ES EXECUTIVE SUMMARY

California's historic Sustainable Groundwater Management Act (SGMA) became effective on January 1, 2015, at the height of the state's last drought. SGMA mandates that groundwater resources be sustainably managed to ensure that water will be available today and into the future for all beneficial users, including flora and fauna, municipal and domestic, agricultural, and business users. The Santa Rosa Plain Groundwater Sustainability Agency (Santa Rosa Plain GSA) was formed to develop and implement this Groundwater Sustainability Plan (GSP or Plan) for the Santa Rosa Plain Groundwater Subbasin (Subbasin) as required by SGMA (**Figure ES-1**).

This GSP lays out a management process for ensuring a sustainable groundwater supply in the future by improving the understanding of this hidden resource, measuring progress through metrics that will be monitored, actively implementing projects, and, as necessary, adopting management actions in response to groundwater levels if they continue to decline unacceptably, and developing the funding needed for long-term implementation. The GSP implementation process includes active engagement of local stakeholders by the GSA Board, Advisory Committee, and periodic community meetings.

The Subbasin is classified by California Department of Water Resources (DWR) as a medium-priority basin. Based on the medium-priority designation, the GSA must submit the GSP to DWR by January 31, 2022. The Santa Rosa Plain GSA began work on the GSP in 2018, to identify and quantify existing problems and data gaps, define local goals for sustainable management of the Subbasin, and develop a GSP that achieves and maintains groundwater sustainability 50 years into the future.

Prior to the passage of SGMA, a U.S. Geological Survey (USGS) study was conducted in the Subbasin and surrounding watershed (contributing watershed area—provides water to the groundwater Subbasin), which was published in 2014 and included the development of an integrated surface water and groundwater computer model. Under the leadership of a diverse-stakeholder based Basin Advisory Panel, the voluntary Santa Rosa Plain Groundwater Management Plan (GMP) was developed and released in 2014. The GMP advanced the characterization and monitoring of groundwater conditions and initial study and planning of potential projects within the Subbasin.

This GSP presents detailed, technical information to build upon the work done in the GMP and to better understand groundwater in the Subbasin. The GSP uses quantifiable sustainable management criteria to define sustainability and includes projects, management actions, and an implementation plan necessary to achieve locally determined sustainability goals.

Because Santa Rosa Plain once again faces historic drought conditions, and with climate change projections showing that longer, more severe droughts are inevitable, the GSP lays out a path for long-term sustainability and resiliency, as defined by SGMA. While the current drought highlights water resource challenges, this GSP was not developed to address immediate short-term issues, but is focused on long-term, systemic groundwater issues.

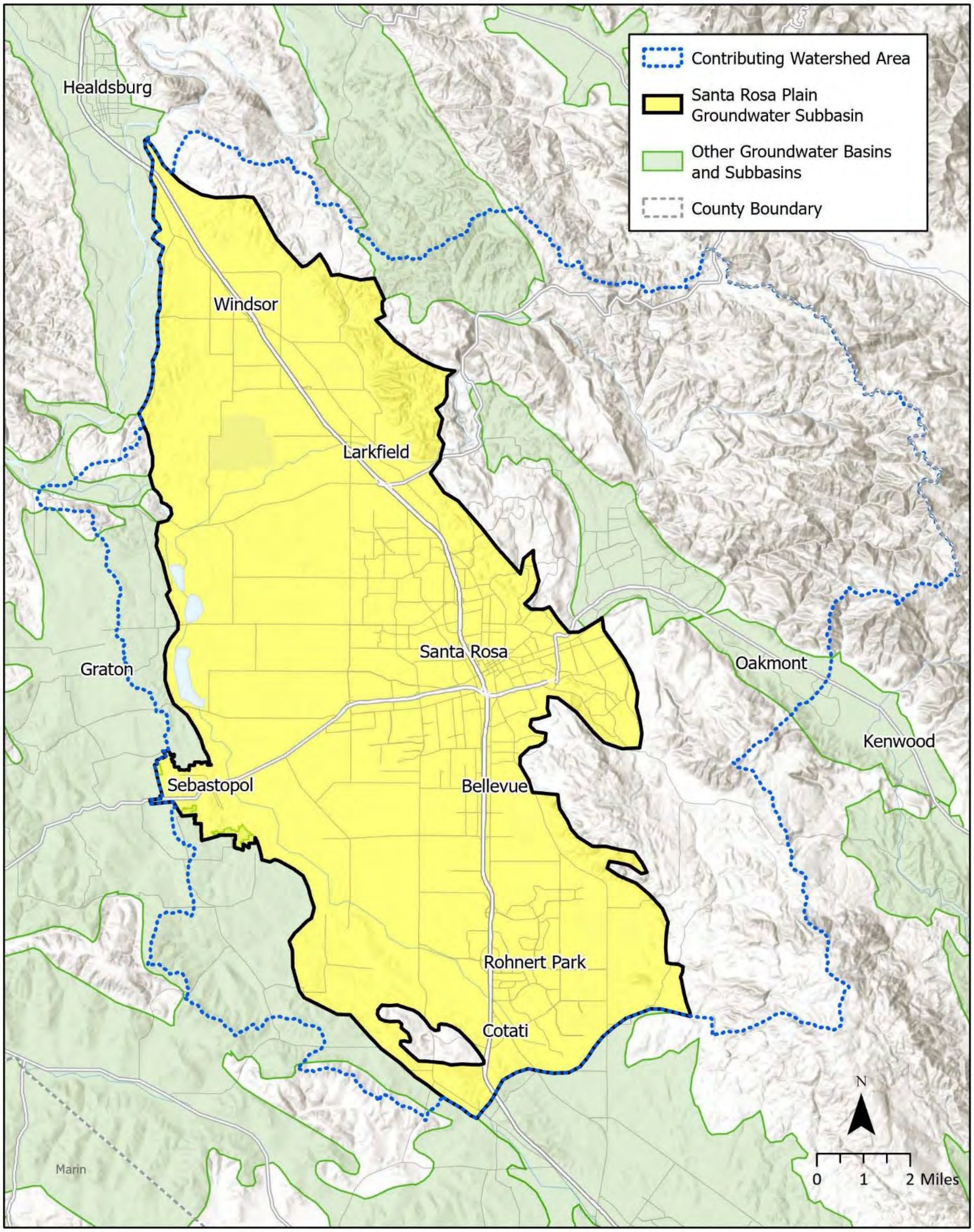

Figure ES-1. Santa Rosa Plain Groundwater Subbasin

For example, using a computerized model, described in **Section ES-3**, the GSP projects a 50-year climate future characterized by a few very dry years, followed by several wet or very wet years, and then a long drought. This scenario is representative of projected conditions in the North Bay, but is one of multiple options that could have been used. The climate scenario will be reevaluated as more refined projections become available. This approach reflects a key component of this GSP, which is adaptive management. The document identifies areas of uncertainty and describes how new information will be incorporated into GSP implementation to make adjustments and to correct course as appropriate when necessary.

Adaptive Management

A key tenant of this GSP is adaptive management. Adaptive management is a structured, iterative process of robust decision-making in the face of uncertainty, with an aim to reducing uncertainty over time via monitoring and through the incorporation of new information as it becomes available.

This GSP and Executive Summary are organized following DWR's guidance documents (DWR 2016a):

- Executive Summary
- Section 1 Introduction
- Section 2 Description of the Plan Area
- Section 3 Basin Setting
- Section 4 Sustainable Management Criteria
- Section 5 Monitoring Networks
- Section 6 Projects and Management Actions to Achieve Sustainability
- Section 7 Implementation Plan
- Section 8 References and Technical Studies Used to Develop the GSP

ES.1 Introduction

The Santa Rosa Plain GSA was formed through a Joint Exercise of Powers Agreement (JPA) entered into by the cities of Cotati, Rohnert Park, and Santa Rosa; the Town of Windsor; Gold Ridge Resource Conservation District; Sonoma County (County); Sonoma County Water Agency (Sonoma Water); Sonoma Resource Conservation District; and an organized group of mutual water and Public Utilities Commission-regulated companies (Independent Water Systems), in accordance with the requirements of California Water Code Section 10723 for establishing GSAs under the SGMA.

In August 2019 following an adjustment of the Subbasin boundaries, the JPA was amended to include the City of Sebastopol. During this time, three mutual water companies neighboring Sebastopol joined the Independent Water Systems group.

In recognition of the importance of stakeholder input, the Board created an 18-member Advisory Committee to provide feedback and advice on all aspects of the GSP to the Board (**Figure ES-2**). The Advisory Committee consists of members appointed by each of the original nine member agencies, the City of Sebastopol, the Federated Indians of Graton Rancheria, and seven interest-based members appointed by the Santa Rosa Plain GSA Board. The seven interest-based members represent the following groups:

- Two from environmental organizations with a presence in the Subbasin
- Two from rural-residential well owners
- One from the business community
- Two from the agricultural community

The Advisory Committee meetings are open to the public, advertised through a monthly email update, and posted on the website, www.santarosaplaingroundwater.org.

GSP development was a collaborative effort among the Board, Advisory Committee, and technical consultants and was further informed by input from member agencies, resource agencies, and the community. Key policy issues were vetted, discussed, and modified based on this open, public exchange.

ES.2 Plan Area

Section 2 of the GSP describes the Plan Area, including government jurisdictions, land use, water sources and uses, topography, surface water features, current monitoring and water management programs, and the well-permitting process.

