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 mandated that groundwater resources be sustainably managed through development and implementation of a Groundwater Sustainability Plan (GSP or Plan) to ensure that groundwater will be available today and into the future for all beneficial users, including flora and fauna, municipal and domestic, agricultural, and business users. The Sonoma Valley Groundwater Sustainability Agency (Sonoma Valley GSA) was formed under SGMA to develop and implement this GSP for the Sonoma Valley Groundwater Subbasin (Subbasin) (refer to **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 high-priority basin, with groundwater levels declining in some areas. Based on the high-priority designation, the GSA must submit the GSP to DWR by January 31, 2022. The Sonoma Valley 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 plan that achieves and maintains groundwater sustainability 50 years into the future.

Declining groundwater levels in Sonoma Valley were apparent long before the passage of SGMA and under the leadership of a diverse, stakeholder-based Basin Advisory Panel, the voluntary Sonoma Valley Groundwater Management Plan (GMP) was released in 2007. The GMP, which includes the Subbasin and contributing Sonoma Valley watershed, relied heavily on a 2006 U.S. Geological Survey (USGS) study funded by the Sonoma County Water Agency (Sonoma Water) and USGS.

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, sustainability management criteria to define sustainability and includes projects, management actions, and an implementation plan to achieve locally determined sustainability goals.

Because Sonoma Valley 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, GSPs are not intended to address immediate short-term

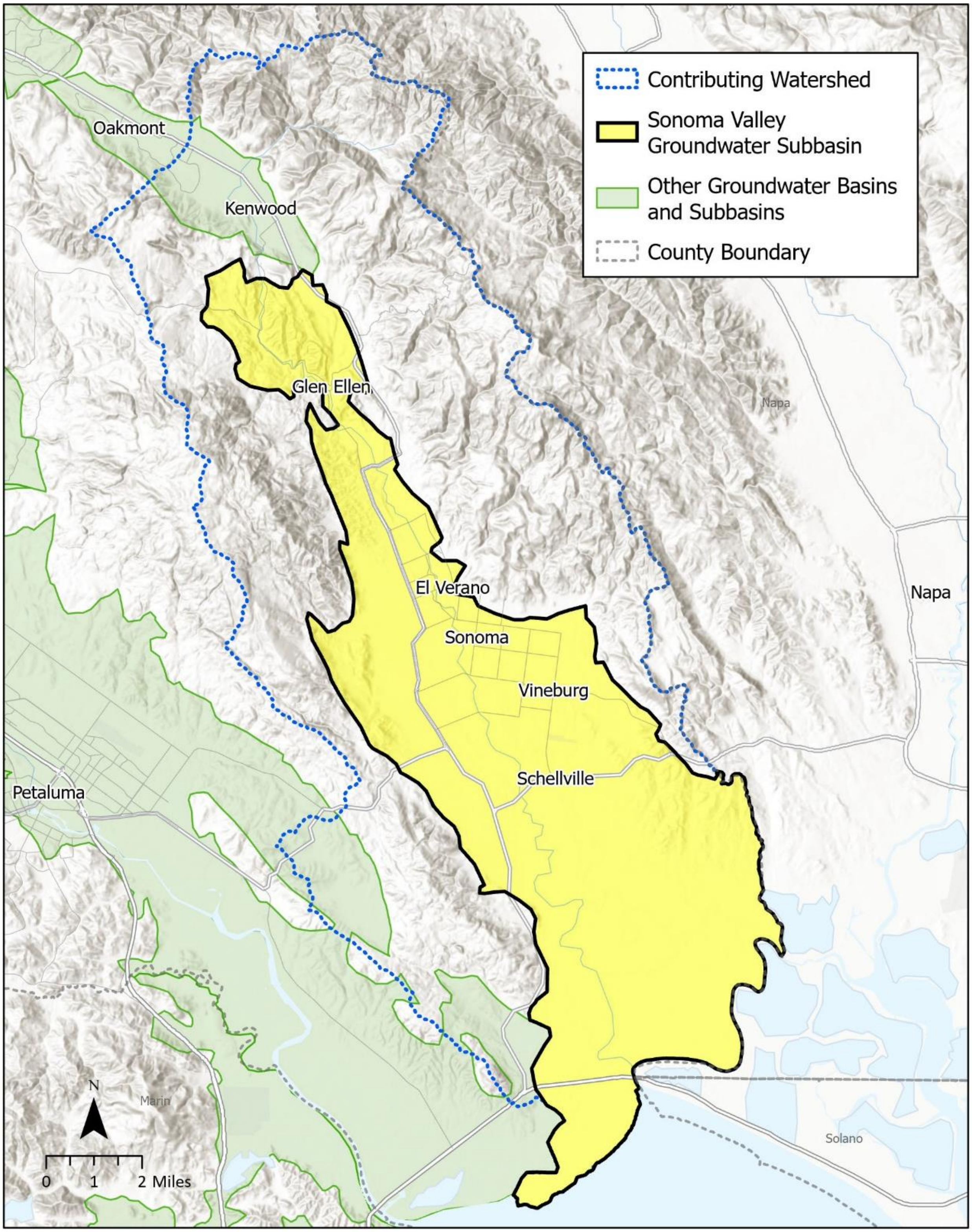

Figure ES-1. Plan Area/Sonoma Valley Groundwater Substation

issues, but are focused on long-term, systemic groundwater issues. 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, and at a minimum of every 5 years when the GSP is required to be updated. 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 developed and incorporated into GSP implementation to make adjustments and to correct course if 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 Plan Implementation
- Section 8 References and Technical Studies Used to Develop the GSP

ES.1 Introduction

In June 2017, the Sonoma Valley GSA, whose jurisdiction is the Subbasin, was formed as a Joint Powers Authority with six member agencies: North Bay Water District, Sonoma County (County), Sonoma Water, Sonoma Resource Conservation District, Valley of the Moon Water District, and the City of Sonoma (**Figure ES-2**). The Sonoma Valley GSA Board of Directors (Board) includes one representative from each member agency. The Board meets approximately six times annually in meetings that are open to the public.

