



CALIFORNIA DEPARTMENT OF WATER RESOURCES

# SUSTAINABLE GROUNDWATER MANAGEMENT OFFICE

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March 2, 2023

Amer Hussain  
Geosyntec Consultants  
5084 N Fruit Ave., Suite 103  
Fresno, CA 93711  
[ahussain@geosyntec.com](mailto:ahussain@geosyntec.com)

RE: Inadequate Determination of the Revised 2020 Groundwater Sustainability Plan Submitted for the Tulare Lake Subbasin

Dear Amer Hussain,

The Department of Water Resources (Department) has evaluated the revised groundwater sustainability plan (GSP or Plan) for the Tulare Lake Subbasin (Subbasin) in response to the Department's incomplete determination on January 28, 2022, and has determined that the actions taken to correct deficiencies identified by the Department were not sufficient (23 CCR § 355.2(e)(3)(C)).

The Department based its inadequate determination on recommendations from the Staff Report, included as an enclosure to the attached Statement of Findings, which explains why the Department believes that the Subbasin's Plan did not take sufficient actions to correct the deficiencies previously identified by the Department and, therefore, does not substantially comply with the GSP Regulations nor satisfy the objectives of the Sustainable Groundwater Management Act (SGMA).

Once the Department determines that a GSP is inadequate, primary jurisdiction shifts from the Department to the State Water Resources Control Board (State Board), which may designate the basin probationary (Water Code § 10735.2(a)). However, Department involvement does not end at that point; the Department may, at the request of the State Board, further assess a plan, including any updates, and may provide technical recommendations to remedy deficiencies to that plan. In addition, the responsibilities of the GSA do not end with an inadequate determination. Regardless of the status of a plan, a GSA remains obligated to continue collecting and submitting monitoring network data (Water Code Part 2.11; Water Code § 10727.2; 23 CCR § 353.40; 23 CCR § 354.40), submit an annual report to the Department (Water Code § 10728; 23 CCR § 356.2), conduct periodic updates to the plan at least every five years (Water Code § 10728.2; 23 CCR § 356.4), and submit this information to DWR's SGMA Portal (23 CCR § 354.40). The Department also encourages GSAs to continue implementation efforts on project and management actions that will support the Subbasin's progress towards achieving sustainability.

Prior to this determination, the Department consulted with the State Board as required by SGMA (Water Code § 10735.2(a)(3)). Moving forward, for questions related to state intervention, please send a request to [sgma@Waterboards.ca.gov](mailto:sgma@Waterboards.ca.gov). For any questions related to assessments, the State Board will coordinate with the Department.

For any other questions, please contact Sustainable Groundwater Management staff by emailing [sgmps@water.ca.gov](mailto:sgmps@water.ca.gov).

Thank You,

*Paul Gosselin*

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Paul Gosselin  
Deputy Director  
Sustainable Groundwater Management

Attachment:

1. Statement of Findings Regarding the Inadequate Determination of the Tulare Lake Subbasin Groundwater Sustainability Plan

**STATE OF CALIFORNIA  
DEPARTMENT OF WATER RESOURCES**

**STATEMENT OF FINDINGS REGARDING THE  
DETERMINATION OF INADEQUATE STATUS OF THE  
SAN JOAQUIN VALLEY BASIN – TULARE LAKE SUBBASIN  
GROUNDWATER SUSTAINABILITY PLAN**

The Department of Water Resources (Department) is required to evaluate whether a submitted groundwater sustainability plan (GSP or Plan) conforms to specific requirements of the Sustainable Groundwater Management Act (SGMA or Act), is likely to achieve the sustainability goal for the basin covered by the Plan, and whether the Plan adversely affects the ability of an adjacent basin to implement its GSP or impedes achievement of sustainability goals in an adjacent basin. (Water Code § 10733.) The Department is directed to issue an assessment of the Plan within two years of its submission. (Water Code § 10733.4.) If a Plan is determined to be Incomplete, the Department identifies deficiencies that preclude approval of the Plan and identifies corrective actions required to make the Plan compliant with SGMA and the GSP Regulations. The GSA has up to 180 days from the date the Department issues its assessment to make the necessary corrections and submit a revised Plan. (23 CCR § 355.2(e)(2)). This Statement of Findings explains the Department's decision regarding the resubmitted Plan by the El Rico GSA, Tri-County Water Authority - Tulare Lake GSA, Southwest Kings GSA, South Fork Kings GSA, and Mid-Kings River GSA (GSA(s) or Agencies) for the Tulare Lake Subbasin (Subbasin No. 5-022.12).

Department management has discussed the Plan with staff and has reviewed the Department Staff Report, entitled *Groundwater Sustainability Plan Assessment Staff Report – Tulare Lake Subbasin*, attached as Exhibit A, recommending an inadequate determination of the GSP. Department management is satisfied that staff have conducted a thorough evaluation and assessment of the resubmitted Plan and concurs with staff's recommendation. The Department therefore finds the resubmitted Plan **INADEQUATE** and makes the following findings:

- A. The initial Plan for the basin submitted by the GSA for the Department's evaluation satisfied the required conditions as outlined in § 355.4(a) of the GSP Regulations (23 CCR § 350 et seq.), and Department Staff therefore evaluated the initial Plan.

On January 28, 2022, the Department issued a Staff Report and Findings determining the initial GSP submitted by the Agencies for the basin to be incomplete, because the GSP did not satisfy the requirements of SGMA, nor did it substantially comply with the GSP Regulations. At that time, the Department provided corrective actions in the Staff Report that were intended to address the deficiencies that precluded approval. Consistent

## Statement of Findings

San Joaquin Valley – Tulare Lake Subbasin (Basin No. 5-022.12)

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with the GSP Regulations, the Department provided the Agencies with up to 180 days to address the deficiencies detailed in the Staff Report. On July 27, 2022, within the 180 days provided to remedy the deficiencies identified in the Staff Report related to the Department's initial incomplete determination, the Agencies resubmitted the basin GSP to the Department for reevaluation. On October 12, 2022, following consultation with the State Water Resources Control Board (Board), the Department determined the Tulare Lake Subbasin's amended Plan "inadequate" under GSP regulations. (23 CCR § 355.2(e)(3)(A).) The Board, by letter dated October 6, however, requested that the Department continue to review that Plan to determine whether the technical deficiencies in the originally submitted Plan had been sufficiently addressed.

When evaluating a resubmitted GSP that was initially determined to be incomplete, the Department reviews the materials (e.g., revised or amended GSP) that were submitted within the 180-day deadline and does not review or rely on materials that were submitted to the Department by the GSA after the resubmission deadline. Furthermore, the Department does not conduct a full evaluation of all components of a resubmitted Plan, but rather focusses on how the Agency has addressed the previously identified deficiencies that precluded approval of the initially submitted Plan. The Department shall find a Plan previously determined to be incomplete to be inadequate if, after consultation with the State Water Resources Control Board, the Agency has not taken sufficient actions to correct the deficiencies previously identified by the Department. (23 CCR § 355.2(e)(3)(C).)

- B. The Department's initial Staff Report identified the deficiencies that precluded approval of the initially submitted Plan. After staff's thorough evaluation of the resubmitted Plan, the Department makes the following findings regarding the sufficiency of the actions taken by the Agency to correct those deficiencies:

Deficiency 1: involved the establishment of sustainability indicators, i.e., undesirable results, minimum thresholds, and measurable objectives for chronic lowering of groundwater levels. The corrective actions advised the Agencies to revise the undesirable results and minimum thresholds to be consistent with the requirements of SGMA and the GSP Regulations. The GSP did not establish sustainable management criteria based on a commensurate level of understanding of the basin setting and the interests of beneficial uses and users have not been considered. The GSP has not explained at what level impacts would be considered significant and unreasonable, nor does it appear that those impacts were accounted for in the development of site-specific measurable objectives and minimum thresholds. The Staff Report indicates that the Agencies did not take

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sufficient actions to correct this deficiency, which materially affects the ability of the Agencies to achieve sustainability and the ability of the Department to evaluate the likelihood of the Plan to achieve sustainability.

Deficiency 2: involved the establishment of sustainability indicators i.e., undesirable results, minimum thresholds, and measurable objectives for subsidence. The corrective actions advised the Agencies to revise their undesirable results, minimum thresholds, and measurable objectives to be consistent with SGMA and the GSP Regulations, and to contain sufficient detail to demonstrate that they are reasonable, supported by best available information and science, are commensurate with the level of understanding of the basin, and consider the interests of beneficial users in the Subbasin. The GSP did not establish subsidence sustainable management criteria based on a commensurate level of understanding of the basin setting and the interests of land surface beneficial uses and users have not been considered. The GSP has not explained at what level impacts would be considered significant and unreasonable, nor does it appear that potential impacts were accounted for in the development of site-specific minimum thresholds. The GSP did not provide measurable objectives. The Staff Report indicates that the Agencies did not take sufficient actions to correct this deficiency, which materially affects the ability of the Agencies to achieve sustainability and the ability of the Department to evaluate the likelihood of the Plan to achieve sustainability.

Deficiency 3: involved the establishment of sustainable management criteria as required by the GSP Regulations for degraded water quality. The corrective action advised the Agencies to revise sustainable management criteria based on the GSAs level of understanding of the historic and current groundwater conditions, provide the methodology used to determine which constituents are included in the sustainable management criteria, and describe the potential effects the undesirable results and minimum thresholds may have on groundwater supply and beneficial users throughout the Subbasin. The revised GSP has not established sustainable management criteria and a monitoring network for managing degradation of water quality in a manner consistent with the GSP Regulations and SGMA. Staff Report indicates that the Agencies did not take sufficient actions to correct this deficiency, which materially affects the ability of the Agencies to achieve sustainability and the ability of the Department to evaluate the likelihood of the Plan to achieve sustainability.

