



CALIFORNIA DEPARTMENT OF WATER RESOURCES

# SUSTAINABLE GROUNDWATER MANAGEMENT OFFICE

715 P Street, 8<sup>th</sup> Floor | Sacramento, CA 95814 | P.O. Box 942836 | Sacramento, CA 94236-0001

February 27, 2025

Michael Cooke  
Turlock Irrigation District and West Turlock Subbasin GSA  
333 East Canal Drive  
Turlock, CA 95380  
[micooke@tid.org](mailto:micooke@tid.org)

RE: Approved Determination of the 2024 Groundwater Sustainability Plan Submitted for the San Joaquin Valley - Turlock Subbasin


Dear Michael Cooke,

The Department of Water Resources (Department) has evaluated the 2024 groundwater sustainability plan (GSP) for the San Joaquin Valley - Turlock Subbasin in response to the Department's Incomplete Determination on January 18, 2024, 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 San Joaquin Valley - Turlock Subbasin GSP has taken sufficient action to correct deficiencies identified by the Department, 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 GSAs are required to submit their periodic evaluation of the San Joaquin Valley - Turlock Subbasin GSP no later than January 28, 2027.

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

Thank You,

  
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Paul Gosselin  
Deputy Director  
Sustainable Groundwater Management

Attachment:

1. Statement of Findings Regarding the Determination of Approval of the San Joaquin Valley - Turlock Subbasin 2024 Groundwater Sustainability Plan

**STATE OF CALIFORNIA  
DEPARTMENT OF WATER RESOURCES**

**STATEMENT OF FINDINGS REGARDING THE  
APPROVAL OF THE  
SAN JOAQUIN VALLEY – TURLOCK SUBBASIN  
2024 GROUNDWATER SUSTAINABILITY PLAN**

Under the Sustainable Groundwater Management Act (SGMA or Act), 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 SGMA, 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.<sup>1</sup> The Department is directed to issue an assessment of the Plan within two years of its submission.<sup>2</sup> If a Plan is determined to be Incomplete, the Department must identify deficiencies that preclude approval of the Plan and identify corrective actions required to make the Plan substantially compliant with SGMA and the GSP Regulations. The Groundwater Sustainability Agency (GSA or Agency) has up to 180 days from the date the Department issues its assessment to make the necessary corrections and submit a revised Plan.<sup>3</sup> When evaluating a revised GSP that was determined to be incomplete, the Department reviews the materials provided by the GSA (e.g., revised or amended GSP) to address the deficiencies by the submission deadline. Part of the Department's review focuses on how the Agency addressed the deficiencies that precluded approval of the Plan. The Department shall find a Plan previously determined to be incomplete to be either:

1. Approved, if the Department determines the Agency has sufficiently addressed those deficiencies, the Department may evaluate other components of the Plan, particularly to assess whether and, if so, how revisions to address deficiencies may have affected other components of a Plan or its likelihood of achieving sustainable groundwater management.
2. Inadequate if, after consultation with the State Water Resources Control Board, the Agency has not taken sufficient action to correct the deficiencies previously identified by the Department.

This Statement of Findings explains the Department's determination regarding the revised Plan for the San Joaquin Valley – Turlock Subbasin (Basin No. 5-022.03) by the

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<sup>1</sup> Water Code § 10733.

<sup>2</sup> Water Code § 10733.4.

<sup>3</sup> 23 CCR § 355.2(e)(2).

East Turlock Subbasin GSA and West Turlock Subbasin GSA (GSAs or Agencies) submitted on July 12, 2024 (referred to as the 2024 GSP or 2024 Plan).

Department management have discussed the 2024 Plan with Department staff and have reviewed the written assessment titled Sustainable Groundwater Management Program Assessment of Incomplete Groundwater Sustainability Plan 2025 Staff Report (Staff Report), attached as Exhibit A, which recommends approval of the 2024 GSP. Department management are satisfied that staff have conducted a thorough evaluation and assessment of the 2024 Plan and concur with staff's recommendations and all the recommended corrective actions. The Department therefore **APPROVES** the 2024 Plan and makes the following findings:

- A. On January 31, 2022, the GSAs submitted a GSP (referred to as the 2022 GSP or 2022 Plan) for the Department's evaluation.
- B. On January 18, 2024, the Department issued a Staff Report (referred to as the 2024 Incomplete Determination) and Findings determining the 2022 GSP to be incomplete, because the 2022 GSP did not satisfy the requirements of SGMA, nor did it substantially comply with the GSP Regulations. The Department's 2024 Incomplete Determination identified the following deficiencies that precluded approval and provided the GSA with corrective actions that were intended to address the deficiencies.
  1. Deficiency 1. The 2022 GSP did not establish sustainable management criteria for chronic lowering of groundwater levels in a manner substantially compliant with the GPS regulations.
  2. Deficiency 2: The 2022 GSP did not include a reasonable assessment of overdraft conditions and reasonable means to mitigate overdraft.

The Department provided the Agencies with 180 days to address the deficiencies.<sup>4</sup>

- C. On July 16, 2024, the GSAs submitted a revised Plan (the 2024 GSP) to the Department. After staff's thorough evaluation of the 2024 Plan, the Department finds:
  1. The Agencies have taken sufficient actions to correct Deficiency 1 with completion of a well impact analysis detailing the anticipated number of wells that could be impacted and development of a well mitigation program to address impacts from declining groundwater water levels, such that, at this time, the Department no longer finds this deficiency to preclude approval.

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<sup>4</sup> 23 CCR § 355.2(e)(2).

2. The Agencies have taken sufficient actions to correct Deficiency 2 by providing a list of additional groundwater recharge/supply augmentation projects with details quantifying additional amount of water anticipated to be provided annually and by providing commitment to development and implementation of management actions including demand reduction and groundwater allocation along with self-funding fee structure, such that, at this time, the Department no longer finds this deficiency to preclude approval.

The 2024 Plan satisfies the required conditions as outlined in § 355.4(a) of the GSP Regulations<sup>5</sup>:

1. 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.<sup>6</sup>
  2. The Plan, either on its own or in coordination with other Plans, appears to cover the entire Basin sufficient to warrant a thorough evaluation.<sup>7</sup>
- D. The general standards the Department applied in its evaluation and assessment of the Plan are: (1) “conformance” with the specified statutory requirements, (2) “substantial compliance” with the GSP Regulations, (3) whether the Plan is likely to achieve the sustainability goal for the Subbasin within 20 years of the implementation of the Plan, and (4) whether the Plan adversely affects the ability of an adjacent basin to implement its GSP or impedes achievement of sustainability goals in an adjacent basin.<sup>8</sup> 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

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<sup>5</sup> 23 CCR § 350 et seq.

<sup>6</sup> 23 CCR § 355.4(a)(2).

<sup>7</sup> 23 CCR § 355.4(a)(3).

<sup>8</sup> Water Code § 10733.

management is best achieved locally through the development, implementation, and updating of local plans and programs<sup>9</sup>; 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.<sup>10</sup> 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 basin under review.

- E. 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 basin (with the possibility that the Department may grant GSAs an additional five years upon request if the GSA has made satisfactory progress toward sustainability); and, (4) local agencies acting as GSAs are authorized, but not required, to address undesirable results that occurred prior to enactment of SGMA.<sup>11</sup>
- F. 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 the Plan's goal to ensure a reliable and sustainable groundwater supply that supports population growth, sustains the agricultural economy, and provides for beneficial uses, especially during drought are sufficiently justified and explained. The Plan relies on credible information and science with thorough analysis 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.<sup>12</sup> (23 CCR § 355.4(b)(1))
  2. The Plan has identified reasonable measures and schedules to eliminate data gaps such as installing additional monitoring wells in the Western Lower Principal Aquifer and for the interconnected surface water monitoring network.<sup>13</sup> Addressing these known data gaps should increase the GSAs'

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<sup>9</sup> Water Code § 113.

<sup>10</sup> Water Code § 10720.1(h).

<sup>11</sup> Water Code §§ 10721(r); 10727.2(b); 10733(a); 10733.8.

<sup>12</sup> 23 CCR § 355.4(b)(1).

<sup>13</sup> 23 CCR § 355.4(b)(2).

understanding of the Subbasin and will lead to refinement of the GSP's sustainable management criteria and water budget. (23 CCR § 355.4(b)(2))

3. The projects and management actions proposed are designed to increase conjunctive use, enhance groundwater recharge, and implement new and innovative management actions such as demand reduction measures and groundwater allocation. The projects and management actions are reasonable and commensurate with the level of understanding of the Subbasin setting. The projects and management actions described in the Plan provide a feasible approach to achieving the Subbasin's sustainability goal and should provide the GSAs with greater versatility to adapt and respond to changing conditions and future challenges during GSP implementation.<sup>14</sup> (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 conducting a well impact analysis detailing how water well users would be impacted by the chosen minimum thresholds.<sup>15</sup> (23 CCR § 355.4(b)(4))
5. The Plan's projects and management actions appear feasible at this time and capable of preventing undesirable results and ensuring that the Subbasin is operated within its sustainable yield within 20 years. The Department will continue to monitor Plan implementation and reserves the right to change its determination if projects and management actions are not implemented or appear unlikely to prevent undesirable results or achieve sustainability within SGMA timeframes.<sup>16</sup> (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.<sup>17</sup> (23 CCR § 355.4(b)(6))
7. At this time, it does not appear that the Plan will adversely affect the ability of an adjacent basin to implement its GSP or impede achievement of sustainability goals in an adjacent basin. The Plan states that through a series of coordination meetings with adjacent subbasin representatives and review of draft and completed GSPs, the minimum thresholds in the three adjacent subbasins were considered together and are not expected to either

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<sup>14</sup> 23 CCR § 355.4(b)(3).

<sup>15</sup> 23 CCR § 355.4(b)(4).

<sup>16</sup> 23 CCR § 355.4(b)(5).

<sup>17</sup> 23 CCR § 355.4(b)(6).

cause undesirable results or adversely impact GSP implementation in adjacent subbasins.<sup>18</sup> (23 CCR § 355.4(b)(7))

8. Because a single plan was submitted for the Subbasin, a coordination agreement was not required.<sup>19</sup> (23 CCR § 355.4(b)(8))
9. The GSAs' 13 member agencies, City of Ceres, City of Hughson, City of Modesto, City of Turlock, Merced County, Stanislaus County, Denair Community Services District, Delhi County Water District, Hilmar County Water District, and Turlock Irrigation District, Eastside Water District, Merced Irrigation District, Ballico-Cortez Water District, have historically implemented surface water and groundwater management and monitoring in the Subbasin. The GSAs' member agencies and their history of groundwater management and participation in the Department's groundwater elevation monitoring programs provide a reasonable level of confidence that the GSAs have the legal authority and financial resources necessary to implement the Plan.<sup>20</sup> (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.<sup>21</sup> (23 CCR § 355.4(b)(10))

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

1. The Department developed its GSP Regulations consistent with and intending to further the State's human right to water policy through implementation of SGMA and the Regulations, primarily by achieving sustainable groundwater management in a basin. By ensuring substantial compliance with the GSP Regulations, the Department has considered the state policy regarding the human right to water in its evaluation of the Plan.<sup>22</sup>
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

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<sup>18</sup> 23 CCR § 355.4(b)(7).

<sup>19</sup> 23 CCR § 355.4(b)(8).

<sup>20</sup> 23 CCR § 355.4(b)(9).

<sup>21</sup> 23 CCR § 355.4(b)(10).

<sup>22</sup> Water Code § 106.3; 23 CCR § 350.4(g).



understanding and management of interconnected surface water. The GSAs acknowledge, and the Department agrees, many data gaps related to interconnected surface water exist. The GSAs should continue filling data gaps, collecting additional monitoring data, and coordinating with resources agencies and interested parties to understand beneficial uses and users that may be impacted by depletions of interconnected surface water caused by groundwater pumping. Future periodic evaluations of the Plan and amendments to the Plan should aim to improve the initial sustainable management criteria as more information and improved methodology becomes available.

3. Projections of future Subbasin extractions are likely to stay within current and historic ranges, at least until the next periodic evaluation by the GSAs and the Department. Subbasin groundwater levels and other SGMA sustainability indicators appear unlikely to substantially deteriorate while the GSAs implement the Department's recommended corrective actions.
4. The California Environmental Quality Act<sup>23</sup> does not apply to the Department's evaluation and assessment of the Plan.

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<sup>23</sup> Public Resources Code § 21000 *et seq.*

Statement of Findings  
San Joaquin Valley – Turlock Subbasin (No. 5-022.03)

February 27, 2025

Accordingly, the 2024 GSP submitted by the Agencies for the San Joaquin Valley – Turlock 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 in the next Periodic Evaluation, which is set to be submitted by January 28, 2027, as required by Water Code § 10733.8. Failure to address the Department’s recommended corrective actions before future, subsequent plan evaluations, may lead to a Plan being determined incomplete or inadequate.

Signed:

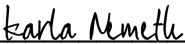
  
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Karla Nemeth, Director  
Date: February 27, 2025

Exhibit A: Groundwater Sustainability Plan Assessment Staff Report – San Joaquin Valley  
– Turlock Subbasin

**State of California  
Department of Water Resources  
Sustainable Groundwater Management Program  
Reassessment of Incomplete  
Groundwater Sustainability Plan  
2025 Staff Report**

Groundwater Basin Name: San Joaquin Valley – Turlock Subbasin (No. 5-022.03)  
Submitting Agency: West Turlock Subbasin Groundwater Sustainability Agency and East Turlock Subbasin Groundwater Sustainability Agency  
Submittal Type: Revised Plan in Response to Incomplete Determination  
Submittal Date: July 12, 2024  
Recommendation: Approve  
Date: February 27, 2025

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On July 12, 2024, the West Turlock Subbasin Groundwater Sustainability Agency (WTSGSA) and the East Turlock Subbasin Groundwater Sustainability Agency (ETSGSA) (collectively referred to as the GSAs or Agencies) resubmitted the Turlock Subbasin Groundwater Sustainability Plan (2024 GSP or 2024 Plan)<sup>1</sup> for the Turlock Subbasin (Subbasin) to the Department of Water Resources (Department or DWR) for evaluation and assessment as required by the Sustainable Groundwater Management Act (SGMA)<sup>2</sup> and GSP Regulations.<sup>3</sup> This was in response to the Department's Incomplete Determination of the initial GSP (2022 GSP or 2022 Plan) on January 18, 2024.<sup>4</sup>

After evaluation and assessment, Department staff conclude the GSAs have taken sufficient actions to correct deficiencies identified by the Department; however, Department staff have provided additional corrective actions which will be required to be addressed by the Plan's periodic evaluation.

Overall, Department staff believe the 2024 Plan contains 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 2024 Plan, and proposes a set of projects and management actions that, if successfully implemented, are likely to achieve the sustainability goal defined for the

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<sup>1</sup> <https://sgma.water.ca.gov/portal/gsp/preview/110>.

<sup>2</sup> Water Code § 10720 *et seq.*

<sup>3</sup> 23 CCR § 350 *et seq.*

<sup>4</sup> Water Code § 10733.4(b); 23 CCR § 355.4(a)(4); <https://sgma.water.ca.gov/portal/gsp/assessments/110>.

Subbasin.<sup>5</sup> Department staff will continue to monitor and evaluate the Subbasin's progress toward achieving the sustainability goal through annual reporting and future periodic evaluations of the 2024 GSP and its implementation.

- ***Based on the evaluation of the 2024 Plan, Department staff recommend the Plan be approved.***

This assessment includes six sections:

- **Section 1 – Summary**: Overview of the Department Staff's assessment and recommendation.
- **Section 2 – Evaluation Criteria**: Describes the legislative requirements and the Department's evaluation criteria.
- **Section 3 – Required Conditions**: Describes the submission requirements of an incomplete resubmittal to be evaluated by the Department.
- **Section 4 – Deficiency Evaluation**: Provides an assessment of whether and how the contents included in the GSP resubmittal addressed the deficiencies identified by the Department in the initial incomplete determination.
- **Section 5 – Plan Evaluation**: Provides a detailed assessment of the contents included in the GSP organized by each Subarticle outlined in the GSP Regulations.
- **Section 6 – Staff Recommendation**: Includes the staff recommendation for the 2024 Plan.

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<sup>5</sup> 23 CCR § 354.24.

# 1 SUMMARY

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Department staff recommend **approval** of the 2024 Turlock GSP and have recommended corrective actions designed to address shortcomings of the 2024 Plan described in this Staff Report. In Section 4 of this report, Department staff reviewed how the 2022 Plan was updated in the 2024 Plan by comparing content from each plan in order to determine if sufficient action was taken in response to deficiencies identified in the 2022 Plan. In Section 5, Department staff reviewed content in the GSP for its substantial compliance with GSP Regulations, and have provided recommended corrective actions for components of the plan that need improvement to support substantial compliance with GSP Regulations and for Subbasin sustainability.

The GSAs have made substantial improvements to its 2024 Plan since the 2022 GSP was determined to be incomplete. The GSAs provide more information to support the proposed temporarily lowering of groundwater levels below minimum thresholds between 2022 and 2032 including providing an analysis which shows it will not cause undesirable results for other sustainability indicators. The GSAs also discuss how this approach was done with consideration of beneficial uses and users by committing to implement a well mitigation program in the near-term for users impacted by the temporary declines. Lastly, the GSAs have added to the suite of projects and management actions and appear to have multiple pathways to allow water levels to recover above minimum thresholds and manage the Subbasin sustainably.

While the GSAs have made substantial progress, diligent plan implementation will be critical to stem declines by 2027, recover water levels to minimum threshold levels by 2032, and manage the Subbasin to avoid undesirable results into the future. Department staff have identified multiple recommended corrective actions that the GSAs should consider for the first periodic evaluation of the Plan (see [Staff Recommendation](#)). Addressing these recommended corrective actions will be important to demonstrate, on an ongoing basis, that implementation of the Plan is likely to achieve the sustainability goal.

The recommended corrective actions generally focus on the following:

- 1) Refining the assessment of how established sustainable management criteria affects beneficial uses and users of groundwater,
- 2) Providing information in future annual reports and the periodic evaluation of the Plan to describe whether projects and management actions are being implemented as anticipated,
- 3) Providing supporting information related to the hydrogeologic conceptual model,
- 4) Estimating the location, quantity, and timing of stream depletions, and

- 5) Refining the degraded water quality sustainable management criteria and improving the monitoring network.

