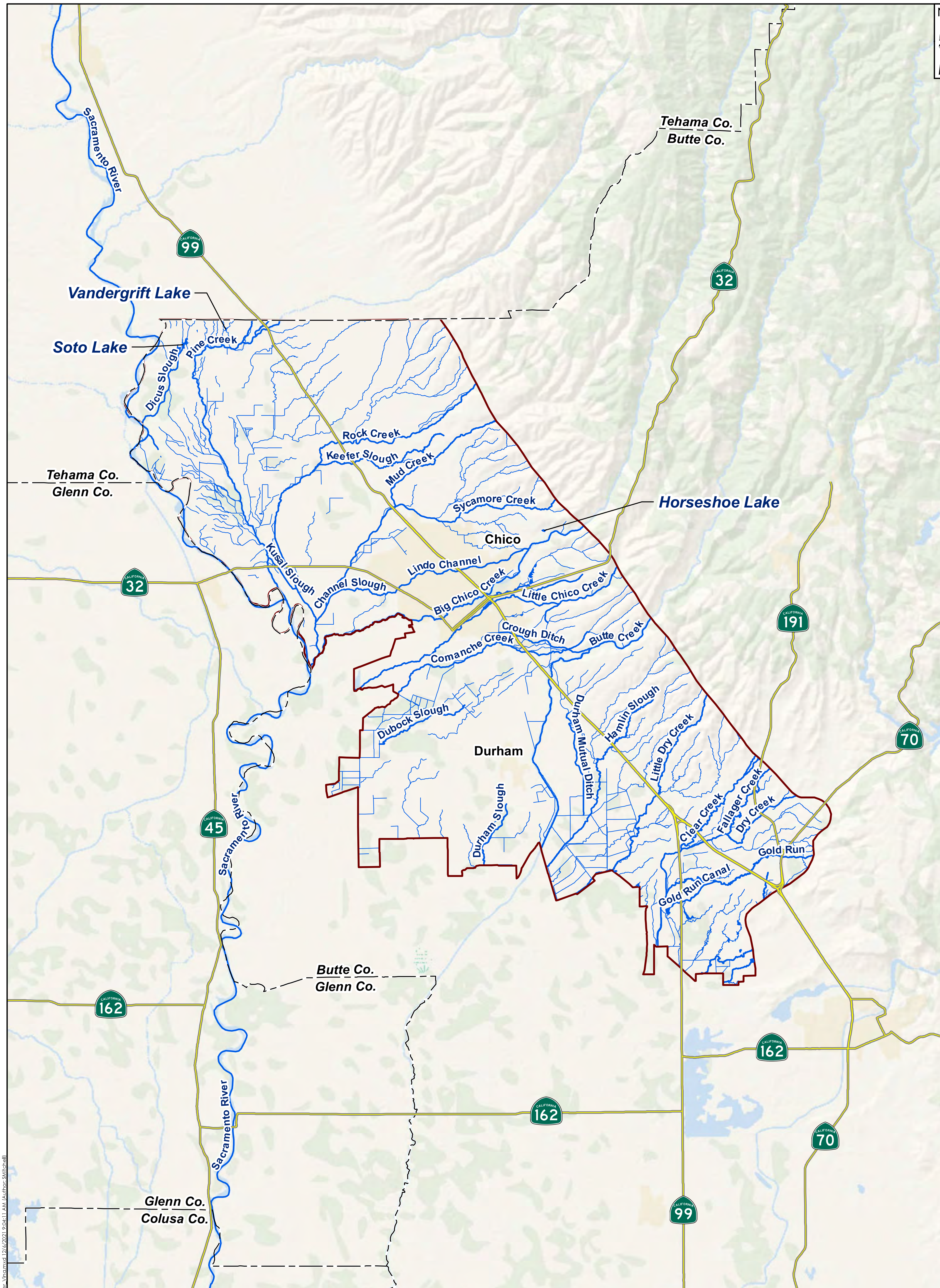
Existing Groundwater Conditions

Groundwater conditions in the Vina Subbasin are continually monitored and have been comprehensively described in reports produced by Butte County since 2001. These documents and other reports portray a subbasin that has adequate groundwater resources to meet demands under most hydrologic conditions. However, hydrographs from monitoring wells show cyclical fluctuations of groundwater levels over a four- to seven-year cycle consistent with variations in water year type. Groundwater levels typically decline during dry years and increase during wet years. Superimposed on this four- to seven-year short-term cycle is a long-term decline in groundwater levels beginning around 2000. In other words, groundwater levels during more recent dry-year cycles are lower than groundwater levels in earlier dry-year cycles. This downward trend during dry years indicates an overall decline in groundwater storage. Groundwater quality in the basin is good except in areas where anthropogenic sources have impacted the groundwater. Figure ES-5 shows the locations of known impacted groundwater from these sources.

Groundwater storage in the subbasin is relatively stable and changes in groundwater storage reflect groundwater level trends. The Sacramento River and streams that cross the Vina Subbasin stabilize storage volumes by providing recharge to the Vina Subbasin. The total fresh groundwater in storage was estimated at over 16 million acre-feet (MAF). The amount of groundwater in storage has decreased by approximately 0.07 percent per year between 2000 and 2018. As such, it is highly unlikely that the Vina Subbasin will experience conditions under which the volume of stored groundwater poses a concern. However, the depth to access that groundwater across the Vina Subbasin does pose a concern.

