



CALIFORNIA DEPARTMENT OF WATER RESOURCES  
**SUSTAINABLE GROUNDWATER  
MANAGEMENT OFFICE**

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

February 27, 2025

Gaylon Norwood  
County of Lassen Groundwater Sustainability Agency  
707 Nevada Street, Suite 5  
Susanville, CA 96130-3912  
[gnorwood@co.lassen.ca.us](mailto:gnorwood@co.lassen.ca.us)

**RECEIVED**

**FEB 27 2025**

LASSEN COUNTY DEPARTMENT OF  
PLANNING AND BUILDING SERVICES

RE: Approved Determination of the 2024 Groundwater Sustainability Plan Submitted for the Big Valley Basin

Dear Gaylon Norwood,

The Department of Water Resources (Department) has evaluated the 2024 groundwater sustainability plan (GSP) for the Big Valley Basin in response to the Department's Incomplete Determination on October 26, 2023, and has determined the GSP is approved. The approval is based on recommendations from the Staff Report, included as an exhibit to the attached Statement of Findings, which describes that the Big Valley Basin GSP has taken sufficient action to correct deficiencies identified by the Department, satisfies the objectives of the Sustainable Groundwater Management Act (SGMA), and substantially complies with the GSP Regulations. The Staff Report also proposes recommended corrective actions that the Department believes will enhance the GSP and facilitate future evaluation by the Department. The Department strongly encourages the recommended corrective actions be given due consideration and suggests incorporating all resulting changes to the GSP in future updates.

Recognizing SGMA sets a long-term horizon for groundwater sustainability agencies (GSAs) to achieve their basin sustainability goals, monitoring progress is fundamental for successful implementation. GSAs are required to evaluate their GSPs at least every five years and whenever the Plan is amended, and to provide a written assessment to the Department. Accordingly, the Department will evaluate approved GSPs and issue an assessment at least every five years. The GSAs are required to submit their periodic evaluation of the Big Valley Basin GSP no later than January 27, 2027.

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

Thank You,

Paul Gosselin  
Paul Gosselin  
Deputy Director  
Sustainable Groundwater Management

Attachment:

1. Statement of Findings Regarding the Determination of Approval of the Big Valley Basin 2024 Groundwater Sustainability Plan

**STATE OF CALIFORNIA  
DEPARTMENT OF WATER RESOURCES**

**STATEMENT OF FINDINGS REGARDING THE  
APPROVAL OF THE  
BIG VALLEY BASIN  
2024 GROUNDWATER SUSTAINABILITY PLAN**

Under the Sustainable Groundwater Management Act (SGMA or Act), the Department of Water Resources (Department) is required to evaluate whether a submitted groundwater sustainability plan (GSP or Plan) conforms to specific requirements of the SGMA, is likely to achieve the sustainability goal for the basin covered by the Plan, and whether the Plan adversely affects the ability of an adjacent basin to implement its GSP or impedes achievement of sustainability goals in an adjacent basin.<sup>1</sup> The Department is directed to issue an assessment of the Plan within two years of its submission.<sup>2</sup> If a Plan is determined to be Incomplete, the Department must identify deficiencies that preclude approval of the Plan and identify corrective actions required to make the Plan substantially compliant with SGMA and the GSP Regulations. The Groundwater Sustainability Agency (GSA or Agency) has up to 180 days from the date the Department issues its assessment to make the necessary corrections and submit a revised Plan.<sup>3</sup> When evaluating a revised GSP that was determined to be incomplete, the Department reviews the materials provided by the GSA (e.g., revised or amended GSP) to address the deficiencies by the submission deadline. Part of the Department's review focuses on how the Agency addressed the deficiencies that precluded approval of the Plan. The Department shall find a Plan previously determined to be incomplete to be either:

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

This Statement of Findings explains the Department's determination regarding the revised Plan for the Big Valley Basin (Basin No. 5-004) by the Lassen County GSA and

---

<sup>1</sup> Water Code § 10733.

<sup>2</sup> Water Code § 10733.4.

<sup>3</sup> 23 CCR § 355.2(e)(2).

the Modoc County GSA (GSAs or Agencies) submitted on April 22, 2024 (referred to as the 2024 GSP or 2024 Plan).

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

- A. On January 27, 2022, the GSAs submitted a GSP (referred to as the 2022 GSP or 2022 Plan) for the Department's evaluation.
- B. On October 26, 2023, the Department issued a Staff Report (referred to as the 2023 Incomplete Determination) and Findings determining the 2022 GSP to be incomplete, because the 2022 GSP did not satisfy the requirements of SGMA, nor did it substantially comply with the GSP Regulations. The Department's 2023 Incomplete Determination identified the following deficiencies that precluded approval and provided the GSAs with corrective actions that were intended to address the deficiencies.
  1. Deficiency 1. The 2022 GSP did not include a reasonable assessment of overdraft conditions and reasonable means to mitigate overdraft.
  2. Deficiency 2: The 2022 GSP did not establish sustainable management criteria for chronic lowering of groundwater levels in a manner substantially compliant with the GPS regulations.
  3. Deficiency 3: The 2022 GSP did not develop sustainable management criteria for degraded of water quality.

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

- C. On April 22, 2024, the GSAs submitted a revised Plan (the 2024 GSP) to the Department. After staff's thorough evaluation of the 2024 Plan, the Department finds:
  1. The Agencies have taken sufficient actions to correct Deficiency 1, such that, at this time, the Department no longer finds this deficiency to preclude approval. The 2024 Plan provided additional analysis of the historical overdraft in the Basin and provided additional information to support the

---

<sup>4</sup> 23 CCR § 355.2(e)(2).

estimate of future overdraft. Additionally, the 2024 Plan provides details of actual progress for projects and management actions such as basin recharge, water conservation, and public education and outreach.