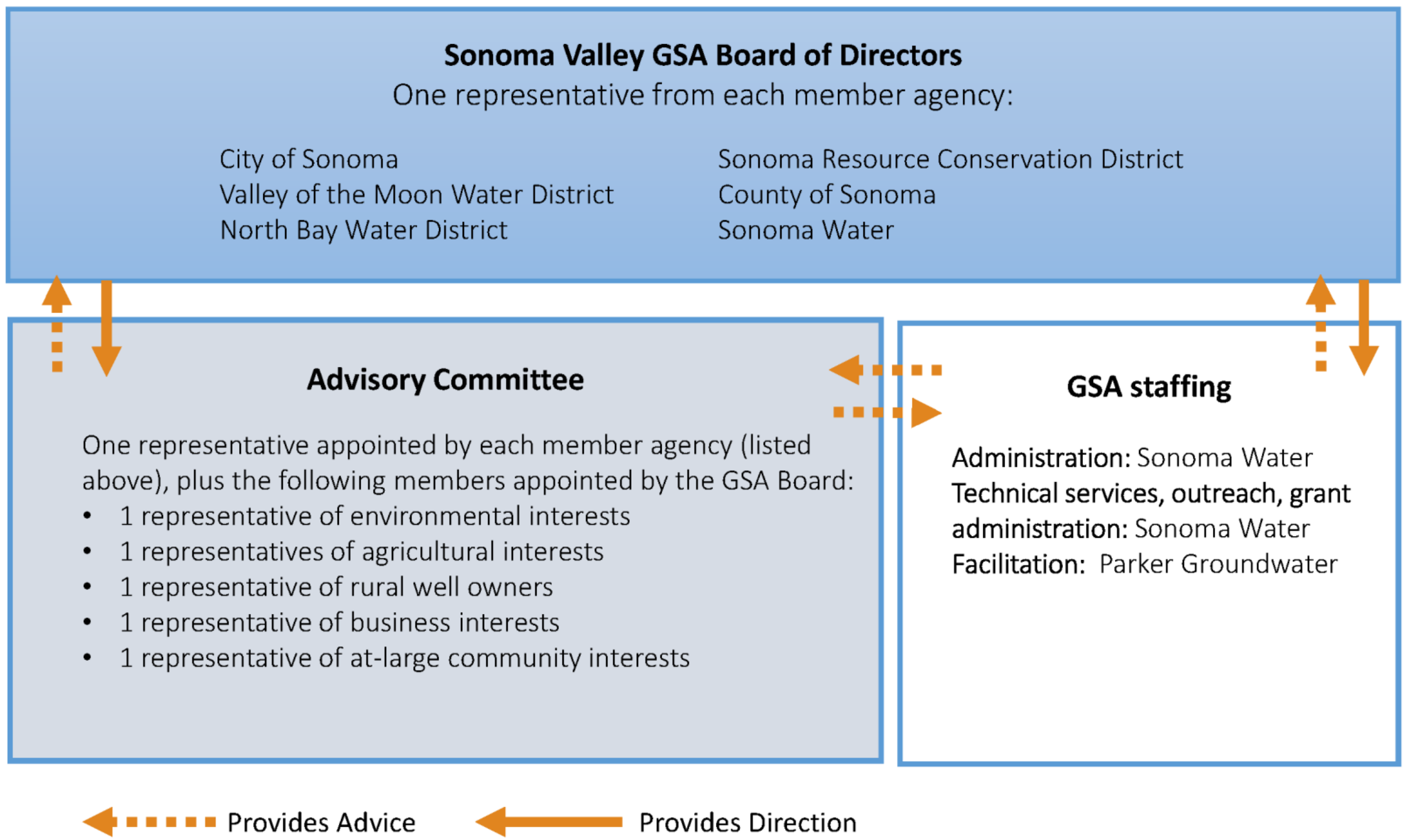

Figure ES-2. Groundwater Sustainability Agency Organization

In recognition of the importance of stakeholder input, the Board created a 12-member Advisory Committee to provide feedback and advice on all aspects of the GSP to the Board (**Figure ES-2**). The Advisory Committee meetings are open to the public, advertised through a monthly email update, and posted on the Sonoma Valley GSA website, sonomavalleygroundwater.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 through open public meetings and workshops. 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 is the entire Sonoma Valley Subbasin (**Figure ES-1**), located immediately north of San Pablo Bay, and bounded on the west by Sonoma Mountains and on the east by the Mayacamas Mountains. The 44,000-acre Subbasin stretches from the Baylands northward, incorporating the City of Sonoma and the communities of Schellville, Buena Vista, El Verano, The Springs (Agua Caliente, Boyes Hot Springs, and Fetters Hot Springs), and Glen Ellen. Sonoma Creek is the principal stream draining the Subbasin, which is located within the larger Sonoma Creek watershed.

The major urban water suppliers in the Subbasin are the City of Sonoma and Valley of the Moon Water District, which rely primarily on imported Russian River water supplied by Sonoma Water, but which also pump groundwater for supplemental supply, and during droughts and in emergencies. These water suppliers serve most of the urban communities, which account for about 13 percent of land use. Agriculture—primarily wine grapes—which relies on groundwater, local surface water, and recycled water, accounts for 44 percent of land use. Native vegetation or water bodies make up 43 percent of land use (**Figure ES-3**). In 2020, imported surface water accounted for 35 percent of water supply in the Subbasin, groundwater accounted for 52 percent, recycled water accounted for about 10 percent and local surface water supplies accounted for about 3 percent.

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 the City of Sonoma and unincorporated areas.