Land subsidence has not historically been an area of concern in the Vina Subbasin, and there are no records of land subsidence caused by groundwater pumping. Seawater intrusion is not applicable to the Vina Subbasin due to distance from the Delta and Pacific Ocean.

Surface waters can be hydraulically interconnected with the groundwater system, where the stream baseflow is either derived from the aquifer (gaining stream) or recharged to the aquifer (losing stream). If the water table beneath the stream lowers as a result of groundwater pumping, the stream may disconnect entirely from the underlying aquifer. Both situations exist in the Vina Subbasin. Within the floodplain of the Sacramento River, there is a continuous saturated zone that connects the shallowest aquifer to the river. The connectivity between shallow and deeper aquifer zones will dictate the overall connectivity to the river. In the upland areas outside of the Sacramento River floodplain, there are creeks that flow seasonally and often dry up in late summer or are dry for an entire year during dry conditions. In this case, the upland creeks may not be influenced by "high groundwater connectivity" and the presence of an undesirable result is not clear cut with respect to surface water depletion. The streams dry up regardless of the groundwater condition, and streams that are already dry are not considered interconnected surface water.



Legend

Groundwater Subbasin[1]

Vina Groundwater Subbasin

Surface Water[2]

Water bodies

Named streams

Other streams

Roads[3]

Highways

Boundaries[3]

County boundaries

Notes:
1) California Department of Water Resources (CA DWR).
2) California Department of Fish and Wildlife (CDFW).
3) TIGER/Line, U.S. Census Bureau.

5 2½ 0 5 Miles

Surface Water Features
Vina Groundwater Subbasin GSP

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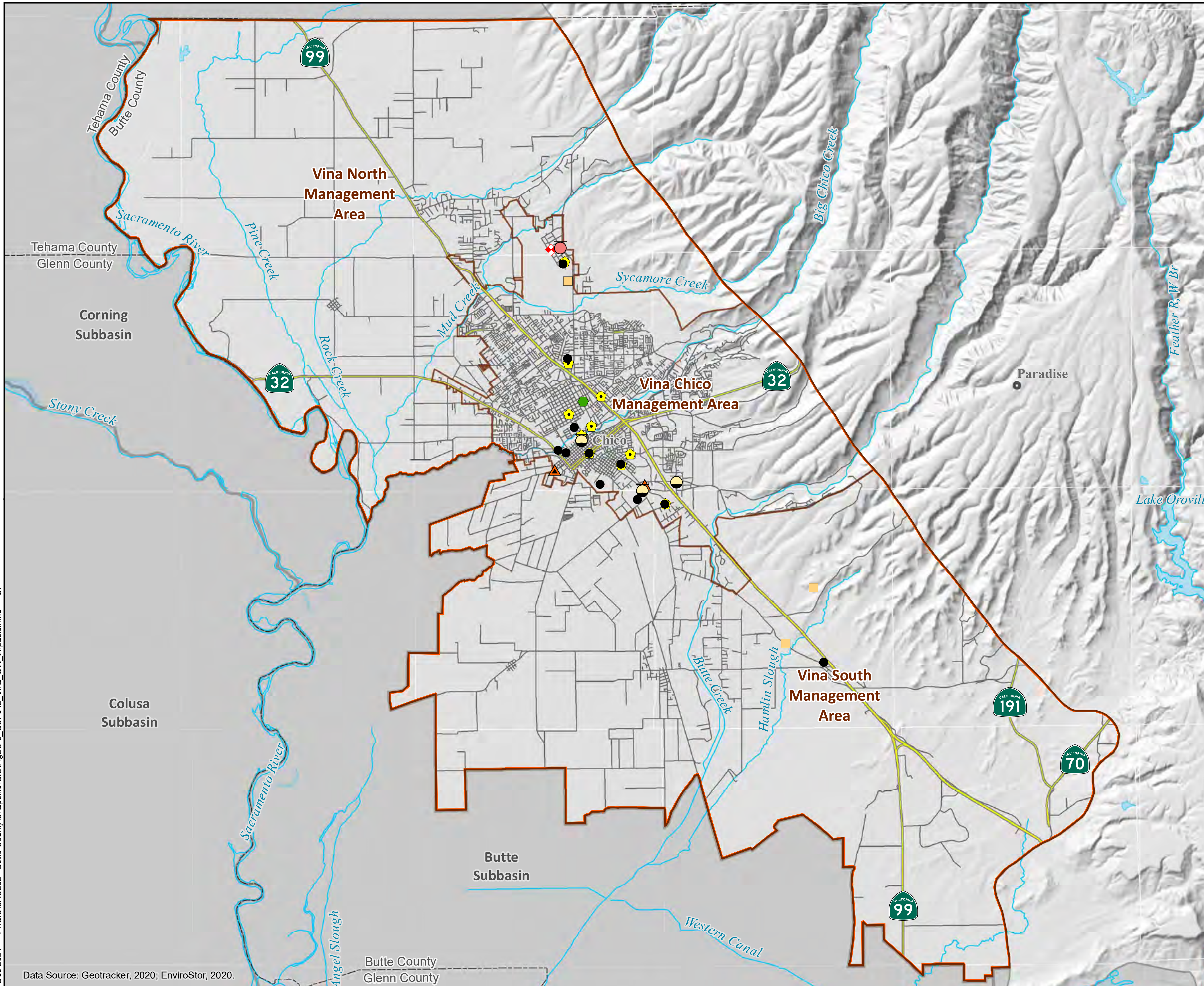
Project No.: SAC282

