CALIFORNIA DEPARTMENT OF WATER RESOURCES
SUSTAINABLE GROUNDWATER MANAGEMENT OFFICE
715 P Street, 8th Floor | Sacramento, CA 95814 | P.O. Box 942836 | Sacramento, CA 94236-0001

October 26, 2023

Guadalupe Rivera
Sutter County
1130 Civic Center Blouvard
Yuba City, CA 95993
grivera@co.sutter.ca.us

RE: Sacramento Valley – Sutter Subbasin - 2022 Groundwater Sustainability Plan

Dear Guadalupe Rivera,

The Department of Water Resources (Department) has evaluated the groundwater sustainability plan (GSP or Plan) submitted for the Sacramento Valley – Sutter 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 Sutter 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 periodic review of the Sutter Subbasin GSP no later than January 28, 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,

Paul Gosselin

Paul Gosselin
Deputy Director
Sustainable Groundwater Management

Attachment:

1. Statement of Findings Regarding the Approval of the Sacramento Valley – Sutter Subbasin Groundwater Sustainability Plan

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

STATEMENT OF FINDINGS REGARDING THE APPROVAL OF THE SUTTER 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 its 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 Butte Water District – Sutter Groundwater Sustainability Agency (GSA), City of Live Oak GSA, City of Yuba City GSA, County of Sutter GSA, Reclamation District No. 70 GSA, Reclamation District No. 1500 GSA, Reclamation District No. 1660 GSA, Sutter Extension Water District GSA, and Sutter Community Service District GSA (GSAs or Agencies) for the Sutter Subbasin (Basin No. 5-021.62).

Department management has discussed the Plan with staff and 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. 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 therefore **APPROVES** the Plan and makes the following findings:

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); 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 and issuance of an assessment 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 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 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 Subbasin under review.

C. In making these findings and Plan determination, the Department also recognized that: (1) the Department 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 Subbasin (with the possibility that the Department may grant GSAs an additional five years upon request if the GSAs have 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 23 CCR § 355.4, and appears likely to achieve the sustainability goal for the Subbasin. It does not appear at this time that the Plan will adversely

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

1. The sustainable management criteria to maintain water levels near the historical range of groundwater level conditions is reasonable. The overall groundwater level and storage conditions in the Subbasin are generally stable based on the information included in the GSP so the recommended corrective actions do not preclude plan approval. The Plan relies on credible information and science such as long-term groundwater level data, a reasonable understanding of aquifer properties, and an updated groundwater model 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 identified and provided reasonable measures to eliminate data gaps, including additional monitoring wells and data collection to better characterize Subbasin groundwater conditions. (23 CCR § 355.4(b)(2).)

3. The projects and management actions proposed are designed to maintain sustainability through an adaptive management strategy to ensure undesirable results do not occur. The projects and management actions are reasonable and commensurate with the level of understanding presented in the basin setting. The projects and management actions described in the Plan provide a feasible approach to achieving the Subbasin's sustainability goal and should provide the GSAs 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 groundwater supply wells and groundwater dependent ecosystems, would be impacted by the chosen minimum thresholds. (23 CCR § 355.4(b)(4).)

5. The Plan's projects and management actions appear feasible at this time and appear capable of preventing undesirable results and ensuring that the Subbasin is managed 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 ability of an adjacent basin to implement its GSP or impede achievement of sustainability goals in an adjacent basin. The Plan states that the Subbasin's minimum thresholds are generally comparable to those of the adjacent subbasins' and the GSAs will coordinate with adjacent subbasins to ensure that subbasin management activities do not cause undesirable results in either the Sutter Subbasin or adjacent subbasins. (23 CCR § 355.4(b)(7).)

8. Because a single plan was submitted for the Subbasin, a coordination agreement was not required. (23 CCR § 355.4(b)(8).)

9. The nine GSAs have historically managed large surface water canal systems or groundwater supplies for irrigation and municipal uses. The GSAs' history of groundwater management provide a reasonable level of confidence that the GSAs have the legal authority and financial resources necessary to implement the Plan. (23 CCR § 355.4(b)(9).)

10. Through review of the Plan and consideration of public comments, the Department determines that the GSAs 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).)

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

1. The Department developed its GSP Regulations consistent with and intending to further the State's human right to water 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 in its evaluation of the Plan. (Water Code § 106.3; 23 CCR § 350.4(g).)

2. The Plan acknowledges and identifies interconnected surface waters within the Subbasin. The GSAs propose initial sustainable management criteria to manage this sustainability indicator and measures to improve understanding and management of interconnected surface water. The

GSAs acknowledge, 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 periodic evaluations of the Plan and amendments to the Plan should aim to improve the initial sustainable management criteria as more information and improved methodology becomes available.

3. The basin is not currently in a state of long-term overdraft and projections of future basin extractions are likely to stay within current and historic ranges, at least until the next periodic evaluation by the GSAs and the Department. Projections of future basin extractions appear likely to stay within current and historic ranges, at least until the next periodic evaluation by the GSA and the Department. Basin groundwater levels and other SGMA sustainability indicators appear unlikely to substantially deteriorate while the GSA implements the Department's recommended corrective actions.

4. The California Environmental Quality Act (Public Resources Code § 21000 *et seq*.) does not apply to the Department's evaluation and assessment of the Plan.

Accordingly, the GSP submitted by the Agencies for the Sutter 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 Agencies address them by the time of the Department's periodic review, which is set to begin on January 28, 2027, as required by Water Code § 10733.8. Failure to address the Department's recommended corrective actions before future, subsequent plan evaluations, may lead to a Plan being determined incomplete or inadequate.

Signed:

Karla Nemeth

Karla Nemeth, Director
Date: October 26, 2023

Exhibit A: Groundwater Sustainability Plan Assessment Staff Report – Sacramento Valley – Sutter Subbasin

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

Groundwater Basin Name:	Sacramento Valley - Sutter Subbasin (No. 5-021.62)
Submitting Agency:	Butte Water District Groundwater Sustainability Agency, City of Live Oak Groundwater Sustainability Agency, City of Yuba City Groundwater Sustainability Agency, County of Sutter Groundwater Sustainability Agency, Reclamation District No. 70 Groundwater Sustainability Agency, Reclamation District No. 1500 Groundwater Sustainability Agency, Reclamation District No. 1660 Groundwater Sustainability Agency, Sutter Extension Water District Groundwater Sustainability Agency, and Sutter Community Service District Groundwater Sustainability Agency
Submittal Type:	Initial GSP Submission
Submittal Date:	January 28, 2022
Recommendation:	Approved
Date:	October 26, 2023

The Butte Water District – Sutter Groundwater Sustainability Agency (GSA), City of Live Oak GSA, City of Yuba City GSA, County of Sutter GSA, Reclamation District No. 70 GSA, Reclamation District No. 1500 GSA, Reclamation District No. 1660 GSA, Sutter Extension Water District GSA, and Sutter Community Service District GSA (collectively referenced to as the GSAs or Agencies) submitted the Sutter Subbasin Groundwater Sustainability Plan (GSP or Plan) for the Sacramento Valley – Sutter Subbasin (Subbasin) 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 conclude 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

[1] Water Code § 10720 *et seq*.
[2] 23 CCR § 350 *et seq*.

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:** Provides an overview of Department staff's assessment and recommendations.
- **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 outlined 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 Sutter GSP. The GSAs have identified areas for improvement of their Plan (e.g., additional well construction information collection, and installation of additional wells to improve the understanding of depletions of interconnected surface water). Department staff concur that those items are important and recommend the GSAs address them as soon as possible. Department staff have also identified additional recommended corrective actions within this assessment that the GSAs should consider addressing by the first periodic evaluation of the Plan. The recommended corrective actions generally focus on the following:

(1) Providing more information about how the proposed minimum thresholds for the chronic lowering of groundwater levels may impact the beneficial uses and users of groundwater, as well as other sustainability indicators.

(2) Providing more information about the sustainable management criteria for land subsidence.

[3] 23 CCR § 350 *et seq*.

(3) Continuing to fill data gaps, collecting additional monitoring data, coordinating with resource agencies and interested parties to understand the beneficial uses and users that may be impacted by depletions of interconnected surface water caused by groundwater pumping, and potentially refine sustainable management criteria.

(4) Revising the sustainable management criteria for degraded water quality to include monitoring data from drought years.

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 GSAs submitted a single GSP to the Department to evaluate whether the Plan conforms to specified SGMA requirements[4] and is likely to achieve the sustainability goal for the Sutter 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 basin.[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 basin, 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 basin 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 basin 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 GSAs have the legal authority and financial resources necessary to implement the Plan.[15]

To the extent overdraft is present in a basin, 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 basin 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 basin.[25] Unless otherwise noted, the Department proposes that recommended corrective actions be addressed by the submission date for the first periodic 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 basin, 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 basin 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 basin.

3.1 SUBMISSION DEADLINE

SGMA required basins 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 GSAs submitted their Plan on January 28, 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 GSAs 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 14, 2022.[32]

3.3 Basin Coverage

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

The GSP intends to manage the entire Sutter Subbasin and the jurisdictional boundary of the submitting GSAs fully contains the Subbasin.[34]

4 Plan Evaluation

As stated in Section 355.4 of the GSP Regulations, a basin "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 basin. 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, its decision-making process and its legal authority;[35] a description of the Plan area and identification of beneficial uses and users in the Plan area;[36] and a description of the ability of the submitting Agency to develop and implement a Plan for that area.[37]

The nine GSAs that have formed within the Sutter Subbasin and collectively submitted the GSP are: Butte Water District – Sutter, City of Live Oak, City of Yuba City, County of Sutter, Reclamation District No. 70, Reclamation District No. 1500, Reclamation District

[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/112.
[33] Water Code § 10727(b); 23 CCR § 355.4(a)(3).
[34] Sutter Subbasin GSP, Section 2.1.2, p. 64; Figure 2-2, p. 65.
[35] 23 CCR § 354.6 *et seq*.
[36] 23 CCR § 354.8 *et seq*.
[37] 23 CCR § 354.6(e).

No. 1660, Sutter Extension Water District, and Sutter Community Service District.[38] Information related to each GSA's contact information, organization and management structure, and legal authority is provided in the GSP.[39] The GSAs entered into a Memorandum of Understanding[40] (MOU, also referred to in the GSP as the Coordination Agreement[41]) with the purpose of developing, adopting, and implementing the GSP.[42] Activities performed under the MOU are guided by the Sutter Subbasin Groundwater Management Coordination Committee (SSGMCC).[43]

The Sutter Subbasin is located within the County of Sutter and includes the cities of Yuba City and Live Oak.[44] The GSP states that no area of the Subbasin is covered by an alternative and there are no adjudicated areas.[45] The Sutter Subbasin is part of the larger Sacramento Valley Groundwater Basin and neighbors seven subbasins: Butte, Wyandotte Creek, North Yuba, South Yuba, North American, Yolo, and Colusa.[46] All adjacent groundwater subbasins are medium and high-priority basins with GSPs under review by the Department. The Sutter Subbasin is bounded by the Sacramento River on the west and the Feather River on the east. A map showing the Subbasin and adjacent subbasins is shown in Figure 1 below.