2. The Agencies have taken sufficient actions to correct Deficiency 2, such that, at this time, the Department no longer finds this deficiency to preclude approval. The 2024 Plan considers all beneficial uses and users of groundwater including domestic wells to establish undesirable results and provides general details for a domestic well mitigation program for impacted wells.
3. The Agencies have taken sufficient actions to correct Deficiency 3, such that, at this time, the Department no longer finds this deficiency to preclude approval. The 2024 Plan establishes sustainable management criteria for the degraded water quality sustainability indicator.

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

1. The Plan was complete, meaning it generally appeared to include the information required by the Act and the GSP Regulations sufficient to warrant a thorough evaluation and issuance of an assessment by the Department.<sup>6</sup>
  2. The Plan, either on its own or in coordination with other Plans, appears to cover the entire Basin sufficient to warrant a thorough evaluation.<sup>7</sup>
- D. The general standards the Department applied in its evaluation and assessment of the Plan are: (1) “conformance” with the specified statutory requirements, (2) “substantial compliance” with the GSP Regulations, (3) whether the Plan is likely to achieve the sustainability goal for the Basin within 20 years of the implementation of the Plan, and (4) whether the Plan adversely affects the ability of an adjacent basin to implement its GSP or impedes achievement of sustainability goals in an adjacent basin.<sup>8</sup> Application of these standards requires exercise of the Department’s expertise, judgment, and discretion when making its determination of whether a Plan should be deemed “approved,” “incomplete,” or “inadequate.”

The statutes and GSP Regulations require Plans to include and address a multitude and wide range of informational and technical components. The Department has observed a diverse array of approaches to addressing these

---

<sup>5</sup> 23 CCR § 350 et seq.

<sup>6</sup> 23 CCR § 355.4(a)(2).

<sup>7</sup> 23 CCR § 355.4(a)(3).

<sup>8</sup> Water Code § 10733.

technical and informational components being used by GSAs in different basins throughout the state. The Department does not apply a set formula or criterion that would require a particular outcome based on how a Plan addresses any one of SGMA's numerous informational and technical components. The Department finds that affording flexibility and discretion to local GSAs is consistent with the standards identified above; the state policy that sustainable groundwater management is best achieved locally through the development, implementation, and updating of local plans and programs<sup>9</sup>; and the Legislature's express intent under SGMA that groundwater basins be managed through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner.<sup>10</sup> The Department's final determination is made based on the entirety of the Plan's contents on a case-by-case basis, considering and weighing factors relevant to the particular Plan and basin under review.

- E. In making these findings and Plan determination, the Department also recognized that: (1) the Department maintains continuing oversight and jurisdiction to ensure the Plan is adequately implemented; (2) the Legislature intended SGMA to be implemented over many years; (3) SGMA provides Plans 20 years of implementation to achieve the sustainability goal in a basin (with the possibility that the Department may grant GSAs an additional five years upon request if the GSA has made satisfactory progress toward sustainability); and, (4) local agencies acting as GSAs are authorized, but not required, to address undesirable results that occurred prior to enactment of SGMA.<sup>11</sup>
- F. The Plan conforms with Water Code §§ 10727.2 and 10727.4, substantially complies with 23 CCR § 355.4, and appears likely to achieve the sustainability goal for the Basin. It does not appear at this time that the Plan will adversely affect the ability of adjacent basins to implement their GSPs or impede achievement of sustainability goals.
1. The sustainable management criteria and the Plan's goal to maintain a locally governed, economically feasible, sustainable groundwater basin for beneficial uses is sufficiently justified and explained. The Plan relies on credible information and science such as conducting a through well impact analysis using publicly available data to quantify the groundwater conditions that the Plan seeks to avoid and provides an objective way to determine

---

<sup>9</sup> Water Code § 113.

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

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

whether the Basin is being managed sustainably in accordance with SGMA.<sup>12</sup>

2. The Plan has identified reasonable measures and schedules to eliminate data gaps by specifying a research and data development project to be implemented to fill known data gaps by improving monitoring networks and refining the understanding of interconnected surface water in the Basin.<sup>13</sup>
3. The projects and management actions proposed are designed to increase recharge in the basin, conserve water usage, and educate the public on groundwater. The projects and management actions are reasonable and commensurate with the level of understanding of the Basin setting. The projects and management actions described in the Plan provide a feasible approach to achieving the Basin's sustainability goal and should provide the GSAs with greater versatility to adapt and respond to changing conditions and future challenges during GSP implementation.<sup>14</sup>
4. The Plan provides a detailed explanation of how the varied interests of groundwater uses and users in the Basin were considered in developing the sustainable management criteria and how those interests, including domestic and agricultural users, would be impacted by the chosen minimum thresholds.<sup>15</sup>
5. The Plan's projects and management actions appear feasible at this time and capable of preventing undesirable results and ensuring that the Basin is operated within its sustainable yield within 20 years. The Department will continue to monitor Plan implementation and reserves the right to change its determination if projects and management actions are not implemented or appear unlikely to prevent undesirable results or achieve sustainability within SGMA timeframes.<sup>16</sup>
6. The Plan includes a reasonable assessment of overdraft conditions and includes reasonable means to mitigate overdraft, if present.<sup>17</sup>
7. At this time, it does not appear that the Plan will adversely affect the ability of an adjacent basin to implement its GSP or impede achievement of sustainability goals in an adjacent basin. The Plan states that there are no direct boundaries with adjacent basins.<sup>18</sup>

---

<sup>12</sup> 23 CCR § 355.4(b)(1).