December 2021

Figure
ES-4



ACTIVE CONTAMINATION REMEDIATION SITES

Geotracker Sites
- Cleanup Program Site
- LUST Cleanup Site
- Land Disposal Site
- Military Cleanup Site
- Military UST Site
- Project

EnviroStor Sites
- State Response Cleanup
- Hazardous Waste
- Waterway
- Lake
- Vina Subbasin
- Neighboring Subbasin
- Highways
- Other roads

0 2.5 5
Miles
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VINA SUBBASIN GSP

DECEMBER 2021 FIGURE ES-5

However, the upland streams are an important source of recharge to the aquifer, so the health of these stream channels and their adjacent riparian zones is important to groundwater sustainability.

Potential impacts of the depletion of interconnected surface water were discussed by stakeholders during technical discussions covering the fundamentals of groundwater-surface water interactions and mapping analysis of groundwater dependent ecosystems (GDEs) prepared by Butte County Department of Water and Resource Conservation (BCDWRC). Potential impacts identified by stakeholders were:

- Disruption to GDEs
- Reduced flows in rivers and streams supporting aquatic ecosystems and water right holders
- Degradation of "Urban Forest" habitat in the City of Chico
- Streamflow changes in upper watershed areas outside of the Vina GSA's boundary
- Water table depth dropping below the maximum rooting depth of Valley Oak (*Quercus lobata*) or other deep-rooted tree species
- Cumulative groundwater flow moving toward the Sacramento River from both the Vina Subbasin and surrounding GSAs on both the east and west side of the river

The Vina Subbasin acknowledges that overall function of the riparian zone and floodplain is dependent on multiple components of the hydrologic cycle that may or may not have relationships to groundwater levels in the principal aquifer. For example, hydrologic impacts outside of the Vina Subbasin, such as upper watershed development or fire-related changes in runoff, could result in impacts to streamflow, riparian areas, or GDEs that are completely independent of any connection to groundwater use or conditions within the Vina Subbasin.

Sustainable Management Criteria

SGMA introduces several terms to measure sustainability. The sustainability goal is the culmination of conditions resulting in a sustainable condition (absence of undesirable results) within 20 years. The sustainability goal for the Vina Subbasin is:

> *to ensure that groundwater is managed to provide a water supply of adequate quantity and quality to support rural areas and communities, the agricultural economic base of the region, and environmental uses now and in the future.*

SIs refer to any of the effects caused by groundwater conditions occurring throughout the Vina Subbasin that, when significant and unreasonable, cause undesirable results. The six SIs identified by DWR are:

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 that substantially interferes with surface land uses
5. Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water
6. Significant and unreasonable seawater intrusion

Undesirable results are the significant and unreasonable occurrence of conditions that adversely affect groundwater use in the Vina Subbasin, including reduction in the long-term viability of domestic, agricultural, municipal, or environmental uses of the Vina Subbasin's groundwater. Categories of undesirable results are defined through the SIs.

Minimum thresholds (MT) are numeric values for each SI and are used to define when undesirable results occur. Undesirable results occur if MTs are exceeded in an established percentage of sites in the Vina Subbasin's representative monitoring network. Measurable objectives are a specific set of quantifiable goals for the maintenance or improvement of groundwater conditions. The margin of operational flexibility is the range of active management between the MT and the MO. Interim milestones (IMs) are targets set in 5-year increments over the implementation period of the GSP offering a path to sustainability. Figure ES-6 illustrates these terms using the groundwater level SI.

