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Section 2: Description of Plan Area
Groundwater Sustainability Plan for Petaluma Valley Groundwater Basin

Table of Contents

Figures

2 DESCRIPTION OF PLAN AREA (REG. 354.8 B)

This section provides a description of the Plan Area, including the Basin's general physical setting and jurisdictional areas, topography and surface water features, land use characteristics, water source types and uses, existing monitoring and management programs, applicable land use plans, and the well permitting process. The numbers in parentheses in each subheading indicate the applicable SGMA regulation.

2.1 General Setting and Jurisdictional Areas (Reg. 354.8 b)

The Plan Area for this GSP is the entire Petaluma Valley groundwater Basin, as defined by California Department of Water Resources (DWR) through its Bulletin 118 (DWR 2003), and was modified through basin reprioritization in 2018 (California Department of Water Resources, 2018). The Basin within a northwest trending structural depression in the Coast Ranges immediately north of San Pablo Bay in the San Francisco Bay Hydrologic Region. The Basin is generally bounded on the east by the Sonoma Mountains and on the west by low-lying hills. As shown on **Figure 2-1**, the approximately 46,000-acre Basin extends from San Pablo Bay northward to a series of low hills bordering the Santa Rosa Plain Subbasin and includes the City of Petaluma and communities of Penngrove and Lakeville.

The Basin is part of the Petaluma River watershed, which is drained by the Petaluma River (**Figure 2-1**). The U.S. Geological Survey (USGS) modified the Petaluma River watershed to include parts of the Basin that extend outside the boundaries of the watershed; primarily along the southeast section of the boundary to better represent the complete area of the Basin. (USGS 2021c) referred to the modified watershed as the Petaluma Valley watershed.

Neighboring groundwater basins and subbasins are also shown on **Figure 2-1** and include the high-priority Sonoma Valley Subbasin (designated as basin 2-002.02 by DWR) to the east, the medium-priority Santa Rosa Plain Subbasin (designated as basin 1-55.01 by DWR) to the north, the very low-priority Wilson Grove Formation Highlands Basin (designated as basin 1-059 by DWR) to the northwest and the very low-priority Novato Valley Basin (designated as basin 2-030 by DWR) to the southwest. The Santa Rosa Plain GSA and the Sonoma Valley GSA are the only neighboring GSAs and were formed in June 2017 to implement SGMA in those two neighboring subbasins. As very low-priority groundwater basins/subbasins, the Wilson Grove Formation Highlands and Novato Valley are not required to form GSAs or develop GSPs; only high- and medium-priority basins are required to meet SGMA mandates.

Available technical information related to the hydrologic connection between the Petaluma Valley Basin and adjacent basins and subbasins is included in **Section 3** (Basin Setting) and provisions for coordinating with applicable GSAs and other local agencies within neighboring basins are described in **Section 7** (Implementation Plan).

While the Plan Area and jurisdiction of the Petaluma Valley GSA is limited to the Bulletin 118 Basin, technical studies (including monitoring data and groundwater-flow modeling) indicate that contributing watershed areas outside of the Bulletin 118 Basin are hydrologically

connected and represent important sources of inflow (both in the form of surface streamflows and subsurface inflows) to the Bulletin 118 Basin. In recognition of the hydrologic connection with the contributing watershed areas, available data and information from these areas are also included in this GSP. Distinctions between metrics and features associated with the Bulletin 118 Basin and contributing watershed areas are clearly indicated or displayed in relevant sections and figures.

Figure 2-3 shows the jurisdictional boundaries of local agencies with water supply, water management, or land use responsibilities within the Basin, mutual water companies and public water systems, state and federal lands, and protected lands within the Basin. State lands include the Petaluma Marsh Wildlife Area within tidal marshlands in the southern portions of the Basin managed by the California Department of Fish and Wildlife and the Petaluma Adobe State Historic Park. Federal lands of the San Pablo Bay National Wildlife Refuge are also present within the tidal marshlands in the southern portions of the Basin and are managed by the U.S. Fish and Wildlife Service. Other protected lands located within the Basin and contributing watershed areas (**Figure 2-3**) include city parks and fields, county regional parks and preserves, special district properties and preserves, and nonprofit preserves.

The California Legislature assigned primary responsibility for protecting and enhancing California's surface water and groundwater quality to the State Water Resources Control Board SWRCB), and the nine regional water quality control boards (Regional Boards). The SWRCB provides state-level coordination for the water quality control program and regulatory monitoring by establishing statewide policies and plans for implementing state and federal laws and regulations. The Regional Boards adopt and implement water quality control plans (basin plans), recognizing the unique characteristics of each region's natural surface water and groundwater quality, actual and potential beneficial uses, and surface water and groundwater-quality problems. Article 3 of Chapter 4 of the Porter-Cologne Act directs the Regional Boards to adopt, review, and revise basin plans, and provides specific guidance on factors that must be considered in the adoption of surface water and groundwater-quality objectives and implementation measures.

The San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) implements water-quality regulations in the watershed, including establishing Total Maximum Daily Loads for pathogens and sediment in Sonoma Creek, adopting General Waste Discharge Requirements (WDRs) for vineyard discharges, and for stormwater and wastewater discharges. The WDRs for vineyard discharges require development of a farm plan, which outlines best management practices (BMPs) implemented to reduce sediment and stormwater runoff and monitoring and reporting. The SFGBRWQCB and the California Department of Toxic Substances Control (DTSC) are responsible for regulating the cleanup of contaminant sites and for and the migration of contaminated groundwater; the GSA has no authority to regulate groundwater contaminant site cleanups or the migration of plumes.