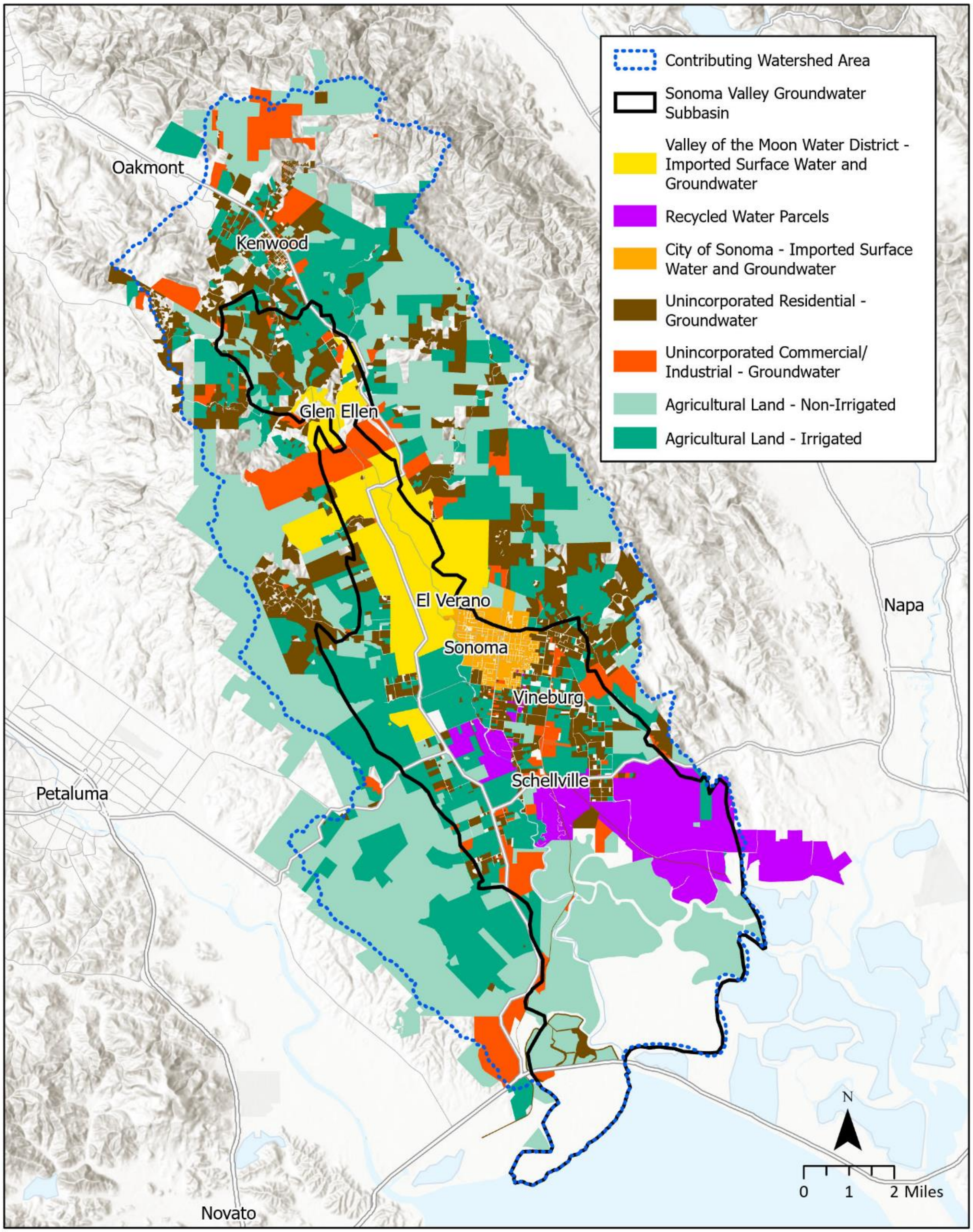

Figure ES-3. Water Sector and Land Use

ES.3 Subbasin 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 bordered by northwest trending faults that can impede, enhance, or redirect groundwater flow **(Figure ES-4).** Groundwater resources are variable throughout the Subbasin, with wells in lower-yielding geologic formations producing from 2 to 20 gallons per minute (gpm) and wells completed in some areas of the highest-yielding areas producing more than 100 gpm. The productive freshwater aquifers generally occur at shallower depths, where many residential wells are drilled. Municipal, industrial, and agricultural wells are constructed in both the shallow and deeper aquifer, with the Subbasin's deepest wells extending to approximately 1,200 feet and no known existing wells extending deeper than 1,500 feet.

In general, groundwater flows from the highlands to the valley axis turning south toward San Pablo Bay. The aquifer system is recharged primarily through precipitation infiltrating on the valley floor, along the Subbasin mountain fronts, and through streambed recharge along Sonoma Creek and its tributaries, providing water to the shallow aquifer on an annual basis. Deeper recharge occurs much more slowly, as evidenced by field tests and studies conducted in the Subbasin. For implementing SGMA, two principal aquifer systems are described: 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.

The shallow aquifer system generally is separated from the underlying deep aquifer system by a sequence of discontinuous clay layers. The shallow aquifer system generally exhibits stable long-term groundwater levels. In many areas, the shallow aquifer system is locally and seasonally connected to Sonoma Creek and other tributaries within the Subbasin, 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 not spatially connected to surface water (although hydraulic connections between the shallow and deep aquifers do provide for hydraulic connectivity between surface water and the deep aquifer). In southern Sonoma Valley, many wells completed within the deep aquifer system have exhibited long-term declining groundwater levels.

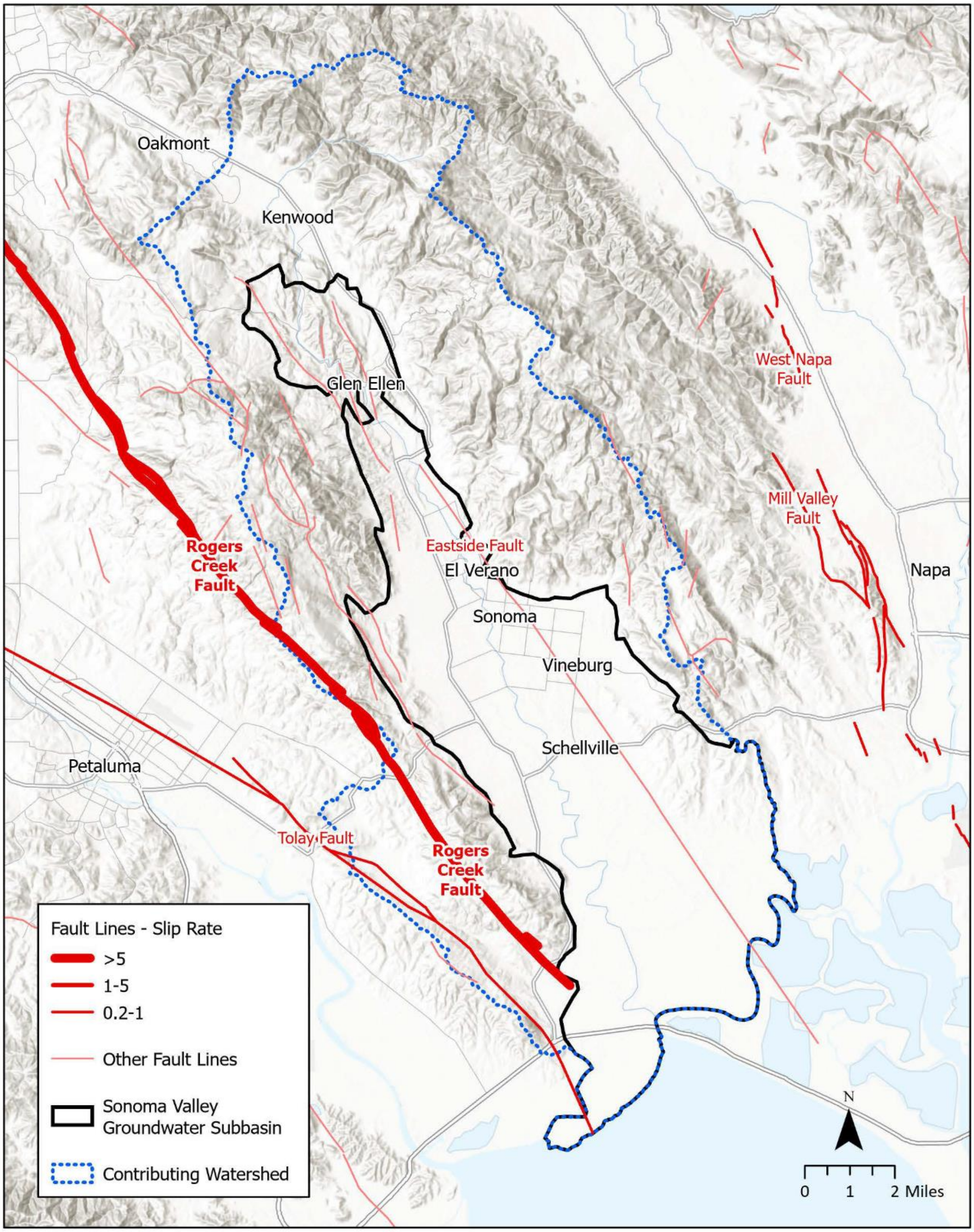

Figure ES-4. Fault Lines

Primary data gaps in the HCM include the geometry and properties of aquifer and aquitards, the origin and extent of brackish water in parts of the Subbasin, and how faults Subbasin, particularly the Eastside Fault, affect groundwater flow. Additionally, more data are needed to better understand groundwater recharge and discharge mechanisms in the Subbasin, including surface water-groundwater interactions and the amount and location 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 in storage, groundwater quality, land subsidence, seawater intrusion, and interconnected surface water and groundwater. In **Section 3**, previous studies, monitoring well data, and data from other monitoring networks are used to describe current and historical groundwater conditions for these six sustainability indicators.