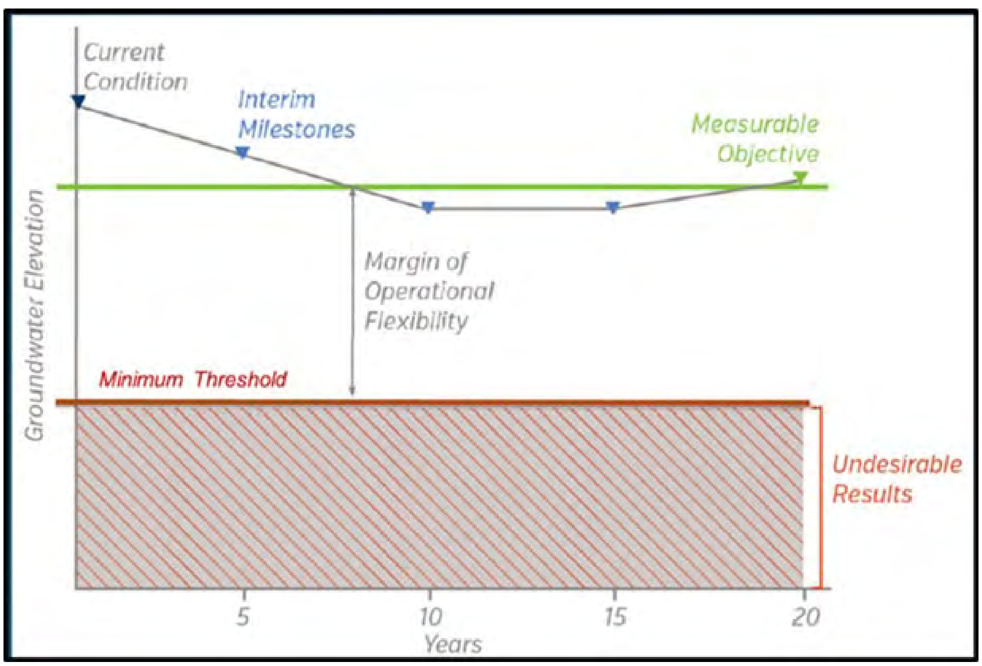


Figure ES-6: Illustration of Terms Used for Describing Sustainable Management Criteria Using the Groundwater Level Sustainability Indicator

A total of 17 representative monitoring sites (RMS) were identified for measurement of groundwater levels in the subbasin, and eight RMS were identified for groundwater quality monitoring. The GSP uses groundwater quality data as a basis for evaluating conditions from saline water below the fresh water and uses groundwater level data as the basis for evaluating conditions for groundwater levels, groundwater storage, and subsidence. The GSP has identified a data gap for development of SMC for depletion of interconnected surface waters and has provided a framework for evaluation of this SI. However, for this GSP, the SMC developed for groundwater levels are used as a proxy for interconnected surface water in an interim manner until data gaps are addressed. As such, the RMS described above provide the basis for measuring the five relevant SIs across the subbasin.

Minimum thresholds and MOs were developed for each RMS. Figure ES-7 shows a typical relationship of the MSs, MOs, and historical groundwater level data for a sample groundwater level RMS.

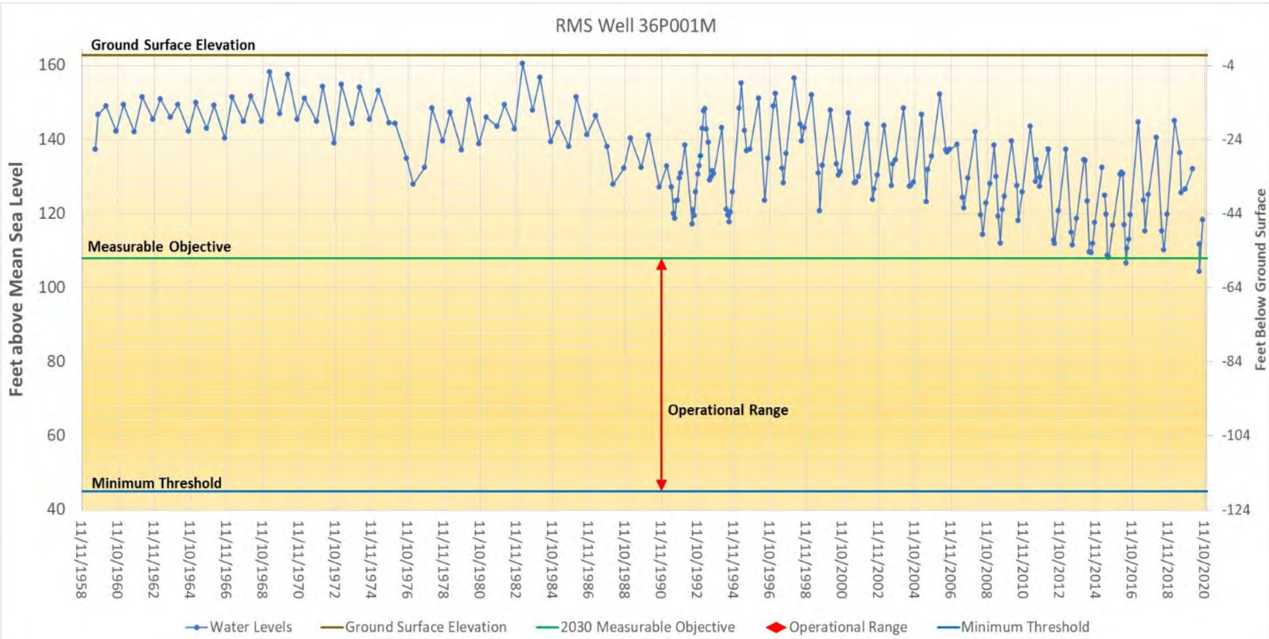


Figure ES-7: Representative Monitoring Site for Groundwater Levels with Relationship of Measurable Objectives, Minimum Thresholds, and Operational Range

