



CALIFORNIA DEPARTMENT OF WATER RESOURCES

SUSTAINABLE GROUNDWATER MANAGEMENT OFFICE

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January 26, 2023

Marcus Trotta
Sonoma Valley Groundwater Sustainability Agency
404 Aviation Boulevard, Santa Rosa, CA 95403
mtrotta@scwa.ca.gov

RE: Napa Sonoma Valley – Sonoma Valley Subbasin - 2022 Groundwater
Sustainability Plan

Dear Marcus Trotta,

The Department of Water Resources (Department) has evaluated the groundwater sustainability plan (GSP) submitted for the Napa Sonoma Valley – Sonoma Valley Subbasin and has determined the GSP is approved. The approval is based on recommendations from the Staff Report, included as an exhibit to the attached Statement of Findings, which describes that the Sonoma Valley Subbasin GSP satisfies the objectives of the Sustainable Groundwater Management Act (SGMA) and substantially complies with the GSP Regulations. The Staff Report also proposes recommended corrective actions that the Department believes will enhance the GSP and facilitate future evaluation by the Department. The Department strongly encourages the recommended corrective actions be given due consideration and suggests incorporating all resulting changes to the GSP in future updates.

Recognizing SGMA sets a long-term horizon for groundwater sustainability agencies (GSAs) to achieve their basin sustainability goals, monitoring progress is fundamental for successful implementation. GSAs are required to evaluate their GSPs at least every five years and whenever the Plan is amended, and to provide a written assessment to the Department. Accordingly, the Department will evaluate approved GSPs and issue an assessment at least every five years. The Department will initiate the first five-year review of the Sonoma Valley Subbasin GSP no later than January 29, 2027.

Please contact Sustainable Groundwater Management staff by emailing sgmps@water.ca.gov if you have any questions related to the Department's assessment or implementation of your GSP.

Thank You,

[REDACTED]

Paul Gosselin
Deputy Director
Sustainable Groundwater Management

Attachment:

1. Statement of Findings Regarding the Approval of the Sonoma Valley Subbasin Groundwater Sustainability Plan

**STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES**

**STATEMENT OF FINDINGS REGARDING THE
APPROVAL OF THE
NAPA-SONOMA VALLEY - SONOMA VALLEY SUBBASIN GROUNDWATER
SUSTAINABILITY PLAN**

The Department of Water Resources (Department) is required to evaluate whether a submitted groundwater sustainability plan (GSP or Plan) conforms to specific requirements of the Sustainable Groundwater Management Act (SGMA or Act), is likely to achieve the sustainability goal for the basin covered by the Plan, and whether the Plan adversely affects the ability of an adjacent basin to implement their GSP or impedes achievement of sustainability goals in an adjacent basin. (Water Code § 10733.) The Department is directed to issue an assessment of the Plan within two years of its submission. (Water Code § 10733.4.) This Statement of Findings explains the Department's decision regarding the Plan submitted by the Sonoma Valley Groundwater Sustainability Agency (GSA or Agency) for the Sonoma Valley Subbasin (Basin No. 2-002.02).

Department management has reviewed the Department Staff Report, entitled Sustainable Groundwater Management Program Groundwater Sustainability Plan Assessment Staff Report, attached as Exhibit A, recommending approval of the GSP. Based on its review of the Staff Report, Department management is satisfied that staff have conducted a thorough evaluation and assessment of the Plan and concurs with staff's recommendation and all the recommended corrective actions. The Department thus **APPROVES** the Plan based on the Staff Report and the findings contained herein.

A. The Plan satisfies the required conditions as outlined in § 355.4(a) of the GSP Regulations (23 CCR § 350 *et seq.*):

1. The Plan was submitted within the statutory deadline of January 31, 2022. (Water Code § 10720.7(a)(2); 23 CCR § 355.4(a)(1).)
2. The Plan was complete, meaning it generally appeared to include the information required by the Act and the GSP Regulations sufficient to warrant a thorough evaluation by the Department. (23 CCR § 355.4(a)(2).)
3. The Plan, either on its own or in coordination with other Plans, covers the entire Subbasin. (23 CCR § 355.4(a)(3).)

B. The general standards the Department applied in its evaluation and assessment of the Plan are: (1) "conformance" with the specified statutory requirements, (2) "substantial compliance" with the GSP Regulations, (3) whether the Plan is likely

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Sonoma Valley Subbasin (Subbasin No. 2-002.02)

to achieve the sustainability goal for the Subbasin within 20 years of the implementation of the Plan, and (4) whether the Plan adversely affects the ability of an adjacent basin to implement its GSP or impedes achievement of sustainability goals in an adjacent basin. (Water Code § 10733.) Application of these standards requires exercise of the Department's expertise, judgment, and discretion when making its determination of whether a Plan should be deemed "approved," "incomplete," or "inadequate."

The statutes and GSP Regulations require Plans to include and address a multitude and wide range of informational and technical components. The Department has observed a diverse array of approaches to addressing these technical and informational components being used by GSAs in different basins throughout the state. The Department does not apply a set formula or criterion that would require a particular outcome based on how a Plan addresses any one of SGMA's numerous informational and technical components. The Department finds that affording flexibility and discretion to local GSAs is consistent with the standards identified above, the state policy that sustainable groundwater management is best achieved locally through the development, implementation, and updating of local plans and programs (Water Code § 113), and the Legislature's express intent under SGMA that groundwater basins be managed through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner (Water Code § 10720.1(h)). The Department's final determination of a Plan's status is made based on the entirety of the Plan's contents on a case-by-case basis, considering and weighing factors relevant to the particular Plan and basin under review.

- C. In making these findings and Plan determination, the Department also recognized that: (1) it maintains continuing oversight and jurisdiction to ensure the Plan is adequately implemented; (2) the Legislature intended SGMA to be implemented over many years; (3) SGMA provides Plans 20 years of implementation to achieve the sustainability goal in a basin (with the possibility that the Department may grant GSAs an additional five years upon request if the GSA has made satisfactory progress toward sustainability); and, (4) local agencies acting as GSAs are authorized, but not required, to address undesirable results that occurred prior to enactment of SGMA. (Water Code §§ 10721(r); 10727.2(b); 10733(a); 10733.8.)
- D. The Plan conforms with Water Code §§ 10727.2 and 10727.4, substantially complies with the GSP Regulations, and appears likely to achieve the sustainability goal for the Subbasin. It does not appear at this time that the Plan

Statement of Findings
Sonoma Valley Subbasin (Subbasin No. 2-002.02)

will adversely affect the ability of adjacent basins to implement their GSPs or impede achievement of sustainability goals.

1. The sustainable management criteria and goal to maintain stable groundwater level conditions in wells with no history of declines and maintain recovering trends in wells that have had historical declining water levels are sufficiently justified and explained. The Plan relies on credible information and science to quantify the groundwater conditions that the Plan seeks to avoid and provides an objective way to determine whether the Subbasin is being managed sustainably in accordance with SGMA. (23 CCR § 355.4(b)(1).)
2. The Plan demonstrates a reasonable understanding of where data gaps exist and demonstrates a commitment to eliminate those data gaps. For example, the Plan's commitment to filling data gaps pertaining to the relationship between regional groundwater pumping and interconnected surface water depletions will be important in reducing uncertainty regarding the GSAs ability to evaluate potential significant and unreasonable effects related to groundwater extraction in the Subbasin. Filling these known data gaps, and others described in the Plan, should lead to refinement of the GSA's monitoring networks and sustainable management criteria and help inform and guide future adaptive management strategies. (23 CCR § 355.4(b)(2).)
3. The projects and management actions, which focus largely on conservation and efficiency; recycled water efforts; increasing groundwater in storage through recharge; and increasing non-groundwater water supply, are reasonable and commensurate with the level of understanding of the Subbasin setting. The projects and management actions described in the Plan provide a generally feasible approach to achieving the Subbasin's sustainability goal and should provide the GSA with greater versatility to adapt and respond to changing conditions and future challenges during GSP implementation. (23 CCR § 355.4(b)(3).)
4. The Plan provides a detailed explanation of how the varied interests of groundwater uses and users in the Subbasin were considered in developing the sustainable management criteria and how those interests, including domestic wells, would be impacted by the chosen minimum thresholds. (23 CCR § 355.4(b)(4).)

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Sonoma Valley Subbasin (Subbasin No. 2-002.02)

5. The Plan's projects and management actions appear feasible at this time and appear likely to prevent undesirable results and ensure that the Subbasin is operated within its sustainable yield within 20 years. The Department will continue to monitor Plan implementation and reserves the right to change its determination if projects and management actions are not implemented or appear unlikely to prevent undesirable results or achieve sustainability within SGMA timeframes. (23 CCR § 355.4(b)(5).)
6. The Plan includes a reasonable assessment of overdraft conditions and includes reasonable means to mitigate overdraft, if present. (23 CCR § 355.4(b)(6).)
7. At this time, it does not appear that the Plan will adversely affect the three adjacent low-priority basin/subbasins, which are not required to be managed under a GSP. The Plan includes an analysis of potential impacts to adjacent basins related to the established minimum thresholds for each sustainability indicator. The Plan does not anticipate any impacts to adjacent basins resulting from the minimum thresholds defined in the Plan. (23 CCR § 355.4(b)(7).)
8. If required, a satisfactory coordination agreement has been adopted by all relevant parties. (23 CCR § 355.4(b)(8).)
9. The GSA's six member agencies, City of Sonoma, North Bay Water District, Valley of the Moon Water District, Sonoma Resource Conservation District, Sonoma County Water Agency, and County of Sonoma have historically implemented numerous project and management actions to address problematic groundwater conditions in the Subbasin. The GSA's member agencies and their history of groundwater management provide a reasonable level of confidence that the GSA has the legal authority and financial resources necessary to implement the Plan. (23 CCR § 355.4(b)(9).)
10. Through review of the Plan and public comments, the Department determines that the GSA adequately responded to comments that raised credible technical or policy issues with the Plan, sufficient to warrant approval of the Plan at this time. The Department also notes that the recommended corrective actions included in the Staff Report are important to addressing certain technical or policy issues that were raised and, if not addressed before future, subsequent plan evaluations, may preclude approval of the Plan in those future evaluations. (23 CCR § 355.4(b)(10).)

Statement of Findings
Sonoma Valley Subbasin (Subbasin No. 2-002.02)

E. In addition to the grounds listed above, DWR also finds that:

1. The Plan sets forth minimum thresholds for chronic lowering of groundwater levels that take into consideration the depths of shallow water supply wells (i.e., domestic, agricultural, industrial, and public supply wells). (Sonoma Valley GSP pp. 278-285.) The Plan utilizes a two-pronged approach for setting minimum thresholds which involves both the evaluation of historical low groundwater levels and a statistical analysis of the 98th percentile shallowest supply well depth (98% of wells being deeper than this depth) for wells located in the vicinity of each representative monitoring point. The final established minimum threshold value for each representative monitoring point was based on the shallower elevation between the historical low, minus a calculated drought buffer, or the nearby well impact depth (98th percentile supply well depth plus a saturated thickness factor associated with potential drawdown). The Plan's compliance with the requirements of SGMA and substantial compliance with the GSP Regulations supports the state policy regarding the human right to water (Water Code § 106.3). The Department developed its GSP Regulations consistent with and intending to further the policy through implementation of SGMA and the Regulations, primarily by achieving sustainable groundwater management in a basin. By ensuring substantial compliance with the GSP Regulations, the Department has considered the state policy regarding the human right to water. (23 CCR § 350.4(g).)
2. The Plan acknowledges and identifies interconnected surface waters within the Subbasin. The GSA proposes initial sustainable management criteria to manage this sustainability indicator and measures to improve understanding and management of interconnected surface water. The GSA acknowledges, and the Department agrees, many data gaps related to interconnected surface water exist. The GSAs should continue filling data gaps, collecting additional monitoring data, and coordinating with resources agencies and interested parties to understand beneficial uses and users that may be impacted by depletions of interconnected surface water caused by groundwater pumping. Future updates to the Plan should aim to improve the initial sustainable management criteria as more information and improved methodology becomes available.
3. The California Environmental Quality Act (Public Resources Code § 21000 et seq.) does not apply to the Department's evaluation and assessment of the Plan.

