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

Austin Miller
Sloughhouse Resource Conservation District
8698 Elk Grove Boulevard, Suite 1-207
Elk Grove, CA 95624
Austin@SloughhouseRCD.org

RE: San Joaquin Valley – Cosumnes Subbasin - 2022 Groundwater Sustainability Plan

Dear Austin Miller,

The Department of Water Resources (Department) has evaluated the groundwater sustainability plan (GSP or Plan) submitted for the San Joaquin Valley – Cosumnes 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 Cosumnes 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 GSP for the Cosumnes Subbasin no later than January 27, 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 San Joaquin Valley – Cosumnes Subbasin Groundwater Sustainability Plan

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

STATEMENT OF FINDINGS REGARDING THE APPROVAL OF THE SAN JOAQUIN VALLEY – COSUMNES 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 Amador County Groundwater Management Authority, City of Galt, Clay Water District, Galt Irrigation District, Omochumne-Hartell Water District, Sacramento County, and Sloughhouse Resource Conservation District Groundwater Sustainability Agencies (GSAs or Agencies) for the San Joaquin Valley – Cosumnes Subbasin (Basin No. 5-022.16).

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 Cosumnes 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 Cosumnes Subbasin (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 GSA has made satisfactory progress toward sustainability); and, (4) local agencies acting as GSAs are authorized, but not required, to address undesirable results that occurred prior to enactment of SGMA. (Water Code §§ 10721(r); 10727.2(b); 10733(a); 10733.8.)

D. The Plan conforms with Water Code §§ 10727.2 and 10727.4, substantially complies with 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 and long-term goal to maintain groundwater levels at those observed in the fall of 2015 are sufficiently justified and explained. The Plan relies on credible information and science to quantify the groundwater conditions that the Plan seeks to avoid, and provides an objective way to determine whether the Subbasin is being managed sustainably in accordance with SGMA. (23 CCR § 355.4(b)(1).)

2. The Plan demonstrates a reasonable understanding of where data gaps exist and demonstrates a commitment to eliminate those data gaps. For example, the GSAs plan to collect additional data to improve understanding of the hydrogeologic properties of the Subbasin, including the lithology and hydraulic connection between the principal aquifer and potential perched groundwater; conduct an inventory of wells in the Subbasin and improve understanding of well construction details, including well type and well status information (i.e., active, inactive, abandoned, or destroyed); and expand monitoring networks to improve characterization of interconnected surface water, address spatial variability and uncertainty in water table conditions in the eastern portion of the Subbasin, and to monitor effects of implemented projects and management actions. The GSAs intend to incorporate the additional data obtained from these data filling efforts into the Subbasin's groundwater model, to improve water budget calculations and better understand surface water and groundwater interactions. (23 CCR § 355.4(b)(2).)

3. The projects and management actions proposed are designed to achieve sustainability for the Subbasin by increasing groundwater levels and the volume of groundwater in storage. The GSAs plan to achieve sustainability through groundwater augmentation from flood-managed aquifer recharge projects and new supplies. The GSAs also plan to generate revenue to support implementation of the GSP through the sale of a portion of conserved or banked groundwater. The planned projects and management actions are reasonable and commensurate with the level of understanding of the Subbasin setting. The GSAs have also identified several other projects and management actions that may be implemented in the future and are meant to provide flexibility for the GSAs to adaptively address unforeseen conditions. 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 domestic wells, 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 subbasin to implement its GSP or impede achievement of sustainability goals in an adjacent subbasin. The Plan includes an analysis of potential impacts to adjacent subbasins related to the established minimum thresholds for each sustainability indicator. The Plan does not anticipate any impacts to adjacent subbasins resulting from the minimum thresholds defined in the Plan. (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 seven GSAs (Amador County Groundwater Management Authority GSA, City of Galt GSA, Clay Water District GSA, Galt Irrigation District GSA, Omochumne-Hartell Water District GSA, Sacramento County GSA, and Sloughhouse Resource Conservation District GSA) and their associated member agencies have a history of groundwater management in the Subbasin, which provides 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, the Department 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, that 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. 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. Subbasin 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 Cosumnes 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 27, 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 – San Joaquin Valley – Cosumnes Subbasin

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

Groundwater Basin Name:	San Joaquin Valley – Cosumnes Subbasin (No. 5-022.16)
Submitting Agency:	Amador County Groundwater Management Authority Groundwater Sustainability Agency, City of Galt Groundwater Sustainability Agency, Clay Water District Groundwater Sustainability Agency, Galt Irrigation District Groundwater Sustainability Agency, Omochumne-Hartnell Water District Groundwater Sustainability Agency, Sacramento County Groundwater Sustainability Agency, and Sloughhouse Resource Conservation District Groundwater Sustainability Agency
Submittal Type:	Initial GSP Submission
Submittal Date:	January 27, 2022
Recommendation:	Approved
Date:	October 26, 2023

The Amador County Groundwater Management Authority, City of Galt, Clay Water District, Galt Irrigation District, Omochumne-Hartnell Water District, Sacramento County, and Sloughhouse Resource Conservation District Groundwater Sustainability Agencies (collectively referenced to as the GSAs or Agencies) submitted the Cosumnes Subbasin Groundwater Sustainability Plan (GSP or Plan) for the San Joaquin Valley – Cosumnes 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 Subbasin.[3] Department staff will continue to monitor and evaluate the Subbasin's

[1] Water Code § 10720 *et seq*.
[2] 23 CCR § 350 *et seq*.
[3] 23 CCR § 350 *et seq*.

progress toward achieving the sustainability goal through annual reporting and future Periodic Evaluations of the GSP and its implementation.

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

This assessment includes five sections:

- **Section 1 – Summary:** Overview of Department staff's assessment and recommendations.
- **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 Cosumnes Subbasin GSP. The GSAs have identified areas for improvement of their Plan (e.g., addressing data gaps related to the hydrogeological conceptual model, well construction information, and interconnected surface water, expanding monitoring networks, and refining projects and management actions). 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) Further assessing the potential impact of the established minimum thresholds for chronic lowering of groundwater levels on domestic wells, as related data gaps are filled, and providing supporting documentation of the assessment.

(2) Revising the undesirable results definition for chronic lowering of groundwater levels to be based on lowering of groundwater and updating the minimum thresholds, as necessary, to be aligned with the undesirable results definition.

(3) Conducting necessary investigations or studies to better understand the relationship between groundwater levels and degraded water quality, and describing the potential impacts of the minimum thresholds established for chronic lowering of groundwater levels on degraded water quality.

(4) Establishing sustainable management criteria for land subsidence based on direct measurements of land elevation changes.

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

(6) Expanding the land subsidence monitoring network to provide sufficient coverage of the Subbasin.

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 Cosumnes 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

[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.*

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]

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

To the extent overdraft is present in a 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

[12] 23 CCR § 355.4(b).
[13] 23 CCR § 351(h).
[14] 23 CCR §§ 355.4(b)(1), (3), (4), and (5).
[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).

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 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.

[25] Water Code § 10733.8.
[26] 23 CCR § 356.4 *et seq*.
[27] Water Code § 10733.8; 23 CCR § 355.6.
[28] Water Code §§ 10728 *et seq.*, 10728.2.

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 27,2022.

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 required information, sufficient to warrant a thorough evaluation by the Department.[31] The Department posted the GSP to its website on February 7, 2022.[32]

3.3 Basin Coverage

A GSP, either on its own or in coordination with other GSPs, must cover the entire 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 Cosumnes Subbasin and the jurisdictional boundaries of the submitting GSAs fully contain 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

[29] Water Code § 10720.7(a)(2).
[30] 23 CCR § 355.4(a)(2).
[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/106.
[33] Water Code § 10727(b); 23 CCR § 355.4(a)(3).
[34] Cosumnes GSP, Section 5.1.1, p. 47, and Figure PA-1, p. 79.

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 GSP provides administrative information identifying the submitting agencies as the Amador County Groundwater Management Authority GSA, City of Galt GSA, Clay Water District GSA, Galt Irrigation District GSA, Omochumne-Hartnell Water District GSA, Sacramento County GSA, and Sloughhouse Resource Conservation District GSA.[38] The GSP describes in an understandable format, the Plan area (Cosumnes Subbasin), the legal authority of the GSAs and their ability to manage groundwater in the Subbasin, and identifies beneficial uses and users present in the Subbasin, as summarized below.

The Cosumnes Subbasin covers an area of approximately 210,300 acres (329 square miles) of the northern end of the San Joaquin Valley Groundwater Basin, within the Sacramento and Amador Counties. The Subbasin is bordered on the east by the foothills of the Sierra Nevada mountains, on the north and west by the South American Subbasin, and on the south by the Eastern San Joaquin Subbasin. A map showing the location of the Subbasin and adjacent subbasins is presented as Figure 1 below.

[35] 23 CCR § 354.6 *et seq*.
[36] 23 CCR § 354.8 *et seq*.
[37] 23 CCR § 354.6(e).
[38] Cosumnes GSP, Section 3.1, p. 36.