- C. In addition to the grounds listed above, the Department also finds that:
1. The Department developed its GSP Regulations consistent with and intending to further the state policy regarding the human right to water

## Statement of Findings

San Joaquin Valley – Tulare Lake Subbasin (Basin No. 5-022.12)

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(Water Code § 106.3) 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. (23 CCR § 350.4(g).)

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

SGMA requires basins to achieve sustainability within 20 years of Plan implementation and requires local GSAs and the Department to continually evaluate a basin's progress towards achieving its sustainability goals. SGMA also requires GSAs to encourage the active involvement of diverse social, cultural, and economic elements of the population within each basin prior to and during development and implementation of Plans. Under SGMA, the GSP is the primary document disclosing and informing the Department, local GSA boards, other local and state agencies, and interested or affected parties of the intended management program for the basin and the potential physical or regulatory impacts or changes that may occur within the basin during decades of Plan implementation. It is therefore essential that each basin begin with a Plan that adequately analyzes, discloses, and informs and that each Plan conform with certain requirements of SGMA and substantially comply with the GSP Regulations. For the reasons stated here and further discussed in the Staff Report, the revised Plan for the Tulare Lake Subbasin is hereby determined to be **INADEQUATE**.

Signed:



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Karla Nemeth, Director

Date: March 2, 2023

Enclosure: Groundwater Sustainability Plan Assessment Staff Report – Tulare Lake Subbasin

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

Groundwater Basin Name: San Joaquin Valley - Tulare Lake Subbasin (No. 5-022.12)

Submitting Agency: El Rico GSA, Tri-County Water Authority GSA - Tulare Lake, Southwest Kings GSA, South Fork Kings GSA, Mid-Kings River GSA

Submittal Type: Revised Plan in Response to Incomplete Determination

Submittal Date: July 27, 2022

Recommendation: Inadequate

Date: March 2, 2023

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On July 27, 2022, the El Rico GSA, Tri-County Water Authority GSA - Tulare Lake, Southwest Kings GSA, South Fork Kings GSA, and Mid-Kings River GSA (GSAs or Agencies) resubmitted the Tulare Lake Subbasin Groundwater Sustainability Plan - Amended (GSP or Plan) for the San Joaquin Valley - Tulare Lake Subbasin to the Department of Water Resources (Department) in response to the Department's incomplete determination on January 28, 2022,<sup>1</sup> for evaluation and assessment as required by the Sustainable Groundwater Management Act (SGMA)<sup>2</sup> and GSP Regulations.<sup>3</sup>

On October 12, 2022, following consultation with the State Water Resources Control Board (Board), the Department determined the Tulare Lake Subbasin's amended Plan "inadequate" under GSP regulations. (23 CCR § 355.2(e)(3)(A).) The basis for this determination was that of the five GSAs in the basin, four<sup>4</sup> had adopted one form of Plan, while the fifth, the Southwest Kern GSA, had adopted and submitted a Plan that was different. SGMA and the GSP Regulations require that when GSAs adopt multiple Plans for a basin, the GSAs also prepare and execute a coordination agreement. (Wat. Code §§ 10727, 10727.6.) At the deadline for submission of the amended Plan, the GSAs in the basin had not submitted a coordination agreement to DWR. Without a coordination agreement, only one amended Plan could be uploaded to the SGMA portal. The Plan

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<sup>1</sup> Water Code § 10733.4(b); 23 CCR § 355.4(a)(4); <https://sgma.water.ca.gov/portal/service/gspdocument/download/7776>.

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

<sup>3</sup> 23 CCR § 350 *et seq.*

<sup>4</sup> El Rico GSA, Tri-County Water Authority GSA – Tulare Lake, South Fork Kings GSA, and Mid-Kings River GSA.

uploaded to the SGMA portal was the one that had been adopted by four of the basin GSAs. The Board, by letter dated October 6, however, requested that the Department continue to review that Plan to determine whether the technical deficiencies in the originally submitted Plan had been sufficiently addressed. Additionally, on December 9, 2022, the Southwest Kings GSA adopted the same amended Plan that had been adopted by the other four GSAs in the basin and uploaded to the SGMA Portal. Accordingly, this Assessment comprises the Department's technical review of the resubmitted, amended Tulare Lake Subbasin Plan.

After evaluation and assessment, Department staff conclude the Plan has not taken sufficient actions to address the deficiencies identified in the Department's incomplete determination.<sup>5</sup>

- **Department staff recommend the Plan be determined inadequate.**

This assessment includes five sections:

- **Section 1 – Summary**: Provides an overview of the Department staff's assessment.
- **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 – Staff Recommendation**: Includes the staff recommendation for the Plan.

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<sup>5</sup> 23 CCR § 355.2(e)(3)(C).



# 1 SUMMARY

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Department staff recommend the Plan for the San Joaquin Valley – Tulare Lake Subbasin be determined **INADEQUATE**.

Department staff concluded the GSAs did not take sufficient action to correct the following deficiencies identified in the incomplete determination:

Deficiency 1 – The GSP does not define undesirable results or set minimum thresholds and measurable objectives for groundwater levels in a manner consistent with the GSP Regulations,

Deficiency 2 – The GSP does not define undesirable results or set minimum thresholds and measurable objectives for subsidence in a manner consistent with the GSP Regulations,

Deficiency 3 – The GSP does not identify sustainable management criteria for degraded water quality.

Generally, while the GSAs have put forth a great amount of effort to respond to the Department's corrective actions identified in the incomplete determination staff report, Department staff concludes that the information provided was not sufficiently detailed and the analysis was not sufficiently thorough and reasonable to correct the deficiencies identified by the Department.

## 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 update 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 reevaluation and reassessment 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 reassessment of a Plan previously determined to be incomplete may involve the review of new information presented by the GSAs, including models and assumptions, and a reevaluation of that information based on scientific reasonableness. In conducting its reassessment, 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 is based on Department staff's conclusion 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.

### **3 REQUIRED CONDITIONS**

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For a Plan that the Department determined to be incomplete, the Department identifies corrective actions to address those deficiencies that preclude approval of the Plan as initially submitted. The GSAs in a basin, whether developing a single GSP covering the basin or multiple GSPs, must attempt to sufficiently address those corrective actions within the time provided, not to exceed 180 days, for the Plan to be reevaluated by the Department.

#### **3.1 INCOMPLETE RESUBMITTAL**

GSP Regulations specify that the Department shall evaluate a resubmitted GSP in which the GSAs have taken corrective actions within 180 days from the date the Department issued an incomplete determination to address deficiencies.<sup>19</sup>

The Department issued the incomplete determination on January 28, 2022. The GSAs resubmitted the GSP to the Department on July 27, 2022, in compliance with the 180-day deadline.

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<sup>19</sup> 23 CCR § 355.4(a)(4).

## 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 three principal deficiencies in the Plan related to chronic lowering of groundwater levels, subsidence, and groundwater quality, which precluded the Plan’s approval in January 2022.<sup>20</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.

This section describes the corrective actions recommended by the Department related to each deficiency, followed by Department staff’s evaluation on the actions taken by the GSAs to address this deficiency.

### **4.1 DEFICIENCY 1 – THE GSP DOES NOT DEFINE UNDESIRABLE RESULTS OR SET MINIMUM THRESHOLDS AND MEASURABLE OBJECTIVES FOR GROUNDWATER LEVELS IN A MANNER CONSISTENT WITH THE GSP REGULATIONS.**

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

As described in the Department’s GSP Assessment Staff Report released in January 2022, Department staff recommended the GSAs consider and address the following:

- a) The GSAs should revise the GSP to describe, with information specific to the Subbasin, the groundwater level conditions that are considered significant and unreasonable and would result in undesirable results. The GSAs may choose to define the conditions in terms of the negative effects they mention in their GSP (e.g., water well problems, subsidence, and deterioration of water quality) or may use other methods to establish a different trigger that would define when an undesirable result would be experienced in the Subbasin. The GSAs should then explain or justify how the quantitative definition of undesirable results (i.e., 45 percent minimum threshold exceedances for three consecutive years), is

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<sup>20</sup> <https://sgma.water.ca.gov/portal/service/gspdocument/download/7783>.

consistent with avoiding the effects the GSAs have determined are undesirable results.

- b) The GSAs must revise the minimum thresholds for chronic lowering of groundwater level to be consistent with the requirements of SGMA and the GSP Regulations. Rather than relying on a projection of continued groundwater level and storage decline to define the undesirable results and minimum thresholds, the GSAs must determine, and document criteria based on a significant and unreasonable depletion of groundwater supply, informed by their understanding of the Subbasin's beneficial uses and users. The GSAs must document the effects of their selected minimum thresholds on beneficial uses and users in the Subbasin. In particular, if the GSP retains minimum thresholds that allow for continued groundwater level decline then the GSP should explain the anticipated effects of that decline on beneficial uses and users and should clearly explain whether projects and management actions have been identified to address impacts to those uses and users. If the GSP does not include projects and management actions to address impacts to uses and users that will be impacted by continued declines in groundwater levels, then it should clearly explain the rationale and analysis that led to that decision.

#### **4.1.2 Evaluation**

To help facilitate this evaluation, the revised GSP has identified and established sustainable management criteria for principal aquifers within the Subbasin.