Statement of Findings
Sonoma Valley Subbasin (Subbasin No. 2-002.02)

Accordingly, the GSP submitted by the Agency for the Sonoma Valley Subbasin is hereby **APPROVED**. The recommended corrective actions identified in the Staff Report will assist the Department's future review of the Plan's implementation for consistency with SGMA and the Department therefore recommends the Agency address them by the time of the Department's five-year review, which is set to begin on January 29, 2027, as required by Water Code § 10733.8.

Signed:



Karla Nemeth, Director

Date: January 26, 2023

Exhibit A: Sustainable Groundwater Management Program Groundwater Sustainability Plan Assessment Staff Report – Sonoma Valley Groundwater Subbasin

State of California
Department of Water Resources
Sustainable Groundwater Management Program
Groundwater Sustainability Plan Assessment
Staff Report

Groundwater Basin Name: Napa-Sonoma Valley – Sonoma Valley Subbasin
(Basin No. 2-002.02)

Submitting Agency: Sonoma Valley Groundwater Sustainability Agency

Submittal Type: Initial GSP Submission

Submission Date: January 29, 2022

Recommendation: Approved

Date: January 26, 2023

The Sonoma Valley Groundwater Sustainability Agency (GSA or Agency) submitted the Sonoma Valley Subbasin (Subbasin) Groundwater Sustainability Plan (GSP or Plan) to the Department of Water Resources (Department) for evaluation and assessment as required by the Sustainable Groundwater Management Act (SGMA)¹ and GSP Regulations.² The GSP covers the entire Subbasin for the implementation of SGMA.

After evaluation and assessment, Department staff concludes that the Plan includes the required components of a GSP, demonstrates a thorough understanding of the Subbasin based on what appears to be the best available science and information, sets well explained, supported, and reasonable sustainable management criteria to prevent undesirable results as defined in the Plan, and proposes a set of projects and management actions that will likely achieve the sustainability goal defined for the Subbasin.³ Department staff will continue to monitor and evaluate the Subbasin's progress toward achieving the sustainability goal through annual reporting and future periodic evaluations of the GSP and its implementation.

- ***Based on the current evaluation of the Plan, Department staff recommend the GSP be approved with the recommended corrective actions described herein.***

This assessment includes five sections:

- **Section 1 – Summary:** Overview of Department staff's assessment and recommendations.

¹ Water Code § 10720 *et seq.*

² 23 CCR § 350 *et seq.*

³ 23 CCR § 350 *et seq.*

- **[Section 2 – Evaluation Criteria](#)**: Describes the legislative requirements and the Department’s evaluation criteria.
- **[Section 3 – Required Conditions](#)**: Describes the submission requirements, Plan completeness, and basin coverage required for a GSP to be evaluated by the Department.
- **[Section 4 – Plan Evaluation](#)**: Provides an assessment of the contents included in the GSP organized by each Subarticle outline in the GSP Regulations.
- **[Section 5 – Staff Recommendation](#)**: Includes the staff recommendation for the Plan and any recommended or required corrective actions, as applicable.

1 SUMMARY

Department staff recommend approval of the Sonoma Valley GSP. The GSA has identified areas for improvement of its Plan (e.g., provide more detail related to the monitoring networks to fill data gaps, further delineating the extent of geologic formations within the Subbasin, and addressing data gaps related to interconnected surface water, including estimations of the quantity and timing of surface water depletions). Department staff concur that those items are important and recommend the GSA address them as soon as possible. Department staff have also identified additional recommended corrective actions within this assessment that the GSA should consider addressing by the first periodic evaluation of the Plan. The recommended corrective actions generally focus on the following:

- (1) providing additional details and discussion related to specific components the GSA used to establish chronic lowering of groundwater levels sustainable management criteria,
- (2) continuing to fill data gaps, collecting additional monitoring data, coordinating with resources agencies and interested parties to understand beneficial uses and users that may be impacted by depletions of interconnected surface water caused by groundwater pumping, and potentially refine sustainable management criteria, and
- (3) and providing additional details related to the monitoring networks.

Addressing the recommended corrective actions identified in [Section 5](#) of this assessment will be important to demonstrate, on an ongoing basis, that implementation of the Plan is likely to achieve the sustainability goal.

2 EVALUATION CRITERIA

The GSA submitted a single GSP to the Department to evaluate whether the Plan conforms to specified SGMA requirements⁴ and is likely to achieve the sustainability goal for the Sonoma Valley Subbasin.⁵ To achieve the sustainability goal for the Subbasin, the GSP must demonstrate that implementation of the Plan will lead to sustainable groundwater management, which means the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.⁶ Undesirable results must be defined quantitatively by the GSAs.⁷ The Department is also required to evaluate whether the GSP will adversely affect the ability of an adjacent basin to implement its GSP or achieve its sustainability goal.⁸

For the GSP to be evaluated by the Department, it must first be determined that the Plan was submitted by the statutory deadline,⁹ and that it is complete and covers the entire Subbasin.¹⁰ If these conditions are satisfied, the Department evaluates the Plan to determine whether it complies with specific SGMA requirements and substantially complies with the GSP Regulations.¹¹ “Substantial compliance means that the supporting information is sufficiently detailed and the analyses sufficiently thorough and reasonable, in the judgment of the Department, to evaluate the Plan, and the Department determines that any discrepancy would not materially affect the ability of the Agency to achieve the sustainability goal for the Subbasin, or the ability of the Department to evaluate the likelihood of the Plan to attain that goal.”¹²

When evaluating whether the Plan is likely to achieve the sustainability goal for the Subbasin, Department staff reviewed the information provided and relied upon in the GSP for sufficiency, credibility, and consistency with scientific and engineering professional standards of practice.¹³ The Department’s review considers whether there is a reasonable relationship between the information provided and the assumptions and conclusions made by the GSA, including whether the interests of the beneficial uses and users of groundwater in the Subbasin have been considered; whether sustainable management criteria and projects and management actions described in the Plan are commensurate with the level of understanding of the Subbasin setting; and whether those projects and management actions are feasible and likely to prevent undesirable results.¹⁴

⁴ Water Code §§ 10727.2, 10727.4.

⁵ Water Code § 10733(a).

⁶ Water Code § 10721(v).

⁷ 23 CCR § 354.26 et seq.

⁸ Water Code § 10733(c).

⁹ 23 CCR § 355.4(a)(1).

¹⁰ 23 CCR §§ 355.4(a)(2), 355.4(a)(3).

¹¹ 23 CCR § 350 et seq.

¹² 23 CCR § 355.4(b).

¹³ 23 CCR § 351(h).

¹⁴ 23 CCR §§ 355.4(b)(1), (3), (4) and (5).

The Department also considers whether the GSA has the legal authority and financial resources necessary to implement the Plan.¹⁵

To the extent overdraft is present in a Subbasin, the Department evaluates whether the Plan provides a reasonable assessment of the overdraft and includes reasonable means to mitigate the overdraft.¹⁶ The Department also considers whether the Plan provides reasonable measures and schedules to eliminate identified data gaps.¹⁷ Lastly, the Department's review considers the comments submitted on the Plan and evaluates whether the GSA adequately responded to the comments that raise credible technical or policy issues with the Plan.¹⁸

The Department is required to evaluate the Plan within two years of its submittal date and issue a written assessment of the Plan.¹⁹ The assessment is required to include a determination of the Plan's status.²⁰ The GSP Regulations define the three options for determining the status of a Plan: Approved,²¹ Incomplete,²² or Inadequate.²³

Even when review indicates that the GSP satisfies the requirements of SGMA and is in substantial compliance with the GSP Regulations, the Department may recommend corrective actions.²⁴ Recommended corrective actions are intended to facilitate progress in achieving the sustainability goal within the Subbasin and the Department's future evaluations, and to allow the Department to better evaluate whether the Plan adversely affects adjacent basins. While the issues addressed by the recommended corrective actions do not, at this time, preclude approval of the Plan, the Department recommends that the issues be addressed to ensure the Plan's implementation continues to be consistent with SGMA and the Department is able to assess progress in achieving the sustainability goal within the Subbasin.²⁵ Unless otherwise noted, the Department proposes that recommended corrective actions be addressed by the submission date for the first five-year assessment.²⁶

The staff assessment of the GSP involves the review of information presented by the GSA, including models and assumptions, and an evaluation of that information based on scientific reasonableness, including standard or accepted professional and scientific methods and practices. The assessment does not require Department staff to recalculate or reevaluate technical information provided in the Plan or to perform its own geologic or engineering analysis of that information. The staff recommendation to approve a Plan

¹⁵ 23 CCR § 355.4(b)(9).

¹⁶ 23 CCR § 355.4(b)(6).

¹⁷ 23 CCR § 355.4(b)(2).

¹⁸ 23 CCR § 355.4(b)(10).

¹⁹ Water Code § 10733.4(d); 23 CCR § 355.2(e).

²⁰ Water Code § 10733.4(d); 23 CCR § 355.2(e).

²¹ 23 CCR § 355.2(e)(1).

²² 23 CCR § 355.2(e)(2).

²³ 23 CCR § 355.2(e)(3).

²⁴ Water Code § 10733.4(d).

²⁵ Water Code § 10733.8.

²⁶ 23 CCR § 356.4 *et seq.*

does not signify that Department staff, were they to exercise the professional judgment required to develop a GSP for the Subbasin, would make the same assumptions and interpretations as those contained in the Plan, but simply that Department staff have determined that the assumptions and interpretations relied upon by the submitting GSA are supported by adequate, credible evidence, and are scientifically reasonable.

Lastly, the Department's review and approval of the Plan is a continual process. Both SGMA and the GSP Regulations provide the Department with the ongoing authority and duty to review the implementation of the Plan.²⁷ Also, GSAs have an ongoing duty to provide reports to the Department, periodically reassess their plans, and, when necessary, update or amend their plans.²⁸ The passage of time or new information may make what is reasonable and feasible at the time of this review to not be so in the future. The emphasis of the Department's periodic reviews will be to assess the progress toward achieving the sustainability goal for the Subbasin and whether Plan implementation adversely affects the ability of adjacent basins to achieve their sustainability goals.

3 REQUIRED CONDITIONS

A GSP, to be evaluated by the Department, must be submitted within the applicable statutory deadline. The GSP must also be complete and must, either on its own or in coordination with other GSPs, cover the entire Subbasin.

3.1 SUBMISSION DEADLINE

SGMA required Subbasins categorized as high- or medium-priority and not subject to critical conditions of overdraft to submit a GSP no later than January 31, 2022.²⁹

The GSA submitted its Plan on January 29, 2022.

3.2 COMPLETENESS

GSP Regulations specify that the Department shall evaluate a GSP if that GSP is complete and includes the information required by SGMA and the GSP Regulations.³⁰

The GSA submitted an adopted GSP for the entire Subbasin. After an initial, preliminary review, Department staff found the GSP to be complete and appearing to include the

²⁷ Water Code § 10733.8; 23 CCR § 355.6.

²⁸ Water Code §§ 10728 et seq., 10728.2.

²⁹ Water Code § 10720.7(a)(2).

³⁰ 23 CCR § 355.4(a)(2).

required information, sufficient to warrant a thorough evaluation by the Department.³¹ The Department posted the GSP to its website on February 7, 2022.³²

3.3 BASIN COVERAGE

A GSP, either on its own or in coordination with other GSPs, must cover the entire Subbasin.³³ A GSP that is intended to cover the entire Subbasin may be presumed to do so if the Subbasin is fully contained within the jurisdictional boundaries of the submitting GSAs.