Groundwater Levels: Groundwater levels for the majority of shallow aquifer wells are generally stable and predominantly above sea level. There are two persistent groundwater pumping depressions in the deep aquifer system in southern Sonoma Valley. Southeast of the City of Sonoma (and primarily east of the Eastside Fault), measured groundwater levels are as deep as 126 feet below mean sea level (msl) and southwest of El Verano groundwater levels are as deep as 28 feet below msl in the deep aquifer system. Declining groundwater levels have persisted and expanded in some portions of these areas. Most of the declines are considered likely to have resulted from increased local groundwater extraction.

Groundwater storage: The groundwater budget (described in a later section) finds that the amount of groundwater stored in the aquifers is declining on average by about 900 acre-feet per year (AFY).

Land Surface Subsidence: Existing data from both Interferometric Synthetic-Aperture Radar (InSAR) and global positioning system (GPS) stations do not indicate that inelastic (irrecoverable) land subsidence is occurring as a result of groundwater pumping. Small, measured changes in land surface elevation (between -0.05 to -0.08 inch annually) 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, related to the brackish waters of San Pablo Bay and tidal marshland areas, hydrothermal fluids associated with portions of the Sonoma Volcanics and/or fault zones, and deep connate waters related to ancient seawater. There are some locally limited human-caused impacts on groundwater quality from land-use activities, such as agriculture, commercial, industrial, septic systems, and wastewater treatment facilities.

Seawater Intrusion: The seawater/freshwater interface likely occurs beneath the tidal marshlands near the Subbasin’s boundary with San Pablo Bay. Limited data indicate possible inland movement of brackish water. However, the limited data make it difficult to discern whether potential groundwater quality changes are due to either the distribution of monitored wells over different timeframes and/or the presence of older connate or thermal water sources.

Interconnected Surface Water and Groundwater: Multiple years of measuring streamflow at different locations combined with high-frequency groundwater monitoring provide evidence of the connection between groundwater and Sonoma Creek and its primary tributaries. In addition, 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.

ES.3.3 Groundwater Flow Model

A computerized numerical groundwater flow model, the Sonoma Valley Integrated Groundwater Flow Model (SVIGFM V2), developed by Sonoma Water and used as a groundwater management tool calculates groundwater flows into and out of the Subbasin (**Figure ES-5**). 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.

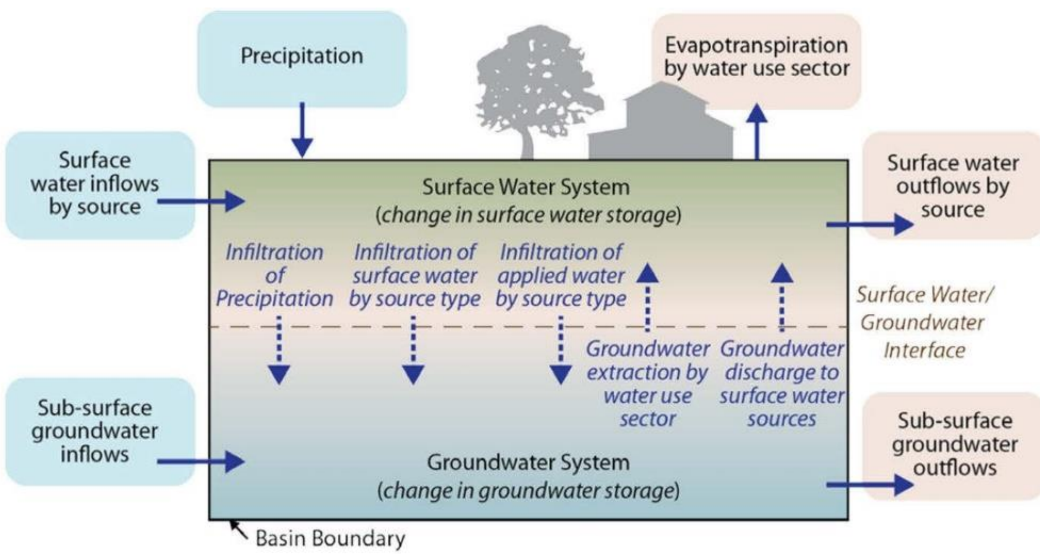

Figure ES-5. Conceptual Groundwater Budget

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 are estimated for rural-residential groundwater pumping, municipal demands, and agricultural land use. Two practitioner workgroups, and stakeholder surveys and input from the Advisory Committee, helped develop the model data used to project future conditions.

The Sonoma Valley GSA chose one potential climate change scenario to limit the number of model simulations and to provide better comparability between various potential projects and actions. The climate change scenario HadGEM2-ES RCP 8.5 simulation 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. The SVIGFM V2 was modified to simulate the 1-in-200 change (0.5 percent probability) sea level rise trajectory, which results in a projected sea level rise of 3.5 feet by the end of the projected 50-year model simulation. 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 SVIGFM V2. 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-6 illustrates the major sources of groundwater inflows and outflows. Overall, 2012-2018 groundwater outflows are larger than inflows, resulting in a loss of groundwater in storage of about 900 AFY. As shown in **Table ES-1**, this loss in storage increased from an average decline of about 300 AFY in the historical period (1971-2018).

This is due to a combination of increased groundwater pumping and the drier climate, including the 2014-2016 drought, in the current period.