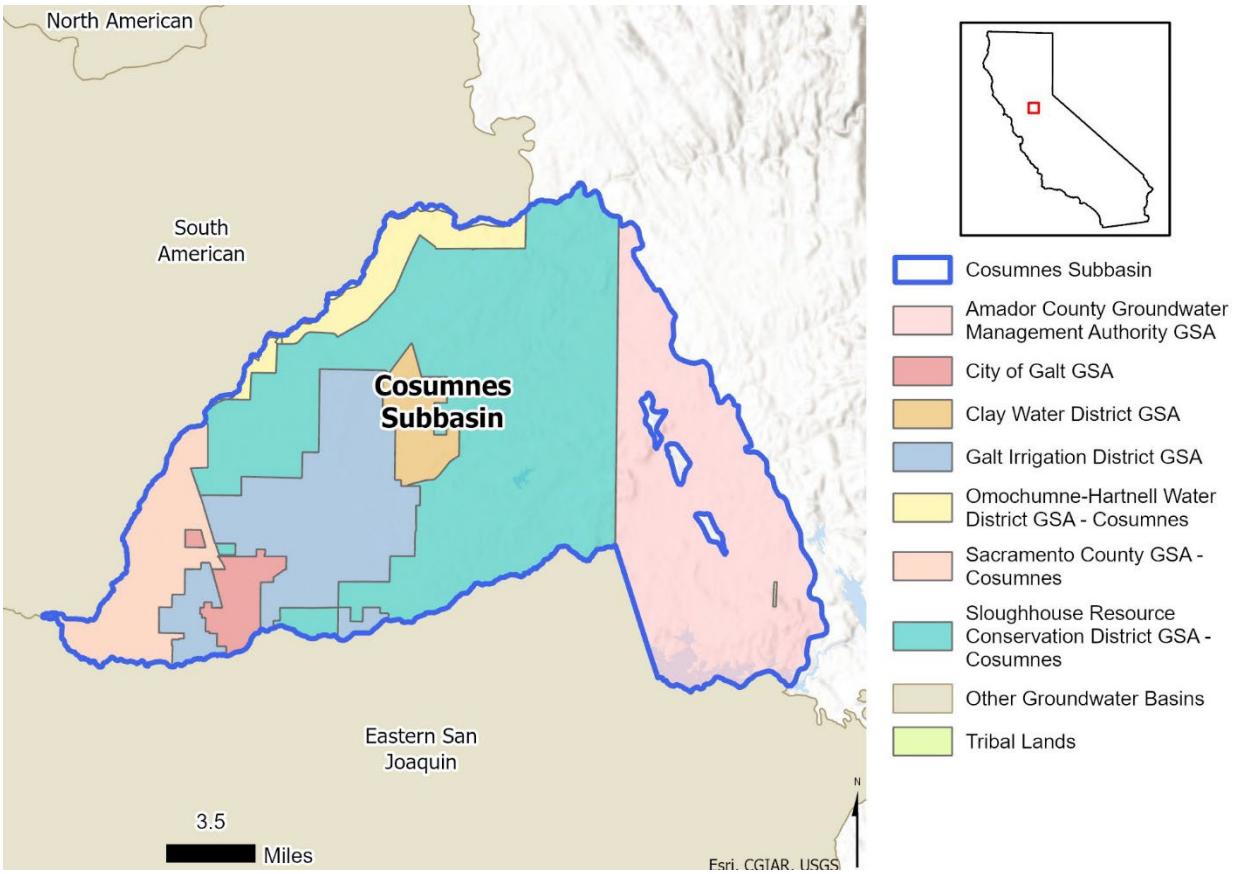

Figure 1: Cosumnes Subbasin Location Map

Based on information presented in the GSP, the majority of land in the Subbasin is undeveloped (approximately 65%). Approximately 27% of the land is used for agriculture (with vineyards, pasture, and grain, being the most abundant agricultural land use) and approximately 9% is used for urban areas, which the GSP describes as including "cities, communities, Ag-residential, and industrial;" [39] the GSP states that disadvantaged and severely disadvantaged communities are present in the southwestern portion of the Subbasin, within Sacramento County.[40]

The jurisdictional boundaries within the Subbasin include the Sacramento and Amador Counties; the cities of Galt and Ione; federal, state, and tribal lands; California protected areas and conservation easement areas; and special district lands encompassing the Camanche Reservoir and Rancho Seco Recreational Park, owned by East Bay Municipal Utility District (EBMUD) and Sacramento Municipal Utility District (SMUD), respectively.[41]

Entities with water management responsibilities in the Subbasin include, Sacramento County, Amador County, City of Galt, City of Ione, utility districts (EBMUD and SMUD),

[39] Cosumnes GSP, Section 5.1.4, p. 52.
[40] Cosumnes GSP, Section 5.1.3, p. 50.
[41] Cosumnes GSP, Section 5.1.3, pp. 48-50.

and joint power authorities: Amador County Groundwater Management Authority (formed by Amador County, Amador Water Agency, and Jackson Valley Irrigation District); Southeast Sacramento County Agricultural Water Authority (formed by Clay Water District, Omochumne-Hartnell Water District, and Galt Irrigation District); and the Cosumnes Groundwater Authority (formed by the GSAs for the purpose of implementing the GSP).[42] Sacramento County, Amador County, City of Galt, and City of Ione, also have land use planning authority in the Subbasin.[43]

The GSP identifies beneficial uses and users of groundwater in the Subbasin as including "agricultural users, domestic well owners, municipal well operators, public water supply systems, local land use planning agencies, environmental users of groundwater, surface water users, the federal government, California Native American tribes, and disadvantaged communities."[44]

The GSP provides an inventory of wells and well-density maps using data from the Department's Online System for Well Completion Report (OSWCR) dataset. Based on the information provided, there are a total of 2,691 wells in the Subbasin; approximately 84% of the wells are domestic wells and the remaining approximately 16% are production and public supply wells.[45]

Groundwater accounts for approximately 80% of the Subbasin's water supply and surface water (diversions and imports) accounts for the remaining 20% of applied water use in the Subbasin. Agriculture is the largest water use sector in the Subbasin. Based on water budget information presented in the GSP, approximately 88% of the groundwater pumped in the Subbasin from 1999 to 2018 was for agricultural use and the remaining approximately 12% was for urban, domestic, and industrial uses.[46]

The GSP includes information on existing groundwater and surface water monitoring conducted by various entities, including existing water management plans and regulatory programs currently operating in the Subbasin.[47] As detailed in the GSP, groundwater management actions have been ongoing in the Subbasin for several years. The GSAs intend to coordinate with other entities in the Subbasin to support existing groundwater management efforts and build upon them to achieve sustainable groundwater management in the Subbasin. The GSP relies upon the existing groundwater monitoring and management programs operating in the Subbasin to describe groundwater conditions, water budgets, and establish sustainable management criteria included in the GSP for groundwater levels, groundwater storage, groundwater quality, land subsidence, and interconnected surface water.

[42] Cosumnes GSP, Section 5.1.3, pp. 49-51.
[43] Cosumnes GSP, Section 5.3.1, pp. 66-68.
[44] Cosumnes GSP, Section 5.5.1, p. 73.
[45] Cosumnes GSP, Section 5.1.5, p. 54.
[46] Cosumnes GSP, Table WB-5, p. 202.
[47] Cosumnes GSP, Section 5.2, pp. 55-65.

The GSP describes in sufficient detail the organizational structure of the GSAs and their legal authority to manage groundwater in the Subbasin, and finance projects and management actions. The GSAs adopted a Framework Agreement in 2020, which formed the Cosumnes Subbasin Sustainable Groundwater Management Act Working Group (Working Group) and various committees, and defined the GSAs' plan to collaborate in the planning and development of the single GSP for the Subbasin. The various committees include the Technical Advisory Committee, Outreach and Engagement Committee, Long-term Governance Committee, Ad-Hoc Committee, Project and Management Committee, Tribal Outreach Committee, and Monitoring Committee. In 2021, the GSAs transitioned to a Joint Powers Authority (JPA) which established the Cosumnes Groundwater Authority with the intent for the GSAs to work collaboratively in complying with SGMA, implementing the GSP, obtaining funding to support GSP implementation, and also to work collaboratively with entities managing the adjacent subbasins.[48]

The GSP also provides the GSAs' funding strategy to support their GSP implementation activities and includes high-level cost estimates for the first five years of GSP implementation. The costs range from approximately $740K to $1.2M per year, and amount to a total of approximately $5.4M for the entire first five-year period. [49] The GSP describes funding mechanisms that the GSAs will consider for meeting the GSP implementation costs, which include a combination of user fees, parcel related fees, Sacramento Area Flood Control Agency contribution, and grant funding.[50]

The GSP includes a Communication and Engagement Plan which describes the GSAs' communication and public engagement efforts during the development phase of the GSP, including their decision-making process. The Communication and Engagement Plan also describes the communication and public involvement approach that the GSAs plan to use during the GSP implementation phase.[51] The GSAs provide a list of public meetings where the GSP was discussed or considered,[52] including public comments and how they were addressed.[53]

Department staff conclude that the administrative information included in the GSP substantially complies with the requirements outlined in the GSP Regulations.

4.2 Basin Setting

GSP Regulations require information about the physical setting and characteristics of the basin and current conditions of the basin, including a hydrogeologic conceptual model; a description of historical and current groundwater conditions; and a water budget

[48] Cosumnes GSP, Section 3.2, pp. 37-44.
[49] Cosumnes GSP, Section 19.2.1, pp. 380-381, and Table PI-1, p. 382.
[50] Cosumnes GSP, Section 3.5, pp. 43-44; Section 19.2.2, p. 381; and Table PI-2, p. 382.
[51] Cosumnes GSP, Appendix D, pp. 461-510.
[52] Cosumnes GSP, Section 5.5.2, pp. 73-74, and Appendix E, pp. 511-514.
[53] Cosumnes GSP, Appendix F, pp. 515-883.

accounting for total annual volume of groundwater and surface water entering and leaving the basin, including historical, current, and projected water budget conditions.[54]

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 support the geologic assumptions used in developing mathematical models, such as those that allow for quantification of the water budget.[55] The GSP Regulations require a descriptive hydrogeologic conceptual model that includes a written description of geologic conditions, supported by cross sections and maps,[56] and includes a description of basin boundaries and the bottom of the basin,[57] principal aquifers and aquitards,[58] and data gaps.[59]

The Plan includes a detailed description of the geology of the Subbasin, including its regional geologic setting, the Subbasin's lateral and vertical extents, principal aquifer, pertinent geologic structures, stratigraphy, geologic formations, and soils, supported by prior technical studies, maps, and cross sections.[60]

The Subbasin is within the northern end of the San Joaquin Valley, which is described as a trough filled with marine and non-marine continental sedimentary rocks and volcanic detritus. The GSP describes the Subbasin as being divided into two distinct physiographic regions or subareas: the Basin Foothills Subarea and the Basin Plain Subarea. The Basin Foothills Subarea is in the eastern portion of the Subbasin and is characterized by variable topography, with thin to no alluvial deposits present. The Basin Plain region is in the central and western portion of the Subbasin and is characterized by gentle westward sloping topography and thick alluvial deposits that dip shallowly to the southwest.[61]

Surface water features present in the Subbasin include the Cosumnes River along the northern Subbasin boundary, Dry Creek along the southern Subbasin boundary, and several smaller creeks and streams within the Subbasin, which generally flow westwards from the Sierra Nevada foothills in the east.

The Subbasin's lateral extent is defined by the surface water bodies present to the north, south, and west, and by the geologic contact between surficial Subbasin sediments and

[54] 23 CCR § 354.12.
[55] 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.
[56] 23 CCR §§ 354.14 (a), 354.14 (c).
[57] 23 CCR §§ 354.14 (b)(2-3).
[58] 23 CCR § 354.14 (b)(4) *et seq.*
[59] 23 CCR § 354.14 (b)(5).
[60] Cosumnes GSP, Section 8.1.1 through 8.3.3, pp. 95-112.
[61] Cosumnes GSP, Section 8.1.1, pp. 95-96.

basement rock of the Sierra Nevada foothills in the east. The bottom of the Subbasin is defined as being the shallower of either the approximated bottom of the Ione Formation or the base of fresh groundwater (i.e., water with measured specific conductance of less than 3,000 micro-ohms per centimeter).[62] Depth to the bottom of the Subbasin ranges from less than 200 feet below ground surface (bgs) in the Basin Foothills Subarea to 1,800 feet bgs in the Basin Plain Subarea.[63]

The Plan identifies one principal aquifer within the Subbasin, characterized by six hydraulically connected geologic formations – the Younger Alluvium, Victor, Laguna, Mehrten, Valley Springs, and Ione Formations.[64] The Plan identifies the Foothills Fault System along the eastern boundary of the Subbasin and the Carabas Paleo-Ridge within the Basin Foothills Subarea, as geologic structures that restrict groundwater flow. The Carabas Paleo-Ridge is basement rock which rises to the surface (basement outcrop). The Plan acknowledges that although there are no significant subbasin-wide barriers to vertical groundwater flow, discontinuous clay beds are present in the principal aquifer at variable depths and can locally and partially restrict recharge and vertical groundwater movement.[65]

As stated in the Plan, the primary uses of groundwater from the principal aquifer are irrigated agriculture, public supply, and rural domestic. [66]

The Plan identifies data gaps in the hydrogeologic conceptual model that warrant further study or investigation. The data gaps relate to lack of, or insufficient lithologic information in the Basin Foothills Subarea; limited aquifer properties data such as hydraulic conductivity and storage parameters; limited groundwater quality data related to ionic composition of groundwater to provide insight about groundwater recharge source(s); and lack of well information such as well construction information, well type, extraction rates, and well status (i.e., active, inactive, abandoned, or destroyed).[67] The Plan states that these data gaps will be addressed during Plan implementation.[68] The Plan does not provide a schedule/timeline for when these data gap filling efforts will be conducted; however, information presented in the Plan implementation cost estimate suggests that data gap filling efforts will be conducted during the first five years of Plan implementation. Department staff will continue to evaluate the GSAs' efforts and progress of data gap filling through review of Annual Reports and Periodic Evaluations of the Plan.