Minimum thresholds for groundwater levels were developed with reference to domestic well depths. Each MA was divided into polygons that represent proximate areas to each representative monitoring site well. The size of each polygon depends on the density of the RMS network. For example, the higher the density of RMS wells in an MA, the smaller the polygons. Each polygon is a different shape and size, determined by the distribution of the RMS wells in the MA. The result is a more refined dataset that more proximately reflects the relationship of domestic wells with each RMS well. In addition, rather than just looking at a percentage of domestic wells to protect, the elevation levels were examined in comparison to what would be considered sustainable domestic wells for the area. For the Vina Chico MA, due the area, the polygon was the entire MA. The DWR database used for information on total depths of the domestic wells is not always accurate or precise, nor is it known which of the wells in the database are in use or have been abandoned or replaced. As such, additional characterization of active domestic wells within the subbasin may be considered during GSP implementation (see Section 5.4.3).

To establish the MO, the water-level hydrograph of observed groundwater levels at each RMS was evaluated. The historical record at these locations shows cyclical fluctuations of groundwater level over a four- to seven-year cycle. The MO for groundwater levels at each RMS well was set at the trend line for the dry periods (since 2000) of observed short-term climatic cycles extended to 2030. Figure ES-8 shows an example of this trend line for an RMS well. Table ES-1 shows the MTs and MOs for groundwater levels at each RMS well.

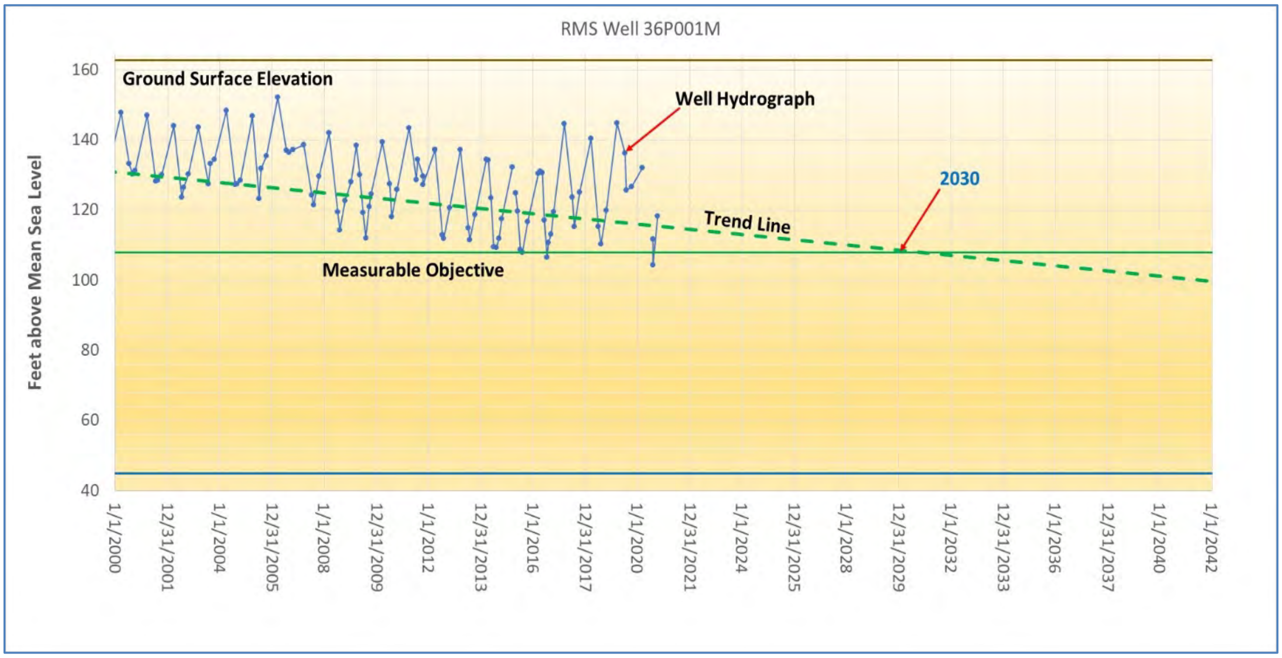


Figure ES-8: Illustration of Long-Term Trend Using Historical Water Levels Extended to 2030 for Development of Measurable Objectives

Table ES-1: Groundwater Levels Sustainable Management Criteria by Representative Monitoring Site in Feet Above Mean Sea Level

RMS Well ID	MT	MO	IM		
			2027	2032	2037
Vina Subbasin – North Management Area					
25C001M	50	130	130	130	130
10E001M	80	136	137	136	136
07H001M[a]	72	136	140	136	136
05M001M	31	115	116	115	115
36P001M	45	108	110	108	108
33A001M	72	125	128	125	125
Vina Subbasin – Chico Management Area					
CWSCH01b	85	106	107	106	106
CWSCH02		105	108	105	105
CWSCH03		108	109	108	108
CWSCH07		95	97	95	95
28J003M		111	113	111	111
Vina Subbasin – South Management Area					
21C001M	10	64	67	64	64
18C003M	65	130	132	130	130
10C002M	20	92	93	92	92
24C001M	18	77	81	77	77
09L001M	30	91	93	91	91
26E005M	36	95	97	95	95

Note:

[a] MO is associated with GSP Well ID 18A001M.