The Plan Area for this GSP covers the entire 80,000-acre Subbasin, which lies within the Coast Ranges geomorphic province. The Subbasin is one of three coastal alluvial subbasins of the Santa Rosa Valley Groundwater Basin in the North Coast Hydrologic Region; Healdsburg Area and Rincon Valley are the other two subbasins. The Santa Rosa Plain Subbasin is generally bounded on the west by low-lying hills of the Mendocino Range and on the east by the Sonoma Mountains and Mayacamas Mountains. The Subbasin is approximately 22 miles long from north to south and the width from west to east varies from approximately 9 miles through the Santa Rosa area to 6 miles at the south end near the City of Cotati and narrows greatly at its northern end. The Subbasin includes the Town of Windsor; Cities of Cotati, Rohnert Park, Santa Rosa, and Sebastopol; and areas of unincorporated rural communities.

The major urban water suppliers in the Subbasin are the individual cities and towns and Cal-American Water Company’s Larkfield system. Most of these water suppliers rely primarily on imported Russian River water supplied by Sonoma Water, but they also pump groundwater for supplemental supply, and during droughts and in emergencies. Residences outside of urban water supply systems rely on groundwater. Agriculture—primarily wine grapes—depends on groundwater and recycled water, where available. The urban communities account for about 36 percent of the land use. Agriculture accounts for 26 percent of land use. Native vegetation or water make up 35 percent of land use, and 3 percent of land is classified as vacant. In 2020, imported water accounted for 45 percent of water supply in the Subbasin, groundwater accounted for 35 percent, and recycled water accounted for about 20 percent (**Figure ES-3**).

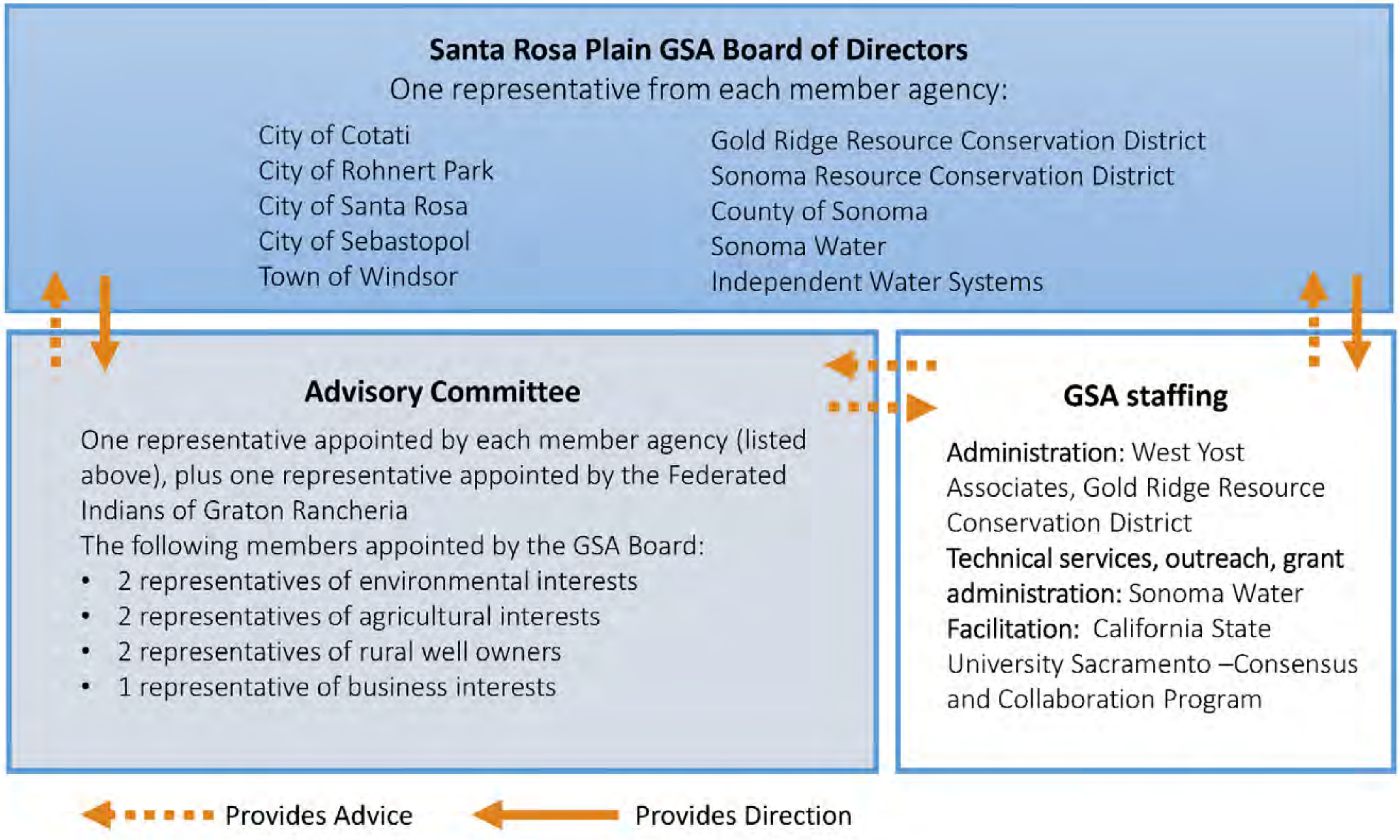

Figure ES-2. GSA Organizational Structure

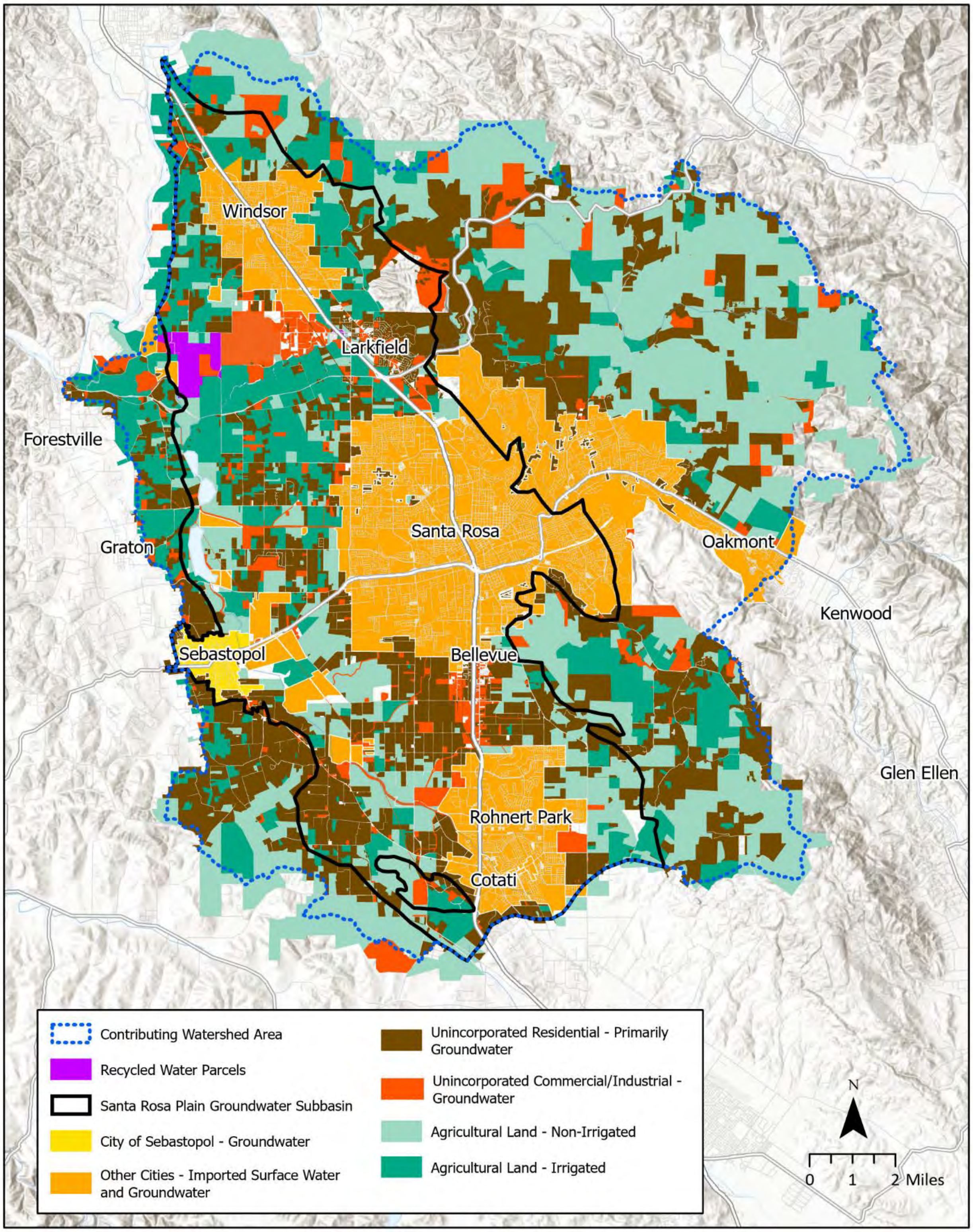

Figure ES-3. Water Sector and Water Use

Climate, groundwater, and streamflow conditions in the Subbasin are informed by robust monitoring networks. Multiple studies, programs, land use plans, and regulations affect, inform, and protect current and future water resources, water use, and water quality in the Subbasin. The County is responsible for administering well permits in both incorporated and unincorporated areas of the Subbasin.

ES.3 Basin Setting

Section 3 describes the Subbasin setting based on existing studies related to geology, climate, and historical groundwater conditions.

ES.3.1 Hydrogeologic Conceptual Model

The Hydrogeologic Conceptual Model (HCM) characterizes the physical components of the surface water and groundwater systems, regional hydrology, geology, water quality, and principal aquifers and aquitards.