2.2 General Land Use Characteristics (Reg. 354.8 b)

Land use maps for 1999, 2012, and 2013 are shown on **Figures 2-4 a through c**, respectively. Land use mapping over the past several decades provides a measure of growth and land use changes in the Basin, which includes increases in residential and commercial land uses and irrigated agriculture and a resulting decrease in native vegetation or water (**Figures 2-4a and b**). **Figure 2-4c** presents more detailed classification of vegetation types within the Basin and contributing watershed areas from the Sonoma County Light Detection and Ranging (LiDAR) and Vegetation Mapping Program.

Existing conditions correlate most closely with the DWR 2012 land use survey (**Figure 2-4b**), which indicates the majority of the land in the Basin is native vegetation or water (57 percent) followed by agriculture (23 percent) and residential, commercial, and industrial (16 percent). The majority of the native vegetation is located in the lower portions of the Basin along the tidal marshlands and in the hills northeast of the City of Petaluma. Throughout the last several decades, the primary irrigated agricultural crop has been vineyards for wine production. Pastures, grains and hay, and dairies, which are primarily not irrigated, are also important land use categories, with a total area exceeding that of irrigated agriculture. The urban and residential areas in the Basin include the City of Petaluma, unincorporated community of Penngrove, and areas of rural and semirural residential development.

2.3 Water Source Types and Water Use Sectors (Reg. 354.8 b)

The GSA recognizes that the efficient use and conjunctive management of the various available water sources is integral to achieving sustainable groundwater management in the Basin. The Basin has four primary water source types: groundwater, imported surface water, local surface water, and recycled water. An overview of the spatial distribution of the reliance on the four primary water source types by primary water use sectors in the Basin is shown on **Figure 2-5**. Additional details on water uses associated with the Basin water budget are described in **Section 3** (Basin Setting), and additional information on the availability and feasibility for future uses is included in **Section 6** (Projects and Actions).

Historically, the Petaluma Valley relied completely on its local groundwater and surface water resources until 1972 with the completion of the Petaluma Aqueduct and initiation of Russian River-imported surface water deliveries resulted in a mix of imported surface water and groundwater to meet water supply demands. Deliveries to the City of Petaluma have been between 7,000 and 11,000 acre-feet per year (AFY) over the past 25 years. Russian River-imported water supply accounts for about 60 percent of the Basin water supply today.

Unlike a good portion of the rest of Sonoma County, irrigated pastures have historically accounted for most of the agricultural demand expansion, from about 4,000 AFY in 1969 to nearly 10,000 AFY in 2013 in the Basin. Since that time, irrigated pasture demand has dropped significantly to roughly 2,000 AFY. Groundwater pumping for irrigated crops in the Basin was estimated through the groundwater model, ranging from 4,000 AFY to nearly 10,000 AFY with a median of 4,800 AFY. Urban and private systems groundwater demands have ranged from 0

AFY to 1,400 AFY with a median of 500 AFY. Rural residential well pumping has ranged from 100 AFY to 300 AFY with a median of 300 AFY. Today, groundwater accounts for approximately 20 percent of the overall Basin water supply.

Deliveries of recycled water commenced in 1990 and is used for agricultural irrigation. An estimated 700 AFY to 1,400 AFY between 1990 and 2018 has been used for irrigation of pastures and vineyards, replacing groundwater pumping. Recycled water accounts for about 20 percent of the water supply in the Basin.

2.3.1 Groundwater

Groundwater resources represent an important, and often only, source of water supply for many communities and water users in the Basin. **Figure 2-6** presents a map showing the approximate location and density of water wells within the watershed, based on available data from DWR. These groundwater resources are relied upon to varying degrees by rural and urban residents, vineyards and wineries, dairies, and commercial and industrial users, and also support streamflows and ecosystems present in the Basin. Local groundwater represents an important supplemental source of supply for the City of Petaluma, which operates a municipal wellfield within the watershed.

2.3.2 Imported Surface Water

Imported surface water consists of Russian River surface water sourced from Sonoma Water's production facilities located outside the watershed that is delivered via aqueduct to the City of Petaluma, as shown on **Figure 2-5**. Imported water represents the primary source of water for urban residents and businesses that are served by the City of Petaluma.

2.3.3 Local Surface Water

Local surface water from the Petaluma River and its tributaries represents an important source of supply for some water users. Information on the approximate amounts of surface water is available through reported surface water diversions filed with the SWRCB.

2.3.4 Recycled Water

Recycled water is treated to tertiary standards at the Ellis Creek Water Recycling Facility (**Figure 2-1**) and is used for crop and landscape irrigation in lieu of using groundwater or imported water. Recycled water is also used for irrigation of agricultural fields, schools, parks, two golf courses, and a vineyard.

2.4 Existing Monitoring Programs and Networks (Reg. 354.8 c, d, e)

Existing monitoring programs and networks within the Basin have been developed and implemented by many agencies, organizations, and volunteers for a variety of purposes. This section provides a description of the existing monitoring programs and networks. An assessment of the existing monitoring networks and programs for their suitability to comply with DWR's GSP Regulations, including identification of data gaps, is described in **Section 5** of this GSP (Proposed Monitoring Program).

