STAFF REPORT

DRAFT RESOLUTION: CONCURRENCE WITH FINDINGS OF THE SONOMA VALLEY SALT AND NUTRIENT MANAGEMENT PLAN

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

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Cover Photo: Sonoma Valley hillside view, photo by Tim Parker.

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SECTION 1: INTRODUCTION

This Staff Report supports a proposed Water Board resolution recognizing the Sonoma Valley Salt and Nutrient Management Plan (SNMP) as described in the *Sonoma Valley Salt and Nutrient Management Plan Final Report*[1] (RMC 2014).The resolution includes a summary of the "Policy for Water Quality Control for Recycled Water" (Recycled Water Policy; Resolution No. 2009-01 as amended by Resolution No. 2013-03)[2] of the State Water Resources Control Board (State Water Board) and the associated requirements to develop salt and nutrient management plans for basins/subbasins in the Region. The resolution includes a summary of the SNMP[3] including descriptions of the: 1) recycled water goals; 2) applicable water quality standards; 3) existing groundwater quality; 4) future groundwater quality analysis; 5) implementation plan; and 6) monitoring program. The resolution also describes efforts of the Sonoma Valley Groundwater Management Program to locally manage the groundwater basin. The resolution summarizes the technical analysis performed and conclusions in the SNMP.[4] For more comprehensive details refer to the SNMP. The resolution includes statements of recognition from the San Francisco Bay Regional Water Quality Board (Water Board) regarding: increasing recycled water use; the importance of salt and nutrient management plans; completion of the SNMP and consistency with the Recycled Water Policy; and continued collaboration with the Sonoma Valley County Sanitation District (SVCSD)[5] to protect the beneficial uses of groundwater. It also addresses the potential need for new implementation actions to attain water quality objectives based on groundwater quality trends.

SECTION 2: RECYCLED WATER POLICY AND SALT AND NUTRIENT MANAGEMENT PLANS (RESOLUTION FINDINGS 1–2)

The resolution includes a description of the goals of the Recycled Water Policy and the requirements to develop salt and nutrient management plans. The preamble of the Recycled Water Policy provides a useful summary of the need and goals for recycled water and salt and nutrient management planning:

[1] Available online at: http://www.scwa.ca.gov/SNMP/
[2] Available online at: http://www.waterboards.ca.gov/water_issues/programs/water_recycling_policy/
[3] The Staff Report uses the acronym SNMP for the Sonoma Valley Salt and Nutrient Management Plan which is synonymous with the term "Sonoma Valley Plan" in the resolution.
[4] The Staff Report uses the acronym "SNMP" when referring to the specific Sonoma Valley Salt and Nutrient Management Plan. The Staff Report also uses the terms "salt and nutrient management plans" and "salt and nutrient management planning" as general references to future plans and planning efforts that will occur throughout the Region as required by the Recycled Water Policy.
[5] The Staff Report uses the acronym SVCSD for the Sonoma Valley County Sanitation District which is synonymous with the term "Sanitation District" in the resolution.

> California is facing an unprecedented water crisis. The collapse of the Bay-Delta ecosystem, climate change, and continuing population growth have combined with a severe drought on the Colorado River and failing levees in the Delta to create a new reality that challenges California's ability to provide the clean water needed for a healthy environment, a healthy population and a healthy economy, both now and in the future. These challenges also present an unparalleled opportunity for California to move aggressively towards a sustainable water future. The State Water Resources Control Board (State Water Board) declares that we will achieve our mission to "preserve, enhance and restore the quality of California's water resources to the benefit of present and future generations." To achieve that mission, we support and encourage every region in California to develop a salt/nutrient management plan by 2014 that is sustainable on a long-term basis and that provides California with clean, abundant water. These plans shall be consistent with the Department of Water Resources' Bulletin 160, as appropriate, and shall be locally developed, locally controlled and recognize the variability of California's water supplies and the diversity of its waterways. We strongly encourage local and regional water agencies to move toward clean, abundant, local water for California by emphasizing appropriate water recycling, water conservation, and maintenance of supply infrastructure and the use of stormwater (including dry-weather urban runoff) in these plans; these sources of supply are drought-proof, reliable, and minimize our carbon footprint and can be sustained over the long-term. We declare our independence from relying on the vagaries of annual precipitation and move towards sustainable management of surface waters and groundwater, together with enhanced water conservation, water reuse and the use of stormwater (p. 1).

The Recycled Water Policy further explains:

> Some groundwater basins in the state contain salts and nutrients that exceed or threaten to exceed water quality objectives established in the applicable Water Quality Control Plans (Basin Plans), and not all Basin Plans include adequate implementation procedures for achieving or ensuring compliance with the water quality objectives for salt or nutrients. These conditions can be caused by natural soils/conditions, discharges of waste, irrigation using surface water, groundwater or recycled water and water supply augmentation using surface or recycled water. Regulation of recycled water alone will not address these conditions (p. 5).

Therefore, the Recycled Water Policy calls for the development of salt and nutrient management plans for each groundwater basin in California to assess water quality and evaluate strategies for complying with water quality objectives. The degree of specificity within salt and nutrient management plans and the length of each plan will be dependent on a variety of site-specific factors, including but not limited to size and complexity of a basin, source water quality, stormwater recharge, hydrogeology, and aquifer water quality. Section 6 of the Recycled Water Policy requires that each salt and nutrient management plan include the following components:

- A basin/subbasin-wide monitoring plan
- Provision for annual monitoring of constituents of emerging concern
- Water recycling and stormwater recharge/use goals and objectives
- Salt and nitrate source/fate/transport identification
- Basin/subbasin assimilative capacity and loading estimates
- Implementation measures to manage salt and nitrate loading on a sustainable basis
- An anti-degradation analysis demonstrating that the projects included within the plan will, collectively, satisfy the requirements of State Antidegradation Policy (State Water Board Resolution 68-1, “Statement of Policy with Respect to Maintaining High Quality of Waters in California”)

The Recycled Water Policy requires that salt and nutrient management plans be completed and proposed to the Water Board by May 14, 2014. However, the Recycled Water Policy also allows the Water Board to grant a two-year extension if it finds that the stakeholders are making substantial progress towards completion of a salt and nutrient management plan.

The Recycled Water Policy requires the Water Board to review each salt and nutrient management plan and consider for adoption revised implementation plans based on the salt and nutrient management plans, consistent with Water Code Section 13242, for those groundwater basins where water quality objectives for salts or nutrients are being, or are threatening to be, exceeded. A revised implementation plan would be adopted as an amendment to the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan; San Francisco Bay Water Board 2013). Water Board staff considered the need for a revised implementation plan and a Basin Plan amendment but determined that an amendment is not necessary at this time because: water quality objectives for salts and nutrients are being attained in the Inland Area (the Sonoma Valley subbasin is subdivided into an Inland Area and Baylands Area); there is adequate assimilative capacity for increasing recycled water use; and monitoring should detect and water quality trends of concern. This Staff Report supports a Water Board resolution concurring with the findings of the SNMP and supporting the SVCSD’s ongoing efforts to evaluate groundwater quality trends in the subbasin. In the future, salt and nutrient management plans for this and other basins/subbasins may require revised implementation plans and amendments to the Basin Plan.

Basin Plan *Section 4.25 Groundwater Protection and Management* describes the planning and management practices to protect and restore groundwater resources that have been impacted by drought, pollution, and over-pumping. Basin Plan Section 4.25 includes three groundwater management goals for the Region:

1. Identify and update beneficial uses and water quality objectives for each groundwater basin.

2. Regulate activities that impact or have the potential to impact the beneficial uses of groundwater of the Region.

3. Prevent future impacts to the groundwater resource through local and regional planning, management, education, and monitoring.

The SNMP (and salt and nutrient management planning in general) is consistent with these groundwater management goals. Water Board staff will consider the applicable groundwater basin salt and nutrient management plan when conducting regulatory review of proposals for subsurface disposal of wastewater, land disposal of waste containing salts and nutrients, and recycled water projects and programs (see Section 3.6.2.1). Recycled water projects and existing and proposed discharges will be evaluated individually with implementation measures tailored, as necessary, to the specific project. The Water Board uses several tools to regulate recycled water projects and groundwater recharge projects including:

- Individual Waste Discharge Requirements or Water Reuse Requirements

- General Water Reuse Requirements for Municipal Wastewater and Water Agencies (Order No. R2-96-11)

- General Waste Discharge Requirements for Recycled Water Use (State Water Board Order No. 2014-0090)

- General Waste Discharge Requirements for Landscape Irrigation Uses of Municipal Recycled water (State Water Board Order No. 2009-0006)

- General Waste Discharge Requirements for Aquifer Storage and Recovery Projects that Inject Drinking Water into Groundwater (State Water Board Order No. 2012-10)

Water Board staff will consider the individual circumstances when determining the appropriate permitting mechanism (from those listed above) for recycled water projects and groundwater recharge projects.

SECTION 3: SONOMA VALLEY SALT AND NUTRIENT MANAGEMENT PLAN

3.1 CONSISTENCY WITH RECYCLED WATER POLICY

Water Board staff reviewed the SNMP and found that it was developed in a manner consistent with the elements listed in Section 6 of the Recycled Water Policy.

3.2 DEVELOPMENT AND SCOPE (FINDING 3)

Development of the SNMP was a collaborative effort between the SVCSD and local stakeholders with input from a technical advisory committee and Water Board staff (see Section 5). The SNMP was developed for the Sonoma Valley Subbasin, defined as basin number 2-2.02 in California Department of Water Resources (DWR) Bulletin 118 (2013). The Sonoma Valley Subbasin encompasses an area of approximately 70 square miles and is located within the larger 166 square mile Sonoma Creek Watershed. For modeling and analysis purposes the Sonoma Valley Subbasin was subdivided into a Baylands Area (containing historical brackish groundwater; 21.7 square miles) and an Inland Area (48.1 square miles). The Sonoma Valley Subbasin separation between the Inland Area and the Baylands Area is at the 750 milligrams per liter (mg/L) total dissolved solids (TDS) contour (i.e., Baylands Area defined as the area with median TDS concentrations greater than 750 mg/L). Figure 1 shows the SNMP study area and the demarcation between the Inland Area and the Baylands Area.

3.3 RECYLED WATER PROGRAM AND GOALS (FINDING 4)

The SVCSD's recycled water program produces recycled water at the SVCSD Wastewater Treatment Plant and distributes it to recycled water customers for irrigation and environmental enhancement of wetland areas including the Napa-Sonoma Salt Marsh Restoration Project. The SVCSD also provides recycled water for truck fill-up at the SVCSD Wastewater Treatment Plant. Trucked recycled water is used for dust control, fire suppression, irrigation, soil compaction, and herbicide/pesticide dilution. The Sonoma County Water Agency (SCWA)[6] manages and operates the wastewater treatment facility owned by the SVCSD. The majority of recycled water application is for irrigation and is typically applied in the summer and fall months. In 2013, the volume of recycled water used within the Sonoma Valley Subbasin to irrigate vineyards, dairies, and pasturelands was approximately 1,100 acre-feet. It is estimated that approximately

[6] The Staff Report uses the acronym SCWA for the Sonoma County Water Agency which is synonymous with the term "Sonoma Water Agency" in the resolution.

59% of the water use is groundwater, 26% of the water use is imported Russian River water for urban supplies, 8% is from local surface water, and 7% is recycled water.

Future planned recycled water use is expected to increase to around 4,100 acre-feet per year (AFY) by 2035. The recycled water goals were set based on 2010 Urban Water Management Plan (Brown and Caldwell 2011) recycled water use projections and 2012 recycled water usage data. Information used to derive future recycled water use is based on a 20-year planning horizon and can change as demand shifts and projects are implemented. At this time, planned future recycled water projects (see Figure 2) include expanding agricultural irrigation within the Sonoma Valley and serving irrigation water to large and urban landscape areas (e.g., Sonoma Valley High School, The Plaza, etc.). After the Napa-Sonoma Salt Marsh Restoration Project is complete, a small volume of recycled water will continue to be discharged to the restored ponds.