The Subbasin is located within a region of geologic complexity caused by long periods of active tectonic deformation, volcanic activity, and sea-level changes. Faults in the Subbasin serve as major structural boundaries for geologic formations and groundwater movement (**Figure ES-4**).

Groundwater resources are highly variable throughout the Subbasin. The productive freshwater aquifers occur both at shallower depths, generally less than 200 feet where many residential wells are drilled, and at deeper depths, where many municipal, industrial, and agricultural wells are constructed. The Subbasin's deepest wells extend to approximately 1,500 feet and no known existing wells extend deeper than 2,000 feet.

In general, groundwater flows from the east and west highlands to the Laguna de Santa Rosa. Faults along the Subbasin boundary may impede, enhance, or redirect groundwater flow and affect groundwater quality locally. Principal sources of groundwater recharge within the Santa Rosa Plain watershed are direct infiltration of precipitation and infiltration from streams. The shallow aquifer system receives most of this type of recharge every year. Recharge that reaches the deeper aquifer zones is less understood but is inferred to come from a combination of leakage from overlying shallow aquifers and mountain-front recharge along the margins of the valley. Deeper recharge may take decades or longer to reach the aquifers, due to long travel paths.

For the purpose of implementing SGMA, two principal aquifer systems are described in the GSP: the shallow and deep aquifer systems. The properties and features that are the basis for grouping into shallow and deep aquifer systems include the degree of surface water connectivity, degree of confinement, and responses to hydraulic stresses such as recharge and pumping. Although the deep and shallow aquifer systems are grouped separately, the boundary between the shallow and deep aquifer systems is not a distinct boundary to groundwater flow.

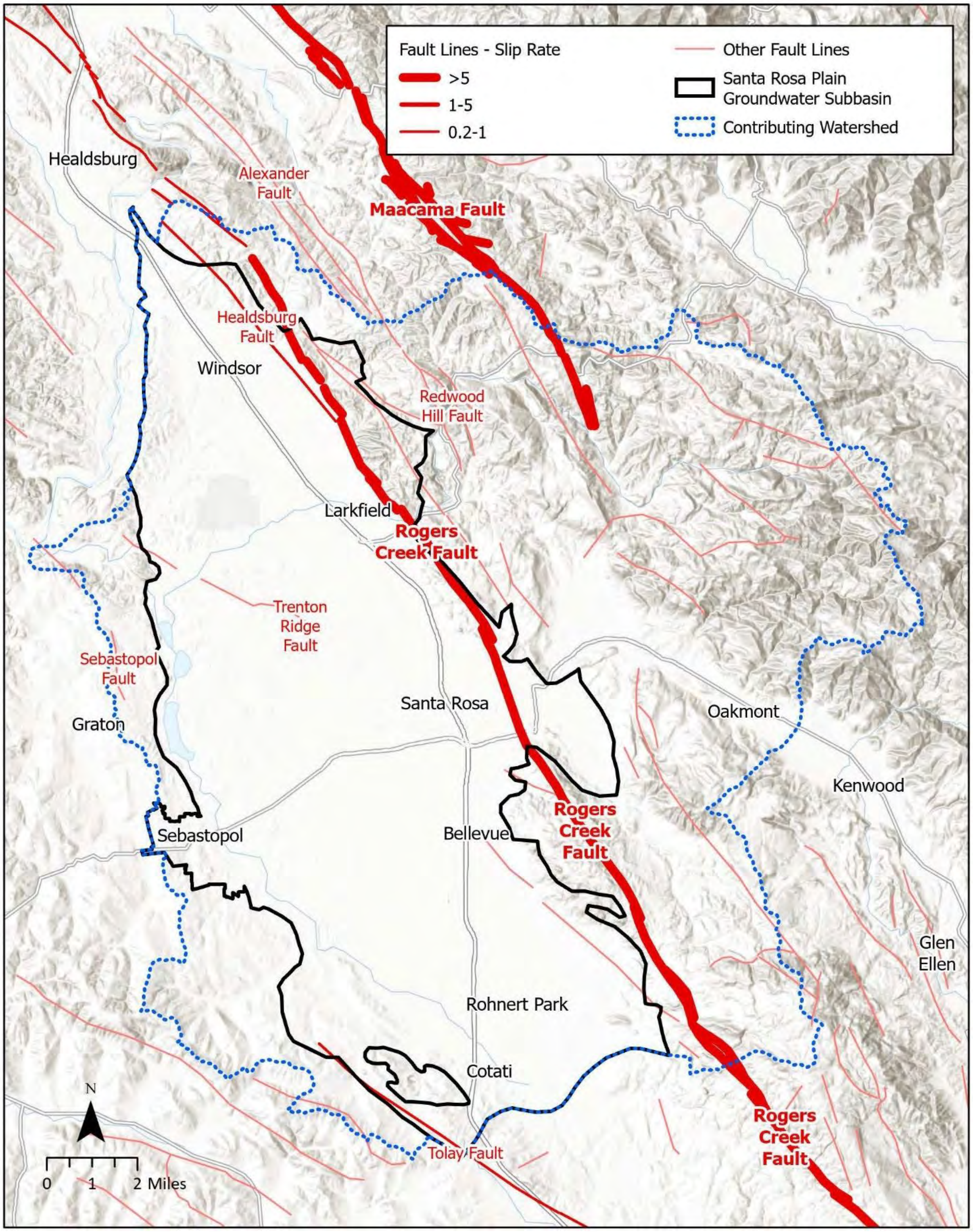

Figure ES-4. Fault Lines

The shallow aquifer system generally is separated from the underlying deep aquifer system by a sequence of discontinuous clay layers. The shallow aquifer system exhibits stable long-term groundwater levels. In many areas the shallow aquifer system is locally and seasonally connected to creeks and streams, and wells completed in the shallow aquifer system near streams show sharp seasonal increases in groundwater levels that correlate closely with precipitation and runoff.

The deep aquifer system is generally confined to semi-confined and is not spatially connected with surface water (although hydraulic connections between the shallow and deep aquifers do provide for hydraulic connectivity between surface water and the deep aquifer). Some wells completed within the deep aquifer system have historically exhibited declining groundwater levels, which have subsequently recovered.

Primary data gaps in the HCM include the geometry and properties of aquifer and aquitards, how the faults in the Subbasin affect groundwater flow, and basin boundary characteristics. Additionally, more data are needed to better understand groundwater recharge and discharge mechanisms, including surface water-groundwater interactions, and the amount and locations of groundwater extractions.

ES.3.2 Current and Historical Groundwater Conditions

SGMA requires GSAs to evaluate groundwater conditions using six indicators of groundwater sustainability: groundwater levels, groundwater storage, groundwater quality, land subsidence, seawater intrusion, and interconnected surface water-groundwater. Because the Subbasin is not connected to or influenced by the ocean or bay, the seawater intrusion sustainability indicator is not applicable. In **Section 3**, previous studies, monitoring well data, and data from other monitoring networks are used to describe current and historical groundwater conditions for the remaining five sustainability indicators.

Groundwater Levels: Groundwater levels for 31 of the 37 shallow aquifer wells are generally stable and 6 of the wells exhibit increasing trends. More limited data from the deeper aquifer system finds that of the 24 wells, 7 exhibit relatively stable groundwater levels; 15 in the southern portions of the Subbasin and along the western boundary exhibit increasing trends and 2 wells, located east of and outside the Subbasin but within the contributing watershed area, have declining levels. Historically, groundwater level declines exceeding 100 feet in the deep aquifer system occurred in the Rohnert Park-Cotati area associated with increases in municipal groundwater pumping due to population growth in the 1980s and 1990s. These declines have since recovered as the use of imported surface water and recycled water has increased and reduced municipal groundwater pumping in this area.

Groundwater Storage: The groundwater budget (described below) finds that the amount of groundwater stored in the shallow and deep aquifer systems is declining on average by about 2,100 acre-feet per year (AFY).

Land Surface Subsidence: Existing data from both Interferometric Synthetic-Aperture Radar (InSAR) and Global positioning system (GPS) stations currently do not indicate that inelastic (irrecoverable) land subsidence is occurring as a result of groundwater pumping. InSAR data from June 2015 to 2018 measured maximum vertical changes within the +0.25- to -0.25-foot range for the entire basin, with a majority of the basin within the 0.0- to -0.25-foot range over the 3-year period. Land surface elevation changes appear to reflect variations observed regionally.

Groundwater Quality: Groundwater quality monitoring performed throughout the Subbasin for numerous different studies and regulatory programs finds that groundwater quality is generally adequate to support existing beneficial uses. Groundwater quality is naturally poor in some local areas and there are some locally limited human-caused impacts on groundwater quality from land use activities, such as industrial, commercial, agriculture, septic systems, and urban activities.

Interconnected Surface Water and Groundwater: Multiple years of measuring streamflows at different locations combined with high-frequency groundwater monitoring provide evidence of the connection between groundwater and surface water in the Subbasin. In addition, an analysis of environmental beneficial users by a practitioners working group identified aquatic species and habitats that could be adversely affected by the depletion of interconnected surface water caused by groundwater pumping. More data are needed from monitoring wells near creeks and from stream gages to determine the specific impacts of groundwater pumping on surface water and on these groundwater dependent ecosystems (GDEs).