## 2 EVALUATION CRITERIA

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The Department evaluates whether a Plan conforms to the statutory requirements of SGMA<sup>6</sup> and is likely to achieve the basin’s sustainability goal,<sup>7</sup> whether evaluating a basin’s first Plan,<sup>8</sup> a Plan previously determined incomplete,<sup>9</sup> an amended Plan,<sup>10</sup> or a GSA’s periodic evaluation to an approved Plan.<sup>11</sup> To achieve the sustainability goal, each version of the Plan must demonstrate that implementation 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.<sup>12</sup> The Department is also required to evaluate, on an ongoing basis, whether the Plan will adversely affect the ability of an adjacent basin to implement its groundwater sustainability program or achieve its sustainability goal.<sup>13</sup>

The Plan evaluated in this Staff Report was previously determined to be incomplete. An incomplete Plan is one which had one or more deficiencies that precluded its initial approval, may not have had supporting information that was sufficiently detailed or analyses that were sufficiently thorough and reasonable, or Department staff determined it was unlikely the GSAs in the basin could achieve the sustainability goal. After a GSA has been afforded up to 180 days to address the deficiencies and based on the GSA’s efforts, the Department can either approve<sup>14</sup> the Plan or determine the Plan inadequate.<sup>15</sup>

The Department’s evaluation and assessment of a Plan previously determined to be incomplete, as presented in this Staff Report, continues to follow Article 6 of the GSP Regulations<sup>16</sup> to determine whether the Plan, with revisions or additions prepared by the GSA, complies with SGMA and substantially complies with the GSP Regulations.<sup>17</sup> As stated in the GSP Regulations, “substantial compliance means that the supporting information is sufficiently detailed and the analyses sufficiently thorough and reasonable, in the judgment of the Department, to evaluate the Plan, and the Department determines that any discrepancy would not materially affect the ability of the Agency to achieve the sustainability goal for the basin, or the ability of the Department to evaluate the likelihood of the Plan to attain that goal.”<sup>18</sup>

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<sup>6</sup> Water Code §§ 10727.2, 10727.4, 10727.6.

<sup>7</sup> Water Code § 10733; 23 CCR § 354.24.

<sup>8</sup> Water Code § 10720.7.

<sup>9</sup> 23 CCR § 355.2(e)(2).

<sup>10</sup> 23 CCR § 355.10.

<sup>11</sup> 23 CCR § 355.6.

<sup>12</sup> Water Code § 10721(v).

<sup>13</sup> Water Code § 10733(c).

<sup>14</sup> 23 CCR §§ 355.2(e)(1).

<sup>15</sup> 23 CCR §§ 355.2(e)(3).

<sup>16</sup> 23 CCR § 355 *et seq.*

<sup>17</sup> 23 CCR § 350 *et seq.*

<sup>18</sup> 23 CCR § 355.4(b).

The recommendation to approve a Plan previously determined to be incomplete does not signify that Department staff, were they to exercise the professional judgment required to develop a Plan for the basin, would make the same assumptions and interpretations as those contained in the revised Plan, but simply that Department staff have determined that the modified assumptions and interpretations relied upon by the submitting GSA(s) are supported by adequate, credible evidence, and are scientifically reasonable. The assessment of a Plan previously determined to be incomplete may involve the review of new information presented by the GSAs, including models and assumptions, and an evaluation of that information based on scientific reasonableness. In conducting its assessment, Department staff does not recalculate or reevaluate technical information or perform its own geologic or engineering analysis of that information.

The recommendation to not approve a Plan previously determined to be incomplete and instead determine it to be inadequate signifies that the resubmitted Plan contains significant deficiencies based on one or more of the criteria identified in 23 CCR § 355.4(b), or the GSAs in the basin have not taken sufficient actions to correct the deficiencies previously identified by the Department when it found the Plan incomplete. The Department engages in consultation with the State Water Resources Control Board before finding a Plan inadequate. A Plan determined to be inadequate is subject to the state intervention provisions contained in Chapter 11 of SGMA.<sup>19</sup>

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<sup>19</sup> Water Code § 10735 *et seq.*



### 3 REQUIRED CONDITIONS

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For a Plan that the Department previously determined to be incomplete, the Department provided required corrective actions that address minor or potentially significant deficiencies that the Department identified in the initially submitted Plan. The GSA(s) in a basin, whether developing a single GSP covering the basin or multiple GSPs, must attempt to sufficiently address those required corrective actions within the time provided, not to exceed 180 days, for the Plan to be reevaluated by the Department and potentially approved.

#### 3.1 INCOMPLETE RESUBMITTAL

GSP Regulations specify that the Department shall evaluate a resubmitted GSP in which the GSA has taken corrective actions within 180 days from the date the Department issued an incomplete determination to address deficiencies.<sup>20</sup>

The Department issued the incomplete determination on January 18, 2024. The GSAs resubmitted the GSP to the Department on July 12, 2024, in compliance with the 180-day deadline.

The GSAs have provided a redline/strikeout version of the resubmitted GSP. The redline/strikeout version highlights the changes made from the initial 2022 submission to the 2024 submission.<sup>21</sup>

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<sup>20</sup> 23 CCR § 355.4(a)(4).

<sup>21</sup> <https://sgma.water.ca.gov/portal/service/gspdocument/download/10271>.

## 4 DEFICIENCY EVALUATION

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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.

In its initial incomplete determination, the Department identified deficiencies in the Plan which precluded the Plan’s approval in January 2024.<sup>22</sup> The GSAs were given 180 days to take corrective actions to remedy the identified deficiencies. Consistent with the GSP Regulations, Department staff are providing an evaluation of the resubmitted Plan to determine if the GSAs have taken sufficient actions to correct the deficiencies identified in the 2022 Plan. For each deficiency, the corrective actions are repeated, the 2022 Plan content is summarized, the 2024 Plan is then described, followed by Department staff’s evaluation.

### **4.1 DEFICIENCY 1. THE GSP DOES NOT PROVIDE SUFFICIENT INFORMATION TO SUPPORT THE SELECTION OF CHRONIC LOWERING OF GROUNDWATER LEVELS SUSTAINABLE MANAGEMENT CRITERIA.**

#### **4.1.1 Corrective Action 1**

In the Department’s Incomplete Determination, the Department identified the following corrective actions related to the consideration of beneficial uses and users of groundwater in the selection of chronic lowering of groundwater level sustainable management criteria.

- a) The GSAs should revise the GSP to include a complete and thorough discussion of how the interests of beneficial uses and users of groundwater in the Subbasin have been considered. Department staff recommend that additional assessment be conducted to understand the impacts to beneficial uses and users from continued overdraft, including what impacts may result if groundwater levels reach the established interim milestones in 2027. The GSP should also include a well impact analysis of how many wells may go dry during the 20-year implementation period based on the proposed interim milestones, for how long they may go dry, and the impacts to land uses and property interests, among others. Additionally, the GSP should include a discussion of how its approach to groundwater

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<sup>22</sup> <https://sgma.water.ca.gov/portal/gsp/assessments/110>.

management may affect all identified beneficial uses and users in the Subbasin, including environmental users.

- b) The GSAs should revise the GSP to describe how impacts to wells experienced at interim milestone levels below minimum thresholds will be managed or mitigated. If the GSAs plan to implement a well mitigation program to avoid causing significant and unreasonable effects to beneficial uses and users, details such as the number of wells anticipated to be eligible for the program, estimated costs, funding sources, and an implementation schedule should be included in the GSP. Department staff also encourage the GSAs to review the Department’s April 2023 guidance document titled *Considerations for Identifying and Addressing Drinking Water Well Impacts*.<sup>23</sup>
- c) The GSAs should revise the GSP to include an analysis describing whether or how managing the Subbasin to allow groundwater levels to drop to interim milestone levels that are below the established minimum thresholds will avoid causing undesirable results for other sustainability indicators.

#### **4.1.2 Evaluation of Resubmitted Plan**

##### *4.1.2.1 Corrective Action 1a –Interests of Beneficial Users and Users*

In response to the incomplete determination, the GSAs provided a well impact analysis evaluating potential impacts to beneficial uses and users at minimum threshold and 2027 interim milestone groundwater elevations.

The 2022 Plan proposed interim milestones for the first ten years of implementation to be below minimum thresholds for all wells in the Eastern Principal Aquifer and for selected wells in the western principal aquifers,<sup>24</sup> but did not include an analysis of the impacts to beneficial uses and users. The Department’s Incomplete Determination recommended that the GSAs’ 2022 Plan be revised to include a complete and thorough discussion of impacts to beneficial uses and users that may result from groundwater levels declining below minimum thresholds as they approach the 2027 interim milestones set below minimum thresholds. In response, the GSAs provided a well impact analysis describing the potential impacts to water supply wells due to groundwater levels declining to reach the proposed 2027 interim milestones, where the 2027 interim milestones are set below the minimum thresholds.

The 2024 Plan states that a well impact analysis was conducted for all water supply wells with available construction information in the Subbasin.<sup>25</sup> The well impact analysis utilized well records of municipal, industrial, domestic, and agricultural water supply wells compiled from three sources: the GSP data management system, wells added to the C2VSim™ model since the GSP was submitted in January 2022, and the Department’s

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<sup>23</sup> <https://water.ca.gov/Programs/Groundwater-Management/Drinking-Water-Well>.

<sup>24</sup> Turlock Subbasin 2022 Plan, Section 6.9, p. 452.

<sup>25</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.1, p. 398.

Online System of Well Completion Reports.<sup>26</sup> The 2024 Plan describes that for the well impact analysis, the water supply wells with well records were mapped and then grouped according to the nearest representative monitoring well (RMW) in the same principal aquifer unit.<sup>27</sup> At each RMW, the depth of the 2027 interim milestone was compared to the depth of each well grouped with a particular RMW and water supply wells with total depths shallower than the interim milestone elevation of the associated RMW were considered to be dry within the scope of the well impact analysis.<sup>28</sup>

The 2024 Plan describes that out of the 7,767 wells with construction information that were analyzed, 85 wells (1.1 percent) were projected to potentially go dry at the 2027 interim milestone elevations, where the interim milestone elevation is below the minimum threshold. Most of the impacted wells (81 of 85) are located in the Eastern Principal Aquifer and 4 are located in the Western Upper Principal Aquifer with no impacted wells in the Western Lower Principal Aquifer.<sup>29</sup> Department staff note that the well inventory used in the well impact analysis (7,767 wells) exceeds the total number of wells in the Department's Online System of Well Completion Reports (OSCWR)<sup>30</sup> database (approximately 3,000 domestic, 1,400 irrigation, and 170 public supply wells for this Subbasin). Therefore, Department staff conclude the 2024 GSP well inventory does not seem to be exclusionary and represents the use of best available information. Consequently, the analysis appears sufficiently thorough to ensure that the results are unbiased and transparent regarding the anticipated impact on wells.

The 2024 Plan also describes limitations of the well impact analysis.<sup>31</sup> In particular, well records without construction information were not included in the analysis. The 2024 Plan also describes that because well records with construction information most commonly include total depth, but not the perforated screened interval of the well casing, groundwater levels were compared to the total depth of the well. The 2024 Plan also describes that well records do not indicate well status and that older shallower wells may no longer be active; these wells were not removed from the analysis. The 2024 Plan also describes that there is uncertainty in the location of wells because many well locations are reported by public land survey system section centers.<sup>32</sup> However, the 2024 Plan did not discuss that some wells may experience impacts before groundwater levels reach the bottom of the well or well screen interval. Department staff understand that there is the potential for some wells to go dry before reaching the bottom of the perforated well screen interval<sup>33</sup> and that the 2024 Plan's approach in the analysis may result in some potentially impacted wells not being accounted for. Still, Department staff consider this approach

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<sup>26</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.1, p. 398.

<sup>27</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.1, p. 398.

<sup>28</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.1, p. 398.

<sup>29</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.1, p. 399.

<sup>30</sup> <https://water.ca.gov/Programs/Groundwater-Management/Wells/Well-Completion-Reports>.

<sup>31</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.1, p. 401.

<sup>32</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.1, p. 401.

<sup>33</sup> Note: A well screen is a filter that allows water to enter the well from one or several entry points.

acceptable because the 2024 Plan provides an assessment of impact to wells and proposes to implement a well mitigation program (see [Section 4.1.2.2](#)).

Department staff believe the GSAs' efforts to quantify and identify potentially impacted wells at interim milestones that were set below minimum thresholds is a substantial improvement from the initial 2022 Plan. The 2024 Plan detailed that all water wells in the Subbasin with construction data were included in the analysis. Department staff conclude that although wells with no construction data were excluded in the analysis, this is acceptable considering that the 2024 Plan relied on best available information and considered beneficial uses and users by providing a reasonable assessment of the number of wells that may be impacted in addition to describing limitations of the well impact analysis.

Department staff conclude that the 2024 Plan information provided for the well impact analysis from proposed interim milestones below the minimum thresholds is sufficiently detailed to address component 1a of Deficiency 1. The 2024 Plan includes a detailed analysis of potential impacts to water wells at interim milestones, provides a thorough description of the analysis performed, and presents the results of the analysis and describes limitations of the analysis. However, Department staff believe that in order to more clearly disclose impacts to beneficial uses and users and assist with mitigation efforts, the well impact analysis should be further detailed by impact to well type such as domestic, public water supply, irrigation, and others as necessary (see [Recommended Corrective Action 1a](#)).

In development of the sustainable management criteria, SGMA and the GSP Regulations require that GSPs consider the interest of all beneficial uses and users of groundwater, including environmental users of groundwater.<sup>34</sup> GSPs are also required to identify and consider impacts on groundwater dependent ecosystems.<sup>35</sup> The Department's Incomplete Determination directed the GSAs that the 2022 Plan be revised to include a discussion of how the approach to lowering groundwater levels below minimum thresholds may affect environmental users. The 2024 Plan did not include a discussion of potential effects on environmental users from the lowering groundwater levels below minimum thresholds. Department staff understand the GSAs efforts to consider beneficial uses and users have focused on water well impacts;<sup>36</sup> however, given that the 2024 Plan identifies groundwater dependent ecosystems and interconnected surface water habitats as beneficial uses and users<sup>37</sup> of groundwater in the Subbasin, the GSP should include consideration of these environmental users. Thus, Department staff reiterate the recommendation of a discussion of potential effects on environmental users from the temporary lowering of groundwater levels below minimum thresholds via the proposed interim milestones (see [Recommended Corrective Action 1b](#)).

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<sup>34</sup> Water Code § 10723.2; 23 CCR §§ 354.26(b)(3), 354.28(b)(4).

<sup>35</sup> Water Code § 10727.4(l); 23 CCR § 354.16(g).

<sup>36</sup> Turlock Subbasin 2024 Plan, Section 6.3.1.2, p. 383.

<sup>37</sup> Turlock Subbasin 2024 Plan, Section 2.3.2, p. 72; Section 4.3.8, p. 202.

Department staff conclude that the GSAs have sufficiently responded to component 1a of Deficiency 1 in the resubmitted 2024 Plan by including a detailed dry well impact analysis of potential impacts to water supply wells in the Subbasin at proposed minimum thresholds and 2027 interim milestones, which provides the number and location of wells that may be negatively affected during groundwater level decline, provides a thorough description of the analysis performed, and presents the results of the analysis while describing the limitations of the analysis. Consequently, the analysis appears to follow valid scientific methods, ensuring that the results are unbiased and transparent regarding the anticipated impact on wells. Lastly, Department staff believe that implementation of the well mitigation plan will help address uncertainties identified in the well impact analysis and will assist in mitigating adverse effects to wells that may occur during lowering of groundwater levels to 2027 interim milestones.

#### *4.1.2.2 Corrective Action 1b –Mitigation of Impacts to Beneficial Uses and Users*

In response to the incomplete determination, the 2024 Plan details the GSAs' commitment to developing and implementing a well mitigation program, along with key details of the program.

The 2022 Plan proposed interim milestones for the first 10 years of implementation to be below minimum thresholds for all wells in the Eastern Principal Aquifer and selected wells in the western principal aquifers,<sup>38</sup> but did not provide a discussion of lasting impacts that may occur even if groundwater levels improve after years of being below minimum threshold levels such as permanent changes in land use practices (e.g., farmland fallowed, converted, or sold), decreased property values and population changes associated with years of inadequate or unreliable groundwater supplies (because below existing well or pump depths), and impacts or damage to, or abandonment of, domestic or agricultural wells whose productivity decreases or ceases at groundwater levels below minimum thresholds. The Department's Incomplete Determination recommended that the GSAs revise the 2022 Plan to describe how impacts to wells experienced at interim milestone levels below minimum thresholds will be managed or mitigated and encouraged the GSAs to review the Department's April 2023 guidance titled Considerations for Identifying and Addressing Drinking Water Well Impacts.<sup>39</sup>

The 2024 Plan details the GSAs' commitments to developing and implementing a proposed well mitigation program through a joint resolution that was adopted July 11, 2024.<sup>40</sup> The 2024 Plan also provides a copy of a draft memorandum of understanding (MOU) between the GSAs that identifies mitigation measures, program details, estimated costs, and means of funding to be adopted by January 31, 2025.<sup>41</sup> The draft MOU states that the GSAs in the Subbasin agree to develop a program to address well impacts resulting from declining groundwater levels, and resulting land subsidence and/or

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<sup>38</sup> Turlock Subbasin 2022 Plan, Section 6.9, p. 452.

<sup>39</sup> <https://water.ca.gov/Programs/Groundwater-Management/Drinking-Water-Well>.

<sup>40</sup> Turlock Subbasin 2024 Plan, Appendix D, pp. 789-798.

<sup>41</sup> Turlock Subbasin 2024 Plan, Appendix I, pp. 1333-1341.

degraded groundwater quality during the period of groundwater management through creation and implementation of a well mitigation program.<sup>42</sup>

The Department's Incomplete Determination also directed the GSAs that if a well mitigation program was proposed to be implemented, details such as the number of wells anticipated to be eligible for the program, estimated costs, funding sources, and an implementation schedule be provided. The 2024 Plan's proposed well mitigation program includes elements recommended in the Department's Incomplete Determination and includes information regarding public outreach. The well mitigation program is described to consist of five major elements: 1) a well mitigation committee, 2) a well mitigation fund, 3) public outreach and application assistance, 4) eligibility criteria, and 5) application process.<sup>43</sup> Based on information provided in the 2024 Plan, Department staff believe the GSAs have demonstrated initiative to implement well mitigation measures in a timely manner. This commitment to implementation is supported by the GSAs' joint resolution detailing that the well mitigation program would begin implementation no later than January 31, 2025.<sup>44</sup>

The 2024 Plan describes that the well mitigation program would provide short-term and long-term mitigation measures for domestic water supply wells that have experienced adverse impacts due to declining groundwater levels occurring after January 6, 2022 (the date of GSP adoption) and that mitigation for other supply wells (e.g., irrigation, municipal, industrial or stock wells) would be considered under the program on a case-by-case basis.<sup>45</sup>

The GSAs' draft MOU adopting the well mitigation program details that initial funding will consist of \$200,000 and that the GSAs agree on annual funding.<sup>46</sup> Department staff are encouraged to see initial funding but considering that an estimated 85 water supply wells could potentially go dry at the 2027 interim milestones, additional funding most likely will be required. With respect to funding, the MOU states: "The Well Mitigation Committee shall develop and recommend an annual funding framework, which shall be reviewed by the respective GSA Technical Advisory Committees and approved by the GSAs' Boards of Directors ("Boards") no later than June 30, 2025 (the end of Fiscal 2024/2025, when the initial funding runs out)".<sup>47</sup> Department staff conclude that the information provided in the 2024 Plan regarding funding for the well mitigation program is sufficient for now, considering that many of these details will require additional local coordination and implementation efforts.

Department staff are encouraged that the 2024 Plan domestic well mitigation program includes proposed measures to conduct public outreach and application assistance.<sup>48</sup>

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<sup>42</sup> Turlock Subbasin 2024 Plan, Appendix I, p. 1334.

<sup>43</sup> Turlock Subbasin 2024 Plan, Section 8.1.3, p. 540.

<sup>44</sup> Turlock Subbasin 2024 Plan, Appendix D, p. 792.