[38] Sutter Subbasin GSP, Section 3.1, p. 149.
[39] Sutter Subbasin GSP, Section 3, pp. 149-158.
[40] Sutter Subbasin GSP, Final Appendices, Appendix 3-A, pp. 29-51.
[41] Note that this subbasin has a single GSP, therefore this term used in the GSP does not have the same meaning as interagency agreements addressed under 23 CCR §357, which are for basins with multiple GSPs.
[42] Sutter Subbasin GSP, Section 3.3, pp. 157-158.
[43] Sutter Subbasin GSP, Section 3.3, p. 157.
[44] Sutter Subbasin GSP, Table 2-1, p. 66.
[45] Sutter Subbasin GSP, Section 2.1.2, p. 64.
[46] Sutter Subbasin GSP, ES-2, p. 37.

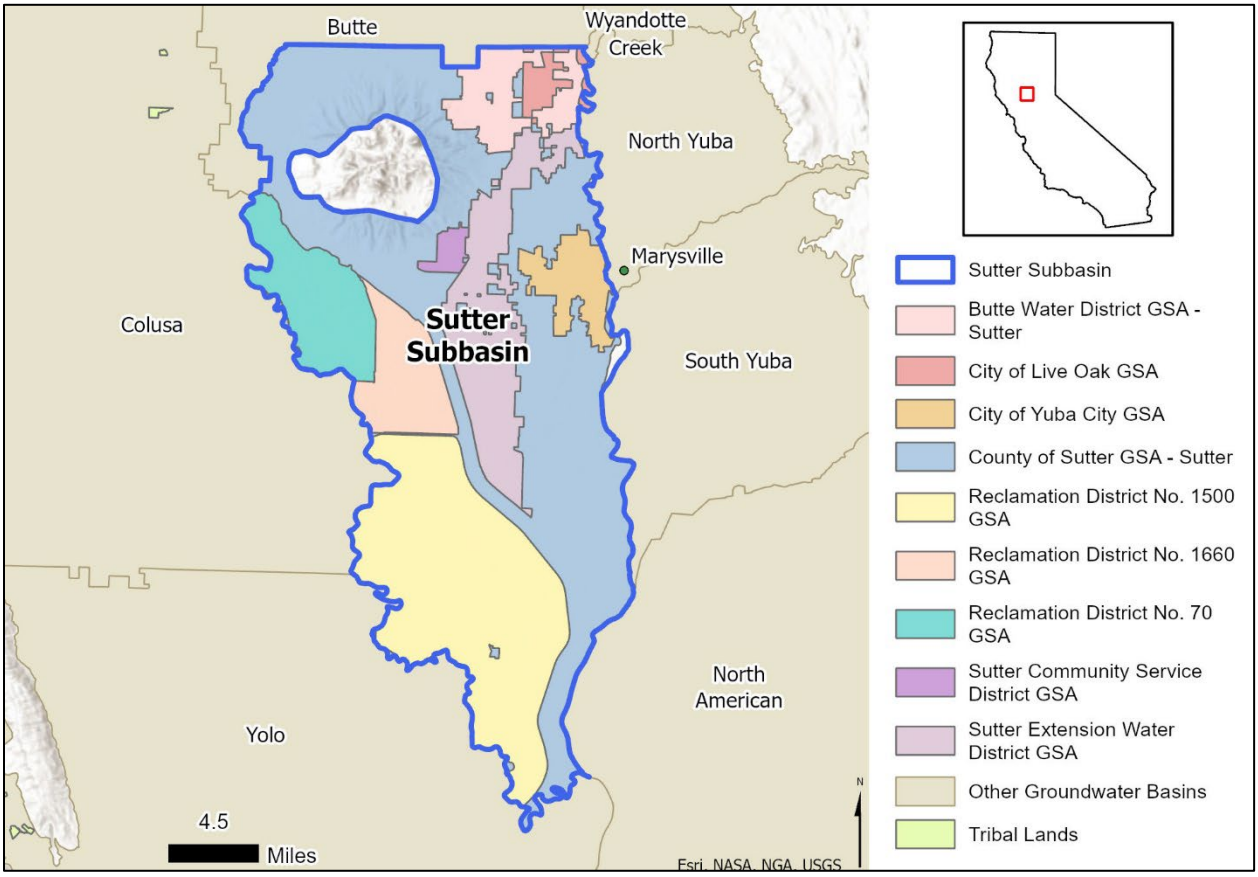

Figure 1: Sutter Subbasin Location Map.

Land use within the Subbasin is predominantly agricultural, with the remaining being urban or riparian vegetation.[47] According to the GSP, state managed lands in the Subbasin are managed by the California Department of Fish and Wildlife and California Department of Parks and Recreation, and federally managed lands are managed by the United States Fish and Wildlife Service.[48] The GSP states that there are an estimated 2,482 domestic wells and 1,210 production wells within the Subbasin.[49]

The Sutter Subbasin's water sources include surface water from the Feather and Sacramento Rivers and groundwater. According to the GSP, most water agencies use surface water as the primary source, augmented by groundwater during "prolonged dry or drought periods."[50] The GSP presents a list of beneficial uses and users of groundwater in the Subbasin, in the following categories: (1) agricultural users, (2) domestic well owners, (3) municipal well operators, (4) public water systems, (5) local land use planning agencies, (6) environmental users of groundwater, (7) the federal

[47] Sutter Subbasin GSP, Table 2-2, p. 81.
[48] Sutter Subbasin GSP, Section 2.1.2, p. 64.
[49] Sutter Subbasin GSP, Section 2.1.3.1, p. 72.
[50] Sutter Subbasin GSP, Section 2.2, p. 81.

government, (8) California Native American tribes, (9) disadvantaged communities, and (10) adjacent subbasins.[51]

The GSP states that "water managers in the Sutter Subbasin will work together and collaboratively with stakeholders and neighboring subbasins through GSP implementation and beyond to achieve [the sustainability] goal."[52] The GSP provides an estimate of general annual costs associated with Plan implementation and GSA operation, as well as costs for proposed projects and management actions.[53] The GSP also presents sources of funding that the GSAs plan to utilize to meet the costs of GSP implementation, which include local fees and grants.[54]

The GSP states that the GSAs "have made note of all comments received and will provide responses to public review period comments along with responses to comments received during [the Department's] 75-day public comment period following GSP submittal and comments received from [the Department] as a result of evaluation of the Sutter Subbasin GSP."[55] Department staff note there are no responses to public comments on the SGMA Portal website,[56] as of the writing of this assessment, and the GSP does not state where responses to public comments will be provided. Department staff recommend the GSAs provide the related information by the next Plan update.

The administrative information included in the Plan substantially complies with the requirements outlined in the GSP Regulations. The GSP's discussion and presentation of administrative information covers the specific items listed in the GSP Regulations in an understandable format using appropriate detail. 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.

4.2 Basin Setting

GSP Regulations require information about the physical setting and characteristics of the basin and current conditions of the basin, 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 basin, including historical, current, and projected water budget conditions.[57]

[51] Sutter Subbasin GSP, Section 4.1, pp. 163-166.
[52] Sutter Subbasin GSP, Section 1.2, p. 56.
[53] Sutter Subbasin GSP, Section 8.2, pp. 647-658.
[54] Sutter Subbasin GSP, Section 8.2.1, pp. 653-658.
[55] Sutter Subbasin GSP, Section 4.2.2, p. 177.
[56] https://sgma.water.ca.gov/portal/gsp/preview/112.
[57] 23 CCR § 354.12.

4.2.1 Hydrogeologic Conceptual Model

The hydrogeologic conceptual model is a non-numerical model of the physical setting, characteristics, and processes that govern groundwater occurrence within a basin, and represents a local agency's understanding of the geology and hydrology of the basin that supports the geologic assumptions used in developing mathematical models, such as those that allow for quantification of the water budget.[58] The GSP Regulations require a descriptive hydrogeologic conceptual model that includes a written description of geologic conditions, supported by cross sections and maps,[59] and includes a description of basin boundaries and the bottom of the basin,[60] principal aquifers and aquitards,[61] and data gaps.[62]

The GSP describes the Subbasin as a 284,800-acre region of the east-central Sacramento Valley Groundwater Basin dominated by east-west compressional forces associated with regional uplift in the west and extension in the east.[63] The Subbasin contains consolidated and unconsolidated freshwater-bearing continental sediments underlain by marine sediments and igneous and metamorphic rocks.[64] Structural features within the Subbasin include the Sutter Buttes and the Willows Fault.[65] The Sutter Buttes are described as an uplifted Pliocene volcanic plug and the only prominent topographic feature within the Subbasin.[66] The GSP identifies the Willows Fault as a northeast-dipping, northwest-trending, active reverse fault that extends through the entire Subbasin from the northwestern border to the southeastern border.[67] The GSP identifies 18 geologic units or formations in the Subbasin.[68] Nine of these units are fresh water-bearing: the Holocene Alluvium; Pleistocene Modesto, Riverbank, and Victor; Laguna; Sutter Buttes Rampart; Sutter; Mehrten; and Valley Springs Formations.[69] Eight units are non-fresh water-bearing: the Eocene Ione and Capay; Lovejoy Basalt; Forbes; Kione; Sacramento Shale; Winter Sands and Shales; and Starsky Sands Formations.[70] The final unit consists of basement rocks, igneous and metamorphic rocks potentially related to the Coast Range and Sierra Nevada, and the volcanic rocks comprising the Sutter Buttes.[71] The GSP provides descriptions of these units including their general locations and

[58] 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.
[59] 23 CCR §§ 354.14 (a), 354.14 (c).
[60] 23 CCR §§ 354.14 (b)(2-3).
[61] 23 CCR § 354.14 (b)(4) *et seq.*
[62] 23 CCR § 354.14 (b)(5).
[63] Sutter Subbasin GSP, Section 5.1.1, pp. 192-193.
[64] Sutter Subbasin GSP, Section 5.1.1, p. 192.
[65] Sutter Subbasin GSP, Section 5.1.1 and Figure 5-1, pp. 193-195.
[66] Sutter Subbasin GSP, Section 5.1.1.1, p. 199.
[67] Sutter Subbasin GSP, Section 5.1.1, p. 193.
[68] Sutter Subbasin GSP, Section 5.1.4, pp. 204-210.
[69] Sutter Subbasin GSP, Section 5.1.4.1, pp. 206-208.
[70] Sutter Subbasin GSP, Section 5.1.4.2, pp. 208-209.
[71] Sutter Subbasin GSP, Section 5.1.4.2, p. 209.

approximate thicknesses, depositional environments, and water-bearing characteristics. The GSP also notes that the identification of geologic units within the Subbasin is inconsistent across existing literature and that there is a need to standardize the nomenclature for these units; the GSP identifies this concern as a data gap.[72] Department staff have determined that the GSP's discussion and presentation of information of the regional and structural setting, as it pertains to major geologic features that affect groundwater flow, sufficiently covers the specific items listed in the GSP Regulations in an understandable format using appropriate data.