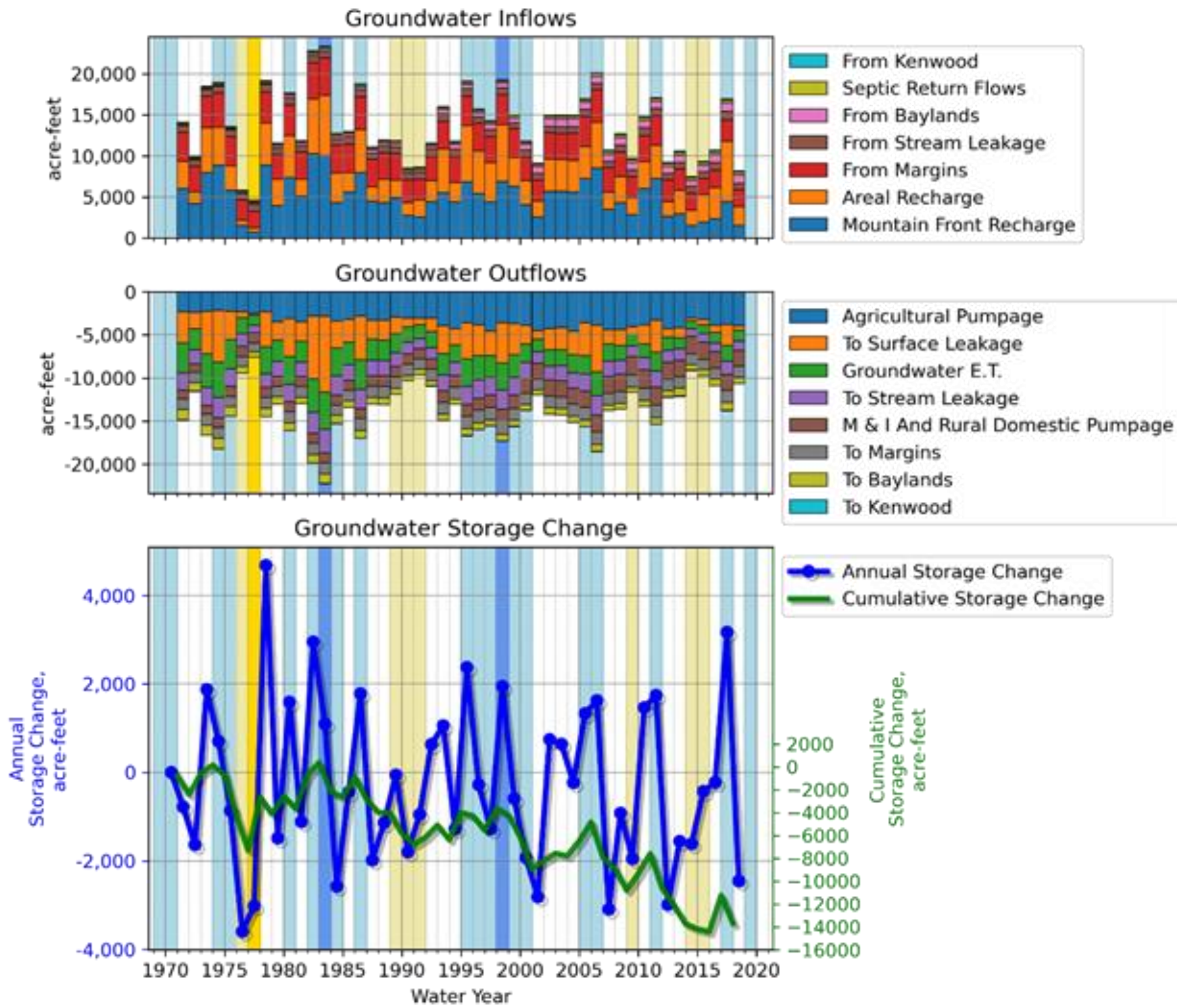

Figure ES-6. Groundwater Inflows and Outflows

The projected water budget covers the water years 2021-2070. Over this period, cumulative groundwater in storage has a modest decline from 2021 through 2050, with stable or even brief increases in groundwater storage associated with wet and very wet periods in the projected climate. The projected climate includes an extended drought beginning in 2050. As a result, the rate of groundwater lost from storage is greater from 2050 through 2070 (a cumulative loss of about 13,000 acre-feet) than during 2021 through 2050 (a cumulative loss of about 8,000 acre-feet). The total cumulative storage loss between 2021 and 2070 is projected to be 21,000 acre-feet with the climate change projections and assumed water demand increases. **Table ES-1** summarizes the historical, current, and projected annual changes in groundwater storage for the Subbasin.

Table ES-1. Average Changes in Groundwater Storage in Sonoma Valley Subbasin

Water Budget Periods	
Average, Historical Period (1971-2018)	-300
Average, Current Period (2012-2018)	-900
Future Period	
Average (2021-2070)	-300

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 sustainable yield for the Subbasin is estimated to be approximately 5,400 AFY. This value is higher than the estimated historical average Subbasin-wide groundwater pumping of 4,900 AFY. However, both the current average of 5,700 AFY and the annual average projected pumping for the 50-year period from 2021 to 2070 of 6,500 AFY exceeds the sustainable yield, indicating that projects and management actions are needed to sustainably manage the Subbasin and avoid potential future undesirable results, as described in **Section ES-6**.

ES.4 Sustainable Management Criteria

SGMA provides specific language and criteria for establishing and maintaining groundwater sustainability, including the development of a sustainability goal, which Sonoma Valley 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 six sustainability indicators, depicted on **Figure ES-7.** The Sonoma Valley GSA identified undesirable results, minimum thresholds (MTs), measurable objectives (MOs), and interim milestones for the sustainability indicators as discussed in GSP **Sections 4.4** through **4.10**. The six sustainability indicators required by SGMA are listed on **Figure ES-7** 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.

Figure ES-7. Sustainability Indicators

Chronic Lowering of Groundwater Levels: Chronic lowering of groundwater levels that significantly exceed historical levels or cause significant and unreasonable impacts on 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

Seawater Intrusion: Seawater intrusion inland of areas of existing brackish groundwater that may affect beneficial uses of groundwater is significant and unreasonable.

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 Sonoma Valley GSP projects or management activities
- Undesirable results occurring for other sustainability indicators

Land Surface Subsidence: Any rate of inelastic land subsidence caused by groundwater pumping is a significant and unreasonable condition, everywhere in the basin 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 groundwater dependent ecosystems (GDEs) or other beneficial users of surface water.

Table ES-2. 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 Declining Trends:** Maintain above historical low elevations and protect at least 98 percent 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 RMP wells.	**Stable Wells:** Maintain within historical observed ranges. Metric*:* Historical median spring groundwater elevation. **Wells with Declining Trends:** Recover groundwater levels to historical groundwater elevations prior to 2010. Metric*:* Historical (pre-2010) median spring groundwater elevation.	20% of RMPs 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 • 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 MT and MOs.	MO for groundwater storage is identical to the MO for Chronic Lowering of Groundwater Levels.	The undesirable result for groundwater storage is identical to the undesirable result for Chronic Lowering of Groundwater Levels.