The overall goal for the SVCSD's recycled water program is to: increase water supplies and supply reliability within the groundwater subbasin; decrease the amount of pumping and strain on groundwater supplies to avoid groundwater overdraft problems; provide a reliable source for wetland enhancement; and prevent additional brackish water intrusion in the Inland Area. Recycled water used to augment the water supply in the Sonoma Valley Subbasin can be considered a one-to-one in-lieu replacement of recycled water for potable water supply for agricultural and urban (future) areas (but not for environmental restoration). Where recycled water is served to agricultural areas, the pumping from groundwater wells decreases by the amount of recycled water served, reducing demands from the groundwater subbasin. Of the future planned use of 4,100 AFY, approximately 2,400 AFY or 59% of recycled water supplies will serve as one-to-one potable water supply offset, with the remaining 41% serving critical environmental restoration needs at the Napa-Sonoma Salt Marsh Restoration Project (eventually this recycled water use will transition to serve agricultural demands in the subbasin).

The SVCSD's recycled water program had been operating under Water Reuse Requirements prescribed by Order No. 92-67.[7] The addition of new recycled water users, changes in program operation, and changes in recycled water quality from disinfected secondary recycled water to disinfected tertiary recycled water necessitated a permit update. Therefore, the SVCSD applied for enrollment under Water Board's General Water Reuse Requirements for Municipal Wastewater and Water Agencies (Order No. R2-96-11) by submittal of a Notice of Intent to the Water Board and an Engineering Report, in accordance with California Code of Regulations Title 22 Water Recycling Criteria, to the State Water Resources Control Board Division of Drinking Water (DDW).[8] The Water Board Executive Officer issued an authorization letter (dated December 3, 2013) for the SVCSD's recycled water program to enroll under the General Water Reuse Requirements for Municipal Wastewater and Water Agencies

[7] Order No. 92-67 Water Reclamation Requirements for: Sonoma Valley County Sanitation District, Mitchell Mulas, Buena Vista Winery, Helen Larson, Domaine Chandon, Dale A. Ricci

[8] Formerly California Department of Public Health

(Order No. R2-96-11). Order No. 2014-09 rescinded the individual Water Reuse Requirements under Order No. 92-68 as SVCSD enrollment under Order No. 96-11 superseded the previous individual order.

Separate Water Board permits cover other recycled water uses from the SVCSD Wastewater Treatment Plant. These include the National Pollutant Discharge Elimination System (NPDES) permit for the Sonoma Valley County Sanitation District Wastewater Treatment Plant and its Wastewater Collection System (Order No. R2-2014-20) that covers discharges from reclamation reservoirs to maintain upland ponds and increase seasonal wetland habitat, and an NPDES permit for the Napa River Salt Marsh Restoration Project, Ponds 7, 7A, and 8 (Order No. R2-2011-35) that covers the discharges to restore the Napa-Sonoma Salt Marsh.

3.4 STORMWATER RECHARGE GOALS (FINDING 5)

The Recycled Water Policy includes a discussion of the need for considering stormwater use and recharge in salt and nutrient management planning:

> It is also the intent of the State Water Board that because stormwater is typically lower in nutrients and salts and can augment local water supplies, inclusion of a significant stormwater use and recharge component within the salt/nutrient management plans is critical to the long-term sustainable use of water in California. Inclusion of stormwater recharge is consistent with State Water Board Resolution No. 2005-06, which establishes sustainability as a core value for State Water Board programs and also assists in implementing Resolution No. 2008-0030, which requires sustainable water resources management and is consistent with Objective 3.2 of the State Water Board Strategic Plan Update dated September 2, 2008 (p. 6).

State Water Board Resolution No. 2008-30 directs staff of the State and Regional Water Boards to "require sustainable water resources management such as LID [low impact development] and climate change considerations, in all future policies, guidelines, and regulatory actions." LID is an approach to site design and stormwater management that seeks to maintain the site's pre-development runoff rates and volumes. LID includes specific techniques, tools and materials to control the amount of impervious surface, increase infiltration, improve water quality by reducing runoff from developed sites, and reduce costly infrastructure.

Agencies and stakeholders in the Sonoma Valley Subbasin are actively working to increase stormwater recharge. However, due to uncertainties in the current and projected volume of stormwater recharge, no quantitative goals were set for stormwater recharge and stormwater recharge is not included in the SNMP groundwater quality analysis. SCWA and other local stakeholders are identifying opportunities to alleviate flooding while providing other benefits including recharging groundwater and improving water quality. The “Stormwater Management-Groundwater Recharge” studies[9] are assessing the feasibility of projects in the Sonoma Valley watershed. Initial scoping studies have been completed and the SCWA is now identifying possible project opportunities. For those projects where partners and potential partners express interest, the SCWA will move forward with engineering and other supporting studies with the goal of being positioned to take advantage of potential grant and other funding sources. In addition, Sonoma County will be conducting a special study to assess and evaluate the effectiveness of LID pilot projects and storm water program components as required under the NPDES General Permit and Waste Discharge Requirements for Storm Water Discharges from Small Municipal Separate Storm Sewer System (State Water Board Order No. 2013-01; Provision E.13.d.2).[10]

Water Board staff plan to evaluate the need for updates to the SNMP on a triennial basis. The SVCSD will be assessing the need to update the SNMP based on new information and will make a recommendation in their groundwater monitoring reports (see Section 3.6.2). An update to the SNMP could be triggered by data on current and/or future projected stormwater recharge quantity and volumes or changes in existing or future planned recycled water use. Future updates to the SNMP will consider stormwater recharge efforts as they continue to be developed and implemented.

3.5 SUBBASIN EVALUATION

3.5.1 Water Quality Standards (Finding 6)

The Sonoma Valley Subbasin has both Municipal and Domestic Supply and Agricultural Supply as existing beneficial uses. Industrial Service Supply and Industrial Process Supply are potential beneficial uses. The applicable numeric water quality objectives for protection of Municipal and Domestic Supply include 500 mg/L for TDS and 10 mg/L for nitrate plus nitrite (as nitrogen). The water quality objective for protection of Agricultural Supply includes a limit of 30 mg/L nitrate plus nitrite (as nitrogen)[11] and a limit of 10,000 mg/L TDS specifically for livestock watering.

3.5.2 Existing Groundwater Quality (Finding 7)

In the Sonoma Valley Subbasin, a significant number of wells were sampled from 2000–2006 (56 for electrical conductivity, 28 for TDS, 10 for nitrate), predominantly as part of work conducted by the United States Geological Survey (USGS 2006). In order to

[9] More information available at: http://www.scwa.ca.gov/stormwater-groundwater/

[10] The SCWA is considered a non-traditional permittee under Order No. 2013-01 and not subject to the same requirements as traditional permittees (i.e., Sonoma County).

[11] The Basin Plan notes (p. 98) that for sensitive crops the values are actually for NO_{3}-N + NH_{4}-N.

provide a robust dataset, data collected during a 12 year period from 2000–2012 was used to assess the average groundwater quality in the subbasin. Monitoring programs that were utilized to establish average groundwater quality in the subbasin include:

- DWR Monitoring
- DDW Required Monitoring
- Sonoma Valley Groundwater Management Program[12] Monitoring
- USGS Special Studies

Spatially, while historical information from the Baylands brackish area was available (see Section 3.5.3), no known monitoring wells (outside of a very limited number of private rural/domestic wells) currently exist in the Baylands Area and therefore no current groundwater quality information was available for that area (see Figure 3). The SNMP groundwater monitoring program has identified the Baylands Area-Inland Area transition as a data gap and a target area for the location of future monitoring wells and is taking steps towards improving the understanding of water quality trends in the transition zone (see Section 3.6.2).

Data from the Kenwood Valley Basin (located directly north of the Sonoma Valley Subbasin) was considered in developing the spatial averages for TDS and nitrate because salt and nutrient loading to Sonoma Creek from this area has the potential to affect groundwater quality in the Sonoma Valley Subbasin. The available data set was limited to seven data points (none of which exceeded water quality objectives for TDS or nitrate) with only one well sampled for nitrate. While recycled water has historically been utilized at the Oakmont Golf Course near the City of Kenwood, the use of recycled water is being discontinued and there are no current plans for the resumption of recycled water use in the Kenwood Valley Subbasin.

The areal distribution of water quality data and depth-discrete data were analyzed with the intent of developing local area and depth-discrete TDS and nitrate averages and assimilative capacity estimates; however, the limited available data could not reliably differentiate groundwater quality in the shallow zone (less than 200-feet deep) and the deep zone (greater that 200-feet deep) thus precluding a depth-discrete analysis. Many wells lack well construction information rendering the depth and screening interval of wells unknown. Without sufficient depth-specific well screen information, water quality for shallow and deep zones could not be distinguished. Instead, a mixing model was used that simulates two big “buckets” (Inland Area and Baylands Area with movement between), with instantaneous mixing, and averaging across each basin area and all

[12] The Sonoma Valley Groundwater Management Program was formed in 2008, to implement the Sonoma Valley Groundwater Management Plan. The Sonoma Valley Groundwater Management Plan was developed by a broad coalition of stakeholders for the purpose of locally managing a sustainable high quality groundwater basin. See Section 3.6.3 for information on the Sonoma Valley Groundwater Management Program.

depth intervals to produce one average TDS and nitrate concentration for each basin area.

The groundwater quality assessment concludes that, in general, groundwater is affected by brackish water intrusion in the southeastern portion of the subbasin, which borders San Pablo Bay, but is not affected by salts and nutrients in the Inland Area. The findings from the technical analysis indicate that overall groundwater quality in the basin is stable with low salinity and nutrient values resulting from a combination of factors including the high percentage of mountain front[13] and precipitation recharge with very low TDS and nitrate concentrations, the low amount of loading from the few sources (see Section 3.5.5), and the low volume and high quality of recycled water used for irrigation. The average TDS and nitrate concentration in the Inland Area, Baylands Area, and combined Sonoma Valley Subbasin area are shown in Table 1 (see Figure 4 and Figure 5 for maps of TDS and nitrate concentration contours). The SNMP uses assimilative capacity as a benchmark to evaluate the relative contribution of additional pollutant loads to groundwater quality. Assimilative capacity is the difference between a water quality objective and ambient water quality. Assimilative capacity was calculated for the Municipal and Domestic Supply water quality objectives which are the most protective in the subbasin (i.e., TDS and nitrate water quality objectives for Agricultural Supply are higher).

The Inland Area has an average TDS concentration of 372 mg/L, less than the water quality objective. The Baylands Area has an average TDS concentration of 1,220 mg/L. The Inland Area has available assimilative capacity, while the Baylands Area does not. Nitrate concentrations are generally very low throughout with a subbasin average of roughly 0.06 mg/L (Inland Area = 0.06 mg/L; Baylands Area = 0.07 mg/L), well below the water quality objective of 10 mg/L.

[13] Mountain front recharge includes both subsurface inflow and stream recharge at the base of the mountains.

Table 1: Average TDS and Nitrate Concentrations and Available Assimilative Capacity in Sonoma Valley

	Sonoma Valley Subbasin[1]	Inland Area	Baylands Area
AVERAGE TDS CONCENTRATIONS AND AVAILABLE ASSIMILATIVE CAPACITY			
Average	635	372	1,220
Water Quality Objective	500	500	500
Available Assimilative Capacity	-135	128	-720
AVERAGE NITRATE CONCENTRATIONS AND AVAILABLE ASSIMILATIVE CAPACITY			
Average	0.06	0.06	0.07
Water Quality Objective	10.00	10.00	10.00
Available Assimilative Capacity	9.94	9.94	9.93

Note: all concentrations in mg/L
[1] Average TDS and nitrate concentration for the Sonoma Valley Subbasin is volume-weighted. The average concentration for the Inland Area and Baylands Area was weighted by the representative volume of water in storage in each area.