- The A-zone principal aquifer (A-zone) is considered by the GSAs to be a perched unconfined aquifer that is found near the surface and is approximately 100 feet in thickness. The bottom is defined as the top of the A-Clay layer. The aquifer extends across the majority of the Subbasin.<sup>21</sup>
- The B-zone principal aquifer (B-zone) is considered a semi-confined/confined aquifer that is found below the A-Clay and above the E-Clay.<sup>22</sup> This aquifer can also be found throughout the Subbasin from 100 to 700 feet below ground surface.
- The C-zone principal aquifer (C-zone) is considered a confined aquifer and is found below the E-Clay. The E-Clay is also known as the Corcoran Clay that is found in much of the Central Valley.

The revised GSP includes a discussion about an area referred to as the R-zone. The R-zone is not considered a principal aquifer but rather an approximately 2-mile-wide zone that is equally split between both sides of the Kings River.<sup>23</sup> The R-zone is also described

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<sup>21</sup> Revised Tulare Lake GSP 2022, Figure 3-17, p. 338.

<sup>22</sup> Revised Tulare Lake GSP 2022, Figure 3-19a, p. 340.

<sup>23</sup> Revised Tulare Lake GSP 2022, Figure 2-4a and 2-4b, pp. 1022-1023.

as an area that “is recharged by higher water quality from the Kings River and remains a viable groundwater supply for public/domestic uses.”<sup>24</sup>

In developing sustainable management criteria for the B- and C-zones, the surface elevation of the E-Clay was required. Figure 2-3 of the revised GSP depicts the GSAs’ interpretation of the varying E-Clay elevations, by 100-foot increments of the E-Clay.<sup>25</sup> Elevations range from being shallower than 100 feet mean sea level in the northern portion of the Subbasin to deeper than -600 feet mean sea level in the southern portion of the Subbasin, resulting in nine 100-foot increments regions.

#### 4.1.2.1 Part a: Undesirable Results

In corrective action ‘a’, Department staff requested that the GSAs “revise the GSP to describe, with information specific to the Subbasin, the groundwater level conditions that are considered significant and unreasonable and would result in undesirable results.” The revised GSP qualitatively described three general types of impacts that can occur due to lowering groundwater levels: water well problems, subsidence, and deterioration of water quality,<sup>26</sup> and states that, if undesirable results did occur, they could diminish groundwater supplies for agricultural, municipal, industrial, and domestic needs. The revised GSP has not addressed this component of the deficiency. It does not provide additional detail nor quantitative analysis describing the prevalence and effects of the three types of impacts to beneficial uses and users that would constitute an undesirable result, such as what increased costs to pump water associated with lowering of pumps or the number of wells that may need to be deepened/replaced due to lowering of groundwater levels, would be considered significant and unreasonable.<sup>27</sup>

Part ‘a’ of the corrective action also requests that “the GSAs should then explain or justify how the quantitative definition of undesirable results (i.e., 45 percent minimum threshold exceedances for three consecutive years), is consistent with avoiding the effects the GSAs have determined are undesirable results.” The GSAs are no longer defining the undesirable result as “45 percent minimum threshold exceedances for three consecutive years.”<sup>28</sup> The updated undesirable result is defined as “[t]he revised [sustainable management criteria] for groundwater levels defines an undesirable result with respect to exceedance of a numerical threshold (a minimum threshold or MT) which would cause a significant and unreasonable loss of beneficial uses for water supply, particularly for domestic/public supply.”<sup>29</sup> While not explicitly clear, Department staff believe this means a single minimum threshold exceedance constitutes an undesirable result for the Subbasin; however, the revised GSP needs to be more explicit in conveying this information. The revised GSP also describes significant and unreasonable conditions for the B- and C-zones. It is unclear to Department staff how significant and unreasonable

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<sup>24</sup> Revised Tulare Lake GSP 2022, Section 2.4.2, p. 981.

<sup>25</sup> Revised Tulare Lake GSP 2022, Figure 2-3, p. 1021.

<sup>26</sup> Revised Tulare Lake GSP 2022, Section 4.2.1.1, p. 162.

<sup>27</sup> Revised Tulare Lake GSP 2022, Section 2.1, p. 975.

<sup>28</sup> Revised Tulare Lake GSP 2022, Section 2, pp. 974-984.

<sup>29</sup> Revised Tulare Lake GSP 2022, Section 2.3, p. 978.

conditions for the B- and C-zones correlate with the definition of significant and unreasonable and definition of undesirable results for the Subbasin.

For the A-zone, the GSAs provided statements about conditions in the A-zone but does not provide a zone-specific description of what is considered significant and unreasonable for the A-zone as with the B- and C-zone.<sup>30</sup> It is unclear to Department staff if undesirable results are being applied to the A-zone; the revised GSP appears to suggest that there is no intention of protecting the A-zone. The A-zone is described as routinely dewatered to the top of the A-Clay thus rendering unusable for groundwater production for the 956 wells (377 domestic and public supply and 579 agricultural, and industrial wells) that rely on the aquifer. As evidence of the dewatering of the aquifer, the revised GSP references the representative monitoring sites hydrographs.<sup>31</sup> Based on review of the A-zone representative monitoring sites hydrographs, Department staff are uncertain that the hydrographs represent dewatering conditions. Several hydrographs have what appears to be missing data over a span of up to 10 years. However, some A-zone representative monitoring sites hydrographs have data for that time period, suggesting that dewatering might only be a local condition and does not apply to the entire extent of the A-zone. While it's possible that dewatering may have occurred between 2010 and 2020, the GSA has not provided sufficient evidence of routinely dewatered to the top of the A-Clay prior to SGMA.<sup>32</sup>

The revised GSP also claims that the dewatering condition is not the result of pumping that the GSA can regulate, but rather the lack of recharge. The revised GSP also states in the same section that GSAs may mitigate A-zone groundwater conditions by restricting agricultural pumping in areas where there are clusters of domestic wells, contradicting the GSAs claim that they cannot regulate pumping.<sup>33</sup> Department staff note that the greatest density of domestic and public supply wells coincides with the greatest density of high groundwater producing agriculture and industrial wells.<sup>34</sup> Department staff believe the approach presented for the A-zone will allow for significant and unreasonable conditions to occur, such as diminished groundwater supplies for agricultural, municipal, industrial, and domestic needs. Therefore, beneficial uses and users have not been considered when establishing sustainable management criteria for the A-zone.

The revised GSP also describes what is considered significant and unreasonable for the B- and C-zone, moving away from the model projection previously used.<sup>35</sup> For the B-zone, using an initial statistical approach of quantifying significant and unreasonable lowering of groundwater level across the large number of wells, the “GSAs selected the 90th percentile groundwater elevation to define the [minimum threshold] associated with

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<sup>30</sup> Revised Tulare Lake GSP 2022, Section 2.4.3, p. 982.

<sup>31</sup> Revised Tulare Lake GSP 2022, Section 2.4.3, p. 982.

<sup>32</sup> Water Code § 10727.2(b)(4).

<sup>33</sup> Revised Tulare Lake GSP 2022, Section 2.4.3, p. 982.

<sup>34</sup> Revised Tulare Lake GSP 2022, Figures 2-4a and 2-4b, pp. 1022-1023.

<sup>35</sup> Revised Tulare Lake GSP 2022, Section 2.2, pp.975-978.

significant and unreasonable lowering of groundwater level.”<sup>36</sup> This was selected because it is protective of 90% of the beneficial users. However, the revised GSP also states that for any representative monitoring sites in the B- and C-zone that were observed at or below the minimum threshold determined by the statistical analysis, the minimum threshold was set 20 feet below the lowest recorded water levels since 2015. While the revised GSP states this would be protective of water uses and users, it is unclear how 20 feet below the lowest recorded levels would not cause significant and undesirable results. The revised GSP states it is potentially willing to mitigate as many as 152 B-zone wells. The well impact analysis does not consider agricultural and industrial uses and users.<sup>37</sup> While the GSAs have conducted a well impact analysis for domestic and public wells, the approach of using a statistical analysis and selecting 90% has not been justified. It is unclear how this will avoid significant and unreasonable impacts described for the Subbasin, such as diminished supplies for agricultural and industrial.<sup>38</sup>

For the C-zone, the revised GSP states it would be significant and unreasonable “if groundwater elevations fall below [50 feet above the E-clay], 10% of wells in the C-zone would not be able to pump at 1,000 [gallons per minute] without drawing water levels below the E-clay.”<sup>39</sup> The GSAs focused on the potential for lowering groundwater levels below the E-Clay, which the GSAs claim could convert the confined aquifer to an unconfined aquifer, reduce well yields, and could make water supply wells unusable for supply purposes.<sup>40</sup> The revised GSP has identified that that 1,000 gallons per minute was selected after discussions with stakeholders; however, it is unclear how the GSAs determined 10% of wells would be impacted and what beneficial uses and users would be impacted.

Overall, Department staff conclude the GSAs have not taken sufficient action in resolving the deficiency because the GSP does not provide additional detail nor quantitative analysis describing significant and unreasonable conditions. The GSP also does not describe the impacts to beneficial uses and users given the undesirable results definition.

#### 4.1.2.2 *Part b: Minimum Thresholds and Measurable Objectives*

Part ‘b’ of the corrective action identified by Department staff required “GSAs [to] revise the minimum thresholds for chronic lowering of groundwater level to be consistent with the requirements of SGMA and the GSP Regulations.” In response, the revised GSP describes the minimum thresholds established at each of the three principal aquifers and the River-zone separately.

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<sup>36</sup> Revised Tulare Lake GSP 2022, Section 2.4.2, p. 981, Figure 2-8, p. 1029.