Department staff conclude that the information provided to characterize 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

[62] Cosumnes GSP, Section 8.1.3, pp. 96-98.
[63] Cosumnes GSP, Figure HCM-3, p. 119.
[64] Cosumnes GSP, Section 8.1.4, pp. 99-102.
[65] Cosumnes GSP, Section 8.1.3, pp. 104-105.
[66] Cosumnes GSP, Section 8.1.4, p. 106.
[67] Cosumnes GSP, Section 8.3.7, pp. 115-116.
[68] Cosumnes GSP, Section 19.1.2, pp. 370-371.

Subbasin's physical characteristics, the principal aquifer, and hydrogeologic conceptual model appear to utilize the best available information and science. Department staff are aware of no significant inconsistencies or contrary technical information to that presented in the Plan.

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,[69] a graph depicting change in groundwater storage,[70] maps and cross-sections of the seawater intrusion front,[71] maps of groundwater contamination sites and plumes,[72] maps depicting total subsidence,[73] identification of interconnected surface water systems and an estimate of the quantity and timing of depletions of those systems,[74] and identification of groundwater dependent ecosystems.[75]

To understand the Subbasin's groundwater conditions, the Plan relies on groundwater data gathered by the various agencies/entities operating in the Subbasin. The Plan includes descriptions of current and historical groundwater conditions for each applicable sustainability indicator in the Subbasin. Current groundwater conditions are based on 2018 data and historical conditions are based on data from 1999 to 2018.[76]

The Plan provides information for current and historical groundwater elevations and flow direction within the Subbasin's principal aquifer,[77] including groundwater elevation contour maps, hydrographs showing groundwater elevation trends, and maps depicting vertical gradient and groundwater level trend information.[78] The elevation contour information[79] presented in the Plan shows that groundwater elevations in the Subbasin ranged from 400 to -50 feet mean sea level (msl) during spring 2018 and ranged from 400 to -60 feet msl during fall 2018, with a difference between spring 2018 and fall 2018 water levels ranging from 0 to 10 feet.

The elevation contour information also shows that groundwater in the Subbasin generally flows from the east and from the west towards a cone of depression located near the central portion of the Subbasin (around the Herald area in the Galt Irrigation District and near the City of Galt). According to the Plan, the cone of depression is also observed on maps prepared based on historical groundwater elevation data. The Plan does not explain

[69] 23 CCR §§ 354.16 (a)(1-2).
[70] 23 CCR § 354.16 (b).
[71] 23 CCR § 354.16 (c).
[72] 23 CCR § 354.16 (d).
[73] 23 CCR § 354.16 (e).
[74] 23 CCR § 354.16 (f).
[75] 23 CCR § 354.16 (g).
[76] Cosumnes GSP, Section 9, p. 140.
[77] Cosumnes GSP, Section 9.1.1 and 9.1.2, pp. 140-144.
[78] Cosumnes GSP, Figures GWC-1 through GWC-7, pp. 167-173.
[79] Cosumnes GSP, Figure GW-1 and GW-2, pp. 167-168.

possible causes of the observed cone of depression; however, the Plan states that agriculture is the primary land use in the Galt Irrigation District and relies mostly on groundwater. Groundwater is also used for aquaculture farms (fish farms) present within the Galt Irrigation District.[80] The GSP also states that the City of Galt relies solely on groundwater for its water supply.[81] Based on this information, staff infer that the cone of depression is likely related to groundwater pumping for agricultural and public supply use in that portion of the Subbasin.

Hydrographs presented in the Plan show that groundwater levels for most of the Subbasin have generally been declining over time. [82] Groundwater levels in the western and central portions of the Subbasin (Basin Plain Subarea) have shown consistently declining trends, while groundwater levels in the eastern portion of the Subbasin (Basin Foothills Subarea) have shown both declining and increasing trends, but are considered to be generally stable.[83]

The Plan provides change in groundwater storage information for the Subbasin that is derived using two methods: (1) by multiplying the change in groundwater elevations between fall 1999 and fall 2018, by the Subbasin's storativity and area, [84] and (2) by the Cosumnes, South American, North American (CoSANA) integrated hydrologic model.[85] The change in groundwater storage derived using the change in groundwater elevations data, the Subbasin's storativity (which ranges from 0.06 to 0.25), and the Subbasin area, is approximated to be a decrease of 6,400 to 26,900 acre-feet per year, between 1999 and 2018; using a representative storativity value estimated as 0.10, the GSP estimates the change in groundwater storage to be a decrease of 10,700 acre-feet per year. [86] The change in storage estimated by the CoSANA model for the period from 1999 to 2018 is a decrease of 10,600 acre-feet per year. [87] Results for the change in groundwater storage for the two methods appear to be comparable and show that historical groundwater use in the Subbasin has exceeded groundwater recharge.

The Plan also provides, in tabular[88] and graphical[89] format, the cumulative change in groundwater storage simulated by the model for the 1999 to 2018 period, which include water year type information. The cumulative change in storage information shows that the Subbasin has experienced a long-term decrease in groundwater storage, which is consistent with the long-term declining groundwater elevation trends observed in the

[80] Cosumnes GSP, Section 3.2.1, p. 40.
[81] Cosumnes GSP, Section 3.2.1, pp. 39-40.
[82] Cosumnes GSP, Figure GWC-5, p. 171, and Figures SMC-1a and SMC-1b, pp. 298-299.
[83] Cosumnes GSP, Section 9.1.2, p.144.
[84] Cosumnes GSP, Section 9.2, pp. 145-146.
[85] Cosumnes GSP, Table WB-1, p. 187.
[86] Cosumnes GSP, Section 9.2, pp. 145-146.
[87] Cosumnes GSP, Table WB-1, p. 187.
[88] Cosumnes GSP, Table WB-7, p. 206.
[89] Cosumnes GSP, Figure WB-11, p. 240.

majority of the Subbasin. The cumulative change in groundwater storage is estimated to be a decrease of 212,600 acre-feet.

The Cosumnes Subbasin is not directly connected to the Pacific Ocean and according to the Plan, no seawater intrusion or intrusion from deep brines has occurred in the Subbasin.[90]

The Plan includes descriptions of current and historical groundwater quality conditions in the Subbasin,[91] along with maps of where groundwater quality issues are observed in the Subbasin[92] and trend graphs for constituents of concern.[93] Degradation of groundwater quality in the Subbasin is reported to be from both point and non-point sources. The Plan identifies groundwater constituents from non-point sources that have been detected above regulatory standards to include arsenic, nitrate, total dissolved solids (TDS), chloride, sulfate, iron, manganese, and boron.[94] The Plan also discusses point-source contamination sites present in the Subbasin and actions being taken to address the contamination; these sites are under the purview of the Central Valley Regional Water Quality Control Board, Department of Toxic Substances Control, Sacramento County, and/or Amador County. The GSAs recognize that regional pumping patterns may affect plume migration in the Subbasin and they plan to take this into consideration during Plan implementation.[95] Department staff encourage the GSAs to coordinate with the water quality regulatory agencies/entities overseeing the various point-source contamination sites in assessing whether groundwater management is affecting plume migration during Plan implementation.

The Plan describes the current and historical land subsidence conditions for the Subbasin[96] and provides a map, with a graph,[97] to show the rate and extent of subsidence. The Plan states that the Department's Interferometric Synthetic Aperture Radar (InSAR) data and measurements collected from a network of subsidence monitoring monuments within the Subbasin and neighboring subbasins, including continuous measurements collected from a University NAVSTAR Consortium (UNAVCO) global positioning system (GPS) station located within the Subbasin, show that land subsistence in the Subbasin has been minimal. Therefore, the GSAs do not consider land subsidence to be a significant concern for the Subbasin.

Based on the information presented in the Plan, InSAR data and measurements from the subsidence monitoring monuments show an annual vertical displacement rate of -0.05 feet per year and -0.099 feet per year, respectively. Measurements collected from July

[90] Cosumnes GSP, Section 9.3, p. 147.
[91] Cosumnes GSP, Section 9.4, pp. 148-157.
[92] Cosumnes GSP, Figures GWC-8 through GCW-11, pp. 174-177.
[93] Cosumnes GSP, Figure SMC-5, p. 303.
[94] Cosumnes GSP, Table GWC-4, p. 151.
[95] Cosumnes GSP, Section 9.4.4, pp. 155-157.
[96] Cosumnes GSP, Section 9.5, pp. 157-158.
[97] Cosumnes GSP, Figure GWC-13.

2006 through September 2019 from the UNAVCO GPS station show a long-term vertical displacement rate of -0.008 feet per year (equating to a cumulative vertical displacement of -0.1 feet), which according to the Plan, is within the range of possible error in subsidence measurements using remote sensing.[98] Department staff note that the annual vertical displacement rates estimated from InSAR and monument survey monitoring data is higher by one order of magnitude than that estimated from the UNAVCO GPS station data; staff attribute this difference to the varying degrees of precision/accuracy of the different methods and consider the InSAR/monument survey data to be more conservative than the UNAVCO GPS station data, based on the information presented in the Plan.

The Plan shows that the Subbasin contains several surface water bodies, with Cosumnes River, Dry Creek, Laguna Creek, Hadselville Creek, Jackson Creek, and Badger Creek being among the larger surface water bodies.[99] The Plan relies on available groundwater level data and stream flow data, including application of the CoSANA model, to identify and map areas with potential interconnected surface water.[100] The Plan states that most of the surface water bodies present in the Subbasin are disconnected from the principal aquifer because the water table is 30 to over 150 feet bgs. The Plan identifies a segment of the Cosumnes River in the western portion of the Subbasin as likely having interconnectivity with the principal aquifer; the rest of the river is identified as being disconnected.[101]

The Plan provides estimates of average stream depletion rates for the potentially interconnected and disconnected reaches of the Cosumnes River, derived using the CoSANA model. The annual average stream depletion for the interconnected and disconnected reaches of the Cosumnes River are estimated to be 300 acre-feet and 400 acre-feet, respectively.[102]

The Plan includes discussion of groundwater dependent ecosystems (GDEs) and provides maps of potential and confirmed GDE locations in the Subbasin. The GSP relied on The Nature Conservancy's Natural Communities Commonly Associated with Groundwater dataset to identify the location of GDEs, including remote sensing and previous field survey data, and depth to groundwater maps. The GSP identifies the absence of shallow well data to confirm whether the water table in the principal aquifer is accessible to plant roots as a gap; the Plan states that data from monitoring interconnected surface water, including data that will be generated following the planned construction of new monitoring wells, will improve characterization of GDEs and other surface-water dependent species.[103]

[98] Cosumnes GSP, Section 9.5, pp. 157-158, and Section 17.1.5, p. 327.
[99] Cosumnes GSP, Section 8.3.5, pp. 113-114, and Figure HCM-23, p. 139.
[100] Cosumnes GSP, Section 9.6, pp. 158-160.
[101] Cosumnes GSP, Section 9.6, pp. 158-161, and Figure SMC-7, p. 306.
[102] Cosumnes GSP, Figure GWC-16, p.182.
[103] Cosumnes GSP, Section 9.7, pp. 161-164, and Figure GWC-17, p. 183.