3.5.3 Baylands Area: Current Conditions and Management Strategy (Finding 8)

As the data in Table 1 above indicate, there is no assimilative capacity for TDS in the Baylands Area and water quality objectives are not being attained. Elevated TDS concentrations from saltwater intrusion into groundwater aquifers is of concern for many groundwater basins, including the Baylands Area, that fringe the San Francisco Bay. The Basin Plan cites examples from other areas in the Region:

> Saltwater from San Francisco Bay and adjacent salt ponds has intruded freshwater-bearing aquifers in the Niles Cone, Santa Clara Valley, and San Mateo Plain basins … The threat of saltwater intrusion in the Niles Cone is primarily due to the basin's proximity to San Francisco Bay and the large system of salt ponds that operate along the Bay's margin. In Santa Clara County, land subsidence, resulting from historical pumping that lowered the water table, has caused the lower reaches of streams and rivers to be invaded by saline tidal waters, increasing salinity in shallow groundwater (p. 4-95).

The Baylands Area has been recognized for decades as an area of historical brackish groundwater (Kunkel and Upson 1960; USGS 2006). The SNMP summarizes the findings from studies conducted to characterize the extent of brackish water in the Sonoma Valley Subbasin:

> Kunkel and Upson (1960) originally identified an area of historical brackish groundwater (conductivity greater than 1,000 uS/cm [microsiemens per centimeter]) located primarily beneath the marshlands south of Highway 12/121. In 2006, The U.S. Geological Survey (USGS) developed new

estimates of the extent of brackish water using conductivity measurements from 44 wells (USGS, 2006). The report found that intrusion had advanced as much as one mile north of Highway 121 in one area, and indicated the advancement may be attributed to increased groundwater pumping southeast of the City of Sonoma. In other areas (e.g., west of Highway 12), salinity levels diminished. Other potential subsurface inputs of salinity to the groundwater basin include upwelling of high-TDS thermal groundwater along fault zones and inflow connate[14] groundwater (p. 176).

Several sources have discussed the possible link between the movement of brackish groundwater in response to groundwater pumping and the resulting depression of hydraulic heads:

- Areas of saline ground water within the study area have long been known. The saline ground water is present in sediments that lie between the shore of San Pablo Bay and Schellville. The origin of the saline water is not known with certainty, but it may be attributed to modern saltwater intrusion from San Pablo Bay, shallow ground water affected by evaporation, connate ground water in areas with evaporates or marine sedimentary deposits, and (or) thermal waters. Additional chemical analyses, perhaps including the use of trace elements such as barium, boron, bromide and iodide, could help distinguish the sources of saline waters. Historical conductivity measurements from long-term water-chemistry monitoring wells indicate that the most significant changes in ground-water chemistry over the past 30 years occurred in the southern part of the Sonoma Valley. The conductivity of water in several wells has doubled, but these increases may not be entirely attributed to natural sources of salinity (USGS 2006).

- Withdrawals alter the direction of ground-water movement locally and can affect significant changes in regional flow patterns if withdrawal rates are relatively large. Present-day (1995) flow patterns, in general, do not differ significantly from those of predevelopment conditions except locally near withdrawal centers. Withdrawal in the past, however, has reversed the freshwater gradient and induced the intrusion of saltwater in the lower parts of the Napa, the Sonoma, and the Petaluma Valleys (Planert and Williams 1995).

- In 2001, the Agency's [SCWA] Board authorized an agreement with the United States Geological Survey (USGS) to develop a cooperative study to characterize major groundwater basins in Sonoma County. The study estimated that pumping in the Sonoma Valley has generally increased from approximately 6,200 acre-feet per year (AF/yr) in 1974 to 8,500 AF/yr in 2000, a 37 percent increase in pumping. The USGS also estimated on the basis of groundwater flow modeling,

[14] Water held in the pores of rocks formed in marine conditions.

that during the period 1975 to 2000, 17,300 AF were lost from overall groundwater storage. As a result, the Sonoma Valley has been experiencing localized declining groundwater levels in some areas, and potential groundwater quality problems from seawater intrusion and geothermal upwelling (SCWA 2007).

The Sonoma Valley Groundwater Management Program[15] (2014) evaluated groundwater levels using data collected from their monitoring program and found two areas with declining groundwater level trends. Deep zone groundwater level declines are present primarily southeast of the City of Sonoma and in the El Verano/Fowler Creek area (see Figure 6 and Section 3.6.3). The continued declining trends of groundwater levels to the north of Highway 116 and southeast of the City of Sonoma could draw the brackish groundwater further north. Section 3.6.1.1 discusses implementation actions related to groundwater pumping and the prevention of additional brackish water intrusion in the Inland Area.

The Baylands Area is considered separately from the Inland Area for purposes of the SNMP and attainment of water quality objectives. Nonetheless, both the Baylands Area and Inland Area were analyzed to determine existing groundwater quality. The mixing model used to determine existing conditions was also used to predict future water quality trends for the Inland Area (but not the Baylands Area). While future conditions in the Baylands area were not simulated, the future groundwater quality analysis included Baylands Area subsurface groundwater outflow/inflow in the mixing model and salt and nutrient balance. In addition, despite portions of existing and proposed future recycled water use areas being located in the Baylands Area (see Figure 1 and Figure 2), all TDS and nitrate loading associated with recycled water use was accounted for and applied within the Inlands Area for the future groundwater quality analysis. Therefore, while the future groundwater quality analysis only predicted TDS and nitrate concentrations for the Inland Area, the analysis considered the characteristics of the Baylands Area and its effect on groundwater quality in the subbasin as a whole.

Despite the fact that recycled water adds TDS and nitrate load, the use of recycled water in the Baylands Area acts to improve groundwater quality with respect to TDS because the average recycled water TDS concentration (440 mg/L) is lower than the ambient average groundwater concentration (1,220 mg/L TDS). While future conditions within the Baylands Area were not explicitly simulated, it is expected that replacing groundwater with recycled water for irrigation will lower TDS levels in groundwater and, with respect to nitrate, will produce only minor effects which will not result in a significant reduction of water quality.

The SNMP includes implementation actions that apply to both the Baylands Area and Inland Area and the SNMP groundwater monitoring program focuses efforts to continue

[15] See Section 3.6.3 for information on the Sonoma Valley Groundwater Management Program

to characterize the extent of the brackish groundwater area (see Section 3.6). The SNMP explains implementation measures to reduce the intrusion of saltwater:

> The Baylands brackish groundwater area is a S/N [salt and nutrient] concern in the Sonoma Valley. One of the objectives of developing and increasing the use of recycled water for irrigation is to reduce groundwater pumping in the southern Sonoma Valley, prevent additional saline intrusion, and potentially reduce the existing inland extent of brackish groundwater. Irrigation with recycled water began in 1992 and is projected to increase in the future. To date, the data are insufficient to determine if the replacement of groundwater with recycled water has reduced the areal extent of brackish groundwater. However, continued monitoring of this area is a key component of the ongoing GMP [Groundwater Management Plan[16]] and SNMP (p. 95).

The Water Board is required to protect and support existing and potential beneficial uses, including the Municipal and Domestic Supply beneficial use. While groundwater in the Baylands Area is not currently being used for municipal and domestic supply, there is information indicating groundwater is used for agricultural uses and the Baylands Area is meeting the nitrate and TDS water quality objectives for the Agricultural Supply beneficial use. The Water Board will rely on data collection efforts to assess water quality and monitor contamination (e.g., brackish water intrusion) of the Baylands Area-Inland Area transition zone by natural processes or human activity and determine whether implementation actions can attain water quality objectives and protect the beneficial uses of the Baylands Area or whether dedesignation of the Municipal and Domestic Supply beneficial use is appropriate.

The Sources of Drinking Water Policy (State Water Board Resolution No. 88-63) establishes that all surface water and groundwater in the State is considered suitable, or potentially suitable, for Municipal or Domestic Water Supply beneficial use. It also established four criteria[17] to consider when making any exception to the Municipal and Domestic Supply beneficial use designation. The assumption as part of the SNMP that

[16] See Section 3.6.3 for information on the Groundwater Management Plan

[17] The Sources of Drinking Water Policy defines the criteria as, “1) The total dissolved solids exceed 3,000 milligrams per liter (mg/L) (5,000 microSiemens per centimeter, μS/cm, electrical conductivity), and it is not reasonably expected by the Water Board that the groundwater could supply a public water system; or 2) There is contamination, either by natural processes or by human activity (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices (BMPs) or best economically achievable treatment practices; or 3) The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day; or 4) The aquifer is regulated as a geothermal energy-producing source or has been exempted administratively pursuant to 40 Code of Federal Regulations (CFR) Part 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR Part 261.3” (p. 2).

the Baylands Area is unlikely to be developed for groundwater supply in the future has no bearing on the designation of the area for Municipal or Domestic Water Supply beneficial use and the protection of water quality to meet this water quality standard. Removal of a designated beneficial use requires the Water Board to conduct a use attainability analysis and amend the Basin Plan and there are currently no plans to undertake such a project.[18]

The Water Board will allow no further degradation of the Baylands Area (see Section 3.6). This approach is consistent with State and Federal antidegradation policies (State Water Board Resolution No. 68-16 "Statement of Policy with Respect to Maintaining High Quality of Waters in California"; and Title 40 of the Code of Federal Regulations, Part 131.12) and the Sources of Drinking Water Policy (State Water Board Resolution No. 88-63).

3.5.4 Total Dissolved Solids and Nitrate Fate and Transport

Groundwater quality concentrations for TDS and nitrate were simulated for the baseline period (1997–2006, for calibration purposes) and future planning period (see Section 3.5.6) using a mixing model. Concentration estimates were based on water and mass inflows and outflows (balances) mixed with the volume of water in the aquifer and the average ambient groundwater quality. Major inflows accounted for in the baseline water balance include: deep percolation of precipitation and mountain front recharge; natural stream recharge; agricultural irrigation water return flow; domestic/municipal irrigation water (including recycled water) return flow; septic system return flow; and subsurface groundwater inflow (from Baylands Area). Major outflows accounted for in the water balance include: groundwater pumping; groundwater discharge to streams; and subsurface groundwater outflow (to Baylands Area). Key findings (see Table 2 and Table 3) of the mixing model include:

- Groundwater recharge from natural precipitation (i.e., aerial precipitation and mountain-front recharge and Sonoma Creek deep percolation) represents 94% of the natural recharge over the historical flow model period. Aerial Precipitation and mountain-front recharge represent most of these inflows (83.5%).
- Return flows can occur when irrigation water exceeds evaporation and plant needs and infiltrates into the aquifer. Sources of return flows collectively represent only 5.8% of total inflows.
- Aerial precipitation and mountain-front recharge represents 57% of the overall TDS loading to the subbasin. However, the TDS concentration of recharge from these source waters is low (250 mg/L), so while these two sources add TDS load, they act to improve overall groundwater quality because their TDS

[18] A use attainability analysis is defined in Title 40 Code of Federal Regulations, Part 131.3(g) as a structured scientific analysis of the physical, chemical, biological, and economic factors affecting the attainment of the use.

concentration is lower than the ambient average groundwater quality (372 mg/L in the Inland Area).

- Septic system[19] return flows (572 mg/L), agricultural (recycled water) return flow (4,344 mg/L), and subsurface inflow from the Baylands Area (1,220 mg/L) combined represent less than 2% of the TDS loading to the subbasin.
- The TDS concentration of agricultural return flow is high (4,347 mg/L) and represents 28% of the overall TDS loading to the subbasin.
- The largest nitrate load is agricultural (groundwater source water) return flow (24 mg/L), which represents approximately 43% of the total nitrate loading to the subbasin. Agricultural (recycled water source water) return flow is a relatively small nitrate load (3% at 24 mg/L).