<sup>13</sup> 23 CCR § 355.4(b)(2).

<sup>14</sup> 23 CCR § 355.4(b)(3).

<sup>15</sup> 23 CCR § 355.4(b)(4).

<sup>16</sup> 23 CCR § 355.4(b)(5).

<sup>17</sup> 23 CCR § 355.4(b)(6).

<sup>18</sup> 23 CCR § 355.4(b)(7).

8. Because a single plan was submitted for the Subbasin, a coordination agreement was not required.<sup>19</sup>
9. The GSAs' 2 member agencies, Modoc County and Lassen County have historically had land-use responsibility and managed groundwater extraction and in the Basin. The GSAs' member agencies and their history of groundwater management provide a reasonable level of confidence that the GSAs has the legal authority and financial resources necessary to implement the Plan.<sup>20</sup>
10. Through review of the Plan and consideration of public comments, the Department determines that the GSAs adequately responded to comments that raised credible technical or policy issues with the Plan, sufficient to warrant approval of the Plan at this time. The Department also notes that the recommended corrective actions included in the Staff Report are important to addressing certain technical or policy issues that were raised and, if not addressed before future, subsequent plan evaluations, may preclude approval of the Plan in those future evaluations.<sup>21</sup>

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

1. The Department developed its GSP Regulations consistent with and intending to further the State's human right to water policy through implementation of SGMA and the Regulations, primarily by achieving sustainable groundwater management in a basin. By ensuring substantial compliance with the GSP Regulations, the Department has considered the state policy regarding the human right to water in its evaluation of the Plan.<sup>22</sup>
2. The Plan acknowledges uncertainty in identifying interconnected surface waters within the Basin. The GSAs do not develop initial sustainable management criteria to manage this sustainability indicator and the Department has provided recommended corrective actions related to this indicator. The GSAs acknowledge, and the Department agrees, many data gaps related to interconnected surface water exist. The GSAs should continue filling data gaps, collecting additional monitoring data, and coordinating with resources agencies and interested parties to understand beneficial uses and users that may be impacted by depletions of interconnected surface water caused by groundwater pumping. Future periodic evaluations of the Plan and amendments to the Plan should aim to

---

<sup>19</sup> 23 CCR § 355.4(b)(8).

<sup>20</sup> 23 CCR § 355.4(b)(9).

<sup>21</sup> 23 CCR § 355.4(b)(10).

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



improve the initial sustainable management criteria as more information and improved methodology becomes available.

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

---

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

Statement of Findings  
Big Valley Basin (No. 5-004)

February 27, 2025

Accordingly, the 2024 GSP submitted by the Agencies for the Big Valley Basin is hereby **APPROVED**. The recommended corrective actions identified in the Staff Report will assist the Department's future review of the Plan's implementation for consistency with SGMA and the Department therefore recommends the Agencies address them in the next Periodic Evaluation, which is set to be submitted by January 27, 2027, as required by Water Code § 10733.8. Failure to address the Department's recommended corrective actions before future, subsequent plan evaluations, may lead to a Plan being determined incomplete or inadequate.

Signed:


  
\_\_\_\_\_  
Karla Nemeth, Director  
Date: February 27, 2025

Exhibit A: Groundwater Sustainability Plan Assessment Staff Report – Big Valley Basin

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

Groundwater Basin Name: Big Valley Basin (No. 5-004)  
Submitting Agency: Lassen County Groundwater Sustainability Agency and Modoc County Groundwater Sustainability Agency  
Submittal Type: Revised Plan in Response to Incomplete Determination  
Submittal Date: April 22, 2024  
Recommendation: Approve  
Date: February 27, 2025

---

On April 22, 2024, the Lassen County Groundwater Sustainability Agency and the Modoc County Groundwater Sustainability Agency (collectively referred to as the GSAs or Agencies) resubmitted the Big Valley Groundwater Sustainability Plan (2024 GSP or 2024 Plan) for the Big Valley Basin (Basin) to the Department of Water Resources (Department or DWR) for evaluation and assessment as required by the Sustainable Groundwater Management Act (SGMA)<sup>1</sup> and GSP Regulations.<sup>2</sup> This was in response to the Department’s Incomplete Determination of the initial GSP (2022 GSP or 2022 Plan) on October 26, 2023.<sup>3</sup>

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

Overall, Department staff believe the 2024 Plan contains the required components of a GSP, demonstrates a thorough understanding of the Basin based on what appears to be the best available science and information, sets well explained, supported, and reasonable sustainable management criteria to prevent undesirable results as defined in the Plan, and proposes a set of projects and management actions that, if successfully implemented, are likely achieve the sustainability goal defined for the Basin.<sup>4</sup> Department staff will continue to monitor and evaluate the Basin’s progress toward achieving the

---

<sup>1</sup> Water Code § 10720 *et seq.*

<sup>2</sup> 23 CCR § 350 *et seq.*

<sup>3</sup> Water Code § 10733.4(b); 23 CCR § 355.4(a)(4); <https://sgma.water.ca.gov/portal/gsp/assessments/140>.

<sup>4</sup> 23 CCR § 354.24.

sustainability goal through annual reporting and future periodic evaluations of the GSP and its implementation.