The Plan also includes discussion of surface water dependent species present in the Subbasin (e.g., fall run Chinook salmon) and various special status species (identified from the Federal Endangered Species list, and the California Endangered Species list or Sensitive Species), some of which are reliant on groundwater or interconnected surface water.[104]

Department staff conclude that overall, the Plan sufficiently describes the historical and current groundwater conditions for the sustainability indicators relevant to the Subbasin, based on what seems to be the best available science and information. Additionally, 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,[105] and the sustainable yield.[106]

The Plan provides water budgets evaluated using the CoSANA model for four time periods, which include the following:

- A 20-year period water budget evaluated for water years 1999 to 2018.
- A historical water budget evaluated for water years 1999 to 2014.
- A current water budget evaluated for a period covering water years 2015 to 2018.
- A 50-year future projection water budget evaluated for water years 2022 to 2071.

The water budgets generally describe an accounting of inflows and outflows for the surface water and groundwater systems, including groundwater storage changes and sustainable yield estimates, presented in tabular and graphical format.[107] However, Department staff note that the Plan provides the projected water budget for the groundwater system, but not for the surface water system, which is required by the regulations. Staff recommend the GSAs include the projected water budget for the surface water system by the first Periodic Evaluation of the Plan.

For the groundwater system, the 20-year period water budget representing hydrologic conditions from water years 1999 to 2018 estimates the average inflow to be 144,200 acre-feet per year and the average outflow to be 154,900 acre-feet per year, resulting in a decline in groundwater storage of 10,600 acre-feet per year.[108]

[104] Cosumnes GSP, Section 9.7, pp. 164-165.
[105] 23 CCR §§ 354.18 (a), 354.18 (c) *et seq*.
[106] 23 CCR § 354.18 (b)(7).
[107] Cosumnes GSP, Section 10.1 through 10.5, pp. 188-229; Figure WB-4 through WB-16, pp. 233-245.
[108] Cosumnes GSP, Table WB-1, p. 187, and Table WB-5, pp 202-203.

The historical groundwater budget estimates the average inflow into the Subbasin's groundwater system to be 143,300 acre-feet per year and the average outflow to be 154,700 acre-feet per year, resulting in a decline in groundwater storage of 11,400 acre-feet per year.[109]

The current groundwater budget estimates inflow into the Subbasin's groundwater system to be 148,000 acre-feet per year and the outflow to be 155,300 acre-feet per year, resulting in a decline in groundwater storage of 7,400 acre-feet year.[110]

The projected groundwater budget is evaluated for several scenarios, including baseline conditions (for current land use conditions and projected land use conditions), and varied climate-modified scenarios, with and without projects and management actions considerations. For baseline conditions evaluated without projects and management actions, the Plan estimates a decrease in groundwater storage of up to 1,700 acre-feet per year. For the various climate-modified scenarios evaluated without considering projects and management actions, the Plan estimates a change in storage that ranges from a decline of 18,600 acre-feet per year to an increase of 3,800 acre-feet per year. When projects and management actions are factored in for all scenarios, the Plan estimates an increase in groundwater storage of 600 to 7,100 acre-feet per year.

Results of the projected annual changes in groundwater storage[111] and hydrographs depicting changes in groundwater elevations for the various modeled scenarios,[112] show that the projects and management actions proposed in the Plan[113] will be necessary to attain measurable objectives and achieve sustainability for the Subbasin.

The Plan provides sustainable yield estimates derived by subtracting the average annual groundwater pumped from the average annual change in groundwater storage during different periods. For the 20-year model evaluation period (1999 to 2018), the sustainable yield is estimated to be 120,600 acre-feet per year; for the historical period (1999 to 2014) and current period (2015 to 2018), the sustainable yield is estimated to be 119,300 acre-feet per year and 125,700 acre-feet per year, respectively. For the projected period (2022 to 2071), the sustainable yield values range from 125,700 to 134,900 acre-feet per year, depending on the modeled scenario (i.e., variable climate conditions, with and without projects and management actions being implemented).

Department staff note that the sustainable yield estimates provided in the Plan do not seem to consider how avoiding undesirable results affects the maximum quantity of groundwater that can be extracted. Staff recommend that the GSAs determine the Subbasin's sustainable yield as the maximum quantity of water, calculated over a base period representative of long-term conditions in the Subbasin and including any

[109] Cosumnes GSP, Table WB-1, p. 187, and Table WB-5, pp 202-203.
[110] Cosumnes GSP, Table WB-1, p. 187, and Table WB-5, pp 202-203.
[111] Cosumnes GSP, Table WB-10, p. 224.
[112] Cosumnes GSP, Figure WB-17a through WB-19a, pp 246-250, and Figure W-20, p. 251.
[113] Cosumnes GSP, Section 18, pp. 346-357.

temporary surplus, that can be withdrawn annually without causing undesirable results in the Subbasin.

The Plan includes discussion on the availability and reliability of surface water within the Subbasin. The Plan states that the maximum contract amount of imported surface water from the Folsom South Canal for SMUD (the only current diverter from the Folsom South Canal) is 30,000 acre-feet per year; however, SMUD has never used the full contractual amount over the historical water budget period. The Plan also states that the City of Ione receives imported surface water through the Amador Water Agency, which has a contractual right to divert up to 15,000 acre-feet per year from the Mokelumne River water. The Plan states that the Amador Water Agency's Urban Water Management Plan projects urban water demands through 2040 that are below the water right contract amount. [114]

The GSP identifies data gaps that the GSAs acknowledge need to be addressed to improve the reliability of the water budgets and reduce uncertainty.[115] Department staff encourage the GSAs to address the relevant data gaps to reduce uncertainty in the model results at the earliest possible, including updating the sustainable yield to be the maximum quantity of water calculated over a base period representative of long-term conditions in the Subbasin, and including any temporary surplus, that can be withdrawn annually without causing undesirable results in the Subbasin.

Department staff conclude that the historical, current, and projected water budgets included in the Plan substantially comply with the requirements outlined in the GSP Regulations. The Plan provides the required historical, current, and future accounting and assessment of the total annual volume of groundwater and surface water (except as noted above) entering and leaving the Subbasin, including initial estimates of the sustainable yield of the Subbasin and projected future water demands, using the best available tools and information available at the time of preparation of the Plan.

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.[116]

There are no management areas defined in the Subbasin.

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

[114] Cosumnes GSP, Section 10.3.2, p. 214.
[115] Cosumnes GSP, Section 10.5.3, pp. 228-229
[116] 23 CCR § 354.20.

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.[117]

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.[118]

The sustainability goal for the Subbasin is "to ensure that groundwater in the [Subbasin] continues to be a long-term resource for beneficial users and uses including urban, domestic, agricultural, industrial, environmental and others. This goal will be achieved by managing groundwater within the [Subbasin's] sustainable yield, as defined by sustainable groundwater conditions and the absence of undesirable results."[119]

The Plan describes an approach to achieve and maintain sustainability over the planning and implementation horizon that includes implementing projects and management actions using an adaptive management strategy, and tracking hydrologic conditions to ensure the Subbasin is operated within its sustainable yield. The projects and management actions largely focus on groundwater augmentation (from flood-managed aquifer recharge projects and new supplies) and revenue generation through the sale of conserved/banked groundwater to support implementation of the Plan.[120]

Based on the information provided in the Plan relating to the sustainability goal, Department staff conclude that the Plan substantially complies with the GSP Regulations.

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.[121] 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

[117] 23 CCR § 354.22 *et seq*.
[118] 23 CCR § 354.24.
[119] Cosumnes GSP, Section 13, p. 261.
[120] Cosumnes GSP, Section 18. 2.1 through 18.2.4, pp. 349-352.
[121] 23 CCR § 351(ah).

surface water[122] – 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.[123] 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.[124]

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.[125] GSAs are required to describe how conditions at minimum thresholds may affect beneficial uses and users,[126] 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.[127]

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.[128] 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.[129]

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.[130]

[122] Water Code § 10721(x).
[123] 23 CCR §§ 354.26 (a), 354.26 (b)(c).
[124] 23 CCR § 354.26 (b)(2).
[125] 23 CCR § 354.28 (b)(1).
[126] 23 CCR § 354.28 (b)(4).
[127] 23 CCR § 354.28 (b)(2).
[128] 23 CCR § 354.30 (a).
[129] 23 CCR § 354.30 (b).
[130] 23 CCR § 354.26 (d).

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.[131]

The GSP describes significant and unreasonable conditions of chronic lowering of groundwater levels as occurring "when the number of completely dewatered domestic wells exceeds the assumed natural well replacement rate projected to occur over the 20-year implementation horizon."[132] The assumed natural well replacement is based on the number of wells that the GSAs deem will need to be replaced or rehabilitated over the 20-year GSP implementation period, due to the wells being past their useful life. According to the GSP, 26% of existing domestic wells in the Subbasin are at least 40 years old and will likely need to be replaced or rehabilitated.

The GSP explains the basis for how significant and unreasonable conditions of chronic lowering of groundwater levels are defined by stating that the primary beneficial users of groundwater in the Subbasin are "groundwater pumpers" and while agriculture is currently the largest groundwater use in the Subbasin, domestic wells make up the majority of wells in the Subbasin. The GSP further explains that domestic wells are generally the shallowest wells in the Subbasin and therefore, more sensitive to lowering of groundwater levels.[133] Thus, domestic wells are used as the constraining factor in defining significant and unreasonable conditions of chronic lowering of groundwater levels.