The GSP details that the Sutter Subbasin has complex lateral boundaries defined by geologic features, surface hydrology, and boundaries with other agencies.[73] The Subbasin is generally bounded by the Sutter-Butte County boundary to the north, the Sacramento River to the west and south, and the Feather River to the east. The Subbasin adjoins seven groundwater subbasins: Butte (No. 5-021.70) to the north and northwest; Wyandotte Creek (No. 5-021.69) to the northeast; North Yuba and South Yuba (Nos. 5-021.60 and 5-021.61) to the east; North American (No. 5-021.64) to the southeast; Yolo (No. 5-021.67) to the southwest; and Colusa (No. 5-021.52) to the west.[74]

The Subbasin's vertical extent is defined as the base of freshwater, which generally occurs between 400 to 1,600 feet below mean sea level (ft bmsl) in the Subbasin, and is deepest in the southern region and south of the Sutter Buttes.[75] The GSP provides a cross-section that indicates the depth to the base of freshwater near the Sutter Buttes is uncertain.[76] The GSP also states, "The Buttes divert groundwater around their flanks, and marine sediments surrounding them have been flushed of their saline water by precipitation to great depths."[77] This suggests that some of the identified marine deposits may be a source of fresh (i.e. non-saline) groundwater near the Sutter Buttes; however, because the cross section through the Sutter Buttes does not depict Subbasin boundaries, it is unclear whether these marine units are within or outside of the Subbasin's lateral extent. Department staff encourage the GSP to provide additional information clarifying the lateral and vertical extent of Subbasin near the Sutter Buttes or identify these topics as data gaps to be further refined.

The GSP describes that the Subbasin has one principal aquifer with three aquifer zones (AZ-1, AZ-2, and AZ-3) separated by areas of low permeability.[78] The GSP identifies the Sutter Buttes Rampart and the Modesto, Riverbank, Victor, and Laguna Formations as the main water bearing formations in the principal aquifer.[79] Zone AZ-1 occurs from the ground surface to approximately 120 to 200 feet below ground surface (ft bgs),[80]

[72] Sutter Subbasin GSP, Section 5.1.4 and Section 5.1.12.7, p. 204 and pp. 301-302.
[73] Sutter Subbasin GSP, Section 5.1.2 and Figure 2-1, p. 202 and p. 63.
[74] Sutter Subbasin GSP, Section 5.1.2 and Figure 2-1, p. 202 and p. 63.
[75] Sutter Subbasin GSP, Section 5.1.3 and Figure 5-5, p. 202 and p. 203.
[76] Sutter Subbasin GSP, Figure 5-9, p. 214.
[77] Sutter Subbasin GSP, Section 5.1.2, p. 202.
[78] Sutter Subbasin GSP, Section 5.1.6.1, p. 218.
[79] Sutter Subbasin GSP, Section 5.1.6.1, p. 218.
[80] Sutter Subbasin GSP, Section 5.1.6.2 and Figure 5-12, p. 218 and p. 221.

encompassing the Modesto and Riverbank Formations.[81] Zones AZ-1 and AZ-2 are separated by a 20 to 60 ft thick low permeability zone.[82] Zone AZ-2 occurs from approximately 180 to 450 ft bgs[83] and is divided into sub-zones AZ-2A and AZ-2B.[84] The sub-zones are laterally separated and consist of the Sutter Buttes Rampart and Laguna Formation, respectively.[85] Zones AZ-2 and AZ-3 are separated by a 30 to 80 ft thick low permeability zone.[86] Zone AZ-3 occurs from approximately 480 to 700 ft bgs[87] and encompasses the Laguna Formation, Sutter Buttes Rampart, and Sutter Formation.[88]

The GSP is unclear and inconsistent at times when describing the principal aquifer system, geologic formations, and vertical extent of the Subbasin. Regarding the identification of geologic formations that comprise the principal aquifer and various aquifer zones, the Victor Formation is identified in the description for the principal aquifer[89] but not identified in any aquifer zone, while the Sutter Formation is not mentioned as a formation in the principal aquifer but is identified as part of aquifer zone AZ-3.[90] Regarding the vertical extent of the Subbasin, the cross-sections that depict the aquifer zones (Figures 5-12 and 5-13)[91] show aquifer zone AZ-3 extending below the base of fresh water (i.e. the defined bottom of the Subbasin) making it unclear to Department staff what is considered the bottom of the Subbasin. Additionally, the GSP describes there are three aquifer zones in the principal aquifer (AZ-1, AZ-2, and AZ-3);[92] however, the monitoring network section also identifies wells to monitor a "shallow"[93] aquifer zone not discussed in the hydrogeologic conceptual model section. It appears the AZ-1 zone (0 – 150 feet deep) is divided into the shallow AZ zone (0 – 50 feet deep) and AZ-1 zone (50 – 150 feet deep) in the monitoring network section.[94] Department staff recommend the GSP present consistent descriptions of the aquifer zones in both the hydrogeologic conceptual model and monitoring networks (see Recommended Corrective Action 1).

The GSP does not discuss structural restrictions to groundwater flow in a dedicated section of its hydrogeologic conceptual model, but it does discuss significant structures in context of the regional geology. Significant structural features in the Subbasin include the Willows Fault and the Sutter Buttes.[95] The GSP states "[t]here are no indications that the Willows Fault controls groundwater flow in the Sutter Subbasin and, as shown in

[81] Sutter Subbasin GSP, Section 5.1.6.1 and Figure 5-10, p. 218 and p. 215.
[82] Sutter Subbasin GSP, Section 5.1.6.2, p. 219.
[83] Sutter Subbasin GSP, Section 5.1.6.2, p. 219.
[84] Sutter Subbasin GSP, Section 5.1.6.1 and Figure 5-12, p. 218 and p. 221.
[85] Sutter Subbasin GSP, Section 5.1.6.1, p. 218.
[86] Sutter Subbasin GSP, Section 5.1.6.2 and Figure 5-12, p. 219 and p. 221.
[87] Sutter Subbasin GSP, Section 5.1.6.2 and Figure 5-12, p. 219 and p. 215.
[88] Sutter Subbasin GSP, Section 5.1.6.1 and Figure 5-10, p. 218 and p. 215.
[89] Sutter Subbasin GSP, Section 5.1.6.1, p. 218.
[90] Sutter Subbasin GSP, Section 5.1.6.1, p. 218.
[91] Sutter Subbasin GSP, Figure 5-12 and Figure 5-13, p. 221 and p. 223.
[92] Sutter Subbasin GSP, Section 5.1.6.1, p. 218.
[93] Sutter Subbasin GSP, Section 7.2.6.1.1, Table 7-48, Figure 7-2, p. 593, pp. 595-596, p. 597.
[94] Sutter Subbasin GSP, Table 7-48, pp. 595-596.
[95] Sutter Subbasin GSP, Section 5.1.1 and Figure 5-1, p. 193 and pp. 194-195.

Figure 5-2, offset on this fault does not appear to occur in sediments younger than Eocene."[96] However, Department staff note that the GSP provides a cross-section showing the Willows Fault extending through the base of freshwater to the ground surface.[97] The GSP provides little discussion on how the Sutter Buttes may restrict groundwater flow, only stating "[t]he Buttes divert groundwater around their flanks, and marine sediments surrounding them have been flushed of their saline water by precipitation to great depths."[98] Department staff encourage the GSAs to present additional discussion on how these two structural features may affect groundwater flow to enhance the GSP's hydrogeologic conceptual model discussion.

The GSP identifies several data gaps in a dedicated section of the hydrogeologic conceptual model[99] and proposes steps and timelines to address these gaps in its projects and management actions chapter.[100] Department staff note that actions to address these data gaps are in the planning stages and that timelines have not been established.[101] The GSAs propose the following actions:

- Install additional monitoring wells to better understand groundwater and surface water interactions along the Sacramento and Feather Rivers;[102]
- Collect nitrogen isotope and oxidation-reduction values in AZ-1 to determine the source of elevated salinity in this aquifer zone;[103]
- Conduct additional aquifer pump tests to improve assessment of aquifer properties;[104]
- Collect regular stable isotope data from surface water and existing nested wells to improve available groundwater recharge information;[105]
- Use airborne electromagnetic (AEM) survey data to refine the hydrogeologic conceptual model;[106]
- Develop standardized stratigraphic nomenclature for geologic formations within the Subbasin.[107]

The projects and management actions section of the GSP also includes a project/management action to conduct an AEM survey specifically to improve the GSAs'

[96] Sutter Subbasin GSP, Section 5.1.2, p. 202.
[97] Sutter Subbasin GSP, Figure 5-10, p. 215.
[98] Sutter Subbasin GSP, Section 5.1.2, p. 202.
[99] Sutter Subbasin GSP, Section 5.1.12, pp. 299-302.
[100] Sutter Subbasin GSP, Section 7.1.6, pp. 553-575.
[101] Sutter Subbasin GSP, Tables 7-29 to 7-36, pp. 554-565.
[102] Sutter Subbasin GSP, Section 5.1.12.1 and Table 7-29, p. 299 and pp. 554-555.
[103] Sutter Subbasin GSP, Section 5.1.12.2 and Table 7-30, p. 299 and pp. 556-557.
[104] Sutter Subbasin GSP, Section 5.1.12.3 and Table 7-31, p. 301 and pp. 557-558.
[105] Sutter Subbasin GSP, Section 5.1.12.4 and Tables 7-32 and 7-33, p. 301 and pp. 558-561.
[106] Sutter Subbasin GSP, Section 5.1.12.6 and Table 7-34, p. 301 and pp. 561-562.
[107] Sutter Subbasin GSP, Section 5.1.12.7 and Table 7-36, pp. 301-302 and pp. 564-565.

understanding of the Sutter Buttes area hydrogeology.[108] Department staff note the GSP does not describe the Sutter Buttes area hydrogeology as a data gap. It is unclear if the AEM survey will provide appropriate data to address the location of the Subbasin bottom and potential restrictions to groundwater flow in the Sutter Buttes area.

The GSP provides sufficiently detailed maps that depict topography,[109] surficial geology,[110] soil characteristics,[111] recharge and discharge areas,[112] surface water bodies,[113] and source and point of delivery of imported water supplies[114] that characterizes the physical components and interaction of the surface water and groundwater systems in the Subbasin. The GSP supplements the provided maps with additional discussion and description of soil properties,[115] recharge and discharge areas,[116] and both imported water[117] and surface water sources[118] throughout the Subbasin.

Despite the recommended corrective action described above, 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.