ES.3.3 Groundwater Flow Model

A computerized numerical groundwater flow model, the Santa Rosa Plain Hydrologic Model (SRPHM), developed by the USGS in 2014 and revised by Sonoma Water to incorporate more recent data, is used as a groundwater management tool and to calculate the combined groundwater flows into and out of the basin of both the shallow and deep aquifer**.** The model accounts for precipitation, surface water, and groundwater entering the Subbasin through runoff, streams, septic systems, and other sources; and surface water and groundwater leaving the basin through evapotranspiration, streams, pumping, diversions, and other means.

ES.3.4 Projected Future Basin Conditions, Land Use, and Climate Change

Sustainability in the Subbasin must be achieved and maintained even as conditions—including land use and climate—change. Assumptions for future projected land use changes and water demands were estimated for rural-residential groundwater pumping, agricultural land use footprint, and municipal demands. Two practitioner workgroups and surveys and input from the Advisory Committee helped develop the model data used to project future conditions.

The Santa Rosa Plain GSA chose one potential climate change scenario to limit the number of simulations and to provide better comparability between various potential projects and actions The climate change scenario provides for several very dry years through 2025; normal and wetter years through 2050; and then a long-term drought after the mid-twenty-first century. This climate scenario allows for a significant stress test for groundwater resources planning during the GSP implementation horizon. As part of its adaptive approach to groundwater management, the GSA anticipates revising and updating climate projections as part of the 5-year update.

ES.3.5 Water Budget

The water budget was developed using the SRPHM. The water budget provides an accounting and assessment of the total annual volume of surface water and groundwater entering and leaving the basin and the change of the volume of groundwater in storage under historical, current, and projected water budget conditions.

Figure ES-5 summarizes the major sources of groundwater inflows and outflows. Overall, groundwater outflows are larger than inflows, resulting in losses of groundwater in storage of about 2,100 AFY during the current modeled period (2012-2018). Current losses are greater than average losses of about 600 AFY in the historical period (1976-2018). This is due to a combination of increased groundwater pumping and the drier climate, including the 2014-2016 drought, in the current period.

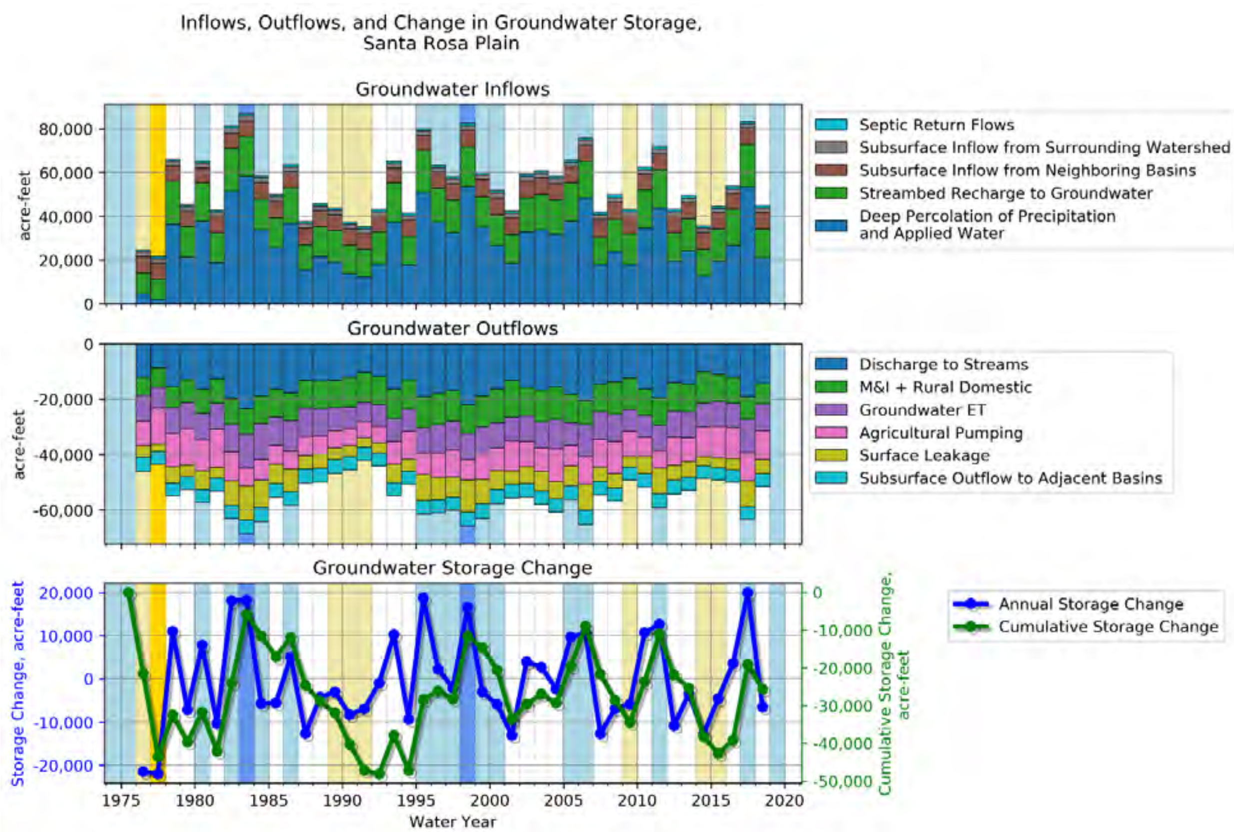

Figure ES-5. Historical and Current Water Budget

The projected water budget covers water years (WYs) 2021 to 2070. Storage change from the first year of the historical period in WY 1976 through to the end of the projected period in WY 2070 has a simulated cumulative loss of 97,200 acre-feet (AF). For the first part of the projected period, from WY 2021 to 2040, the simulated average loss of groundwater in storage is 200 AFY (a loss of 3,300 AF cumulatively over the 20-year period), reflecting the projected wet and very wet climate change scenario. For the full projected period from WY 2021 through WY 2070, that includes an extended drought beginning in 2050, the simulated average loss of groundwater in storage increases to 1,400 AFY (a loss of 71,500 AF cumulatively over the 50-year period). **Table ES-1** summarizes the historical, current, and projected annual changes in groundwater storage for the Subbasin.

Figure ES-6 illustrates the changes in groundwater inflows, by source, in the historical, current, and future periods, while **Figure ES-7** illustrates the changes in groundwater outflows during the same time periods. The primary source of inflow, precipitation, is projected to increase between 2021-2040, and then decline. Outflows are also projected to increase in the future, through outflows to streams and agricultural pumping.

Table ES-1. Summary Historical (WYs 1976-2018), Current (WYs 2012-2018), and Projected (WYs 2021-2070) Average Annual Change in Groundwater Storage (AFY)[a]

Water Budget Periods	
Average, Historical Period (1976-2018)	-600
Average, Current Period (2012-2018)	-2,100
Future Period	
Average (2021-2070)	**-1,400**

Note:

[a] Values rounded to nearest 100.