Table 2: TDS Mass Loading Results

Inflows	Baseline Average Flow (AFY)	Baseline Average TDS (mg/L)	TDS Mass (Tons)	TDS Mass (%)
Aerial Precipitation/Mountain Front Recharge	49,915	250	16,994	56.6%
Agriculture (Non-Recycled Water) Irrigation Return	1,415	4,347	8,363	27.9%
Sonoma Creek Leakage	6,363	210	1,817	6.1%
Municipal Irrigation Return	1,074	1,182	1,726	5.8%
Agriculture (Recycled Water) Irrigation Return	91	4,344	538	1.8%
Septic System Return	621	572	483	1.6%
Subsurface Inflow From Baylands	51	1,220	84	0.3%
Total	59,529		30,003	100%
Volume-Weighted Average		368		

[19] A dataset documenting which parcels in the Sonoma Valley have septic systems was not available for the subbasin evaluation. It was assumed that parcels outside of the SVCSD service area use a septic system. Of those parcels, septic systems were assumed where a residence was identified in the land use dataset.

Table 3: Nitrate Mass Loading Results

Inflows	Baseline Average Flow (AFY)	Baseline Average Nitrate (mg/L)	Nitrate Mass (Tons)	Nitrate Mass (%)
Agriculture (Non-Recycled Water) Irrigation Return	1,415	23.82	45.8	43.4%
Municipal Irrigation Return	1,074	20.31	29.7	28.1%
Septic System Return	621	25.51	21.5	20.4%
Aerial Precipitation/Mountain Front Recharge	49,915	0.06	4.1	3.9%
Agriculture (Recycled Water) Irrigation Return	91	23.81	2.9	2.8%
Sonoma Creek Leakage	6,363	0.19	1.6	1.6%
Subsurface Inflow From Baylands	51	0.07	0.005	0.005%
Total	59,529		106	100%
Volume-Weighted Average		1.31		

3.5.5 Source Identification and Loading Model

The loading model used in the SNMP was a simple, spatially-based mass balance tool that represents TDS and nitrogen loading on an annual-average basis. Salt and nutrient loading sources in the Sonoma Valley Subbasin include:

- Irrigation water (potable water, surface water, groundwater, and recycled water)
- Agricultural inputs (fertilizer, soil amendments, and irrigation water)
- Residential inputs (septic systems, landscape fertilizer and soil amendments, and irrigation water)
- Animal waste (dairy manure land application)

The model considered or accounted for the spatial distribution of land uses (with associated loading factors), irrigation water sources (with associated water quality), septic system effluent, wastewater infrastructure loads (e.g., recycled water ponds, leakage from wastewater and recycled water pipelines, and winery wastewater ponds),[20] and soil textures. Extensive stakeholder coordination (see Section 5) was performed to refine the parameters in the loading model including land use class extent and distribution, irrigation water rates, TDS and nitrogen application loads (in irrigation water, as fertilizers and amendments, and in land-applied manure), irrigation water source quality, and location of sewer service areas (to determine septic loads). The analysis compared pollutant loads from land use groups and found the highest loading of TDS in the rural and agricultural areas of the subbasin and the highest nitrate loading in the urban areas. Table 4 presents the TDS and nitrate loading results from the model.

[20] SVCSD determined wastewater infrastructure loads were negligible and did not include them in the model. This is because recycled water ponds are lined, leakage from wastewater (sanitary sewer) and recycled water pipelines is not likely to be a significant source of salt and nutrient loading, and winery wastewater ponds are often lined and no salts and nutrients are added in the winemaking process.

Table 4: TDS and Nitrate Land Use Loading Results

Land Use Group	Total Area (Acres)	Percent of Total Area	Percentage of Total TDS Loading	Percentage of Nitrogen Loading
Irrigated Vines	13,075	31%	43%	3%
Non-irrigated Field Crops (Hay)	8,489	20%	5%	6%
Grasslands/Barren/ Herbaceous	7,212	17%	0%	0%
Farmsteads/Rural-Residential	5,608	13%	11%	37%
Irrigated Pasture	2,266	5%	17%	10%
Urban Residential	2,238	5%	6%	22%
Urban Commercial and Industrial	1,018	2%	1%	8%
Urban Commercial and Industrial, Low Impervious Surface	807	2%	5%	7%
Dairy	769	2%	7%	5%
Urban Landscape/Golf Course	327	1%	5%	1%
Non-irrigated Vines	284	1%	0%	0%
Other Livestock Operations	102	0%	0%	0%
Non-irrigated Orchard	41	0%	0%	0%
Paved Areas	28	0%	0%	0%

3.5.6 Future Groundwater Quality Analysis (Finding 9)

The mixing model developed for the baseline analysis was modified to evaluate the effects of planned future salt and nutrient loading on overall groundwater quality in the Inland Area for the future planning period (water year 2013-14 through water year 2034-35). The recycled water goals and planning period were chosen to be consistent with those used in other planning documents including the 2010 Urban Water Management Plan (Brown and Caldwell 2011).

As discussed in Section 3.5.3, while future conditions in the Baylands Area were not simulated, the future groundwater quality analysis included Baylands Area subsurface groundwater outflow/inflow in the mixing model and salt and nutrient balance. In general, while subsurface groundwater flows from the Inlands Area to the Baylands Area, there is a small component of subsurface inflow from the Baylands Area likely caused by groundwater pumping which has created a pumping depression in the southern portion of the subbasin. The concentrations applied to subsurface inflows from the Baylands Area (51 AFY) were assumed to be the current average concentration in the Baylands Area (1,220 mg/L for TDS and 0.07 mg/L for nitrate). Additionally, despite portions of existing and proposed future recycled water use areas being located in the Baylands Area (see Figure 1 and Figure 2), all TDS and nitrate loading associated with recycled water use was applied within the Inlands Area for the future groundwater quality analysis. Therefore, while the future groundwater quality analysis only predicted TDS and nitrate concentrations for the Inland Area, the analysis considered the characteristics of the Baylands Area and its effect on groundwater quality in the subbasin as a whole.

While recycled water use is projected to ramp up gradually over time, the maximum 2035 recycled water use conditions were applied beginning in water year 2013-14 and applied over the entire future planning period (from water year 2013-14 through water year 2034-35). Thus, the simulated groundwater quality impacts from recycled water projects are considered highly conservative. Three future scenarios were simulated using the mixing model:

- Future Scenario 0 (No-Project): assumes average baseline water balance conditions

- Future Scenario 1: assumes 2035 planned recycled water use of 4,100 AFY

- Future Scenario 2: assumes 2035 planned recycled water use (4,100 AFY) plus an additional 5,000 AFY of recycled water (9,100 AFY total)

Key conclusions of the future groundwater quality analysis include:

- For all three scenarios, recycled water projects use less than 5% of the available assimilative capacity for both TDS and nitrate

- Average TDS concentrations in the Inland Area are projected to decrease from 2013–2035 by 0.9 mg/L for Scenario 0 (No-Project)

- Average TDS concentrations in the Inland Area are projected to increase from 2013–2035 by 1.4 mg/L for Scenario 1 and by 3.5 mg/L for Scenario 2

- Scenario 1 uses 1.8% (2.3 mg/L) of the TDS assimilative capacity, while Scenario 2 use 4.8% (6.1 mg/L) of the TDS assimilative capacity

- Average nitrate concentrations in the Inland Area are projected to increase similarly for all three scenarios from 2013–2035 (between 0.83 and 0.88 mg/L)

- Scenarios 1 uses 0.2 % (0.02 mg/L) of the nitrate assimilative capacity (9.93 mg/L), while Scenario 2 uses 0.5 % (0.05 mg/L) of the nitrate assimilative capacity

Model results for the three scenarios indicate that recycled water projects will use less than 5% of the available assimilative capacity for both TDS and nitrate in the Inland Area, and project concentrations will remain below water quality objectives. Low salinity and nutrient values in the Inland Area are a result of a combination of factors including the high percentage of mountain front and precipitation recharge with very low TDS and nitrate concentrations, the low amount of loading from sources, and the low volume and high quality of recycled water used for irrigation. Based on recycled water use rates and estimated demands the subbasin evaluation assumed that vineyards receiving recycled water blended it with groundwater (~60% recycled water) to irrigate. Recycled water has concentrations of 440 mg/L TDS and 5.2 mg/L nitrate and agricultural irrigation return flow from recycled water represents only 1.8% of the TDS mass and 2.8% of the nitrate mass.

Data collected as part of the SNMP groundwater monitoring program (see Section 3.6.2) will help to determine if the relatively flat trends predicted by the groundwater quality analysis are verified in the future.

3.6 SUBBASIN MANAGEMENT

3.6.1 Implementation Plan (Finding 10)

The Recycled Water Policy requires that salt and nutrient management plans include, "implementation measures to manage salt and nutrient loading in the basin on a sustainable basis" (p. 8). Because groundwater quality is stable in the subbasin and is predicted to remain so through the period analyzed (i.e., through 2035), existing implementation of programs that help manage groundwater supplies and quality in the subbasin will continue and are sufficient to protect beneficial uses and attain water quality objectives in the Inland Area. These implementation measures and best management practices (BMPs) are associated with several categories including: agriculture; pastureland; dairy operations; municipal wastewater management; recycled water irrigation; onsite wastewater treatment system management; stormwater runoff; and groundwater management. The BMPs described in the SNMP (and resolution) and are currently in place and associated, in part, with requirements from State and Regional Water Boards' permits and policies[21] including, but not limited to the following:

- Water Board's General Waste Discharge Requirements for Confined Animal Facilities (Order No. R2-2003-93)

[21] Not all State and Regional Water Boards' permits and policies apply to the SCWA or the SCVSD and some permits or policies may apply to the SCWA or SCVSD and other dischargers such as Sonoma County, dairy operators, and onsite wastewater treatment system owners.

- NPDES permit for the Sonoma Valley County Sanitation District Wastewater Treatment Plant and its Wastewater Collection System (Order No. R2-2014-20)

- Water Board's General Water Reuse Requirements for Municipal Wastewater and Water Agencies (Order No. R2-96-11)

- State Water Board's Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems

- NPDES General Permit and Waste Discharge Requirements for Storm Water Discharges from Small Municipal Separate Storm Sewer System (Order No. R2-2013-01)

Existing groundwater supply and quality BMPs subject to the permits and policies described above will continue. This includes agricultural BMPs for vineyards operations such as drip irrigation and focused application of fertilizer. Pastureland BMPs include irrigation at rates to avoid ponding and runoff and no irrigation when animals are present in the paddock. Dairy operation BMPs include retention of water within manured areas, use of paving or impermeable soils in manure storage areas, and application of manure and wastewater on land at a reasonable rate to minimize percolation to groundwater. Municipal wastewater management BMPs include source control programs to reduce salinity and nutrients in influent waters and operations and maintenance of the SVCSD Wastewater Treatment Plant to provide secondary and tertiary treatment of wastewater. Recycled water irrigation BMPs include water quality monitoring at the SVCSD Wastewater Treatment Plant, irrigation at agronomic rates, and minimizing runoff of recycled water from irrigation. Onsite wastewater treatment system BMPs include septic system site evaluations, design, operation, maintenance, and setbacks from water supply wells and surface waters. Other BMPs include implementing LID to increase stormwater recharge and limit nutrient loading to runoff and conducting groundwater level and groundwater quality monitoring as part of the Sonoma Valley Groundwater Management Program (see Section 3.6.3).

3.6.1.1 Baylands Area Specific Implementation Measures

The implementation measures described above apply in both the Baylands Area and Inland Area. The Water Board will rely on data collection efforts described below to assess water quality and will evaluate potential implementation actions to attain water quality objectives and protect the beneficial uses of the Baylands Area.

Other efforts to protect water quality in the Baylands Area include the identified actions in the Groundwater Management Plan (see Section 3.6.3) and policies in the Sonoma

County General Plan 2020.[22] Policies in the General Plan that address groundwater management and prevent saltwater intrusion include:

- Policy WR-1t: Where area studies or monitoring find that saltwater intrusion has occurred, support analysis of how the intrusion is related to groundwater extraction and support development of a groundwater management plan or other appropriate measures to avoid further intrusion and, where practicable, reverse past intrusion.

- Policy WR-1u: In the marshlands and agricultural areas south of Sonoma and Petaluma, require all environmental assessments and discretionary approvals to analyze and, where practicable, avoid any increase in saltwater intrusion into groundwater.