MTs and MOs for water quality were defined by considering two primary beneficial uses, drinking water and agricultural uses, that would be at risk of undesirable results as they relate to specific conductance, a measure of the water's saltiness. MTs are 1,600 micro-siemens per centimeter (µS/cm) for each representative monitoring well, consistent with the upper limit of the California Secondary Maximum Contaminant Level (SMCL) for electrical conductivity. MOs are 900 µS/cm for each representative monitoring well, consistent with the California SMCL for electrical conductivity.

Data needed to develop the SMCs for interconnected surface waters include definition of stream reaches and associated priority habitat, streamflow measurements to develop profiles at multiple time periods, and measurements of groundwater levels directly adjacent to stream channels, first water bearing aquifer zone, and deeper aquifer zones. These data are not available and are a data gap for the GSP. The GSAs in the Vina Subbasin intend to further evaluate this SMC to avoid undesirable results to aquatic ecosystems and GDEs. To that end, an Interconnected Surface Water SMC framework has been developed for the GSP. As such, for this GSP the groundwater levels SMC are used by proxy and the MT and MO for interconnected surface water is the same as for groundwater levels.

The MTs and MOs for groundwater levels are also used for the land subsidence and groundwater storage SIs, as both are strongly linked to groundwater levels. The groundwater levels MTs are found to be protective of land subsidence and groundwater storage.

Water Budgets

The groundwater evaluations conducted as part of GSP development have provided estimates of the historical, current, and projected groundwater budget conditions. The current analysis was prepared using the best available information and through use of the Butte Basin Groundwater Model (BBGM). The BBGM was initially developed in 1992 and has been updated over time to simulate historical conditions through 2018. To prepare water budgets for this GSP, historical BBGM results for water years 2000 to 2018 have been relied upon, and four additional baseline scenarios have been developed to represent current and projected conditions utilizing 50 years of hydrology. It is anticipated that as additional information becomes available, the model will be updated, and more refined estimates of annual pumping and overdraft can be developed.

Based on these analyses and an evaluation of declining water levels, the estimated long-term groundwater pumping offset and/or recharge required for the subbasin to achieve sustainability is approximately 10,000 AFY. The estimated sustainable yield for the Vina Subbasin is 233,000 AFY. Groundwater levels are expected to continue to decline based on projections of current land and water uses. Projects identified in Section 5 that offset groundwater pumping and/or increase recharge will help the subbasin reach sustainability.

The projected subbasin water budget was also evaluated under climate change conditions, which simulate higher demand requiring increased groundwater pumping despite more precipitation and streamflows. The climate change scenario used for the analysis was based on the 2030 and 2070 central tendency climate change datasets provided by DWR to support GSP development. Figure ES-9 illustrates the cumulative change in groundwater storage for current and future conditions.

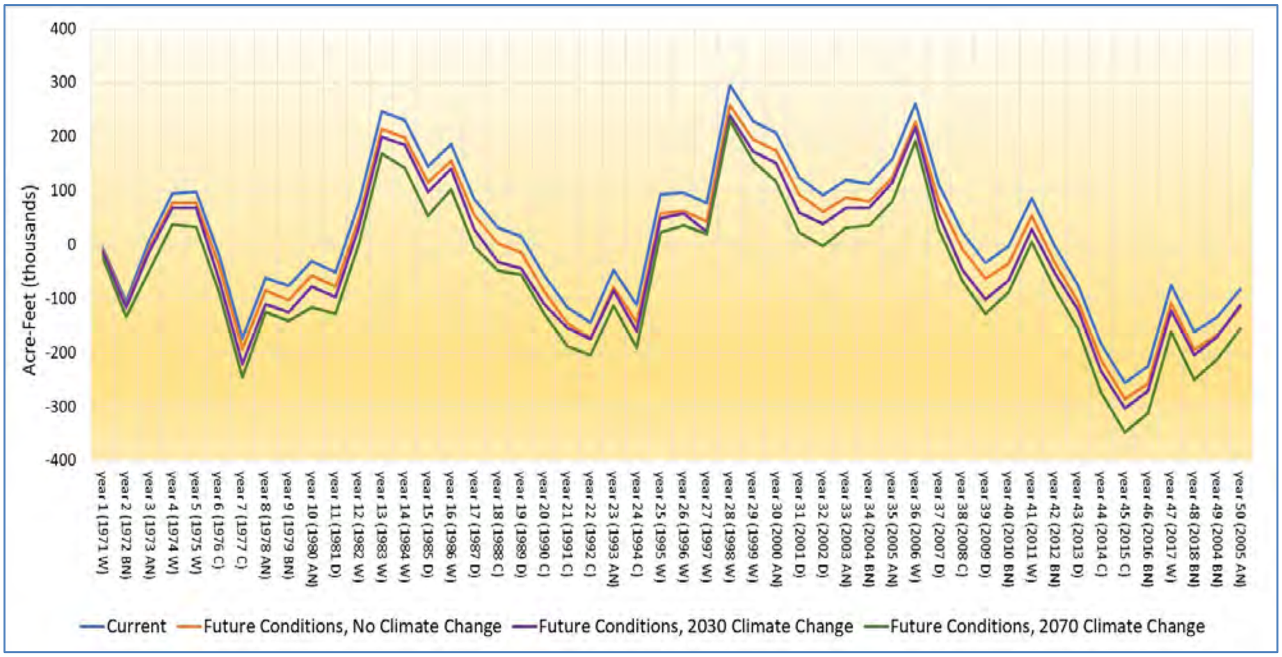


Figure ES-9: Cumulative Change in Groundwater Storage for Current and Future Conditions Baseline Scenarios