<sup>45</sup> Turlock Subbasin 2024 Plan, Section 8.1.3, p. 538.

<sup>46</sup> Turlock Subbasin 2024 Plan, Appendix D, p. 792.

<sup>47</sup> Turlock Subbasin 2024 Plan, Appendix I, p. 1336.

<sup>48</sup> Turlock Subbasin 2024 Plan, Section 8.1.3, p. 540.

Staff encourage the GSAs to conduct a robust and public process in development and implementation of the well mitigation program. This outreach effort may include coordination with trusted local community local partners that represent a wide variety of interests.

Based on a review of the information provided in the 2024 Plan, Department staff believe that, at this time, the GSAs have sufficiently addressed component 1b of Deficiency 1. The 2024 Plan's well mitigation program provides details requested in the Department's Incomplete Determination pertaining to eligibility criteria and selection through the proposed well mitigation committee, initial funding and future funding actions to be taken, and an implementation schedule. The 2024 GSP includes and relies on swift development and implementation of a well mitigation program to support and achieve sustainable groundwater management in the Subbasin. Department staff agree and encourage the GSAs to complete this important aspect of the 2024 GSP on the timeline indicated and Department staff will closely monitor achievement of implementation milestones. To that end, the GSAs should ensure that implementation information and milestones are reported in the next annual report for the Subbasin, due in April 2025. The GSAs may provide implementation updates at any time and Department staff may request updates from the GSAs between annual or periodic reporting periods. In conclusion, Department staff believe the GSAs have provided sufficient details of the proposed well mitigation program; however, at this time implementation is in the early stages and Department staff will not be able to fully evaluate the program until further details are determined.

#### *4.1.2.3 Corrective Action 1c –Undesirable Results Avoidance for Sustainability Indicators*

In response to the incomplete determination, the 2024 Plan provided details of analysis conducted to evaluate potential impacts to the degraded water quality, land subsidence, and depletions of interconnected surface water sustainability indicators from groundwater levels dropping below minimum thresholds to the 2027 interim milestones, which are the lowest proposed management threshold. Details of the analysis provided for each applicable sustainability indicator are discussed in the subsections below.

The 2022 Plan described the relationship between minimum thresholds for chronic lowering of groundwater levels and how the minimum thresholds will avoid undesirable results for other sustainability indicators; however, the 2022 Plan did not describe the potential impacts to other sustainability indicators that may occur through the proposed management approach of allowing groundwater levels to decline below minimum thresholds via interim milestones. The Department's Incomplete Determination requested that the GSAs revise the 2022 Plan to include an analysis describing how allowing groundwater levels to drop to interim milestone levels below the minimum thresholds would avoid causing undesirable results for other sustainability indicators. In response and as discussed below, the 2024 Plan provided details of analysis conducted to evaluate potential impacts to the degraded water quality, land subsidence, and depletions of interconnected surface water sustainability indicators from groundwater levels dropping



below minimum thresholds to the 2027 interim milestones, which are the lowest proposed management threshold.

### Degraded Water Quality

The 2024 Plan provided details of analysis conducted to evaluate potential impacts to degraded water quality sustainability indicator from the lowering of groundwater levels below minimum thresholds, where the 2027 interim milestones are set below minimum thresholds.<sup>49</sup> The 2024 Plan describes that groundwater levels at each representative monitoring well were compared to concentrations of the Subbasin's six identified constituents of concern (nitrate, tetrachloroethene (PCE), 1,2,3-Trichloropropane (TCP), arsenic, uranium, and total dissolved solids (TDS)) at the nearest five groundwater ambient monitoring and assessment (GAMA) wells to assess correlation between changes in groundwater elevations in representative monitoring wells and constituent of concern concentrations in monitored wells.<sup>50</sup> The 2024 Plan describes that for each representative monitoring well, a hydrograph of groundwater levels over time was compared to time-concentration plots of the constituents of concern at the five closest GAMA wells. The 2024 Plan states that the results of the analysis showed no clear relationship between constituent of concern concentrations and declining groundwater levels and concludes that the absence of a clear relationship suggests that lowering groundwater levels to the 2027 interim milestone that are below the minimum thresholds should not adversely affect water quality.<sup>51</sup>

The 2024 Plan's analysis is limited to individual representative monitoring wells located throughout the Subbasin<sup>52</sup>, which is an acceptable approach under SGMA, provided there are no contaminant plumes or zones with elevated constituents of concern in the Subbasin that could potentially impair water supplies. However, based on information provided in the 2024 Plan, there appears to be areas in the Subbasin with elevated constituent of concern concentrations with the potential to impact water supplies. For example, the 2024 Plan identifies that salinity may potentially affect water supply wells near the City of Ceres where a 460-foot deep well screened below the Corcoran Clay encountered groundwater with TDS concentrations of approximately 1,200 milligrams per liter (mg/L), but that the source and extent of brackish water in this area are not known.<sup>53</sup> Of potential concern is that the 2024 Plan's analysis does not provide details of how decreases of groundwater levels below minimum thresholds throughout the Subbasin may affect groundwater gradients and flow directions and corresponding migration of constituents of concern. Furthermore, the 2024 Plan acknowledges that the analysis provided to compare the effect of 2027 interim milestones to effects on water quality was limited by the number of GAMA wells in the Subbasin and in some instances the lack of

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<sup>49</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.2.1, pp. 401-403.

<sup>50</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.2.1, p. 402.

<sup>51</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.2.1, p. 403.

<sup>52</sup> Turlock Subbasin 2024 Plan, Figure 7-4, p. 492.

<sup>53</sup> Turlock Subbasin 2024 Plan, Section 4.3.5.3.2, p. 189.

historical groundwater level data.<sup>54</sup> Department staff are concerned because impacts to water quality may not recover in the same manner that groundwater levels can. For example, increased pumping can increase lateral and vertical hydraulic gradients and flow directions which may result in the migration of constituents of concern into a new zone, but even if groundwater gradients and flow direction return to normal, constituents of concern that migrated may adhere to sediments (e.g., PCE) and result in lasting impacts to water quality.

Given the above reasons, Department staff believe that the assessment to correlate changes between groundwater elevations in representative monitoring wells and constituent of concern concentrations in the Subbasin may be lacking; however, at this time, the analysis represents the use of best available data to conclude that the 2027 interim milestones should not affect the degradation of water quality sustainability indicator, as stated in the 2024 GSP.<sup>55</sup> The GSAs have authority to regulate groundwater pumping, which affects hydraulic gradients and groundwater flow. The GSAs can monitor for and influence the migration of groundwater and have the responsibility to prevent unimpacted areas from becoming significantly and unreasonably impacted by constituents of concern.<sup>56</sup> Department staff understand that the GSAs are not responsible for improving degraded water quality conditions that existed before SGMA was enacted. However, the GSAs are required to manage the Subbasin to not exacerbate existing degraded water quality conditions. Department staff recommend the GSAs closely track the degradation of water quality during the implementation of the 2024 GSP, provide detailed reporting of groundwater conditions and undesirable results resulting from degraded water quality in annual reports, and proactively supplement the 2024 Plan as needed if conditions do not progress as expected.

### Land Subsidence

The 2022 Plan proposed to allow groundwater levels to decline below minimum thresholds via the 2027 interim milestones, but did not describe land subsidence potential impacts that may occur. In response, the 2024 Plan provided details of analysis conducted to evaluate whether there may be significant effect on land subsidence as a result of lowering groundwater levels below minimum thresholds, where the 2027 interim milestones were set below minimum thresholds.<sup>57</sup> Although the 2024 Plan does not specifically use the word undesirable results, Department staff interpret that the intent of the analysis was to evaluate whether lowering groundwater levels below minimum thresholds would result in land subsidence undesirable results.

Pertaining to land subsidence, the 2024 Plan states:

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<sup>54</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.2.1, p. 402.

<sup>55</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.2.1, p. 403.

<sup>56</sup> 23 CCR 354.28(c)(4).

<sup>57</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.2.2, p. 403.

“Undesirable results are defined as significant and unreasonable inelastic land subsidence, caused by groundwater extraction and associated water level declines, that adversely affects land use or reduces the viability of the use of critical infrastructure. An undesirable result will occur in the Western Upper Principal Aquifer when 33% of representative monitoring wells exceed the MT [minimum thresholds] in three consecutive Spring monitoring events. An undesirable result will occur in the Western Lower Principal Aquifer when 33% of representative monitoring wells exceed the MT in two consecutive Spring monitoring events. An undesirable result will occur in the Eastern Principal Aquifer when 33% of representative monitoring wells exceed the MT in three consecutive Fall monitoring events.”<sup>58</sup>

The 2024 Plan states that no impacts from inelastic land subsidence are known to occur in the Turlock Subbasin<sup>59</sup> and presents a methodology for minimizing subsidence in the western principal aquifers by using groundwater levels as a proxy for monitoring the land subsidence sustainability indicator.<sup>60</sup> The methodology for the subsidence analysis focuses on representative monitoring wells located within the area of the Corcoran Clay and close to the edge of the Corcoran Clay that have groundwater level 2027 interim milestones set below minimum thresholds.<sup>61</sup>

The analysis conducted was focused on comparing the groundwater level minimum thresholds and the 2027 interim milestones to the elevations of the top and bottom of the Corcoran Clay for seven wells within the western principal aquifers and a few wells within the Eastern Principal Aquifer that are close to the edge of the Corcoran Clay. The 2024 Plan describes that the results of the analysis indicate that lowering groundwater elevations to the 2027 interim milestones that were set below minimum thresholds would not result in groundwater elevation declines below the top of the Corcoran Clay and based on the results of the analysis, the 2024 Plan concludes that it is unlikely that groundwater elevations at the 2027 interim milestones set below the minimum thresholds will have an impact on land subsidence.<sup>62</sup>

Although the 2024 Plan’s premise that maintaining interim milestones above top of the Corcoran Clay would not result in land subsidence undesirable results may be plausible, the 2024 Plan does not provide supporting evidence that may be available (such as land subsidence data, technical studies, or site-specific data that supports the 2024 Plan’s contention). Also, the 2024 Plan does not clarify how the analysis relates to the land subsidence undesirable results quantitative criteria. However, at this time, the analysis represents the use of best available data to conclude that the 2027 interim milestones should not affect the land subsidence sustainability indicator, as stated in the 2024 GSP. Department staff recommend the GSAs closely track the rate and extent of land

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<sup>58</sup> Turlock Subbasin 2024 Plan, Table 6-17, p. 438.

<sup>59</sup> Turlock Subbasin 2024 Plan, Section 4.3.6, p. 195.

<sup>60</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.2.2, pp. 403-404.

<sup>61</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.2.2, p. 404.

<sup>62</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.2.2, p. 406.

subsidence during the implementation of the 2024 GSP, provide detailed reporting of groundwater conditions and any undesirable results resulting from land subsidence in annual reports, and proactively supplement the 2024 Plan as needed if conditions do not progress as expected.

### Interconnected Surface Waters

The 2024 Plan provided details of analysis conducted to evaluate whether there would be significant effects on the beneficial uses of interconnected surface waters as a result of lowering groundwater levels below minimum thresholds, where the 2027 interim milestones are set below minimum thresholds.<sup>63</sup> Although the 2024 Plan does not specifically use the word undesirable results, Department staff interpret that the intent of the analysis was to evaluate whether lowering groundwater levels below minimum thresholds would result in undesirable results to beneficial uses of interconnected surface waters. SGMA defines undesirable results for depletions of interconnected surface water as effects caused by groundwater conditions leading to depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.<sup>64</sup>

The 2024 Plan describes that the analysis focused on evaluating representative monitoring wells of the interconnected surface water monitoring network that have their 2027 interim milestones set below their minimum thresholds. In total, seven representative monitoring wells were evaluated, three along the Tuolumne River (Ceres 36, ETSGSA- 01 and ETSGSA-02) and four along the Merced River (ETSGSA-14, ETSGSA-17, ETSGSA-21, and ETSGSA-23), while representative monitoring wells along the San Joaquin River were not evaluated as none of the representative monitoring wells in proximity to the river have 2027 interim milestones set below the minimum thresholds.<sup>65</sup> The analysis included a comparison of the minimum threshold and the 2027 interim milestone elevations at the representative monitoring wells to the elevation of the nearest stream node invert elevation (based on the C2VSim TM model) that represents the base of the stream channel.

The results of the analysis detail that for all of the representative monitoring wells evaluated, the minimum thresholds and 2027 interim milestone groundwater elevations are either both above or both below the nearest stream node invert elevation, with no representative monitoring wells having the minimum threshold above the nearest stream node invert elevation and the interim milestone below the nearest stream node elevation.<sup>66</sup> The 2024 Plan does not directly state whether the lowering of groundwater elevations from minimum thresholds above the nearest stream node invert elevation to interim milestones below the nearest stream node elevation would be considered an undesirable result for depletion of interconnected surface water. However, the 2024

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<sup>63</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.2.3, p. 406.

<sup>64</sup> Water Code § 10721(x)(6).

<sup>65</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.2.3, p. 407.

<sup>66</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.2.3, p. 407.

Plan’s definition of undesirable results states: “Undesirable results for interconnected surface water are defined as significant and unreasonable adverse impacts on the beneficial uses of surface water caused by groundwater extractions. An undesirable result will occur on one of the three monitored rivers when 50% of the representative monitoring sites for that river exceed the MT [minimum thresholds] in two consecutive Fall monitoring events.” The 2024 GSP concludes “that it is less likely that lowering groundwater levels from the MT [minimum threshold] to the 2027 IM [interim milestone] will result in groundwater levels declining from above the base of the river channel to below the base of the river channel” and that it is “unclear if [this change] has the potential to cause river disconnection.”<sup>67</sup> The 2024 GSP acknowledges that there are data gaps that will need to be filled.<sup>68</sup> Department staff recommend the GSAs work to fill the identified data gaps, closely track effects on interconnected surface water during the implementation of the 2024 GSP, provide detailed reporting of groundwater conditions and any undesirable results resulting from depletions of interconnected surface water in annual reports, and proactively supplement the 2024 Plan as needed if conditions do not progress as expected.

#### **4.1.3 Conclusion**

Despite the recommended corrective action provided for the 2024 Plan, Department staff believe that at this time the GSAs have sufficiently addressed Deficiency 1. The 2024 Plan included an analysis by principal aquifer of all water wells with construction data in the Subbasin that may go dry at the interim milestones that were set below minimum thresholds and discussed limitations of the analysis. Additionally, the 2024 Plan provides details demonstrating commitment to the implementation of a well mitigation program. Finally, the 2024 Plan provides analysis of potential effects of temporary lowering of groundwater level elevations below minimum thresholds on degraded water quality, land subsidence, and depletions of interconnected surface water sustainability indicators. Although Department staff consider information in the 2024 Plan sufficient to address Deficiency 1 at this time, the GSAs should address Department staff recommendations in future annual reports and by the next periodic evaluation of the Plan.

## **4.2 DEFICIENCY 2. THE GSP DOES NOT INCLUDE SUFFICIENT DETAILS OF PROJECTS AND MANAGEMENT ACTIONS TO MITIGATE OVERDRAFT IN THE SUBBASIN OR PROVIDE A FEASIBLE PATH TO ACHIEVE SUSTAINABILITY.**

### **4.2.1 Corrective Action 2**

In the Department’s Incomplete Determination, the Department defined the following corrective actions related to the 2022 Plan’s lack of details of projects and management

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<sup>67</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.2.3, p. 406 and p. 409.

<sup>68</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.2.3, p. 409.

actions to halt groundwater level declines and address overdraft in the Subbasin through a collection of feasible projects and management actions to raise groundwater levels.

- a) The GSAs should revise the GSP to include a reasonable means to arrest groundwater level declines and stop overdraft that is continuing to occur in the Subbasin. Specifically, the GSAs should describe feasible, effective proposed projects and management actions that are commensurate with the level of understanding of groundwater conditions in the Subbasin and provide sufficient details for Department staff to be able to clearly evaluate how the Plan's projects and management actions will ensure achieving the sustainability goal in the Subbasin. For projects and management actions that involve supply augmentation or groundwater recharge, the GSP should clarify whether the source of water, which is identified by the Plan to be predominantly from the Tuolumne River, would reduce surface water supply in other parts of the Subbasin.
- b) The GSAs should revise the GSP to include a feasible collection of projects and management actions to raise groundwater levels to avoid undesirable results that would occur as a result of groundwater levels dropping below minimum thresholds towards the proposed interim milestones levels.

## 4.2.2 Evaluation of Resubmitted Plan

### 4.2.2.1 Corrective Action 2a & 2b – Details of feasible projects and management actions to mitigate overdraft lacking

In response to the incomplete determination, the 2024 Plan provided additional details of proposed projects and management actions. Due to the similarity of content provided by the 2024 Plan for projects and management actions pertaining to Corrective Actions 2a and 2b, Department staff have provided content that evaluate Corrective Actions 2a and 2b together.

GSP Regulations require that a GSP include a description of the projects and management actions that will achieve the sustainability goal for the basin and the quantification of demand reduction or other methods for the mitigation of overdraft.<sup>69</sup> As part of Department's evaluation, staff assess whether a GSP provides a reasonable assessment of overdraft conditions and includes reasonable means to mitigate overdraft, if present.<sup>70</sup> The 2022 Plan not only recognized that the Subbasin has had historical groundwater overdraft of 63,900 acre-feet per year (AFY) based on water years 1991-2015,<sup>71</sup> but additionally proposed to operate the Subbasin at groundwater levels below minimum thresholds during a portion of the 20-year implementation period. Although the 2022 Plan provided information for proposed projects and a description of a framework for management actions, both projects and management actions lacked details describing

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<sup>69</sup> 23 CCR §§ 354.44 and 354.44(b)(2).

<sup>70</sup> 23 CCR § 355.4(b)(6).

<sup>71</sup> Turlock Subbasin 2022 Plan, Table 5-17, p. 321.

how the GSAs would halt existing overdraft and ultimately raise groundwater levels back to minimum thresholds from proposed lower interim milestone levels.

Therefore, the Department’s Incomplete Determination requested the GSAs revise the 2022 Plan to include a suite of projects and management actions sufficient to not only arrest current groundwater level declines, but also to raise groundwater levels to offset and mitigate the temporary removal of groundwater in storage that would occur during the implementation period when groundwater levels were below the minimum threshold levels. The 2022 Plan included details for 11 groundwater recharge/supply augmentation projects already in development or planned for implementation (Group 1 and 2 projects) and the 2024 Plan has expanded this initiative by increasing the total number of projects from 11 to 18.<sup>72</sup> The 2024 Plan provides updated estimates of the volume of water that would be contributed for the proposed 18 projects and details of the source of water, which is predominantly from the Tuolumne River.<sup>73</sup> In some instances, the 2024 Plan reports volumetric benefits during full allocation years instead of estimated average annual contribution from the Tuolumne River.<sup>74</sup> In some projects, the volumetric benefit consists of various water sources such as the Dianne Storm Basin project consisting of stormwater and water from the Tuolumne River, but there is no clarification estimating the volume of water that would be provided on average from stormwater or the Tuolumne River.<sup>75</sup>

The 2022 Plan noted that the source of water intended for most of the supply augmentation and groundwater recharge projects was predominantly from the Tuolumne River but did not address whether use of this water would reduce surface water supply in other parts of the Subbasin. The Department’s Incomplete Determination stated that for projects and management actions that involve supply augmentation or groundwater recharge, the GSP should clarify whether the source of water, which is identified by the Plan to be predominantly from the Tuolumne River, would reduce surface water supply in other parts of the Subbasin. The 2024 Plan does not directly describe whether surface water use from the Tuolumne River would reduce surface water supply in other parts of the Subbasin, which is important to prevent double counting of available water and improperly accounting available groundwater in the Subbasin. Instead, the 2024 Plan states that the “Tuolumne River contains approximately 1,500,000 acre-feet of surface water in wet water years and 620,000 acre-feet in above normal water years, producing more water than can be stored or beneficially used by existing customers.”<sup>76</sup> Additionally, the 2024 Plan states that surface water supply for the Regional Surface Water Supply Project would be up to 30,000 AFY, or approximately two to five percent of “available surface water” from the Tuolumne River.<sup>77</sup> Based on this information provided by the 2024 Plan, it appears to Department staff that the 2024 Plan estimates that surface water

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<sup>72</sup> Turlock Subbasin 2024 Plan, Table 8-4, p. 545.