- Policy WR-2e: …Deny discretionary applications in Class 3 [marginal groundwater availability areas] and 4 [areas with low or highly variable water yield] areas unless a hydrogeologic report establishes that groundwater quality and quantity are adequate and will not be adversely impacted by the cumulative amount of development and uses allowed in the area, so that the proposed use will not cause or exacerbate an overdraft condition in a groundwater basin or subbasin. Procedures for proving adequate groundwater should consider groundwater overdraft, land subsidence, saltwater intrusion, and the expense of such study in relation to the water needs of the project.

- Policy WR-2j: Cooperate with the incorporated Cities, SCWA, DWR, US Geological Survey, well drillers, and all water users and purveyors in the development of a comprehensive groundwater assessment for each major groundwater basin in the county and the priorities, sequence and timing for such studies. Prepare such assessments to meet the applicable requirements of the California Water Code for a “groundwater management plan” and, where appropriate, include the following: (1) Computer models of groundwater recharge, storage, flows, usage and sustainable yield, (2) Assessment of nitrates, boron, arsenic, saltwater and other water quality contaminants, (3) Analysis of resource limitations and relationships to other users for wells serving public supply systems and other large users, (4) Opportunities for changing the sources of water used for various activities to better match the available resources and protect groundwater, (5) Possible funding sources for monitoring, research, modeling and development of management options, and (6) Provisions for applicant fees and other funding of County costs. If a basin assessment indicates that future groundwater availability, water quality and surface water flows may be threatened and there may be a need for additional management actions to address groundwater problems, prepare a plan for managing

[22] More information available at: http://www.sonoma-county.org/PRMD/gp2020/index.htm

groundwater supplies which may require limitations on water extraction and use and other special standards for allowed development, wells, extraction or use. Consideration of new management actions shall include involvement by the interests and parties stated above in development of alternatives addressing specific problems and a review of legal and fiscal issues for each alternative.

3.6.2 Monitoring Program (Finding 11)

The Recycled Water Policy requires that salt and nutrient management plans include a monitoring program that consists of a network of monitoring locations “adequate to provide a reasonable, cost-effective means of determining whether the concentrations of salts, nutrients, and other constituents of concern as identified in the salt and nutrient plans are consistent with applicable water quality objectives” (p. 7). Additionally, salt and nutrient management plans “must focus on basin water quality near water supply wells and areas proximate to large water recycling projects, particularly groundwater recharge projects. Also, monitoring locations shall, where appropriate, target groundwater and surface waters where groundwater has connectivity with the adjacent surface waters” (p. 8). The preferred approach is to “collect samples from existing wells if feasible as long as the existing wells are located appropriately to determine water quality throughout the most critical areas of the basin. The monitoring plan shall identify those stakeholders responsible for conducting, sampling, and reporting the monitoring data. The data shall be reported to the Water Board at least every three years” (p. 8).

Water Board staff determined that each salt and nutrient management plan groundwater monitoring report should include at a minimum:

- A discussion of salt, nutrients, and other constituents of concern (as identified in the basin-specific salt and nutrient management plan) water quality data and consistency with applicable water quality objectives;
- The status of current recycled water use, stormwater use and recharge projects and implementation measures to protect water quality;
- A description of future planned use of recycled water and any changes in planned use which may trigger constituents of emerging concern monitoring requirements and planned stormwater use and recharge projects; and
- An assessment of need to update salt and nutrient management plan.

Water Board staff will review each groundwater monitoring report to determine if the salt and nutrient management plan needs to be updated to comply with the Recycled Water Policy, the Basin Plan, and/or other Water Board permits and policies. The following are examples of activities that could trigger an update to a salt and nutrient management plan: major changes in land use or land management practices; new information from the groundwater monitoring report; or changes in basin/subbasin management (e.g. additional recharge projects or changes in existing or future planned recycled water use).

The SNMP groundwater monitoring program is intended to serve as an early warning system by identifying any water quality trends of concern. The SNMP groundwater monitoring program relies on the current monitoring conducted by DWR, DDW, and the Sonoma Valley Groundwater Management Program, all of which report at different frequencies (DWR wells: every two years; DDW wells: between one and three years; and Sonoma Valley Groundwater Management Program wells: annually). The SNMP groundwater monitoring program includes 47 monitoring locations that are spread throughout Sonoma Valley with the majority clustered in the northern portion of the subbasin (see Figure 7). One DWR monitoring well exists within an area currently using recycled water and two DDW and one DWR monitoring well are located on the northern (currently downgradient in the deeper groundwater zone) side of the current recycled water irrigation areas. One SCWA monitoring well is also downgradient (in the deeper groundwater zone) of the existing recycled water irrigation areas. Limitations and uncertainties associated with the development of the SNMP are mainly data related. Spatially, while historical information from the Baylands brackish area was available, no known monitoring wells (outside of a very limited number of private rural/domestic wells) currently exist in the Baylands Area. In order to improve the understanding of groundwater quality, SVCSD is taking the following steps:

1. The SNMP monitoring program will collect and consider data from any other special studies conducted in the subbasin, such as future studies conducted through the Sonoma Valley Groundwater Management Program to evaluate salinity sources in southern Sonoma Valley and studies conducted under the California Groundwater Ambient Monitoring and Assessment Program, including the USGS's Shallow Aquifer Assessment (in preparation).

2. SVCSD has identified the Baylands Area-Inland Area transition as a data gap and a target area for the location of future monitoring wells.

3. SVCSD is working with Sonoma County to gather information on wells in the subbasin including well installation and destruction permits. SVCSD is also coordinating with the DWR to obtain records for newly installed wells.

4. SVCSD worked with DDW to request well owners submit TDS and specific conductance (SC) data annually in their self-reporting to DDW. TDS and SC are reported biannually or sometimes not reported at all by well owners. DDW mailed out their monitoring schedule requirements to well owners within Sonoma Valley Subbasin in February 2014, and SVCSD created a 1-page mailer insert to inform well owners about the SNMP groundwater monitoring program and request that they voluntarily collect and report TDS and SC to DDW on an annual basis. The SNMP groundwater monitoring program will be updated as more well owners volunteer to report data.

5. Efforts to expand the monitoring network as described above will include a focus to better understand well depths (i.e., shallow or deep).

The SNMP groundwater monitoring report will include a review of efforts to expand the number of wells in the SNMP monitoring program. The SNMP groundwater monitoring report will also include a discussion of sea-level rise and potential resulting impacts from saltwater intrusion on TDS concentrations in the Sonoma Valley. The SVCSD will continue to characterize the extent of the brackish groundwater area and evaluate if actions taken to increase the use of recycled water for irrigation and reduce groundwater pumping in the southern Sonoma Valley is preventing and reducing saline groundwater intrusion. As appropriate, changes in groundwater quality demonstrated through an SNMP groundwater monitoring report could trigger necessary changes to the SNMP including additional implementation measures or monitoring requirements. The SVCSD is committed to reporting monitoring results through the GeoTracker database system, or other applicable database, to the Water Board every three years in a Sonoma Valley Plan groundwater monitoring report.

The SNMP groundwater monitoring program, including the identified steps to improve the understanding of water quality, is sufficient to provide a means of determining whether the concentrations of salts and nutrients as identified in the SNMP are consistent with applicable water quality objectives and to determine water quality throughout the most critical areas of the subbasin.

3.6.2.1 Monitoring Data and Evaluating Water Board Permits

The SNMP provides a basin-wide overview of water quality and water quality protection strategies and, in general, projects will be evaluated individually with implementation measures tailored to the specific project. Nonetheless, the SNMP and the SNMP groundwater monitoring program will provide a valuable resource on existing conditions and water quality trends when Water Board staff evaluate if programs and permits are sufficient to protect beneficial uses and attain water quality objectives.

If an SNMP groundwater monitoring report determines the presence of elevated levels of salts and/or nutrients (or a trend in that direction) in the Sonoma Valley Subbasin, Water Board staff will use this information to inform regulatory decision-making including evaluating the effectiveness of BMPs implemented or other regulatory requirements (e.g., time schedules, waste discharge requirements, etc.) as part of Water Board’s permits and policies as described in Section 3.6.1. A key part of evaluating BMP effectiveness is to examine the activities and land uses that are the largest contributors of salt and nutrient loading. As described in Section 3.5.5 salt and nutrient loading are due to various sources, including:

- Irrigation water (potable water, surface water, groundwater, and recycled water)
- Agricultural inputs (fertilizer, soil amendments, and irrigation water)

- Residential, commercial, and industrial inputs (septic systems, landscape fertilizer and soil amendments, and irrigation water)
- Animal waste (dairy manure land application)

The subbasin evaluation found that irrigated vines contribute 43% of the total TDS loading and farmsteads/rural-residential contribute 37% of the total nitrogen loading. These, and other, results from the SNMP subbasin evaluation and the data submitted as part of the SNMP groundwater monitoring reports will be considered in any future Water Board BMP effectiveness evaluation and regulatory decision-making.

3.6.2.2 Monitoring Constituents of Emerging Concern

Constituents of emerging concern (CECs) can be broadly defined as any synthetic or naturally-occurring chemical that is not regulated or commonly monitored in the environment but has the potential to enter the environment and cause adverse ecological or human health impacts. The Recycled Water Policy defines CECs as "chemicals in personal care products, pharmaceuticals including antibiotics, antimicrobials; industrial, agricultural, and household chemicals; hormones; food additives; transformation products, inorganic constituents; and nanomaterial" (Attachment A, p. 1). The Recycled Water Policy Attachment A states that "monitoring of health-based CECs or performance indicator CECs is not required for recycled water used for landscape irrigation due to the low risk for ingestion of the water" (p. 3). The Recycled Water Policy explains that, "the monitoring requirements pertain to the production and use of recycled water for groundwater recharge reuse[23] by surface and subsurface application methods" (p. 1). Water Board staff will consider when monitoring for CECs is triggered based on the implementation of future recycled water projects or any recommendations from the DDW.[24] As part of the triennial submission of the SNMP groundwater monitoring report, the SVCSD has stated its intention to consider updating the SNMP groundwater monitoring program to include CEC monitoring measures.

3.6.3 Sonoma Valley Groundwater Management Program (Findings 12–13)

The Groundwater Management Plan (SCWA 2007),[25] implemented through the Sonoma Valley Groundwater Management Program,[26] was prepared under the authority of the

[23] As used in the Recycled Water Policy, use of recycled water for groundwater recharge reuse has the same meaning as indirect potable reuse for groundwater recharge as defined in Water Code Section 13561(c), where it is defined as the planned use of recycled water for replenishment of a groundwater basin or an aquifer that has been designated as a source of water supply for a public water system.
[24] The Recycled Water Policy states "implementation of a monitoring program for CECs that is consistent with Attachment A and any recommendations from CDPH [DDW]" (p. 12).
[25] Available online at: http://www.scwa.ca.gov/files/docs/projects/svgw/130_Sonoma-Valley-Groundwater-Management-Plan-Dec-2007.pdf
[26] More information available at: http://www.scwa.ca.gov/svgroundwater/

Groundwater Management Act (Water Code Section 10750 et seq.) to encourage voluntary, non-regulatory groundwater management at the local level. The Groundwater Management Plan was developed to inform and guide the SCWA, as the lead agency, as well as stakeholders and other interested parties for the purpose of maintaining a sustainable, high-quality groundwater resource for the users of the groundwater basin underlying the Sonoma Valley.

The Groundwater Management Plan identifies a range of voluntary management actions to maintain the health of the groundwater basin including increasing recycled water use to offset groundwater pumping, enhancing groundwater recharge, and mitigation of existing contamination including saline water intrusion. Additional strategies for limiting the potential for brackish water intrusion contemplated in the Groundwater Management Plan include increasing water conservation and assessing the potential for enhanced recharge projects (e.g., stormwater recharge and/or groundwater banking using imported Russian River drinking water). The Groundwater Management Plan also includes a monitoring program to assess the current status of the Sonoma Valley Subbasin and predict responses in the subbasin as a result of future management actions or inaction. The Sonoma Valley Groundwater Management Program implements the Groundwater Management Plan with the stated goal to "locally manage, protect, and enhance groundwater resources for all beneficial uses in a sustainable, environmentally sound, economical, and equitable manner for generations to come."