Sustainability Indicator	Significant and Unreasonable Statement	Minimum Threshold	Measurement	Measurable Objective	Undesirable Result
Seawater Intrusion	Seawater intrusion inland of areas of existing brackish groundwater that may affect beneficial uses of groundwater is a significant and unreasonable condition.	The 250 mg/L chloride isocontour located in an area that is protective of beneficial users of groundwater. This MT isocontour is initially located between the currently approximate 250 mg/L isocontour (inferred interface of brackish groundwater) and beneficial users of groundwater (known water wells supplying beneficial users). This MT will need to be reassessed during early stages of GSP implementation once additional monitoring data and information are available, as the initial location is selected from very limited available data.	The chloride isocontour will be developed based on chloride concentrations measured in groundwater samples collected from an RMP network, which will be developed during the early stages of GSP implementation.	The 250 mg/L chloride isocontour at the currently inferred interface of brackishgroundwater (i.e., current conditions).	When two conditions are met: (1) 3 consecutive years of MT exceedances <u>and</u> (2) the MT exceedance is caused by groundwater pumping.
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 foot per year of total subsidence.	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 foot per year of subsidence).	Annual MT of 0.1 foot total subsidence is exceeded over a minimum 50-acre area <u>or</u> Cumulative total subsidence of 0.2 foot is exceeded within 5-year period <u>and</u> MT exceedance is determined to be correlated with: (1) groundwater pumping, (2) an MT exceedance of

Sustainability Indicator	Significant and Unreasonable Statement	Minimum Threshold	Measurement	Measurable Objective	Undesirable Result
					the Chronic Lowering of GWLs SMC (that is, groundwater levels have fallen below historical lows).
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 Sonoma Valley GSP projects or management activities. • Undesirable results occurring for other sustainability indicators.	The MT is based on one additional supply well exceeding the applicable maximum contaminant level 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 maximum contaminant levels in groundwater quality data available through State data sources.	The MO is based on zero additional supply wells exceeding the applicable maximum contaminant level for (1) arsenic, (2) nitrate or (3) salts (measured as TDS).	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.

Sustainability Indicator	Significant and Unreasonable Statement	Minimum Threshold	Measurement	Measurable Objective	Undesirable Result
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.	Undesirable result occurs if MTs are exceeded at 40 percent of RMP wells during drought years and 10 percent of RMP wells during non-drought years.

mg/L = milligram(s) per liter

RMP = representative monitoring point

TDS = total dissolved solids

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.

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.

Measurable Objectives: Specific, quantifiable goals at each representative monitoring site to maintain or improve groundwater conditions to maintain or achieve the sustainability goal for the basin.

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.

RMP networks are a subset of the larger monitoring network and are described in detail in **Section 5**. Representative monitoring points within the RMP network are wells where sustainability indicators are monitored. **Table ES-3** describes the monitoring network and the subset of RMP for each sustainability indicator, and **Figures ES-8 and ES-9** illustrate the RMP network for the chronic lowering of shallow and deep groundwater levels, respectively.

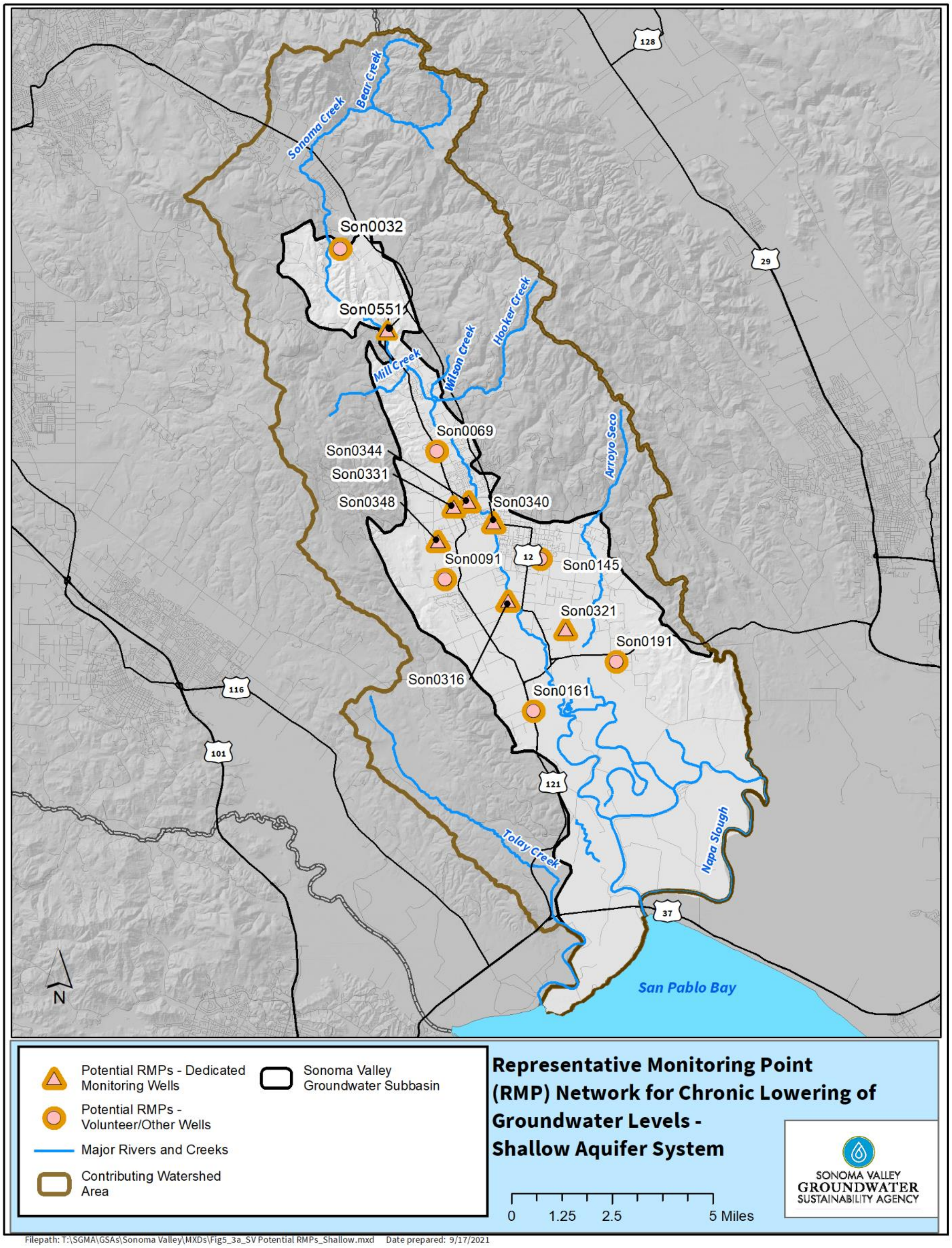

Figure ES-8. Representative Monitoring Points Network for Groundwater Levels, Shallow Aquifer System