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

This assessment includes six sections:

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

# 1 SUMMARY

---

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

The GSA has identified areas for improvement of its Plan (e.g., addressing data gaps related to hydrogeological conceptual model, groundwater conditions, and water budgets, incorporating new information into the numerical model, and expanding monitoring networks). Department staff concur that those items are important and recommend the GSA address them as soon as possible. Department staff have also identified additional recommended corrective actions that the GSAs should consider for the first periodic evaluation of the Plan (see Section 6). Addressing these recommended corrective actions will be important to demonstrate, on an ongoing basis, that implementation of the Plan is likely to achieve the sustainability goal. The recommended corrective actions generally focus on the following:

- (1) providing regular updates of overdraft,
- (2) outlining a schedule and providing a plan to fill data gaps in the hydrogeological conceptual model,
- (3) providing more information about the sustainable management criteria for degraded water quality, and,
- (4) establishing sustainable management criteria for land subsidence.

## 2 EVALUATION CRITERIA

---

The Department evaluates whether a Plan conforms to the statutory requirements of SGMA<sup>5</sup> and is likely to achieve the basin's sustainability goal,<sup>6</sup> whether evaluating a basin's first Plan,<sup>7</sup> a Plan previously determined incomplete,<sup>8</sup> an amended Plan,<sup>9</sup> or a GSA's periodic evaluation to an approved Plan.<sup>10</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>11</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>12</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>13</sup> the Plan or determine the Plan inadequate.<sup>14</sup>

The Department's evaluation and assessment of a Plan previously determined to be incomplete, as presented in this Staff Report, continues to follow Article 6 of the GSP Regulations<sup>15</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>16</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>17</sup>

---

<sup>5</sup> Water Code §§ 10727.2, 10727.4, 10727.6.

<sup>6</sup> Water Code § 10733; 23 CCR § 354.24.

<sup>7</sup> Water Code § 10720.7.

<sup>8</sup> 23 CCR § 355.2(e)(2).

<sup>9</sup> 23 CCR § 355.10.

<sup>10</sup> 23 CCR § 355.6.

<sup>11</sup> Water Code § 10721(v).

<sup>12</sup> Water Code § 10733(c).

<sup>13</sup> 23 CCR §§ 355.2(e)(1).

<sup>14</sup> 23 CCR §§ 355.2(e)(3).

<sup>15</sup> 23 CCR § 355 *et seq.*

<sup>16</sup> 23 CCR § 350 *et seq.*

<sup>17</sup> 23 CCR § 355.4(b).

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

The recommendation to not approve a Plan previously determined to be incomplete and instead determine it to be inadequate signifies that the resubmitted Plan contains significant deficiencies based on one or more of the criteria identified in 23 CCR § 355.4(b), or the GSAs in the basin have not taken sufficient actions to correct the deficiencies previously identified by the Department when it found the Plan incomplete. The Department engages in consultation with the State Water Resources Control Board before finding a Plan inadequate. A Plan determined to be inadequate is subject to the state intervention provisions contained in Chapter 11 of SGMA.<sup>18</sup>

---

<sup>18</sup> Water Code § 10735 *et seq.*

### 3 REQUIRED CONDITIONS

---

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

#### 3.1 INCOMPLETE RESUBMITTAL

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

The Department issued the incomplete determination on October 26, 2023. The GSAs resubmitted the GSP to the Department on April 22, 2024, in compliance with the 180-day deadline.

The GSA has provided a redline/strikeout version of the resubmitted GSP. The redline/strikeout version highlights the changes made from the initial 2022 submission to the 2024 submission.<sup>20</sup>

---

<sup>19</sup> 23 CCR § 355.4(a)(4).

<sup>20</sup> <https://sgma.water.ca.gov/portal/service/gspdocument/download/10051>.



## 4 DEFICIENCY EVALUATION

---

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

In its initial incomplete determination, the Department identified deficiencies in the Plan which precluded the Plan’s approval in October 2023.<sup>21</sup> The GSAs were given 180 days to take corrective actions to remedy the identified deficiencies. Consistent with the GSP Regulations, Department staff are providing an evaluation of the resubmitted Plan to determine if the GSAs have taken sufficient actions to correct the deficiencies identified in the 2022 Plan. For each deficiency, the corrective actions are repeated, the 2022 Plan content is summarized, the 2024 Plan is then described, followed by Department staff’s evaluation.

### 4.1 DEFICIENCY 1: THE GSP DOES NOT INCLUDE A REASONABLE ASSESSMENT OF OVERDRAFT CONDITIONS AND REASONABLE MEANS TO MITIGATE OVERDRAFT.

#### 4.1.1 Corrective Action 1

As described in the Department’s Incomplete Determination released on October 26, 2023, Department staff determined that the GSP failed to provide a reasonable assessment of overdraft conditions or include a reasonable means to mitigate overdraft. The Department provided the following corrective actions for the GSAs to consider and address:

- a) Reevaluate the assessment of overdraft conditions in the Basin. Specifically, the GSAs should examine the assumptions that were used to develop the projected overdraft estimates in the projected water budget considering the results vary greatly from the values reported in the historical and current water budgets and the recent annual report data. The assessment should include the latest information for the Basin to ensure the GSP includes the required projects and management actions to mitigate overdraft in the Basin.
- b) Provide a reasonable means to mitigate the overdraft that is continuing to occur in the Basin. Specifically, the GSAs should describe feasible proposed management actions that are commensurate with the level of understanding of groundwater conditions of the Basin and with sufficient details for Department staff to be able to

---

<sup>21</sup> <https://sgma.water.ca.gov/portal/service/gspdocument/download/9962>.

clearly understand how the Plan's projects and management actions will mitigate overdraft in the Basin under different climate scenarios. For projects and management actions that involve supply augmentation or groundwater recharge, the GSP should clarify whether the source of water would reduce water availability in other parts of the Basin. The Department plans to release guidance on funding in early 2024. The GSAs are encouraged to review the guidance for options to fund projects and management actions.