The GSP acknowledges the presence of other potential sensitive beneficial users of shallow groundwater, such as GDEs, and discusses them under the depletions of interconnected surface water sustainability indicator, which uses shallow groundwater levels as a proxy.[134]

The GSP quantitatively defines an undesirable result for chronic lowering of groundwater levels as occurring "when [minimum thresholds] are exceeded in 25% or more of the [representative monitoring wells] (5 out of 19) for two (2) consecutive years."[135] The GSP justifies the criteria selected for defining undesirable results for chronic lowering of groundwater levels by stating that the criteria limit impact to a small fraction of domestic wells in the Subbasin, and the requirement for minimum thresholds to be exceeded for

[131] 23 CCR § 354.28(c)(1) *et seq.*
[132] Cosumnes GSP, Section 14.1, p. 263.
[133] Cosumnes GSP, Section 15.1.2, p. 277.
[134] Cosumnes GSP, Section 15.1.2, p. 277.
[135] Cosumnes GSP, Section 14.1.3, p. 264.

two consecutive years before being considered an undesirable result is to confirm that conditions of chronic lowering of groundwater levels are persistent.[136]

The GSP establishes minimum thresholds for chronic lowering of groundwater levels at 19 representative monitoring wells. The GSP explains that the methodology to establish the minimum thresholds included evaluating historical groundwater trends for the period from water years 1999 to 2018; evaluating historical low groundwater levels, water year types, and projected water use in the Subbasin; reviewing well construction information to consider impacts to beneficial uses and users; and considering effects of the selected minimum thresholds on other sustainability indicators. The minimum thresholds for chronic lowering of groundwater levels are established by either of the following methods:

- For wells exhibiting a long-term declining trend, the minimum thresholds are set at projected future groundwater levels, determined by extending the historical declining trends over a 20-year period.
- For wells exhibiting increasing groundwater level trends or groundwater level trends that are projected to be above the measurable objectives over the 20-year period, the minimum thresholds are set at the historical low groundwater levels observed in the Subbasin (since 1990).[137]

As explained in the GSP, the GSAs' rationale for projecting the historical groundwater level trends for 20 years in the future is to provide reasonable and necessary time to implement projects and management actions to address declining groundwater level trends; avoid potentially causing abrupt disruption to land uses; and because 20 years is the length of time allowed by SGMA for the Subbasin to achieve its sustainability goal.[138]

To assess impacts of the selected minimum thresholds for chronic lowering of groundwater levels on beneficial uses and users, the GSAs analyzed impacts on domestic wells using well construction information from the Department's OSWCR database. For comparison, the GSAs also analyzed impacts on domestic wells based on fall 2015 groundwater levels (which are set as the measurable objectives). The GSP points out that domestic wells older than 40 years were excluded from the impact analyses[139] (i.e., approximately 587 domestic wells were excluded).

Department staff note the decision to exclude wells that are older than 40 years from the analysis, which equates to nearly 600 wells, could lead to users within the Subbasin being impacted by the proposed management of the GSAs. While production wells do require routine maintenance to remain operational over time, staff believe that it is highly likely many users within the Subbasin are utilizing wells older than 40 years old. Additionally, the wells used in the analysis (less the 40 years old) are likely to remain active during the

[136] Cosumnes GSP, Section 14.6.3, p. 271.
[137] Cosumnes GSP, Section 15.1.1, p. 277, and Figures SMC-1a and SMC-1b, pp. 298-299.
[138] Cosumnes GSP, Section 15.1.1, pp. 276-277.
[139] Cosumnes GSP, Section 15.1.2, pp. 277-279.

implementation period. Department staff encourage the GSA to contact domestic well owners in the Subbasin and evaluate how the proposed groundwater management of the Subbasin may impact these beneficial users.

According to the GSP, results of the impact analysis show that if groundwater levels are lowered to the minimum thresholds, approximately 83 domestic wells (3.5%) could be partially dewatered and approximately 48 wells (2%) could be completely dewatered. At the fall 2015 groundwater levels, approximately 65 domestic wells (2.8%) could be partially dewatered and approximately 36 wells (1.5%) could be completely dewatered.[140] The GSP includes a map showing where in the Subbasin wells could be partially or completely dewatered if groundwater levels reached the minimum thresholds.[141] However, the GSP does not include supporting documentation or calculations for the impact analysis results presented in the GSP. As the GSAs work to fill data gaps related to well information, Department staff recommend the GSAs conduct further assessment of the selected minimum thresholds on domestic wells, and include supporting documentation of the assessment in their GSP (see Recommended Corrective Action 1).

Based on the above results, 18 more wells would be partially dewatered at the minimum threshold levels than at the fall 2015 levels and 12 more wells would be completely dewatered at the minimum threshold levels than at the fall 2015 levels.

The GSAs do not consider the number of partially and/or completely dewatered wells at the minimum threshold levels to be significant and unreasonable because the number of impacted wells is markedly lower than "the 26% of wells that are likely to require replacement based on well age and lifespan alone."[142] The GSAs aim to maintain groundwater levels at or above the measurable objectives through implementation of projects and management actions,[143] and the GSP includes an action plan to investigate exceedances of minimum thresholds should they occur.[144]

Department staff note that the GSP has not defined undesirable results for chronic lowering of groundwater levels based on impacts due to lowering of groundwater levels or depletion of supply. By setting the undesirable result based on an average percentage of wells that may need to be replaced or rehabilitated over the 20-year GSP implementation period, the GSAs have not considered what the exact impacts on wells going dry are. For instance, wells being dewatered prior to the owners expecting to replace them is an impact that is not explained or factored in the definition of undesirable results.

Department staff also note that the minimum thresholds established for chronic lowering of groundwater levels are not aligned with the undesirable results definition. The

[140] Cosumnes GSP, Section 15.1.2, p. 279.
[141] Cosumnes GSP, Figure SMC-2, p. 300.
[142] Cosumnes GSP, Section 15.1.2, p. 279.
[143] Cosumnes GSP, Section 14.1.3, p. 265.
[144] Cosumnes GSP, Section 15.8, pp. 291-292.

undesirable results definition should include criteria to determine the presence of significant and unreasonable effects based on the exceedance of minimum thresholds. However, the GSP discusses how the number of wells that could go dry at the minimum thresholds is significantly less than the 26% of wells described in the undesirable results. Consequently, the GSP includes minimum thresholds that are not tied to an undesirable result. Department staff recommend the GSAs revise the undesirable results definition for chronic lowering of groundwater levels to be based on impacts due to lowering of groundwater levels (i.e., the number or percentage of wells that the GSAs deem acceptable to impact due to lowering of groundwater levels) and update, as necessary, the minimum thresholds for chronic lowering of groundwater levels to be tied to the undesirable result definition (see Recommended Corrective Action 2).

If, after re-evaluating and updating the sustainable management criteria for chronic lowering of groundwater levels, the GSAs retain the minimum thresholds that allow for additional supply wells to be partially/completely dewatered relative to the 2015 baseline conditions, Department staff recommend the GSAs discuss in their GSP, how they will address effects on beneficial uses and users (e.g., drinking water supply impacts) during the 20-year GSP implementation period. The GSAs may consider utilizing the Department's "Guidance for Sustainable Groundwater Management Act Implementation: Considerations for Identifying and Addressing Drinking Water Well Impacts."[145]

The GSP includes descriptions of the relationship between the established groundwater level minimum thresholds and the other sustainability indicators relevant in the Subbasin, except for the degraded water quality sustainability indicator. The GSAs do not expect the established minimum thresholds for chronic lowering of groundwater levels to negatively affect the reduction of groundwater storage, land subsidence, and depletions of interconnected surface water sustainability indicators. For the degraded water quality sustainability indicator, the GSP states that the relationship between groundwater elevations and degraded water quality is not well understood and that the relationship "can be explored using improved data set generated by the [Subbasin] monitoring program and planned projects that are implemented by the GSP."[146]

Department recommend the GSAs conduct the necessary investigations or studies to better understand the relationship between groundwater levels and degraded water quality, given that, for the most part, the selected minimum thresholds for groundwater levels are lower than levels historically experienced in the Subbasin. Based on the results of the investigations/studies, the GSAs should describe in their GSP, the relationship between the minimum thresholds established for chronic lowering of groundwater levels and degraded water quality (see Recommended Corrective Action 3).

[145] Department of Water Resources, March 2023: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Files/Considerations-for-Identifying-and-Addressing-Drinking-Water-Well-Impacts_FINAL.pdf
[146] Cosumnes GSP, Section 15.7, pp. 290-291.

As previously mentioned, the GSP sets the measurable objectives for chronic lowering of groundwater levels at the fall 2015 groundwater levels. The GSP explains that the fall 2015 groundwater levels were selected because they represent the first seasonal low following SGMA adoption. The established measurable objectives and minimum thresholds provide a margin of operation that ranges from 10 to 27 feet.[147] The GSP also sets interim milestones at 5-year increments to track progress towards achieving the measurable objectives.[148]

Despite the recommended corrective actions identified, Department staff conclude that the GSP's discussion of sustainable management criteria for groundwater levels is comprehensive, includes sufficient information to understand the GSAs' process, analysis and rationale, and substantially covers the specific items listed in the GSP Regulations. Staff consider the GSAs' objective of maintaining groundwater levels in the Subbasin near the 2015 levels to be a reasonable approach that will help avoid a significant and unreasonable depletion of supply in the Subbasin in the long-term. Addressing the identified recommended corrective actions by the first periodic evaluation of the GSP is acceptable at this time because the projected historical groundwater level declines are not expected to reach the currently established minimum threshold elevations by 2027, which are also currently set to limit impact to a relatively small percentage of wells (2%).

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.[149]

The GSP describes significant and unreasonable reduction of groundwater storage as "reduction in usable groundwater storage of more than 10% over the 20-year implementation horizon, based on the estimated Fall 2018 groundwater storage volume."[150]

The GSP establishes sustainable management criteria for the reduction of groundwater storage sustainability indicator using groundwater levels as a proxy. Therefore, undesirable results, minimum thresholds, and measurable objectives established for the chronic lowering of groundwater levels sustainability indicator, apply to the reduction of groundwater sustainability indicator.[151]

[147] Cosumnes GSP, Section 16.1.1, pp. 293-294, Table SMC-5, p. 281, and Figure SMC-9, p. 308.
[148] Cosumnes GSP, Section 16.1.2, p. 294.
[149] 23 CCR § 354.28(c)(2).
[150] Cosumnes GSP, Section 14.2, p. 265.
[151] Cosumnes GSP, Section 15.2, p. 282; Section 14.2.3, p. 265; and Section 16.2, p. 295.

To support the use of groundwater levels as a proxy and demonstrate that the minimum thresholds established for chronic lowering of groundwater levels are sufficiently protective of the reduction of groundwater storage sustainability, the GSAs used the CoSANA model to compare the volume of the principal aquifer's "usable storage" with the volume that would be lost from the aquifer if groundwater levels declined from the current levels (i.e. fall 2018 levels), to the minimum thresholds set for the chronic lowering of groundwater levels sustainability indicator.

The GSP states that production wells in the Subbasin are less than 1,720 feet deep, with over 90% of the production wells being 900 feet or less[152] and 50% of the production wells being 400 feet deep or less.[153] Groundwater in storage above the 400-foot depth interval was selected to represent a conservative estimate for usable storage. Results from the model showed that the principal aquifer's total usable storage volume is about 11.7 million acre-feet and the volume of groundwater above the established minimum thresholds for chronic lowering of groundwater levels is about 400,000 acre-feet. Because the total groundwater usable storage is greater than the volume of groundwater when levels are at the minimum thresholds set for chronic lowering of groundwater level, the GSAs consider the minimum thresholds established for groundwater levels to be protective for the reduction of groundwater storage sustainability indicator.[154]

Based on the information presented to support use of groundwater levels as a proxy for the reduction of groundwater storage sustainability indicator, Department staff conclude that the GSAs' rationale to use groundwater levels as a proxy for reduction of groundwater storage is reasonable.

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.[155]

The GSP states that the Subbasin is not directly connected to the Pacific Ocean and that seawater intrusion has not occurred in the Subbasin. The GSP acknowledges that the western boundary of the Subbasin is near the Sacramento-San Joaquin Delta (Delta), which is influenced by the Pacific Ocean. However, based on surface water management strategies implemented in the Delta to prevent seawater intrusion, which include use of hydraulic and physical barriers and physical alterations to improve flow patterns in the Delta channels, the GSAs do not expect seawater intrusion to occur in the Subbasin.