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 that includes the following: groundwater elevation contour maps and hydrographs,[119] a graph depicting change in groundwater storage,[120] maps and cross-sections of the seawater intrusion front,[121] maps of groundwater contamination sites and plumes,[122] maps depicting total subsidence,[123] identification of interconnected surface water systems and an estimate of the quantity and timing of depletions of those systems,[124] and identification of groundwater dependent ecosystems.[125]

[108] Sutter Subbasin GSP, Table 7-35, pp. 562-563.
[109] Sutter Subbasin GSP, Figure 5-3, p. 200.
[110] Sutter Subbasin GSP, Figure 5-1, p. 194.
[111] Sutter Subbasin GSP, Figure 5-4, p. 201.
[112] Sutter Subbasin GSP, Figures 5-24 and 5-26, p. 243 and p. 246.
[113] Sutter Subbasin GSP, Figure 2-1, p. 63.
[114] Sutter Subbasin GSP, Figure 5-48, p. 298.
[115] Sutter Subbasin GSP, Section 5.1.6.3, pp. 238-240.
[116] Sutter Subbasin GSP, Section 5.1.7 and 5.1.8, pp. 240-242 and p. 245.
[117] Sutter Subbasin GSP, Section 5.1.11, p. 297.
[118] Sutter Subbasin GSP, Section 5.1.10, p. 297.
[119] 23 CCR §§ 354.16 (a)(1-2).
[120] 23 CCR § 354.16 (b).
[121] 23 CCR § 354.16 (c).
[122] 23 CCR § 354.16 (d).
[123] 23 CCR § 354.16 (e).
[124] 23 CCR § 354.16 (f).
[125] 23 CCR § 354.16 (g).

The GSP provided over 33 hydrographs that depict long-term groundwater elevations and hydraulic gradients for the principal aquifer within the Subbasin.[126] The periods of record for hydrographs provided in the GSP vary, but generally begin in approximately 2010, with some beginning as early as 2004, and extend through 2020. The hydrographs depict relatively stable groundwater levels throughout the Subbasin with historic highs typically occurring in 2016 or 2019 and historic lows typically occurring in 2014 to 2015. The GSP states that groundwater level trends are largely stable over time "indicating sustainable conditions in the Sutter Subbasin as the aquifer rebound is observed during all water year types."[127] The GSP identifies vertical gradients between the zones of the principal aquifer throughout the Subbasin through the use of nested wells but notes that no distinct patten can be identified.[128]

The GSP includes a description of the change in groundwater storage and graphs depicting the change in storage demonstrating the annual and cumulative change in volume of groundwater storage.[129] The average annual decrease in groundwater storage in the Subbasin is estimated at approximately 7,000 acre-feet per year during the historical period of Water Year 1996 to 2015.[130]

The GSP includes a description of current and historical groundwater quality issues, including a map, and has identified total dissolved solids (TDS), nitrate as N, arsenic, and boron as constituents that have been detected above drinking water standards historically.[131] The GSP identifies arsenic and boron as naturally occurring.[132] Groundwater quality data spans from 1952 to 2020 and is sourced from the State Water Resources Control Board's Groundwater Ambient Monitoring and Assessment (GAMA) Program.[133] The GSP also describes several groundwater contamination sites throughout the Subbasin.[134]

The GSP states that the Subbasin is located far from coastal areas and seawater intrusion is not a relevant sustainability indicator for the Subbasin.[135]

The GSP includes a description of current and historical land subsidence conditions, along with maps, in the Subbasin.[136] The maps of current land subsidence cover the extent, cumulative total, and annual rate of subsidence in the Subbasin. The GSP states

[126] Sutter Subbasin GSP, Figures 5-60 through 5-68, pp. 319-327.
[127] Sutter Subbasin GSP, Section 5.2.2.1, p. 317.
[128] Sutter Subbasin GSP, Section 5.2.2.3, p. 342.
[129] Sutter Subbasin GSP, Figure 5-81, p. 345.
[130] Sutter Subbasin GSP, Table 5-13, p. 388.
[131] Sutter Subbasin GSP, Section 5.2.5, p. 345; Figure 5-82, p. 346.
[132] Sutter Subbasin GSP, Section 5.1.9, p. 249.
[133] Sutter Subbasin GSP, Section 5.2.5, p. 347.
[134] Sutter Subbasin GSP, Section 5.1.9.7, pp. 291-292; Figure 5-47, p. 293.
[135] Sutter Subbasin GSP, Section 5.2.4, p. 345.
[136] Sutter Subbasin GSP, Section 5.2.6, pp. 354-358, Figures 5-88 and 5-89, pp. 357-358, Table 5-8, p. 356.

that "land subsidence and its associated impacts have not been recorded within the Sutter Subbasin".[137]

The GSP determines gaining and losing stream segments along the Sacramento and Feather Rivers and the Sutter Bypass.[138] The C2VSimFG-Sutter integrated flow model was used to characterize the interconnected surface waters. The portions of the stream that were found to be gaining or losing in at least 80 percent of the simulated months from 1996 to 2015 were categorized as such (gaining or losing nodes), while stream nodes that did not meet the 80 percent threshold for either categorization were classified as having mixed conditions. Average monthly streamflow gains and losses from 1996 to 2015 are also reported.[139] However, the GSP does not provide volumetric estimates of depletion of interconnected surface water due to groundwater pumping. Department staff recommend the GSAs provide estimates of depletion through modeling and improve their assessment of interconnected surface water based on guidance from the Department as discussed in Section 4.3.2.6.

The GSP includes a description of groundwater dependent ecosystems (GDEs) in the Subbasin, along with maps of potential GDEs during normal (2013), dry (2015), and wet (2017) hydrologic years.[140] The GDE assessment utilized data from the Natural Communities Commonly Associated with Groundwater (NCCAG) database provided by the Department to identify potential vegetative and wetland GDEs in the Subbasin. The GSP also presents an inventory of freshwater species identified by The Nature Conservancy in the Sutter Subbasin that may rely on groundwater.[141]

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 basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current, and projected water budget conditions,[142] and the sustainable yield.[143]

The Plan estimates historical, current, and projected water budgets with C2VSimFG-Sutter, a numerical groundwater and surface water model developed specifically for the Sutter Subbasin.[144] The C2VSimFG-Sutter model was adapted from C2VSimFG v1.0, released by the Department in December 2020, with updates to better represent local

[137] Sutter Subbasin GSP, Section 5.2.6, p. 354.
[138] Sutter Subbasin GSP, Figure 5-91, p. 361.
[139] Sutter Subbasin GSP, Table 5-9, p. 360.
[140] Sutter Subbasin GSP, Figures 5-96, 5-97, and 5-98, pp. 368-370.
[141] Sutter Subbasin GSP, Table 5-10, pp. 371-373.
[142] 23 CCR §§ 354.18 (a), 354.18 (c) *et seq*.
[143] 23 CCR § 354.18 (b)(7).
[144] Sutter Subbasin GSP, Section 5.3.1, p. 376.

conditions. The model was refined and calibrated specifically for the Sutter Subbasin. The water budget information is provided in tabular and graphical forms for the surface system and groundwater system.[145]

The Plan includes a historical water budget for Water Year (WY) 1996 through WY 2015,[146] a current water budget for WY 2013,[147] and projected water budgets that repeat three times WY 1996 through WY 2015 with[148] and without[149] climate change. The historical groundwater budget reports an average negative change in groundwater storage of about 7,000 acre-feet per year (AFY).[150] The average change in groundwater storage in the current water budget is a negative 19,000 AFY.[151] For the projected water budgets, an average annual increase of 1,300 AFY in groundwater storage is estimated for either scenario.[152]

The GSP estimates that the sustainable yield of the Subbasin is 182,000 AFY based on a simulation of increase in demand (i.e., 20 percent increase in evapotranspiration) that resulted in a change in groundwater storage of almost zero.[153] The estimated sustainable yield is higher than simulated average annual groundwater pumping in all four water budget scenarios – historical, current conditions, projected conditions, and projected conditions with climate change. Therefore, the GSP states that the Subbasin is currently operating under sustainable conditions and is expected to continue to be sustainable if the projected conditions hold true into the future.

Department staff note that net subsurface inflows from adjacent basins (i.e., Butte, North Yuba, South Yuba, North American, and Yolo) increase significantly in the projected water budgets in comparison to the historical and current water budgets,[154] which are not explained in the GSP. The GSP's sustainable yield simulation may have similar increases because it is related to the projected water budget simulation. However, GSPs from the adjacent subbasins do not anticipate such changes in their water budgets.[155] Department staff recommend the Sutter Subbasin GSAs provide further information and justification related to the increases in net subsurface inflows from adjacent subbasins in the projected water budgets and the sustainable yield estimation (see Recommended Corrective Action 2).

[145] Sutter Subbasin GSP, Section 5.3.5, pp. 384-403.
[146] Sutter Subbasin GSP, Section 5.3.5.1, pp. 389-396.
[147] Sutter Subbasin GSP, Section 5.3.5.2, pp. 396-398.
[148] Sutter Subbasin GSP, Section 5.3.5.3, pp. 398-401.
[149] Sutter Subbasin GSP, Section 5.3.5.4, pp. 401-403.
[150] Sutter Subbasin GSP, Section 5.3.5.1, p. 390; Table 5-13, p. 388.
[151] Sutter Subbasin GSP, Section 5.3.5.2, p. 398; Table 5-13, p. 388.
[152] Sutter Subbasin GSP, Section 5.3.5.3, p. 400; Table 5-13, p. 388.
[153] Sutter Subbasin GSP, Section 5.3.6, p. 404.
[154] Sutter Subbasin GSP, Table 5-13, p. 388.
[155] Butte Subbasin GSP, Table 2-8, p. 157; North and South Yuba Subbasins GSP, Table 2-14, p. 212, Table 2-16, p. 214; North American Subbasin GSP, Table 6-13, pp. 206-207; Yolo Subbasin GSP, Table 2-29, p. 259.

The water budget described in the GSP substantially complies with the GSP Regulations and appears to be developed using the best available science. 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. Because the Subbasin's groundwater levels are currently stable, the recommended corrective action regarding the projected water budgets and sustainable yield does not preclude plan approval at this time.

4.2.4 Management Areas

The GSP Regulations provide the option for one or more management areas to be defined within a basin 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 basin.[156]

There are no management areas proposed within the Plan area.[157]

4.3 Sustainable Management Criteria

GSP Regulations require each Plan to include a sustainability goal for the basin 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 basin including the process by which the GSA characterizes undesirable results and establishes minimum thresholds and measurable objectives for each applicable sustainability indicator.[158]

4.3.1 Sustainability Goal

GSP Regulations require that GSAs establish a sustainability goal for the basin. The sustainability goal should be based on information provided in the GSP's basin setting and should include an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation.[159]

The GSP describes the Sutter Subbasin's sustainability goal as to "maintain locally managed groundwater resources for existing and future beneficial uses and users that are economically viable and sustainable by managing groundwater use within the sustainable yield, resulting in the avoidance of undesirable results."[160]

The Plan's approach to achieve the sustainability goal is through "implementation of proposed projects and management actions and monitoring activities aiding in reaching

[156] 23 CCR § 354.20.
[157] Sutter Subbasin GSP, Section 5, p. 191.
[158] 23 CCR § 354.22 *et seq*.
[159] 23 CCR § 354.24.
[160] Sutter Subbasin GSP, Section 6.3, p. 413.

or maintaining established interim milestones and measurable objectives culminating in the absence of undesirable results by 2042."[161] The GSP states that the Sutter Subbasin will be sustainable even without projects and management actions, and that projects and management actions will be implemented through an adaptive management approach to ensure undesirable results do not occur and to address data gaps.[162] The GSAs anticipate that the Subbasin will be operated within its sustainable yield and will be absent of undesirable results during the 20-year Plan implementation period, which will support the conclusion that the sustainability goal has been achieved by 2042 and will be maintained beyond 2042.