<sup>73</sup> Turlock Subbasin 2024 Plan, Section 8.3, pp. 549-619.

<sup>74</sup> Turlock Subbasin 2024 Plan, Section 8.3.1.1.4, p. 555.

<sup>75</sup> Turlock Subbasin 2024 Plan, Section 8.3.1.2, p. 559.

<sup>76</sup> Turlock Subbasin 2024 Plan, Section 8.3.1.1.6, p. 557.

<sup>77</sup> Turlock Subbasin 2024 Plan, Section 8.3.1.1.6, pp. 556-557.

available from the Tuolumne River would be up to 600,000 AFY; however, the 2024 Plan does not directly state the quantity of the surface water from the Tuolumne River on average would be available for use for the GSAs' proposed 18 projects. Therefore, to better assess the quantification of mitigation for overdraft, Department staff believe clarification is needed regarding the average annual volume of surface water from the Tuolumne River potentially available for the Subbasin and the estimated amount that would be supplied on average from the Tuolumne River for the proposed 18 projects (see [Recommended Corrective Action 2a](#)).

Although the 2024 Plan provides substantially more credible information that allows assessment of projects that are under the development, the 2024 Plan states that projects alone are not expected to reduce the groundwater deficit sufficiently to achieve the Subbasin's sustainability goal and will be supplemented by demand reduction management actions.<sup>78</sup> The 2024 Plan further states that modeling analysis results indicate that a 25 percent reduction in groundwater use within the Subbasin may be necessary after Group 1 and 2 projects are implemented.<sup>79</sup> The extensive amount of groundwater use reduction that is projected by the 2024 Plan underscores the importance of management actions for the Subbasin.

The 2024 Plan identifies 11 management actions organized into three categories that are in development or conceptual:<sup>80</sup>

- Demand reduction strategies
- Groundwater use regulation and fee program
- Well mitigation (see [Section 4.1.2.2](#) above)

Department's staff review of the 2024 Plan's three categories of management actions is primarily focused on management actions that are in development, instead of "conceptual management actions" that have a great deal of uncertainty due to limited information.

### *Demand Reduction Strategies*

The 2024 Plan proposes demand reduction strategies only for ETSGSA, with proposed demand reduction strategies including: 1) the Multi-benefit Land Repurposing Program (MLRP) and 2) Land Retirement.

The MLRP management action intends to repurpose 21,000 acres by incentivizing landowners to repurpose portions of their irrigated acreage to non-irrigated uses (e.g., orchard swale re-wilding, agricultural buffer zones, rotational fallowing, and miscellaneous repurposing) that provide benefits such as recharge, habitat, flood control, and community benefits.<sup>81</sup> Based on C2VSim<sup>TM</sup> model simulations, implementation of

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<sup>78</sup> Turlock Subbasin 2024 Plan, Section 8.1, p. 497.

<sup>79</sup> Turlock Subbasin 2024 Plan, Section 8.1, p. 497.

<sup>80</sup> Turlock Subbasin 2024 Plan, Table 8-1, p. 500.

<sup>81</sup> Turlock Subbasin 2024 Plan, Section 8.1.1.1, p. 501.



MLRP is anticipated to result in 46,400 AFY of demand reduction.<sup>82</sup> ETSGSA will initiate implementation of MLRP using \$8.89 million in grant funding from the California Department of Conservation, with full implementation of MLRP by 2037.<sup>83</sup> Estimated costs for implementation of MLRP are still being evaluated by the GSAs and long-term operational costs will be provided by the Groundwater Use Fee Program that is being developed.

The 2024 Plan states that the Land Retirement Program would establish procedures with financial incentives for a targeted land buyout and fallowing or transition to non-irrigated farming to provide a more rapid and targeted action than MLRP.<sup>84</sup> The 2024 Plan does not provide details of the amount of demand reduction that Land Retirement would provide, but states that volumetric benefits of land retirement would be provided in annual reports and periodic evaluations.<sup>85</sup> The 2024 Plan states that initially the Land Retirement management action is budgeted at \$200,000 for near-term implementation activities by ETSGSA in Fiscal Year 2024/2025 and long-term funding being evaluated as part of a fee study under a Proposition 218 process with program costs escalating significantly, reaching an estimated \$2,500,000 per year.<sup>86</sup>

The GSAs appear to have made efforts toward implementing demand management strategies; however, implementation is in its early stages and the GSAs may face challenges to implement these strategies. Demand reduction of 46,400 AFY is a challenging task, while funding to successfully implement the program has not yet been determined. Because MLRP is an innovative and relatively new strategy, there is limited information available to support what elements including funding are required for successful implementation. Department staff believe that these demand reduction strategies will require time to implement, and the Department's evaluation of successful implementation will need to occur during future annual reports and periodic evaluations. Therefore, Department staff recommend the GSAs develop, implement, and provide updates on the adaptive management action level for each of the management actions and report progress and challenges on projects and management actions in annual reports and the periodic evaluation of the Plan (see [Recommended Corrective Action 2b](#)).

#### Groundwater Use Regulation and Fee Program

Groundwater use regulation and fee program are only in development by ETSGSA and include: 1) Groundwater use allocation and regulation, 2) groundwater use fee program, 3) groundwater accounting platform, and 4) groundwater use rules and regulations.<sup>87</sup>

Groundwater use allocation and regulation program is a new management action proposed by the 2024 Plan that establishes rules and regulations for measurement,

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<sup>82</sup> Turlock Subbasin 2024 Plan, Table 8-2, p. 505.

<sup>83</sup> Turlock Subbasin 2024 Plan, Section 8.1.1.1.5, p. 505.

<sup>84</sup> Turlock Subbasin 2024 Plan, Section 8.1.1.2, p. 509.

<sup>85</sup> Turlock Subbasin 2024 Plan, Section 8.1.1.2.4, p. 511.

<sup>86</sup> Turlock Subbasin 2024 Plan, Section 8.1.1.2.8, p. 511.

<sup>87</sup> Turlock Subbasin 2024 Plan, Table 8-1, p. 500.

tracking, and management of groundwater allocations and use reduction targets for irrigated parcels within ETSGSA.<sup>88</sup> Groundwater use reduction targets are set with progressive decreases in allocated groundwater use with initial groundwater use reduction targets set at 10% for 2025 through 2027, 20% from 2028 through 2032, 30% from 2033 through 2037, and 40% from 2038 through 2042 with adjustments based on monitoring data or if sustainable management criteria are not being met.<sup>89</sup> The 2024 Plan also proposes a groundwater use fee program that will implement an escalating fee structure based on the allocation and reduction targets and anticipates fee rates will be adopted early 2025.<sup>90</sup> The groundwater accounting platform to facilitate implementation of groundwater use allocation and groundwater use fee program is under development and anticipated to be implemented early 2025.<sup>91</sup> Because groundwater use allocation and the regulation program are new management action strategies that will require time to implement, the Department's evaluation of successful implementation will need to occur during future annual reports and periodic evaluations.

### Modeling results – Rise in Groundwater levels

The Department's Incomplete Determination also directed the GSAs that the GSP be revised to include a feasible collection of projects and management actions to raise groundwater levels to avoid undesirable results that would occur as a result of groundwater levels dropping below minimum thresholds towards the proposed interim milestones levels. As described above, the 2024 Plan provided updated information regarding projects and management actions proposed to arrest overdraft and raise groundwater levels to avoid undesirable results. The 2024 Plan proposed 18 projects, with Group 1 projects already in development and most Group 2 projects anticipated to be completed by 2026.<sup>92</sup> The 2024 Plan also proposed three management actions aimed at reducing demand and enhancing groundwater recharge (multi-benefit land repurposing, land retirement, and groundwater use allocation and regulation). The 2024 Plan describes that to evaluate the effects of projects and management actions in meeting the sustainability goal for the Subbasin, the 18 proposed Group 1 and 2 projects were analyzed using C2VSim<sup>TM</sup> groundwater flow model.<sup>93</sup> The analysis included five modeling scenarios with scenarios 1 through 3 consisting of a mix of some of the 18 proposed projects and demand reduction and scenario 4 and 5 consisting of the majority of projects implemented, combined with implementation of MLRP with no demand reduction.<sup>94</sup> In baseline modeling conditions, the Subbasin is anticipated to be in overdraft during various portions of 50 year simulation period, while in all the five modeling scenarios consisting of various combination of projects and management actions,

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<sup>88</sup> Turlock Subbasin 2024 Plan, Section 8.1.2.1, p. 523.

<sup>89</sup> Turlock Subbasin 2024 Plan, Section 8.1.2.1, p. 524.

<sup>90</sup> Turlock Subbasin 2024 Plan, Section 8.1.2.2, p. 527-528.

<sup>91</sup> Turlock Subbasin 2024 Plan, Section 8.1.2.3, pp. 532-533.

<sup>92</sup> Turlock Subbasin 2024 Plan, Table 8-4, p. 545.

<sup>93</sup> Turlock Subbasin 2024 Plan, Section 8.5.1, p. 639.

<sup>94</sup> Turlock Subbasin 2024 Plan, Table 8-25, p. 640.

groundwater levels are projected to rise.<sup>95</sup> Department staff believe the results of modeling show a potential path that with successful implementation of a combination of projects and management actions, overdraft can be halted and groundwater levels can rise. However, Department staff will rely on empirical data provided in annual reports and periodic evaluations that demonstrates successful progress toward the achievement of the Subbasin's sustainability goal.

### Adaptive Management

The 2024 Plan details that projects, demand management, and groundwater use regulations would be implemented under an adaptive management framework that utilizes three escalating action levels (Action 1 through 3).<sup>96</sup> The adaptive management framework would be implemented using a three step process: 1) comparing monitoring data to sustainability indicator threshold triggers to determine action level, 2) preparing a course correction, priority action or intervention plan based on program implementation performance and sustainability indicator performance, and 3) identifying appropriate actions for inclusion in a course correction, priority action or intervention plan. The performance of the groundwater allocation and fee program and groundwater demand reduction would be backstopped by corrective actions under an adaptive management program implemented based on monitoring data.<sup>97</sup>

Department staff are encouraged by GSAs' efforts to develop projects and management actions and developing an adaptive management framework. Department staff believe that implementation of demand management along with a groundwater use allocation program will be an important tool for the GSAs to complement projects to halt overdraft and help raise groundwater levels. The Department staff are also encouraged with modeling results detailed in the 2024 Plan supporting the premise that with successful implementation of projects and management actions, groundwater levels are anticipated to rise in the Subbasin. However, at this time, much of the information presented pertaining to management actions and the adaptive management framework has not yet been developed and Department staff will look to detailed updates in annual reports and periodic evaluations to continue to evaluate the effectiveness of the 2024 Plan's approach.

### **4.2.3 Conclusion**

The 2022 Plan provided limited information on projects and no commitment to management actions. In contrast, the 2024 Plan provided additional details for projects including source of water for projects and details of initial efforts to implement management actions. Although projects and management actions are not fully implemented, Department staff believe the 2024 Plan demonstrates substantial progress

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<sup>95</sup> Turlock Subbasin 2024 Plan, Figure 8-13, p. 649.

<sup>96</sup> Turlock Subbasin 2024 Plan, Figures 8-1 and 8-2, pp. 507-508.

<sup>97</sup> Turlock Subbasin 2024 Plan, Appendix K, p. 1354.

and considers the information sufficient to address Deficiency 2 at this time but will continue to track how the GSAs address Department staff recommendations.

## 5 PLAN EVALUATION

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

The Department staff’s evaluation of the likelihood of the 2024 Plan to attain the sustainability goal for the Subbasin is provided below. Department staff consider the information presented in the 2024 Plan to satisfy the general requirements of the GSP Regulations.

### 5.1 ADMINISTRATIVE INFORMATION

The GSP Regulations require each Plan to include administrative information identifying the submitting Agency, its decision-making process, and its legal authority;<sup>98</sup> a description of the Plan area and identification of beneficial uses and users in the Plan area;<sup>99</sup> and a description of the ability of the submitting Agency to develop and implement a Plan for that area.<sup>100</sup>

The 2024 Plan describes the GSAs, discusses their decision-making process, and provides their legal authority. The 2024 Plan describes that in 2017, WTSGSA and ETSGSA were formed under a joint-powers agreement (JPA)<sup>101</sup> and provides a copy of the JPA for each GSA in Appendix B.<sup>102</sup> The WTSGSA is governed by a Board of Directors consisting of one Board member from each of the ten member agencies, and ETSGSA is also governed by a Board of Directors with one Board member from each of the five member agencies.<sup>103</sup> The 2024 Plan describes that both GSAs formed technical advisory committees and all Board and TAC meetings are open to the public.<sup>104</sup>

The 2024 GSP provides a description of the plan area. The Turlock Subbasin (DWR Subbasin No. 5-022.03) covers 348,160 acres and is within the larger San Joaquin Valley Groundwater Basin (Figure 1). The Subbasin is predominantly agricultural. As of 2017, the Subbasin consists of approximately 66 percent irrigated agriculture, 27 percent

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<sup>98</sup> 23 CCR § 354.6 *et seq.*

<sup>99</sup> 23 CCR § 354.8 *et seq.*

<sup>100</sup> 23 CCR § 354.6(e).

<sup>101</sup> Turlock Subbasin 2024 Plan, Section 1.1, pp. 59-60.

<sup>102</sup> Turlock Subbasin 2024 Plan, Appendix B, pp. 698-771.

<sup>103</sup> Turlock Subbasin 2024 Plan, Section 1.1, pp. 59-60.

<sup>104</sup> Turlock Subbasin 2024 Plan, Section 1.1, pp. 59-60.

undeveloped, and 7 percent urban.<sup>105</sup> Most of the undeveloped land is within the eastern portion of the Subbasin.

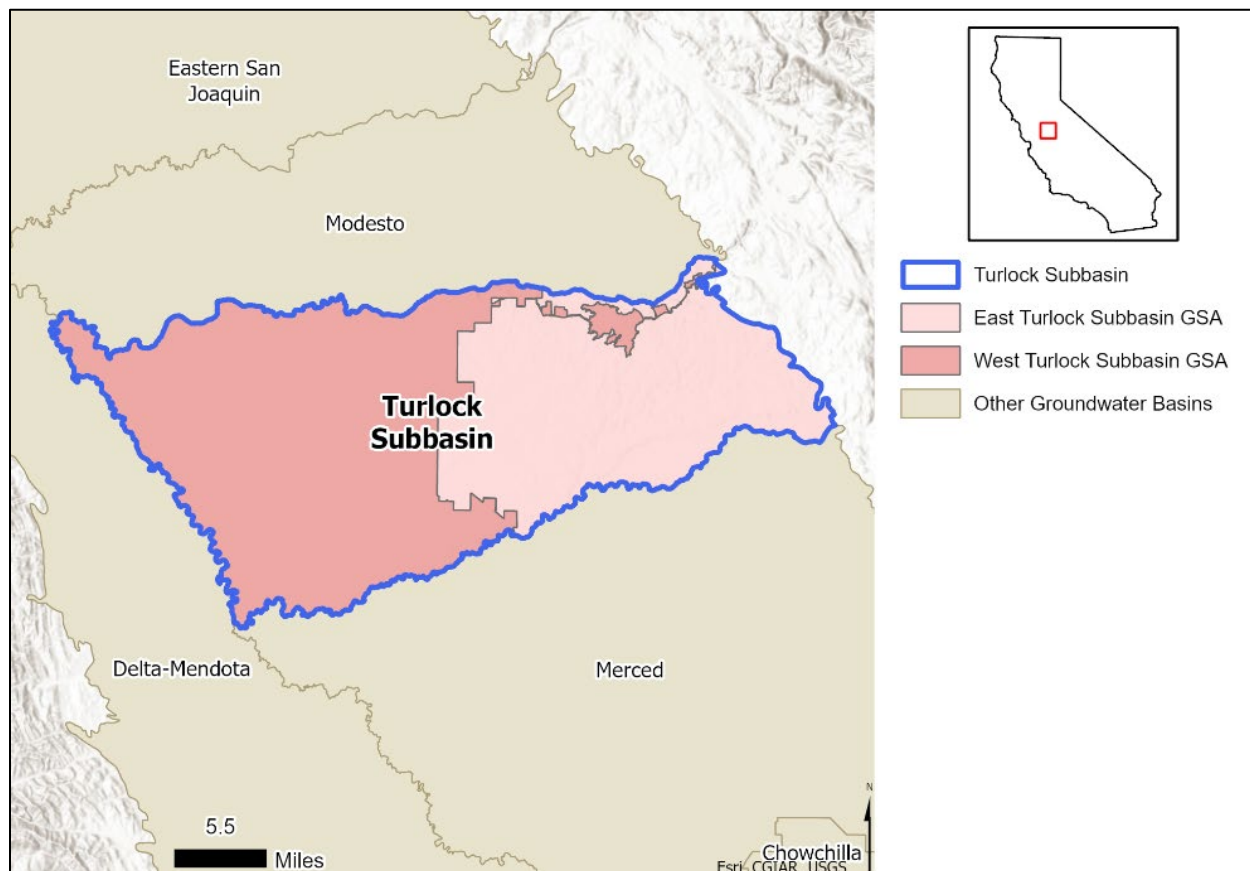


Figure 1: Turlock Subbasin Location Map.

The 2024 Plan’s identified beneficial uses and users for the Subbasin include: water supply providers and their customers, private agricultural pumpers, private rural domestic well pumpers, small community water systems, individual groundwater users, disadvantaged communities, organized agricultural interest, environmental interest, local government interest, tribal interest, community organizations, education institutions, resource conservation districts, flood control districts, natural resources conservation service and other interested parties.<sup>106</sup> Groundwater use in the Subbasin is primarily for agricultural irrigation (approximately 86%), followed by municipal (9%), and domestic potable water supply (5%).<sup>107</sup> In an effort to reach out to interested persons and entities about the GSAs proposed groundwater management activities and GSP implementation for the Subbasin, the GSAs developed a Communications Plan.<sup>108</sup> The 2024 Plan further describes that an interested parties list was developed during development and implementation of the GSP and that interested member of the public can also be added

<sup>105</sup> Turlock Subbasin 2024 Plan, Section 2.2, p. 69.

<sup>106</sup> Turlock Subbasin 2024 Plan, Section 3.1, p. 129.