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

##### *4.1.2.1 Corrective Action 1a – Assessment of Overdraft*

The Department's Incomplete Determination directed the GSAs that the 2022 Plan did not provide a reasonable assessment of overdraft<sup>22</sup> because the 2022 Plan's overdraft estimate of 2,000 acre-feet per year for the projected water budget varied greatly from the 5,000 acre-feet per year and 18,748 acre-feet per year of overdraft estimated for the historical and current water budget conditions, respectively.

In response to the corrective action, the 2024 GSP provides additional analysis<sup>23</sup> that estimates the annual and cumulative change groundwater in storage. The analysis is based on historical and most recent spring groundwater elevation measurements, as required by the GSP Regulations,<sup>24</sup> and aims to describe historical groundwater conditions. However, this additional analysis is not utilized to modify the projected overdraft estimate developed by the water budget tool.<sup>25</sup>

The additional analysis incorporates 2023 groundwater elevation measurements, extending the period of analysis from 1983 to 2023. The analysis also provides a revised estimate of specific yield (6.85 percent average) to calculate the annual and cumulative change in groundwater in storage.<sup>26</sup> The change in storage is determined by calculating the average depth to water for a year based on spring measurements, subtracting the previous year's average depth, multiplying by the Basin's area, and then multiplying by the Basin's specific yield.<sup>27</sup> Details are discussed in [Section 5.2.2](#).

Based on the information provided, the revised average annual change in groundwater in storage in the Basin is 3,200 acre-feet per year over the period of analysis—which represents a loss of storage approximately 30% larger from the estimate provided in the 2022 GSP. The updated historical conditions presented in the 2024 GSP acknowledge that the estimated change in groundwater storage and overdraft experienced in the Basin, based on empirical measurements of spring groundwater elevations, is larger than previously thought in the 2022 GSP. However, the 2024 GSP reiterates that the water budget tool remains the “best available tool currently available to project future

---

<sup>22</sup> 23 CCR § 354.18(b)(5).

<sup>23</sup> 2024 Big Valley GSP Section 5.2, p. 109; Table 5-2, p. 110.

<sup>24</sup> 23 CCR § 354.16(b).

<sup>25</sup> 23 CCR §§ 354.18(b)(5); 354.18(c)(3).

<sup>26</sup> 2024 Big Valley GSP, Section 4.4.5, p. 87; Table 5-2, p. 110.

<sup>27</sup> 2024 Big Valley GSP, Section 5.2, p. 109.

conditions”.<sup>28</sup> The water budget tool estimates the projected overdraft to be 2,000 acre-feet per year.<sup>29</sup> The 2024 GSP explains that the water budget tool, described as a “non-modeling (spreadsheet) approach”<sup>30</sup>, accounts for the movement of land surface, surface water, and groundwater systems. It incorporates estimates such as projected groundwater pumping, water source, and gains/losses to streams, among other factors to estimate future conditions of supply and demand.<sup>31</sup>

The 2024 GSP details key differences between the historical change in groundwater in storage calculated using groundwater elevations and the historical trends depicted by the water budget tool. These differences indicate that the water budget tool tends to overestimate the fluctuations in groundwater storage and overestimates the decline in groundwater storage over the historical period.<sup>32</sup> For instance, the analysis of measured groundwater elevations (and updated estimate of specific yield) approximates annual historical overdraft at 3,800 acre-feet per year<sup>33</sup> from 1984 to 2018, while the water budget tool estimates historical overdraft of approximately 5,000 acre-feet per year<sup>34</sup> for the same period.

Furthermore, the water budget tool is used to project overdraft with climate change using change factors provided by the Department. The change factors are applied to projected precipitation, evapotranspiration, and streamflow information to estimate anticipated climate change by 2070. The 2024 GSP states that with change factors applied, the water budget tool estimates a projected overdraft of 1,000 acre-feet per year.<sup>35</sup>

Additionally, the 2024 GSP provides updated and revised information for a suite of projects and management actions (see [Section 4.1.2.2](#) of this Staff Report) that are likely to address the projected overdraft of 2,000 acre-feet per year. For instance, the GSAs initiated a water availability analysis in 2022 for agriculture manage aquifer recharge as part of the Basin Recharge Projects.<sup>36</sup> This analysis estimates the average annual recharge benefit could be 800 acre-feet per year, which could significantly reduce the projected overdraft by nearly half. Furthermore, the 2024 GSP suggests that irrigation efficiency across the Basin could improve by 5 to 10 percent, resulting in a net benefit to the groundwater Basin of approximately 1,000 to 2,000 acre-feet per year. However, while this information is presented as part of the Water Conservation Projects description, a detailed project schedule is not provided.<sup>37</sup>

---

<sup>28</sup> 2024 Big Valley GSP, Section 9, p. 184.

<sup>29</sup> 2024 Big Valley GSP, Figure 6-9, p. 149.

<sup>30</sup> 2024 Big Valley GSP, Section 6.1, p. 142.

<sup>31</sup> 2024 Big Valley GSP, Appendix 6A, pp. 403-408.

<sup>32</sup> 2024 Big Valley GSP, Section 6.1, p. 147.