The GSP's discussion and presentation of information related to the Subbasin's sustainability goal substantially complies with the requirements outlined in the GSP Regulations in an understandable format using appropriate data.

4.3.2 Sustainability Indicators

Sustainability indicators are defined as any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results.[163] 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 water[164] – 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.

GSP Regulations require that GSAs provide descriptions of undesirable results including defining what are significant and unreasonable potential effects to beneficial uses and users for each sustainability indicator.[165] GSP Regulations also require GSPs provide the criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.[166]

[161] Sutter Subbasin GSP, Section 6.3, p. 413.
[162] Sutter Subbasin GSP, Section 6.3, p. 414; Section 7.1.2, pp. 477-479.
[163] 23 CCR § 351(ah).
[164] Water Code § 10721(x).
[165] 23 CCR §§ 354.26 (a), 354.26 (b)(c).
[166] 23 CCR § 354.26 (b)(2).

GSP Regulations require that the description of minimum thresholds include the information and criteria relied upon to establish and justify the minimum threshold for each sustainability indicator.[167] GSAs are required to describe how conditions at minimum thresholds may affect beneficial uses and users,[168] and the relationship between the minimum thresholds for each sustainability indicator, including an explanation for how the GSA has determined conditions at each minimum threshold will avoid causing undesirable results for other sustainability indicators.[169]

GSP Regulations require that GSPs include a description of the criteria used to select measurable objectives, including interim milestones, to achieve the sustainability goal within 20 years.[170] GSP Regulations also require that the measurable objectives be established based on the same metrics and monitoring sites as those used to define minimum thresholds.[171]

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 applicable sustainability indicator. 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 basin.[172]

4.3.2.1 Chronic Lowering of Groundwater Levels

In addition to components identified in 23 CCR §§ 354.28 (a-b), for the chronic lowering of groundwater, 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 that is supported by information about groundwater elevation conditions and potential effects on other sustainability indicators.[173]

The Plan states that "[a]n undesirable result for chronic lowering of groundwater levels in the Sutter Subbasin is experienced through groundwater levels dropping to a level at which domestic or irrigation wells go dry or lose functional pumping capacity, result in significantly higher pumping costs, and/or the significant and unreasonable effort is required to maintain or deepen production wells."[174]

The GSP states that "[a]n undesirable result is observed when groundwater elevations drop below the minimum threshold criteria at 25% of representative monitoring locations

[167] 23 CCR § 354.28 (b)(1).
[168] 23 CCR § 354.28 (b)(4).
[169] 23 CCR § 354.28 (b)(2).
[170] 23 CCR § 354.30 (a).
[171] 23 CCR § 354.30 (b).
[172] 23 CCR § 354.26 (d).
[173] 23 CCR § 354.28(c)(1) *et seq*.
[174] Sutter Subbasin GSP, Section 6.4.1.1, p. 415.

(16 out of 63 representative wells) concurrently over two consecutive seasonal high water level measurements."[175] The GSP also states that "[i]mpacts relating to this [sustainable management criteria] will be evaluated both by aquifer zone and for the principal aquifer as a whole."[176] However, it is unclear how undesirable results will be evaluated by aquifer zone. For example, about two-thirds of the 23 representative monitoring sites in the shallow AZ and AZ-1 zones will have their minimum thresholds exceeded if all exceedances occur in the two shallow zones. Department staff encourage the GSAs to provide additional information regarding how the impacts of undesirable results will be evaluated by aquifer zone.

Department staff conclude the decision to set sustainable management criteria based on seasonal high water level measurements may not adequately consider the interests of beneficial uses and users of groundwater in the Subbasin. Based on a review of hydrographs provided in the GSP, groundwater levels in the Subbasin typically decline during the peak irrigation season and hit seasonal lows in the late summer or fall period where potential impacts to beneficial uses and users will be most severe. The GSAs' decision to set sustainable management criteria for the chronic decline of groundwater levels based on the highest anticipated groundwater levels of the season in spring, instead of during the time of most impacts in late summer or fall, is concerning to Department staff as it likely disregards potential impacts to beneficial uses and users from seasonal variations. Under this management decision, even if the GSAs successfully maintain spring groundwater levels within the historical range, impacts to beneficial uses and users that occur during any other times of the year (as groundwater levels typically decline) appear to not be considered. The GSAs should revise the sustainable management criteria to be based on seasonal low groundwater levels to ensure potential impacts to beneficial uses and users are considered (see Recommended Corrective Action 3a).

The GSP establishes minimum thresholds as the deepest of (1) historical low, (2) "90% of the average groundwater elevation from the projected water budget (baseline condition over 60-year period using C2VSimFG-Sutter) at each representative monitoring site with an artificial increase in evapotranspiration (ET) of 50%," or (3) water level corresponding to an average operating range of 8.0 feet for the AZ and AZ-1 zones, and 16.5 feet for the AZ-2 and AZ-3 zones.[177]

The GSP does not present a clear description for Department staff to understand the methodology of the second criterion (i.e., "90% of the average groundwater elevation from…"). It is unclear what "90% of the average groundwater elevation" at each representative monitoring site refers to and how it relates to Appendix 6-B's statement of "assuming a percentage of groundwater levels under sustainable yield estimates

[175] Sutter Subbasin GSP, Section 6.4.1.2, p. 415.
[176] Sutter Subbasin GSP, Section 6.4.1.2, p. 415.
[177] Sutter Subbasin GSP, Section 6.5.1.1, p. 422.

impacting interconnected surface waters."[178] The assumed groundwater conditions associated with this method are not well defined, such as the spatial and temporal aggregations that define "interconnected streams that are gaining become losing."[179] Department staff recommend the GSAs provide detailed information to clarify this method (see Recommended Corrective Action 3b).

The GSP describes the potential impacts of minimum thresholds on beneficial uses and users of groundwater, including domestic, municipal, agricultural, and environmental uses and users (i.e., GDEs).[180] The GSP states that minimum thresholds are established to avoid undesirable results for domestic wells, which are typically screened in the shallow AZ and AZ-1 zones, and to protect groundwater production of municipal and agricultural wells in the deeper aquifer zones. However, the GSP does not present the analysis or information in support of this statement. Department staff recommend the GSAs provide more information about how the proposed minimum thresholds for the chronic lowering of groundwater levels may impact beneficial uses and users. Specifically, consider the impact of the selected minimum threshold levels on supply wells. The consideration should identify the degree/extent of potential impact including the percentage, number, and location of potentially impacted wells at the proposed minimum thresholds for chronic lowering of groundwater levels (see Recommended Corrective Action 3c).

The GSP describes the relationship between the minimum thresholds for groundwater levels and other sustainability indicators.[181] The GSP states that land subsidence has not been observed in the Subbasin and the minimum thresholds are not expected to cause land subsidence. However, because minimum thresholds are deeper than historical lows in some representative monitoring wells, future land subsidence may be possible. Department staff recommend the GSA reevaluate how groundwater level minimum thresholds may impact land subsidence (see Recommended Corrective Action 3d).

Additionally, it is also unknown how much stream depletion is projected along the Sacramento and Feather Rivers, despite the GSA's concern of impacts to the two rivers (i.e., purpose of this method) and the statement that "the rivers went from gaining to losing at a 50% increase in ET."[182] The GSP has not provided justification that stream conditions at the groundwater level minimum thresholds, before gaining streams become losing (i.e., the second criterion), will avoid significant and unreasonable adverse impacts on beneficial uses and users of interconnected surface water. Department staff recommend the GSAs provide estimates of correlated stream depletion and evaluate the potential impacts to beneficial uses and users of interconnected surface water (see Recommended Corrective Action 3e).

[178] Sutter Subbasin GSP Appendices, Appendix 6-B, Section 3.4, pp. 662-665.
[179] Sutter Subbasin GSP, Section 6.5.1.1, p. 422.
[180] Sutter Subbasin GSP, Section 6.5.1.4, pp. 431-432.
[181] Sutter Subbasin GSP, Section 6.5.1.2, pp. 427-428.
[182] Sutter Subbasin GSP Appendices, Appendix 6-B, Section 3.4, p. 662.

The GSP states that the Sutter Subbasin's minimum thresholds for groundwater levels are not anticipated to cause undesirable results or affect the abilities of the adjacent subbasins to achieve their sustainability goals. The GSP explains that the Subbasin's minimum thresholds are generally comparable to those of the adjacent subbasins' and that the Feather and Sacramento Rivers maintain groundwater levels along the borders between Sutter and adjacent subbasins.[183]

The GSP establishes measurable objectives and interim milestones for groundwater levels at the average of historical measurements at each representative monitoring site.[184] The GSP explains that the Subbasin is in a sustainable state and will maintain sustainable conditions. Department staff note that the measurable objectives are generally lower than historical groundwater levels because they are defined with seasonal high groundwater level measurements. Additionally, Department staff note the GSP does not present projected groundwater levels for review. Future groundwater levels are likely to differ to some degree from historical conditions at some locations due to changes in groundwater pumping (e.g., more municipal, and less agricultural groundwater pumping). Department staff recommend that the GSAs include hydrographs of projected groundwater levels to facilitate Department review of groundwater level sustainable management criteria.

The GSP's discussion and presentation of information seems to be comprehensive and generally covers the specific items listed in the GSP Regulations in an understandable format using appropriate data and information. Because the overall groundwater level and storage conditions in the Basin are generally stable based on the information included in the GSP, the recommended corrective actions do not preclude plan approval at this time. However, the GSAs should give due consideration to implementing the recommended corrective actions detailed in this section prior to the first periodic evaluation of the Plan.

4.3.2.2 Reduction of Groundwater Storage

In addition to components identified in 23 CCR §§ 354.28 (a-b), for the 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 basin 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 basin, calculated based on historical trends, water year type, and projected water use in the basin.[185]

The GSP describes the potential effects of undesirable results for reduction of groundwater storage as "shallow wells going dry and/or losing production capacity resulting in the need to deepen or replace wells; increased pumping costs as deeper wells

[183] Sutter Subbasin GSP, Section 6.5.1.3, pp. 428-430.
[184] Sutter Subbasin GSP, Section 6.6.1, p. 457.
[185] 23 CCR § 354.28(c)(2).

are required to access groundwater; and an overall reduction in beneficial uses of groundwater."[186] The GSP uses groundwater levels as a proxy and the same sustainable management criteria (i.e., undesirable results,[187] minimum thresholds,[188] measurable objectives,[189] and interim milestones[190]) as those for chronic lowering of groundwater levels.