2.4.1 Groundwater-level Monitoring

Groundwater-level data in the watershed have been collected by the DWR since the 1950s. Historically, these have included approximately 24 wells and currently include 13 wells, which are privately owned wells monitored through voluntary agreements with DWR. Most of these wells were incorporated into DWR's monitoring network between the mid-1950s and 1981. Measurements are generally collected from these wells semiannually in the spring and fall, although a subset of wells are monitored monthly (**Figure 2-7a**).

The groundwater-level monitoring network has been supplemented through the California Statewide Groundwater Elevation Monitoring (CASGEM) program since approximately 2012. Monitoring responsibilities for CASGEM are split between the City of Petaluma, which monitors city wells, and Sonoma RCD, which monitors private wells under contract with the GSA. All CASGEM data are reported by the City of Petaluma, and includes nine wells as follows:

- Five are former public-supply wells that are located within the city's boundaries. The remaining four wells in the monitoring network are privately owned.
- One is a private well in the north part of the basin between Penngrove and Cotati.
- Two private wells are in east Petaluma, one just east of the city limits on Adobe Road, and the other in the hills to the east of the wastewater treatment plant on Lakeville Highway.
- One private well is southeast of Petaluma at the Sonoma Raceway near Highway 37.

Permit Sonoma administers a Groundwater Monitoring Program, which requires the measurement and reporting of groundwater levels on a quarterly or monthly basis for all cannabis permits and commercial/industrial projects requiring a use permit and use more than 0.5 AFY of water.

Groundwater-level data from DWR, SWRCB, and the U.S. Geological Survey (USGS) are also available to the public. The SWRCB GeoTracker program provides groundwater-level monitoring data on a number of soil and groundwater cleanup sites in the Basin. The USGS operates the National Water Information System (NWIS; https://waterdata.usgs.gov/nwis), which is a database of surface water and groundwater data.

2.4.2 Groundwater-quality Monitoring

Groundwater-quality data have been collected through state and federal programs and initiatives described in the following subsections. The synthesis and evaluation of results from water-quality monitoring programs are described in **Section 3** (Basin Setting).

2.4.2.1 Public Water Supply Well Monitoring

The SWRCB's Division of Drinking Water (DDW) monitors public-water-system wells for CCR Title 22 requirements relative to levels of organic and inorganic compounds such as metals, microbial compounds, and radiological analytes. Data are available for active and inactive

drinking water sources, for water systems that serve the public, and wells defined as serving 15 or more connections, or more than 25 people per day. In the Basin, DDW wells were monitored for Title 22 requirements, including pH, alkalinity, bicarbonate, calcium, magnesium, potassium, sulfate, barium, copper, iron, zinc, and nitrate.

2.4.2.2 SWRCB Groundwater Ambient Monitoring and Assessment Program

Established in 2001, the Groundwater Ambient Monitoring and Assessment (GAMA) Program monitors groundwater quality throughout the State of California. GAMA is intended to create a comprehensive groundwater monitoring program and increase public access to groundwater-quality and contamination information. GAMA receives data from a variety of monitoring entities, including DWR, USGS, and the SWRCB.

2.4.2.3 Water Data Library

DWR monitors groundwater quality and reports the results through its Water Data Library (WDL). Samples are collected from a variety of well types, including irrigation, stock, domestic, and some public-supply wells. Wells are not sampled regularly, and most wells have only a few sampling measurements and large temporal gaps between the results. Constituents most frequently monitored include chloride, sodium, calcium, boron, magnesium, and sulfate. Measurements taken include conductance, pH, total alkalinity, and hardness (more than 1,000 total samples per parameter). Additional dissolved nutrients, metals, and total dissolved solids (TDS) are also sampled but have fewer sample results available (1 to 1,000 samples per parameter).

2.4.2.4 U.S. Geological Survey

The groundwater study conducted by the USGS within the Petaluma Valley Basin included the collection and analysis of groundwater-quality data. Water-quality analyses have included major ions, trace elements, nutrients, and stable isotopes (oxygen-18 and deuterium), tritium, the radioactive isotope of carbon (carbon-14), and the stable isotope carbon-13. Data collected by the USGS through this study are available on the NWIS database (https://waterdata.usgs.gov/nwis).

2.4.3 Climate Monitoring

Climate data in the Basin are collected by stakeholders such as the Western Weather Group (n.d.), the Community Collaborative Rain, Hail & Snow Network (CoCoRaHS 2021), Sonoma Water (2021), California Irrigation Management Information System (CIMIS; DWR 2021), and the National Oceanic and Atmospheric Administration (NOAA; **Figure 2-7c**). Climate-related monitoring stations in the watershed provide information necessary for forecasting weather conditions, flood preparedness, drought preparedness, water supply planning, and for determining the Basin water budget. Climate monitoring stations may include sensors to collect data on rainfall, air temperature, relative humidity, wind speed and direction, solar radiation, and soil temperature and moisture.

The primary weather station in the Petaluma Valley Basin that has been used to calculate mean annual rainfall is the Western Regional Climate Center (WRCC) climate station in the City of Petaluma (046826). Data are available from 1913 to the present at this station.