The GSP intends to manage the entire Sonoma Valley Subbasin and the jurisdictional boundary of the submitting GSA fully contains the Subbasin.³⁴

4 PLAN EVALUATION

As stated in Section 355.4 of the GSP Regulations, a Subbasin “shall be sustainably managed within 20 years of the applicable statutory deadline consistent with the objectives of the Act.” The Department’s assessment is based on a number of related factors including whether the elements of a GSP were developed in the manner required by the GSP Regulations, whether the GSP was developed using appropriate data and methodologies and whether its conclusions are scientifically reasonable, and whether the GSP, through the implementation of clearly defined and technically feasible projects and management actions, is likely to achieve a tenable sustainability goal for the Subbasin. The Department staff’s evaluation of the likelihood of the Plan to attain the sustainability goal for the Subbasin is provided below.

4.1 ADMINISTRATIVE INFORMATION

The GSP Regulations require each Plan to include administrative information identifying the submitting Agency, a description of the Plan area, and a demonstration of the legal authority and ability of the submitting Agency to develop and implement a Plan for that area.³⁵

The GSP states that the Sonoma Valley GSA has exclusive authority over the entire Subbasin.³⁶ The GSP provides descriptions and summaries of the costs and assumptions of the main GSP components for the initial five years of Plan implementation; the estimated average yearly expenses for the initial five years range from \$755,000 to

³¹ The Department undertakes a preliminary completeness review of a submitted Plan under section 355.4(a) of the GSP Regulations to determine whether the elements of a Plan required by SGMA and the Regulations have been provided, which is different from a determination, upon review, that a Plan is “incomplete” for purposes of section 355.2(e)(2) of the Regulations.

³² <https://sgma.water.ca.gov/portal/gsp/preview/136>.

³³ Water Code § 10727(b); 23 CCR § 355.4(a)(3)

³⁴ Sonoma Valley GSP, Section 1.3.1, p. 72.

³⁵ 23 CCR § 354.2 *et seq.*

³⁶ Sonoma Valley GSP, Section 2.1, p. 81.

\$1,720,000 and includes GSA administration, communication and stakeholder engagement, annual monitoring and reporting, data gap filling, conceptual projects and planning, model updates, five-year GSP update, and contingencies. Estimates of future implementation costs will be provided in future five-year GSP updates. Funding for GSP implementation will come from local, state, and federal grants; DWR technical support; and partnerships with member agencies, other GSAs, and entities interested in leveraging mutually beneficial programs, projects, and studies.³⁷

The Plan area for this GSP is the entire 44,000-acre Subbasin, which lies within a northwest trending structural depression in the coast ranges immediately north of San Pablo Bay. The Subbasin encompasses the City of Sonoma and communities of El Verano, Agua Caliente, Fetters Hot Springs, Boyes Hot Springs, Glen Ellen, Schellville, Buena Vista, and Vineberg. The principal stream draining the Subbasin is Sonoma Creek. According to the GSP, neighboring groundwater basins and subbasins include the Petaluma Valley Basin (2-001), Kenwood Valley Basin (2-019), and the Napa-Sonoma Lowlands Subbasin (2-002.03).³⁸ The GSP also mentions that the Sonoma Valley Subbasin is one of three coastal alluvial subbasins in the larger and regional Napa-Sonoma Valley Groundwater Basin. A map depicting the Subbasin boundary and adjacent basins is shown in Figure 1 below.³⁹

³⁷ Sonoma Valley GSP, Section 7.3, pp. 413-414.

³⁸ Sonoma Valley GSP, Section 2.1, p. 81.

³⁹ Sonoma Valley GSP, Figure 1-1, p. 62.

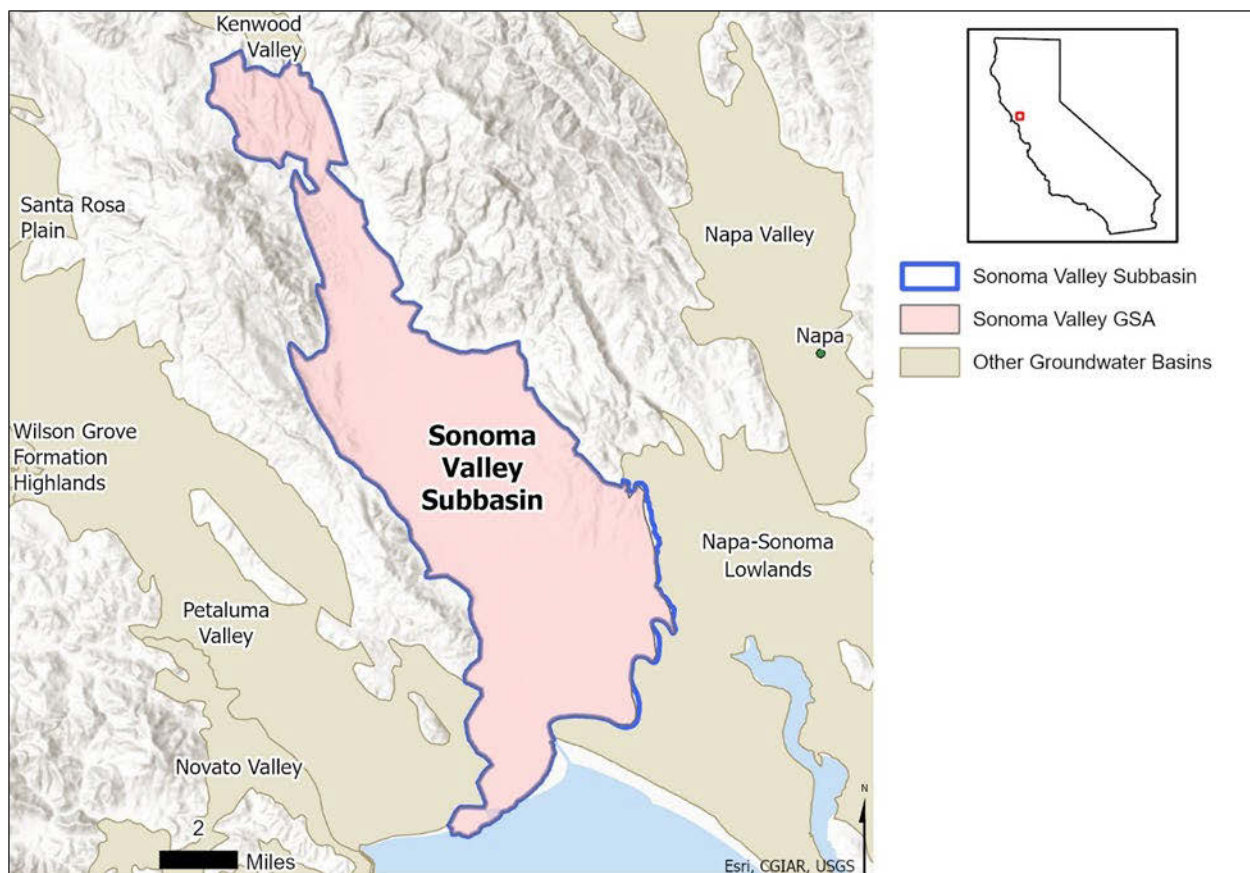


Figure 1: Sonoma Valley Subbasin Location Map.

Land use within the Subbasin, based on DWR’s 2012 land use survey, includes: irrigated agriculture (primarily vineyards) (21.5%); non-irrigated agriculture (pasture, grain and hay, and dairies) (21.5%); native vegetation or water (42.6%); and urbanized uses (residential, commercial, and industrial) (13.3%). According to the GSP, land use mapping over time illustrates land use changes in the Subbasin, which most notably includes increases in irrigated agriculture and residential and commercial land uses.⁴⁰ Primary water source types are identified as groundwater, imported surface water, local surface water, and recycled water.⁴¹

The Plan describes in some detail the GSA’s authority to manage groundwater in the Subbasin which was generally presented in an understandable format using appropriate data. Department staff did not note any significant inconsistencies or contradicting information and consider the information presented in the Plan to satisfy the general requirements of the GSP Regulations. The Plan contains sufficient detail regarding the beneficial uses and users of groundwater, water use types, existing water monitoring and resource programs, and types and distribution of land use and land use plans for the Subbasin. The Agency provides a list of public meetings; materials; and notifications on

⁴⁰ Sonoma Valley GSP, Section 2.2, p. 86.

⁴¹ Sonoma Valley GSP, Section 2.3, p. 90.

its website, and lists of meetings and public comments, and how they were addressed by the GSA, are included in the appendices of the GSP.

The GSP's discussion and presentation of administrative information covers the specific items listed in the GSP Regulations in an understandable format using appropriate data. Department staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and therefore have no significant concerns regarding the quality, data, and discussion of this subject in the GSP. The administrative information included in the Plan substantially complies with the requirements outlined in the GSP Regulations.

4.2 BASIN SETTING

GSP Regulations require information about the physical setting and characteristics of the Subbasin and current conditions of the Subbasin, including a hydrogeologic conceptual model; a description of historical and current groundwater conditions; and a water budget accounting for total annual volume of groundwater and surface water entering and leaving the Subbasin, including historical, current, and projected water budget conditions.⁴²

4.2.1 Hydrogeologic Conceptual Model

The GSP Regulations require a descriptive hydrogeologic conceptual model of the Subbasin that includes a written description supported by cross sections and maps.⁴³ The hydrogeologic conceptual model is a non-numerical model of the physical setting, characteristics, and processes that govern groundwater occurrence within a Subbasin, and represents a local agency's understanding of the geology and hydrology of the Subbasin that support the geologic assumptions used in developing mathematical models, such as those that allow for quantification of the water budget.⁴⁴

The primary water sources within the Subbasin are groundwater, imported surface water, local surface water, and recycled water. According to the Plan, groundwater within the Subbasin supplies various beneficial uses and users, including stream baseflow, groundwater-dependent ecosystems (GDEs), domestic wells, irrigation wells, industrial wells, and public water-supply for various districts and municipalities.⁴⁵

The Plan describes two principal aquifers beneath the Subbasin, differentiating between a shallow and a deep aquifer system separated by clay layers associated with the Glen Ellen and Huichica Formations.⁴⁶ The aquitards generally reside between 200 and 400 feet below land surface and range in thickness from 160 to 350 feet.⁴⁷ The Plan indicates

⁴² 23 CCR § 354.12 *et seq.*

⁴³ 23 CCR § 354.12 *et seq.*

⁴⁴ DWR Best Management Practices for the Sustainable Management of Groundwater: Hydrogeologic Conceptual Model, December 2016: [https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-3-Hydrogeologic-Conceptual-Model ay 19.pdf](https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-3-Hydrogeologic-Conceptual-Model%20ay%2019.pdf).

⁴⁵ Sonoma Valley GSP, Section 3.1.5, pp. 144 and 147.

⁴⁶ Sonoma Valley GSP, Section 3.1.5, p. 141.

⁴⁷ Sonoma Valley GSP, Section 3.1.5.3, p. 147.

that due to the heterogeneity of the geologic units within the Subbasin, the shallow and deep aquifer systems are generally distinguished by depth, rather than by specific geologic units.⁴⁸ Using lithologic data recorded from approximately 2,000 well-completion reports, the Plan presents a textural model of the shallow and deep aquifer systems and the confining aquitard units which display the distribution of fine-grained, coarse-grained, and volcanic materials throughout the Subbasin.⁴⁹

The Plan specifies that the primary mechanisms for groundwater recharge within the Subbasin are streambed recharge along Sonoma Creek and its tributaries, direct infiltration of precipitation, and mountain-front recharge along the valley margins. While the Plan notes that the shallow aquifer system likely captures the majority of this recharge, it speculates that the deep aquifer system is likely recharged from the mountain-front recharge along the valley's margins, and from leakage from the shallow aquifer system.⁵⁰ The Plan presents a figure using data from a 2011 study that maps areas of potential recharge based on a qualitative assessment of soil type, slope, vegetation, and underlying geology.⁵¹ The Plan includes a complimentary figure that maps groundwater recharge potential based on additional information such as depth to shallow groundwater, locations of losing stream reaches, distribution of lithologic textures, and relative groundwater ages.⁵²

The information provided in the GSP that comprises the hydrogeologic conceptual model substantially complies with the requirements outlined in the GSP Regulations. In general, the Plan's descriptions of the regional geologic setting, the Subbasin's physical characteristics, the principal aquifer, and hydrogeologic conceptual model appear to utilize the best available science. Department staff are aware of no significant inconsistencies or contrary technical information to that presented in the Plan and encourage the GSA to address the identified data gaps.