The Sonoma Valley Groundwater Management Program (2014) evaluated groundwater levels using data collected from their monitoring program and found two areas with declining groundwater level trends. Deep zone groundwater level declines are present primarily southeast of the City of Sonoma and in the El Verano/Fowler Creek area (see Figure 6). Groundwater levels in many wells in these two areas are declining at rates of several feet per year and have fallen well below sea level with resulting storage declines of up to 1,400 AFY in the deep zone aquifer. The main uses of groundwater in these two areas are agricultural irrigation, rural domestic usage, and golf course irrigation (in the case of the El Verano/Fowler Creek area). The Sonoma Valley Groundwater Management Program (2014) summarized the condition of these areas:

> The area of declines has persisted for the last decade or more and appears to be expanding. While the magnitude of the declining rate may be influenced, in part, by the lower than average rainfall which has occurred in seven of the last ten years (most notably the last two years), many of the wells with declining groundwater levels exhibit persistent declines, which do not recover during relatively wetter years, indicating that groundwater withdrawals are occurring at a rate exceeding the rate of recharge or replenishment within the deeper zones (p. 3-58).

The continued declining trends of groundwater levels to the north of Highway 116 and southeast of the City of Sonoma could draw the brackish groundwater further north. The Sonoma Valley Groundwater Management Program is analyzing alternatives and considering possible technical, regulatory and institutional approaches to address groundwater depletion in the two areas with declining groundwater levels. Alternatives could include, but are not limited to: additional water supply programs; conservation and efficiency programs; increased data collection and reporting; implementation of land use strategies; regulatory responses; and institutional approaches.

While the SCWA is the lead agency for the Sonoma Valley Groundwater Management Program, the program is a voluntary and non-regulatory program, and the SCWA has no regulatory powers related to groundwater management within the subbasin. Water Board staff will coordinate with staff from the State Water Board Division of Water Rights, agency partners, and local stakeholders to assess any necessary implementation actions related to groundwater pumping and the prevention of additional brackish water intrusion in the Inland Area. Water Board staff will utilize the Sonoma Valley Groundwater Management Program as a forum for coordination. Water Board staff will explore implementation actions to: 1) identify and protect groundwater recharge areas; 2) enhance the recharge of groundwater where appropriate; 3) identify potential groundwater recharge areas and develop pilot projects; and 4) assess other actions such as injection wells and modified groundwater pumping strategies.

SECTION 4: REGULATORY ANALYSIS

4.1 ANTIDEGRADATION ANALYSIS (FINDING 14)

The SNMP complies with the State Antidegradation Policy (State Water Board Resolution No. 68-16 “Statement of Policy with Respect to Maintaining High Quality of Waters in California”), which is designed to maintain existing, high quality waters, and is consistent with the federal Antidegradation Policy (40 Code of Federal Regulations, Section 131.12). The beneficial uses of water bodies, water quality objectives and antidegradation policies, together, constitute a state’s water quality standards. In instances where water quality is better than that prescribed by the water quality objectives, the State Antidegradation Policy applies.

The subbasin water quality evaluation (see Section 3.5) indicates that for the Inland Area water quality is only slightly reduced over planning horizon (2035) and does not result in water quality less than that prescribed in water quality objectives nor does the change unreasonably affect present and anticipated beneficial uses of water. The projected change in water quality uses less than 5% of the available assimilative capacity for both TDS and nitrate. Based upon these facts, staff concurs that the use of recycled water will produce minor effects which will not result in a significant reduction of water quality and, therefore, a complete antidegradation analysis is not required.

In addition, while recycled water adds TDS load, the use of recycled water in the Baylands Area acts to improve groundwater quality because the average recycled water TDS concentration (440 mg/L) is lower that the ambient average groundwater concentration (1,220 mg/L TDS). With respect to nitrate, Water Board staff concurs that the use of recycled water will produce only minor effects which will not result in a significant reduction of water quality and, therefore, a complete antidegradation analysis is not required.

The State Water Board finds in the Recycled Water Policy that:

> The use of recycled water in accordance with this Policy [Recycled Water Policy], that is, which supports the sustainable use of groundwater and/or surface water, which is sufficiently treated so as not to adversely impact public health or the environment and which ideally substitutes for use of potable water, is presumed to have a beneficial impact (p. 3).

Under this presumption, increasing the use of recycled water in the Sonoma Valley Subbasin is consistent with maximum benefit to the people of the State. The SVCSD has set a goal of 4,100 acre-feet per year of recycled water use (see Section 3.3). A majority of the recycled water use will be a replacement for potable water (at least 59%) and contribute towards the sustainable management of water supplies. Therefore, the SNMP is in compliance with the State Antidegradation Policy.

4.2 CALIFORNIA ENVIRONMENTAL QUALITY ACT (FINDING 15)

Because the resolution consists of only general descriptions of existing regulations and water quality information from the SNMP and does not include any regulatory changes, it is not a "project" under the California Environmental Quality Act (CEQA) definition and therefore no additional CEQA analysis was conducted other the analysis completed by the State Board when it adopted the Recycled Water Policy. In addition, because the SNMP did not include any new implementation measures it also did not fit the description of “project” under CEQA and no CEQA regulatory analysis was performed by the SVCSD. The future expansion of the recycled water application in Sonoma Valley is already covered under existing CEQA and National Environmental Policy Act (NEPA) documents, and any future infrastructure projects like groundwater banking or stormwater recharge would be covered under a separate environment compliance process.

With respect to the Recycled Water Policy, the State Water Board staff prepared a "substitute environmental document" (SED) and circulated it during the development and adoption of the Recycled Water Policy. The SED contained the required environmental documentation under the State Water Board's CEQA regulations (California Code of Regulations, Title 23, Section 3777). The State Water Board found in the Recycled Water Policy that:

> The use of recycled water in accordance with this Policy [Recycled Water Policy], that is, which supports the sustainable use of groundwater and/or surface water, which is sufficiently treated so as not to adversely impact public health or the environment and which ideally substitutes for use of potable water, is presumed to have a beneficial impact (p. 3).

The resolution describes the State Water Board's Recycled Water Policy. Because the resolution element falls within the scope of the Recycled Water Policy as analyzed by the State Water Board in the SED for the Recycled Water Policy, the resolution does not require further environmental review pursuant to CEQA (Public Resources Code Section 21166; California Code of Regulations, Title 14, Sections 15162 and 15163).

SECTION 5: PUBLIC REVIEW (FINDINGS 16–17)

The public circulation of the Staff Report and the consideration of the resolution for adoption build on the robust public participation that occurred for the development of the SNMP. The development of the SNMP was a locally-driven and controlled, collaborative process open to all stakeholders including the local water and wastewater entities, salt- and nutrient-contributing stakeholders, and Water Board staff. As the primary local distributor of recycled water, the SVCSD led the development of the SNMP.

The SNMP was coordinated through the Sonoma Valley Groundwater Management Program's existing stakeholder groups and a technical advisory committee. Participating stakeholders included:

- Municipal agencies: SCWA, SVCSD, Valley of the Moon Water District, City of Sonoma
- Resource group: Sonoma Resource Conservation District
- Agricultural interests: North Bay Agricultural Alliance and Sonoma Valley Vintners & Growers Alliance, Sonoma County Winegrape Commission, Mulas Dairy, individual vineyard owners
- Others: Sonoma Ecology Center, private well owners

- Regulatory/government agencies: Water Board, California Department of Public Health, Department of Water Resources, United States Geological Survey

Development of the SNMP included six workshops at key milestones in the plan development and technical analysis. Workshops were held throughout the 18-month (January 2012–June 2013) SNMP development process to present the technical analysis methodology and findings, and to obtain input and direction on assumptions and key elements of the SNMP. Staff of the Water Board were involved in the development of the SNMP and several additional meetings were held with staff of the SVCSD and the Water Board to discuss SNMP findings and obtain concurrence on key elements of the technical analysis.