2.4.4 Surface Water Monitoring

Existing continuous surface water monitoring locations in the watershed are operated by the USGS, Sonoma Water (OneRain), and the city of Petaluma (**Figure 2-7b**). The USGS previously maintained two streamflow gages on the Petaluma River and one on San Antonio Creek (**Figure 2-7b**). Stream gage 11459150 (Petaluma River at Copland Pumping Station) is located near the City of Petaluma, along the northern end of the tidally-influenced reach of the river. Data collection at this streamflow gage began in February 1999 and ended in November 2016 (U.S. Geological Survey 2021a). Because water-surface elevation in the Petaluma River fluctuates with the tides, beginning in 2011, streamflow data for this stream gage were tidally filtered to provide a better understanding of streamflows at the stream gage.

Streamflow gage 11459000 (Petaluma River at Petaluma) was located north of the city of Petaluma, along the non-tidally influenced reach of the river. Data collection at this stream gage began in October 1948 and ended in September 1963 (USGS n.d.).

The USGS also historically operated streamflow gage 11459300 (San Antonio Creek near Petaluma) which was located on San Antonio Creek approximately 3 miles upstream of the confluence with the Petaluma River at the Petaluma Marsh. Data collection at this stream gage began in August 1975 and ended in September 1981 (USGS 2021b).

2.4.5 Land Surface Subsidence Monitoring

In the Petaluma Valley, a global positioning system (GPS) station monitored by the University NAVSTAR Consortium's (UNAVCO) Plate Boundary Observatory (PBO) program is available for use as an indicator for subsidence. The UNAVCO PBO network consists of a network of about 1,100 continuous GPS and meteorology stations in the western United States used to monitor multiple pieces of information, including subsidence. There is one station in the Basin located near the Petaluma Municipal Airport (Station P198). There are currently no regularly scheduled theodolite or total station surveys and no extensometers in the Petaluma Valley.

2.5 Existing Management Programs and Studies (Reg. 354.8 c, d, e)

There are many existing and previous water management programs, studies, and initiatives covering the Petaluma Valley Basin that have been developed for a variety of purposes by multiple agencies and organizations. This section summarizes those deemed most relevant to groundwater management planning and indicates the type of information to be incorporated into subsequent sections of this GSP.

2.5.1 USGS Petaluma Valley Groundwater Study

A study conducted by the USGS and funded by the City of Petaluma, Sonoma Water, and the USGS will underpin much of the development of the Basin setting of the GSP. The objective of

the study is to develop an updated assessment of the hydrogeology, geochemistry, and geology of the Petaluma Valley. Tasks include development of a geographical information system database, collection and interpretation of water-quality data and streamflow measurements, estimates of groundwater recharge and annual groundwater pumping, and development of a groundwater-flow model. The study will culminate in a report in 2021 consisting of the following major sections:

- Hydrogeologic characterization
- Data collection and interpretation (primarily water quality)
- Numerical groundwater-flow model

The study uses information from previous studies and will integrate them with a digital geologic map, borehole, and geophysical data to create a three-dimensional geologic framework model of the Basin and surrounding Petaluma Valley watershed that defines the subsurface stratigraphic and structural architecture for the study area. The integrated numerical groundwater-flow model simulates groundwater flow, surface water flow, and landscape processes in the basin for 56 years of historical hydrology from 1959 to 2015. The model incorporates the updated hydrogeologic model to represent the multi-layered aquifer system and was calibrated using groundwater level data from groundwater monitoring wells and measured streamflow data from streamflow gages.

2.5.2 Bay Area Integrated Regional Water Management Plan

In November 2002, California voters approved Proposition 50, the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002. The Act encourages regional cooperation in water resources planning by providing grant funding for projects identified in a regional plan, referred to as an Integrated Regional Water Management Plan (IRWMP). DWR designed the IRWM planning process to be consistent with the California Water Plan, a statewide water resources planning document that is updated periodically, and intends that IRWMPs and future updates of the California Water Plan be integrated further in the future.

The Bay Area IRWMP (San Francisco Bay Area IRWMP Coordinating Committee 2019) defines the Bay Area region according to the SFBRWQCB's (Region 2) jurisdiction, which includes the Petaluma Valley Basin. This region includes all or major portions of the nine counties that surround the San Francisco Bay. The Bay Area IRWMP is a living document and involves a diverse group of water supply, water quality, wastewater, stormwater, flood management, watershed and habitat agencies, local governments, environmental groups, business groups, and community-based organizations (San Francisco Bay Area Region Coordinating Committee 2019).

Stakeholders from the nine counties developed four Functional Areas to identify specific needs and challenges related to each specific functional area, describe water management strategies to address these needs, and develop a list of potential strategies and implementation projects that maximize benefits and enhance opportunities for regional cooperation within a given functional area. The four Functional Areas are as follows:

- Water Supply and Water Quality
- Wastewater and Recycled Water
- Flood Protection and Stormwater Management
- Watershed Management-Habitat Protection and Restoration

2.5.3 Urban Water Management Planning

Urban Water Management Plans (UWMPs) are prepared every 5 years by California's urban water suppliers to support long-term resource planning and ensure adequate water supplies are available to meet existing and future water demands. Every urban water supplier that either provides more than 3,000 AFY or serves more than 3,000 customers is required to assess the reliability of its water sources over a 20-year planning horizon considering normal, dry, and multiple dry years. The plans are submitted to DWR, which then reviews the submitted plans to ensure they have completed the requirements identified in the UWMP Act (Division 6 Part 2.6 of the Water Code Section 10610 - 10656).