4.2.2 Groundwater Conditions

The GSP Regulations require a written description of historical and current groundwater conditions for each of the applicable sustainability indicators and groundwater dependent ecosystems (GDEs).⁵³

The GSP provided a total of 19 hydrographs that depict long-term groundwater elevations which primarily start in the early 2000s, but some records begin in the early- to mid-1970s.⁵⁴ Hydrographs representing groundwater conditions in the shallow aquifer are generally stable throughout the Subbasin. One site in the shallow aquifer, Son0078, displays a groundwater decline since the year 2000. Hydrographs that depict long-term

⁴⁸ Sonoma Valley GSP, Section 3.1.5, p. 140.

⁴⁹ Sonoma Valley GSP, Figures 3-7a through 3-7c, pp. 143, 146, and 148.

⁵⁰ Sonoma Valley GSP, Section 3.1.7.1, pp. 149-150.

⁵¹ Sonoma Valley GSP, Figure 3-8a, p. 151.

⁵² Sonoma Valley GSP, Figure 3-8b, p. 152.

⁵³ 23 CCR § 354.16 (a-f).

⁵⁴ Sonoma Valley GSP, Figures 3-12a through 3-12g, pp. 167-173.

conditions of the deep aquifer in the central portion of the Subbasin display a groundwater level decline.⁵⁵ In the shallow aquifer, historical lows generally occur around 2015. Historical highs in the shallow aquifer are difficult to identify due to the stable conditions indicated from the hydrographs; however, shallow aquifer hydrographs with the most variance display a historical high around 2005. Historical lows in the deep aquifer vary, but typically occur around 2015.

The GSP includes a description⁵⁶ of the change in groundwater storage and a graph⁵⁷ depicting the simulated annual and cumulative change in volume of groundwater storage. The graph includes groundwater use, water year type, annual change in storage, and cumulative change in storage. The GSP states that the historical total average estimated groundwater storage loss has been approximately 300 acre-feet per year since water year 1971.⁵⁸

The GSP discusses the seawater/freshwater interface beneath the tidal marshlands near San Pablo Bay.⁵⁹ Maps and graphs displaying total dissolved solids (TDS) and chloride concentrations were provided in the GSP⁶⁰; however, cross-sections displaying the seawater/freshwater interface in the Subbasin were not provided.⁶¹ Although the specific location of the seawater/freshwater interface is not yet known, the GSP states that chloride concentrations approaching or exceeding 1,000 milligrams per liter (mg/L) and total dissolved solids (TDS) levels exceeding 1,500 mg/L from historical analysis of groundwater from wells south of Highway 37 is potentially indicative of seawater intrusion.⁶² The GSP states that limited historical monitoring of groundwater quality in the northern margins of the tidal marshlands and tidal reaches of Sonoma Creek has revealed possible inland movement of brackish water.⁶³ The GSA has not determined whether the brackish water observed in historical monitoring is from seawater intrusion or from connate water sources, but intends to assess this data gap with future monitoring.

The GSP includes a description, along with maps and trend graphs, for current and historical groundwater quality issues in the Subbasin and has identified general minerals, major-ions, TDS, specific conductance, arsenic, nitrate, boron, and chloride as the water quality constituents of interest.⁶⁴ The reasoning for selecting each constituent of interest is described in the GSP.⁶⁵ The GSP states that groundwater quality is “generally adequate” to support existing beneficial uses. Poor groundwater quality within the

⁵⁵ Sonoma Valley GSP, Figure 3-12f, p. 172.

⁵⁶ Sonoma Valley GSP, Section 3.4.1.3, pp. 244-246.

⁵⁷ Sonoma Valley GSP, Figure 3-36, p. 245.

⁵⁸ Sonoma Valley GSP, Table 3-10, p. 245.

⁵⁹ Sonoma Valley GSP, Section 3.2.6.5, p. 206.

⁶⁰ Sonoma Valley GSP, Figures 3-16e through 3-16i, pp. 194-196, 198-199, and 201-202.

⁶¹ Sonoma Valley GSP, Section 3.2.6.5, p. 206.

⁶² Sonoma Valley GSP, Section 3.2.6.5, p. 206.

⁶³ Sonoma Valley GSP, Section 3.2.6.5, p. 206.

⁶⁴ Sonoma Valley GSP, Section 3.2.6 and Figures 3-16b through 3-16j, pp. 185, 190-192, 194-196, 198-199, and 202-204.

⁶⁵ Sonoma Valley GSP, Sections 3.2.6.1 through 3.2.6.3, pp. 185-200.

Subbasin is associated with brackish water in the vicinity of the San Pablo Bay and tidal marshlands, hydrothermal fluids associated with Sonoma Volcanic deposits and fault zones, deep connate waters in Tertiary sedimentary units, and anthropogenic inputs associated with land use.⁶⁶ A description of point-source contamination sites, along with a map, was also provided in the GSP.⁶⁷ The GSP states that there are eight active remediation sites in the Subbasin according to Geotracker.⁶⁸

The GSP includes a description, along with maps and graphs, of current and historical land subsidence conditions in the Subbasin.⁶⁹ The GSP states that current and historical subsidence monitoring data collected in the Subbasin suggest that groundwater extraction induced inelastic subsidence has not occurred.⁷⁰

The GSP identifies that Sonoma Creek and its tributaries, principally Aqua Caliente Creek and Nathanson Creek, are interconnected to groundwater in the Subbasin. Interconnected surface water conditions were evaluated using historical monitoring data of groundwater elevation, streambed elevations, stream gauging data, and seepage runs.⁷¹

The GSP describes model simulations of historical groundwater pumping and no-pumping scenarios using the Sonoma Valley Integrated Groundwater Flow Model (SVIGFM) to establish correlation between volume or rate of stream depletion and selected groundwater level proxy using a 15-year simulation period from 2004 to 2018.⁷² The Plan evaluated 17 high-frequency groundwater level observations of shallow monitoring wells at 13 near-stream locations in addition to the simulated estimates of stream depletion by groundwater pumping which indicate streamflow change for pumping and no-pumping scenarios using the Sonoma Valley Integrated Hydrologic Model (SVIHM).⁷³ The Plan states groundwater levels are used as proxy for the volume or rate of depletion of interconnected surface water for the purpose of assessing and managing depletions.

The Plan sufficiently describes the historical and current groundwater conditions throughout the Subbasin, and the information included in the Plan substantially complies with the requirements outlined in the GSP Regulations.

4.2.3 Water Budget

GSP Regulations require a water budget for the Subbasin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering

⁶⁶ Sonoma Valley GSP, Section 3.2.6, p. 185.

⁶⁷ Sonoma Valley GSP, Section 3.2.6.3 and Figure 3-16k, pp. 204-205.

⁶⁸ Sonoma Valley GSP, Section 3.2.6.3, p. 205.

⁶⁹ Sonoma Valley GSP, Section 3.2.5 and Figures 3-15a through 3-15c, pp. 180-184.

⁷⁰ Sonoma Valley GSP, Section 3.2.5, p. 181.

⁷¹ Sonoma Valley GSP, Appendix 3-D, p. 701.

⁷² Sonoma Valley GSP, Appendix 4-D, p.1173.

⁷³ Sonoma Valley GSP, Appendix 4-D, p. 1172.

and leaving the Subbasin, including historical; current; and projected water budget conditions, and the change in the volume of water stored, as applicable.⁷⁴

The Plan provides a water budget using the SVIGFM and contains a model simulation for water years 1971 through 2018. The estimated sustainable yield of the Subbasin is 5,400 acre-feet per year and the GSP states overdraft is currently occurring.⁷⁵ The SVIGFM was developed by the Sonoma County Water Agency using MODFLOW One-Water Hydrologic Flow Model (MF-OWHM).

Department staff conclude the historical, current, and projected water budgets included in the Plan substantially comply with the requirements outlined in the GSP Regulations. The GSP provides the required historical, current, and future accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the Subbasin including an estimate of the sustainable yield of the Subbasin and projected future water demands.

4.2.4 Management Areas

The GSP Regulations provide the option for one or more management areas to be defined within a Subbasin if the GSA has determined that the creation of the management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives, provided that undesirable results are defined consistently throughout the Subbasin.⁷⁶

There are no management areas proposed within the Plan area.

4.3 SUSTAINABLE MANAGEMENT CRITERIA

GSP Regulations require each Plan to include a sustainability goal for the Subbasin and to characterize and establish undesirable results, minimum thresholds, and measurable objectives for each applicable sustainability indicator, as appropriate. The GSP Regulations require each Plan to define conditions that constitute sustainable groundwater management for the Subbasin including the process by which the GSA characterizes undesirable results and establishes minimum thresholds and measurable objectives for each applicable sustainability indicator.⁷⁷

4.3.1 Sustainability Goal

The GSP describes the sustainability goal as to “adaptively and sustainably manage, protect, and enhance groundwater resources, while allowing for reasonable and managed growth through: careful monitoring of groundwater conditions; close coordination and collaboration with other entities and regulatory agencies that have a stake or role in groundwater management in the Subbasin; a diverse portfolio of projects and

⁷⁴ 23 CCR § 354.18.

⁷⁵ Sonoma Valley GSP, Section 3.5, p. 262.

⁷⁶ 23 CCR § 345.20.

⁷⁷ 23 CCR § 354.22 *et seq.*

management actions that ensure clean and plentiful groundwater for future uses and users in an environmentally sound and equitable manner.”⁷⁸

The GSP describes an approach to achieve the sustainability goal through implementation of various projects and actions. The projects and actions include filling data gaps, improving monitoring, and reducing uncertainty to inform possible sustainable management criteria adjustments during implementation. The GSP states that available data and model projections documented in the Basin Setting section of the GSP indicate that current and future groundwater conditions are generally acceptable and indicates the early stages of GSP implementation will focus on conservation and efficiency, recycled water efforts, aquifer storage and recovery projects, and stormwater capture and managed aquifer recharge.⁷⁹

In describing the measures to achieve the Subbasin’s sustainability goal, the GSP lists four primary projects and two management actions that the GSA intends to implement using an “adaptive management strategy, which will allow the GSA to react to the progress and outcomes of projects and management actions implemented in the Subbasin and to make management decisions to redirect efforts in the Subbasin as necessary to more effectively achieve the sustainability goal.”⁸⁰ The GSP references and relates the sections of the GSP that explain the projects and management actions in more detail and the stages of GSP implementation (i.e., Section 6 and Section 7 of the GSP, respectively) to the achievement of the sustainability goal.

4.3.2 Sustainability Indicators

Sustainability indicators are defined as any of the effects caused by groundwater conditions occurring throughout the Subbasin that, when significant and unreasonable, cause undesirable results.⁸¹ Sustainability indicators thus correspond with the six undesirable results – chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon, significant and unreasonable reduction of groundwater storage, significant and unreasonable seawater intrusion, significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies, land subsidence that substantially interferes with surface land uses, and depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water⁸² – but refer to groundwater conditions that are not, in and of themselves, significant and unreasonable. Rather, sustainability indicators refer to the effects caused by changing groundwater conditions that are monitored, and for which criteria in the form of minimum thresholds are established by the agency to define when the effect becomes significant and unreasonable, producing an undesirable result.