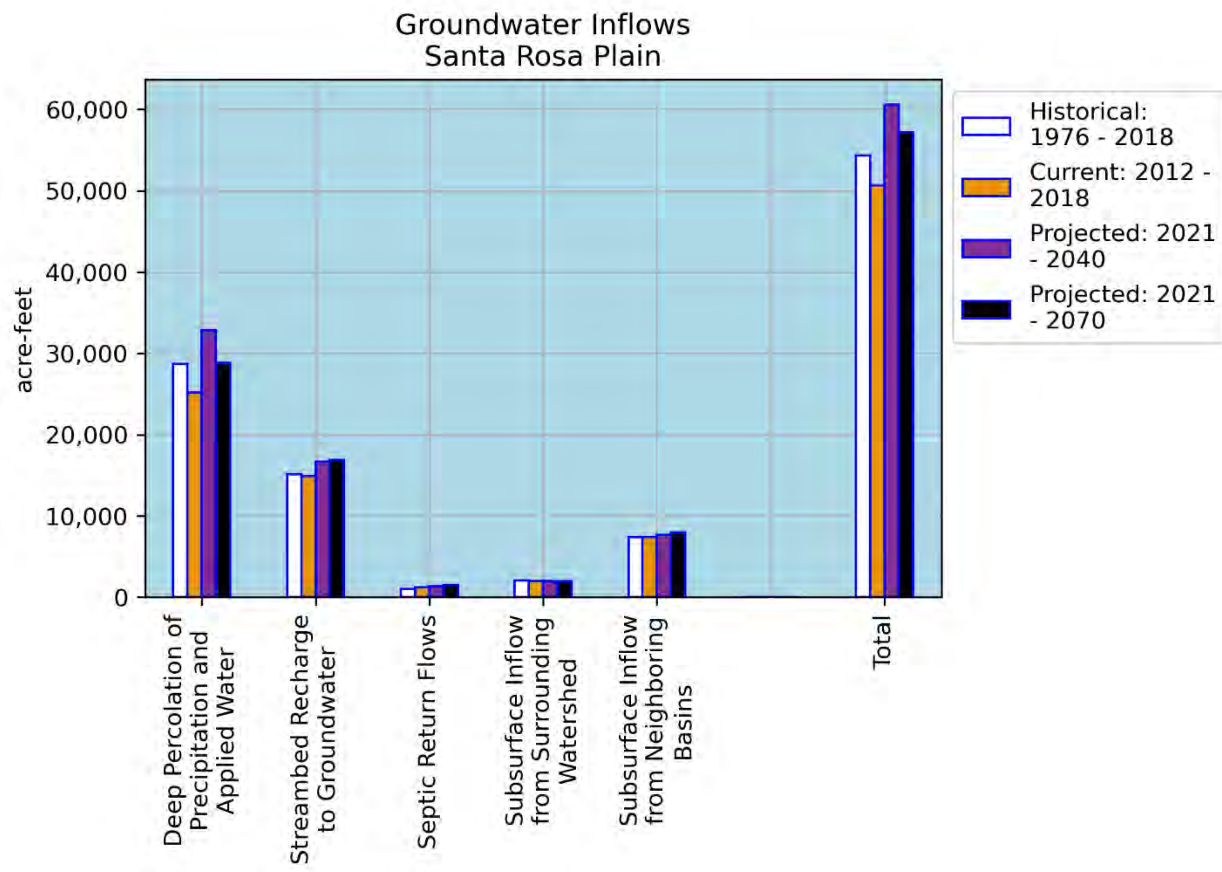

Figure ES-6. Historical, Current, and Future Groundwater Inflows

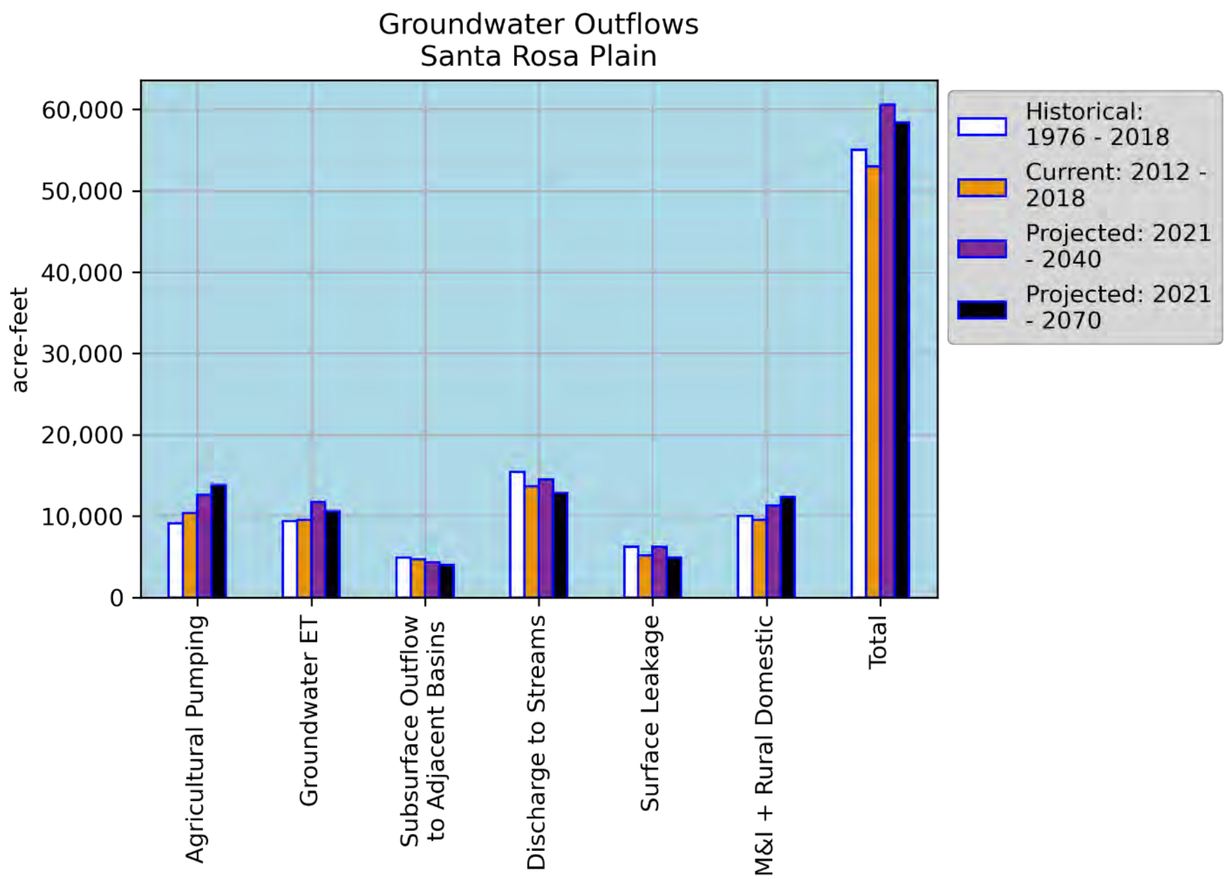

Figure ES-7. Historical, Current, and Future Groundwater Outflows

ES.3.6 Sustainable Yield

The sustainable yield of the Subbasin is an estimate of the quantity of groundwater that can be pumped on a long-term average annual basis without causing undesirable results. Basin-wide pumping within the sustainable yield estimate is neither a measure of, nor proof of, sustainability.

The 20-year modeled period from WY 2021 to WY 2040 is used to determine the sustainable yield of the Subbasin. The average total annual groundwater pumping for this period is 23,900 AF, which is defined here as the sustainable yield. This value is higher than the estimated historical and current average Subbasin-wide groundwater pumping of 19,600 and 20,300, respectively. However, the annual average projected pumping for the 50-year period from 2021 to 2070 of 26,100 AF exceeds the sustainable yield indicating that projects and management actions are needed to sustainably manage the Subbasin and avoid potential future undesirable results.

ES.4 Sustainable Management Criteria

SGMA provides specific language and criteria for establishing and maintaining sustainability, including the development of a sustainability goal, which Santa Rosa Plain GSA defines as follows:

The goal of this GSP is to adaptively and sustainably manage, protect, and enhance groundwater resources while allowing for reasonable and managed growth through:

- Careful monitoring of groundwater conditions
- Close coordination and collaboration with other entities and regulatory agencies that have a stake or role in groundwater management in the Subbasin
- A diverse portfolio of projects and management actions that ensure clean and plentiful groundwater for future uses and users in an environmentally sound and equitable manner

Central to SGMA is the development of sustainable management criteria (SMC) for the sustainability indicators, depicted on **Figure ES-8.** The Santa Rosa Plain GSA identified undesirable results, minimum thresholds (MTs), measurable objectives (MOs), and interim milestones for the sustainability indicators as discussed in **Sections 4.4** through **4.10** (refer to the breakout box for definitions). The five sustainability indicators applicable and relevant to the Subbasin are listed in the following paragraphs with a summary of what the GSA considers significant and unreasonable conditions for each indicator. **Table ES-2** provides the SMC for all sustainability indicators.

Chronic Lowering of Groundwater Levels: Chronic lowering of groundwater levels that significantly exceed historical levels or cause significant and unreasonable impacts to beneficial users.

Reduction in Groundwater Storage: Reduction of groundwater storage that causes significant and unreasonable impacts on the long-term sustainable beneficial use of groundwater in the basin, as caused by either:

- Long-term reductions in groundwater storage
- Pumping exceeding the sustainable yield

Degraded Groundwater Quality: Significant and unreasonable water quality conditions occur if an increase in the concentration of constituents of concern (arsenic, nitrates, and salinity) in groundwater leads to adverse impacts on beneficial users or uses of groundwater, due to either:

- Direct actions by Santa Rosa Plain GSP projects or management activities
- Undesirable results occurring for other sustainability indicators

Table ES-2. Santa Rosa Plain GSA Sustainable Management Criteria

Sustainability Indicator	Significant and Unreasonable Statement	Minimum Threshold	Measurement	Measurable Objective	Undesirable Result
Chronic lowering of groundwater levels	Chronic lowering of groundwater levels that significantly exceed historical levels or cause significant and unreasonable impacts on beneficial users.	**Stable Wells:** Maintain near historical observed ranges while accounting for future droughts and climate variability. Metric: Historical low elevations minus four-year drought assumption. **Wells with Historical Declines and then recovery:** Maintain above historical low elevations and protect at least 98% of nearby water supply wells. Metric: Shallower (more protective) of historical low elevations OR above the 98th percentile of nearby water supply well depths.	Monthly or monthly-averaged groundwater levels measured at representative monitoring point wells.	**Stable Wells:** Maintain within historical observed ranges. Metric: Historical median spring groundwater elevation **Wells with Historical Declines and then recovery:** Maintain within recent (recovered or recovering) historical observed ranges. Metric: Recent (2010-2019) median spring groundwater elevation	10% of RMPs (2 RMPs within the shallow or deep aquifer) exceed MT for 3 consecutive years
Reduction in groundwater storage	Reduction of groundwater storage that causes significant and unreasonable impacts on the long-term sustainable beneficial use of groundwater in the Subbasin, as caused by: • Long-term reductions in groundwater storage; or • Pumping exceeding the sustainable yield	Measured using groundwater elevations as a proxy. MT for groundwater storage is identical to the MT for chronic lowering of groundwater levels.	Annual groundwater storage will be calculated and reported by comparing changes in contoured groundwater elevations. However, monitoring for the chronic lowering of groundwater levels will be used to compare with MTs and MOs.	MO for groundwater storage is identical to the MO for chronic lowering of groundwater levels.	Undesirable result for groundwater storage is identical to the undesirable result for chronic lowering of groundwater levels.
Degraded water quality	Significant and unreasonable water quality conditions occur if an increase in the concentration of constituents of concern in groundwater leads to adverse impacts on beneficial users or uses of groundwater, due to: • Direct actions by Santa Rosa Plain GSP projects or management activities • Undesirable results occurring for other sustainability indicators.	The MT is based on two additional supply wells exceeding MCLs for (1) arsenic, (2) nitrate, or (3) salts (measured as TDS).	The number of public water supply wells with annual average concentrations of arsenic, nitrate, or TDS that exceed MCLs in groundwater quality data available through state data sources.	The MO is identical to the MT.	An undesirable result occurs if, during 2 consecutive years, a single groundwater quality MT is exceeded when computing annual averages at the same well, as a direct result of projects or management actions taken as part of GSP implementation.
Subsidence	Any rate of inelastic subsidence caused by groundwater pumping is a significant and unreasonable condition, everywhere in the Subbasin and regardless of the beneficial uses and users.	0.1 ft/year of inelastic subsidence (elastic and inelastic).	DWR-provided InSAR dataset average annual subsidence for each 100 meter by 100-meter grid cell.	The MO is identical to the MT (0.1 ft/year of subsidence)	Annual MT of 0.1 foot total subsidence is exceeded over a minimum 25-acre area **OR** Cumulative total subsidence of 0.2 foot is exceeded within 5-year period **AND** MT exceedance is determined to be correlated with: (1) groundwater pumping, (2) a MT exceedance of the Chronic Lowering of GWLs SMC (that is., groundwater levels have fallen below historical lows)
Depletion of interconnected surface water	Significant and unreasonable depletion of surface water from interconnected streams occurs when surface water depletion, caused by groundwater pumping within the Subbasin, exceeds historical depletion or adversely impacts the viability of GDEs or other beneficial users of surface water.	Maintain estimated streamflow depletions below historical maximum amounts. Metric: Shallow groundwater elevations are used as a proxy for stream depletion. The MT is the equivalent groundwater level, representing the 3 years (2014-2016) during which the most surface water depletion due to groundwater pumping was estimated between 2004-2018.	Monthly-averaged groundwater levels measured in representative monitoring points (shallow monitoring wells near interconnected surface water).	The MO is to maintain groundwater levels within historical observed ranges. Metric: Mean groundwater level for available dry-season observations between 2004 and 2020.	When MTs are exceeded at 40 percent of RMP wells during drought years and 10 percent of RMP wells during non-drought years.