Within the Basin, UWMPs are prepared by Sonoma Water (as a wholesaler; Sonoma Water 2016) and the City of Petaluma (as a water retailer; City of Petaluma 2016). The two UWMPs were adopted in 2016 and were updated in 2021. The UWMPs discuss and describe the following:

- Existing water supplies and infrastructure
- Projected water demands over the next 20 years, based on population growth projections, land use designations and growth policies in city and county general plans
- Projected water supplies available over the next 20 years, the reliability of that supply, and general plans for water supply projects
- Current and planned water conservation activities, targets, and compliance
- A water shortage contingency analysis
- A comparison of water supply and water demand over the next 20 years under different hydrological assumptions (normal year, single dry year, four consecutive dry years)

As local groundwater makes up a portion of the urban water supply within the Basin, the UWMPs also discuss and describe groundwater production facilities, historical and projected groundwater use, and the conditions of the groundwater basin. These UWMPs serve as a routine mechanism for local urban water providers to coordinate and plan for future urban groundwater use. The most recent projections for future urban groundwater use are incorporated into **Section 3** (Basin Setting). UWMPs do not consider rural residential, agriculture, and small municipal/mutual water systems.

In addition to the UWMPs required by the state, local urban water providers perform other water supply planning activities related to groundwater, including development of water-

master plans, preparation of water supply assessments for larger proposed developments (more than 500 dwelling units or equivalent), updates of city and county general plans, and other activities. Information regarding some of these activities is summarized as follows:

- The City of Petaluma developed a Groundwater Feasibility Study (Petaluma 2003) to evaluate groundwater supplies as part of the city's General Plan update.

- Sonoma Water developed the 2018 Water Supply Strategies Action Plan in coordination with its water contractors to increase water supply system reliability, resiliency, and efficiency in the face of limited resources, regulatory constraints, and climate change uncertainties. The 2018 Water Supply Strategies Action Plan is an update of a 2013 plan and incorporates SGMA-related requirements and initiatives (Sonoma Water 2018).

- Beginning with the passage of Senate Bill (SB) 610 in 2002, water supply assessments must be furnished to local governments for inclusion in any environmental documentation for certain projects that are subject to the CEQA. The water supply assessments are required to determine water supply sufficiency for a 20-year projection in addition to the demand of existing and other planned future uses.

2.5.4 Water Conservation Programs

Numerous regional and local water conservation programs are operational in the Plan Area including the Sonoma-Marin Saving Water Partnership, the LandSmart Program, and the Sustainable Winegrowing Program.

These programs are described following, however, it is anticipated that changes will likely occur as a result of sweeping legislation approved in 2018: Assembly Bill (AB) 1668 (Friedman) and SB 606 (Hertzberg), which lay out a new long-term water conservation framework for California. The framework addresses both the urban and agricultural sectors, with goals to establish long-term improvements in water conservation and drought planning that recognize the need to adapt to climate change and the resulting longer and more intense droughts in California. The development of programs and initiatives is organized around the following four primary goals:

1. Use water more wisely.
2. Eliminate water waste.
3. Strengthen local drought resilience.
4. Improve agricultural water use efficiency and drought planning.

To fully plan, develop, and implement the new framework, DWR and the SWRCB are working together in collaboration with stakeholders to develop new standards for the following:

- Indoor residential water use

- Outdoor residential water use

- Commercial, industrial, and institutional (CII) water use for landscape irrigation with dedicated meters
- Water loss

Based on these standards, urban water suppliers will be required to stay within annual water budgets for their service areas. In addition, water suppliers will need to report on implementation of new performance measures for CII water use.

The legislation also made important changes to existing urban and agricultural water management planning, and enhanced drought preparedness and water shortage contingency planning for both urban water suppliers and small water systems and rural communities. Currently, state agencies are conducting necessary studies and investigations as well as developing standards and performance measures, web-based tools and calculators, data and data platforms, and reports and recommendations for the adoption of new regulations.

2.5.4.1 Sonoma-Marin Saving Water Partnership

The Sonoma-Marin Saving Water Partnership represents 10 water utilities in Sonoma and Marin counties that are signatories to the California Urban Water Conservation Council (CUWCC) and have joined to create a regional approach to water use efficiency. Within the Basin, these utilities include the City of Petaluma and Sonoma Water. Each of these member utilities have water conservation programs to assist their communities in reducing water use. Water conservation and water use efficiency program elements specific to the Sonoma-Marin Saving Water Partnership include the following:

- Establishing a conservation coordinator, water waste prohibition, assistance and water loss control programs (audits, leak detection, and repair).
- Metering urban water and conservation pricing (tiered structure).
- Developing and maintaining public information and school education programs on water and conservation.
- Increasing conservation through specific urban residential programs for indoor (high-efficiency toilets, fixtures, and washers) and outdoor landscaping assistance, surveys, and retrofits.
- Increasing conservation through specific industrial and large landscape assistance, surveys, and retrofits.
- Initiating rebate programs for high-efficiency appliances and fixtures.
- Training for qualified water efficient landscapers that provides education on proper plant selection for local climates, irrigation system design and maintenance, and irrigation system programming and operation.

- Offering an online water wise gardening website that offers a Mediterranean and native plant list, design and garden installation tips, and irrigation system design and maintenance information.

- Providing a green business program that provides businesses with water and energy conservation information and incentives, to reduce waste and prevent pollution.