⁷⁸ Sonoma Valley GSP, Section 4.2.1, p. 270.

⁷⁹ Sonoma Valley GSP, Section 4.2.2, p. 270.

⁸⁰ Sonoma Valley GSP, Section 4.2.2, p. 271.

⁸¹ 23 CCR § 351(ah).

⁸² Water Code § 10721(x).

The following subsections thus consolidate three facets of sustainable management criteria: undesirable results, minimum thresholds, and measurable objectives. Information, as presented in the Plan, pertaining to the processes and criteria relied upon to define undesirable results applicable to the Subbasin, as quantified through the establishment of minimum thresholds, are addressed for each sustainability indicator. However, a submitting agency is not required to establish criteria for undesirable results that the agency can demonstrate are not present and are not likely to occur in a Subbasin.⁸³

4.3.2.1 Chronic Lowering of Groundwater Levels

The GSP regulations require the minimum threshold for chronic lowering of groundwater levels to be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results.⁸⁴

The GSP's sustainable management criteria for the chronic lowering of groundwater levels, for areas with stable trends, was developed around the goal of maintaining groundwater levels within or near historical conditions while also accounting for future droughts and climate variability. For areas with declining groundwater level trends, the goal of the GSP is to protect beneficial users that could be impacted by declining groundwater levels and to stabilize and reverse the declining trends.⁸⁵ The GSP describes significant and unreasonable lowering of groundwater levels as conditions that "significantly exceed historical levels or cause significant and unreasonable impacts to beneficial users..." The GSP further describes impacts to beneficial users as the following:

- Declining water levels that limit access to groundwater causing an economic burden on those who rely on groundwater
- Groundwater levels falling near basin boundaries that may impact neighboring basins
- Groundwater levels declining in the shallow aquifer that may impact groundwater-dependent vegetation⁸⁶

The GSP states that an undesirable result would occur when groundwater levels in 20 percent of the representative monitoring points in either the shallow aquifer system or deep aquifer system exceed their specific minimum threshold for three consecutive fall measurements. The GSP further explains that an undesirable result would not be occurring if minimum threshold exceedances are caused by emergency operational issues or droughts that extend for longer than the 4-year drought factor incorporated into establishing the minimum thresholds. However, an undesirable result would occur under these circumstances if groundwater levels do not recover above the minimum threshold

⁸³ 23 CCR § 354.26(d).

⁸⁴ 23 CCR § 354.28(c)(1).

⁸⁵ Sonoma Valley GSP, Section 4.5, p. 272.

⁸⁶ Sonoma Valley GSP, Section 4.5.1, p. 277.

during future normal and/or wet years following periods of drought.⁸⁷ The GSP, however, provides little discussion of the process, information, and data considered when presenting the discussion of what constitutes emergency operations. Department staff recognize the GSP includes a description of what Sonoma County considers drought conditions;⁸⁸ however, the lack of information related to how the 4-year drought period correlates with emergency operational issues makes it difficult for Department staff to understand how the GSA intends to manage the Subbasin during extended dry periods (i.e., drought conditions exceeding the 4-year drought buffer analysis). SGMA also identifies “overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.”⁸⁹ Department staff recommend providing further explanation and description related to emergency operations and the potential effects on beneficial uses and users if conditions extend beyond the 4-year drought factor (see [Recommended Corrective Action 1](#)).

The GSP generally outlines potential effects of undesirable results for chronic lowering of groundwater levels on beneficial users as the inability of supplying groundwater to meet water demands for a significant amount of private, agricultural, municipal, and industrial production wells. These beneficial users include domestic well users, irrigation well users, and public water supply well users. The GSP further explains that the chronic lowering of groundwater levels reduces the saturated thickness of aquifers leading to increased pumping costs, reduction in pumping capacity, and/or the need to install deeper groundwater wells.⁹⁰

The GSP sets minimum thresholds for chronic lowering of groundwater levels at 13 representative monitoring points in the shallow aquifer and 10 representative monitoring points in the deep aquifer. The GSP explains the methodology to establish the minimum thresholds included evaluating historical groundwater elevation data; depths and locations of existing wells; maps of current and historical groundwater elevation data; input from stakeholders; and results from modeling future conditions. The GSP further explains that the minimum thresholds set at each representative monitoring point are based on three criteria:

1. Identifying the lowest historical groundwater elevation
2. Calculation of well impact depths in the vicinity of each monitoring point
3. Calculation of a drought factor used as an additional buffer⁹¹

Per the GSP, the methodology for incorporating the potential impacts on existing well users involved the statistical evaluation of known well construction information for all

⁸⁷ Sonoma Valley GSP, Section 4.5.4.1, p. 291.

⁸⁸ Sonoma Valley GSP, Appendix 4-B, p. 923.

⁸⁹ Water Code § 10721(x)(1).

⁹⁰ Sonoma Valley GSP, Section 4.5.4.3, pp. 292-293.

⁹¹ Sonoma Valley GSP, Section 4.5.2.1, pp. 278-281.

water supply wells (i.e., domestic wells, irrigation wells, public supply wells, and industrial wells) located within the vicinity of each potential representative monitoring point. The minimum threshold was set at the 98th percentile shallowest supply well depth, plus a saturated thickness factor of 10 feet in the shallow aquifer and 50 feet in the deep aquifer, for wells located in the vicinity of the representative monitoring point.⁹² The GSP does not disclose the total number of wells that fall outside of the 98th percentile that could be potentially impacted. Additionally, the GSP does not describe how the 10-foot and 50-foot saturated thickness values were established. Department staff conclude that including this information in the GSP will provide additional technical details supporting the description of how the GSA established the sustainable management criteria for chronic lowering of groundwater levels (see [Recommended Corrective Action 2](#)).

The methodology for the drought buffer was based on either historical 4-year declines during historically dry periods or simulated declines for wells with less than 10 years of data. The drought buffer was then subtracted from the historical lows. The calculated drought buffers range from 4 to 22 feet.⁹³

The final established minimum threshold value for each representative monitoring point was based on the shallower of the historical low groundwater level with the drought buffer, or the calculated well impact depth in the vicinity of the monitoring point. The historical low groundwater level minus the 4-year drought buffer was used as the minimum threshold for all 13 of the representative monitoring points in the shallow aquifer system. For the 10 representative monitoring points in the deep aquifer system, the well impact depth was used as the minimum threshold in three monitoring points while the historical low groundwater level minus the 4-year drought buffer was used for the remaining seven monitoring points.⁹⁴

The measurable objective for representative monitoring sites with stable conditions is established at the historical median spring groundwater elevation. The GSP explains that for representative monitoring points that have stable long-term groundwater level trends the goal is to maintain groundwater levels within the historical range. For representative monitoring points that have historical groundwater level declines, the goal is to stabilize and reverse the declining trends. The measurable objectives for representative monitoring points with declining trends are set at the median spring groundwater level that occurred prior to 2010.⁹⁵ The GSP states that the interim milestones are based on recent and historical groundwater levels and are effectively equivalent to the measurable objectives in monitoring points with stable conditions. Interim milestones in monitoring points with declining conditions are initially set at current spring conditions for the first 5-years of implementation.⁹⁶

⁹² Sonoma Valley GSP, Section 4.5.2.1, p. 281.

⁹³ Sonoma Valley GSP, Section 4.5.2.1, p. 282.

⁹⁴ Sonoma Valley GSP, Section 4.5.2.1, pp. 282-285.

⁹⁵ Sonoma Valley GSP, Section 4.5.3.1, p. 290.

⁹⁶ Sonoma Valley GSP, Section 4.5.3.2, p. 290.

Department staff conclude that the sustainable management criteria for groundwater levels are commensurate with the understanding of current conditions, responsive to interested party feedback, and reasonably protective of the groundwater uses and users in the Subbasin. The approach to maintain stable groundwater level conditions in wells with no history of declines and maintain recovering trends in wells that have had historical declining water levels is a reasonable approach that will help avoid a significant and unreasonable depletion of supply in the Subbasin. The Plan provides a credible and sufficient assessment of the impacts the minimum thresholds would have on supply wells – including domestic wells – by evaluating the well impact depth and comparing that to the historical low with a drought factor to establish the minimum thresholds at individual representative monitoring points. However, as highlighted in the recommended corrective actions above, the GSP should include some additional supporting technical details that provides further description as to how the minimum thresholds will help the GSA achieve its sustainability goal and avoid undesirable results.

4.3.2.2 Reduction of Groundwater Storage

The GSP Regulations require the minimum threshold for the reduction of groundwater storage to be a total volume of groundwater that can be withdrawn from the Subbasin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the Subbasin, calculated based on historical trends, water year type, and projected water use in the Subbasin.⁹⁷

The GSP describes a significant and unreasonable reduction of groundwater storage as conditions that would result in “impacts on long-term sustainable beneficial use of groundwater in the basin, as caused by: long-term reduction in groundwater storage; and pumping exceeding the sustainable yield.”⁹⁸

The GSP states that “based on well-established hydrogeologic principles, stable groundwater elevations maintained above the minimum threshold will indicate that groundwater storage is not being depleted.” The GSP further describes that chronic lowering of groundwater levels criteria and representative monitoring points will be used as a proxy for groundwater storage sustainable management criteria.⁹⁹ The GSP quantitatively defines an undesirable result as when 20 percent of the representative monitoring points in either of the principal aquifer systems exceed the groundwater level minimum threshold for three consecutive fall measurements.¹⁰⁰ Additionally, the GSP states that the measurable objectives and interim milestones are the same as those established for the chronic lowering of groundwater.¹⁰¹

⁹⁷ 23 CCR § 354.28(c)(2).

⁹⁸ Sonoma Valley GSP, Section 4.6.1, p. 293.

⁹⁹ Sonoma Valley GSP, Section 4.6.2, p. 293.

¹⁰⁰ Sonoma Valley GSP, Section 4.6.4.1, p. 295.

¹⁰¹ Sonoma Valley GSP, Section 4.6.3, p. 295.

The GSP explains that the effects of the reduction of storage minimum thresholds on beneficial uses and users are the equivalent to the potential effects caused by the chronic lowering of groundwater levels.

The measurable objective for the change in storage sustainability indicator was defined using groundwater levels as a proxy. Thus, the change in storage measurable objective is equivalent to the chronic lowering of groundwater levels measurable objective. While groundwater levels are used as a proxy instead of using the total volume of groundwater extracted, the measurable objectives will require that groundwater levels either increase or are maintained at their current levels. The measurable objectives will necessitate that extraction within the Subbasin will remain within the estimated sustainable yield.¹⁰²

Based on review of the materials referenced in the GSP, staff conclude that the GSP's discussion and presentation of information related to significant and unreasonable reduction of groundwater storage, including the rationale that maintaining stable groundwater levels indicates groundwater storage is not being reduced, covers the specific items listed in the GSP Regulations in an understandable format using appropriate data.

4.3.2.3 Seawater Intrusion

The GSP Regulations require the minimum threshold for seawater intrusion to be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results.¹⁰³

The San Pablo Bay borders the Baylands area in the southern portion of the Subbasin. This area contains brackish groundwater and, according to the GSP, the interface between seawater and freshwater is not clearly defined due to significant data gaps.¹⁰⁴ The GSP states that the limited number of agricultural and residential production wells in the Baylands area have been influenced by the San Pablo Bay and have been pumping brackish groundwater for decades indicating that beneficial users have not been impacted by the brackish groundwater. While the GSP states current conditions related to seawater intrusion are not considered significant and unreasonable, the GSP acknowledges that there are significant data gaps due to the lack of groundwater quality data and well construction information in this area.¹⁰⁵

The GSP considers any seawater intrusion inland of areas of existing brackish groundwater that may affect beneficial uses of groundwater to be a significant and unreasonable condition. The GSP states that an undesirable result occurs when the following two conditions are experienced:

¹⁰² Sonoma Valley GSP, Section 4.6.3, p. 295.