<sup>33</sup> 2024 Big Valley GSP, Table 5-2, p. 110.

<sup>34</sup> 2024 Big Valley GSP, Section 6.2, p. 148.

<sup>35</sup> 2024 Big Valley GSP, Section 6.4.2, p. 150.

<sup>36</sup> 2024 Big Valley GSP, Section 9.1, pp. 192-196.

<sup>37</sup> 2024 Big Valley GSP, Section 9.5.1, p. 209.

The 2024 GSP provides a reasonable discussion justifying the use of the water budget tool to estimate future overdraft, analyzing the uncertainty associated with the tool, and have detailed a suite of planned projects and management actions. The GSAs are also considering additional projects to address overdraft which may be implemented based on Basin conditions, The 2024 GSP quantifies the potential benefit from projects and management actions and, though not all details are provided at this time, they appear to potentially be sufficient to mitigate overdraft.

Department staff question the effectiveness of the GSAs continuing to utilize the non-modeling spreadsheet method to calculate change in storage. The 2024 GSP provides details for land system, surface water system, and groundwater system components of the water budget in Appendix 6A and includes information such as data sources, assumptions, and relative level of precision. Unknown or roughly estimated water budget components are adjusted within acceptable ranges until the budget is balanced and all components are deemed reasonable.<sup>38</sup> In most instances, the relative precision of component estimates are “Moderate” or “Low”, with nearly half of the components having a “Low” level of precision.<sup>39</sup> The 2024 GSP states water source (surface water and/or groundwater) and use are based on input from local landowners, an assessment of surface water rights, well drilling records, aerial imagery, and evapotranspiration.<sup>40</sup> The 2024 GSP also notes that despite efforts to improve estimates of water source, significant inaccuracies and further refinement of the water source dataset are needed.<sup>41</sup> Notably, the 2024 GSP includes placeholders for groundwater loss to stream, assuming this component is equal to zero. These concerns were also raised during the review of the 2022 GSP as the water budget method estimates did not align with the actual overdraft values reported in recent annual reports.

GSP Regulations do not require the use of a numerical model; however, the Plan is still required to utilize an equally effective method that relies on the best available information and best available science to provide an understanding of projected hydrology.<sup>42</sup> Therefore, Department staff recommend that the GSAs provide a robust and accurate assessment of overdraft in annual reports<sup>43</sup>, a comparison of recently reported overdraft values to projected values from the water budget tool, actual benefits from projects, and a description of additional reasonable, feasible projects or management actions that the GSAs will implement for the mitigation of unmitigated levels of overdraft<sup>44</sup>, as needed (see [Recommended Corrective Action 1](#)).

Despite the recommended corrective action, Department staff believe the GSAs’ revisions to overdraft are a reasonable assessment to determine the required set of projects and

---

<sup>38</sup> 2024 Big Valley GSP, Section 6.1, p. 142.

<sup>39</sup> 2024 Big Valley GSP, Appendix 6A, pp. 403-408.

<sup>40</sup> 2024 Big Valley GSP, Section 6.2, p. 145.

<sup>41</sup> 2024 Big Valley GSP, Section 6.2, p. 145.

<sup>42</sup> 23 CCR § 354.18(e).

<sup>43</sup> 23 CCR §§ 356.2(b)(5)(A-B).

<sup>44</sup> 23 CCR § 354.44(b)(2).

management actions to mitigate overdraft in the Basin because the GSAs have justified the use of the water budget tool to estimate overdraft, have selected the more conservative estimate based on climate change factors, and have provided a suite of projects and management actions to mitigate estimated future overdraft with additional potential projects to be implemented based on actual conditions.

Based on the information provided, Department staff conclude the 2024 GSP sufficiently addresses Component 1a of the Deficiency.

#### *4.1.2.2 Corrective Action 1b – Means to Mitigate Overdraft*

The Department’s Incomplete Determination directed the GSAs that the Plan did not provide a reasonable means to mitigate overdraft because the information provided lacked specific details such as timelines or schedules, expected benefits, and funding sources.<sup>45</sup>

In response to the corrective action, the 2024 GSP provides sufficient details on the general timeline, schedule, and expected benefit from projects with supporting analysis. Two categories of projects, the Basin Recharge Projects, and the Water Conservation Projects, are planned to be implemented in the “shorter term”<sup>46</sup> (i.e., within 2 years)<sup>47</sup> and expected to have a cumulative benefit of around 2,800 acre-feet per year, a volume sufficient to address estimated Basin overdraft. The 2024 Plan references the SGMA Implementation Grant that Modoc County acquired in 2023 to fund several of the described projects and management actions. Specifically, the \$2,640,000 grant objective included a water availability analysis for groundwater recharge projects, a feasibility study for the potential of expanding existing reservoirs, and public outreach to all beneficial users in the Basin for engagement in GSP implementation.<sup>48</sup>

For Basin Recharge Projects, the GSAs initiated the development of a water availability analysis for a temporary water right diversion permit in 2022.<sup>49</sup> The 2024 GSP states that the analysis is expected to be completed in 2024 and a pilot project for agricultural managed aquifer recharge could begin in 2025.<sup>50</sup> The expected recharge benefit from the agricultural managed aquifer recharge is estimated to be 800 acre-feet per year or nearly half of the estimated Basin overdraft.

The Water Conservation Projects are also planned to be implemented in the *shorter term* but are described as largely voluntary. The 2024 GSP explains how high irrigation water and water application costs can account for approximately 30 percent of total operating costs for users in the Basin and highlights how the type of irrigation, maintenance of the system, controlling quantity and timing of irrigation, and crop selection can increase

---

<sup>45</sup> 23 CCR § 354.44(b)(2).