More information pertaining to the bulleted items listed above is available at http://www.savingwaterpartnership.org/.

2.5.4.2 Local Landscape Ordinances

The State Legislature adopted the Water Conservation in Landscaping Act of 2006 (AB 1881) requiring the DWR to update the State Model Water Efficient Landscape Ordinance. All local land use agencies were required to adopt the model ordinance, or develop an ordinance that is at least as effective by January 1, 2010. Sonoma County and the City of Petaluma have developed individual water efficient landscape ordinances. The new water efficient landscape ordinances require a landscape plan check for certain projects, as described in the ordinance. It includes requirements for landscape water budgets, landscape and irrigation design, and irrigation scheduling.

2.5.4.3 LandSmart Program

The Sonoma RCD, Napa RCD, and the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service developed the LandSmart Program to help land managers identify and meet their natural resource management goals that support productive landscapes and thriving streams while meeting or exceeding environmental regulations. The program is applicable to a variety of agricultural lands. LandSmart Plans are developed by the agricultural producer, either independently, through workshops, or through one-on-one assistance from an RCD. Producers can also seek certification from the RCD's certification team once plans are complete. Plan templates and guidance materials are designed to assess current practices and identify recommendations for other practices that would benefit natural resources such as water quantity and quality. Practices are prioritized and tracked over time. Information on LandSmart is available at: www.LandSmart.org.

2.5.4.4 Sustainable Winegrape Program

Members of Wine Institute and the California Association of Winegrape Growers introduced the Code of Sustainable Winegrowing Practices Self-Assessment Workbook in 2002 (updated in 2006, 2013 and 2020) to promote environmental stewardship and social responsibility in the California wine industry (California Sustainable Winegrowing Alliance 2020). The workbook addresses a number of criteria for measuring performance, including Vineyard Water Management and Winery Water Conservation and Quality. Additionally, the Sonoma County Winegrowers have developed a Sustainability Certification Program for vineyards, which includes water conservation assessments.

2.5.5 Climate Change Studies and Planning

Projected changes in climate include increased variability in precipitation and rises in air temperature, resulting in a shorter wet season, longer dry season, more droughts, and more extreme high flows. To face these potential changes in climate, local organizations are working with federal and state partners, including the USGS, DWR, NOAA, and the U.S. Army Corps of Engineers, to advance the science in our region in an effort to plan for and adapt to predicted changes. Local agencies have also partnered to form the Sonoma County Regional Climate Protection Authority and have developed a Regional Climate Action Plan (Sonoma County Regional Climate Protection Authority 2016). Findings and results from these efforts are described in **Section 3** (Basin Setting) and incorporated into future model projections in this GSP.

2.5.6 Groundwater Banking Feasibility Study

Because of uncertainties in the reliability of regional future water supplies (both surface water and groundwater), Sonoma Water, City of Sonoma, and other local partners, including the cities of Rohnert Park and Cotati, Valley of the Moon Water District, and the Town of Windsor conducted the Groundwater Banking Feasibility Study for a regional groundwater banking program to investigate the viability of enhancing the conjunctive management of surface water and groundwater resources (GEI et al. 2013).

Conceptually, the groundwater banking program would involve the diversion and transmission of surplus Russian River water produced at existing drinking water production facilities during wet weather conditions (that is, the winter and spring seasons) for storage in groundwater basins. The stored water would then be available for subsequent recovery and use during dry weather conditions (that is, the summer and fall seasons) or emergency situations. The Groundwater Banking Feasibility Study provided an evaluation of the regional needs and benefits, source water availability and quality, regional hydrogeologic conditions, and alternatives for groundwater banking. While groundwater resources in Petaluma Valley were not evaluated as part of the Groundwater Banking Feasibility Study, regional information from the feasibility study is applicable to potential groundwater banking alternatives in Petaluma Valley.

Based on the findings from the study, pilot studies to further assess the technical feasibility of Aquifer Storage and Recovery (ASR) as a method for groundwater banking were recommended and currently are being pursued in Sonoma Valley, where a pilot project was completed in fall of 2018 in the City of Sonoma. The pilot project resulted in the empirical verification of specific hydrogeologic and water-quality factors. The next steps are a technical and economic viability assessment of ASR technology in the region. If deemed feasible, the pilot project results could be used to complete environmental documentation and design for a full scale or permanent ASR project in the region.

2.5.7 Stormwater Management Planning

Sonoma Water conducted a scoping study (Sonoma Water 2012) in the Petaluma River watershed to identify opportunities to alleviate flooding, while possibly recharging groundwater aquifers or providing other benefits. The study assessed the feasibility of projects in the Upper Petaluma River watershed. Information and results from the study have informed the development of a Storm Water Resources Plan (SWRP). SWRPs are required by SB 985 (Pavley 2014) to be eligible to seek funding from any future state bond measures for stormwater projects. A SWRP is a nonregulatory, watershed-based and stakeholder-driven plan that builds on local stormwater management objectives and identifies and prioritizes projects that capture, treat, or reuse stormwater and dry weather runoff. These projects must provide at least two benefits, which may include environmental enhancement, flood protection, groundwater recharge, water-quality improvement, and/or recreational opportunities.