<sup>107</sup> Turlock Subbasin 2024 Plan, Table 2-1, p. 72.

<sup>108</sup> Turlock Subbasin 2024 Plan, Appendix F1, p. 932.

to the list by signing up at [turlockgroundwater.org/get-involved](http://turlockgroundwater.org/get-involved) in an effort to allow interested parties to reach out to GSAs.<sup>109</sup>

The 2024 Plan describes that groundwater and surface water from the Tuolumne River and Merced River are the primary sources of water within the Subbasin and that the Tuolumne River provides the largest supply of surface water to the Subbasin, primarily for irrigated agriculture.<sup>110</sup> The 2024 Plan also details that surface water is the main source of agricultural water in the western portion of the Subbasin; but in the eastern portion of the Subbasin, groundwater is the main source of water for agricultural irrigation.

The 2024 Plan contains description of water resources management programs such as those for groundwater, urban, agricultural, and a water district. The 2024 Plan acknowledges that these existing monitoring and management programs may be incorporated per regulation into the GSP.<sup>111</sup> In terms of possible limitations to operational flexibility in the Subbasin, the 2024 Plan states that, although general plans accommodate a growing population and resulting increased water demands, most acknowledge the need for sustainable groundwater management. The 2024 Plan also describes that many planning agencies are members of not only the Turlock Subbasin GSAs but also neighboring basin GSAs and that this crossover affiliation presumably will lead to a high level of coordination between land use planning and the GSP process and enhance, rather than limit, operational flexibility.<sup>112</sup>

The 2024 Plan provides estimates of costs for GSP implementation.<sup>113</sup> Administrative costs are estimated to be approximately \$150,000 to \$225,000 per year for each GSA with annual costs for on-going activities for GSP implementation to be in the range of \$330,000 per year to \$585,000 per year. One-time implementation costs, such as the planned improvements to the existing monitoring network, is estimated to be approximately \$1.5 to \$2.2 million, to be expended over the first five years of GSP implementation. The 2024 Plan explains that the GSA operation costs are funded through contributions of GSA member agencies which are ultimately funded through customer fees or other public funds. Both GSAs intend to pursue grants and loans to help pay for project costs.<sup>114</sup> Department staff believe the information provided by the 2024 Plan related to the GSAs' authority and financial plan to implement the 2024 GSP is sufficient for now, considering that it is subject to change based on future local level decisions and, as a result, Department staff will need to further evaluate progress in future annual reports and periodic evaluations.

The administrative information section included in the 2024 GSP is substantially compliant with the requirements outlined in the GSP Regulations. Department staff

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<sup>109</sup> Turlock Subbasin 2024 Plan, Section 3.1, p. 129.

<sup>110</sup> Turlock Subbasin 2024 Plan, Section 2.3, pp. 69-70.

<sup>111</sup> Turlock Subbasin 2024 Plan, Section 2.5, pp. 84-92.

<sup>112</sup> Turlock Subbasin 2024 Plan, Section 2.6.3, p. 110.

<sup>113</sup> Turlock Subbasin 2024 Plan, Section 1.3.1, p. 63.

<sup>114</sup> Turlock Subbasin 2024 Plan, Section 1.3.2, p. 64.

consider the information presented in the 2024 Plan to satisfy the general requirements of the GSP Regulations for administrative information.<sup>115</sup>

## 5.2 BASIN SETTING

GSP Regulations require information about the physical setting and characteristics of the basin and current conditions of the basin, including a hydrogeologic conceptual model; a description of historical and current groundwater conditions; and a water budget accounting for total annual volume of groundwater and surface water entering and leaving the basin, including historical, current, and projected water budget conditions.<sup>116</sup>

### 5.2.1 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.<sup>117</sup> The GSP Regulations require a descriptive hydrogeologic conceptual model that includes a written description of geologic conditions, supported by cross sections and maps,<sup>118</sup> and includes a description of basin boundaries and the bottom of the basin,<sup>119</sup> principal aquifers and aquitards,<sup>120</sup> and data gaps.<sup>121</sup>

The 2024 Plan describes the regional and structural setting of the Turlock Subbasin as situated within the northern Sierran block,<sup>122</sup> a relatively stable structural region that extends beginning from the Stockton Arch north of the Subbasin to the San Joaquin River south of the Subbasin. The 2024 Plan also details that the Subbasin is in the northeastern San Joaquin Valley, a large northwest-trending structural trough containing marine and continental sediments overlying consolidated sedimentary units and basement rock of the Sierra Nevada.<sup>123</sup>

The 2024 Plan details that the Subbasin's lateral boundaries are defined by surficial features: To the north by the Tuolumne River, to the west by the San Joaquin River, to the south by the Merced River, and to the east by the contact of the Subbasin sedimentary

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<sup>115</sup> 23 CCR §§ 354.2 et seq.

<sup>116</sup> 23 CCR § 354.12 et seq.

<sup>117</sup> DWR Best Management Practices for the Sustainable Management of Groundwater: Hydrogeologic Conceptual Model, December 2016: [https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-3-Hydrogeologic-Conceptual-Model\\_ay\\_19.pdf](https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-3-Hydrogeologic-Conceptual-Model_ay_19.pdf).

<sup>118</sup> 23 CCR §§ 354.14 (a), 354.14 (c).

<sup>119</sup> 23 CCR §§ 354.14 (b)(2-3).

<sup>120</sup> 23 CCR § 354.14 (b)(4) et seq.

<sup>121</sup> 23 CCR § 354.14 (b)(5).

<sup>122</sup> Bartow J. A. (1991). *The Cenozoic Evolution of the San Joaquin Valley, California*. U.S. Geological Survey Professional Paper 1501.

<sup>123</sup> Turlock Subbasin 2024 Plan, Section 4.2.1, pp. 152-153.



deposits with the crystalline basement rocks of the Sierra Nevada.<sup>124</sup> The 2024 Plan also describes that rivers influence groundwater conditions by serving as hydrogeologic groundwater divides for unconfined aquifers.<sup>125</sup> The 2024 Plan states that although structural faulting is present in the eastern portion of the Subbasin, data suggests that the vertical offset of the faulting does not create a lateral boundary barrier to groundwater flow.<sup>126</sup>

That 2024 Plan explains that because some deeper marine deposited stratigraphic units such as the lone Formation have distinct zones of low and high salinity water, the base of freshwater rather than stratigraphy is used to define the bottom of the Subbasin.<sup>127</sup> Therefore, the bottom of the basin is based predominantly on a 1973 study<sup>128</sup> that mapped the base of fresh water across the San Joaquin Valley using a specific conductance value of 3,000 micromhos per centimeter (total dissolved solids 2,000-2,880 milligrams per liter) as the cut-off for defining fresh water; however, the 2024 Plan describes that although the study was detailed in other parts of the San Joaquin Valley, for the Turlock Subbasin there was only one data point near the city of Hilmar (southwestern corner of the Subbasin) that could be used to determine the base of freshwater. The 2024 Plan further describes that data from the 1973 study was incorporated into the Department's California Central Valley Groundwater-Surface Water Simulation model (commonly known as C2VSim) that provides base of fresh water elevation contours over the entire Subbasin, which the 2024 Plan uses as a tentative basis for the bottom of the basin determination.<sup>129</sup> The 2024 Plan identified the limited data to support the basin bottom determination as a data gap of the hydrogeologic conceptual model, but only proposed to evaluate delineation of the base of fresh water as new wells are drilled.<sup>130</sup> Department staff consider the lack of sufficient information to define the bottom of the Subbasin to be data gaps that warrant further study to reduce uncertainty in the hydrogeologic conceptual model and improve groundwater management (see [Recommended Corrective Action 3](#)).

Consistent with adjacent subbasins to the north (Modesto) and south (Merced), the 2024 Plan identifies three principal aquifers: Western Upper Principal Aquifer, Western Lower Principal Aquifer, and the Eastern Principal Aquifer.<sup>131</sup> The 2024 Plan includes sufficiently detailed cross-sections that display the major stratigraphic and structural features in the Subbasin pertaining to the principal aquifers including the location and extent of the regionally extensive Corcoran Clay. In particular, the Subbasin's stratigraphy is thoroughly depicted in cross section A1-A4, which extends southwest to northeast along

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<sup>124</sup> Turlock Subbasin 2024 Plan, Section 4.2.3.1, pp. 158-159.

<sup>125</sup> Turlock Subbasin 2024 Plan, Section 4.2.3.1, p. 158.

<sup>126</sup> Turlock Subbasin 2024 Plan, Section 4.2.4.3, p. 172.

<sup>127</sup> Turlock Subbasin 2024 Plan, Section 4.2.3.2, p. 159.

<sup>128</sup> Page, R. W. (1973). *Base of Fresh Ground Water (approximately 3,000 micromhos) in the San Joaquin Valley, California*. Hydrologic Atlas 489.

<sup>129</sup> Turlock Subbasin 2024 Plan, Section 4.2.3.2, pp. 159-160.

<sup>130</sup> Turlock Subbasin 2024 Plan, Section 4.4, p. 206.

<sup>131</sup> Turlock Subbasin 2024 Plan, Section 4.2.4, p. 162.

the axis of the entire Subbasin and cross sections B-B', C-C', D-D', and E-E' which traverse north to south across the Subbasin and are oriented perpendicular to cross sections A1-A4.<sup>132</sup>

The 2024 Plan describes that the Western Upper Principal Aquifer is separated from the Western Lower Principal Aquifer by the Corcoran Clay, which acts an aquitard, while the Eastern Principal Aquifer is east of the extent of the Corcoran Clay.<sup>133</sup> The 2024 Plan also details that the Western Upper Principal Aquifer has unconfined groundwater conditions and is composed of Plio-Pleistocene- to Holocene-age alluvial sediments of the Modesto, Riverbank, Turlock Lake formations, and younger alluvium, while the Lower Principal Aquifer (identified as having confined groundwater conditions) is composed of sediments from the Turlock Lake Formation and underlying Mehrten Formation. The 2024 Plan describes that the Eastern Principal Aquifer consists of the shallower unconsolidated sedimentary units to the deeper formations including the extensive Mehrten Formation. The 2024 Plan also states that the Eastern Principal Aquifer is presumed to become semi-confined with depth based on previous studies, and that the hydraulic connection between the Mehrten Formation and overlying deposits is not well understood. However, the 2024 Plan explains that although there is limited understanding of hydraulic connection, many wells are screened in both the Mehrten Formation and the overlying younger sedimentary deposits and that there is likely sufficient hydraulic connection to consider them as one principal aquifer, the Eastern Principal Aquifer.

The 2024 Plan describes that the primary use of groundwater in the Western Upper Principal Aquifer is domestic and irrigation supply while in the Lower Principal Aquifer the primary use is for irrigation and municipal supply. Wells in the eastern portion of Subbasin (i.e., Eastern Principal Aquifer) are primarily used for irrigation and generally deeper than wells in the west because of greater groundwater depths.<sup>134</sup>

The hydrogeologic conceptual model section included in the 2024 GSP is considered substantially compliant with the requirements outlined in the GSP Regulations at this time.<sup>135</sup> Department staff have provided recommended corrective actions for this section that the GSAs should consider and address by the next periodic evaluation.

### **5.2.2 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,<sup>136</sup> a graph depicting change in groundwater storage,<sup>137</sup> maps and cross-

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<sup>132</sup> Turlock Subbasin 2024 Plan, Section 4.2.4.1, p. 164 and Figure 4-13, p. 219.

<sup>133</sup> Turlock Subbasin 2024 Plan, Section 4.2.4, pp. 161-162.

<sup>134</sup> Turlock Subbasin 2024 Plan, Section 4.2.4, p. 163.

<sup>135</sup> 23 CCR § 354.14 *et seq.*

<sup>136</sup> 23 CCR §§ 354.16 (a)(1-2).

<sup>137</sup> 23 CCR § 354.16 (b).

sections of the seawater intrusion front,<sup>138</sup> maps of groundwater contamination sites and plumes,<sup>139</sup> maps depicting total subsidence,<sup>140</sup> identification of interconnected surface water systems and an estimate of the quantity and timing of depletions of those systems,<sup>141</sup> and identification of groundwater dependent ecosystems.<sup>142</sup>

The 2024 Plan provides for the Subbasin's three principal aquifers groundwater elevation contour maps consisting of data from the beginning of the GSP Study Period (1991), during the wettest year of the GSP Study Period (1998), at the end of the GSP Study Period during a critically dry year (2015), and the most recent year with a large dataset (2017).<sup>143</sup> The 2024 Plan describes that wells with screened interval openings in the Western Lower Principal Aquifer are sparse and that the potentiometric surface elevation is not well known.<sup>144</sup> However, the 2024 Plan identified this as a data gap and described that actions would be taken to install additional deep monitoring wells and incorporate existing municipal multi-depth wells into the monitoring network.<sup>145</sup>

The 2024 Plan provided a total of 18 hydrographs for the principal aquifers that depict long-term (1990 – 2017) groundwater elevations as relatively stable (fluctuating less than 20 feet) in aquifers in the western and north-central portion of the Subbasin, but substantial groundwater elevation declines ranging from approximately 40 to 80 feet in the south-central and eastern portions of the Subbasin.<sup>146</sup> The decline in groundwater elevations seen in the hydrographs aligns with a groundwater level contour depression identified in the eastern portion of the Subbasin.<sup>147</sup> The 2024 GSP also includes hydrographs for wells comprising the chronic lowering of groundwater levels, reduction of groundwater storage, land subsidence, and interconnected surface water representative monitoring networks.<sup>148</sup>

The 2024 Plan states that the historical total average estimated decrease in groundwater in storage (overdraft) is approximately 63,900 acre-feet per year based on data from water year 1991 to water year 2015.<sup>149</sup> This decrease in groundwater in storage is further detailed in Table 5-6 and Figure 7-16 of the 2024 Plan that depict the annual and cumulative change in volume of groundwater in storage.<sup>150</sup> Department staff note that although the cumulative change in groundwater in storage graph did not include water year type for each year, this is not of concern as water year type for this graph has been

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<sup>138</sup> 23 CCR § 354.16 (c).

<sup>139</sup> 23 CCR § 354.16 (d).

<sup>140</sup> 23 CCR § 354.16 (e).

<sup>141</sup> 23 CCR § 354.16 (f).

<sup>142</sup> 23 CCR § 354.16 (g).

<sup>143</sup> Turlock Subbasin 2024 Plan, Section 4.3.3.1, Figures 4-28 to 4-31.

<sup>144</sup> Turlock Subbasin 2024 Plan, Section 4.3.3.1, p. 179.

<sup>145</sup> Turlock Subbasin 2024 Plan, Table 4-3, p. 206.

<sup>146</sup> Turlock Subbasin 2024 Plan, Figures 4-23 to 4-27, pp. 230-235.

<sup>147</sup> Turlock Subbasin 2024 Plan, Figure 4-30a, p. 238.

<sup>148</sup> Turlock Subbasin 2024 Plan, Appendix H, pp. 1,283-1,332.

<sup>149</sup> Turlock Subbasin 2024 Plan, Section 4.3.4, p. 185.

<sup>150</sup> Turlock Subbasin 2024 Plan, Table 5-6, p. 288, Figure 5-16, p. 333.

included in annual reports and in the discussion of precipitation in the Subbasin. Department staff recommend that the GSAs include the water year type in future graphical representations of the annual and cumulative change in groundwater in storage for the Subbasin.

The 2024 Plan states that the Subbasin is located far from coastal areas and seawater intrusion is not a relevant sustainability indicator for the Subbasin.<sup>151</sup> Given the geographic setting of the Subbasin, Department staff regard the reasoning of the 2024 Plan as sufficient to demonstrate that undesirable results related to seawater intrusion are not present in the Subbasin and are not likely to occur in the future.

The 2024 Plan includes a description of current and historical groundwater quality. The 2024 Plan describes that according to State Water Board's GeoTracker online dataset, there are 262 documented contamination sites in the Subbasin with 209 sites being closed or inactive and 53 active remediation sites, with most contamination sites located within the central portion of the West Turlock Subbasin GSA.<sup>152</sup> The 2024 Plan does not provide isocontour maps depicting concentrations of constituents that may affect groundwater quality or plumes of contaminants. However, the 2024 Plan does provide maps and an analysis detailing the distribution with the Subbasin of 10 constituents that could affect the quality and supply of groundwater: nitrate as nitrogen, total dissolved solids, arsenic, manganese, uranium, manganese, sulfate, boron, 1,2,3-Trichloropropane (1,2,3-TCP), tetrachlorethylene (PCE), and dibromochloropropane (DBCP).<sup>153</sup> Out of the 10 constituents for which the 2024 Plan presented maps and analyzed, eight were determined to be constituents of concern, excluding sulfate and boron. The 2024 Plan states that the potential constituents of concern were identified from a preliminary review of the Central Valley Salinity Alternative for Long-Term Sustainability (CV-SALTS) and State of California Division of Drinking Water (DDW) databases, recent investigations for public water suppliers, and local professional knowledge of water quality issues in the Subbasin.<sup>154</sup>

The 2024 Plan includes a description of current and historical land subsidence conditions, along with maps of subsidence for the Subbasin.<sup>155</sup> The 2024 Plan utilizes Department provided Interferometric Synthetic Aperture Radar (InSAR) data from June 2015 to September 2019 and subsidence data from a monitoring point managed by the United States Bureau of Reclamation (USBR) from July 2012 to July 2018 to describe current and historical subsidence conditions.<sup>156</sup> The 2024 Plan states that based on USBR data, subsidence in the Subbasin over the six year period was 0.22 feet, equivalent to 0.04 feet per year.<sup>157</sup> Department staff note that the USBR subsidence data is of limited use since

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<sup>151</sup> Turlock Subbasin 2024 Plan, Section 6.5, pp. 418-419.

<sup>152</sup> Turlock Subbasin 2024 Plan, Section 4.3.5.3, p. 195, Figure 4-57, p. 266.

<sup>153</sup> Turlock Subbasin 2024 Plan, Section 4.3.5.3, pp. 187-195, Figures 4-36 to 4-57, pp. 245-266.

<sup>154</sup> Turlock Subbasin 2024 Plan, Section 4.3.5.3, p. 187.

<sup>155</sup> Turlock Subbasin 2024 Plan, Section 4.3.6, pp. 195-198.

<sup>156</sup> Turlock Subbasin 2024 Plan, Section 4.3.6, p. 197.