GWL = groundwater levels

RMP = representative monitoring point

Figure ES-8. Sustainability Indicators

Land Surface Subsidence: Any rate of inelastic land subsidence caused by groundwater pumping is a significant and unreasonable condition, everywhere in the Subbasin and regardless of beneficial uses and users.

Depletion of Interconnected Surface Water: Significant and unreasonable depletion of surface water from interconnected streams occurs when surface water depletion, caused by groundwater pumping within the Subbasin, exceeds historical depletion or adversely impacts the viability of GDEs or other beneficial users of surface water.

Components of Sustainable Management Criteria

Sustainability Goal: A succinct statement of the GSA's objectives and desired conditions and how the basin will achieve these conditions.

Significant and Unreasonable Condition: A qualitative statement regarding conditions that should be avoided.

Undesirable Results: A quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the Basin or Subbasin.

Minimum Thresholds: The quantitative values that reflect what is significant and unreasonable at every measuring site. This value is what you want to try to avoid, and take action if reached.

Measurable Objectives: Specific, quantifiable goals at each representative monitoring site to maintain or improve groundwater conditions in order to maintain or achieve the sustainability goal for the basin. This value is what you want to achieve in the future, where you want to be.

Interim Milestone: The quantitative values that are set to reach at 5-year increments.

Representative Monitoring Sites: These are typical monitoring sites within the broader network of sites that reliably provide high quality data that characterize groundwater conditions in the basin.

SGMA requires the use of monitoring networks to quantitatively measure Subbasin health and the GSA's progress in meeting or maintaining sustainability. The monitoring network is described in **Section 5**. Because the Santa Rosa Plain GSA lacks detailed information needed to measure changes for several of the sustainability indicators, groundwater level monitoring will initially be used as proxy for monitoring Subbasin health for reductions in groundwater storage and depletion of interconnected surface water. Additionally, an assessment of how other sustainability indicators could be influenced by groundwater level MTs indicates that if groundwater level undesirable results are avoided, undesirable results for other sustainability indicators (reduction in groundwater storage, land subsidence, and degraded water quality caused by groundwater pumping) are not expected to occur. For these reasons, groundwater levels are a main focus of sustainability monitoring.

ES.5 Monitoring Networks

SGMA requires monitoring networks to quantitatively measure Subbasin health and the GSA's progress in meeting or maintaining sustainability. **Section 5** describes the monitoring networks that are planned in the Subbasin and in the contributing watershed area. The section also discusses how the existing monitoring networks described in **Section 2** were evaluated and refined.

The purpose of the monitoring networks is to demonstrate progress toward achieving MOs, monitor impacts on groundwater users and uses, monitor changing groundwater conditions, and quantify changes in the water budget.

Representative monitoring point (RMP) networks are a subset of the larger monitoring network and are described in detail in **Section 5** (**Table ES-3**). Representative monitoring points within the RMP network are wells where sustainability indicators are monitored. **Figures ES-9** and **ES-10** illustrate the location of RMPs for chronic lowering of groundwater levels. As shown in **Table ES-3**, **Section 5** includes a monitoring plan for groundwater levels outside the Subbasin but within and along the boundaries of the contributing watershed. These wells are included to provide information on possible changes near the Subbasin boundaries.

Table ES-3. Monitoring Networks and Initial Representative Monitoring Point Networks

Sustainability Indicator	Monitoring Network	Initial Representative Monitoring Point Network
Chronic Lowering of Groundwater levels	96 wells within the contributing watershed area (including 85 wells in the Subbasin) • 61 wells are in the shallow aquifer • 35 wells in the deep aquifer	14 wells screened within the shallow aquifer 12 wells screened primarily within the deep aquifer
Subbasin Boundary Groundwater Level Monitoring Network: This network provides information on boundary conditions, but is not used for RMPs	16 wells outside boundaries but within contributing watershed, including: 8 wells – Wilson Grove Formation Highlands Basin 1 well – Petaluma Valley Basin 3 wells – Rincon Valley Subbasin 1 well – Alexander Valley Subbasin 2 wells – outside of defined basins	
Reduction in Groundwater Storage	96 wells within the contributing watershed area (including 85 wells in the Subbasin) • 61 wells are in the shallow aquifer • 35 wells in the deep aquifer	13 wells screened within the shallow aquifer 10 wells screened primarily within the deep aquifer

Sustainability Indicator	Monitoring Network	Initial Representative Monitoring Point Network
Degraded Water Quality	Existing supply well groundwater quality monitoring programs, as follows: Arsenic: 104 wells Nitrate: 122 wells Salts: 92 wells	Existing supply well groundwater quality monitoring programs, as follows: Arsenic: 104 wells Nitrate: 122 wells Salts: 92 wells
Land Surface Subsidence	3 GPS locations; InSAR satellite in most of the Subbasin	InSAR dataset
Interconnected Surface Water	18 stream gages; 10 shallow monitoring wells adjacent to streams	7 shallow monitoring wells adjacent to streams

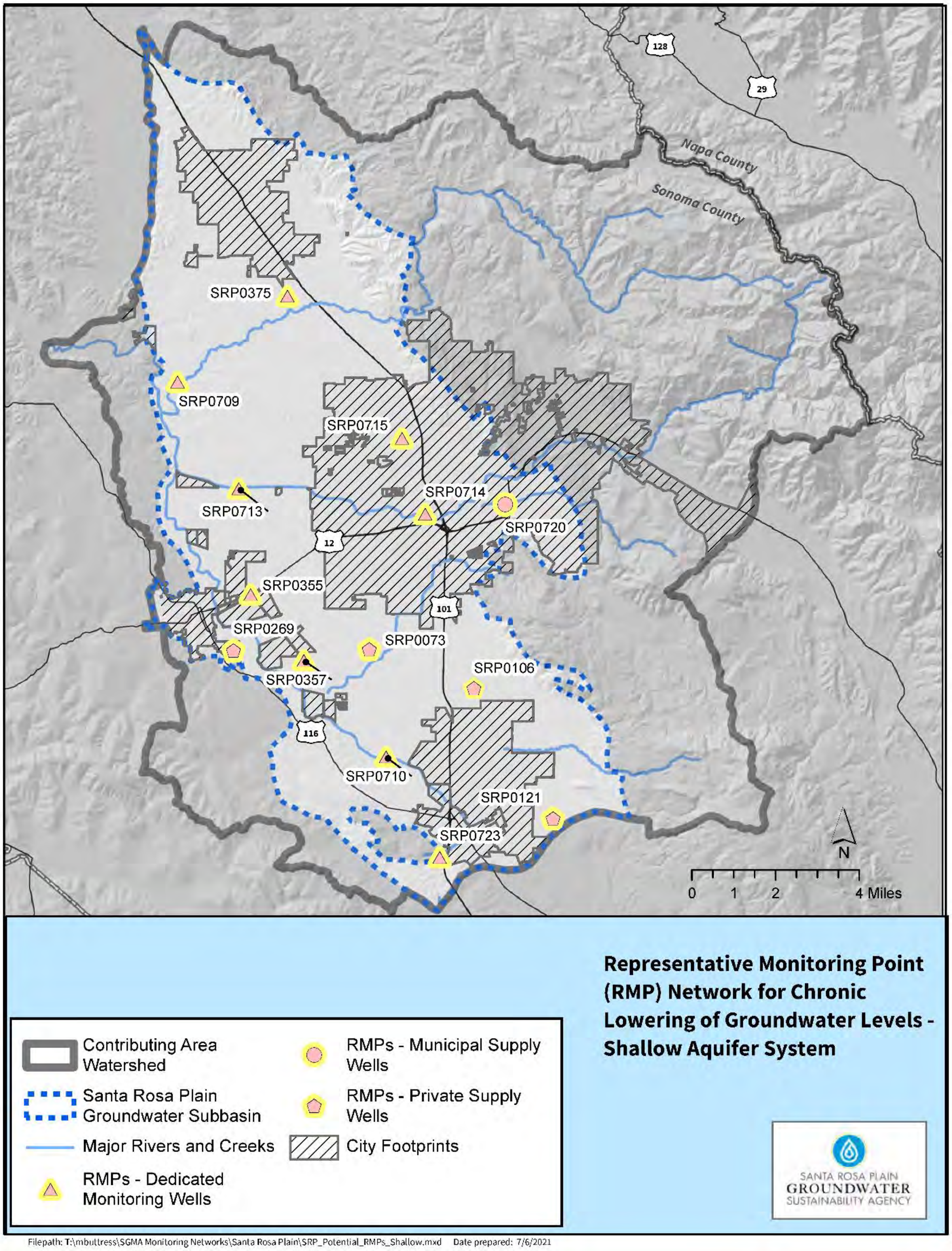

Figure ES-9. Representative Monitoring Point Network for Chronic Lowering of Groundwater Levels, Shallow Aquifer System