The GSP justifies using groundwater levels as a proxy by stating that "[l]ong-term reductions in storage are not anticipated as the Sutter Subbasin is already sustainable and due to the large volume of water currently in storage in the Subbasin" and that "as long as groundwater levels are managed above minimum thresholds, changes in storage should not be significant."[191] The Subbasin's storage is estimated at approximately 49 million acre-feet.[192] Department staff generally understand the GSAs' reasoning for using the same sustainable management criteria as groundwater levels and agree that maintaining groundwater levels above minimum thresholds will avoid significant changes in storage and depletions of groundwater supply in the Subbasin.

The GSP's discussion and presentation of information related to the reduction of groundwater storage are generally reasonable and covers the specific items listed in the GSP Regulations. Staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the discussion of this subject in the GSP.

4.3.2.3 Seawater Intrusion

In addition to components identified in 23 CCR §§ 354.28 (a-b), for 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.[193]

The GSP states that seawater intrusion is not an applicable sustainability indicator because the Subbasin is far from the Pacific Ocean and is not adjacent to the Sacramento-San Joaquin Delta.[194] Therefore, the GSP does not establish sustainable management criteria for seawater intrusion.

Department staff regard the GSAs' rationale for not setting sustainable management criteria for seawater intrusion to be reasonable given the location of the Subbasin.

[186] Sutter Subbasin GSP, Section 6.4.2.3, p. 417.
[187] Sutter Subbasin GSP, Section 6.4.2.1, p. 416.
[188] Sutter Subbasin GSP, Section 6.5.2, p. 433.
[189] Sutter Subbasin GSP, Section 6.6.2, p. 463.
[190] Sutter Subbasin GSP, Section 6.6.2, p. 463.
[191] Sutter Subbasin GSP, Section 6.4.2.1, p. 416.
[192] Sutter Subbasin GSP, Section 6.5.1.2, p. 427.
[193] 23 CCR § 354.28(c)(3).
[194] Sutter Subbasin GSP, Section 6.4.3, p. 417.

4.3.2.4 Degraded Water Quality

In addition to components identified in 23 CCR §§ 354.28 (a-b), for 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 of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.[195]

The GSP states that "[a]n undesirable result for degraded water quality in the Sutter Subbasin would be the result stemming from a causal nexus between groundwater-related activities, such as groundwater extraction or recharge, and a degradation in groundwater quality that causes a significant and unreasonable reduction in long-term viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of this GSP."[196] The GSP describes that "the causal nexus would be related to increased salinity (measured as total dissolved solids [TDS]) and nitrate (measured as nitrate as nitrogen [N]) concentration resulting from groundwater pumping or implementation of projects and/or management actions."[197] The GSAs will consider establishing sustainable management criteria for other constituents of concern with elevated concentrations if groundwater management activities are determined to be the cause.

The GSP states that undesirable results occur "when 50% of representative monitoring wells (14 out of 28 representative wells) across all aquifer zones exceed the minimum threshold for two consecutive measurements at each location during non-drought years and where these minimum threshold exceedances can be tied to a causal nexus between SGMA-related activities and water quality."[198] The GSP explains that such criteria "would provide sufficient data to establish a trend in potential worsening groundwater level as a result of GSP-related activities." However, the GSP does not justify why drought years are excluded from the criteria for undesirable results. In general, in drought years groundwater pumping increases, groundwater levels decline, and groundwater quality tends to degrade. For example, shallow domestic wells tend to experience more water quality issues during drought. Excluding water quality data in drought years is likely to exclude more severe impacts on water quality from either groundwater extraction or the GSAs' projects and management actions. Department staff recommend the GSAs revise the sustainable management criteria for degraded water quality to include water quality monitoring data collected in drought year (see Recommended Corrective Action 4).

[195] 23 CCR § 354.28(c)(4).
[196] Sutter Subbasin GSP, Section 6.4.4.1, pp. 417-418.
[197] Sutter Subbasin GSP, Section 6.4.4.1, p. 418.
[198] Sutter Subbasin GSP, Section 6.4.4.2, p. 417.

The GSP establishes minimum thresholds as "the highest of: (1) the upper Secondary MCL for TDS (1,000 mg/L) and Primary MCL for nitrate as [nitrogen] (10 mg/L) or (2) current water quality conditions for TDS and nitrate as [nitrogen] based on data available from 2000 to the time of GSP development (Summer 2021) at the representative monitoring well or nearby well within the same aquifer zone as described in Section 5.2.5 of the Basin Setting chapter, using maximum concentration detected of each constituent."[199] The minimum thresholds exceed 1,000 mg/L for TDS or 10 mg/L for nitrate as nitrogen in two and one representative monitoring well, respectively.[200] The minimum thresholds are consistent with the State drinking water standards and takes into consideration historical data.

The GSP describes the effects of the minimum thresholds on beneficial uses and users of groundwater in the Subbasin,[201] and how the GSAs determined that conditions at minimum thresholds will avoid undesirable results for other sustainability indicators[202] and will avoid undesirable results for adjacent subbasins or the ability of adjacent subbasins to achieve their sustainability goals.[203]

The GSP sets measurable objectives as "the current water quality conditions for TDS and nitrate as [nitrogen] based on data available from 2000 to the time of GSP development (Summer 2021) at the representative monitoring well or nearby well within the same aquifer zone (as described in Section 5.2.5 of the Basin Setting chapter) using maximum concentration detected of each constituent", or "500 mg/L for TDS (the recommended Secondary MCL) and 7 mg/L for nitrate as [nitrogen]" where such data are not available.[204] The interim milestones are set the same as the measurable objectives.[205] The measurable objectives and interim milestones are consistent with State drinking water standards and are informed by historical data.

The GSP's discussion of the minimum thresholds and measurable objectives for degraded water quality seems to be comprehensive and includes adequate support, justification, and information to understand the GSAs' process, analysis, and rationale. The GSP's discussion and presentation of information covers the specific items listed in the GSP Regulations in an understandable format using appropriate data and assumptions. The recommended corrective action of including drought-year water quality data does not preclude approval of the GSP at this time.

4.3.2.5 Land Subsidence

In addition to components identified in 23 CCR §§ 354.28 (a-b), the GSP Regulations require the minimum threshold for land subsidence to be the rate and extent of

[199] Sutter Subbasin GSP, Section 6.5.4.1, p. 434.
[200] Sutter Subbasin GSP, Table 6-2, pp. 435-436.
[201] Sutter Subbasin GSP, Section 6.5.4.4, pp. 439-441.
[202] Sutter Subbasin GSP, Section 6.5.4.2, p. 437.
[203] Sutter Subbasin GSP, Section 6.5.4.3, pp. 437-440.
[204] Sutter Subbasin GSP, Section 6.6.4, p. 463.
[205] Sutter Subbasin GSP, Table 6-6, pp. 465-466.

subsidence that substantially interferes with surface land uses and may lead to undesirable results.[206] 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 basin, 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 basin that defines the minimum thresholds and measurable objectives.[207]

The GSP describes that inelastic land subsidence has not been observed in the Subbasin historically and that potential causes of inelastic land subsidence would be significant increases in groundwater production. The GSP states that "[a]n undesirable result for land subsidence would be a result due to groundwater extraction that causes a significant reduction in the viability of the use of infrastructure for water distribution and flood control, including impacts to laterals from differential settlement that reduces the ability to deliver surface water supplies or inadequate freeboard on levee systems in wet years impacting conveyance of flood waters."[208]

The GSP states that "[u]ndesirable results are considered to occur when at least 25% of representative subsidence monitoring sites (6 out of 22 sites) exceed the minimum threshold for subsidence over the 5-year monitoring period."[209] Department staff note that this definition of land subsidence could result in localized occurrences of land subsidence that are not considered undesirable results and encourage the GSAs to provide more information regarding how the proposed criteria avoid significant and unreasonable conditions in the Subbasin. Department staff also note that identification of vulnerable water conveyance and flood control infrastructure may improve the GSAs' ability to avoid undesirable results during the planning and implementation horizon of the GSP.

The GSP states that the 22 representative subsidence monitoring sites are part of the Sacramento Valley Global Positioning System (GPS) Subsidence Monitoring Network and "is intended to be monitored on a 5-year timeframe."[210] The GSP states that the GSAs will rely on the Department to collect data in the future;[211] however, there is no commitment that this data will be collected on a routine basis. Given the GSAs' definition of undesirable results which allows a certain amount of subsidence over a 5-year period, measurements from the land subsidence monitoring network must be collected at a minimum of every 5-years to evaluate whether undesirable results are occurring in the Subbasin. If data is not collected at a minimum of every 5-years from the network, another

[206] 23 CCR § 354.28(c)(5).
[207] 23 CCR §§ 354.28(c)(5)(A-B).
[208] Sutter Subbasin GSP, Section 6.4.5.1, p. 419.
[209] Sutter Subbasin GSP, Section 6.4.5.2, pp. 419-420.
[210] Sutter Subbasin GSP, Section 6.4.5.2, pp. 419-420; Section 7.2.6.5.3, p. 624; Table 7-51, p. 621.
[211] Sutter Subbasin GSP, Section 7.2.6.5.4, p. 624.

method should likely be utilized to ensure undesirable results are not occurring within the Subbasin (see Recommended Corrective Action 5a).

The GSP states that InSAR data collected by NASA's Jet Propulsion Laboratory and published by DWR "will also be reviewed on an annual basis to ensure subsidence does not become a concern over the 5-year monitoring period."[212] However, it is not clear how the InSAR data will be incorporated into minimum threshold assessment. Department staff recommend the GSAs provide a description of how the InSAR data will be incorporated into identifying undesirable results for land subsidence (see Recommended Corrective Action 5b).

The GSP establishes the minimum threshold as "0.5 feet of subsidence over a 5-year period" at each survey monument site.[213] The GSP explains that water conveyance and levees become sensitive to land subsidence at this subsidence rate.

The GSP states that minimum thresholds are selected to avoid undesirable results for all beneficial uses and users of groundwater.[214] The GSP describes the potential impacts to the interests of beneficial uses and users of groundwater or land uses and property interests if minimum thresholds are exceeded. The impacts generally involve well repair or replacement, disturbance of gravity-fed water conveyance systems, and reduced ability to divert or convey flood water, and changes in streambed slope.

The GSP states land subsidence minimum thresholds do not cause undesirable results for other sustainability indicators and are selected to avoid causing undesirable results in adjacent subbasins.[215] The GSP describes minimum thresholds for subsidence in GSPs of adjacent subbasins. The Butte, North Yuba, and South Yuba Subbasins have similar minimum thresholds for subsidence as the Sutter Subbasin, while the Yolo and Colusa subbasins allow higher rates of subsidence as their minimum thresholds. The GSP states that the GSAs will coordinate with GSAs in the Yolo and Colusa Subbasins to ensure their minimum thresholds do not cause undesirable results in the Sutter Subbasin.