<sup>157</sup> Turlock Subbasin 2024 Plan, Section 4.3.6, p. 197, Figure 4-60, p. 269.

there is only one monitoring site located in the southwestern portion of the Subbasin. However, the 2024 Plan does present InSAR data that covers the entire Subbasin which indicate that from June 2015 to September 2019 most of the Turlock Subbasin subsided less than 0.05 feet, with localized areas of subsidence up to 0.2 feet.<sup>158</sup>

The 2024 Plan identifies the presence of interconnected surface waters along the three Subbasin river boundaries (the Tuolumne River on the north, the Merced River on the south, and the San Joaquin River on the west).<sup>159</sup> The 2024 Plan also provides for historical and projected conditions, C2VSimTM modeling results that map out gaining and losing stream nodes for interconnected surface waters in the Subbasin.<sup>160</sup> The 2024 Plan details that for the historical water budget period (water year 1991 – water year 2015), the Tuolumne River and the San Joaquin River were net gaining (taking from groundwater) in the Subbasin, while the Merced River was a net losing (contributing to groundwater) in the Subbasin.<sup>161</sup> The 2024 Plan also states that based on results of C2VSimTM modeling, streamflow depletions for the projected conditions baseline water budget are predicted to increase along each river from the historical water budget: by 43,000 AFY on the Merced River, 41,600 AFY on the Tuolumne River, and 10,400 AFY on the San Joaquin River.<sup>162</sup>

The 2024 Plan provides a description of data and methods utilized to identify groundwater dependent ecosystems (GDEs) in the Subbasin.<sup>163</sup> The 2024 Plan utilized data made available online by the Department from the Natural Communities Commonly Associated with Groundwater (NCCAG) spatial dataset that identifies areas in California where vegetation, wetlands, springs, and seeps are likely to be dependent on groundwater. The 2024 Plan describes that in addition to the NCCAG dataset, the GSAs utilized depth to groundwater, the GDE Pulse Tool (developed by The Nature Conservancy), and a visual land assessment to identify GDEs and that this analysis resulted in the identification of approximately 1,233 polygons of potential GDEs within the Subbasin, mostly along the San Joaquin River with some GDEs along the Tuolumne and Merced Rivers.<sup>164</sup> The 2024 Plan states: “Recognizing the uncertainty associated with this analysis, groundwater conditions along the river boundaries will continue to be evaluated with improved future monitoring and local groundwater management.”<sup>165</sup> Department staff believe the GSAs have taken sufficient steps in identifying the presence of groundwater dependent ecosystems, but considering the uncertainty identified by the 2024 Plan with the analysis, updates to the analysis should be provided in annual reports and periodic evaluations.

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<sup>158</sup> Turlock Subbasin 2024 Plan, Section 4.3.6, p. 197, Figure 4-61, p. 270.

<sup>159</sup> Turlock Subbasin 2024 Plan, Section 4.3.7, pp. 198-200.

<sup>160</sup> Turlock Subbasin 2024 Plan, Figures 4-62 and 4-63, pp. 271-272.

<sup>161</sup> Turlock Subbasin 2024 Plan, Table 5-7, p. 289.

<sup>162</sup> Turlock Subbasin 2024 Plan, Section 4.3.7, pp. 199-200.

<sup>163</sup> Turlock Subbasin 2024 Plan, Section 4.3.8, pp. 202-205.

<sup>164</sup> Turlock Subbasin 2024 Plan, Section 4.3.8.4, p. 205, Figure 4-66, p. 275.

<sup>165</sup> Turlock Subbasin 2024 Plan, Section 4.3.8.4, p. 205.

Overall, Department staff conclude the 2024 Plan sufficiently describes the historical and current groundwater conditions throughout the Subbasin, provides sufficient maps, and the information included in the 2024 Plan substantially complies with the requirements outlined in the GSP Regulations.

### 5.2.3 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,<sup>166</sup> and the sustainable yield.<sup>167</sup>

The 2024 Plan provides a historical, current, and projected water budget that accounts for the total annual volume of groundwater and surface water entering and leaving the Subbasin.<sup>168</sup> The 2024 Plan describes that the C2VSimTM model, a numerical surface - groundwater flow model that covers the entire Central Valley, was used to generate the historical, current and projected water budget.<sup>169</sup> The C2VSimTM model is a more refined version of the California Central Valley Groundwater-Surface Water Simulation – Fine Grid Model (commonly known as C2VSimFG) that reflects the local data including hydrology, hydrogeology, land use and cropping patterns, and water resources operations, for the Turlock and Modesto Subbasins.<sup>170</sup>

The historical water budget covers a 25-year period from water year 1991 to 2015 that was selected as representative hydrologic period.<sup>171</sup> The 2024 Plan details that based on the historical water budget, average groundwater overdraft in the Subbasin has been 63,900 AFY.<sup>172</sup> The 2024 Plan states the current water budget is based on water year 2010 because it reflects an average, non-drought water supply and demand conditions.<sup>173</sup> The 2024 Plan documents that the projected water budget is used to estimate future baseline conditions for the Subbasin and uses projected supply and demand conditions and a 50-year hydrologic period (water year 1969 to 2018) that contains varied hydrologic conditions. The 2024 Plan details that under the projected water budget, groundwater overdraft is anticipated to be 7,600 AFY, which is substantially less than historical overdraft of 63,900 AFY, but this is at the expense of additional seepage from surface waters and increased subsurface flows from neighboring basins.<sup>174</sup> Depletions of interconnected surface waters is further described in [Section 5.3.2.6](#).

The 2024 Plan provides a climate change water budget that is based on projected baseline conditions with climate change inputs for streamflow, precipitation and

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<sup>166</sup> 23 CCR §§ 354.18(a), 354.18(c) *et seq.*

<sup>167</sup> 23 CCR § 354.18(b)(7).

<sup>168</sup> Turlock Subbasin 2024 Plan, Section 5.1, pp. 276-291.

<sup>169</sup> Turlock Subbasin 2024 Plan, Section 5.1.2, p. 278.

<sup>170</sup> Turlock Subbasin 2024 Plan, Appendix E, p. 807.

<sup>171</sup> Turlock Subbasin 2024 Plan, Section 5.1.4.1, p. 291.

<sup>172</sup> Turlock Subbasin 2024 Plan, Table 5-19, p. 315.

<sup>173</sup> Turlock Subbasin 2024 Plan, Section 5.4.4.2, p. 295.

<sup>174</sup> Turlock Subbasin 2024 Plan, Section 5.1.4.3, p. 296.

evapotranspiration.<sup>175</sup> The 2024 Plan details that groundwater overdraft is anticipated to increase from 7,600 AFY in the projected water budget to 19,300 AFY in the climate change water budget as a result of higher evapotranspiration rates, less available surface water, and increased groundwater pumping.<sup>176</sup>

The 2024 Plan describes that the sustainable yield for the Subbasin is based on projected water budget conditions baseline and was calculated through C2VSim<sup>TM</sup> modeling.<sup>177</sup> The sustainable yield for the Subbasin is estimated as 310,700 acre-feet per year.<sup>178</sup>

Department staff conclude the historical, current, and projected water budgets included in the 2024 Plan complies with the requirements outlined in the GSP Regulations. The 2024 Plan provides the required historical, current, and future accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the Subbasin including an estimate of the sustainable yield of the Subbasin and projected future water demands.

#### **5.2.4 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.<sup>179</sup>

The 2024 Plan does not use management areas.

### **5.3 SUSTAINABLE MANAGEMENT CRITERIA**

GSP Regulations require each Plan to include a sustainability goal for the basin and to characterize and establish undesirable results, minimum thresholds, and measurable objectives for each applicable sustainability indicator, as appropriate. The GSP Regulations require each Plan to define conditions that constitute sustainable groundwater management for the basin including the process by which the GSA characterizes undesirable results and establishes minimum thresholds and measurable objectives for each applicable sustainability indicator.<sup>180</sup>

#### **5.3.1 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

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<sup>175</sup> Turlock Subbasin 2024 Plan, Section 5.2.3.3, p. 307.

<sup>176</sup> Turlock Subbasin 2024 Plan, Section 5.2.3.3, p. 307, Table 5-17, p. 310.

<sup>177</sup> Turlock Subbasin 2024 Plan, Section 5.3, pp. 312-313.

<sup>178</sup> Turlock Subbasin 2024 Plan, Section 5.3, p. 313, Table 5-19, p. 315.

<sup>179</sup> 23 CCR § 354.20.

<sup>180</sup> 23 CCR § 354.22 *et seq.*

and should include an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation.<sup>181</sup>

The 2024 Plan states: “The Sustainability Goal for the Turlock Subbasin is to ensure a reliable and sustainable groundwater supply that supports population growth, sustains the agricultural economy, and provides for beneficial uses, especially during drought.” The 2024 GSP also states that the sustainability goal is supported by and includes the following actions:<sup>182</sup>

- Manage the Subbasin within its sustainable yield and arrest ongoing long-term water level declines.
- Support interconnected surface water to avoid adverse impacts to surface water uses.
- Manage groundwater extractions and water levels to avoid impacts from future potential land subsidence.
- Optimize conjunctive use of surface water, recycled water, and groundwater.
- Support efficient water use and water conservation.
- Coordinate with GSAs in neighboring subbasins to avoid undesirable results along shared Subbasin boundaries.
- Adaptively manage the Subbasin over time to improve operational flexibility and to ensure sustainability of the groundwater resources.

The 2024 Plan describes that the sustainability goal will be achieved through implementation of projects and management actions that may involve improved conjunctive use, increased supplies, conservation, and/or reductions in groundwater demand in conjunction with monitoring the performance of projects and groundwater conditions through the GSP monitoring network.<sup>183</sup>

Department staff conclude that the sustainability goal section included in the 2024 Plan is substantially compliant with the requirements outlined in the GSP Regulations.<sup>184</sup>

### **5.3.2 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.<sup>185</sup> 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

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<sup>181</sup> 23 CCR § 354.24.

<sup>182</sup> Turlock Subbasin 2024 Plan, Section 6.1, p. 375-376.

<sup>183</sup> Turlock Subbasin 2024 Plan, Section 6.1, p. 376.

<sup>184</sup> 23 CCR § 354.16 *et seq.*

<sup>185</sup> 23 CCR § 351(ah).



and unreasonable reduction of groundwater storage, significant and unreasonable seawater intrusion, significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies, land subsidence that substantially interferes with surface land uses, and depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water<sup>186</sup> – 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.<sup>187</sup> 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.<sup>188</sup>

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.<sup>189</sup> GSAs are required to describe how conditions at minimum thresholds may affect beneficial uses and users,<sup>190</sup> 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.<sup>191</sup>

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.<sup>192</sup> 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.<sup>193</sup>

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

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<sup>186</sup> Water Code § 10721(x).

<sup>187</sup> 23 CCR §§ 354.26(a), 354.26(b)(c).

<sup>188</sup> 23 CCR § 354.26(b)(2).

<sup>189</sup> 23 CCR § 354.28(b)(1).

<sup>190</sup> 23 CCR § 354.28(b)(4).

<sup>191</sup> 23 CCR § 354.28(b)(2).

<sup>192</sup> 23 CCR § 354.30(a).

<sup>193</sup> 23 CCR § 354.30(b).

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.<sup>194</sup>

### 5.3.2.1 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.<sup>195</sup>

The 2024 Plan states that undesirable results for the chronic lowering of groundwater levels focus on adverse impacts to drinking water wells and states: “An undesirable result is defined as significant and unreasonable groundwater level declines such that water supply wells are adversely impacted during multi-year droughts in a manner that cannot be readily managed or mitigated”. The 2024 Plan also states that although the chronic lowering of groundwater levels sustainability indicator is focused on adverse impacts to wells, chronic lowering of groundwater levels can also adversely impact environmental uses of groundwater including GDEs.<sup>196</sup> However, the 2024 Plan’s definition of chronic lowering of groundwater levels undesirable results is limited only to water supply well users and in particular, does not include environmental uses and users in the definition. Since the 2024 Plan identifies environmental water uses including GDEs and interconnected surface water habitat as beneficial uses of groundwater in the Subbasin, Department staff recommend the GSAs revise the undesirable results definition for chronic lowering of groundwater levels to be inclusive of all groundwater uses and users by the next periodic evaluation.

Quantitatively, the 2024 Plan establishes that “[a]n undesirable result for each principal aquifer will occur when at least 33% of representative monitoring wells exceeds the MT [minimum threshold] for that Principal Aquifer in three (3) consecutive Fall semi-annual monitoring events.”<sup>197</sup> The 2024 Plan states that the use of three consecutive fall semi-annual monitoring events in the undesirable results definition recognizes the three-year critically dry period (water years 2013 – 2015) which resulted in undesirable results impacting numerous domestic wells and municipal wells, including 165 dry domestic wells reported in the Subbasin.<sup>198</sup> However, the 2024 Plan also states that the use of 33 percent of representative monitoring wells represents a rough estimate of the number of wells that might indicate an overall groundwater level decline.<sup>199</sup> Although, the 2024 Plan provides details of a well impact analysis that identified the potential number of water supply wells in the Subbasin likely impacted due to groundwater levels reaching minimum thresholds

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<sup>194</sup> 23 CCR § 354.26(d).

<sup>195</sup> 23 CCR § 354.28(c)(1) *et seq.*

<sup>196</sup> Turlock Subbasin 2024 Plan, Section 6.3.1.2, p. 383.

<sup>197</sup> Turlock Subbasin 2024 Plan, Table 6-2, p. 386.

<sup>198</sup> Turlock Subbasin 2024 Plan, Section 6.3.1.3, p. 384; Section 6.3.1.4, p. 386.

<sup>199</sup> Turlock Subbasin 2024 Plan, Section 6.3.1.4, p. 386.

(208 wells),<sup>200</sup> the 2024 Plan did not provide an analysis that provides an estimate of the anticipated number of domestic wells that would go dry when at least 33 percent of the representative monitoring wells exceeds the minimum threshold for a principal aquifer in three (3) consecutive fall monitoring events. Additionally, the 2024 Plan does not explain why the 33 percent exceedance criteria would constitute an undesirable result in the Subbasin. Public comments to the Department also express concerns that the proposed undesirable results criteria will allow groundwater levels to go below historic drought levels across portions of the Subbasin. The justification for choosing the 33 percent exceedance criteria in the quantitative definition along with an analysis of the anticipated number of wells impacted for undesirable results should be provided by the GSAs in the next periodic evaluation.

In setting minimum thresholds, the 2024 Plan states: “Minimum thresholds are established as the low groundwater elevation observed in Fall 2015 at each representative monitoring site in each Principal Aquifer.”<sup>201</sup> The 2024 Plan describes that justification for minimum thresholds is supported by assessment of historical groundwater level trends.<sup>202</sup> The 2024 Plan states that groundwater elevations measured during 2015 are close to the historical lows because of drought conditions from water year 2013 through water year 2016.<sup>203</sup> The 2024 Plan also describes that although groundwater elevations have only recovered up to about 20 feet above the 2015 lows in areas where many wells went dry, no additional well failures have been reported, suggesting that long-term maintenance of water levels at or above 2015 levels should be protective of domestic wells.<sup>204</sup> Department staff believe that proposing minimum thresholds intended to prevent groundwater levels in the Subbasin from getting worse than those conditions experienced in 2015 is a reasonable approach. However, for new wells that will be added to the monitoring network, there may not be groundwater level measurements from 2015. The 2024 Plan provides some approaches for how minimum thresholds will be set for the monitoring network wells,<sup>205</sup> but this approach does not appear to be transparent to Department staff because the information is not presented as part of the 2024 Plan’s minimum threshold definition. Department staff recommend that the GSAs provide clarification regarding how minimum thresholds will be applied to future representative monitoring sites that do not have observed groundwater level data from 2015 in annual reports and the next periodic evaluation of the Plan.

With respect to how the minimum thresholds for chronic lowering of groundwater levels avoid causing undesirable results for other sustainability indicators,<sup>206</sup> the 2024 Plan describes that minimum thresholds for chronic lowering of groundwater levels based on fall 2015 groundwater levels are the same as for groundwater storage and for land

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<sup>200</sup> Turlock Subbasin 2024 Plan, Section 6.3.3.1, p. 386.

<sup>201</sup> Turlock Subbasin 2024 Plan, Table 6-3, p. 388.

<sup>202</sup> Turlock Subbasin 2024 Plan, Section 6.3.2, p. 388.

<sup>203</sup> Turlock Subbasin 2024 Plan, Section 4.3.3, p. 181.

<sup>204</sup> Turlock Subbasin 2024 Plan, Section 6.3.1.3, p. 385.

<sup>205</sup> Turlock Subbasin 2024 Plan, Table 7-1, p. 484.

<sup>206</sup> 23 CCR §354.28(b)(2).

subsidence, with the exception that for land subsidence minimum thresholds are the shallower of fall 2015 groundwater elevations or the top of the Corcoran Clay.<sup>207</sup> For water quality, the 2024 Plan states that the minimum thresholds based on fall 2015 groundwater levels are supportive of the minimum thresholds developed for degraded water quality by managing groundwater to a previous groundwater level surface; thereby maintaining historical hydraulic gradients and not accelerating the migration of groundwater contaminants.<sup>208</sup>

The 2024 Plan defines measurable objectives as the midpoint between the minimum threshold and the high groundwater elevation observed over the historical study period (water year 1991 – 2015) at each representative monitoring site for each principal aquifer.<sup>209</sup> The 2024 Plan states that the proposed interim milestones consist of a glide path approach that provides flexibility with continued groundwater level declines with interim milestones for 2027 set below the minimum threshold for all wells in the Eastern Principal Aquifer and selected wells in the western principal aquifers.<sup>210</sup> Department staff's evaluation of interim milestones is detailed as part of evaluation of the 2024 Plan's response to Corrective Action 1a of Deficiency 1 in [Section 4.1.2.1](#).

The sustainable management criteria for chronic lowering of groundwater levels sustainability indicator included in the 2024 Plan substantially complies with the requirements outlined in the GSP Regulations, at this time.

#### *5.3.2.2 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.<sup>211</sup>

The 2024 Plan states that the Subbasin is not at risk of depleting a large percentage of its total volume of groundwater supply and describes the conditions for an undesirable result as 1) a significant and unreasonable reduction of groundwater in storage that would occur if the volume of groundwater supply is at risk of depletion and/or may not be accessible for beneficial use and 2) long-term overdraft, based on projected water use and average hydrologic conditions.<sup>212</sup>

The 2024 Plan proposes to use sustainable management criteria developed for the chronic lowering of groundwater levels as a proxy for the reduction of groundwater

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<sup>207</sup> Turlock Subbasin 2024 Plan, Section 6.3.2.2, p. 390.

<sup>208</sup> Turlock Subbasin 2024 Plan, Section 6.3.2.2, p. 391.

<sup>209</sup> Turlock Subbasin 2024 Plan, Table 6-10, p. 410.

<sup>210</sup> Turlock Subbasin 2024 Plan, Section 6.3.3, p. 395.

<sup>211</sup> 23 CCR § 354.28(c)(2).

<sup>212</sup> Turlock Subbasin 2024 Plan, Section 6.4.1.3, p. 413.

storage sustainability indicator.<sup>213</sup> Correspondingly, the quantitative criteria for depletion of storage undesirable results, minimum thresholds, and measurable objectives are the same as chronic lowering of groundwater levels.<sup>214</sup>

The 2024 Plan states that the use of groundwater elevations as a proxy is supported by the sustainable yield analysis, whereby fall 2015 water levels are correlated directly to a sustainable yield volume for the Subbasin.<sup>215</sup> The 2024 Plan further states that both the chronic lowering of water levels criteria and reduction of groundwater storage are correlated to the sustainable yield of 310,700 AFY, and that the sustainable yield can be applied as a metric to the sustainable management criteria for both sustainability indicators.<sup>216</sup>

Overall, Department staff believe that the use of groundwater levels as a proxy for the reduction of groundwater storage sustainability indicator to be appropriate, as the potential impacts related to reductions of groundwater storage are similar to those described for chronic lowering of groundwater levels.