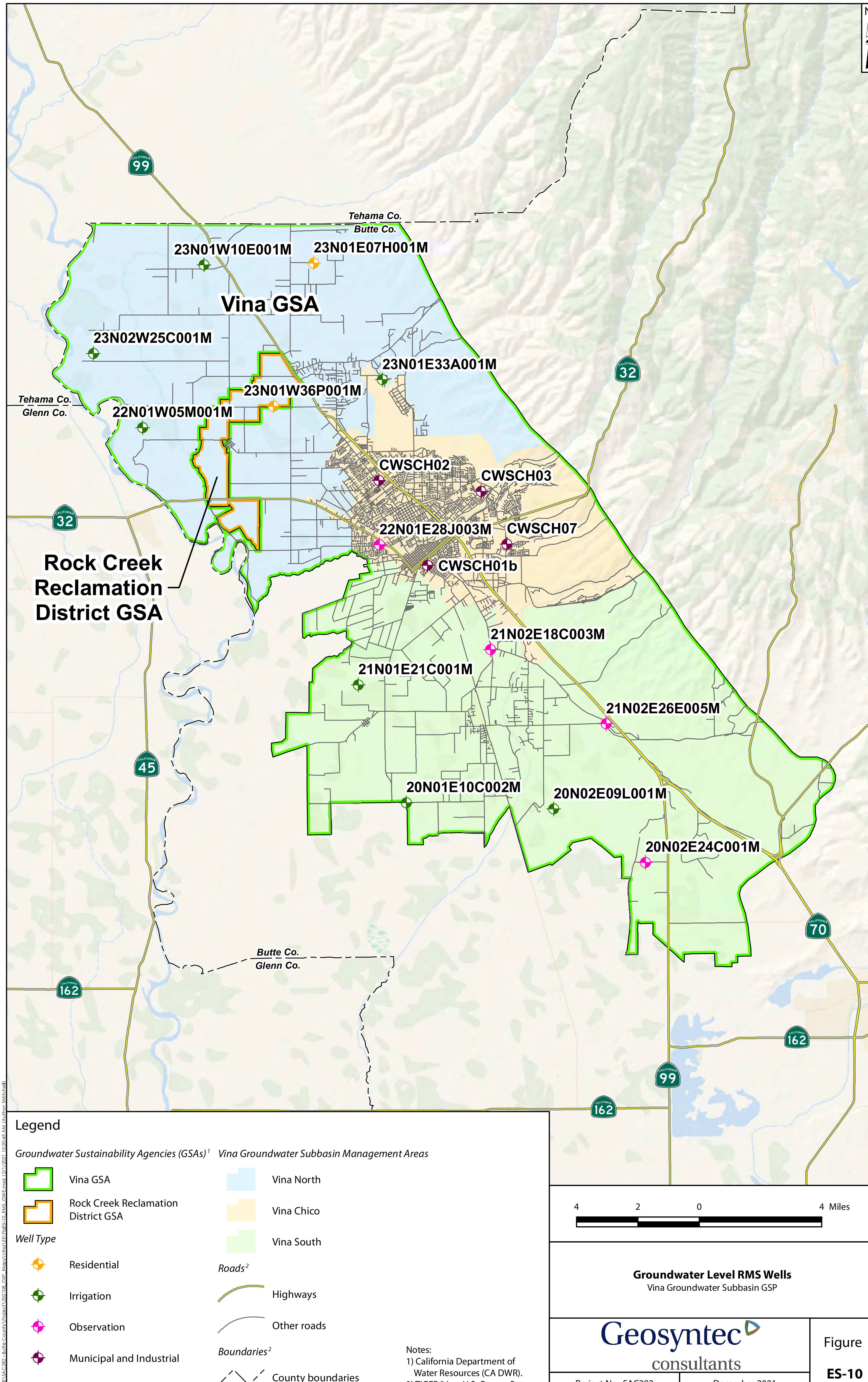
Monitoring Networks

The GSP outlines the monitoring networks for the six SIs. The objective of these monitoring networks is to monitor conditions across the subbasin and to detect trends toward undesirable results. Specifically, the monitoring network was developed to do the following:

- Monitor impacts to the beneficial uses or users of groundwater
- Monitor changes in groundwater conditions relative to MO and MT
- Demonstrate progress toward achieving MO described in the GSP

There are five monitoring networks in the Vina Subbasin: a representative network for water levels; a broad network for water levels; a representative network for water quality; a broad network for water quality; and a broad network for land subsidence. Representative networks are used to determine compliance with the MT, while the broad networks collect data for informational purposes to identify trends and fill data gaps. The two monitoring networks for water quality will additionally be used to develop an electrical conductivity isocontour to monitor for potential intrusion from underlying saline waters, and water level data will inform depletions of interconnected surface water.