Sonoma Water, with support from a Technical Advisory Committee, collaboratively developed the Southern Sonoma County SWRP (Sonoma Water 2019) covering the Petaluma River and the Sonoma Creek watersheds (including the Basin). Through the planning process, more than 60 projects were identified and submitted by proponents for consideration and inclusion. The resulting plan provides a framework for submitting, quantifying, scoring, and ranking future projects in an objective and data driven format.

2.5.8 Water Quality Regulatory Programs

The California Legislature assigned primary responsibility for protecting and enhancing California's surface water and groundwater quality to the SWRCB, and the nine regional water quality control boards (Regional Water Boards or SFBRWQCB).

The SWRCB provides state-level coordination for the water-quality control program by establishing statewide policies and plans for implementing state and federal laws and regulations. The Regional Water Boards adopt and implement water-quality control plans (basin plans), recognizing the unique characteristics of each region's natural surface water and groundwater quality; actual and potential beneficial uses; and surface water and groundwater-quality problems. Article 3 of Chapter 4 of the Porter-Cologne Act directs regional water boards to adopt, review, and revise basin plans, and provides specific guidance on factors that must be considered in adoption of surface water and groundwater-quality objectives and implementation measures. The SFBRWQCB implements water-quality regulations in the watershed, including establishing Total Maximum Daily Loads for bacteria and sediment in the Petaluma River.

2.6 General Plan and Related Land Use Planning

Existing city and county planning activities that are directly or indirectly linked with water supply and groundwater management include general plans and specific plans, in addition to the UWMPs previously described. Under SGMA, cities and counties retain their land use authorities; however, in recognizing the linkages between land use and water management, SGMA does require increased coordination between land use planners and GSAs. Cities and

counties must now refer proposed general plan changes to GSAs and, similarly, GSPs must consider "the most recent planning assumptions stated in local general plans of jurisdictions overlying the basin" (CWC Section 10726.9). In addition, Government Code 65350.5 stipulates that before general plans are adopted, they must review and consider GSPs.

The City of Petaluma and Sonoma County general plans and specific plans provide growth estimates based on build out of land use designations that are used in the UWMPs and in this GSP to project future water demands, and are incorporated into the sustainable management criteria and metrics, including measurable objectives and interim milestones, the sustainability goal, proposed projects, and management actions. Projections of future groundwater availability and planned projects and actions needed for sustaining groundwater resources in the Basin will be shared with city and county planners for incorporation into their respective land use planning and decision-making.

In addition to coordinating on activities within the Basin, coordination and information sharing between the GSA and land use planning agencies will be needed for the contributing watershed areas located outside of the GSA's jurisdiction. These areas primarily fall within the purview of the county general plan.

Future land use planning and associated growth projections are incorporated into the analysis of the future water budget, over the planning and implementation horizon (**Section 3**, Basin Setting).

2.6.1 General Plans

Counties and cities are required to develop and adopt comprehensive general plans to guide future local physical development, as required in California State Government Code Title 7, Division 1, Article 5, Section 65300 et seq. Each general plan must contain a statement of policies, including maps or diagrams and text, setting forth objectives, principles, standards, and plan proposals. City general plans are focused on providing guidance on growth and development in the urban setting, while county general plans focus on the unincorporated areas of the county. Developing and updating general plans involves significant community involvement through workshops, hearings, and public review of draft plans and policies.

While there are seven mandatory elements of a general plan, the conservation element is typically where water resources are addressed, although other water-related topics may also be addressed in other elements. In particular, the conservation element of a general plan must reflect the content of the other general plan elements and must account for "rivers, creeks, streams, flood corridors, riparian habitats, and land that may accommodate floodwater for purposes of groundwater recharge and stormwater management…" as identified in the conservation element (Gov. Code Section 65302[d][3). The housing elements must be updated on an eight-year cycle to correspond with state regional housing needs allocations (Gov. Code Section 65584 [b]).

The Petaluma Valley Basin includes areas covered by the county of Sonoma's general plan and the City of Petaluma's general plan within the city's jurisdictional areas.

2.6.2 Sonoma County General Plan 2020

The Sonoma County General Plan 2020 contains the seven mandatory elements. In addition, the following four optional elements are also included: agricultural resources, air transportation, water resources, and public facilities and services. The water resources element was developed and included in the Sonoma County General Plan 2020 in recognition of the importance of water resources within unincorporated areas of the county. The main purpose of the water resources element is to ensure that Sonoma County's water resources are sustained and protected. To achieve this main purpose, the water resources element states that water-resource management should consider the amount of quality water that can be used without exceeding the replenishment rates over time or causing long-term declines or degradation in available surface water or groundwater resources.

The water resources element includes goals, objectives, and policies for water quality; groundwater; public water systems; conservation and reuse; importing and exporting; and watershed management. These goals, objectives, and policies include supporting local groundwater studies and management programs, encouraging activities that protect natural groundwater recharge areas.

Specific water resources element goals related to groundwater include the following:

- Protect, restore, and enhance the quality of surface and groundwater resources to meet the needs of all reasonable beneficial uses.
- Manage groundwater as a valuable and limited shared resource.
- Assure that new proposals for surface and groundwater imports and exports are consistent with Sonoma County's ability to sustain an adequate supply of high-quality water for all its water uses and dependent natural resources.
- Improve understanding, valuation, and sound management of the water resources in Sonoma County's diverse watersheds.