#### *5.3.2.3 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.<sup>217</sup>

The 2024 Plan states that the Subbasin is separated from the Pacific Ocean by bedrock units of the Coast Ranges and seawater intrusion does not have the potential to occur in the future and thus, seawater intrusion is deemed not an applicable sustainability indicator for the Subbasin.<sup>218</sup> Department staff concur with the 2024 Plan that seawater intrusion is not an applicable sustainability indicator for the Subbasin.

#### *5.3.2.4 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.

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<sup>213</sup> Turlock Subbasin 2024 Plan, Section 6.4.1, p. 411.

<sup>214</sup> Turlock Subbasin 2024 Plan, Section 6.4, p. 413-418.

<sup>215</sup> Turlock Subbasin 2024 Plan, Section 6.3.2.2, p. 391.

<sup>216</sup> Turlock Subbasin 2024 Plan, Section 6.4.1, p. 411.

<sup>217</sup> 23 CCR § 354.28(c)(3).

<sup>218</sup> Turlock Subbasin 2024 Plan, Section 6.5, pp. 418-419.

In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.<sup>219</sup>

The 2024 Plan provides maps and an analysis detailing the distribution with the Subbasin of 10 constituents of concern that could affect the quality and supply of groundwater: nitrate as nitrogen, total dissolved solids, dibromochloropropane (DBCP), arsenic, manganese, uranium, sulfate, boron, 1,2,3-Trichloropropane (1,2,3-TCP), and tetrachlorethylene (PCE).<sup>220</sup>

Minimum thresholds are established for 6 of the 10 constituents of concern, excluding manganese, sulfate, boron, and DBCP. The 2024 Plan defines minimum thresholds as a new (first-time) exceedance of a drinking water quality standard (primary or secondary MCL) in a potable supply well in the representative monitoring network for (nitrate (as N) – 10 mg/L, arsenic – 10 micrograms per liter ( $\mu\text{g/L}$ ), uranium – 20 pCi/L, total dissolved solids (TDS) – 500 mg/L, 1,2,3-trichloropropane (1,2,3-TCP) – 0.005  $\mu\text{g/L}$ , Tetrachloroethene (PCE) – 5  $\mu\text{g/L}$ ).<sup>221</sup> The 2024 Plan describes that setting minimum thresholds for these six constituents was based on exceedances of water quality standards over a relatively widespread area of the Subbasin with emphasis on areas where groundwater provides drinking water.<sup>222</sup>

Department staff recommend that the sustainable management criteria also include manganese and DCBP based on details provided in the 2024 Plan documenting that manganese and DBCP have historically impacted groundwater quality near population centers within the Subbasin. The 2024 Plan describes that elevated concentrations near or exceeding the secondary MCL were detected in some wells near Hughson and the Tuolumne River and that a 460-foot well within the City of Ceres exceeding the MCL for manganese was not put into service.<sup>223</sup> Additionally, the 2024 GSP states that localized areas of DBCP exceedances of the MCL have occurred in urban areas near Hughson and west of Ceres. Department staff believe that based on the information provided by the 2024 Plan, the GSAs should further assess whether to include manganese and DBCP in the degraded water quality sustainable management criteria (see [Recommended Corrective Action 4a](#)).

The 2024 Plan states that the GSP Regulations for undesirable results include quantitative criteria, which allows clear identification for when and where an undesirable result is triggered.<sup>224</sup> However, the 2024 Plan's definition for degraded water quality undesirable results includes within the same sentence, both, quantitative and qualitative criteria defining undesirable results. Specifically, the 2024 Plan states that an "undesirable result will occur if a new (first-time) exceedance of a MT [minimum threshold]

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<sup>219</sup> 23 CCR § 354.28(c)(4).

<sup>220</sup> Turlock Subbasin 2024 Plan, Section 4.3.5.3, pp. 187-195, Figures 4-36 to 4-57, pp. 245-266.

<sup>221</sup> Turlock Subbasin 2024 Plan, Section 6.6.2, p. 424.

<sup>222</sup> Turlock Subbasin 2024 Plan, Section 6.6.2, p. 424.

<sup>223</sup> Turlock Subbasin 2024 Plan, Section 4.3.5.3.4, p. 191.

<sup>224</sup> Turlock Subbasin 2024 Plan, Section 6.6.1.3, p. 422.

is observed in a potable water supply well in the representative monitoring network that results in a well owners increase on operational costs and is caused by GSA management activities....”<sup>225</sup> Department staff recommend that the qualitative criteria should be separated from the degraded water quality undesirable results description pertaining to GSP Regulations § 354.26(b)(2), which specifically requires that the criteria be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects.

Additionally, Department staff conclude the GSP’s definition of what constitutes an undesirable result for degraded water quality, which solely focuses on water quality impacts caused directly by the GSA implementing projects and/or management actions, to be problematic, as this approach could allow for unmanaged groundwater conditions. As currently defined, if for instance, minimum threshold exceedances occur because of mobilization of constituents of concern or migration of a contaminant plume to supply wells caused by groundwater extraction and recharge that are not conducted by GSA projects and/or management actions, the GSA would not identify this as an undesirable result. Department staff consider this to be inconsistent with the intent of SGMA,<sup>226</sup> which defines undesirable results for water quality as the effects caused by groundwater conditions occurring throughout the basin that result in significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies. By the 2024 Plan defining undesirable results only for projects and management actions of the GSA, this could allow for unmanaged groundwater conditions through the Subbasin that could result in significant and unreasonable degraded water quality. Although SGMA does not require GSAs to address water quality undesirable results that occurred prior to January 1, 2015, SGMA does require that GSAs manage and use groundwater in a manner that can be maintained without causing undesirable results.<sup>227</sup> Therefore, degraded water quality caused by groundwater extraction and/or recharge, whether the GSA has implemented projects or management actions or not, should be considered in the assessment of undesirable results in the Subbasin (see [Recommended Corrective Action 4b](#)).

Department staff believe that the minimum thresholds proposed by the 2024 Plan for the degraded water quality sustainability indicator may not be protective of beneficial users and uses. The 2024 GSP states that minimum thresholds are set as a new (first-time) exceedance of a drinking water quality standard (primary or secondary MCL) in a potable supply well in the representative monitoring network for any of the Subbasin constituents (nitrate (as N) – 10 mg/L, arsenic – 10 µg/L, uranium – 20 pCi/L, total dissolved solids (TDS) – 500 mg/L, 1,2,3-Trichloropropane (1,2,3-TCP) – 0.005 µg/L, Tetrachloroethene (PCE) – 5 µg/L. The 2024 Plan further states: “By setting the MT [minimum threshold] for water quality at the MCLs for the six primary constituents of concern in the Subbasin, any new increases in constituent concentrations above the MCL will be tracked and evaluated

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<sup>225</sup> Turlock Subbasin 2024 Plan, Section 6.6.1.3, p. 423.

<sup>226</sup> Water Code §10721(x)(4).

<sup>227</sup> Water Code §10721(x)(v).

with respect to the GSP implementation and GSA management. In this manner, beneficial uses of groundwater for drinking water will be preserved.”<sup>228</sup> Due to groundwater quality variability throughout the Subbasin, Department staff believe that in some instances, constituent of concern concentrations may be substantially lower than the MCL and an increase even below a minimum threshold (that is set to the MCL) could result in water quality degradation. For example, approximately half of monitoring wells have reported 1,2,3-Trichloropropane (TCP) concentrations that are 1,000 times lower than the MCL, with only a few wells within the north-central portion of the Subbasin with reported concentrations above the MCL.<sup>229</sup> Therefore, the GSAs need to consider that even increases in concentrations below the MCL could result in significant and unreasonable water quality degradation. Consistent with SGMA, the 2024 GSP’s description of minimum thresholds and undesirable results must not allow for the occurrence of significant and unreasonable degraded water quality.<sup>230</sup> Therefore, Department staff recommend the GSAs develop minimum thresholds that consider the potential effects on beneficial uses and users of groundwater. The allowed degradation should be reasonable, as close as possible to ambient (January 1, 2015) groundwater quality, with minimum thresholds and undesirable result criteria set low enough to be able to detect whether increases of constituents of concern that are potentially impacting beneficial users and uses are caused by GSA management activities or other factors.

Department staff believe that the 2024 Plan did not provide sufficient information to demonstrate that the measurable objectives proposed would prevent further degradation of water quality. Department staff believe that setting the measurable objective to the maximum historical concentration is not an appropriate protective measure because often times the maximum historical concentration reported could be as a result of an anomaly in monitoring and analysis, or it could be a result of seasonal high, or a onetime event not representative of groundwater conditions. Department staff believe that to “prevent further degradation” as alluded by the 2024 Plan, the measurable objectives need to be set consistent with SGMA, which would consist of setting quantifiable goals for the maintenance or improvement of groundwater quality. Thus, in setting the measurable objectives, ambient groundwater quality (as of January 1, 2015) needs to be taken into consideration. Furthermore, the inclusion of the word “potable” for measurable objectives appears unnecessary, as this implies that agricultural and environmental users and uses are not considered. Additionally, the 2024 Plan is unclear what is meant by “water supply well in the GSP monitoring program”, which appears to be wells that are part of the representative monitoring network. Therefore, Department staff recommend the measurable objectives definition be revised to address the issues discussed above.

Additionally, the 2024 Plan does not provide a discussion comparing their chosen baseline to groundwater quality conditions of January 1, 2015, to identify if undesirable results (defined as any new exceedances) have occurred. While GSAs are not required

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<sup>228</sup> Turlock Subbasin 2024 Plan, Section 6.6.2.2, p. 429.

<sup>229</sup> Turlock Subbasin 2024 Plan, Figure 4-52, p 261.

<sup>230</sup> Water Code §10721(x)(4)



to address undesirable results that occurred prior to January 1, 2015, GSAs are required to address undesirable results that occur after January 1, 2015. Department staff recommend the GSAs provide the baseline from which the 2024 GSP will be tracking additional exceedances and a rationale for establishing the minimum thresholds for degraded water quality based on those concentrations if the groundwater conditions differ from 2015 data (see [Recommended Corrective Action 4c](#)).

Department staff consider the 2024 Plan’s sustainable management criteria for degraded water quality to be reasonable and consistent with the GSP Regulations, at this time. Department staff have provided recommended corrective actions for this section which the GSAs should consider and address by the next periodic evaluation.

### 5.3.2.5 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 subsidence that substantially interferes with surface land uses and may lead to undesirable results.<sup>231</sup> 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.<sup>232</sup>

The 2024 Plan states that no impacts from land subsidence have been documented in the Turlock Subbasin<sup>233</sup> and InSAR data (June 2015 to September 2019) covering the full extent of the Subbasin illustrates limited to no subsidence (i.e., subsidence between 0 to 0.1 feet) within most of the area covering the western principal aquifers and subsidence ranging from 0.1 to 0.3 feet in the central portion of the Eastern Principal Aquifer.<sup>234</sup> Although impacts from subsidence have not been documented in the Subbasin, the GSAs recognize that land subsidence associated with groundwater extraction has been documented across large segments of the San Joaquin Valley since the 1950s and thus establish sustainable management criteria because the potential for land subsidence exists.<sup>235</sup>

The 2024 Plan defines undesirable results for land subsidence “as significant and unreasonable inelastic land subsidence, caused by groundwater extraction and associated water level declines, that adversely affects land use or reduces the viability of the use of critical infrastructure.”<sup>236</sup> The 2024 Plan also describes that land subsidence

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<sup>231</sup> 23 CCR § 354.28(c)(5).

<sup>232</sup> 23 CCR §§ 354.28(c)(5)(A-B).

<sup>233</sup> Turlock Subbasin 2024 Plan, Section 4.3.6, p. 195.

<sup>234</sup> Turlock Subbasin 2024 Plan, Section 6.7.2.1, p 441, and Figure 4-61, p. 270.

<sup>235</sup> Turlock Subbasin 2024 Plan, Section 6.7, p. 434.

<sup>236</sup> Turlock Subbasin 2024 Plan, Table 6-17, p. 438.

effects on beneficial uses and users within the Subbasin could result in well failures and that differential elevation changes along the widespread network of surface canals could interfere with the efficient delivery of surface water.<sup>237</sup> Quantitatively, the 2024 Plan defines undesirable results for land subsidence by principal aquifer and states: “An undesirable result will occur in the Western Upper Principal Aquifer when 33% of representative monitoring wells exceed the MT [minimum threshold] in three consecutive Spring monitoring events. An undesirable result will occur in the Western Lower Principal Aquifer when 33% of representative monitoring wells exceed the MT in two consecutive Spring monitoring events. An undesirable result will occur in the Eastern Principal Aquifer when 33% of representative monitoring wells exceed the MT in three consecutive Fall monitoring events”.<sup>238</sup> The 2024 Plan states that spring monitoring events are used for the more susceptible western aquifers because low water levels in fall may result in higher rates of subsidence that will recover when water levels rise the following spring (elastic land subsidence) and the use of only two consecutive spring exceedances for the Western Lower Principal Aquifer acknowledges the higher susceptibility for land subsidence in the Western Lower Principal Aquifer.<sup>239</sup>

The 2024 Plan states: “Minimum thresholds are the low groundwater elevations observed in Fall 2015 or the top of the Corcoran Clay (where present), whichever is shallower, at each representative monitoring site for each principal aquifer”<sup>240</sup> and “[m]easurable objectives are the midpoint between the MT and the high groundwater elevation observed over the historical study period WY 1991 – WY 2015 at each representative monitoring site for each principal aquifer.”<sup>241</sup>

Department staff conclude that this section of the 2024 Plan substantially complies with the requirements outlined in the GSP Regulations, at this time.

#### 5.3.2.6 *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.<sup>242</sup> 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.<sup>243</sup> 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

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<sup>237</sup> Turlock Subbasin 2024 Plan, Section 6.7.1.2, pp. 436-437.

<sup>238</sup> Turlock Subbasin 2024 Plan, Section 6.7.1.3, p. 438.

<sup>239</sup> Turlock Subbasin 2024 Plan, Section 5.7.1.3, p. 439.

<sup>240</sup> Turlock Subbasin 2024 Plan, Table 6-18, p. 441.

<sup>241</sup> Turlock Subbasin 2024 Plan, Table 6-19, p. 447.

<sup>242</sup> Water Code § 10721(x)(6).

<sup>243</sup> 23 CCR § 354.16 (f).

adversely impact beneficial uses of the surface water and may lead to undesirable results.<sup>244</sup>

The 2024 Plan identifies the presence of interconnected surface waters in the Subbasin for the Merced, Tuolumne, and San Joaquin Rivers and provides historical C2VSim™ modeling simulations of gaining (contribution from groundwater) and losing (stream depletion) stream nodes.<sup>245</sup> However, the 2024 Plan does not quantify the rate or volume of surface water depletions due to groundwater pumping as the sustainable management criteria for depletions of interconnected surface water.<sup>246</sup> Instead, the 2024 Plan proposes to use groundwater levels as a proxy for monitoring surface water-groundwater interactions on the basis that modeling results demonstrate a linkage between streamflow depletion and declining groundwater levels in wells near the river<sup>247</sup> and develops sustainable management criteria for depletions of interconnected surface water based on groundwater elevations as a proxy.<sup>248</sup>

The 2024 Plan defines undesirable results for depletions of interconnected surface water as “significant and unreasonable adverse impacts on the beneficial uses of surface water caused by groundwater extractions.”<sup>249</sup> The 2024 Plan describes causes of undesirable results as groundwater extractions that created a cone of depression in the east-central Subbasin that has expanded north and south toward the Tuolumne and Merced Rivers, intercepting groundwater that would otherwise have flowed toward the rivers.<sup>250</sup> The 2024 Plan states that an undesirable result for depletions of interconnected surface water will occur on one of the three monitored rivers when 50% of the representative monitoring sites for that river exceed the minimum threshold in two consecutive fall monitoring events.<sup>251</sup> The 2024 GSP describes that the 50% criterion is based on the current, relatively small number of wells in the initial monitoring network with additional wells planned and that the criterion may be adjusted downward after the number of interconnected surface water monitoring sites has been finalized. As stated in the 2024 Plan, the total number of current wells and number of minimum threshold exceedances that would trigger an undesirable result are 3 wells (66% - 2 wells) for the Tuolumne River, 3 wells (66% - 2 wells) for the San Joaquin River and 6 wells (50% - 3 wells) for the Merced River.<sup>252</sup> Department staff note that the 2024 Plan does not relate depletions of interconnected surface water quantitative undesirable results criteria to the beneficial uses of surface water (see [Recommended Corrective Action 5a](#)).

For minimum thresholds and measurable objectives, the 2024 Plan states: “For the Merced River, the MT [minimum threshold] will be expressed as the groundwater

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<sup>244</sup> 23 CCR § 354.28 (c)(6).

<sup>245</sup> Turlock Subbasin 2024 Plan, Section 4.3.7 p. 200, Figures 4-62 and 4-63, pp. 271-272.

<sup>246</sup> 23 CCR § 354.28 (c)(6).

<sup>247</sup> Turlock Subbasin 2024 Plan, Section 6.8.1, p. 448.

<sup>248</sup> Turlock Subbasin 2024 Plan, Section 6.8, pp. 447-557.

<sup>249</sup> Turlock Subbasin 2024 Plan, Table 6-20, p. 450.

<sup>250</sup> Turlock Subbasin 2024 Plan, Section 6.8.1.1, p. 449.

<sup>251</sup> Turlock Subbasin 2024 Plan, Table 6-20, p. 450.

<sup>252</sup> Turlock Subbasin 2024 Plan, Section 6.8.1.3, p. 450.

elevation observed in Spring 2014 at each representative monitoring site. For the Tuolumne River and San Joaquin River, the MT will be expressed as the low groundwater elevation observed in Fall 2015 at each representative monitoring site”<sup>253</sup> and “Measurable objectives are established at the midpoint between the MT and the high water level observed over the historical Study Period WY [water year] 1991 – WY 2015 at each representative monitoring site for each river boundary”.<sup>254</sup> The 2024 Plan claims that the minimum thresholds would avoid undesirable results and would be supportive of environmental uses of surface water and groundwater; however, no information is provided to support this contention. Additionally, public comments submitted to the Department also note the lack of explanation for the proposed minimum thresholds and avoiding significant and unreasonable adverse impacts to surface water beneficial uses. Department staff recommend that the 2024 Plan explain how the proposed minimum thresholds for depletions of interconnected surface water avoid significant and unreasonable adverse impacts to beneficial uses of surface water.

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 evaluations to the GSP (see [Recommended Corrective Action 5b](#)). 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 5c](#)). Furthermore, GSAs should coordinate with local, state, and federal resources agencies as well as interested parties to better

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<sup>253</sup> Turlock Subbasin 2024 Plan, Table 6-21, p. 451.

<sup>254</sup> Turlock Subbasin 2024 Plan, Table 6-23, p. 457.

understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion (see [Recommended Correction Action 5d](#)).