¹⁰³ 23 CCR § 354.28(c)(3).

¹⁰⁴ Sonoma Valley GSP, Section 4.7, p. 296.

¹⁰⁵ Sonoma Valley GSP, Section 4.7.1, p. 297.

1. Three consecutive years of minimum threshold exceedances (exceedances occur when monitoring data indicate that the current extent of groundwater with 250 mg/L of chloride is inland relative to the minimum threshold contour).
2. The minimum threshold is determined to be caused by groundwater pumping.

The GSA explains that three years of minimum threshold exceedances defines an undesirable result due to significant uncertainty related to the extent of the chloride isocontour in the Baylands area and to account for chloride fluxes related to conditions other than groundwater pumping.¹⁰⁶ Based on the contents of the GSP, Department staff conclude that the GSP describes the potential causes of seawater intrusion undesirable results and the possible effects on beneficial uses and users.

The GSP establishes the minimum threshold for seawater intrusion at the 250 mg/L chloride isocontour for both principal aquifers in the southern portion of the Subbasin that abuts the San Pablo Bay. The GSP states that the 250 mg/L chloride isocontour is interpolated from existing groundwater monitoring data from various programs with differing sample collection timeframes. The GSP defines this contour as being representative of current conditions and relates the minimum threshold to other sustainability indicators and beneficial uses and users.¹⁰⁷

The GSP acknowledges that there are data gaps related to defining the 250 mg/L chloride concentration isocontour due to a limited amount of monitoring in the Baylands area. The GSP also states that understanding the potential impacts resulting from climate change (i.e., sea level rise) will be incorporated into filling data gaps associated with sea water intrusion.¹⁰⁸

The GSP establishes the measurable objective as the same criteria as the minimum threshold (i.e., 250 mg/L chloride isocontour). The interim milestones are described as current conditions being that the measurable objective is set at the current chloride isocontour.¹⁰⁹

Department staff conclude that the GSP justifies the sustainable management criteria using the best available information. Department staff encourage the GSA to refine their minimum thresholds in future updates to the GSP as new data and information are acquired.

4.3.2.4 Degraded Water Quality

The GSP Regulations require the minimum threshold for degraded water quality to be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations

¹⁰⁶ Sonoma Valley GSP, Section 4.7.4.1, pp. 302-304.

¹⁰⁷ Sonoma Valley GSP, Section 4.7.2, p. 298-302

¹⁰⁸ Sonoma Valley GSP, Section 4.7, p. 297.

¹⁰⁹ Sonoma Valley GSP, Section 4.7.3, p. 302.

of constituents determined by the Agency to be of concern for the Subbasin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the Subbasin.¹¹⁰

The GSP defines significant and unreasonable water quality conditions as “an increase in concentrations of constituents of concern due to either: GSA implementation of projects and management action or undesirable results occurring from other sustainability indicators.”¹¹¹ Three constituents of concern – arsenic, nitrate, and TDS – were identified in the GSP based on three criteria including, whether the constituents have an established water quality standard, whether the constituents have occurred in the Subbasin above the established standard, and whether the constituent is present throughout the Subbasin. The GSP explains that point source contaminants are not observed on a regional extent and are regulated and monitored through other regulatory programs, so the GSP does not consider localized point source contaminants constituents of concern in the GSP. The GSP states the GSA will coordinate with other regulatory agencies to evaluate water quality conditions.¹¹²

The GSP states a water quality undesirable result occurs if “during 2 consecutive years a single groundwater quality [minimum threshold] is exceeded when computing annual averages at the same well, as a direct result of projects or management actions taken as part of GSP implementation.”¹¹³ The GSP further provides a process the GSA will employ to evaluate whether the minimum threshold exceedances are associated with GSP implementation, including assessment of the spatial relationships between the exceedances and GSA projects and whether other sustainability indicator minimum thresholds have been exceeded. The GSP describes the potential causes of undesirable results and the possible effects on beneficial users and land use if undesirable results were to occur.¹¹⁴

The GSP establishes minimum thresholds based on a number of supply wells exceeding the water quality standard for the constituents of concern. The supply wells are described as public supply wells where the constituents of concern will be monitored against the maximum contaminant level or secondary maximum contaminant level. The GSP explains that a review of available data between 2015 and 2020 provided the total number of wells that had existing maximum contaminant exceedances. The GSP further states that the minimum threshold for each of the three constituents of concern – arsenic, nitrate, and TDS – is established at one additional supply well exceeding the associated standard. For example, the GSPs analysis of water quality data between 2015 and 2020 indicated 11 wells had exceeded the regulatory standard for arsenic (i.e., the maximum

¹¹⁰ 23 CCR § 354.28(c)(4).

¹¹¹ Sonoma Valley GSP, Section 4.8.1, p. 305.

¹¹² Sonoma Valley GSP, Section 4.8.1, p. 305.

¹¹³ Sonoma Valley GSP, Section 4.8.4.1, p. 315.

¹¹⁴ Sonoma Valley GSP, Section 4.8.4.2, pp. 315-316.

contaminant level); therefore, the minimum threshold is established at 12 wells exceeding the regulatory standard.

The GSP states that minimum thresholds will maintain adequate groundwater quality suitable for irrigation purposes because individual thresholds are set below water quality objectives known to be harmful to crops associated with the Subbasin. The GSP also explains the minimum thresholds' relationship with the other sustainability indicators, the possible effects on neighboring basins, and beneficial uses and users in the Subbasin.

The measurable objectives for degraded water quality are established at the total number of wells exceeding the regulatory standard for each constituent of concern from 2015 to 2020. The GSP states that the measurable objective "is to have zero additional supply wells exceeding the applicable [maximum contaminant level] or [secondary maximum contaminant level] for any of the constituents of concern." The GSP states that eleven wells exceeded the arsenic standard, one well exceeded the nitrate standard, and two wells exceeded the TDS standard. The GSP therefore sets the measurable objects at eleven wells with exceedances for arsenic, one well with exceedances for nitrate, and two well with exceedances for TDS.¹¹⁵

Based on review of the GSP's discussion of the established sustainable management criteria, Department staff conclude that the GSP's discussion and presentation of information on degradation of water quality covers the specific items listed in the regulations in an understandable format using appropriate data.

4.3.2.5 Land Subsidence

The GSP Regulations require the minimum threshold for land subsidence to be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results.¹¹⁶ Minimum thresholds for land subsidence shall be supported by identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the Subbasin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency's rationale for establishing minimum thresholds in light of those effects, and maps and graphs showing the extent and rate of land subsidence in the Subbasin that defines the minimum thresholds and measurable objectives.¹¹⁷

The GSP states that available State-wide datasets do not indicate the occurrence of inelastic land surface subsidence due to groundwater extraction within the Subbasin. Additionally, no local stakeholders have reported damage to infrastructure or modified drainage patterns due to subsidence. The GSP defines significant and unreasonable subsidence as any rate of future inelastic subsidence caused by groundwater pumping.¹¹⁸

¹¹⁵ Sonoma Valley GSP, Table 4-7 and Section 4.8.3, pp. 312 and 314.

¹¹⁶ 23 CCR § 354.28(c)(5).

¹¹⁷ 23 CCR § 354.28(c)(5)(A-B).

¹¹⁸ Sonoma Valley GSP, Section 4.9.1, p. 317.

The GSP states that “a land subsidence undesirable results will occur if:

- The land subsidence minimum threshold of 0.1 foot of total subsidence is exceeded over a geographic area of 50 acres in a single year; of
- Cumulative total subsidence of 0.2 foot is exceeded over a geographic area of 50 acres within a 5-year period; and
- The minimum threshold exceedance is determined to be correlated with: (1) groundwater pumping and (2) a minimum threshold exceedance of the chronic lowering of groundwater levels sustainable management criteria.”

The GSP’s goal for land subsidence is zero inelastic subsidence, which would be measured by satellite via InSAR. However, the GSP describes that InSAR contains a 0.1-foot potential error in its data processing, therefore the GSP establishes the minimum threshold for land subsidence at 0.1 feet per year of inelastic subsidence for approximately 2.5-acre grids throughout the Subbasin.¹¹⁹

The GSP defines the measurable objective for land subsidence in the Subbasin as the minimum threshold, given that the zero-subsidence related to groundwater extraction is the minimum threshold. The interim milestones for the land subsidence sustainability indicator are identical to the measurable objectives and minimum threshold.¹²⁰

Department staff conclude that the GSP adequately establishes sustainable management criteria to manage land subsidence. Department staff also believe the Agency uses the best information and science available at the time of Plan development.

4.3.2.6 Depletions of Interconnected Surface Water

SGMA defines undesirable results for the depletions of interconnected surface water as those that have significant and unreasonable adverse impacts on beneficial uses of surface water and are caused by groundwater conditions occurring throughout the Subbasin.¹²¹ The GSP Regulations require that a Plan identify the presence of interconnected surface water systems in the Subbasin and estimate the quantity and timing of depletions of those systems.¹²² The GSP Regulations further require that minimum thresholds be set based on the rate or volume of surface water depletions caused by groundwater use, supported by information including the location, quantity, and timing of depletions, that adversely impact beneficial uses of the surface water and may lead to undesirable results.¹²³

The Plan acknowledges the presence of interconnected surface waters in the Subbasin and identifies their location using historical monitoring data of groundwater elevation, streambed elevations, stream gauging data and seepage runs.¹²⁴ The GSA describes

¹¹⁹ Sonoma Valley GSP, Section 4.9.2, pp. 317-318.

¹²⁰ Sonoma Valley GSP, Section 4.9.3, p. 320.

¹²¹ Water Code § 10721(x)(6).

¹²² 23 CCR § 354.16 (f).

¹²³ 23 CCR § 354.28 (c)(6).

¹²⁴ Sonoma Valley GSP, Appendix 3-D. Page 701.

using a conservative approach to combine this information to predict where interconnected surface waters are likely to occur. Department staff are satisfied that the GSA has adopted a reasonable approach to identify the location of interconnected surface waters in the Subbasin.

The GSP does not quantify the rate or volume of depletions due to groundwater pumping. Instead, the GSP describes a methodology to correlate shallow near-stream groundwater levels with simulated stream depletion. The GSP further proposes initial sustainable management criteria based on the evaluated shallow near-stream groundwater levels as a proxy for the rate and volume of depletions. In addition, the Plan describes an adaptive management approach for developing new information and data to refine the initial sustainable management criteria in the first few years of Plan implementation. The GSP explains the approach to managing depletions was informed by two practitioner groups organized by the GSA that helped to (1) map and understand GDEs in the Subbasin; and (2) establish the quantitative metrics for the initial sustainable management criteria and identify areas for developing new information and data that will improve the management criteria.¹²⁵

The GSP describes significant and unreasonable depletions of interconnected surface water occurs when “surface water depletion, caused by groundwater pumping within the Subbasin, exceeds historical depletion or adversely impacts the viability of GDEs or other beneficial users of surface water.”¹²⁶ The GSP states that the goal of the sustainable management criteria is to maintain groundwater levels above the levels observed during the recent historical period (i.e., 2004 to 2018) in which the largest volume of depletions occurred (i.e., 2014 to 2016).¹²⁷ The GSP further describes the process to develop the sustainable management criteria based on model simulations and statistical correlation which support the GSPs goal of maintaining conditions so that estimated depletion rates and volumes do not reach the quantity estimated during the 3 years between 2014 and 2016. The GSP does not, however, describe the magnitude or effect of those historical depletions on beneficial uses and users.

According to the GSP, an undesirable result related to the depletion of interconnected surface water occurs when the minimum threshold is exceeded in 40 percent of wells during dry years or in 10 percent of wells during normal and wet years and is determined to be associated with groundwater pumping. The GSP explains that differentiating between dry years and normal and wet years is necessary to help avoid higher levels of depletions that have been observed in dry years from occurring in wet or normal years. The Plan also states that an exceedance of a minimum threshold in a single representative monitoring point will initiate an investigation to determine if the GSA should implement actions to avoid the potential occurrence of undesirable results.¹²⁸ The steps

¹²⁵ Sonoma Valley GSP, Section 4.10, pp. 322-323.