<sup>37</sup> Revised Tulare Lake GSP 2022, Section 2.4.1, p. 978, Section 2.4.2, p. 981.

<sup>38</sup> 23 CCR § 354.26(b)(3).

<sup>39</sup> Revised Tulare Lake GSP 2022, Section 2.4.1, p. 979.

<sup>40</sup> Revised Tulare Lake GSP 2022, Section 2.4.1, p. 978.



### A-zone Aquifer

The minimum thresholds for the A-zone have not been updated; the original minimum thresholds have been retained.<sup>41</sup> The revised GSP states “[minimum thresholds] is defined with respect to the elevation of the A-clay, which defines the vertical and horizontal extent of the A-zone aquifer.”<sup>42</sup> The minimum thresholds are set at the top of the A-Clay which is the bottom of the A-zone aquifer. The A-zone is described as routinely dewatered to the top of the A-Clay.<sup>43</sup> Thus it is expected that during the “routine” dewatering of the A-zone all 956 wells (18% of all wells in the Subbasin) would be impacted.

### B-zone Aquifer

The B-zone aquifer minimum thresholds were updated in the revised GSP after determining the well use, location, and depth of wells completed within the aquifer. The GSAs selected a minimum threshold at the 90<sup>th</sup> percentile elevation above the E-Clay. The GSP states this threshold is protective of 90% of domestic and public supply wells, resulting in 10 percent of domestic and public supply wells being impacted (152 wells).<sup>44</sup> While the revised GSP does group wells into two groups, domestic and public supply wells, and agricultural and industrial wells, it is unclear what impacts the minimum threshold will have on the other beneficial users and uses. In determining the minimum thresholds within the B-zone, the revised GSP only used domestic and public supply wells.<sup>45</sup> The impacts of the threshold have not been fully described.<sup>46</sup>

The revised GSP describes the method that was used to determine the minimum threshold. After identifying wells in the B-zone using the Department’s On-Line Statewide Well Completion Report (OSWCR) database, the wells were compared to the Kings County well permit database. Based on the comparison of the two databases, several wells were removed from the percentile statistics calculation. The revised GSP reports that wells have been drilled deeper and the shallower wells are no longer in use as groundwater levels declined over time. The GSAs claim well owners in the Subbasin have adapted to a “typical” lifespan for shallower wells of 30 years or less [and as] groundwater levels declined, well owners have become accustomed to having to re-drill or deepen their wells.”<sup>47</sup> Therefore, the revised GSP states that it removed wells completed at depths shallower than 200 feet and installed before the year 2000 because the GSAs believe there is a high likelihood they were abandoned, deepened, or not used currently for beneficial uses.

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<sup>41</sup> Revised Tulare Lake GSP 2022, Table 2-10, p. 1063.

<sup>42</sup> Revised Tulare Lake GSP 2022, Section 2.2, Step 5, p. 977.

<sup>43</sup> Revised Tulare Lake GSP 2022, Section 2.4.3, p. 982.

<sup>44</sup> Revised Tulare Lake GSP 2022, Section 2.4.2, p. 981.

<sup>45</sup> Revised Tulare Lake GSP 2022, Figure 2-8, p. 1029.

<sup>46</sup> 23 CCR § 354.28(b)(4).

<sup>47</sup> Revised Tulare Lake GSP 2022, Section 2.4.2, p. 980.

Initially 2,048 wells were identified in the B-zone from the OSWCR database.<sup>48</sup> Due to the removal of wells described above, the minimum threshold statistics were calculated based on 1,523 wells.<sup>49</sup> Department Staff is concerned the removal of 525 wells was based on assumptions without any level of physically verification of their status is reducing the actual impacts. It is also unclear why impacts to agricultural and industrial wells have not been considered in the development of minimum thresholds. And finally, it is unclear why the year 2000 (representing approximately 22 years) was selected as the cutoff for well removal when the revised GSP indicates the life of a well in the Subbasin could be up to 30 years.<sup>50</sup>

Department staff note that the revised minimum thresholds for the B-zone are generally lower than those established in the 2020 GSP. For the 30 representative monitoring sites, the minimum threshold has been lowered by an average of 30.4 feet. Six of the sites have minimum thresholds raised, with the greatest increase being 42 feet; and 17 minimum thresholds were lowered by as much as 254 feet below 2020 GSP levels. Also, minimum thresholds are on average approximately 65 feet below the most historical lows and range from 82 feet above historical lows to 319 feet below historical lows.<sup>51</sup> For most of the representative monitoring sites, the historical lows occurred after 2015. Given these changes, Department staff believe the revised GSP should have included an updated discussion on impacts to other sustainability indicators, such as subsidence.

In the establishment of these new minimum thresholds for the B-zone, the revised GSP does not explain why agricultural and industrial wells were not included in the analysis. The revised GSP has also not explained how the new minimum thresholds will avoid undesirable results.

### C-zone Aquifer

Department staff understand that a piezometric head of 50 feet above the elevation of the E-clay is the minimum threshold C-zone to avoid undesirable conditions.<sup>52</sup> The 50-foot buffer being used is the result of averaging drawdowns from wells detailed in two pump test studies.<sup>53</sup> The revised GSP uses the same E-Clay elevations that are discussed above under the B-zone minimum threshold establishment. Based on the location of a representative monitoring site in comparison to the E-Clay layer elevation map, 50 feet is added to determine the minimum threshold.

Department staff are concerned with the approach and assumptions made to establish minimum thresholds. The GSAs use of interpolating, averaging, and finally grouping of the E-Clay elevation can lead to significant margins of error, up to 100 feet or more above

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<sup>48</sup> Revised Tulare Lake GSP 2022, Table 2-2, p. 1055.

<sup>49</sup> Revised Tulare Lake GSP 2022, Table 2-6, p. 1059.

<sup>50</sup> Revised Tulare Lake GSP 2022, Section 2.4.2, p. 980.

<sup>51</sup> Revised Tulare Lake GSP 2022, Table 2-10, p. 1063.

<sup>52</sup> Revised Tulare Lake GSP, 2022, p. 978, Figure 2-7, p. 1028.

<sup>53</sup> E.J. McClelland, 1962. Aquifer-test compilation for the San Joaquin Valley, California Open-File Report 62-80, <https://pubs.usgs.gov/of/1962/0080/report.pdf>, accessed 1/11/2023; Tule Subbasin – Tri-Counties Water Authority 2022 GSP, Appendix B, p. 442.

or below the actual elevation of the E-Clay at any given point. If the E-Clay elevation is shallower than expected, groundwater levels could drop below the E-Clay before reaching the minimum threshold causing undesirable results sooner than expected.

Additionally, since the buffer is based on an average drawdown there is the potential for the drawdown to be much greater which can also cause groundwater to drop below the E-Clay. Based on the study provided in the revised GSP for the Tule Subbasin, drawdown ranges from 28.8 feet to 184.8 feet.<sup>54</sup> If a production well in the Tulare Lake Subbasin has a similar drawdown, like the study well with 184 ft of drawdown, the groundwater level will most likely be deeper than the minimum threshold and thus cause undesirable results unexpectedly. And finally, depending on where the representative monitoring site location in relationship to the production wells, only a portion of the drawdown will be recorded allowing wells further away to drawdown groundwater levels further and possibly below the minimum thresholds and E-Clay.

The updated minimum thresholds for the C-zone aquifer are considerably lower than those established in the 2020 GSP. For example, the average minimum threshold adjustment for the 22 representative monitoring sites has an average lowering of 196 feet from the minimum thresholds set in the 2020 GSP. Further breakdowns show one representative monitoring site with raised minimum threshold of 1.5 feet and 21 representative monitoring sites minimum thresholds were lowered as much as 451 feet below the 2020 minimum thresholds. Interestingly, the minimum threshold are approximately 169 feet on average below historical lows and a range of 20 feet to 279 feet below historical lows. For most of the representative monitoring sites, the historical low has occurred after 2015.<sup>55</sup>

The revised GSP does not describe impacts to beneficial uses and users in the C-zone. However, Department staff believe that impacts to beneficial users can occur in the form of lowering equipment such submersible pumps and pump bowls are typically set at depths below groundwater surface to obtain maximum efficiency and life span. The equipment will have to be lowered whenever groundwater levels reach their drawdown elevation. This can impact many of the 700 wells currently identified within the C-zone. Department Staff find the approach discussed only considered the effects on the hydrogeology of the confining aquifer in establishing the minimum thresholds. The GSAs did not consider the impacts to beneficial uses or users, the potential of adversely impacting adjacent basins, and effects on groundwater storage and subsidence.<sup>56</sup>

### R-zone

The revised GSP also discusses an area referred to as the Kings River zone (R-zone) described as a narrow zone that follows the Kings River.<sup>57</sup> Even though the zone is most

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<sup>54</sup> Revised Tule Subbasin – Tri-Counties Water Authority 2022 GSP, Appendix B, p. 442.

<sup>55</sup> Department staff used data from DWR's Data Viewer Application to find the historical low at each representative monitoring site, <https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#gwlevels>.

<sup>56</sup> 23 CCR §§ 354.28(b)(3), 354.28(b)(4).