Figure 1: Sonoma Valley Subbasin Salt and Nutrient Management Plan Study Area

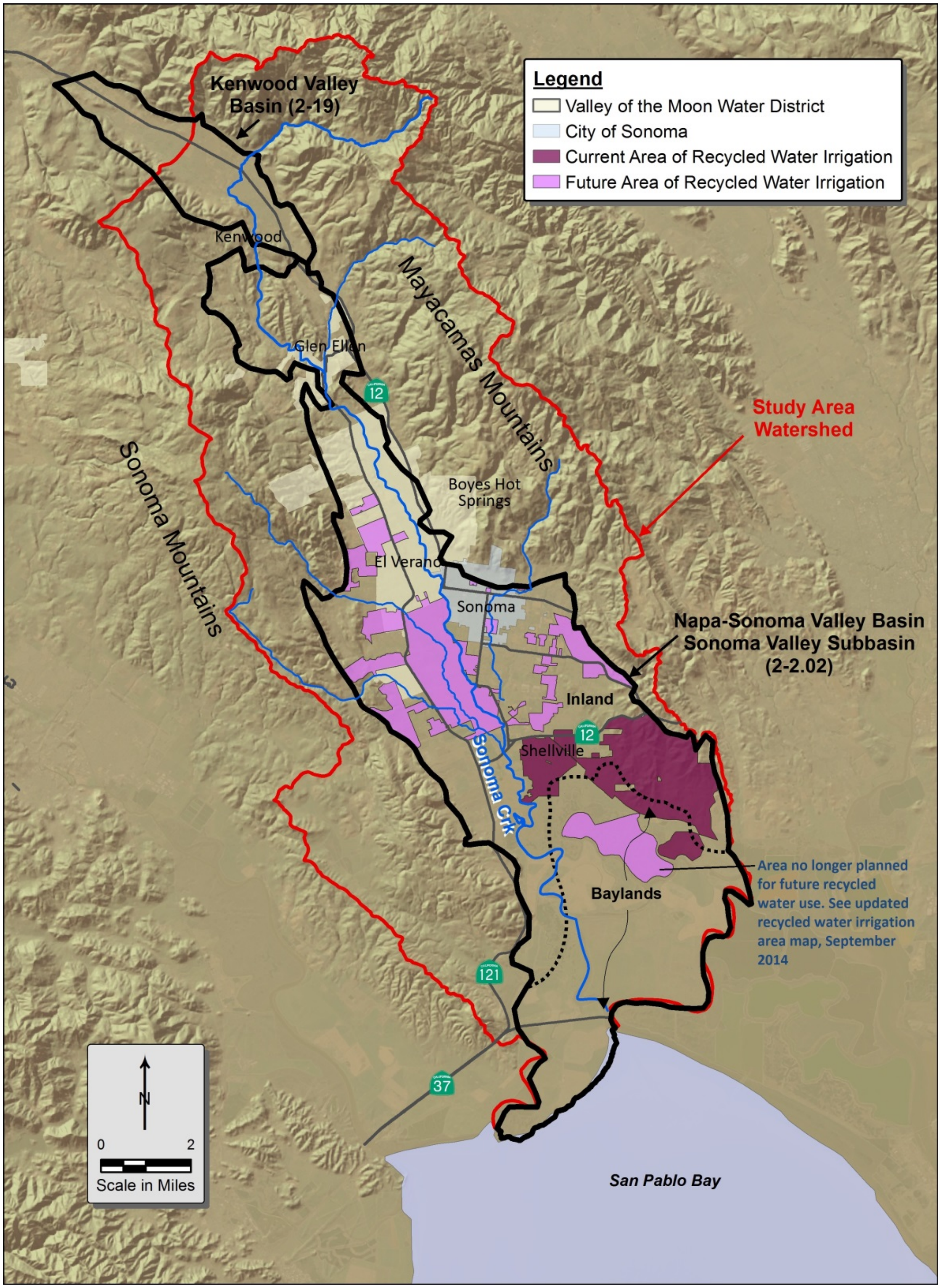
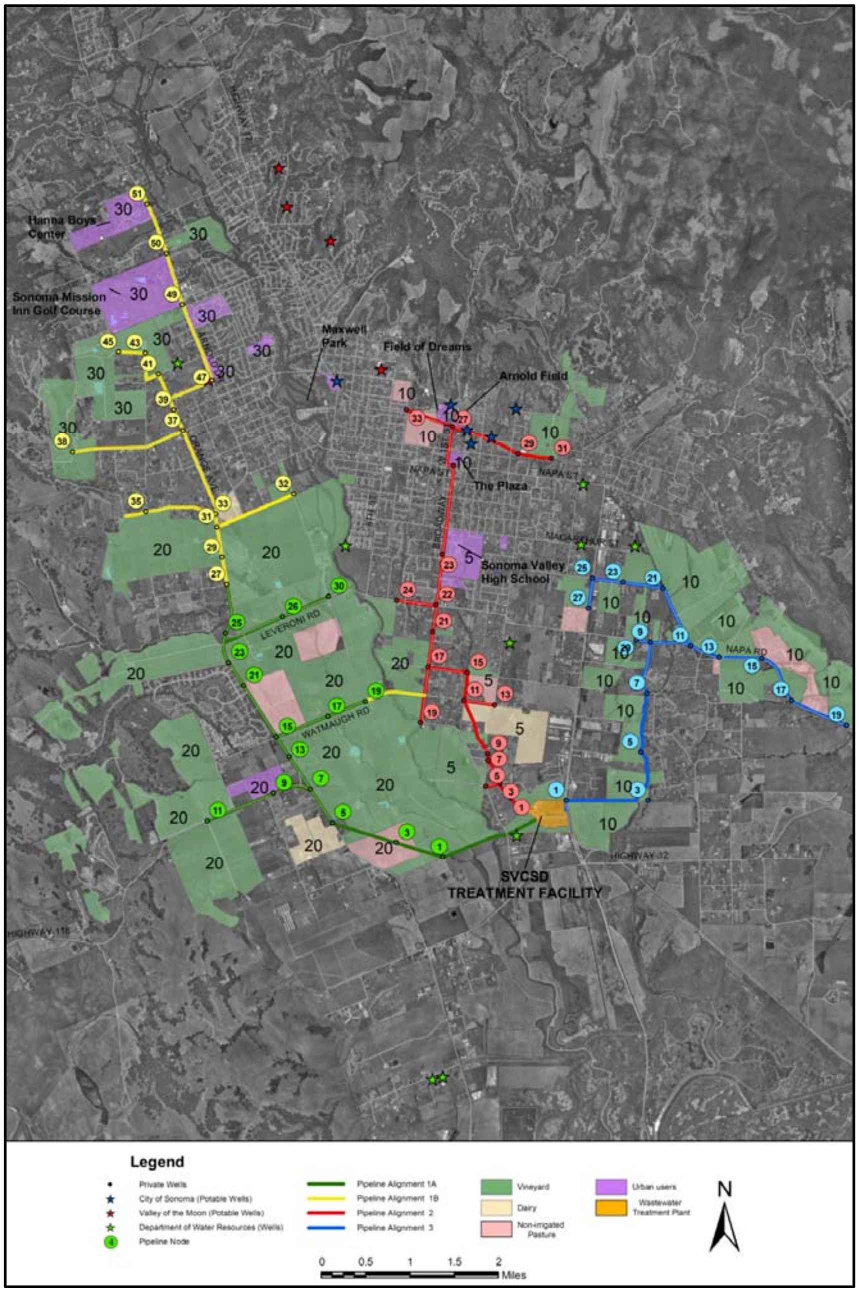
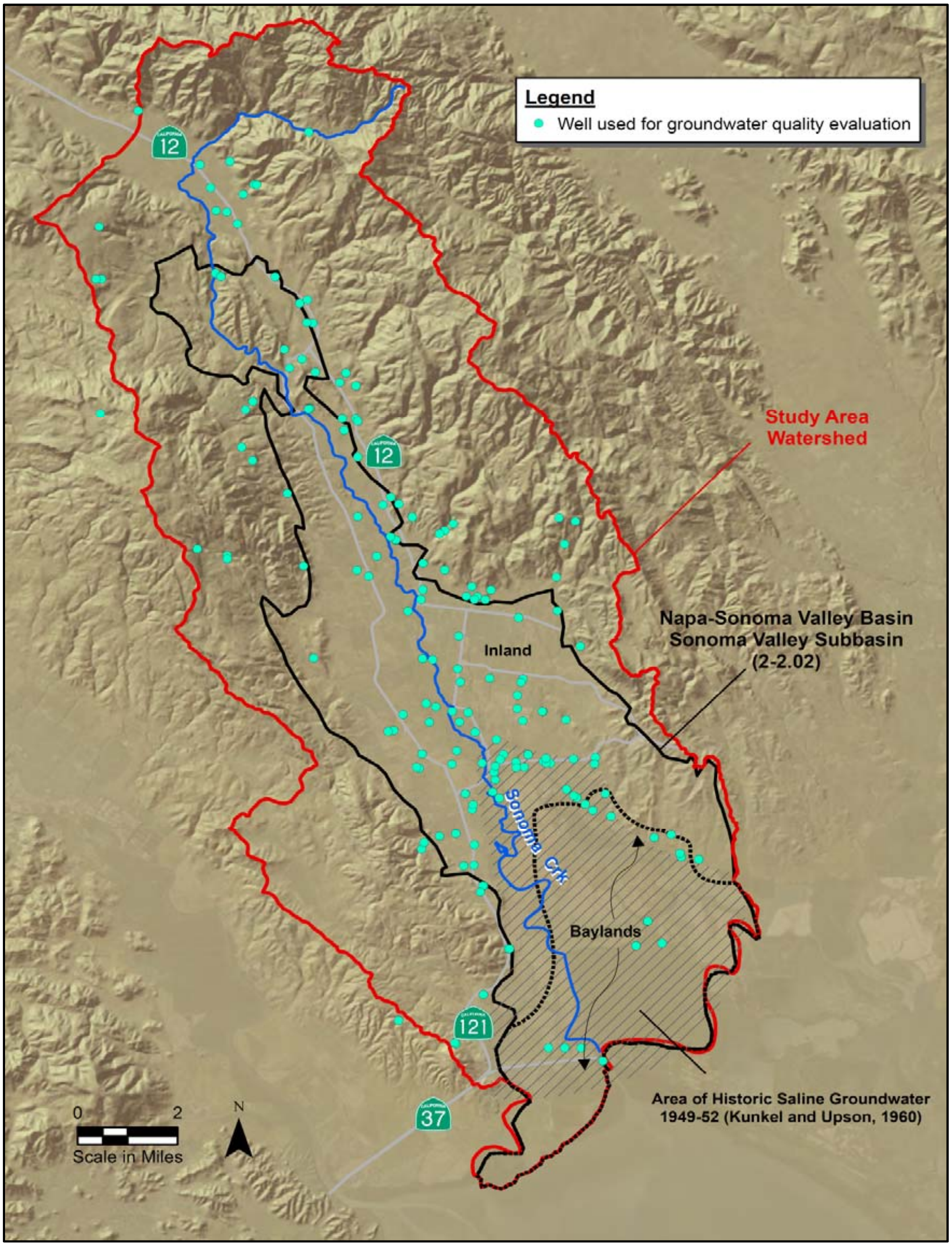


Figure 2: Future Areas of Recycled Water Irrigation[27]



[27] The SVCSD will expand recycled water use by constructing recycled water pipelines in phases. Green line: the reuse site that is just west of Red nodes 5,7,9 and east of Sonoma Creek will come on line in 2015. The remaining reuse sites on the green line are likely 20-years out. Red line: reuse sites above Sonoma Valley High School are 10-years out (at a minimum). Reuse site on the redline, from Sonoma Valley High School and south, could come on line in 1–2 years (SVCSD is in the designing phase for constructing pipeline to Sonoma Valley High School). Yellow line: reuse sites north of yellow node 31 are 30-years out. Blue line: reuse sites are 10-years out (potential for some reuse sites to come on line sooner).

Figure 3: SNMP Monitoring Program Well Locations[28]



[28] Seven wells in the southern portions of the Baylands Area (e.g., wells located at Skaggs Island) are no longer operational.

Figure 4: Sonoma Valley Subbasin TDS Concentration Contours (2000 to 2012)

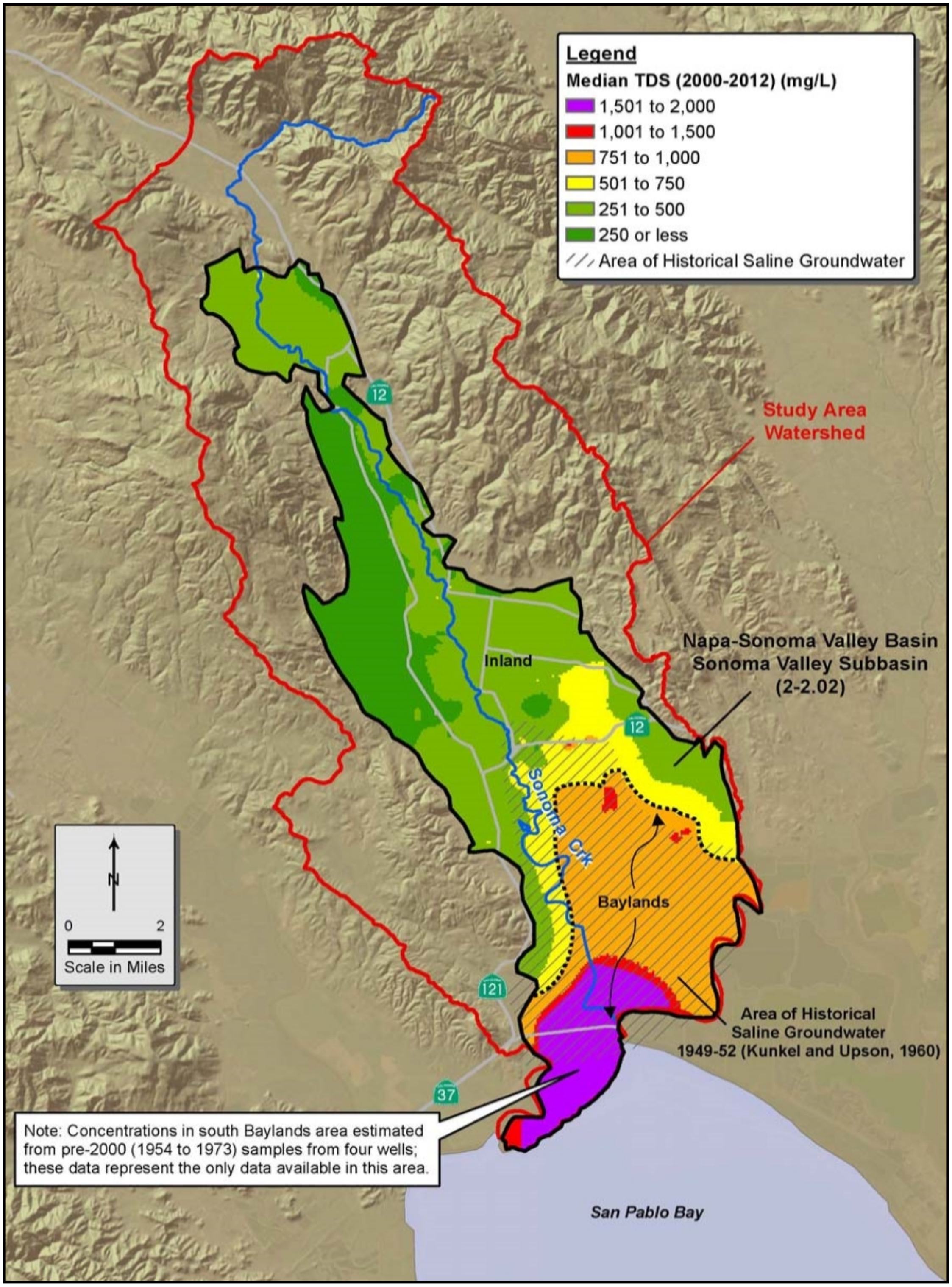


Figure 5: Sonoma Valley Subbasin Nitrate Concentration Contours (2000 to 2012)