The monitoring networks were designed by evaluating data from Butte County's existing Basin Management Objectives (BMOs) program, the United States Geological Survey (USGS), and participating GSAs. The monitoring network consists largely of wells that are already being used for monitoring in the subbasin. Figure ES-10 shows the location of groundwater monitoring wells for the groundwater level representative monitoring network.



Groundwater Level RMS Wells
Vina Groundwater Subbasin GSP

Geosyntec consultants

Figure ES-10

Project No.: SAC282 | December 2021

Wells in the monitoring networks will be measured on a semi-annual schedule. Historical measurements will be entered into the Vina Subbasin Data Management System (DMS), and future data will also be stored in the DMS. A summary of the monitoring sites in the monitoring networks is shown in Table ES-2 below.

Table ES-2: Summary of Network Site Wells

Summary of Monitoring Network Site Wells	
Representative Networks	**Monitoring Site Count**
Groundwater Level	17
Groundwater Quality	8
Broad Network	
Groundwater Levels	78
Groundwater Quality	7
Subsidence	19

Data Management System

The DMS that will be used is a geographical relational database that will include information on water levels, land elevation measurements, and water quality testing. The DMS will allow the GSAs to share data and store the necessary information for annual reporting.

The DMS will be on local servers, and data will be transmitted annually to form a single repository for data analysis for the subbasin's groundwater, as well as to allow for preparation of annual reports. GSA representatives have access to data and will be able to ask for a copy of the regional DMS. The DMS currently includes the necessary elements required by the regulations, including:

- Well location and construction information for the representative monitoring points (where available)
- Water level readings and hydrographs including water year type
- Land-based measurements
- Water quality testing results
- Estimate of groundwater storage change, including map and tables of estimation
- Graph with Water Year type, Groundwater Use, and Annual Cumulative Storage Change

Additional items may be added to the DMS in the future as required. Data will be entered into the DMS by each GSA. The majority of the data will then be aggregated to the entity that is responsible for the regional DMS and summarized for reporting to DWR.

Projects and Management Actions

As stated above, the GSP outlines the need to address overdraft and related conditions and has identified 15 projects for potential development that either replace groundwater use (offset) or supplement groundwater supplies (recharge) to meet current and future water demands. In addition, the GSP also identifies seven management actions that can be implemented to focus on reduction of groundwater demand.

Projects

Each of the projects are in various stages of development ranging from planned to those still in the conceptual phase. Thus, each of the projects have a different level of development. The GSA will maintain a list of proposed projects and track their development status. The GSA will use this list to help secure funding as opportunities become available. Projects presented in this Plan will remain a part of the potential projects that the GSA may choose to implement, however as other projects come up those will be added to the list. The projects currently being considered are listed below and are listed from planned to conceptual.

Planned:

- Agricultural Irrigation Efficiency
- Residential Conservation
- Scoping for Flood Managed Aquifer Recharge (FloodMAR)/Surface Water Supply and Recharge
- Community Water Education Initiative
- Fuels Management for Watershed Health

Potential:

- Paradise Irrigation District Intertie
- Agricultural Surface Water Supplies
- Streamflow Augmentation
- Community Monitoring Program
- Recycled Wastewater
- Rangeland Management
- Removal of Invasive Species
- Surface Water Supply and Recharge

Conceptual:

- Extend Orchard Replacement
- Recharge from Miocene Canal

Management Actions

GSAs have a variety of tools to use to achieve sustainable groundwater management. Projects focus primarily on capture, use, and recharge of surface water supplies while management actions focus on groundwater demand.

The GSP presents several management actions that the GSA may consider during GSP implementation. It is expected that the GSA will further develop and modify management actions in response to stakeholder input and available information. The management actions identified in this GSP include:

- General Plans Updates
- Domestic Well Mitigation
- Well Permitting Ordnance
- Landscape Ordnance
- Prohibition of Groundwater Use for Ski (Recreational) Lakes
- Expansion of Water Purveyors' Service Area
- Groundwater Allocation

Plan Implementation

The adoption of the GSP is official start of plan implementation for the Vina Subbasin. The GSAs will continue their public outreach efforts and work to secure funding to implement projects and management actions. The estimated budgets and implementation schedule for the proposed projects and management actions are presented in Section 6.

Implementing the Vina Subbasin GSP will require numerous management activities that will be undertaken by the GSAs, including:

- Monitoring conditions relative to applicable SIs at specified frequency and timing
- Entering updated monitoring data into the subbasin DMS
- Refining the subbasin model and water budget planning estimates
- Preparing annual reports summarizing the conditions of the subbasin and progress towards sustainability and submitting them to DWR
- Updating the GSP once every five years
- Overseeing and monitoring projects, management actions, and collection of data identified as "data gaps" within the GSP
- Identify funding sources
- Coordinating with neighboring subbasins