[152] Cosumnes GSP, Section 8.1.3, p. 99.
[153] Cosumnes GSP, Section 15.2.1, p. 282.
[154] Cosumnes GSP, Section 15.2.1, pp. 282- 283.
[155] 23 CCR § 354.28(c)(3).

Therefore, the GSAs do not establish sustainable management criteria for seawater intrusion.

Based on the isolation of the Subbasin from the influences of the ocean, the seawater intrusion preventative measures implemented in the Delta and in the Subbasins directly adjacent to the Delta, and no historical occurrence of seawater intrusion in the Subbasin, Department staff consider the GSAs' rationale to not establish sustainable management criteria for seawater intrusion for the Subbasin to be reasonable.

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.[156]

The GSP establishes sustainable management criteria for three constituents – arsenic, nitrate, and TDS – which the GSAs identify as constituents of concern on a regional scale in the Subbasin.[157]

The GSP describes significant and unreasonable conditions for degraded water quality as "an increase in concentrations of identified constituents of concern above levels of state and federal regulatory thresholds on a regional rather than well-specific basis."[158]

Undesirable results for degraded water quality are quantitatively defined as occurring "when [minimum thresholds] for a constituent of concern are exceeded in 25% or more of the [representative monitoring wells] (for example, the [minimum threshold] for arsenic are exceeded in 4 out of the 14 [representative monitoring wells]) for two (2) consecutive years."[159] The GSP explains that the criteria selected to define undesirable results for degraded water quality are justified because 25% of representative monitoring wells exceeding minimum thresholds relates to a level of impact that corresponds to a regional water quality issue rather than a well-specific water quality issue. The GSP further explains that the requirement for minimum thresholds to be exceeded for two consecutive years before considering that undesirable results are occurring is to confirm that degraded water quality conditions persist.

[156] 23 CCR § 354.28(c)(4).
[157] Cosumnes GSP, Section 15.4.1 p. 284, and Section 9.4.3, pp. 153-155.
[158] Cosumnes GSP, Section 14.4, p. 266.
[159] Cosumnes GSP, Section 14.4.3, p. 268.

The GSP includes descriptions of groundwater conditions that would lead to undesirable results associated with degraded water quality[160] and potential effects of undesirable results associated with degraded water quality on beneficial uses and users.[161]

The GSP sets minimum thresholds for degraded water quality based on California's Title 22 drinking water standards: primary Maximum Contaminant Levels (MCLs) or secondary MCLs. The minimum thresholds for arsenic and nitrate are set at their respective primary MCLs (i.e.,10 micrograms per liter [ug/L] and 10 milligrams per liter [mg/L], respectively). The minimum threshold for TDS is set at the upper limit of its secondary MCL (1,000 mg/L).[162]

Measurable objectives for degraded water quality are set at 80% of the primary MCL for arsenic and nitrate (8 ug/L and 8 mg/L, respectively), and at the recommended secondary MCL for TDS (500 mg/L).[163]

In lieu of setting interim milestones for degraded water quality, the GSP sets trigger thresholds because concentrations of constituents of concern in the Subbasin are mostly below measurable objectives. According to the GSP, the trigger thresholds are set such that if the concentration of a constituent of concern reaches 50% of its MCL, the GSAs will consider additional action if warranted. The GSP presents in Table SMC-6 of the GSP, the trigger thresholds for arsenic, nitrate, and TDS, as 9 ug/L, 9 mg/L, and 750 mg/L, respectively.[164] Department staff note that these trigger thresholds do not equate to 50% of their respective constituent of concern MCL as stated in the text of the GSP. For instance, 50% of the MCL for arsenic is 5 ug/L and not 9 mg/L. Department staff also note that the GSP does not elaborate on the additional action that the GSAs will consider if concentrations of constituents of concern reach their trigger thresholds. Staff recommend the GSAs explain why the tabulated trigger threshold values are higher than 50% of their respective MCLs or provide the correct values if the current tabulated values are typographical errors. In addition, staff recommend the GSAs elaborate on the additional action that will be considered if concentrations of constituents of concern reach their trigger thresholds.

Based on review of the Plan's discussion of the established sustainable management criteria for degradation of water quality, overall, Department staff conclude that the Plan substantially covers the specific items listed in the GSP regulations in an understandable format and uses the best available information and science.

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

[160] Cosumnes GSP, Section 14.4.1, p. 267.
[161] Cosumnes GSP, Section 14.4.2, p. 268.
[162] Cosumnes GSP, Sections 15.4.1 and 15.4.2, pp. 284-285.
[163] Cosumnes GSP, Section 16.4, p. 295.
[164] Cosumnes GSP, Section 16.4, p. 295 and Table SMC-6, p. 285.

subsidence that substantially interferes with surface land uses and may lead to undesirable results.[165] 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.[166]

The GSP states that undesirable results for land subsidence due to groundwater level declines would be experienced in the Subbasin when the ability to use existing critical and non-critical infrastructure with the Subbasin is negatively affected. [167]

Significant and unreasonable land subsidence conditions as described in the GSP "include subsidence-related damage to water conveyance infrastructure resulting in a loss of functional capacity of the infrastructure that prevents conveyance of available volumes of water that could otherwise be conveyed if the subsidence had not occurred."[168]

The GSP identifies increased pumping and/or reduced groundwater recharge which result in depressurization of aquifers and aquitards and cause compaction of compressible strata and vertical displacement of the ground surface, as conditions that could lead to undesirable results associated with land subsistence. [169] Potential effects of land subsidence as described in the GSP include damage to the Subbasin's critical infrastructure such as the Folsom South Canal (and other canals), municipal water lines, roadways, bridges, and railroads tracks, and damage to non-critical infrastructure such as groundwater well heads and well casings.[170]

The GSP uses the historical rate of subsidence measured by the single continuous global positioning system monitoring station located within the Subbasin to estimate, by extrapolation, the magnitude of land subsidence that would occur if the historical rate of groundwater level decline continues over the 20-year GSP implementation horizon. The GSP estimates the land subsidence to be approximately 1.7 inches. The GSAs do not anticipate this additional subsidence to cause adverse impacts to infrastructure in the Subbasin, and therefore, do not establish sustainable management criteria for land subsidence. Instead, the GSAs plan to use groundwater levels as a proxy for land subsidence, because they expect the minimum thresholds set for groundwater levels to prevent significant and unreasonable land subsidence in the Subbasin.[171]

[165] 23 CCR § 354.28(c)(5).
[166] 23 CCR §§ 354.28(c)(5)(A-B).
[167] Cosumnes GSP, Section 14.5, p. 269.
[168] Cosumnes GSP, Section 14.5, p. 269.
[169] Cosumnes GSP, Section 14.5.1, p. 269.
[170] Cosumnes GSP, Section 14.5.2, p. 269.
[171] Cosumnes GSP, Section 14.5.3, p. 270.

While there is generally a correlation between chronic lowering of groundwater levels and land subsidence, the relationship between the two sustainability indicators may not exactly or necessarily be linear at every point in the Subbasin due to influences of other factors such as soil structure. Because of the limited number of global positioning system monitoring stations within the Subbasin, limited InSAR-based subsidence data, and minimum thresholds for chronic lowering of groundwater levels being established at levels lower than historical lows for the majority of the Subbasin, Department staff conclude that the GSAs have not demonstrated with sufficient evidence that chronic lowering of groundwater levels is a reasonable proxy for land subsidence in the Subbasin and that use of groundwater level as a proxy for land subsidence is inappropriate because of the GSAs' plan to allow continued lowering of groundwater levels. Therefore, Department staff recommend the GSAs establish sustainable management criteria for land subsidence based on direct measurements of land elevation changes to assess and confirm that no significant and unreasonable land subsidence is occurring (see Recommended Corrective Action 4).

Despite the identified recommended corrective action, the GSP's discussion of land subsidence is comprehensive and includes adequate support, justification, and information to understand the GSAs' process, analysis, and rationale. While Department staff have recommended the GSAs to remove the use of groundwater levels as a proxy for land subsidence, this does not preclude the Plan for approval at this time, given that the Subbasin does not appear to have significant current or historical land subsidence. 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 Plan.

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.[172] 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.[173] 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.[174]

The Plan acknowledges the presence of interconnected surface waters in the Subbasin and identifies their location by evaluating available groundwater level and stream flow

[172] Water Code § 10721(x)(6).
[173] 23 CCR § 354.16 (f).
[174] 23 CCR § 354.28 (c)(6).

data compiled for the Subbasin, including application of the CoSANA numerical model.[175] The Plan includes a map that depicts the location of potentially interconnected surface water in the Subbasin.[176] The Plan acknowledges that there is currently insufficient data to estimate depletions of interconnected surface water.[177] The Plan also acknowledges that the interaction of surface water and the aquifer is complex, and states that this is considered a data gap in the Subbasin.[178] To address this data gap and refine the approach used to establish sustainable management criteria for depletions of interconnected surface water, the GSAs intend to gather additional shallow groundwater data, river/stream stage and flow data, and accurate surface water diversions and return flow information for the Subbasin.[179] Based on information presented in the Plan, Department staff are satisfied that the GSAs have adopted a reasonable approach to identify the location of interconnected surface waters in the Subbasin.

The Plan provides a quantification of interconnected surface water depletions for the Cosumnes River, using the CoSANA model. Annual average depletions for the segment of the river considered to be potentially interconnected and the segment considered to be disconnected are estimated as 300 acre-feet and 400 acre-feet, respectively. However, the Plan does not quantify the rate or volume of surface water depletions due to groundwater pumping as the sustainable management criteria as required by the GSP Regulations.[180] Instead, the Plan proposes to use shallow groundwater levels and river/stream flow data to evaluate depletions of interconnected surface water. The Plan explains that the correlation between model-calculated depletions and measured groundwater levels is limited due to uncertainty in the model-calculated depletion, limited number of monitoring wells, and a lack of river stage data.[181] Therefore, Department staff note that at this time, the Plan does not demonstrate, with adequate evidence, that the use of groundwater elevations as a proxy for depletions of interconnected surface water is sufficient to quantify the location, quantity, and timing of depletions.

The Plan describes significant and unreasonable depletions of interconnected surface water as “depletions of surface water at a rate greater than the maximum pre-2015 historical rate of depletion during below-average rainfall years, and a reduction in GDE area, vigor and recruitment demonstrated by its correlation with groundwater level trends in the Principal Aquifer.”[182]

[175] Cosumnes GSP, Section 9.6, pp. 158-159.
[176] Cosumnes GSP, Figure SMC-7, p. 306.
[177] Cosumnes GSP, Section 15.6, p. 287.
[178] Cosumnes GSP, Section 14.6.3, p. 271.
[179] Cosumnes GSP, Section 15.6.1, p. 289.
[180] 23 CCR § 354.28 (c)(6).
[181] Cosumnes GSP, Section 15.6, p. 287.
[182] Cosumnes GSP, Section 14.6, p. 270.