¹²⁶ Sonoma Valley GSP, Section 4.10.1, p. 323.

¹²⁷ Sonoma Valley GSP, Section 4.10.2.1, p. 325.

¹²⁸ Sonoma Valley GSP, Section 4.10.4.1, pp. 329-330.

related to the investigation of a single minimum threshold exceedance includes a review of the entire groundwater level monitoring network to assess the extent of declining levels, review climatic data, assess changes in groundwater extraction, and engage with stakeholders to share information.¹²⁹

The GSP describes the process to establish the sustainable management criteria in four steps: demonstrating correlation between shallow groundwater levels and surface water depletion; methodology for establishing groundwater levels as a proxy for minimum thresholds and measurable objectives; description of quantitative undesirable results; and evaluation of future improvements to refine the sustainable management criteria.

To demonstrate correlation between shallow groundwater levels and surface water depletions the GSP describes model simulations to isolate stream flow depletion by subtracting pumping scenarios from non-pumping scenarios near each of the representative monitoring points. The estimated amount of depletion based on the SVIGFM simulations were then evaluated against the groundwater levels in the representative monitoring points to calculate a coefficient of determination value (R-squared value). If the R-squared value was greater than 0.60 then the water levels and surface water depletions at the representative monitoring point were determined to be “sufficiently correlated.” As indicated in the GSP and discussed in some public comments, there are two representative monitoring points that show a poor correlation between groundwater levels and stream depletion which the GSP attributes to insufficiencies in the model for those locations and states the GSA will focus on improving the representation of those areas in the model.¹³⁰ The remaining eight of the ten representative monitoring points showed adequate correlation based on the GSPs analysis (i.e., R-squared value >0.60).¹³¹

The minimum thresholds were established in the GSP by evaluated simulated streamflow from 2004 to 2018 using a Subbasin-wide pumping versus non-pumping scenario at the most-downstream representative monitoring location along Sonoma Creek. The simulation results provided an aggregate of the total surface water depletion by year that had occurred in the Subbasin. The aggregate depletion volumes were then used to evaluate the years with the largest amount of simulated depletion (i.e., 2014, 2015, and 2016).¹³² As mentioned above, the minimum thresholds in the shallow near-stream groundwater monitoring wells were established to avoid the water level conditions observed in the 2014 to 2016 time period identified as having the greatest amount of estimated historical depletions. The GSP clarifies that the shallow representative monitoring points were installed in fall 2019 which limits the evaluation of dry-season groundwater levels in some dedicated monitoring points. The GSP further describes a process to use “match points” to interpolate historical dry-season groundwater levels from

¹²⁹ Sonoma Valley GSP, Section 4.10.4.2, pp. 330-331.

¹³⁰ Sonoma Valley GSP, Appendix 4-D, pp. 1173-1174.

¹³¹ Sonoma Valley GSP, Appendix 4-D, p. 1213.

¹³² Sonoma Valley GSP, Appendix 4-D, p. 1174.

adjacent wells with longer periods of record to establish the minimum threshold groundwater level in the representative monitoring points. The minimum threshold value in the shallow representative monitoring points was then established using a “percentile-ranking of historical dry-season groundwater levels” which generally resulted in the minimum threshold value being set relative to the 2019 and 2020 groundwater levels. Department staff understand that the representative monitoring points do not have sufficient data, however Department staff do not fully understand – from what is presented in the GSP – how the percentile-ranking is developed and applied to inform establishing minimum thresholds (see [Recommended Corrective Action 3a](#)).

The measurable objective for representative monitoring sites with stable conditions is established at the historical median spring groundwater elevation, as the goal is to maintain groundwater within the historical range in these areas. The GSP explains that for representative monitoring points that have stable long-term groundwater level trends, the goal is to maintain groundwater levels within the historical range. For representative monitoring points that have historical groundwater level declines, the goal is to stabilize and reverse the declining trends. The measurable objectives for representative monitoring points with declining trends are set at the median spring groundwater level that occurred prior to 2010.¹³³ The GSP states that the interim milestones are based on recent and historical groundwater levels and are effectively equivalent to the measurable objectives in monitoring points with stable conditions. Interim milestones in monitoring points with declining conditions are initially set at current spring conditions for the first 5-years of implementation.¹³⁴

The GSP describes an adaptive management approach to address data gaps that will inform the improvement and refinement of the initial sustainable management criteria. The adaptive management approach is broken out into two groups: characterization of cause and effect of depletions; and monitoring network improvements and special studies. The characterization of depletions activities includes the improvement of data and information from wells and stream diversions, focused numeric model calibration of surface water and groundwater interaction, and better understanding of GDEs. The monitoring networks and special studies include additional shallow monitoring wells and stream gauges, geophysical surveys, and geomorphic and habitat assessments. The Plan also provides a description of the future methodology the GSA intends to implement prior to the first periodic update, including developing a modeling framework to isolate impacts of groundwater pumping on stream flow, improving correlation between groundwater levels and depletions, and refining the process for setting groundwater levels as a proxy for minimum thresholds.

As mentioned, the GSP identifies several data gaps and future methodologies that will improve the GSA’s understanding of the timing and location of interconnectivity including incorporating data collected from the dedicated representative monitoring points installed

¹³³ Sonoma Valley GSP, Section 4.5.3.1, p. 290.

¹³⁴ Sonoma Valley GSP, Section 4.5.3.2, p. 290.

in 2019 into the process and limiting the need to use adjacent wells to inform the minimum threshold value.¹³⁵ Department staff encourage addressing those data gaps to the extent that they can improve the GSAs overall understanding of the conditions leading to depletions in the Subbasin.

Department staff understand that quantifying depletions of surface water from groundwater extractions is a complex task that likely requires developing new, specialized tools, models, and methods to understand local hydrogeologic conditions, interactions, and responses. During the initial review of GSPs, Department staff have observed that most GSAs have struggled with this new requirement of SGMA. However, staff believe that most GSAs will more fully comply with regulatory requirements after several years of Plan implementation that includes projects and management actions to address the data gaps and other issues necessary to understand, quantify, and manage depletions of interconnected surface waters. Department staff further advise that at this stage in SGMA implementation it is appropriate to approve Plans with recommended corrective actions to address deficiencies related to interconnected surface water depletion where GSAs are still working to fill data gaps related to interconnected surface water and where these data will be used to inform plan components that will be subject to future review. Accordingly, Department staff believes that affording GSAs adequate time to refine their Plans to address interconnected surface waters is appropriate and remains consistent with SGMA's timelines and local control preferences.

The Department will continue to support GSAs in this regard by providing, as appropriate, financial and technical assistance to GSAs, including the development of guidance describing appropriate methods and approaches to evaluate the rate, timing, and volume of depletions of interconnected surface water caused by groundwater extractions. Once the Department's guidance related to depletions of interconnected surface water is publicly available, the GSA, where applicable, should consider incorporating appropriate guidance approaches into their future periodic updates to the GSP ([See Recommended Corrective Action 3b](#)). GSAs should consider availing themselves of the Department's financial or technical assistance, but in any event must continue to fill data gaps, collect additional monitoring data, and implement strategies to better understand and manage depletions of interconnected surface water caused by groundwater extractions and define segments of interconnectivity and timing within their jurisdictional area ([See Recommended Corrective Action 3c](#)). Furthermore, GSAs should coordinate with local, state, and federal resources agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion ([See Recommended Corrective Action 3d](#)).

4.4 MONITORING NETWORK

The GSP Regulations describe the monitoring network that must be developed for each Subbasin including monitoring objectives, monitoring protocols, and data reporting

¹³⁵ Sonoma Valley GSP, Appendix 4-D, p. 1176.

requirements. Collecting monitoring data of a sufficient quality and quantity is necessary for the successful implementation of a groundwater sustainability plan. The GSP Regulations require a monitoring network of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the Subbasin and evaluate changing conditions that occur through implementation of the Plan. Specifically, a monitoring network must be able to monitor impacts to beneficial uses and users, monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds, capture seasonal low and high conditions, include required information such as location and well construction and include maps and tables clearly showing the monitoring site type, location, and frequency. Department staff encourage GSAs to collect monitoring data as specified in the GSP, fill data gaps identified in the GSP prior to the first periodic update, update monitoring network information as needed, follow monitoring best management practices, and submit all monitoring data to the Department's Monitoring Network Module immediately after collection including any additional groundwater monitoring data that is collected within the Plan area that is used for groundwater management decisions. Department staff note that if GSAs do not fill their identified data gaps, the GSA's Subbasin understanding may not represent the best available science for use to monitor Subbasin conditions.

The GSP has identified 107 monitoring wells within the contributing watershed area to include in the groundwater level monitoring network with 66 of the 107 wells located within the Subbasin with 34 wells screened in the shallow aquifer system and 32 wells screened in the deep aquifer system.¹³⁶ A total of 23 wells are used as representative monitoring points. As described in GSP's hydrogeologic conceptual model, two principal aquifers have been defined; the shallow aquifer system and the deep aquifer system.¹³⁷ The GSP states that the shallow aquifer system ranges in depth up to 220 feet below ground surface and the deep aquifer system is generally present below approximately 400 feet below ground surface and is separated from the shallow aquifer system by aquitards.¹³⁸

The GSP proposes to use the groundwater level monitoring network as a proxy for the groundwater storage monitoring network because changes in groundwater storage are directly dependent on changes in groundwater levels.¹³⁹

The GSP identifies one multi-completion monitoring well and nine potential public water supply wells to be included in the seawater intrusion monitoring network which are all approximately 1 mile from the Baylands tidal marsh area.¹⁴⁰ The GSP proposes to monitor the spatial distribution of saline groundwater through semi-annual chloride sampling and groundwater level monitoring.¹⁴¹

¹³⁶ Sonoma Valley GSP, Section 5.2.1.2, pp. 337-338.

¹³⁷ Sonoma Valley GSP, Section 3.1.5, pp. 140-149.

¹³⁸ Sonoma Valley GSP, Section 3.1.5.1, p. 141 and Section 3.1.5.2, p. 145.

¹³⁹ Sonoma Valley GSP, Section 4.6, p. 293.

¹⁴⁰ Sonoma Valley GSP, Section 5.2.5, p. 350 and Figure 5-3, p. 351.

¹⁴¹ Sonoma Valley GSP, Section 5.2.5, p. 350.

The GSP states that Sonoma Valley Sanitation District's Salt and Nutrient Management Plan (SNMP) monitoring network and public supply wells regulated by the California State Water Resources Control Board's Division of Drinking Water (DDW) will make up the groundwater quality monitoring network.¹⁴² The GSP states that both monitoring programs have differing constituents that are sampled with DDW wells analyzed for arsenic, nitrate, and TDS and SNMP wells analyzed for nitrate, conductivity, and TDS.¹⁴³

The GSP states that in addition to utilizing Interferometric Synthetic Aperture Radar (InSAR) data, three continuous global positioning system (GPS) sites will be included in the monitoring network.¹⁴⁴ Two GPS sites are located within the Subbasin and one site is located in the upper watershed outside of the Subbasin.

The GSP has identified 17 shallow stream-adjacent monitoring wells to include in the monitoring network for depletions of interconnected surface water.¹⁴⁵ Each of the shallow stream-adjacent monitoring wells contains a pressure transducer to collect temperature and groundwater level data on hourly intervals. The shallow monitoring wells on the network are adjacent to Sonoma Creek and its tributaries in the central portion of the Subbasin. The monitoring network also includes three United States Geological Survey (USGS) stream gages and two Sonoma Water stream gages.¹⁴⁶ Four stream gages collect continuous data, and one stream gage is seasonally operated from October to April. Three of the stream gages have an adjacent shallow monitoring well.¹⁴⁷ The three stream gages that have adjacent shallow monitoring wells include the USGS stream gage in Sonoma Creek at Aqua Caliente, the OneRain stream gage in Sonoma Creek downstream of Calabazas Creek, and the OneRain stream gage in Nathanson Creek.