The GSP establishes the measurable objectives as "0.25 feet of subsidence per 5-year period at each site."[216] The GSP explains that this rate is comparable to the accuracy of the subsidence monitoring network (i.e., 0.17 feet). Interim milestones are set at the measurable objectives because inelastic land subsidence has not been observed historically.

Department staff note that the GSAs have not established what amount of subsidence would be considered "significant and unreasonable" in the Subbasin but conclude that the

[212] Sutter Subbasin GSP, Section 6.4.5.2, p. 420; Section 7.2.6.5.3, p. 624.
[213] Sutter Subbasin GSP, Section 6.5.5.1, pp. 441-442.
[214] Sutter Subbasin GSP, Section 6.5.5.1, pp. 441-442.
[215] Sutter Subbasin GSP, Sections 6.5.5.2-6.5.5.3, pp. 442-445.
[216] Sutter Subbasin GSP, Section 6.6.5, p. 467.

GSP's sustainable management criteria for subsidence are reasonable in light of the lack of currently observed land subsidence in the Subbasin.

The GSP's discussion of land subsidence is comprehensive and includes adequate support, justification, and information to understand the GSAs' process, analysis, and rationale. Although a recommend corrective action was identified, which requires the GSAs to provide more information about how an undesirable result will be detected, this does not preclude plan approval as it appears that the Subbasin has not experienced land subsidence based on information presented in the GSP. 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 discussion of this subject in the GSP.

4.3.2.6 Depletions of Interconnected Surface Water

SGMA defines undesirable results for the depletion 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 basin.[217] The GSP Regulations require that a Plan identify the presence of interconnected surface water systems in the basin and estimate the quantity and timing of depletions of those systems.[218] 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.[219]

The Plan acknowledges the presence of interconnected surface waters in the Subbasin and identifies their locations by evaluating the differences in elevations between the groundwater and surface water at the stream node scale through modeling of historical conditions for the Sacramento and Feather Rivers and the Sutter Bypass.[220] Department staff are satisfied that the GSA has adopted a reasonable approach to identify the location of interconnected surface waters in the Basin.

The GSP does not quantify the rate or volume of surface water depletions due to groundwater pumping as required by the GSP Regulations.[221] Instead, the GSP proposes to use groundwater elevations as a proxy metric to manage depletions of interconnected surface water.[222] The GSP indicates that groundwater levels associated with gaining streams turning into losing streams are considered undesirable results. Department staff note the GSP does not demonstrate, with adequate evidence, that the use of groundwater

[217] Water Code § 10721(x)(6).
[218] 23 CCR § 354.16 (f).
[219] 23 CCR § 354.28 (c)(6).
[220] Sutter Subbasin GSP, Section 5.2.7, pp. 359-362.
[221] 23 CCR § 354.28 (c)(6).
[222] Sutter Subbasin GSP, Section 6.4.6.2, p. 421.

elevations as a proxy for depletions of interconnected surface water is sufficient to quantify the location, quantity, and timing of depletions.

The GSP states that "[t]he undesirable result for depletions of interconnected surface water is a result that causes significant and unreasonable adverse effects on beneficial uses and users of interconnected surface water within the Sutter Subbasin over the GSP planning and implementation horizon,"[223] and that "the adverse effects could potentially include reduced ability of surface water flows to meet instream flow requirements or to deliver surface water supplies to users in the Subbasin."[224] The GSP describes potentially impacted beneficial uses and users, including fisheries, riparian habitat, recreation, and agriculture. Department staff note that the GSP has not described the potential impacts of stream depletion on downstream beneficial uses and users of surface water, including water rights holders and environmental uses and users.

The GSP describes that undesirable results occur when "[g]roundwater elevations [drop] below the minimum threshold criteria at 25% of representative monitoring locations (6 out of 23 representative wells) concurrently over two consecutive seasonal high water level measurements resulting in a significant loss of aquifer contribution to the interconnected water course (if currently a gaining stream) and/or a reversal of stream connection from gaining to losing streams."[225]

Department staff generally understand that the GSP's definition of undesirable results emphasizes the long-term effects of Subbasin-wide groundwater level decline on interconnected surface waters, such as turning gaining streams into losing streams. However, the GSP has not explained how the GSAs decided the conditions of gaining streams becoming losing streams correspond to the significant and unreasonable effects, such as "reduced ability of surface water flows to meet instream flow requirements or to deliver surface water supplies to users in the Subbasin." Specifically, the GSP has not quantified stream depletions that are considered significant and unreasonable. Additionally, it is unclear whether the GSAs have considered the seasonality of stream depletion and determined that increased pumping and stream depletions in irrigation seasons (e.g., seasonal low water levels) during Plan implementation do not cause significant and unreasonable adverse effects. Department staff recommend the GSAs present justification for its criteria of when and where undesirable results occur for depletions of interconnected surface water (see Recommended Corrective Action 6a).

The minimum thresholds for interconnected surface water were established using the same methodology as for the chronic lowering of groundwater levels (see Section 4.3.2.1).[226] The minimum thresholds are set as the deepest of (1) historical low, (2) "90% of the average groundwater elevation from the projected water budget (baseline condition over 60-year period using C2VSimFG-Sutter) at each representative monitoring site with

[223] Sutter Subbasin GSP, Section 6.4.6.1, p. 420.
[224] Sutter Subbasin GSP, Section 6.4.6.4, p. 421.
[225] Sutter Subbasin GSP, Section 6.4.6.2, p. 421.
[226] Sutter Subbasin GSP, Section 6.5.6.1, p. 446.

an artificial increase in evapotranspiration (ET) of 50%," or (3) water level corresponding to an average operating range of 8.0 feet for the AZ and AZ-1 zones, and 16.5 feet for the AZ-2 and AZ-3 zones.[227] As noted in the GSP, minimum thresholds will be modified during Plan implementation if it is determined that applying the minimum operating range will lead to a reversal of stream connection from gaining to losing streams.[228] As discussed in Section 4.3.2.1, Department staff recommend the GSAs provide clarification related to the methodology of the second criterion.

The GSP describes the impacts of minimum thresholds on beneficial uses and users of groundwater, including environmental uses and users. The GSP states that "[i]f an undesirable result for depletions of interconnected surface water is observed and presently gaining streams become losing streams, this reversal of stream interconnection would affect aquatic systems and potentially GDEs. Overall water supply utilized by environmental beneficial users of water would be reduced, thereby reducing suitable habitat through reduced stream depth, flow velocity, cover, and dissolved oxygen as well as increased temperature."[229] However, while the minimum thresholds are associated with gaining streams turning into losing streams, the GSP has not provided justification that stream conditions at the groundwater level minimum thresholds, before gaining streams become losing (i.e., the second criterion), will avoid significant and unreasonable adverse impacts on surface water uses and users. As discussed in Section 4.3.2.1, Department staff recommend the GSAs provide estimates of correlated stream depletion and present justification why the impacts are not considered significant and unreasonable.

The GSP describes the potential impact of minimum thresholds on other sustainability indicators and adjacent subbasins. The GSAs anticipate the minimum thresholds will not prevent neighboring subbasins from achieving their sustainability goals and explain that the minimum thresholds are comparable to those of the adjacent subbasins, and the Sacramento and Feather rivers serve as "regulating reservoirs" to maintain groundwater levels in the region. Department staff note that the GSAs have not provided depletion estimates at minimum thresholds or discussed how depletions may impact water quality or water availability for water rights holders and environmental users.

The measurable objectives and interim milestones were also set the same as those for chronic lowering of groundwater levels, at the average groundwater level of the available historical records at each representative monitoring site.[230] The GSP explains that maintaining current, sustainable conditions will avoid undesirable results. Department staff note that depletions at the measurable objectives will be generally higher than historical depletions because the measurable objectives are defined with seasonal high groundwater level measurements.

[227] Sutter Subbasin GSP, Section 6.5.6.1, p. 446.
[228] Sutter Subbasin GSP, Section 6.5.6.1, p. 451.
[229] Sutter Subbasin GSP, Section 6.5.6.4, p. 456.
[230] Sutter Subbasin GSP, Section 6.5.1.1, p. 427.

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. 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 6b). 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 6c). 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 6d).

4.4 Monitoring Network

The GSP Regulations describe the monitoring network that must be developed for each sustainability indicator including monitoring objectives, monitoring protocols, and data reporting 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 basin and evaluate changing conditions that occur through implementation of the Plan.[231] Specifically, a monitoring network must be able to monitor impacts to beneficial uses and users,[232] monitor changes in groundwater conditions relative to measurable objectives

[231] 23 CCR § 354.32.
[232] 23 CCR § 354.34(b)(2).

and minimum thresholds,[233] capture seasonal low and high conditions,[234] include required information such as location and well construction and include maps and tables clearly showing the monitoring site type, location, and frequency.[235] Department staff encourage GSAs to collect monitoring data as specified in the GSP, follow SGMA data and reporting standards,[236] fill data gaps identified in the GSP prior to the first periodic evaluation,[237] update monitoring network information as needed, follow monitoring best management practices,[238] 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 basin understanding may not represent the best available science for use to monitor basin conditions.

The GSP has identified 62 monitoring wells within the principal aquifer of Subbasin to include in the groundwater level monitoring network.[239] The entire groundwater level monitoring network will be used as representative monitoring points in the Subbasin, according to the GSP. However, there are a total of 59 wells uploaded to DWR's SGMA Portal Monitoring Network Module (MNM) which identifies only 56 wells as being representative monitoring points. The Department's review of the groundwater level monitoring network is based on information provided in the MNM rather than the information provided in the GSP.

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.[240]

The GSP identifies 28 representative wells in its degraded water quality monitoring network.[241] The GSP lists several active groundwater quality monitoring programs within the Subbasin which include the Irrigated Lands Regulatory Program (ILRP), Groundwater Ambient Monitoring and Assessment Program (GAMA), and others.[242] The GSP identifies TDS and nitrate as [nitrogen] as the constituents of concern for the Subbasin[243] and that all wells will be sampled annually during the month of September.[244]

The GSP proposes a dedicated land subsidence monitoring network using 22 monuments from the Department's Sacramento Valley Subsidence Network (SVSN) and

[233] 23 CCR § 354.34(b)(3).
[234] 23 CCR § 354.34(c)(1)(B).
[235] 23 CCR §§ 354.34(g-h).
[236] 23 CCR § 352.4 *et seq*.
[237] 23 CCR § 354.38(d).
[238] Department of Water Resources, 2016, Best Management Practices and Guidance Documents.
[239] Sutter Subbasin GSP, Table 7-48, pp. 595-596.
[240] Sutter Subbasin GSP, Section 6.4.2, pp. 416-417; Section 6.5.2, p. 433; Section 7.2.6.2, p. 606.
[241] Sutter Subbasin GSP, Table 7-50, p. 607.
[242] Sutter Subbasin GSP, Section 2.3.3.1, pp. 126-132.
[243] Sutter Subbasin GSP, Table 7-50, p. 607.
[244] Sutter Subbasin GSP, Section 7.2.6.4.3, p. 614.