The Plan quantitatively defines undesirable results for depletions of interconnected surface water as occurring "when [minimum thresholds] are exceeded in one or more [representative monitoring wells] (1 of 9) for two (2) consecutive years."[183]

The Plan includes descriptions of potential causes of undesirable results associated with depletions of interconnected surface water in the Subbasin, including descriptions of potential effects of the undesirable results on beneficial users and uses (which include permitted diversions of surface water, fish, GDEs, and environmental uses and users of surface water). [184]

The GSAs developed minimum thresholds for depletions of interconnected surface water using a combination of measured and model-calculated values. The minimum thresholds were established at nine representative monitoring wells (two near areas along the Cosumnes River identified as potentially having interconnected surface water; four in areas identified as being disconnected from groundwater; and three within areas identified as GDE locations). The GSP establishes the minimum thresholds as follows:

- For interconnected reaches of surface water bodies, the minimum threshold is "the highest seasonal low elevation during a below normal water year from the start of monitoring through 2015."[185] The "start" of monitoring is 1999. The GSAs use the rationale that if groundwater levels are maintained above these minimum thresholds, the associated rate of depletion of interconnected surface water "will theoretically be less than the rate prior to 1 January 2015, the effective date of the SGMA, thus being protective and avoiding Undesirable Results for Depletions of Interconnected Surface Water." [186]
- For disconnected reaches of surface water bodies, the minimum threshold is "the projected 20-year water level based on long-term trend for wells with negative long-term trends or the historical low for wells with positive long-term trends (i.e., the same approach as for [minimum threshold] for Chronic Lowering of Groundwater Levels, but applied at shallow groundwater wells)."[187]
- For GDE locations, the minimum thresholds are based on typical rooting depths guidelines developed by The Nature Conservancy, which suggest that natural communities are disconnected from the principal aquifer where depth to groundwater is greater than 30 feet bgs. [188] Minimum thresholds at two of the three representative monitoring wells (RMW-ISW7 and RMW-ISW8) are "set to a depth of 20 [feet] bgs, which is considered conservative because it is 10 [feet] higher than the lower limit

[183] Cosumnes GSP, Section 14.6.3, p. 272.
[184] Cosumnes GSP, Sections 14.6.1 and 14.6.2, pp. 270-271.
[185] Cosumnes GSP, Section 15.6.1, p. 288.
[186] Cosumnes GSP, Section 15.6.1, p. 288.
[187] Cosumnes GSP, Section 15.6.1, p. 288.
[188] The Nature Conservancy, 2018, *Groundwater Dependent Ecosystem Under the Sustainable Groundwater Management Act Guidance for Preparing Groundwater Sustainability Plans.*

recommended by [The Nature Conservancy]."[189] One of the representative monitoring well (RMW-ISW9) is reported to have a total depth of 15 feet bgs; therefore, the minimum threshold for this well is "set at the historical low in measured water levels."[190]

Measurable objectives for depletions of interconnected surface water are established as follows:

- For potentially interconnected reaches of surface water bodies, the measurable objective is "calculated using the range in measured seasonal-low elevations over the period from 1999 through 2015." [191] For example, at representative monitoring well RMW-ISW2, the seasonal lows prior to 2016, range from about -6 feet msl to approximately -9 feet msl (a net difference of 3 feet). This range is added to the minimum threshold for RMW-ISW2, which is set at -6 feet msl, to obtain its measurable objective of -3 feet msl.[192]
- For disconnected reaches of surface water bodies, the measurable objective is "set at the model-calculated Fall 2015 water level (same as the [measurable objective] for Chronic Lowering of Groundwater Levels, but applied at shallow groundwater wells)."[193]
- For GDE locations, the measurable objective is "the model-calculated Fall 2015 water level, which is the same as the [measurable objective] for Chronic Lowering of Groundwater Levels, but applied at shallow groundwater wells, and above the [minimum threshold] for all three wells."[194]

The Plan developed interim milestones for depletion of interconnected surface water as follows:

- For potentially interconnected reaches of surface water bodies and GDE locations, the Plan sets "trigger thresholds" rather than interim milestones, explaining that the groundwater levels for the representative monitoring wells within these areas are cyclical and do not show a declining trend. The trigger thresholds are set such that if groundwater levels in the representative monitoring wells falls below the mid-point between the measurable objective and the minimum threshold, the GSAs will consider the need for a management response. The Plan does not specify or elaborate on what type of the management response would be considered.
- For disconnected reaches of surface water bodies, the interim milestones "are based on a long-term trajectory of groundwater levels, the [minimum thresholds], and the

[189] Cosumnes GSP, Section 15.6.1, pp. 288-289.
[190] Cosumnes GSP, Section 15.6.1, pp. 288-289.
[191] Cosumnes GSP, Section 16.6.1, p. 296.
[192] Cosumnes GSP, Section 16.6.1, p. 296.
[193] Cosumnes GSP, Section 16.6.1, p. 296.
[194] Cosumnes GSP, Section 16.6.1, p, 296.

> [measurable objectives] (same [interim milestone] approach for Chronic Lowering of Groundwater Levels, but applied at shallow groundwater wells)."[195]

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 5a). 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 5b). 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 5c).

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.[196]

[195] Cosumnes GSP, Section 16.6.2, p. 296.
[196] 23 CCR § 354.32.

Specifically, a monitoring network must be able to monitor impacts to beneficial uses and users,[197] monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds, [198] capture seasonal low and high conditions, [199] include required information such as location and well construction and include maps and tables clearly showing the monitoring site type, location, and frequency.[200] Department staff encourage GSAs to collect monitoring data as specified in the GSP, follow SGMA data and reporting standards,[201] fill data gaps identified in the GSP prior to the first periodic evaluation,[202] update monitoring network information as needed, follow monitoring best management practices,[203] 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 describes monitoring networks for the five sustainability indicators relevant to the Subbasin: chronic lowering of groundwater levels, reduction of groundwater storage, degraded water quality, land subsidence, and depletions of interconnected surface water.

As stated in the GSP, the objective of the Subbasin's monitoring network is to monitor short-term, seasonal, and long-term trends in groundwater and related surface water conditions; monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds; monitor impacts to beneficial uses or users of groundwater; quantify annual changes in water budget components; and monitor impacts of project and management actions in adjacent basins, such as the Harvest Water Project in the South American Subbasin.

The monitoring network for the chronic lowering of groundwater sustainability indicator consists of 19 existing monitoring wells, a subset of monitoring wells used for other programs operating in the Subbasin.[204] Department staff note that there are a total of 24 wells uploaded to the Department's Monitoring Network Module, of which 19 are labeled "SGMA Representative" (which aligns with the GSP) and the remaining five are labeled as "SGMA". The GSP states that a network of supplemental wells will also be used to monitor groundwater levels in the Subbasin.[205] However, the Plan does not indicate the number of supplemental wells that will be used nor does it provide a map to show their location in the Subbasin; therefore, it is not clear if the wells labeled "SGMA" in the

[197] 23 CCR § 354.34(b)(2).
[198] 23 CCR § 354.34(b)(3).
[199] 23 CCR § 354.34(c)(1)(B).
[200] 23 CCR §§ 354.34(g-h).
[201] 23 CCR § 352.4 *et seq*.
[202] 23 CCR § 354.38(d).
[203] Department of Water Resources, 2016, Best Management Practices and Guidance Documents.
[204] Cosumnes GSP, Table MN-2, p. 320, and Figure MN-1, p. 342.
[205] Cosumnes GSP, Section 17.1.1, p. 317.

Monitoring Network Module are the supplemental wells discussed in the GSP. Department staff recommend the GSAs provide information for the supplemental wells that will be used as part of the groundwater level monitoring network, including the number and their location in the Subbasin by the first periodic evaluation.

The GSAs recognize that although the number of representative monitoring wells selected for monitoring groundwater levels meets the range of density of monitoring wells recommended by the Department's Best Management Practices[206], additional monitoring sites are necessary in the eastern portion of the Subbasin (Basin Foothills Subarea) to address spatial variability and uncertainty in water table conditions in this area. The GSP identifies this as a data gap that will be addressed during GSP implementation. The GSP also identifies a lack of well information for some representative monitoring wells in the monitoring network as a data gap that the GSAs intend to address during GSP implementation.[207]

The GSAs plan to collect groundwater level measurements bi-annually, during the spring and fall (March and October), to represent seasonal high and seasonal low groundwater conditions. [208]

The GSAs use groundwater levels as a proxy for reduction of groundwater storage. Therefore, the GSAs plan to use the monitoring network established for the chronic lowering of groundwater levels sustainability indicator to monitor and evaluate reduction of groundwater storage.

The monitoring network for degraded water quality consists of 14 wells,[209] six of which are public supply wells and are monitored under the State Water Resources Control Board's Division of Drinking Water (DDW) program. Of the remaining eight wells, three are new dedicated monitoring wells installed as part of the Department's Technical Support Services Grant Program, one is a domestic well, and four are agricultural production wells. For the six public supply wells, the GSAs will leverage monitoring data collected under the DDW program, which includes data for TDS, nitrate, and arsenic, among other constituents analyzed under the program. For the rest of the wells, groundwater samples for analysis of the constituents of concern will be collected annually (in the fall). The Plan identifies a lack of well information for some wells in the monitoring network as a data gap that the GSAs intend to address during Plan implementation.[210]

The Plan proposes to use the groundwater level monitoring network as a proxy for monitoring and evaluating land subsidence, in conjunction with data collected from the single GPS station located in the Subbasin.[211] As stated previously, Department staff do

[206] Department of Water Resources, 2016, Monitoring Networks and Identification of Data Gaps BMP.
[207] Cosumnes GSP, Section 17.4, p. 340, and Section 19.1.2, p. 370.
[208] Cosumnes GSP, Section 17.1.1, p. 317.
[209] Cosumnes GSP, Table MN-3, p. 326, and Figure MN-2, p. 343.
[210] Cosumnes GSP, Section 17.4, p. 340, and Section 19.1.2, p. 370.
[211] Cosumnes GSP, Section 17.1.5, p. 327 and Figure MN-3, p. 344.

not consider use of groundwater levels as a proxy for land subsidence to be appropriate because of the GSAs' plan to allow continued lowering of groundwater levels below historical lows in the Subbasin. While the GSAs have identified one single GPS station to include in the monitoring network, Department staff conclude this will not provide sufficient coverage of the Subbasin. Department staff recommend the GSAs expand the land subsidence monitoring network to include additional locations to provide sufficient coverage of the Subbasin. The GSAs may consider the use of additional GPS stations, extensometers, or publicly available remote sensing data (e.g., InSAR) to expand the land subsidence monitoring network in the Subbasin (see Recommended Corrective Action 6).

The monitoring network for evaluating depletions of interconnected surface water due to groundwater use consists of nine existing shallow wells, located near surface water bodies and near areas identified as having GDEs. The monitoring network also includes five stream gauging stations.[212] The Plan points out that although several shallow wells are located near the Cosumnes River and Dry Creek, few to none of the wells are located adjacent to an existing gauging station. The Plan identifies this as a data gap[213] that the GSAs will address during Plan implementation.[214]

The Plan states that all shallow monitoring wells for evaluating depletions of interconnected surface water will be instrumented to record water levels changes daily, or at a higher frequency. Stream gauging sites will also be instrumented to record stage and flow data daily, or at a higher frequency. [215]

While a recommended corrective action is identified, the description of the monitoring network included in the Plan substantially complies with the requirements outlined in the GSP Regulations. Overall, the Plan describes in sufficient detail a monitoring network that promotes the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the Subbasin and evaluate changing conditions that occur through Plan implementation. The monitoring network appears to be supported by the best available information and data and is designed to ensure adequate coverage of sustainability indicators. The Plan also describes existing data gaps and the steps that will be taken to fill data gaps and improve the monitoring network. Department staff will evaluate the GSAs' progress of filling data gaps through review of Annual Reports and Periodic Evaluations of the GSP.