## 5.4 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.<sup>255</sup> Specifically, a monitoring network must be able to monitor impacts to beneficial uses and users,<sup>256</sup> monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds,<sup>257</sup> capture seasonal low and high conditions,<sup>258</sup> include required information such as location and well construction and include maps and tables clearly showing the monitoring site type, location, and frequency.<sup>259</sup> Department staff encourage GSAs to collect monitoring data as specified in the GSP, follow SGMA data and reporting standards,<sup>260</sup> fill data gaps identified in the GSP prior to the first periodic evaluation,<sup>261</sup> update monitoring network information as needed, follow monitoring best management practices,<sup>262</sup> 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 2024 Plan includes monitoring networks for chronic lowering of groundwater levels, reduction of groundwater storage, degraded water quality, land subsidence, and depletions of interconnected surface water sustainability indicators. The 2024 Plan proposes to use the chronic lowering of groundwater levels monitoring network as a proxy for the reduction of groundwater storage and land subsidence sustainability indicator. The 2024 Plan also proposes to use groundwater levels as a proxy to monitor the depletions of interconnected surface water sustainability indicator, but with a monitoring network that is distinct from the network for chronic lowering of groundwater levels.

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<sup>255</sup> 23 CCR § 354.32.

<sup>256</sup> 23 CCR § 354.34(b)(2).

<sup>257</sup> 23 CCR § 354.34(b)(3).

<sup>258</sup> 23 CCR § 354.34(c)(1)(B).

<sup>259</sup> 23 CCR §§ 354.34(g-h).

<sup>260</sup> 23 CCR § 352.4 *et seq.*

<sup>261</sup> 23 CCR § 354.38(d).

<sup>262</sup> Department of Water Resources, 2016, [Best Management Practices and Guidance Documents](#).

The 2024 Plan has identified 104 monitoring wells to include in the groundwater level monitoring network.<sup>263</sup> Out of the 104 monitoring wells, 47 wells are used as representative monitoring wells for which sustainable management criteria are defined.<sup>264</sup> Of the 47 representative monitoring wells included in the monitoring network, 18 wells are screened in the Western Upper Principal Aquifer, 8 wells are screened in the Western Lower Principal Aquifer, and 21 wells are screened in the Eastern Principal Aquifer.<sup>265</sup> The monitoring wells will be measured twice per year to represent seasonal high and seasonal low groundwater conditions.<sup>266</sup>

The 2024 Plan describes that well density for the groundwater level monitoring network is between one and ten monitoring wells per 100 square miles,<sup>267</sup> consistent with the Department's guidance.<sup>268</sup> However, the 2024 Plan describes that there is a data gap of wells in the central/northwestern Western Lower Principal Aquifer<sup>269</sup> and provides details of proposed actions to install additional wells and assess if more wells would be needed.<sup>270</sup>

The 2024 Plan describes that the groundwater storage monitoring network is the same network of monitoring wells for the chronic lowering of groundwater levels.<sup>271</sup> Department staff conclude that this approach appears reasonable for monitoring changes in groundwater storage.

The 2024 Plan recognizes that GSP regulations that require the GSA provide an annual estimation of the change in groundwater in storage.<sup>272</sup> As such, the GSAs provide an estimate of the historical reduction of groundwater in storage at about 63,900 acre-feet per year and commit to provide both the change in groundwater in storage and corresponding water levels for the Subbasin in the GSP annual reports.<sup>273</sup>

The 2024 GSP states the seawater intrusion sustainability indicator is not applicable to the Subbasin; therefore, no monitoring network is proposed.<sup>274</sup> Department staff agree the sustainability indicator for seawater intrusion is not present in the Subbasin and therefore, the monitoring of seawater intrusion is not required.

The 2024 Plan describes that for the degraded water quality monitoring network, the GSAs will rely entirely on wells and monitoring data from various entities with water quality

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<sup>263</sup> Turlock Subbasin 2024 Plan, Section 7.1.1.7, p. 478.

<sup>264</sup> Turlock Subbasin 2024 Plan, Section 7.1.1, pp. 468-472, Figures 7-1 to 7-3, pp. 489-491, Table 7-1, pp. 484-486.

<sup>265</sup> Turlock Subbasin 2024 Plan, Section 7.1.1, pp. 461-465, Figures 7-1 to 7-3, pp. 485-487, Table 7-1, pp. 479-481.

<sup>266</sup> Turlock Subbasin 2024 Plan, Section 7.1.1, pp. 468-471.

<sup>267</sup> Turlock Subbasin 2024 Plan, Section 7.1.1, p. 469.

<sup>268</sup> Department of Water Resources, 2016, [Best Management Practices and Guidance Documents](#).

<sup>269</sup> Turlock Subbasin 2024 Plan, Section 4.4, p. 206.

<sup>270</sup> Turlock Subbasin 2024 Plan, Section 9.2.1, p. 670.

<sup>271</sup> Turlock Subbasin 2024 Plan, Section 7.1.2, p. 472.

<sup>272</sup> 23 CCR § 354.34(c)(2).

<sup>273</sup> Turlock Subbasin 2024 Plan, Section 7.1.2, p. 472.

<sup>274</sup> Turlock Subbasin 2024 Plan, Section 6.5, pp. 418-419.

monitoring programs.<sup>275</sup> The 2024 Plan details that the GSAs will download water quality data each year and analyze any new exceedances of the six constituent of concern in potable supply wells.<sup>276</sup> As shown in Figure 7-4 and Appendix J of the 2024 Plan, the water quality monitoring network for the Subbasin consists of over 300 wells.<sup>277</sup> Although the number of wells listed is extensive, Department staff have concerns about the network. In particular, the 2024 Plan does not identify wells by principal aquifer and because wells shown in Figure 7-4 are not individually identified, there is no way to relate wells with monitoring data. Also of concern is that “[t]he monitoring network may vary from year-to-year based on regulatory requirements for each water quality program.” Public comments to the Department expressed concern that because there is no defined monitoring network, the GSAs will not be able to control the availability, frequency, and quality of monitoring data. Department staff are also concerned that without a defined monitoring network, it may not be feasible to assess compliance with the degraded water quality sustainable management criteria (see [Recommended Corrective Action 6](#)).

The 2024 Plan proposes to use groundwater levels as a proxy to monitor land subsidence using the same monitoring network as the chronic lowering of water level sustainability indicator.<sup>278</sup> The 2024 Plan also states that remote sensing data (e.g., InSAR) of ground surface elevations will be used as a screening tool to evaluate whether subsidence might be occurring and this evaluation will be included in annual reports.<sup>279</sup>

The 2024 Plan describes that monitoring of depletions of interconnected surface water is conducted using groundwater levels as a proxy.<sup>280</sup> Department staff’s assessment of 2024 Plan’s proposed use of groundwater levels as a proxy for monitoring and to develop sustainable management criteria is detailed in [Section 5.3.2.6](#).

The monitoring network for depletions of interconnected surface water consists of 12 monitoring wells that are located along the San Joaquin, Tuolumne, and Merced Rivers and are distinct wells from the chronic lowering of groundwater levels monitoring network.<sup>281</sup> The 2024 Plan also states that groundwater data will be supplemented with surface water data (releases and diversions on the Tuolumne and Merced Rivers coupled with stream gage data monitored by the United States Geological Survey) monitored by others. Irrespective of how groundwater level data from monitoring wells are used to evaluate depletions of interconnected surface water, Department staff have concerns about the proposed monitoring well network intended to monitor conditions along the Tuolumne, Merced, and San Joaquin Rivers as detailed below:

**Tuolumne River:** The 2024 Plan states that groundwater elevations in monitoring wells ETSGAS-01 and ETSGSA-02 are representative of an unconfined aquifer system

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<sup>275</sup> Turlock Subbasin 2024 Plan, Section 7.1.4, p. 473.

<sup>276</sup> Turlock Subbasin 2024 Plan, Section 7.1.4, p. 473.

<sup>277</sup> Turlock Subbasin 2024 Plan, Figure 7-4, p. 492, Appendix J, p. 1242.

<sup>278</sup> Turlock Subbasin 2024 Plan, Section 7.1.5, p. 474.

<sup>279</sup> Turlock Subbasin 2024 Plan, Section 7.1.5, p. 474.

<sup>280</sup> Turlock Subbasin 2024 Plan, Section 6.8.2, p. 451.

<sup>281</sup> Turlock Subbasin 2024 Plan, Section 7.1.6, p. 475, Table 7-2, p. 487.

connected to shallow groundwater conditions and are likely influenced by surface water seepage.<sup>282</sup> However, Department staff believe Monitoring wells ETSGAS-01 and ETSGSA-02 are likely not appropriate wells to monitor conditions along the Tuolumne River because the well casing screened intervals are at depths greater than 200 feet below ground surface and the 2024 Plan does not provide hydrogeologic evidence to support that these wells would be effective in monitoring groundwater-surface water interactions along the Tuolumne River.

**Merced River:** Monitoring wells ETSGSA-14 and ETSGSA-21 are over 2-miles from the Merced River and five of the six proposed monitoring wells are located along losing stream nodes where it is more likely that the Merced River is disconnected from groundwater.<sup>283</sup>

**San Joaquin River:** The three proposed wells to monitor groundwater conditions adjacent to the San Joaquin River are all approximately 3-miles from the river.

Although the 2024 Plan states that groundwater conditions along the river boundaries were identified as data gap<sup>284</sup> and future improvements are planned including the installation of shallower monitoring wells,<sup>285</sup> further assessment to the monitoring network appears to be necessary and should be discussed in future annual reports and periodic evaluations.

## 5.5 PROJECTS AND MANAGEMENT ACTIONS

The GSP Regulations require a description of the projects and management actions the submitting Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.<sup>286</sup> 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.<sup>287</sup>

The 2024 Plan provides estimates of the volume of water that would be contributed to the Subbasin from 18 projects (termed Group 1 and 2 projects) that are currently in place or planned to be implemented within five years.<sup>288</sup> The majority of the projects (17 of 18) are supply augmentation through direct recharge or in lie recharge where surface water is provided to reduce groundwater pumping with one metering project aimed at water conservation.<sup>289</sup> The majority of water sourced from these projects would be from the

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<sup>282</sup> Turlock Subbasin 2024 Plan, Section 7.1.6.2, p. 476.

<sup>283</sup> Turlock Subbasin 2024 Plan, Figure 4-62, p. 271, Figure 7-5, p. 493.

<sup>284</sup> Turlock Subbasin 2024 Plan, Section 7.1.6.3, p. 478.

<sup>285</sup> Turlock Subbasin 2024 Plan, Section 9.2.2, p. 670.

<sup>286</sup> 23 CCR § 354.44 (a).

<sup>287</sup> 23 CCR § 354.44 (b) *et seq.*

<sup>288</sup> Turlock Subbasin 2024 Plan, Section 8.3, pp. 549-619.

<sup>289</sup> Turlock Subbasin 2024 Plan, Table 8-6, p. 551.



Tuolumne River and this is discussed as part of review of information provided by 2024 Plan to address [Deficiency 2](#).

The 2024 Plan further states that modeling analysis results indicate that a 25 percent reduction in groundwater use within the Subbasin may be necessary after Group 1 and 2 projects are implemented.<sup>290</sup> The extensive amount of groundwater use reduction that is projected by the 2024 Plan underscores the importance of management actions for the Subbasin. Proposed management actions are discussed in detail as part of review of information provided by the 2024 plan to address [Deficiency 2](#).

Overall, the 2024 Plan presents a reasonable discussion of how projects and management actions are anticipated to mitigate overdraft and ultimately achieve and maintain Subbasin sustainability in a manner that complies with the GSP Regulations. Although the GSAs have demonstrated progress to projects and management actions in the Subbasin, Department staff note that many projects and management actions are still in conceptual and developmental phases and the effectiveness of proposed projects and management actions to arrest groundwater decline in the Subbasin will need to be supported by quantitative data demonstrating progress toward Subbasin sustainability goals. Department staff will look to detailed updates in annual reports and periodic evaluations to continue to evaluate the effectiveness of the 2024 Plan's approach.

## 5.6 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."<sup>291</sup> 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.<sup>292</sup>

The 2024 Plan evaluates potential impacts from sustainable management criteria established for sustainability indicators in the Subbasin to adjacent subbasins, the Merced Subbasin to the south, the Delta-Mendota Subbasin to the west, and the Modesto Subbasin to the north and that the Subbasin minimum thresholds. The 2024 Plan states that through a series of coordination meetings with adjacent subbasin representatives and review of draft and completed GSPs, the minimum thresholds in the three adjacent subbasins were considered together and are not expected to either cause undesirable results or adversely impact GSP implementation in adjacent subbasins.<sup>293</sup>

Department staff conclude that based on the information provided by the 2024 Plan, it appears unlikely that GSP implementation in the Subbasin, if implemented as proposed,

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<sup>290</sup> Turlock Subbasin 2024 Plan, Section 8.1, p. 497.

<sup>291</sup> Water Code § 10733(c).

<sup>292</sup> 23 CCR § 354.28(b)(3).

<sup>293</sup> Turlock Subbasin 2024 Plan, Section pp. 381 – 457.

will adversely affect adjacent basins to implement their groundwater sustainability plan or impede achievement of their sustainability goals.

## **5.7 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.<sup>294</sup>

Since the GSP was adopted and submitted, climate change conditions have advanced faster and more dramatically. It is anticipated that the hotter, drier conditions will result in a loss of 10% of California's water supply. As California adapts to a hotter, drier climate, GSAs should be preparing for these changing conditions as they work to sustainably manage groundwater within their jurisdictional areas. Specifically, the Department encourages GSAs to:

- 1) Explore how their proposed groundwater level thresholds have been established in consideration of groundwater level conditions in the Subbasin based on current and future drought conditions.
- 2) Explore how groundwater level data from the existing monitoring network will be used to make progress towards sustainable management of the Subbasin given increasing aridification and effects of climate change, such as prolonged drought.
- 3) Take into consideration changes to surface water reliability and that impact on groundwater conditions.
- 4) Evaluate updated watershed studies that may modify assumed frequency and magnitude of recharge projects, if applicable, and
- 5) Continually coordinate with the appropriate groundwater users, including but not limited to domestic well owners and state small water systems, and the appropriate overlying county jurisdictions developing drought plans and establishing local drought task forces to evaluate how their Plan's groundwater management strategy aligns with drought planning, response, and mitigation efforts within the Subbasin.

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<sup>294</sup> 23 CCR § 354.18.

## 6 STAFF RECOMMENDATION

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Department staff believe sufficient action has been taken by the GSAs to the deficiencies identified. Department staff recommend **APPROVAL** of the Plan with the required and recommended corrective actions listed below. The Plan conforms with Water Code Sections 10727.2 and 10727.4 of SGMA and substantially complies with the GSP Regulations. Implementation of the Plan will likely achieve the sustainability goal for the Turlock Subbasin. The GSAs have identified several areas for improvement of its Plan and Department staff concur that those items are important and should be addressed as soon as possible. Department staff have also identified additional recommended corrective actions that should be considered by the GSAs for the first periodic evaluation of its GSP. Addressing these recommended corrective actions will be important to demonstrate that implementation of the Plan is likely to achieve the sustainability goal. The recommended corrective actions include:

### RECOMMENDED CORRECTIVE ACTION 1

Department staff recommend the GSAs address the following recommendations related to the chronic lowering of groundwater levels sustainability indicator:

- a) Refine the well impact analysis with a detailed assessment of impacts to water well type such as domestic, public water supply, irrigation, and others as necessary in continued consideration of groundwater beneficial uses and users.<sup>295</sup>
- b) Revise the GSP to include a discussion of potential effects on environmental users from the temporary lowering of groundwater levels below minimum thresholds via the proposed interim milestones. In the assessment, the GSAs also need to consider effects on groundwater dependent ecosystems.

### RECOMMENDED CORRECTIVE ACTION 2

Department staff recommend the GSAs provide sufficiently detailed supporting information so that it will be evident to Department staff that the GSAs' implementation of projects and management actions continues to be feasible and likely to prevent undesirable results.<sup>296</sup> In annual reports and in the next periodic evaluation, the GSAs should report the progress and challenges on projects and management actions. The GSAs should describe whether projects and management actions are being implemented as anticipated and if additional efforts or measures will be necessary. Specifically, the GSAs should:

- a) Provide clarification regarding the average annual volume of surface water potentially available from the Tuolumne River for the Subbasin and the estimated

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<sup>295</sup> 23 CCR §§ 355.4(b)(4).

<sup>296</sup> 23 CCR § 355.4(b)(5).

volume of water that would be supplied on average from the Tuolumne River for the proposed 18 projects.<sup>297</sup> If implementation of a project would potentially reduce water availability in other parts of the Subbasin, the GSAs should describe how this information was considered and why the project would still be necessary.

- b) Develop, implement, and provide updates on the adaptive management action level for each of the management actions and report progress and challenges on projects and management actions in annual reports and the periodic evaluation of the Plan.

### **RECOMMENDED CORRECTIVE ACTION 3**

Provide details along with a schedule to address the identified data gap pertaining to the bottom of the Subbasin. The GSAs should consider available data and methodologies that can be used to better characterize the bottom of the Subbasin.

### **RECOMMENDED CORRECTIVE ACTION 4**

Department staff recommend that the GSAs consider and address the following recommendations related to the degraded water quality sustainability indicator.

- a) Include manganese and DBCP in the monitoring program and establish sustainable management criteria given that these constituents are present near or above MCLs and elevated concentrations have the potential to affect water supply and beneficial uses as documented in the GSP or, alternatively, provide details supporting the basis for not developing sustainable management criteria for these constituents.
- b) Revise the definition of undesirable results for degraded water quality so that exceedances of minimum thresholds caused by groundwater extraction, whether due to action or inaction of the GSAs with respect to Subbasin management, are considered in the undesirable result definition; or the GSAs should explain why they exclude minimum threshold exceedances that may result from unmanaged groundwater pumping in the Subbasin, in the definition of undesirable results.
- c) Provide an explanation to clearly identify a baseline number of exceedances for each constituent of concern in the Subbasin from which new exceedances can be tracked and the rationale for establishing the minimum thresholds for degraded water quality based on those concentrations if the conditions differ from 2015 data.

### **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

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<sup>297</sup> 23 CCR § 354.44 (b)(2).

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 GSAs should work to address the following items by the first periodic evaluation:

- a) Provide details that relate depletions of interconnected surface waters minimum thresholds and undesirable results quantitative criteria to beneficial uses of surface water. This may include an analysis of impacts to surface water beneficial uses from the proposed depletions of interconnected surface water undesirable results criteria.
- b) Consider utilizing the interconnected surface water guidance, as appropriate, when issued by the Department to establish quantifiable minimum thresholds, measurable objectives, and management actions.<sup>298</sup>
- c) Continue to fill data gaps, collect additional monitoring data, and implement the current strategy to manage depletions of interconnected surface water and define segments of interconnectivity and timing.
- d) Prioritize collaborating and coordinating with local, state, and federal regulatory agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion within the GSA's jurisdictional area.

## **RECOMMENDED CORRECTIVE ACTION 6**

Develop a water quality network capable of providing sufficient spatial data from each applicable principal aquifer to determine groundwater quality trends for identified constituents of concern and to assess compliance with sustainable management criteria. In consideration of assessing impacts to beneficial uses and users, the monitoring network should be tailored to monitor the migration of plumes and degradation of water quality that may impair water supply. If the monitoring network will vary from year-to-year as proposed in the 2024 Plan, the GSAs should provide updated information in annual reports and periodic evaluations, along with the rationale why annual changes were made to the monitoring well network. Also, in developing the monitoring network, the GSAs should strive to coordinate with monitoring entities to conduct sufficient spatial and temporal monitoring.

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<sup>298</sup> Department of Water Resources, 2016, [Best Management Practices and Guidance Documents](#).