<sup>46</sup> 2024 Big Valley GSP, Section 9, p. 185.

<sup>47</sup> 2024 Big Valley GSP, Table 9-2, p. 188.

<sup>48</sup> 2024 Big Valley GSP, Section 10.7, p. 228.

<sup>49</sup> 2024 Big Valley GSP, Section 9.1, p. 192; Appendix 12, pp., 649-673.

<sup>50</sup> 2024 Big Valley GSP, Table 9-3, p. 189.

efficiency; however, the examples were not specific to the Basin.<sup>51</sup> The estimated benefit from Water Conservation Projects could be up to 2,000 acre-feet per year but specific milestones are not provided in the 2024 GSP.<sup>52</sup> The GSAs assert that public outreach and education for water conservation activities is a lower-cost action that can have an immediate impact and identify education outreach via U.C. Cooperative Extension, technical support from Natural Resources Conservation Services, and cost-share and grant programs as critical to supporting water use efficiency measures.<sup>53</sup>

The 2024 Plan also provides details for additional projects and management actions that can address additional overdraft with an estimated benefit at full completion of over 2,300 acre-feet per year.<sup>54</sup> These projects and management actions include ongoing and long-term efforts such as upland forest recharge enhancement, increasing reservoir storage capacity, and a domestic well mitigation program ([see Section 4.2.2.1](#)). Additionally, the GSAs have made progress on projects to improve the understanding of the Basin with research and data development projects including, the installation of a CIMIS station in 2023 in Nubieber, calibrating local steam gages, and incrementally improving land use and water source mapping.<sup>55</sup>

Overall, Department staff believe the GSAs' revisions to projects and management actions in the Plan are a reasonable means to mitigate overdraft because the 2024 Plan provides specific details such as timelines, schedules, and expected benefits from projects alongside a description of a potential funding source to implement required projects. Specific timelines and quantification of expected benefits were not provided in the 2022 Plan and represent a significant improvement for the Plan.

Based on the information provided, Department staff conclude the 2024 GSP sufficiently addresses Component 1b of the Deficiency.

#### **4.1.3 Conclusion**

Overall, Department staff believe the GSAs have taken sufficient action to address the identified deficiencies by providing a reasonable assessment of overdraft and providing a reasonable means to mitigate overdraft. The justification to use the water budget tool to estimate projected overdraft in the Basin appears to be reasonable and supported by sufficiently detailed analysis. Additionally, the suite of projects is described in sufficient detail, and with sufficient supporting analysis for Department staff to assess that the Plan has provided a reasonable means to mitigate projected overdraft.

---

<sup>51</sup> 2024 Big Valley GSP, Section 9.5.1, pp. 209-210.

<sup>52</sup> 2024 Big Valley GSP, Table 9-3, p. 190.

<sup>53</sup> 2024 Big Valley GSP, Table 9-3, p. 190; Section 9.5.1, p. 210.

<sup>54</sup> 2024 Big Valley GSP, Table 9-3, p. 189-191.

<sup>55</sup> 2024 Big Valley GSP, Section 9.2.2, pp. 197-198; 2023 Annual Report, p. 25.

## **4.2 DEFICIENCY 2: THE GSP DOES NOT ESTABLISH SUSTAINABLE MANAGEMENT CRITERIA FOR CHRONIC LOWERING OF GROUNDWATER LEVELS IN A MANNER SUBSTANTIALLY COMPLIANT WITH THE GSP REGULATIONS.**

### **4.2.1 Corrective Action 2**

As described in the Department's Incomplete Determination released on October 26, 2023, Department staff determined the 2022 GSP did not provide a thorough explanation and justification regarding the selection of the sustainable management criteria for groundwater levels, particularly undesirable results and minimum thresholds, and did not quantitatively describe the effects of those criteria on the interests of beneficial uses and users of groundwater.

Department staff recommended the GSAs consider and address the following:

- a. Refine the description of undesirable results to clearly describe the significant and unreasonable conditions the GSAs are managing the Basin to avoid. This must include a quantitative description of the negative effects to all beneficial uses and users that would be experienced at undesirable result conditions.<sup>56</sup> The GSAs should fully disclose, describe, and explain the rationale for determining the number of wells that may be dewatered and the level of impacts that may occur without rising to significant and unreasonable levels constituting undesirable results. Lastly, the GSAs should explain how well mitigation will be considered by the GSAs during management of the Basin in a project or management action as part of the GSP. Department staff also encourage the GSAs to review the Department's April 2023 guidance document titled *Considerations for Identifying and Addressing Drinking Water Well Impacts*.<sup>57</sup>
- b. The GSAs should revise minimum thresholds to be set at the level where the depletion of supply across the Basin may lead to undesirable results<sup>58</sup> and provide the criteria used to establish and justify minimum thresholds.<sup>59</sup> Fully document the justifications and analysis performed to establish the criteria used to establish minimum thresholds. Clearly show each step of the analysis and provide supporting information used in the analysis.<sup>60</sup>
- c. Provide an evaluation of how minimum thresholds may affect the interests of beneficial uses and users of groundwater, as well as land uses and property interests.<sup>61</sup> Identify the number and location of wells that may be negatively affected when minimum thresholds are reached. Compare well infrastructure for all well types in the Basin with minimum thresholds at nearby representative

---

<sup>56</sup> 23 CCR § 354.28 (b)(3).