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,

[212] Cosumnes GSP, Table MN-4, p. 331, and Figure MN-4, p. 345.
[213] Cosumnes GSP, Section 17.1.6, p. 330.
[214] Cosumnes GSP, Section 17.4, p. 340.
[215] Cosumnes GSP, Section 17.1.6, p. 330.

including projects and management actions to respond to changing conditions in the basin.[216] 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.[217]

To achieve and maintain long-term sustainability for the Subbasin, the GSAs plan to implement five projects and one management action. The proposed projects and management action focus largely on groundwater augmentation (from flood-managed aquifer recharge projects and new supplies), and revenue generation through the sale of conserved/banked groundwater to support implementation of the GSP. The GSAs also identify numerous other supplemental projects and management actions that may be implemented in the future. These projects and management actions are intended to provide flexibility for the GSAs to adaptively address unforeseen conditions.[218] The projects and management actions presented in the GSP include the following:

- Groundwater Augmentation from Wet Year Supplies
    - #1 Omochumne-Hartnell Water District (OHWD) Agricultural Flood Managed Aquifer Recharge (Flood-MAR)[219]
    - #2 Sacramento Area Flood Control Agency Flood-MAR[220]
- Groundwater Augmentation from New Supplies
    - #3 OHWD Cosumnes River Flow Augmentation[221]
    - #4 City of Galt Recycled Water Project[222]
- Revenue Generation
    - #5 Voluntary Land Repurposing[223]
    - #6 Groundwater Banking and Sale[224]
- Other Projects and Management Actions225
    - Expand the voluntary land fallowing program or incentivize growing less water intensive crops.

[216] 23 CCR § 354.44 (a).
[217] 23 CCR § 354.44 (b) *et seq.*
[218] Cosumnes GSP, Section 18 through 18.2.4, pp. 346-354.
[219] Cosumnes GSP, Section 18.2.1, p. 349, Table PMA-1, p. 355, and Figure PMA-1, p. 366.
[220] Cosumnes GSP, Section 18.2.1, pp. 349-350; Table PMA-1, p. 355; and Figure PMA-1, p. 366.
[221] Cosumnes GSP, Section 18.2.2, pp. 350-351; Table PMA-1, p. 355; and Figure PMA-1, p. 366.
[222] Cosumnes GSP, Section 18.2.2, p. 351; Table PMA-1, p. 355; and Figure PMA-1, p. 366.
[223] Cosumnes GSP, Section 18.2.3, p. 351; Table PMA-1, p. 356; and Figure PMA-1, p. 366.
[224] Cosumnes GSP, Section 18.2.3, p. 352; Table PMA-1, p. 356; and Figure PMA-1, p. 366.
[225] Cosumnes GSP, Section 18.2.4, pp. 352-354.

- Provide technical and financial incentives that support landowners wanting to implement local water use efficiency/conservation projects.
- Explore multi-benefit opportunities for off-stream impoundments to store floodwaters.
- Coordinate with various partners working with willing landowners near the Cosumnes River to develop multi-benefit projects (e.g., recharge and agricultural and/or habitat preservation benefits).
- Explore recharge projects that utilize potentially available surface water from Amador County and existing infrastructure.
- Explore multi-benefit opportunities for diversions to interior Subbasin drainages to increase recharge from leakage and reconnect their lower reaches in the floodplains.
- Evaluate the efficacy of local recharge projects such as catch ponds, dry wells, seepage pits, and other water substitution practices.
- Implement Low Impact Development practices in the City of Galt (including the use of dry wells to redirect stormwater runoff for recharge).
- Implement the Drought Resilience Impact Platform for verifying pumping, conservation efforts and land repurposing effectiveness.
- Participate in regional water supply and water banking projects.
- Review implementation of the Deer Creek Hills Aquifer Storage and Recovery (ASR) project, initially proposed in 1997, which utilizes high flows from the Cosumnes for ASR immediately north of the community of Rancho Murieta (anticipated benefit of 4,800 acre-feet per year).
- Construct a new well for Arcohe School and develop a groundwater recharge program for the students.

Consistent with the GSP Regulations, the descriptions for the planned projects and management action (#1 through #6) contain information for the measurable objectives expected to benefit from the projects or management action, circumstances for implementation, permitting and regulatory process requirements, public noticing process, timetable for implementation, expected benefits, and legal authority under which the projects and management action will be implemented.[226] For the other supplemental projects and management actions that are still under consideration, the GSP does not provide detailed descriptions nor the expected benefits because information for these projects and management action is currently insufficient.[227]

[226] Cosumnes GSP, Table PMA-1 and PMA-2, pp. 355-357.
[227] Cosumnes GSP, Section 18.2.4, p. 352.

The GSAs plan to implement each of the projects and management action (#1 through #6) in two phases. Based on the implementation schedule provided in the GSP, Phase 1 activities for each of the projects and management action were initiated in 2022 and will be completed in 2027; Phase 2 activities will be initiated in 2028 and completed in 2042.[228]

The combined expected benefit from the groundwater augmentation projects (#1 through #4) is an increase in the volume of groundwater in storage by approximately 7,100 acre-feet per year.[229] The expected benefit from the voluntary land purposing management action (#5) is a reduction in groundwater use by approximately 6,300 acre-feet, of which 5,000 acre-feet per year will be extracted for sale, leaving a net of 1,300 acre-feet per year in the Subbasin's groundwater storage.[230] For the groundwater banking and sale project (#6), the GSP states that sale of banked groundwater will only occur when volume from the recharge projects is sufficient to offset the volume sold. Exported groundwater will be guided by a leave-behind policy to ensure there are no negative impacts to groundwater storage in the Subbasin; for every 1 acre-foot of banked groundwater sold, 3 acre-feet will have been added to the Subbasin's aquifer.[231]

In summary, the combined expected increase in groundwater storage from the planned projects and management action (i.e., #1 through #5) is approximately 8,400 acre-feet per year, which is higher than the estimated current overdraft of 7,400 acre-feet per year and the estimated projected baseline overdraft of 1,700 acre-feet per year.

However, Department staff note that based on the estimated overdraft of 18,600 acre-feet per year projected under assumed extreme climate conditions for 2070,[232] the GSAs may need to implement the supplemental projects and management actions to offset the projected overdraft under future potential extreme conditions and assess the effects of the sale of conserved/banked groundwater on progress towards maintaining sustainability, through their planned adaptive management strategy. As more information is gathered to refine the supplemental projects and management actions, Department staff recommend the GSAs update information for the supplemental projects and management actions, to include the items listed in the GSP regulations and demonstrate that the proposed supplemental projects and management actions would be sufficient for the Subbasin to withstand potential extreme climatic conditions. The GSAs should at a minimum, provide quantifiable benefits expected from the supplemental projects and management action and clearly defined triggers for implementation.

Generally, the GSP describes the planned projects and management action (#1 through #6) in a manner that is consistent and substantially complies with the GSP Regulations.

[228] Cosumnes GSP, Table PMA-1, p. 355.
[229] Cosumnes GSP, Section 18.2.1 and 18.2.2, pp. 349-351.
[230] Cosumnes GSP, Table PMA-1, pp. 355-356.
[231] Cosumnes GSP, Section 18.2.3, p. 352, and Section 19.1.5, p. 374.
[232] Cosumnes GSP, Table WB-1, p. 187.

The projects and management action which focus largely on groundwater augmentation and demand reduction (albeit with the aim to sale a portion of the conserved groundwater) are directly related to the sustainable management criteria and appear to present a generally feasible approach to mitigate the existing groundwater overdraft and achieve the sustainability goal of the Subbasin. The Plan also includes a host of other projects and management actions that may be implemented as necessary. Because the GSP's projects and management actions are an integral component for achieving sustainability for the Subbasin, Department staff will monitor the progress and performance of the projects and management actions through review of Annual Reports and Periodic Evaluations. Failure to implement the projects and management actions, or modifications to those proposed or implemented projects and management actions, may affect the Department's conclusions regarding the adequacy of the Plan or its implementation in future evaluations.

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."[233] 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.[234]

The Cosumnes Subbasin has two adjacent subbasins: South American and East San Joaquin Subbasins. Both the South American and East San Joaquin Subbasins are designated as high-priority; the East San Joaquin Subbasin is also designated as critically overdrafted. Both subbasins are subject to SGMA and required to be managed under a GSP. The Plan includes an analysis of potential impacts to the adjacent basins with the defined minimum thresholds for each sustainability indicator. The Plan does not anticipate any negative impacts to adjacent subbasins resulting from the minimum thresholds defined in the Plan.

Department staff will continue to review Periodic Evaluations of the Plan to assess whether implementation of the Cosumnes Subbasin GSP is potentially impacting adjacent subbasins.

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.[235]

[233] Water Code § 10733(c).
[234] 23 CCR § 354.28(b)(3).
[235] 23 CCR § 354.18.

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 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. The Department encourages GSAs to also 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. Lastly, the Department encourages GSAs to continually coordinate with the appropriate groundwater users, including but not limited to domestic well owners and state small water systems, and the appropriate overlying county jurisdictions developing drought plans and establishing local drought task forces[236] to evaluate how their Plan's groundwater management strategy aligns with drought planning, response, and mitigation efforts within the basin.

5 STAFF RECOMMENDATION

Department staff recommend approval of the GSP with the recommended corrective actions listed below. The Cosumnes 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 Cosumnes 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 evaluation 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

Further assess potential impact of the established minimum thresholds for chronic lowering of groundwater levels on domestic wells as related data gaps are filled and provide supporting documentation of the assessment.

RECOMMENDED CORRECTIVE ACTION 2

Revise the undesirable results definition for chronic lowering of groundwater levels to be based on impacts due to lowering of groundwater levels (i.e., the number or percentage

[236] Water Code § 10609.50.

of wells that the GSAs deem acceptable to impact due to lowering of groundwater levels) and update the minimum thresholds for chronic lowering of groundwater levels, as necessary, to be tied to the undesirable result definition.

RECOMMENDED CORRECTIVE ACTION 3

Conduct the necessary investigations or studies to better understand the relationship between groundwater levels and degraded water quality. Based on the results of the investigations/studies, describe in the GSP, the relationship between the minimum thresholds established for chronic lowering of groundwater levels and degraded water quality.

RECOMMENDED CORRECTIVE ACTION 4

Establish sustainable management criteria for land subsidence based on direct measurements of land elevation changes to assess and confirm that no significant and unreasonable land subsidence is occurring.

RECOMMENDED CORRECTIVE ACTION 5

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 evaluation:

a. Consider utilizing the interconnected surface water guidance, as appropriate, when issued by the Department to establish quantifiable minimum thresholds, measurable objectives, and management actions.

b. 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.

c. 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 6

Expand the land subsidence monitoring network to provide sufficient coverage of the Subbasin. The GSAs may consider the use of additional GPS stations, extensometers, or publicly available remote sensing data (e.g., InSAR) to expand the land subsidence monitoring network in the Subbasin.