Other water-related topics incorporated in the Sonoma County General Plan 2020 include water availability as a factor in land use map densities that is addressed in the land use element. Land use designations based on the county's General Plan 2020 are shown on **Figure 2-8**. The open space and resource conservation element addresses riparian corridors; wetlands; wildlife protection; tree protection; fishery resources and other biotic resources; water-oriented recreation; soil erosion; forestry; and mineral resources. The public facilities and services element addresses connections to public water systems. The public safety element addresses flood hazards, fire suppression, and hazardous materials. It is anticipated that the next Sonoma County General Plan update will begin in 2022 and conclude in 2028.

2.6.3 City of Petaluma General Plan

City general plans guide growth and development in the urban community, and typically involve an urban-growth boundary. The UWMPs and general plans are clearly linked: UWMPs calculate future water demand based on growth and development projected in the general plan.

The elements included in the City of Petaluma's 2025 General Plan (City of Petaluma 2008) include goals, policies, and implementation measures that set a course for future land use in the city. Goals summarize how development and future growth should be directed to achieve the general plan vision by identifying physical, economic and/or social ends that the community wishes to achieve.

Petaluma's 2025 General Plan water resources element includes water conservation BMPs and goals and policies for water supply and demand, wastewater, recycled water, groundwater supply, water conservation, surface water management, and water quality. The water resources element includes the following policies:

- 8-P-19 Ensure adequate water supply during emergency situations by developing potential groundwater resources and aquifer storage capacity, combined with management of surface water, to meet overall emergency water supply objectives. The city's groundwater resources shall be preserved to meet emergency needs and to offset peak demands.

- 8-P-20 Manage groundwater as a valuable and limited shared resource by protecting potential groundwater recharge areas and stream sides from urban encroachment within the Petaluma watershed.

- 8-P-21 Protect groundwater quality from surface contamination by requiring 100-foot sanitary seals on all new municipal water supply wells.

2.6.4 Specific Area Plans

Specific area plans are planning documents that guide the development of a geographic area within the county. Any new developments or subdivisions within the defined area must be consistent with the general plan and specific plan. The Central Petaluma Specific Plan (City of Petaluma 2003) was prepared by the city and provides specific land use and development regulations for nearly 400 acres within the city, adjacent to downtown.

The county prepared, and in 2008 updated, three area plans specific to the Basin, as follows:

- The Penngrove Area Plan (Penngrove 1984) provides land use and development regulations for the community of Penngrove.

- The Petaluma Dairy Belt Area Plan (Petaluma Dairy 1985) was prepared for an area primarily located outside and to the west of the Basin.

- The West Petaluma Area Plan (West Petaluma 1981) refers to an area that straddles the Basin and covers approximately 11,000 acres west of the City of Petaluma.

2.6.5 Sonoma County Local Agency Formation Commission

The Sonoma County Local Agency Formation Commission (LAFCO) is a state-created regulatory agency that approves or disapproves proposals to expand municipal water and wastewater services outside of existing service areas. Through this power, the LAFCO is an important player in proposals to offset groundwater use with urban water for both new and existing development in the county.

LAFCO has responsibility in four areas affecting local government in Sonoma County as follows:

1. Review and approve or disapprove proposals for changes in the boundaries and organization of the 9 cities and 54 special districts within Sonoma County including incorporations of new cities, formation of new special districts and mergers, consolidations or dissolutions of existing cities and special districts.

2. Conduct studies, including municipal service reviews, of existing local government services with the goal of improving the efficiency of providing services.

3. Establish spheres of influence, which are plans for the probable physical boundaries of each local agency, for cities and special districts within the county and to review and update those spheres of influence every 5 years.

4. Assist the public and other government agencies concerning changes in local government boundaries and organization.

2.7 Well Permitting Policies and Procedures

Permit Sonoma is the Sonoma County agency responsible for administering permits for water supply and monitoring wells within the Basin, including within the jurisdiction of cities. Department of Health Services administers permits for environmental drilling and wells, generally associated with contaminated sites. The purpose of the County's well-construction policies is to provide for the location, construction, repair, reconstruction, and destruction, and addressing abandonment of all wells to protect the groundwater resource of the county because contamination may cause serious public health, safety, or economic problems.

The Sonoma County Well Ordinance contains regulations and requirements for constructing wells to prevent groundwater contamination from the surface and between multiple water bearing zones in (Ordinance 25B). The well-construction standard does not regulate flow volumes or rates, nor does it evaluate water availability or local hydrogeology.

Permit Sonoma reviews all development proposals within unincorporated areas that will rely on wells for water supply. Permit Sonoma has developed a four-tier classification system, based on geologic information and water yields, to designate general areas of groundwater availability

(**Figure 2-9**). Class 1 areas are Major Groundwater Basins, Class 2 areas are Major Natural Recharge Areas, Class 3 areas are Marginal Groundwater Availability Areas, and Class 4 areas are Areas with Low or Highly Variable Water Yield (permit Sonoma, 2016).

Permit Sonoma uses this groundwater classification system in reviewing certain development and building permit applications. For example, dry season well yield tests are required in Class 4 areas prior to residential development. In addition, discretionary applications in Class 3 and 4 areas and in SGMA medium- and high-priority basins are required to include hydrogeologic reports to establish that groundwater quality and quantity are adequate and will not be adversely impacted by the cumulative developments and uses allowed in the area. The aim is to avoid causing or exacerbating an overdraft condition in a groundwater basin or subbasin.

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Figures