<sup>57</sup> Revised Tulare Lake GSP 2022, Figure 2-4a and 2-4b, pp. 1022-1023.

likely part of the unconfined A-zone aquifer, the revised GSP elected to establish minimum thresholds using the same well depth percentile approach that was used for the B-zone.<sup>58</sup> Using the same approach as was used for the B-zone percentile Department staff calculations indicate that the 60<sup>th</sup> percentile was selected since 25 of the estimated 60 domestic and public supply wells located within the R-zone can be impacted. The revised GSP does not discuss the potential impacts to the agricultural wells within the R-zone.<sup>59</sup>

Based on the information provided on the R-zone, Department staff believe the minimum thresholds for the R-zone have not been established in a manner consistent with SGMA and the GSP Regulations and informed by the hydrogeology. The source water being from the Kings River also indicates that these wells are probably shallow enough to be part of the A-zone. The R-zone appears to be above the A-Clay, leading Department staff to believe the use of the B-zone approach to establishing thresholds inappropriate.<sup>60</sup> It is unclear to Department staff why this area is being managed apart from the A-zone. When using the B-zone approach, it's also unclear why a lower percentile (60 percent instead of 90 percent). It is also noted that there are no A-zone representative monitoring sites within the R-zone.<sup>61</sup> Department staff questions the GSAs ability to adequately monitor for undesirable results in the R-zone.

#### Projects and Management Actions

A component of the deficiency required the GSAs to “clearly explain whether projects and management actions have been identified to address impacts to those uses and users, [and] if the GSP does not include projects and management actions to address impacts to uses and users that will be impacted by continued declines in groundwater levels, then it should clearly explain the rationale and analysis that led to that decision.”

The revised GSP puts forth a mitigation plan framework (framework) that provides the minimum criteria which each GSA will include in its own mitigation plan. There is no discussion of how agricultural and industrial wells, which account for over 60 percent of the wells in the A-zone, are considered given that the management of the Subbasin will allow the A-zone to be depleted. The GSP also states the GSAs are potentially willing to mitigate as many as 152 B-zone wells and 25 R-zone wells used for domestic or public supply” and there is no mention of whether mitigation is planned for the C-zone.<sup>62</sup> The revised GSP isn't specific in regard to how wells in the A-zone would be mitigated; however, provides possible options and the framework states that “once a claim of impact has been confirmed to be due to revised GSP implementation, the GSA will pursue suitable mitigation efforts as described in each GSA specific plan.”<sup>63</sup> The framework does not explain how the GSA specific plans will determine how the claims will be evaluated

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<sup>58</sup> Revised Tulare Lake GSP 2022, Section 2.4.2, p. 981.

<sup>59</sup> Revised Tulare Lake GSP 2022, Figure 2-4b, p. 1023.

<sup>60</sup> Revised Tulare Lake GSP 2022, Figure 3-17, p. 338.

<sup>61</sup> Revised Tulare Lake GSP 2022, Figure 5-1, p. 388.

<sup>62</sup> Revised Tulare Lake GSP 2022, Section 2.4.2, p. 981.

<sup>63</sup> Revised Tulare Lake GSP 2022, Appendix D, p. 1157.

and ultimately mitigated. The identification of beneficial users requiring mitigation will be further complicated due to the uncertainty and questionable accuracy of the allocated wells in the aquifers and applicable statistical analysis that was performed.

Department staff do not believe sufficient details related to the framework have been provided; therefore, are unable to assess whether the GSAs have established sustainable management criteria based on a commensurate level of understanding of the basin setting or whether the interests of beneficial uses and users have been considered.

Department staff could not find any discussion on how project and management actions were factored into the establishment of the minimum thresholds for groundwater levels. Additionally, there does not appear to be any direct project or management actions to address the potential impacts from declining groundwater levels.

### Measurable Objectives

The revised GSP states measurable objectives were not adjusted because it was not a requirement in the corrective actions.<sup>64</sup> The GSP maintains the initial GSP's methods for establishing measurable objectives. The 2020 GSP had the measurable objectives at a consistent 50 feet above the 2020 GSP minimum thresholds. Without updating the measurable objectives in the revised GSP, difference is now 80 feet on average for the B-zone with a range 8 to 304 feet. The C-zone average difference is 233 feet with a range of 14 to 501 feet.

The GSP Regulations require measurable objectives to be based on quantitative values using the same metrics and monitoring sites used to define the minimum thresholds.<sup>65</sup> While the corrective action did not specifically indicate measurable objectives be updated, the deficiency description in the Incomplete Determination staff report described the issues with the approach taken to identify the original minimum thresholds and measurable objectives. Given that the revised GSP completely revised the approach to minimum thresholds, the GSAs should have aligned the measurable objectives in the same manner, regardless of the corrective action specification.

### Additional Concerns with the Plan

In the GSA's response to the corrective action, Department staff is concerned with how the revised GSP allocated wells between the different aquifers. Step 1 defines the aquifer thicknesses, less than 100 feet for the A-zone, 100 to 700 feet for the B-zone, and greater than 700 feet for the C-zone.<sup>66</sup> The aquifer maps<sup>67</sup> and tables<sup>68</sup> produced show the well counts based on the defined aquifer thicknesses. There does not appear to be any adjustments, explained or otherwise, to the totals based on the variable E-Clay elevations. Not doing so would place many wells in the northern portion of the Subbasin

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<sup>64</sup> Revised Tulare Lake GSP 2022, Section 2.6, p. 983.

<sup>65</sup> 23 CCR § 354.30(b).

<sup>66</sup> Revised Tulare Lake GSP 2022, Section 2.2, pp. 975-976.

<sup>67</sup> Revised Tulare Lake GSP 2022, Figures 2-4(a-b), 2-5(a-b), 2-6(a-b), pp. 1022-1027.

<sup>68</sup> Revised Tulare Lake GSP 2022, Tables 2-3, 2-4, 2-5, pp. 1056-1058.

allocated in the B-zone when they might be better placed in the C-zone, thus potentially misrepresenting the impacts of the sustainable management criteria selected.

Also, the A-Clay, which defines the bottom of the A-zone aquifer does not extend across the entire Subbasin. The A-Clay is not found approximately beginning north and east of the cities of Corcoran and Hanford.<sup>69</sup> It does not appear the revised GSP allocated wells in the area where the A-Clay does not exist to the B-zone. The result is the shallow wells (less than 100 feet) in this area would not be part of the beneficial user statistical analysis applied to B-zone wells.

Finally, the revised GSP did not take into consideration that wells can be screened across more than one aquifer or how well logs with limited or no construction details were processed. This latter concern is amplified since 55 percent of the representative monitoring sites have unknown well depths. It is not clear to Department Staff how the GSAs handled these wells when allocating wells to the aquifers. Department staff has little confidence with the accuracy on the allocation of wells within each aquifer as described in the revised GSP and concerned that there may be greater impacts to beneficial uses and users than predicted by this revised GSP.

#### *4.1.2.3 Conclusion*

Overall Department staff conclude sufficient action has not been taken to address the deficiency related to defining sustainable management criteria for the chronic lowering of groundwater levels in a manner consistent with SGMA and the GSP Regulations. The GSAs have not established sustainable management criteria based on a commensurate level of understanding of the basin setting and the interests of beneficial uses and users have not been considered. The GSP has not explained at what level impacts would be considered significant and unreasonable, nor does it appear that those impacts were accounted for in the development of site-specific measurable objectives and minimum thresholds.

## **4.2 DEFICIENCY 2 – THE GSP DOES NOT DEFINE UNDESIRABLE RESULTS OR SET MINIMUM THRESHOLDS AND MEASURABLE OBJECTIVES FOR SUBSIDENCE IN A MANNER CONSISTENT WITH THE GSP REGULATIONS.**

### **4.2.1 Corrective Action 2**

As described in the Department's GSP Assessment Staff Report released in January 2022, Department staff recommended the GSAs consider and address the following:

- a) The GSAs should revise their undesirable results to be consistent with SGMA and the GSP Regulations, and to contain sufficient detail to demonstrate that they are reasonable, supported by best available information and science, are commensurate with the level of understanding of the basin, and consider the

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<sup>69</sup> Revised Tulare Lake GSP 2022, Figure 3-17, p. 338.

interests of beneficial users in the Subbasin. If the GSAs are concerned with the functionality of critical infrastructure, then they should clearly describe the critical infrastructure in the Subbasin, and the level of subsidence that would substantially interfere with that infrastructure.

- b) The GSAs should revise their discussions of measurable objectives and minimum thresholds to be consistent with the requirements of SGMA. Rather than basing those criteria on projections of status-quo subsidence, they should be informed by the site-specific consideration of the level of subsidence that would substantially interfere with land surface uses.
- c) In resolving this discrepancy, the GSAs should demonstrate that their representative monitoring sites, where minimum thresholds and measurable objectives are defined, are commensurate with monitoring for the undesirable results, such as impacts to critical infrastructure, that they are trying to avoid through implementation of the GSP.
- d) In resolving this discrepancy, Department staff recommend including flood protection infrastructure in the assessment of users susceptible to potential interference from subsidence. Department staff recommend engaging with flood management agencies in the basin and region, as appropriate.

## 4.2.2 Evaluation

### 4.2.2.1 Part a – Undesirable Results

Department staff requested the GSAs “revise their undesirable results to be consistent with SGMA and the GSP Regulations.” The revised GSP has not updated the description of significant and unreasonable subsidence; it is still “the significant loss of functionality of a critical infrastructure or facility, so the feature(s) cannot be operated as designed, requiring either retrofitting or replacement to a point that is economically unfeasible.”<sup>70</sup> The revised GSP acknowledges the subjectivity of this definition.<sup>71</sup> Impacts from subsidence would not be considered undesirable if the mitigation is economically feasible, but the GSP has not defined the limits of what is considered economically feasible nor the tolerable amount of subsidence for the critical infrastructure. The revised GSP identified the following as critical infrastructure: all canals and aqueducts, high-speed rail line, levees, pipelines, other railroads, airports, bridges, and emergency facility buildings.