Interferometric Synthetic Aperture Radar (InSAR) satellite data.[245] As discussed in Section 4.3.2.5, the GSAs should evaluate the reliability and frequency of the SVSN and explain how InSAR data will be used.

The GSP proposes to use a combination of stream gauges and a subset of wells from the groundwater level monitoring network as a proxy for the depletions of interconnected surface water monitoring network.[246] This network consists of 30 stream gauges and 23 wells; of the 23 wells, 15 are shared with the chronic lowering of groundwater levels monitoring network and 8 are unique to the depletions of interconnected surface water monitoring network.[247] All sites are considered representative monitoring sites for this network.[248] Of the 30 stream gauges, 27 will be monitored every 15 minutes and 3 will be monitored hourly.[249] The GSP states that the wells will be monitored at least semi-annually, following the same monitoring schedule as wells in the chronic lowering of groundwater levels monitoring network.[250]

While the GSP does provide tables and includes maps identifying the location of the representative monitoring sites for the chronic lowering of groundwater levels and depletions of interconnected surface water monitoring networks, Department staff have determined additional information should be provided in the GSP regarding the monitoring network for these sustainability indicators. The GSP did not report, in tabular format, the measurement frequency for groundwater elevation measurements within the chronic lowering of groundwater levels and depletions of interconnected surface water monitoring networks as required by the GSP Regulations.[251] Providing this information will provide the Department additional clarity on how the Subbasin will comply with the requirements of the GSP Regulations and SGMA (see Recommended Corrective Action 7).

Despite the recommended corrective action for additional information, the description of the monitoring network included in the Plan substantially complies with the requirements outlined in the GSP Regulations at this time. Overall, the monitoring network is supported by the best available information and data and is designed to ensure adequate coverage of sustainability indicators.

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 basin, including projects and management actions to respond to changing conditions in the

[245] Sutter Subbasin GSP, Section 7.2.6.5, pp. 619 and 624; Table 7-51, p. 621; Figure 7-12, p. 623.
[246] Sutter Subbasin GSP, Section 7.2.6.6, pp. 626-627; Tables 7-52 and 7-53, pp. 629-630; Figures 7-13 through 7-16, pp. 631-634.
[247] Sutter Subbasin GSP, Tables 7-48, 7-52, 7-53, pp. 595, 629-630.
[248] Sutter Subbasin GSP, Section 7.2.3, p. 586.
[249] Sutter Subbasin GSP, Table 7-53, p. 630.
[250] Sutter Subbasin GSP, Section 7.2.6.1.3, pp. 601-602; Section 7.2.6.6.3, p. 635.
[251] 23 CCR § 354.34 (h).

basin.[252] Each Plan's description of projects and management actions must include details such as: how projects and management actions in the GSP will achieve sustainability, the implementation process and expected benefits, and prioritization and criteria used to initiate projects and management actions.[253]

The Plan states that the Sutter Subbasin is expected to achieve its sustainability goal by 2042 and maintain sustainability through 2072 even without projects and management actions.[254] The GSAs plan to maintain sustainability through an adaptive management strategy, implementing projects and management actions as needed to ensure undesirable results do not occur. The GSAs also propose to address data gaps to improve the understanding of groundwater conditions and inform adaptive management of the Subbasin.

The GSP groups projects and management actions into three categories based on their status and purpose.[255] Category 1 includes six ongoing and planned projects and management actions that are intended to help the Subbasin achieve the sustainability goal, meet interim milestones and measurable objectives, and avoid minimum threshold exceedances.[256] These projects and management actions focus on improved water management, in-lieu or direct recharge, and improved shallow groundwater monitoring. Category 2 comprises 17 other projects and management actions that will be implemented as needed to support sustainability and adapt to changing conditions when measurable objectives cannot be maintained, or minimum thresholds are exceeded.[257] Category 3 contains 16 potential projects and management actions that address data gaps and will be implemented on an as-needed basis.[258] Department staff recommend the GSAs prioritize projects and management actions that address the identified data gaps and specify when they will be initiated.

The GSP includes a table that summarizes these projects and management actions into eight general types and depicts whether each type would directly benefit each of the applicable sustainability indicators.[259] Projects and management actions related to improved water management, in-lieu or direct recharge, and groundwater demand reduction are expected to directly improve conditions of groundwater levels, groundwater storage, and interconnected surface water depletion. Projects and management actions specifically scoped for water quality enhancement are also included.

The Plan adequately describes proposed projects and management actions in a manner that is generally consistent and substantially complies with the GSP Regulations. The adaptive management approach and the projects and management actions, which focus

[252] 23 CCR § 354.44 (a).
[253] 23 CCR § 354.44 (b) *et seq.*
[254] Sutter Subbasin GSP, Section 7.1.2, pp. 477-479.
[255] Sutter Subbasin GSP, Section 7.1.3, pp. 479-481; Table 7-2, pp. 483-491.
[256] Sutter Subbasin GSP, Section 7.1.4, pp. 495-535.
[257] Sutter Subbasin GSP, Section 7.1.5, pp. 535-553.
[258] Sutter Subbasin GSP, Section 7.1.6, pp. 553-575.
[259] Sutter Subbasin GSP, Table 7-3, pp. 492-493.

largely on supply augmentation and conservation, present a generally feasible approach to achieve the Subbasin's sustainability goals. As projects and management actions are implemented, the Department expects that progress be included in annual reports and any addition or removal of project and management actions be documented in periodic updates.

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."[260] 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.[261]

The Sutter Subbasin has seven adjacent subbasins - Butte, Colusa, North American, North Yuba, South Yuba, Wyandotte Creek, and Yolo.[262] Each of them is required to be managed under a GSP.

The GSP describes that the Sutter Subbasin's minimum thresholds and measurable objectives were developed in a coordinated way with the adjacent subbasins by reviewing their respective sustainable management criteria chapters and through discussions with consulting staff in the Sacramento Valley.[263] The GSP describes how the Sutter Subbasin GSAs determined that conditions at minimum thresholds would avoid causing undesirable results for adjacent subbasins or affecting the ability of adjacent subbasins to achieve their sustainability goals.[264] The GSP explains that the Subbasin's minimum thresholds are generally comparable to those of the adjacent subbasins'. The GSP also states that "[t]he Sutter Subbasin GSAs will continue to coordinate with adjacent subbasins regarding [Sustainable Management Criteria] and related monitoring and ensure that subbasin management activities do not cause undesirable results in either the Sutter Subbasin or for adjacent subbasins."[265]

Based on information available, Department staff have no reason to believe that groundwater management under the Plan in the Sutter Basin will adversely affect the ability of local agencies in the adjacent basins at this time. Department staff will review this issue during periodic updates to the Plan.

[260] Water Code § 10733(c).
[261] 23 CCR § 354.28(b)(3).
[262] Sutter Subbasin GSP, Table 4-1, p. 165.
[263] Sutter Subbasin GSP, Section 6.3, p. 414.
[264] Sutter Subbasin GSP, Section 6.5.1.3, pp. 428-430; Section 6.5.4.3, pp. 437-440; Section 6.5.5.3, pp. 443-445; Section 6.5.6.3, pp. 452-455.
[265] Sutter Subbasin GSP, Sections 6, p. 411.

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.[266]

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, GSAs should be preparing for these changing conditions as they work to sustainably manage groundwater within their jurisdictional areas. Specifically, the Department encourages GSAs to:

1. Explore how their proposed groundwater level thresholds have been established in consideration of groundwater level conditions in the basin based on current and future drought conditions.
2. Explore how groundwater level data from the existing monitoring network will be used to make progress towards sustainable management of the basin given increasing aridification and effects of climate change, such as prolonged drought.
3. Take into consideration changes to surface water reliability and that impact on groundwater conditions.
4. Evaluate updated watershed studies that may modify assumed frequency and magnitude of recharge projects, if applicable, and
5. 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 forces to evaluate how their Plan's groundwater management strategy aligns with drought planning, response, and mitigation efforts within the basin.

[266] 23 CCR § 354.18.

5 STAFF RECOMMENDATION

Department staff recommend approval of the GSP with the recommended corrective actions listed below. The Sutter 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 Sutter Subbasin. The GSAs have identified several areas for improvement of their 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 GSAs for the first periodic assessment of the 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

Provide clarification regarding the various zones of the principal aquifer system, geologic formations comprising the principal aquifer, and the vertical extent of the Subbasin. Consistent descriptions and naming of the aquifer zones should be present throughout the GSP, including in the hydrogeologic conceptual model and the monitoring network.

RECOMMENDED CORRECTIVE ACTION 2

Provide further information and justification related to the increases in net subsurface inflows from adjacent subbasins in the projected water budgets and the sustainable yield estimation.

RECOMMENDED CORRECTIVE ACTION 3

Revise the sustainable management criteria for the chronic lowering of groundwater levels as follows:

a. Revise the sustainable management criteria to be based on seasonal low groundwater levels to ensure potential impacts to beneficial uses and users are considered.

b. Provide clarification and detailed information related to the methodology of the second criterion for minimum thresholds (i.e., associated with the projected water budget simulation with a 50 percent increase in ET). Clearly describe the processes and terms involved, and the spatial and temporal aggregations that define “interconnected streams that are gaining become losing.”

c. Provide more information about how the proposed minimum thresholds for the chronic lowering of groundwater levels may impact beneficial uses and users. Specifically, consider the impact of the selected minimum threshold levels on

supply wells. The consideration should identify the degree/extent of potential impact including the percentage, number, and location of potentially impacted wells at the proposed minimum thresholds for chronic lowering of groundwater levels.

d. Reevaluate how groundwater level minimum thresholds may impact land subsidence.

e. Provide estimates of stream depletions when groundwater levels are at the minimum thresholds and evaluate the potential impacts to beneficial uses and users of interconnected surface water.

RECOMMENDED CORRECTIVE ACTION 4

Revise the sustainable management criteria for degraded water quality to use water quality monitoring data collected in all water year types including drought years.

RECOMMENDED CORRECTIVE ACTION 5

Revise the sustainable management criteria for land subsidence as follows:

a. Describe how undesirable results will be evaluated since it is unclear at what frequency data will be collected from the Sacramento Valley GPS Subsidence Monitoring Network. If data is not collected at a minimum of every 5-years from the network, another method should be utilized to ensure undesirable results are not occurring within the Subbasin.

b. Provide a description of how the InSAR data will be incorporated into identifying undesirable results for land subsidence.

RECOMMENDED CORRECTIVE ACTION 6

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. Provide justification for the criteria of when and where undesirable results occur. Explain how the GSAs have determined that significant and unreasonable effects

will not occur before gaining streams become losing, and how the GSAs have considered the seasonality of stream depletions.

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

RECOMMENDED CORRECTIVE ACTION 7

Define the data collection frequency in tabular format for groundwater monitoring sites within the chronic lowering of groundwater levels and depletions of interconnected surface water monitoring networks in the GSP.