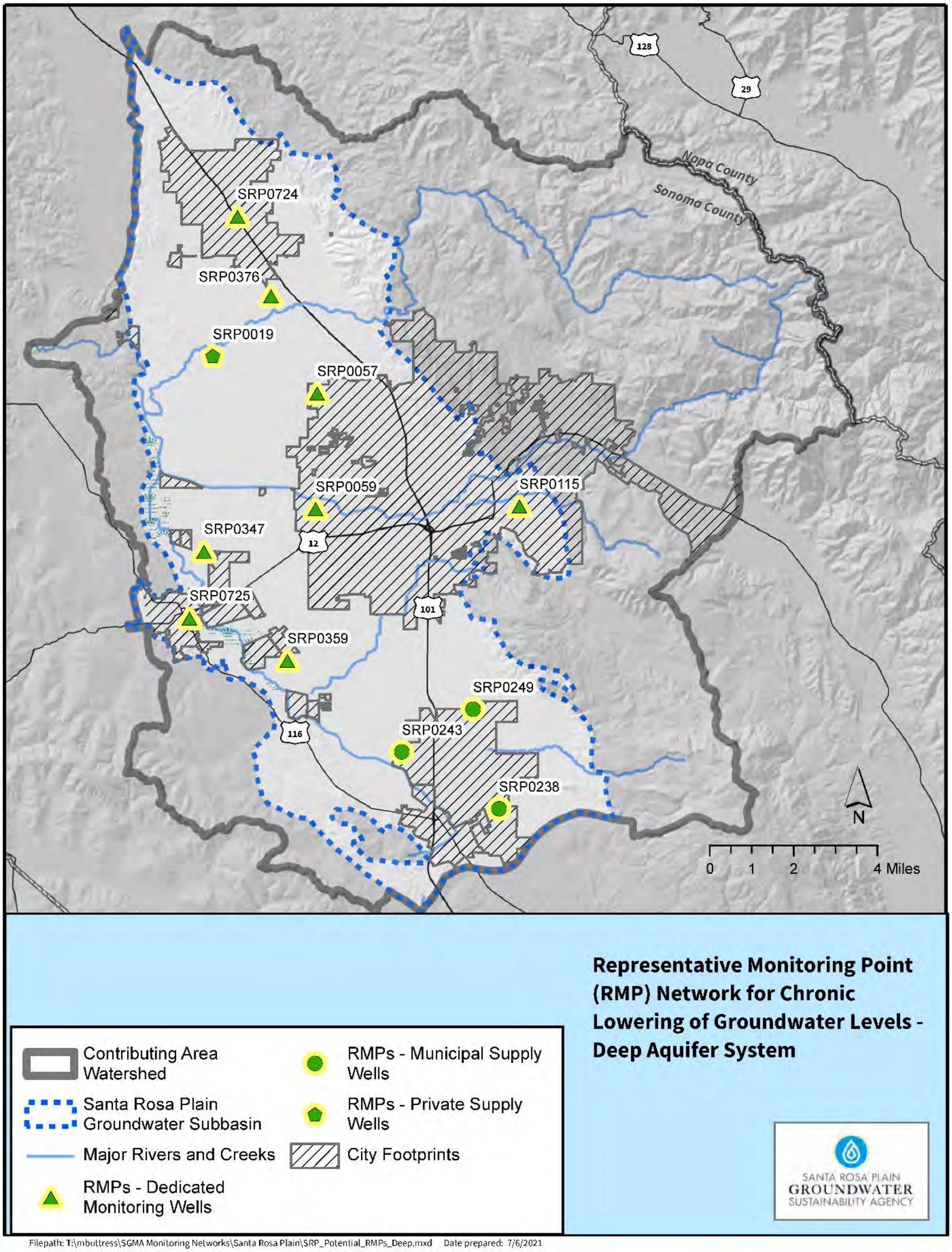

Figure ES-10. Representative Monitoring Point Network for Chronic Lowering of Groundwater Levels, Deep Aquifer System

Section 5 also identifies the data gaps that exist in the monitoring networks, and describes how these gaps will be filled during GSP implementation. While a DWR Technical Support Services grant for 12 new shallow monitoring wells near streams and DWR Proposition 68 grant funding for 4 new multilevel monitoring wells have helped address some data gaps, the early years of GSP implementation will specifically focus on filling additional data needs to better monitor interconnected surface water, basin boundary conditions, and specific groundwater levels.

ES.6 Projects and Management Actions

GSPs are intended to help communities achieve groundwater sustainability as defined by the SMC and based on current and projected future groundwater conditions. **Section 6** of the GSP identifies conceptual projects and management actions that avoid undesirable results and unsustainable groundwater conditions described in **Section 4**. These projects and management actions attempt to balance groundwater pumping reductions with projects that maximize the use of supplemental sources of water.

Projects and management actions are grouped into three categories. The groupings are as follows:

Group 1

- Voluntary reductions in rural domestic, agricultural, commercial, and industrial groundwater use through water conservation tools (such as appliance rebates and replacement, smart irrigation controllers, and water use audits), onsite rainwater capture, and greywater use. The programs and education offered to domestic, commercial, and industrial groundwater users will mirror programs offered to regional municipal water users, which have led to a 37 percent reduction in per capita water use since 2010. Many grape growers already use drip irrigation and rely on new technologies to determine when and how much to irrigate vines. The programs and education offered to agricultural users would be focused on leveraging existing best management practices and working with farmers who have not had access to or the resources available to reduce water use. For the purposes of simulating these projects using the model, it was assumed that these tools would result in a 20 percent reduction in rural domestic groundwater use and a 10 percent reduction in agricultural groundwater use.

Group 2

- Stormwater capture and recharge along and near streams. The focus of this project is to temporarily capture local stormwater during high flow events in detention basins or by spreading on farmlands during the dormant season, letting it slowly sink into the ground to recharge the shallow aquifer and provide baseflow to streams near critical coho salmon streams.

Group 3

- Aquifer storage and recovery of treated Russian River drinking water into existing or new deep water supply wells. This project entails using dedicated groundwater wells in reverse during the rainy season to store treated Russian River water when it is plentiful. A feasibility study found that even during drought years, there are periods when river flows are high enough to store water in aquifers for use during the summer, in droughts, or during emergencies.

The project groups were modeled incrementally, with the following results:

Undesirable Results for Groundwater levels: In the baseline scenario, groundwater levels in the shallow and deep aquifers remain above MTs for the first 20-year period. Water levels generally fall below MTs in the last 11 years of the 50-year projected baseline water budget, primarily in RMPs in the deeper aquifer, leading to undesirable results. The cumulative projects decrease MT exceedances by 73 percent and remove all occurrences of undesirable results.

Groundwater Storage: Groundwater in storage under a baseline scenario without projects is estimated to decline by an average of 1,400 AFY over the entire 50-year projection period that includes a simulated extreme 20-year drought between 2050 and 2070. The projects in all three groups are simulated to reduce the average decline by 300 AFY over the entire 50-year projection.

Stream-aquifer Interaction: Higher groundwater levels near streams can better support streamflow, particularity in the summer and fall months. Simulations performed for Group 2 projects focused on the Mark West Creek drainage and resulted in an increase in simulated summer streamflow by 10 percent in Mark West Creek.

Considering current uncertainties due to modeling and project information, these project scenarios provide a pathway for reaching sustainability and preparing for future changed conditions in the Subbasin to meet GSP requirements and help address future extreme droughts. Additional data collection and project conceptualization during early phases of GSP implementation will help refine these scenarios and allow for consideration of additional scenarios, including mandatory restrictions on groundwater extractions, if necessary, to achieve sustainability.

ES.6.1 Management Actions

In addition to the projects described above, the GSA will initiate the following management actions in the first year of GSP implementation.

<u>Study of and Prioritization of Potential Policy Options</u>: This management action involves a collaboration between the GSA Board, local land use agencies, GSA member agencies, other Sonoma County GSAs, and stakeholders to assess and prioritize future policy options that may be appropriate for the GSA to consider adopting or recommending for adoption by other agencies. This study will prepare a prioritized list of potential policy options. Based on input

from the Advisory Committee and GSA Board, the following initial list of policy options has been developed for potential inclusion in the assessment:

- Water conservation plan requirements for new development
- Discretionary review of well permits for any special areas identified in GSP
- Expand low impact development or water efficient landscape plan requirements
- Modifications to the County well ordinance to improve monitoring of the deep aquifer system in areas of known groundwater depletion
- Well construction and permitting recommendations (for example, water quality sampling/reporting for contaminants of concern, requirement for water-level measurement access, and procedures for preventing cross-screening of multiple aquifers)
- Well metering program for non-residential wells
- Study of water markets
- Permitting and accounting of water hauling

Coordination of Farm Plans with GSP Implementation: This management action involves a collaboration between the three Sonoma County GSAs and interested members of the agricultural community to evaluate the feasibility of developing a program that coordinates farm plans, developed at individual farm sites, with the implementation of the basin-wide GSP. This effort will identify areas of mutual interest (for example, improved water use efficiency, increased groundwater recharge, increased monitoring and data collection, coordinated information sharing, and reporting) and recommend standards, metrics, and incentives for the program.