The undesirable result is defined as the rate of 36 inches in three years, as this represents the highest rate of subsidence across the Subbasin.<sup>72</sup> It is unclear to Department staff how this definition will avoid significant and unreasonable effects on critical infrastructure given that groundwater levels are projected to continue to decline past historical values and information about the tolerable amount of subsidence that could be mitigated is not

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<sup>70</sup> Revised Tulare Lake GSP 2022, Section 3.6, p. 992, Table 3-1, p. 1064.

<sup>71</sup> Revised Tulare Lake GSP 2022, Section 3.6, p. 992.

<sup>72</sup> Revised Tulare Lake GSP 2022, Section 3.7, p. 994.

provided. For this component of the corrective action, Department staff conclude sufficient corrective action has not been taken.

#### *4.2.2.2 Part b – Measurable Objectives and Minimum Thresholds*

Department staff required the GSAs “revise their discussions of measurable objectives and minimum thresholds to be consistent with the requirements of SGMA.” The revised GSP has established minimum thresholds for an additional 25 representative monitoring sites located throughout the Subbasin. Table 3-2 in the revised GSP provides a baseline value for each representative monitoring site that indicates the 20-year cumulative subsidence with and without the implementation of project and management actions.<sup>73</sup>

The baseline cumulative subsidence in 2040 was calculated by the addition of each annual subsidence from 2016 through 2022 (seven years) and then repeated in seven-year increments. This seven-year range was considered to be representative of water year types experienced by the Subbasin. These baseline subsidence values are considered status-quo (i.e., without implementation of projects and management actions) by the GSAs. The revised GSP also presents minimum thresholds with the implementation of projects and managements actions; however, the revised GSP does not describe how the minimum thresholds were determined and only identifies them as being “similar to the values determined by the groundwater model in the 2020 GSP.”<sup>74</sup>

Department staff still interpret baseline subsidence estimates and the estimates of subsidence with projects and management actions implemented as maintaining status-quo and conclude that the GSAs have not established minimum thresholds based on the level of subsidence that would substantially interfere with land surface use and avoid undesirable results. The revised GSP has also not provided details on the project and management actions to explain the quantified benefits, identify the principal aquifers which would benefit from the projects and management actions, and schedule. The revised GSP does mention management actions such as groundwater pumping limits and groundwater allocations, but no details are provided.<sup>75</sup> Therefore, Department staff cannot determine if projects and management actions will assist in minimizing and avoiding subsidence in the Subbasin beyond 2040.

Additionally, it appears to Department staff that the two monitoring sites (LEMA and CRCN) have exceeded their identified cumulative allowable subsidence. Based on review of data from the LEMA<sup>76</sup> and CRCN<sup>77</sup> subsidence representative monitoring sites from January 1, 2015, through December 17, 2022, Department staff determined that both sites have already exceeded their respective minimum thresholds. The measured

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<sup>73</sup> Revised Tulare Lake GSP 2022, Section 3.7, p. 994, Table 3-2, p. 1065.

<sup>74</sup> Revised Tulare Lake GSP 2022, Section 3.7, Steps 1, 2, and 3, p. 994.

<sup>75</sup> Revised Tulare Lake GSP 2022, Section 3.7, p. 995.

<sup>76</sup> California Department of Water Resources, Data Viewer, GPS Subsidence stations, LEMA, <https://sgma.water.ca.gov/webgis/?appid=SGMADDataViewer#landsub>, 1/19/2023.

<sup>77</sup> California Department of Water Resources, Data Viewer, GPS Subsidence stations, CRCN, <https://sgma.water.ca.gov/webgis/?appid=SGMADDataViewer#landsub>, 1/18/2023.



cumulative subsidence at the LEMA site is -4.65 feet while the minimum threshold is -3.7 feet. The measured cumulative subsidence at the CRCN site is -5.18 feet while the minimum threshold is -4.34 feet. Given that the minimum threshold appears to be the total tolerable cumulative subsidence at a site, it is unclear to Department staff how minimum threshold exceedances inform the management of subsidence in the Subbasin and how they are considered in the definition of undesirable results.

Department staff also note that the GSAs have an agreement with the Department State Water Project managers to keep subsidence along the aqueduct to 0.01 feet annually or a maximum of 0.2 feet during the 20-year implementation; however, eight representative monitoring sites along the aqueduct have minimum thresholds values set greater than 0.2 feet (ranging from 0.7 feet to 1.9 feet).<sup>78</sup> Department staff are unclear if this is a typo in the revised GSP; these thresholds need to be updated. The revised GSP also states that after 2040, subsidence will be limited to residual subsidence. It is unclear how much subsidence is expected beyond 2040 and therefore, unclear if undesirable results will be avoided past 2040.

The revised GSP states “measurable objective for subsidence will ultimately be achieved through the [minimum thresholds] and [measurable objectives] set for groundwater levels and storage, which is expected to result in decreasing subsidence over time.”<sup>79</sup> In reviewing the measurable objectives for groundwater levels, it is stated that “[t]he [measurable objective] for groundwater levels will not be derived from well completion data but will rather be tied to the groundwater storage [sustainable management criteria], subsidence [sustainable management criteria] and associated projects and management actions that will inform groundwater pumping to avoid undesirable results (including groundwater level and subsidence).”<sup>80</sup> Department staff identify this as circular referencing. Groundwater levels are not being used as a proxy for minimum thresholds and therefore, this is not consistent with the GSP Regulations. Department staff conclude that measurable objectives have not been established for subsidence. Department staff conclude the GSAs have not taken sufficient action to respond to this component of the corrective action.

#### 4.2.2.3 Part c – Representative Monitoring Sites

Department staff required the GSAs to “demonstrate that their representative monitoring sites, where minimum thresholds and measurable objectives are defined, are commensurate with monitoring for the undesirable results, such as impacts to critical infrastructure, that they are trying to avoid through implementation of the GSP.” In response, the revised GSP has increased its monitoring sites from two to 27.<sup>81</sup> All but one site has an established minimum threshold. The GSA does not identify measurable objectives or milestones for the subsidence representative monitoring site.

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<sup>78</sup> Revised Tulare Lake GSP 2022, Table 3-2, p. 1065.

<sup>79</sup> Revised Tulare Lake GSP 2022, Section 3.10, p. 998.

<sup>80</sup> Revised Tulare Lake GSP 2022, Section 2.6, p. 984.

<sup>81</sup> Revised Tulare Lake GSP 2022, Section 3.11, p. 999, Table 3-2, p. 1065.

In reviewing the monitoring locations,<sup>82</sup> the Subbasin appears to have better subsidence coverage and includes monitoring sites in the proximity of the critical infrastructure such as the aqueduct. Department staff note that some representative monitoring sites are located outside the Subbasin. It is unclear how those sites will be utilized to inform the GSAs of conditions in the Subbasin. Overall, Department staff concludes sufficient action has been taken to expand the monitoring network to monitor for undesirable results.

#### 4.2.2.4 Part d - Flood Protection Infrastructure

Department staff required the GSAs to include “flood protection infrastructure in the assessment of users susceptible to potential interference from subsidence and engagement with flood management agencies in the basin and region, as appropriate.” The revised GSP includes additional discussion on flood protection levees and the potential flooding impact from subsidence.<sup>83</sup> The revised GSP states that flooding can come from overtopping, surface erosion, piping, and slides. The revised GSP looks at two potential ways subsidence can impact levees. The first being the lowering of the crown of the levee with respect to the elevation of the flood area. The plan considers this a non-issue in most cases. The revised GSP states “the elevation of the flood protection levees and the elevation of the flood-prone areas (i.e., floodplain) generally decrease uniformly. With little or no differential movement between the crown of the levee and the floodplain, the performance of the levee is unaffected.”<sup>84</sup> The revised GSP fails to mention that if subsidence continues, there is a risk of reducing the conveyance capacity of the channels and reduction of freeboard.

The revised GSP explains the second potential impact to the levees comes from the differential subsidence by inducing differential amounts of subsidence along the longitudinal axis of the levee that can lead to longitudinal cracking and other types of distress to the earthen embankment.<sup>85</sup> The revised GSP adds that “levees are flexible earthen structures that can tolerate typical differential longitudinal settlement that occurs due to variability of soils in their foundation. As such, there is very little literature on performance limits of levees affected by differential settlement along their longitudinal axis.”<sup>86</sup>

SGMA and the GSP Regulations do not differentiate between residual and differential subsidence; therefore, total subsidence must be considered. As with other critical infrastructure, the revised GSP has not identified the amount of subsidence that would impact levees in the Subbasin. Department staff also note the revised GSP does not mention whether the GSAs engaged with the flood management agencies in the Subbasin as mentioned in the corrective action. While the revised GSP did include flood protection infrastructure in the assessment of users susceptible to potential interference

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<sup>82</sup> Revised Tulare Lake GSP 2022, Figure 3-11, p. 1042.

<sup>83</sup> Revised Tulare Lake GSP 2022, Appendix B, Section 3.1.2, pp. 1140-1141.

<sup>84</sup> Revised Tulare Lake GSP 2022, Appendix B, Section 3.1.2, p. 1141.

<sup>85</sup> Revised Tulare Lake GSP 2022, Appendix B, Section 3.1.2, p. 1141.

<sup>86</sup> Revised Tulare Lake GSP, Appendix B, Section 3.1.2, p. 1141.

from subsidence, the information was not considered in the establishment of sustainable management criteria, and it is unclear to Department staff the level of subsidence that would substantially interfere with levees. Therefore, Department staff conclude sufficient action was not taken to address part 'd' of the corrective action.