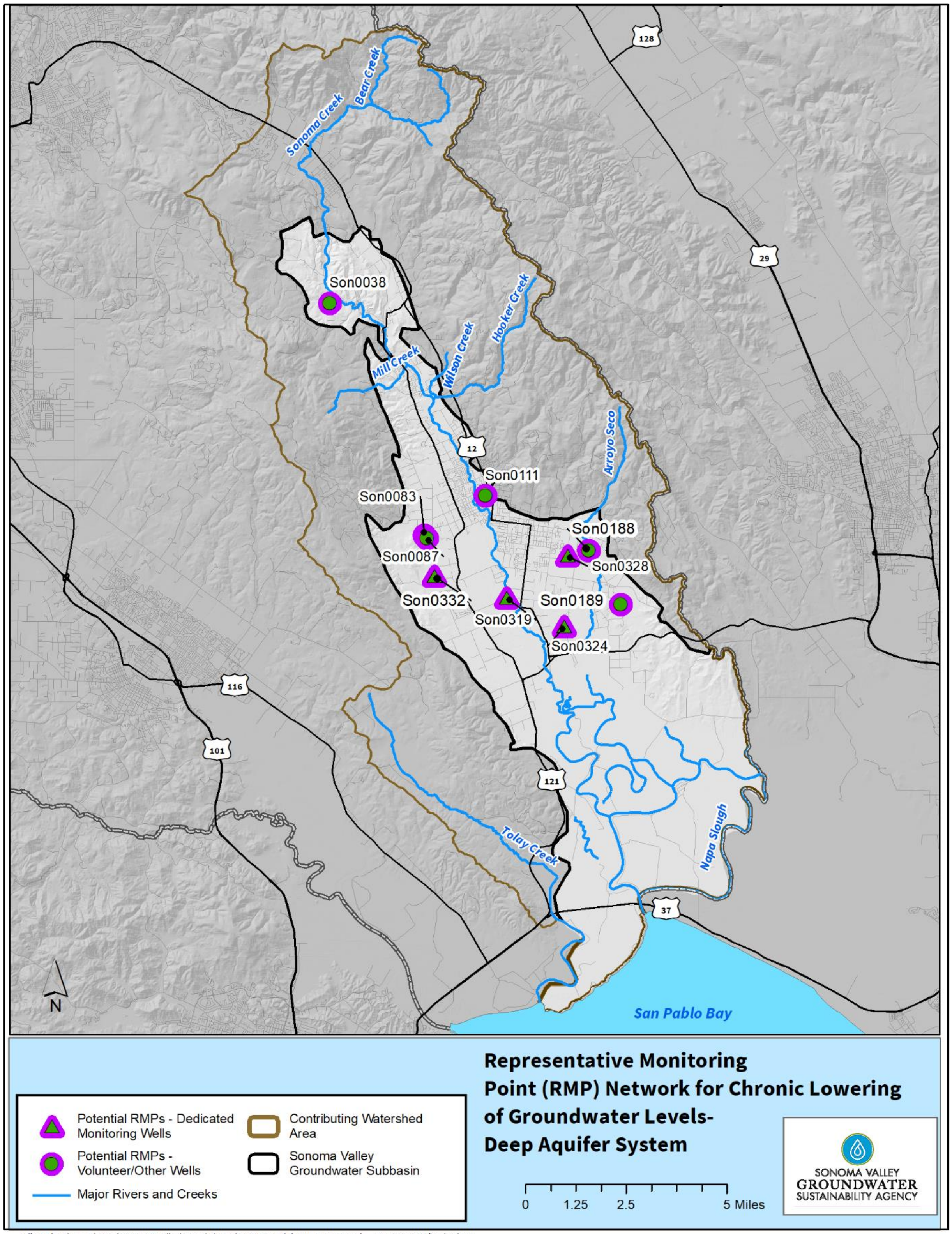

Figure ES-9. Representative Monitoring Points Network for Groundwater Levels, Deep Aquifer System

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	107 wells within the contributing watershed area (including 66 wells in the Subbasin) 53 wells are in the shallow aquifer 54 wells in the deep aquifer	13 wells screened within the shallow aquifer 10 wells screened primarily within the deep aquifer
Reduction in Groundwater Storage	107 wells within the contributing watershed area (including 66 wells in the Subbasin) 53 wells are in the shallow aquifer 54 wells in the deep aquifer	13 wells screened within the shallow aquifer 10 wells screened primarily within the deep aquifer
Seawater Intrusion	Within 1 mile of Baylands: 9 water supply wells; 1 dedicated monitoring well	Within 1 mile of Baylands: 9 water supply wells; 1 dedicated monitoring well
Degraded Water Quality	Existing supply well groundwater quality monitoring programs, as follows: Arsenic: 25 wells Nitrate: 40 wells Salts: 13 wells	Existing supply well groundwater quality monitoring programs, as follows: Arsenic: 25 wells Nitrate: 40 wells Salts: 13 wells
Land Surface Subsidence	3 GPS locations; InSAR satellite in most of the Subbasin	InSAR dataset
Interconnected Surface Water	5 stream gages; 17 shallow monitoring wells adjacent to streams; annual and monthly seepage runs that measure streamflows at multiple sites over a shorter time period	10 shallow monitoring wells adjacent to streams

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, seawater intrusion, and groundwater levels in specific areas, such as identified depletion areas.

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 the undesirable results and unsustainable groundwater conditions described in **Section 4**, primarily regarding loss of groundwater storage and declines in groundwater levels that could also result in lower stream flows.

ES.6.1 Projects

Projects are grouped into three categories and modeled to determine the potential impact on groundwater storage, inflows of brackish water from the Baylands, and reductions in streamflow depletion. 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), stormwater capture, and greywater use. The programs and education offered to 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. This program 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. This project will also include an assessment within the first year of GSP implementation on the exact types of water use efficiency tools and alternate water source projects that are expected to be most effective and feasible for Subbasin stakeholders. While implementation of these projects is initially planned to be on a voluntary basis, the assessment will also identify specific metrics for evaluating the benefits of the projects and assess Subbasin conditions that may lead to mandatory implementation of demand management actions.
- Implementation of existing recycled water contracts by the Sonoma Valley County Sanitation District (SVCSD).

Group 2A and 2B

- Expansion of recycled water system to 8th Street East/Napa Road areas and from West Study Area to Sonoma Creek by SVCSD.
- Aquifer storage and recovery (ASR).
- This project entails using dedicated groundwater wells in reverse during the rainy season to store treated Russian River drinking water when it is available. 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.

- Implementation of stormwater recharge projects. 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 streams.

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

Undesirable Results for Groundwater Levels: The projects, cumulatively, are projected to raise groundwater levels 25 feet to 90 feet in the vicinity of the projects and to reduce the frequency of MT exceedances within the deep aquifer system. In the deep aquifer, MT exceedances that could lead to undesirable results are still projected to occur during 2 years of excessive drought conditions.

Groundwater Storage: While groundwater storage would continue to fluctuate annually, the addition of all three project groups is projected to reduce storage losses by approximately 220 AFY.

Subsurface Inflows from Baylands: Inflows of brackish water from the Baylands will occur as groundwater levels decline. The addition of all three project groups is projected to reduce brackish water inflow to from 400 AFY to 100 AFY, thereby reducing the potential for seawater intrusion from the Baylands.

Stream-aquifer Interaction: Higher groundwater levels near streams can better support streamflows, particularly in the summer and fall months. The addition of the three project groups is projected to increase the amount of groundwater discharging to streams by approximately 300 AFY of groundwater contributing to streamflow.

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 mitigate against 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.6.2 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, including stronger demand management actions that may need to be adopted should the projects described

above not be implementable or successful. 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, the requirement for water-level measurement access, and procedures for preventing cross-screening of multiple aquifers)
- Well metering program
- 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

Section 7 describes how the GSA will implement the projects and management actions while monitoring groundwater conditions, reporting to DWR, closing data gaps, engaging with stakeholders, and managing the organization. The GSA will continue to conduct business in meetings open to the public, maintain an Advisory Committee of representative basin stakeholders to provide recommendations on implementation activities and actions, and hold periodic community meetings to inform and receive input from the community.