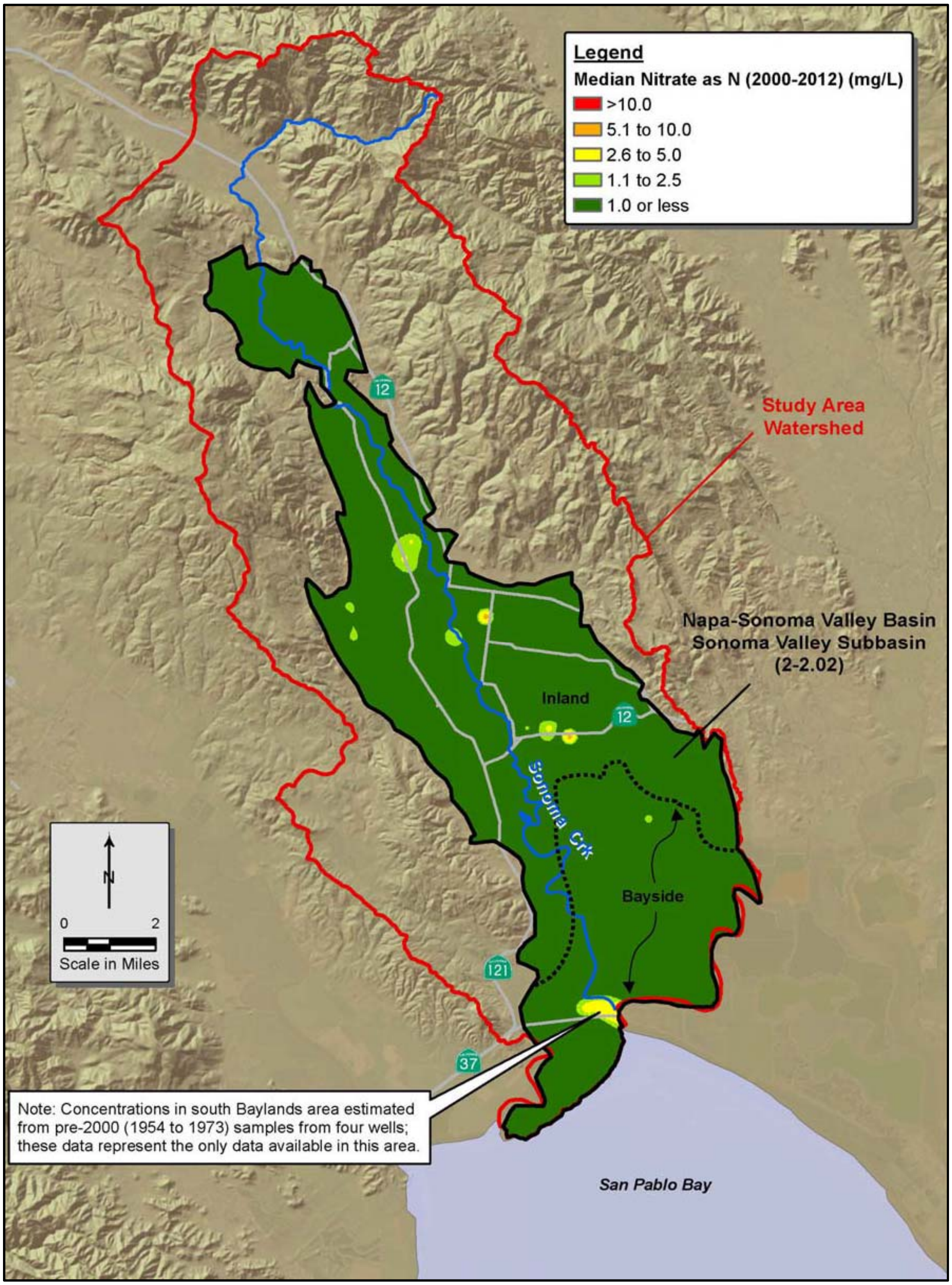


Figure 6: Areas with Groundwater Levels below Sea Level

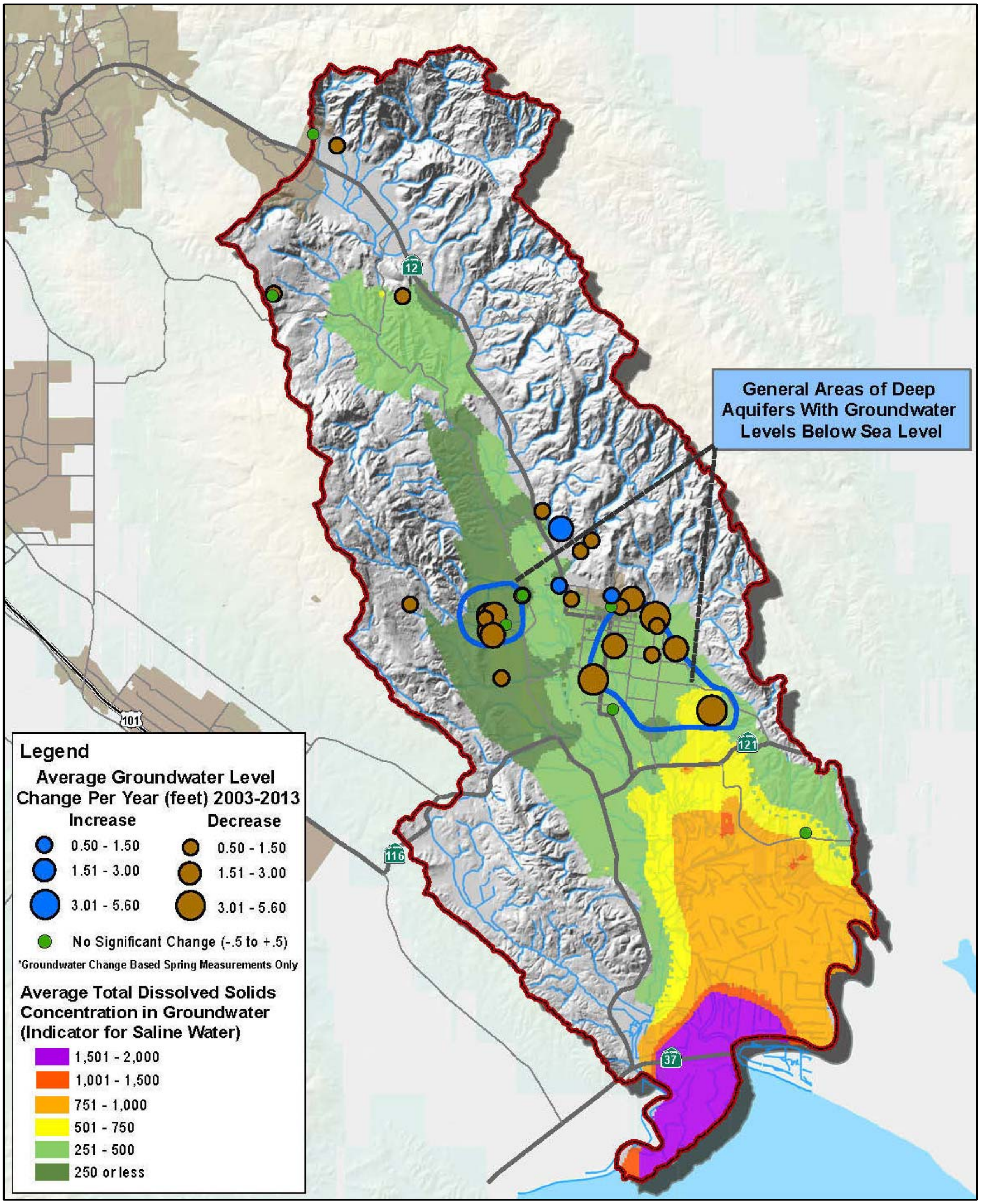
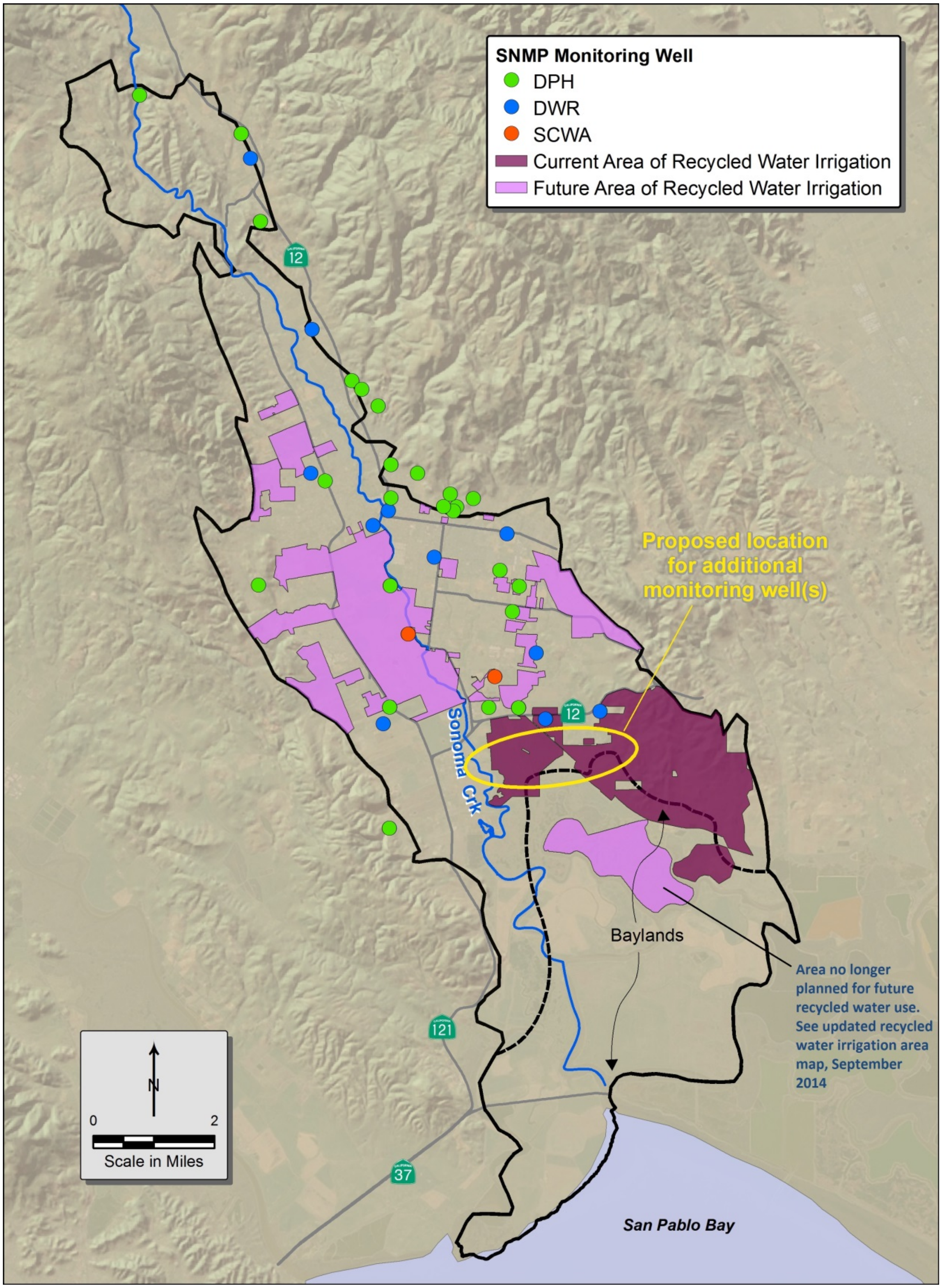


Figure 7: SNMP Monitoring Program Well Locations



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