#### *4.2.2.5 Conclusion*

While the monitoring network was improved as requested by the corrective action, in total the revised GSP did not take sufficient action in addressing the corrective action as it relates to establishing sustainable management criteria in a manner consistent with SGMA and the GSP Regulations and protection of flood infrastructure.

### **4.3 DEFICIENCY 3 – THE GSP DOES NOT IDENTIFY SUSTAINABLE MANAGEMENT CRITERIA FOR DEGRADED WATER QUALITY.**

#### **4.3.1 Corrective Action 3**

As described in the Department's GSP Assessment Staff Report released in January 2022, Department staff recommended the GSAs consider and address the following:

- a) Characterize historic and current groundwater quality conditions within the principal aquifers including the primary constituents of concern. Describe how the constituents will be monitored and how the baseline concentrations or federal and state standards will be assessed to evaluate potential degradation. Provide details for constituents which are partially or entirely linked to existing programs, the monitoring and management that those programs implement, and how they align with the requirements of a GSA under SGMA. Describe how the GSAs intend to coordinate and work with existing agencies and programs to evaluate and assess how GSP implementation may impact groundwater quality.

Define sustainable management criteria based on the GSAs level of understanding of the historic and current groundwater conditions as required by the GSP Regulations. In defining sustainable management criteria, the GSAs should evaluate and utilize components of existing programs, including federal, state, and agricultural water quality standards. Include a discussion of the methodology used to determine which constituents are included in the sustainable management criteria and describe the potential affects the undesirable results and minimum thresholds may have on groundwater supply and beneficial users."<sup>87</sup>

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<sup>87</sup> <https://sgma.water.ca.gov/portal/service/gspdocument/download/7783>.

## 4.3.2 Evaluation

### 4.3.2.1 Characterize Conditions and Constituents of Concern

In the first part of the corrective action, Department staff required the GSA “Characterize historic and current groundwater quality conditions within the principal aquifers including the primary constituents of concern.” The revised GSP has identified the primary constituents of concern to be the following: Total Dissolved Solids (TDS), nitrate as N, arsenic, uranium, 1,2,3-Trichloropropane (1,2,3-TCP), 1,2-Dibromo-3-chloropropane, sulfate, and chloride. In providing these constituents, the GSAs have also provided historic and current groundwater quality conditions for these constituents using the Groundwater Ambient Monitoring & Assessment Groundwater Information (GAMA) System. The revised GSP provided spatial plots for concentrations of the constituents evaluated in the three principal aquifers (A-zone, B-zone, and C-zone), and a plot for data points where the zone could not be identified.<sup>88</sup> The plots show concentrations above the maximum contaminant level for each constituent except 1,2-Dibromo-3-chloropropane. The revised GSP indicates it developed sustainable management criteria for TDS, nitrate as N, arsenic, uranium, 1,2,3-TCP, sulfate, and chloride, and did not establish sustainable management criteria for 1,2-Dibromo-3-chloropropane because no concentrations above its maximum contaminant level were detected in the GAMA data.<sup>89</sup> Department staff note the revised GSP indicates the data used to create the plots is included,<sup>90</sup> however, staff were not able to locate the data.<sup>91</sup>

Department staff consider the revised GSP to have taken sufficient action to characterize historic and current groundwater quality conditions.

### 4.3.2.2 Monitoring

The corrective action also asked GSAs to “describe how the constituents will be monitored” and “provide details for constituents which are partially or entirely linked to existing programs, the monitoring and management that those programs implement, and how they align with the requirements of a GSA under SGMA.” The revised GSP indicates the constituents of concern will be monitored under drinking water monitoring programs following existing regulations and policies, and with the frequency of sampling is driven State Water Resource Control Board, Division of Drinking Water (SWRCB-DDW).<sup>92</sup> The GSAs will rely on the existing monitoring program standards determined by the SWRCB-DDW.<sup>93</sup>

Because the GSAs have now submitted an approach to addressing degradation of water quality to address the corrective action, Department staff are also considering compliance with the GSP Regulations in their evaluation. The GSP Regulations require the monitoring

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<sup>88</sup> Revised Tulare Lake GSP 2022, Figures 4-2 through 4-9, pp. 1044-1051.

<sup>89</sup> Revised Tulare Lake GSP 2022, Section 4.3.9, p. 1006.

<sup>90</sup> Revised Tulare Lake GSP 2022, Section 4.3, p. 1003.

<sup>91</sup> Revised Tulare Lake GSP 2022, Appendix C, pp. 1149-1154.

<sup>92</sup> Revised Tulare Lake GSP 2022, Section 4.6, p. 1010.

<sup>93</sup> Revised Tulare Lake GSP 2022, Section 4.6, p. 1010.

network for degraded groundwater quality to collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues.<sup>94</sup> A map of the degraded water quality monitoring network that indicates spatial locations of monitoring and which principal aquifers are monitored.<sup>95</sup> The map shows that monitoring sites located in the northern portion of the subbasin for the C-zone, two sites along the western boundary of the subbasin for the B-zone, no sites for the A-zone, and five sites in an unknown aquifer.<sup>96</sup> The revised GSP indicates that a large portion of the basin has been de-designated for municipal and/or agricultural beneficial uses per SWRCB Resolution R5-2017-0032.<sup>97</sup> Department staff note the SWRCB Resolution R5-2017-0032 includes depth discrete boundaries of the de-designated zone that were not included in the revised GSP's description of the de-designated zone.<sup>98</sup> Department staff conclude the GSAs are not monitoring the zones which fall outside the de-designated areas. Department believes the GSAs are overextending the de-designated area and must monitor that area.

GSP Regulations require that the GSA determine the frequency of measurements required to demonstrate short-term, seasonal, and long term trends with consideration of the amount of groundwater use, aquifer characteristics, impacts to beneficial uses and users, and whether the agency has adequate long-term existing monitoring results to demonstrate an understanding of aquifer response.<sup>99</sup> The revised GSP provides a table indicating the constituents, sample frequencies relied upon for the monitoring network and which GSA is responsible for the reporting at each site. These frequencies are established by other water quality monitoring programs of which the GSAs already implement. The table indicates the following frequency of planned monitoring, with varying frequencies at each well site: TDS (once every 2 to 3 years); nitrate as N (once every 1 to 9 years); arsenic (4 times a year to once every 9 years); sulfate (once every 2 to 3 years); 1,2,3-TCP (4 times a year to once every 9 years), and Chloride (once every 2 to 3 years).<sup>100</sup> Monitoring for uranium occurs in three of the monitoring wells. The GSP has not explained the appropriateness of the frequency as it relates to leveraging other water quality programs for compliance with SGMA and the GSP Regulations, specifically how this monitoring frequency is sufficient to demonstrate short-term and seasonal trends as indicated by the GSP Regulations.<sup>101</sup> Later in this staff report, the frequency of monitoring as it relates to the undesirable results is further discussed.

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<sup>94</sup> 23 CCR § 354.34(c)(4).

<sup>95</sup> Revised Tulare Lake GSP 2022, Figure 4-10, p. 1052.

<sup>96</sup> Revised Tulare Lake GSP 2022, Figures 4-2 through 4-9, pp. 1044-1051.

<sup>97</sup> Revised Tulare Lake GSP 2022, Section 4.3, p. 1003.

<sup>98</sup> Revised Tulare Lake GSP 2022, Section 4.3, p. 1003, Section 4.4.2, p. 1008, Figure 4-1, p. 1043; [https://www.waterboards.ca.gov/rwqcb5/board\\_decisions/adopted\\_orders/resolutions/r5-2017-0032\\_res.pdf](https://www.waterboards.ca.gov/rwqcb5/board_decisions/adopted_orders/resolutions/r5-2017-0032_res.pdf).

<sup>99</sup> 23 CCR § 354.34(f) *et seq.*

<sup>100</sup> Revised Tulare Lake GSP 2022, Table 4-2, p. 1070.

<sup>101</sup> 23 CCR § 354.34(f) *et seq.*; Revised Tulare Lake GSP 2022, Section 4.6, pp. 1010-1011.

GSP Regulations require that GSAs identify data gaps wherever the Subbasin does not contain a sufficient number of monitoring sites or frequency, and that the GSP include a description of the steps taken to fill data gaps before the next five-year assessment.<sup>102</sup> The revised GSP identifies that there are data gaps in the degraded water quality monitoring network for the A-zone and the B-zone.<sup>103</sup> The GSAs will continue to look for additional monitoring locations for all three aquifers within areas of domestic and environmental uses, as well as outside of de-designated areas.<sup>104</sup>

Department staff also note that the monitoring network for degraded water quality utilize public supply wells located in the northern portion of the Subbasin, which are predominantly in the C-zone. It is unclear to Department staff how the monitoring network will adequately reflect water quality conditions throughout the Subbasin and be protective of the beneficial uses and users identified in the revised GSP's description of what is considered significant and unreasonable degraded water quality conditions. The revised GSP states that 90% of the groundwater usage is for agricultural purposes;<sup>105</sup> therefore, it is unclear to Department staff if the monitoring network considers this beneficial use.

Overall, Department staff conclude the revised GSP has sufficiently described how constituents will be monitored but has not taken sufficient action to describe how the monitoring and management that those programs implement align with the requirements of a GSA under SGMA. Department staff also note that what has been provided is not consistent with the GSP Regulations. While the Department encourages the use and leveraging of other water quality programs already in place within the Subbasin, the GSAs must explain how activities in those programs are consistent with SGMA and the GSP Regulations and this has not been accomplished by the revised GSP.