The description of the monitoring network included in the Plan substantially complies with the requirements outlined in the GSP Regulations. Overall, the Plan describes in sufficient detail a monitoring network that promotes the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the Subbasin and evaluate changing conditions that occur through Plan implementation. The monitoring network appears to be supported by the best available information and data and is designed to ensure adequate coverage of sustainability indicators. The Plan also describes existing data gaps and the steps that will be taken to fill data gaps and improve the monitoring network prior to the next five-year assessment. Department staff consider the information presented in the Plan to satisfy the general requirements of the GSP Regulations regarding the monitoring network.

While the information included in the GSP for the monitoring network does not preclude plan approval, Department staff have identified multiple recommended corrective actions

¹⁴² Sonoma Valley GSP, Section 5.2.2, p. 338.

¹⁴³ Sonoma Valley GSP, Section 5.2.2, p. 338.

¹⁴⁴ Sonoma Valley GSP, Section 5.2.4, p. 350.

¹⁴⁵ Sonoma Valley GSP, Section 5.2.3, p. 347 and Appendix 3-D, pp. 700-713.

¹⁴⁶ Sonoma Valley GSP, Section 5.2.3, p. 347 and Table 5-2, p. 348.

¹⁴⁷ Sonoma Valley GSP, Section 5.2.3, Table 5-2, p. 348.

for further improvement of the Plan. The GSP provides a robust monitoring network that will monitor the sustainability indicators and assist in achieving the sustainability goal; however, there are some components of the GSP Regulations which the GSP does not address.

The GSP provides maps¹⁴⁸ identifying the location of the representative monitoring sites for degradation of water quality, and representative monitoring sites have been identified in the monitoring network module; however, the GSP does not report, in tabular format, the monitoring site type or measurement frequency for the degraded water quality monitoring sites as required by the GSP Regulations¹⁴⁹. Providing this information will provide the Department additional clarity on how other water quality programs are being leveraged by the Subbasin to comply with the requirements of the GSP Regulations and SGMA (see [Recommended Corrective Action 4](#)).

The GSP Regulations require GSPs to provide specific information about each monitoring site per the data and reporting standards.¹⁵⁰ As an example, well construction information is required for monitoring sites, but is not provided for wells in the seawater intrusion and degraded water quality monitoring networks. It is imperative the GSA work to ensure the information defining the monitoring network is consistent within the GSP, consistent with the Department's Monitoring Network Module, and follow the data and reporting standards. Department staff recommend the GSA reconcile the details of the monitoring network provided in the GSP with the requirements of the data and reporting standards in the GSP Regulations (see [Recommended Corrective Action 5](#)).

4.5 PROJECTS AND MANAGEMENT ACTIONS

The GSP Regulations require a description of the projects and management actions the submitting agency has determined will achieve the sustainability goal for the Subbasin, including projects and management actions to respond to changing conditions in the Subbasin.¹⁵¹

The Sonoma Valley Groundwater Subbasin Groundwater Sustainability Plan proposes four projects organized in three groups (1, 2a, and 2b) and two management actions (also referred to as Group 3) that the GSA could undertake to maintain, mitigate, or reach sustainability. Group 1 projects include voluntary, incentive-based water-use efficiency projects focused on non-municipal groundwater users that includes programs such as turf removal, rainwater harvesting, and irrigation efficiency practices and alternate water source projects that include recycled water deliveries to recent rural domestic and agricultural customers for existing contracts. Group 2a projects expand upon the Group 1 projects by increasing the area for recycled water deliveries and adding managed aquifer recharge sites and Group 2b projects represent additional managed aquifer

¹⁴⁸ Sonoma Valley GSP, Figures 5-5 and 5-6, pp. 358-359.

¹⁴⁹ 23 CCR § 354.34(h).

¹⁵⁰ 23 CCR § 352.4; 354.34(g)(2).

¹⁵¹ 23 CCR § 354.44 et seq.

recharge projects.¹⁵² The Management Actions presented in the GSP include two projects, the development of potential policy options and the coordination of farm plans. Potential policy options provide a host of options such as manage demand net-zero groundwater use for future development, several changes to wells that include additional criteria for review, well ordinance improvements that includes construction and well metering.¹⁵³

The Plan adequately describes proposed projects and management actions in a manner that is generally consistent and substantially complies with the GSP Regulations.¹⁵⁴ Department staff conclude that the projects and management actions, which focus largely on conservation and efficiency; recycled water efforts; increasing groundwater in storage through recharge; and increasing non-groundwater water supply, are directly related to the sustainable management criteria and present a generally feasible approach to achieving the sustainability goal of the Subbasin.

4.6 CONSIDERATION OF ADJACENT BASINS/SUBBASINS

SGMA requires the Department to "...evaluate whether a groundwater sustainability plan adversely affects the ability of an adjacent basin to implement their groundwater sustainability plan or impedes achievement of sustainability goals in an adjacent basin."¹⁵⁵ Furthermore, the GSP Regulations state that minimum thresholds defined in each GSP be designed to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.¹⁵⁶

The Sonoma Valley Subbasin has three adjacent basins/subbasins: Petaluma Valley, Kenwood Valley, and Napa-Sonoma Lowlands. The Kenwood Valley Basin and Napa-Sonoma Lowlands Subbasin are designated very-low priority basins and are not required to be managed under a GSP. The Plan includes an analysis of potential impacts to adjacent basins with the defined minimum thresholds for each sustainability indicator. The Plan does not anticipate any impacts to adjacent basins resulting from the minimum thresholds defined in the Plan.

4.7 CONSIDERATION OF CLIMATE CHANGE AND FUTURE CONDITIONS

The GSP Regulations require a GSA to consider future conditions and project how future water use may change due to multiple factors including climate change.¹⁵⁷

Since the GSP was adopted and submitted, climate change conditions have advanced faster and more dramatically. It is anticipated that the hotter, drier conditions will result in a loss of 10% of California's water supply. As California adapts to a hotter, drier climate,

¹⁵² Sonoma Valley GSP, Section 6.3, p. 385.

¹⁵³ Sonoma Valley GSP, Section 6.4.1, pp. 390-391.

¹⁵⁴ 23 CCR §§ 354.44 (a), 354.44 (b), 354.44 (c), 354.44 (d).

¹⁵⁵ Water Code § 10733(c).

¹⁵⁶ 23 CCR § 354.28(b)(3).

¹⁵⁷ 23 CCR § 354.18.

GSAAs should be preparing for these changing conditions as they work to sustainably manage groundwater within their jurisdictional areas. Specifically, the Department encourages GSAAs to explore how the proposed groundwater level thresholds have been established in consideration of groundwater level conditions in the Subbasin based on current and future drought conditions. The Department encourages GSAAs to also explore how groundwater level data from the existing monitoring network will be used to make progress towards sustainable management of the Subbasin given increasing aridification and effects of climate change, such as prolonged drought. Lastly, the Department encourages GSAAs to continually coordinate with the appropriate groundwater users, including but not limited to domestic well owners and state small water systems, and the appropriate overlying county jurisdictions developing drought plans and establishing local drought task forces¹⁵⁸ to evaluate how the Agency’s groundwater management strategy aligns with drought planning, response, and mitigation efforts within the Subbasin.

5 STAFF RECOMMENDATION

Department staff recommend approval of the GSP with the recommended corrective actions listed below. The Sonoma Valley Subbasin GSP conforms with Water Code Sections 10727.2 and 10727.4 of SGMA and substantially complies with the GSP Regulations. Implementation of the GSP will likely achieve the sustainability goal for the Sonoma Valley Subbasin. The GSAAs have identified several areas for improvement of its Plan and Department staff concur that those items are important and should be addressed as soon as possible. Department staff have also identified additional recommended corrective actions that should be considered by the GSA for the first five-year assessment of its GSP. Addressing these recommended corrective actions will be important to demonstrate that implementation of the Plan is likely to achieve the sustainability goal. The recommended corrective actions include:

RECOMMENDED CORRECTIVE ACTION 1

The GSP’s undesirable results definition for chronic lowering of groundwater levels includes drought conditions stating that minimum threshold exceedances caused by “emergency operational issues or droughts that extend for longer than the 4-year drought factor incorporated into the minimum thresholds” will not contribute to an undesirable result unless the groundwater levels do not recover in proceeding hydrologically normal to wet years. The GSP, however, provides little discussion of the process, information, and data considered when presenting the discussion of what constitutes emergency operations. The GSP should provide further explanation and description related to what constitutes emergency operations. Additionally, the GSP should analyze the anticipated groundwater conditions that would lead to emergency operations and the potential effects on beneficial uses and users if conditions extend beyond the 4-year drought factor.

¹⁵⁸ Water Code § 10609.50.

RECOMMENDED CORRECTIVE ACTION 2

The minimum threshold for chronic lowering of groundwater levels was set at the 98th percentile shallowest supply well depth, plus a saturated thickness value of 10 feet. The GSP does not disclose the total number of wells that could be potentially impacted at the proposed minimum threshold. The GSA should more explicitly analyze and report the total number of wells that may be impacted by the proposed minimum thresholds. The GSA should also provide a description related to the spatial relationship of the potentially impacted wells and the representative monitoring point associated with each of the vicinity area polygons used for the statistical well impact depth analysis.¹⁵⁹

RECOMMENDED CORRECTIVE ACTION 3

Department staff understand that estimating the location, quantity, and timing of stream depletion due to ongoing, subbasin-wide pumping is a complex task and that developing suitable tools may take additional time; however, it is critical for the Department's ongoing and future evaluations of whether GSP implementation is on track to achieve sustainable groundwater management. The Department plans to provide guidance on methods and approaches to evaluate the rate, timing, and volume of depletions of interconnected surface water and support for establishing specific sustainable management criteria in the near future. This guidance is intended to assist GSAs to sustainably manage depletions of interconnected surface water.

In addition, the GSA should work to address the following items by the first periodic update:

- a. Elaborate on how the percentile-ranking in groundwater wells near the representative monitoring points was developed and applied to the minimum thresholds for depletions of interconnected surface water. The GSP should also provide an explanation, as part of the future methodology for refining the minimum thresholds, of how the measurements from the shallow near stream representative monitoring points and future data gap filling efforts will be interpreted to modify the initial sustainable management criteria. The explanation of how the newly acquired data will be applied to refining the minimum thresholds should include an assessment of how the observed conditions compare to the conditions in 2014, 2015, and 2016.
- b. Consider utilizing the interconnected surface water guidance, as appropriate, when issued by the Department to establish quantifiable minimum thresholds, measurable objectives, and management actions.
- c. Continue to fill data gaps, collect additional monitoring data, and implement the current strategy to manage depletions of interconnected surface water and define segments of interconnectivity and timing.
- d. Prioritize collaborating and coordinating with local, state, and federal regulatory agencies as well as interested parties to better understand the full suite of

¹⁵⁹ Sonoma Valley GSP, Appendix 5-B, pp. 1245-1246.

beneficial uses and users that may be impacted by pumping induced surface water depletion within the GSA's jurisdictional area.

RECOMMENDED CORRECTIVE ACTION 4

Define the monitoring site type and data collection frequency in tabular format for the degraded water quality monitoring network in the GSP.

RECOMMENDED CORRECTIVE ACTION 5

Conduct a reconciliation between the details of the monitoring network provided in the GSP with the requirements of the data and reporting standards in the GSP Regulations. Where requirements of the data and reporting standards are not provided, the GSA should include this information in the periodic update of the GSP. As a reminder, updates to the monitoring network must be reflected in the SGMA Portal's Monitoring Network Module.