ES.7 Plan Implementation

ES.7.1 Estimated Implementation Costs

Section 7 provides a high-level budget for the estimated cost over the initial 5 years of GSP implementation. Costs are based on the best estimates available and reflect Santa Rosa Plain GSA's understanding of the effort necessary for effective management and to comply with SGMA requirement for monitoring and reporting.

Costs are divided into the following categories: administration and operations (including legal and grants); communication and stakeholder engagement; routine monitoring, data evaluation, and reporting; addressing data gaps; model maintenance, updates, and improvements; conceptual projects and planning design; and 5-year GSP update. Percentage allocations of costs are shown on **Figure ES-11**.

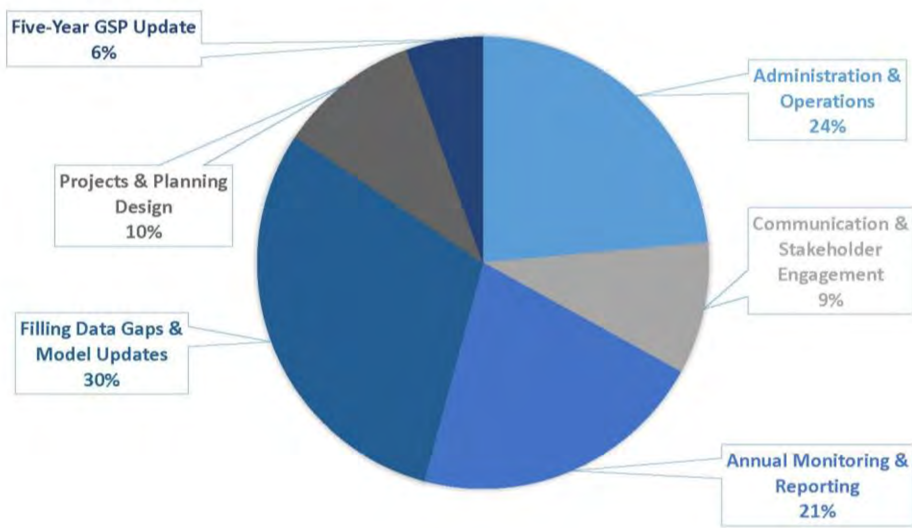

Figure ES-11. Percentage Breakdown of Cost Categories for 5-year GSP Implementation

The mid-range budget projections for the first 5 years total about $5.9 million, averaging about $1.2 million annually, as summarized in **Table ES-4**.

Table ES-4. Mid-Range 5-year Total Budget Estimates

GSP Implementation Item	Year 1 2022 to 2023	Year 2 2023 to 2024	Year 3 2024 to 2025	Year 4 2025 to 2026	Year 5 2026 to 2027
GSA Administration and Operations	$285,000	$255,000	$250,000	$240,000	$255,000
Communication and Stakeholder Engagement[a]	$120,000	$95,000	$95,000	$95,000	$110,000
Annual Monitoring, Evaluation, and Reporting	$275,000	$220,000	$220,000	$220,000	$220,000
Data Gap Filling[a]	$100,000	$355,000	$551,000	$290,000	$0
Conceptual Projects and Planning Design[a]	$80,000	$165,000	$265,000	$20,000	$20,000
Model Updates[a]	$50,000	$150,000	$75,000	$50,000	$25,000
5-year GSP Updates[a]	$0	$0	$0	$100,000	$200,000
Subtotal	$910,000	$1,240,000	$1,456,000	$1,015,000	$830,000
10% Contingency - rounded to nearest $5,000	$90,000	$125,000	$145,000	$100,000	$85,000
Total	**$ 1,001,000**	**$ 1,364,000**	**$ 1,601,600**	**$ 1,116,500**	**$ 913,000**
Preliminary average annual costs equal approximately $1.2 million					

Note:

[a] Potential for bond funding/technical services support

ES.7.2 Funding Sources and Mechanisms

Currently, the GSA funds operations, outreach, and GSP development through a groundwater user fee. Municipal water suppliers pay an annual fee based on average annual groundwater extraction, as determined in 2019 when the fee was implemented. The County and Sonoma Water contribute funds to the Santa Rosa Plain GSA in lieu of the fee being collected from residential, agricultural, industrial, commercial, and other groundwater pumpers. The in lieu contribution will end on June 30, 2022, and all groundwater pumpers will be subject to the fee.

The Santa Rosa Plain GSA has successfully applied for and received more than $2 million in state grant funding for GSP development and to help address data gaps. Grant funding through Proposition 68 and future state bond measures continue to be a critical source of revenue, particularly for closing data gaps and for project planning and implementation. In addition, Santa Rosa Plain GSA has initiated a funding study to review its current fee and to identify alternative local financing options moving forward.

ES.7.3 Implementation Schedule

Group 1 projects and management actions are scheduled to be implemented by Santa Rosa Plain GSA and partner agencies by 2025. Group 2 and Group 3 projects have a longer planning horizon, and are anticipated to be implemented by 2028, as shown on **Figure ES-12**. However, some of the projects and management actions may be implemented sooner by other agencies and entities within the Subbasin in response to the 2021 drought conditions.

ES.8 References and Technical Studies

The final section of the GSP includes a complete list of references and technical studies that supported the development of this GSP.

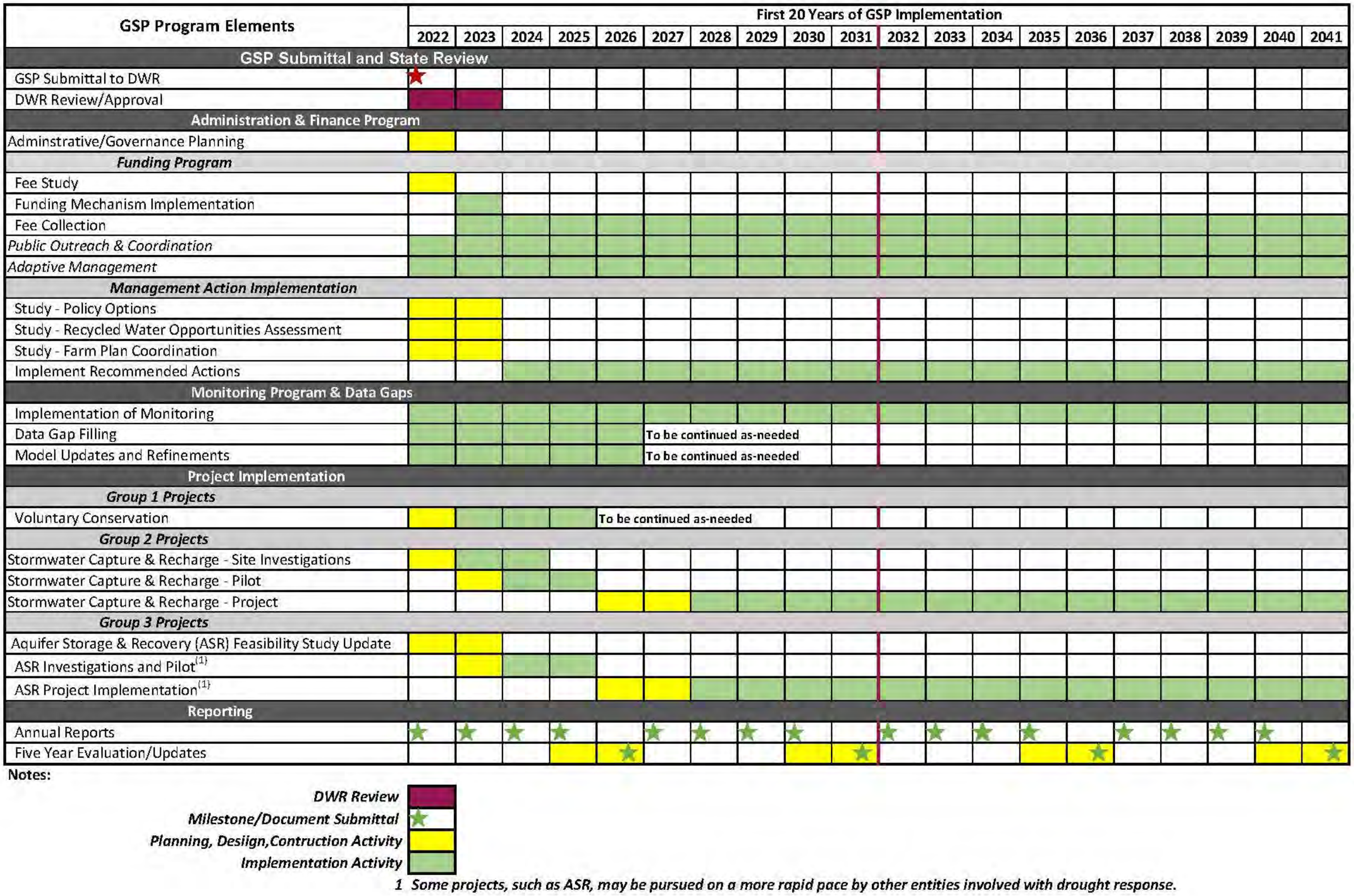

Figure ES-12. Santa Rosa Plain GSP Implementation Schedule