#### 4.3.2.3 Sustainable Management Criteria

As part of the corrective action, Department staff required the GSAs to “define sustainable management criteria based on the GSAs level of understanding of the historic and current groundwater conditions as required by the GSP Regulations” and explain “how the baseline concentrations or federal and state standards will be assessed to evaluate potential degradation.” The revised GSP has developed sustainable management criteria for the degradation of water quality sustainability indicator, and the Department's review includes evaluating the newly established sustainable management criteria with the requirements of the GSP Regulations.<sup>106</sup>

Department staff note that the GSP states that the identified constituents of concern are “naturally occurring constituents in aquifer materials, [including]... anthropogenic constituents...salinity, nitrate, sulfate, and 1,2,3-TCP” and that the GSAs have no control over the presence of these constituents.” The GSAs have established sustainable

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<sup>102</sup> 23 CCR§ 354.38(d).

<sup>103</sup> Revised Tulare Lake GSP 2022, Section 4.8, p. 1012.

<sup>104</sup> Revised Tulare Lake GSP 2022, Section 4.6, p. 1010.

<sup>105</sup> Revised Tulare Lake GSP 2022, Section 2.1, p. 975.

<sup>106</sup> Revised Tulare Lake GSP 2022, Section 4, pp. 1001-1013.

management criteria as an “early warning” system to assess groundwater quality trends within the Subbasin. If a trend is discovered, as further described below, “then an assessment will be conducted to evaluate if there is a relationship between this trend and changing water levels and if these changing water levels are a result of GSP-related activities.”<sup>107</sup> If a trend is confirmed, then the definition of undesirable results is applicable.

### Undesirable Results

SGMA defines the undesirable result for water quality to be significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies, caused by groundwater conditions occurring throughout the basin.<sup>108</sup> GSAs are to select the criteria used to define when and where the effects of the groundwater conditions cause undesirable results, based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin. Conditions that would be significant and unreasonable are to be defined by local GSAs.

According to the revised GSP, “an undesirable result for degraded water quality in the Subbasin would be the result stemming from a causal nexus between groundwater-related GSP activities, such as groundwater extraction or recharge, and a degradation in groundwater quality that causes a significant and unreasonable reduction in long-term viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of this GSP.”<sup>109</sup> It is unclear to Department staff what constitutes a significant and unreasonable reduction in viability of groundwater use for the identified beneficial uses, including what long-term viability means to the GSAs. Therefore, Department staff conclude that impacts to beneficial uses and users have not been described.

The revised GSP establishes two criteria that if exceeded would indicate that an undesirable result is detected. The revised GSP states that degraded water quality is considered significant and unreasonable when:

- “A representative monitoring well within an individual aquifer zone exceeds the [minimum threshold] for two consecutive measurements when exceedances can be tied to a causal nexus between GSP-related activities and water quality and the individual well has been exhibiting an upward trend;”
- “When [minimum thresholds] are exceeded with no observable upward trend, when 25% of representative monitoring wells within an individual aquifer zone exceeds the [minimum thresholds] for two consecutive measurements at each location where these [minimum threshold] exceedances can be tied to a causal nexus between GSP-related activities and water quality. Twenty-five

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<sup>107</sup> Revised Tulare Lake GSP 2022, Section 4.4, pp. 1006-1007.

<sup>108</sup> Water Code § 10721(x)(4).

<sup>109</sup> Revised Tulare Lake GSP 2022, Section 4.4, p. 1006.

percent of the representative monitoring wells were selected because no observable upward trend would indicate a non-GSP- related activity at an individual well. Although exceedances of [minimum thresholds] at 25% of the representative monitoring wells with no observable upward trend still indicate non-GSP-related activity, assessing the causal nexus with water quality at this value will provide a factor of safety.”<sup>110</sup>

The revised GSP states that it will determine whether the causal nexus between GSP operations and conditions exists by using a statistical analysis. The revised GSP indicates that if the statistical analysis shows an upward trend, then the GSA will perform an “assessment to evaluate if there is a relationship between this trend and changing water levels”.<sup>111</sup> The revised GSP does not describe the assessment. The revised GSP states that “trend analysis will not be conducted until at least six samples have been collected for each analyte at each individual representative monitoring site.”<sup>112</sup> Based on the monitoring frequency presented in the GSP, Department staff conclude it would take 1.5 – 54 years before a six measurements would be available to determine a trend.<sup>113</sup> Therefore, the GSAs would not be actively managing the Subbasin to avoid an undesirable result until that trend is established in 1.5 – 54 years for the majority of the constituents of concern.

While Department staff are unclear whether historical data would be included as part of the six measurements for the trend analysis; this approach to defining undesirable results is inconsistent with SGMA and the GSP Regulations. Department staff believe the approach of utilizing a trend analysis and then conducting an assessment (which is not described) will risk significant and unreasonable effects on beneficial users and uses within the Subbasin. Department staff conclude the Subbasin will not be managed to avoid undesirable results for an extended period of time and therefore, sufficient action has not been taken in describing undesirable results for the Subbasin.

### Minimum Thresholds

SGMA requires GSAs to establish minimum thresholds that quantify groundwater conditions for each sustainability indicator at each representative monitoring site, including the information and criteria relied upon to establish the minimum threshold.<sup>114</sup> GSP Regulations additionally require GSAs to describe how minimum thresholds may affect the interests of beneficial uses and users, and how state, federal, or local standards relate to the sustainability indicator.<sup>115</sup>

The revised GSP selected minimum thresholds for degraded quality as the Maximum Contaminant Level (MCL) or Secondary Maximum Contaminant Level (SMCL) depending

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<sup>110</sup> Revised Tulare Lake GSP 2022, Section 4.4.1, pp. 1007-1008.

<sup>111</sup> Revised Tulare Lake GSP 2022, Section 4.4.1, p. 1007.

<sup>112</sup> Revised Tulare Lake GSP 2022, Section 4.4.1, p. 1007.

<sup>113</sup> Revised Tulare Lake GSP 2022, Table 4-2, p. 1070.

<sup>114</sup> 23 CCR §§ 354.28 (a), 354.28 (b)(1).

<sup>115</sup> 23 CCR §§ 354.28 (b)(4), 354.28 (b)(5).



on the constituent, or a measured condition, from 2000 to 2020, at a representative monitoring site or nearby well screened in the same aquifer whichever is higher.<sup>116</sup> It is unclear why data from nearby wells are used to establish minimum thresholds at representative monitoring sites rather than actual data from each site. Department staff are unable to review the suitability of the revised GSP's use of nearby wells within the same aquifer zone' because the supporting information was not provided. Department staff note that some sites identify thresholds which exceed the MCL or SMCL. The GSP has not provided an explanation of how exceeding a state standard does not cause significant and undesirable results. The GSP also does not describe the impacts to beneficial uses and users.

### Measurable Objectives

SGMA requires that GSAs establish measurable objectives based on quantitative values and using the same metrics and monitoring sites as are used to define minimum thresholds,<sup>117</sup> that provide a reasonable margin of operational flexibility under adverse conditions.<sup>118</sup>

The revised GSP set measurable objectives using a variety of methods depending on the constituent monitored, and whether the minimum threshold was set at the SMCL or MCL or was set based on data available from 2000 to 2020. For wells where minimum thresholds were based on the 2000 to 2020 data, the revised GSP used a tolerance interval approach by selecting the upper tolerance coefficient, using a 95% tolerance coefficient.<sup>119</sup> The revised GSP set measurable objectives at each representative monitoring site in the following manner for each constituent of concern<sup>120</sup>:

- TDS, sulfate, chloride
  - If all measurements from 2000 to 2020 were below recommended SMCL, the measurable objective is the recommended SMCL.
  - If any measurements were above the SMCL from 2000 to 2020 in the representative monitoring site or nearby well, the measurable objective is the average of collected samples until six samples are collected, then it is the upper tolerance coefficient.
  - If no measurements or nearby well data are present, the measurable objective is the SMCL.
- Nitrate as N, arsenic, uranium, 1,2,3-TCP
  - The measurable objective is the average of collected samples until six samples are collected, then it is the upper tolerance coefficient.

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<sup>116</sup> Revised Tulare Lake GSP 2022, Section 4.4.1, p. 1007, Table 4-1, p. 1069.

<sup>117</sup> 23 CCR § 354.30 (b).

<sup>118</sup> 23 CCR § 354.30 (c).

<sup>119</sup> Revised Tulare Lake GSP 2022, Section 4.7, p. 1011.

<sup>120</sup> Revised Tulare Lake GSP 2022, Section 4.7, pp. 1011-1012.

- If no measurements or nearby data are present, the measurable objective is 70% of the MCL.

Department staff conclude that the revised GSP's approach establishes dynamic measurable objectives that may change from year to year. The use of data after January 1, 2015, to 2020 may include data that would be considered undesirable results. The revised GSP has also not provided a justification for why measurable objectives above regulatory requirements such as SMCL and MCL are not significant and unreasonable impacts beneficial uses and users.<sup>121</sup>

Department staff conclude the GSAs have not taken sufficient action to address this component of the deficiency and did not establish sustainable management criteria for degradation of groundwater levels consistent with the GSP Regulations.

#### 4.3.2.4 Conclusion

In all, Department staff conclude the GSP did not take sufficient action to address the entire deficiency. The revised GSP has not established sustainable management criteria and a monitoring network for managing degradation of water quality in a manner consistent with the GSP Regulations and SGMA.

## 5 STAFF RECOMMENDATION

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Department staff believe sufficient action has not been taken by the GSAs to remedy the deficiencies identified. Department staff recommend the Plan be determined **INADEQUATE**.

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<sup>121</sup> 23 CCR § 354.28(b)(4).