Planning for and permitting projects and management actions will begin immediately and will be completed within 5 years (the exception is planning for recycled water expansion in the western area and an ASR project in the Napa/Denmark roads area).

Group 1 projects and management actions are planned to be implemented by Sonoma Valley GSA and partner agencies and SVCSD by 2025. Group 2A and Group 2B projects have a longer planning horizon and are anticipated to be implemented within 10 years (**Figure ES-10**).

Sonoma Valley GSA administration, finances, stakeholder engagement, monitoring, and reporting are ongoing activities that will take place throughout GSP implementation.

ES.7.1 Estimated Implementation Costs

Section 7 provides a high-level budget for estimated costs over the initial 5 years of GSP implementation. Costs are based on the best estimates available and reflect Sonoma Valley GSA's understanding ofthe 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.

The mid-range budget projections for the first 5 years total about $5.9 million, averaging $1.2 million annually. Potential capital project costs total an additional $8.6 million (**Figure ES-11**).

ES.7.2 Funding Sources and Mechanisms

Currently, the six GSA member agencies annually contribute funding for operations, outreach, and GSP development. The Sonoma Valley GSA has successfully applied for and received more than $2 million in 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, Sonoma Valley GSA has initiated a funding study to identify local financing options moving forward, including possible groundwater user fees.

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.

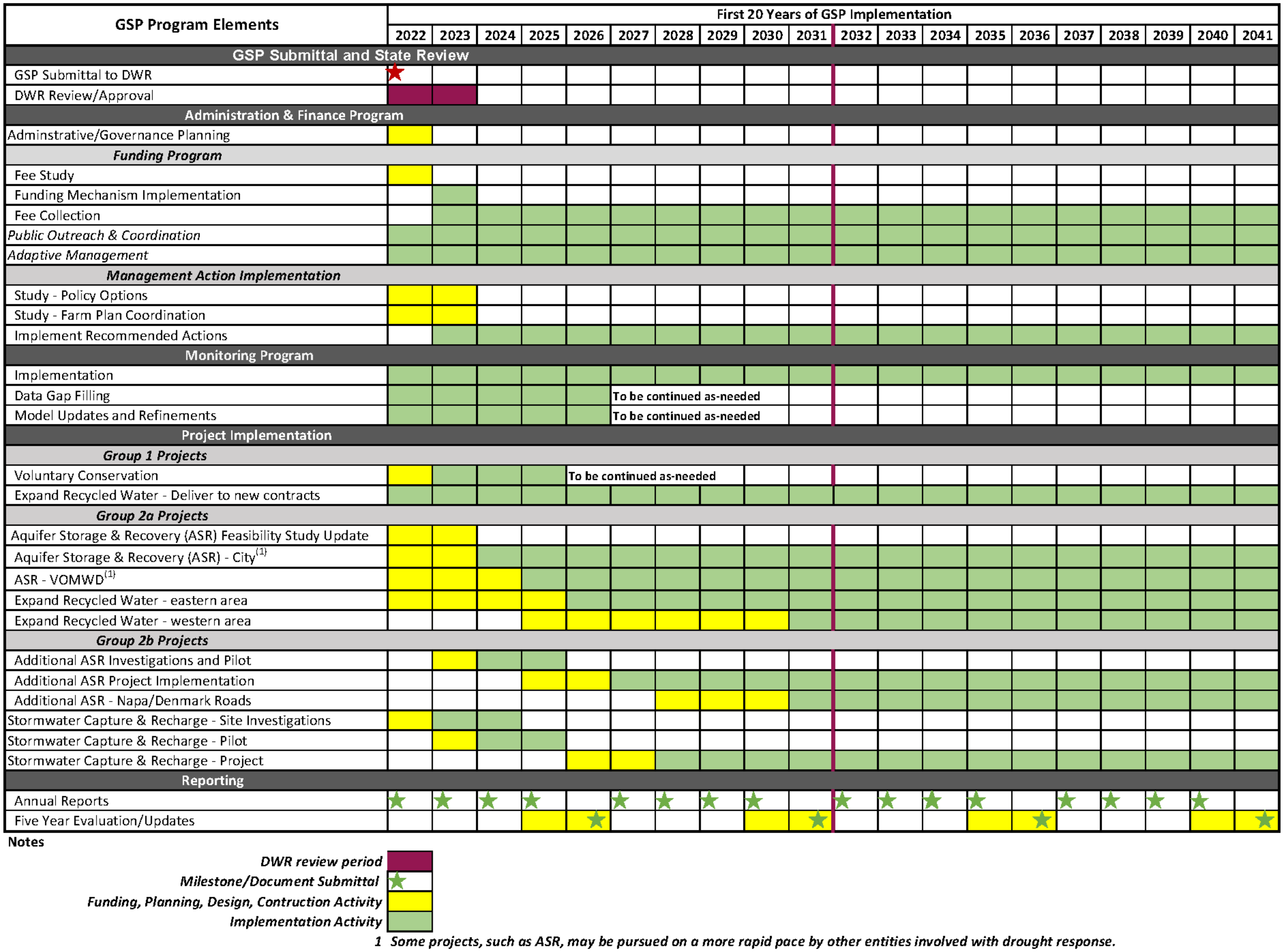

Figure ES-10. GSP Implementation Schedule

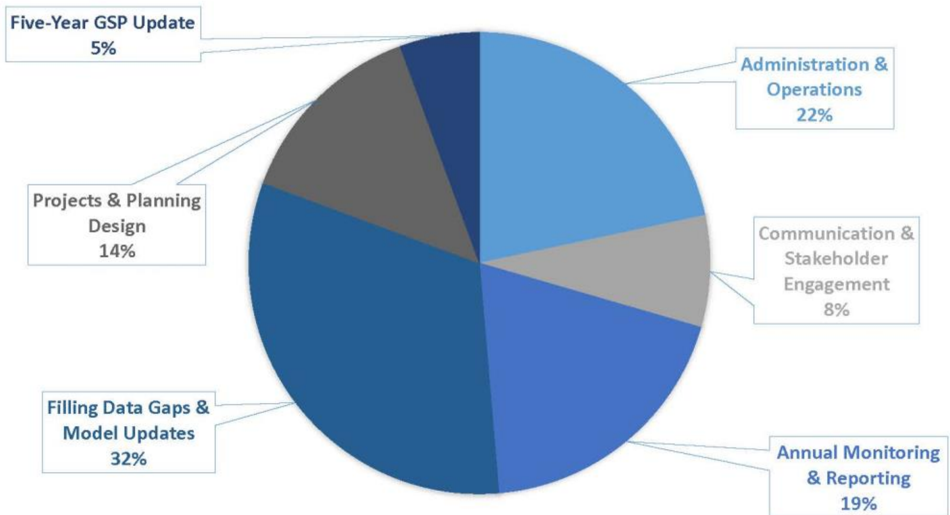

Figure ES-11. Average Budget Allocation for First 5 Years of GSP Implementation