<sup>57</sup> <https://water.ca.gov/Programs/Groundwater-Management/Drinking-Water-Well>

<sup>58</sup> 23 CCR § 354.28 (c)(1).

<sup>59</sup> 23 CCR § 354.28 (a).

<sup>60</sup> 23 CCR § 354.28 (b)(1).

<sup>61</sup> 23 CCR 354.28 (b)(4).

monitoring sites. Document all assumptions and steps clearly so it will be understood by readers of the GSP. Include maps of potentially affected well locations, identify the number of potentially affected wells by well type, and provide a supporting discussion of the effects.

#### 4.2.2 Evaluation of Resubmitted Plan

##### 4.2.2.1 Corrective Action 2a – Assessment of Undesirable Results and Potential Effects

The Department's Incomplete Determination directed the GSAs that the 2022 Plan did not consider all beneficial uses and users when defining undesirable results and was unspecific regarding the potential effects that would be considered significant and unreasonable<sup>62</sup> or how those effects would be mitigated.

In response to the corrective action, the GSAs supplemented their definition of undesirable results from only considering the cost of pumping water for agricultural use to including consideration of well impacts to domestic, public supply, and agricultural wells. Specifically, the 2024 Plan states:

“Undesirable results identified included (1) domestic, agricultural, and public wells going dry, experiencing reduced capacity, requiring lowering of pumps, or requiring deeper well installations, (2) depletion of supply leading to agriculture becoming economically unviable, and (3) adverse impacts to wildlife and recreational activities.”<sup>63</sup>

The 2024 Plan supports this definition with a well impact analysis (see [Section 4.2.2.3](#)) that quantitatively describes the potential effects to domestic, agricultural, and public wells that constitute an undesirable result. The 2024 Plan definition added “impacts to wildlife and recreational activities” as a consideration to define undesirable results which implies consideration of environmental uses and users. The 2024 Plan reviews the natural communities commonly associated with groundwater (NCAAG) dataset and identifies freshwater wetlands, wet meadows, and willow as groundwater dependent ecosystems.<sup>64</sup> However, details describing any specific potential effects<sup>65</sup> that would constitute an undesirable result for these uses and users are not provided in the 2024 Plan. Department staff recommend the GSAs thoroughly consider these beneficial users and define the specific potential effects that constitute an undesirable result for environmental uses and users (see [Recommended Corrective Action 2](#)).

The 2024 Plan also revises the definition of when and where undesirable results would occur to one-third of representative monitoring wells falling below the minimum threshold for three consecutive years; a more responsive improvement from the original 2022 Plan definition utilizing a lengthy five-year period.<sup>66</sup> The 2024 GSP revision is a significant

---

<sup>62</sup> 23 CCR 354.26 (b)(3).

<sup>63</sup> 2024 Big Valley GSP, Section 7.3.1, p. 155.

<sup>64</sup> 2024 Big Valley GSP, Section 5.7, p. 138.

<sup>65</sup> 23 CCR 354.26 (b)(3).

<sup>66</sup> 2024 Big Valley GSP, Section 7.3.1, p. 156.



improvement in how the Plan defines the specific conditions the GSAs are managing the Basin to avoid. The 2024 GSP considers the effects to the shallowest and, therefore, likely the most vulnerable well infrastructure for groundwater use in the Basin and quantitatively defines the significant and unreasonable condition that would constitute an undesirable result.

Results of the well impact analysis indicate that 15 domestic wells or three agricultural wells going dry constitutes an undesirable result in the Basin; no public supply wells should go dry.<sup>67</sup> The 2024 GSP adds that “[t]he potential effect could be offset by a shallow well mitigation program, which would apply to domestic wells that have gone dry because water levels have fallen below the measurable objective.”<sup>68</sup> As stated in the 2024 GSP, “[a] domestic well mitigation program will be developed by the GSAs to support domestic well owners if their well goes dry or the quality of groundwater degrades due to the chronic lowering of groundwater levels.”<sup>69</sup> The estimated cost for the mitigation program is \$750,000 with potential funding from federal, state, and local sources.<sup>70</sup> The Plan acknowledges development of the program may take 2-10 years<sup>71</sup> and that many of the details have yet to be formulated<sup>72</sup>. While details of the program are being developed, Department staff encourage the GSAs to reconsider the proposed criteria that may require undesirable results to have occurred in the Basin or require groundwater levels in the vicinity of the domestic well to be below the minimum threshold to determine eligibility.<sup>73</sup> Given the Plan’s definition of undesirable results requires three consecutive years of groundwater levels exceeding minimum thresholds, it is likely that an affected water supply well, such as a domestic well, will remain dewatered for an extended period of time leaving uses and users dependent on such a well without water supply for multiple years. Therefore, Department staff recommend the GSAs should instead base eligibility requirements for the mitigation program on groundwater conditions and rely primarily on factors related to depletion of supply such as loss in well production capacity related to declining water levels.

Overall, Department staff believe the GSAs’ revisions to sustainable management criteria and projects and management actions in the Plan sufficiently consider beneficial uses and users of groundwater in the Basin when defining undesirable results. Additionally, the 2024 GSP provides an outline for a well mitigation program that GSAs will implement to mitigate domestic wells going dry due to declining groundwater levels. Specific details for the plan are being developed and staff encourage the GSAs to base the eligibility criteria for the program on effects caused by groundwater conditions.

---

<sup>67</sup> 2024 Big Valley GSP, Figure 7-5, p. 162.

<sup>68</sup> 2024 Big Valley GSP, Section 7.3.1, p. 164.

<sup>69</sup> 2024 Big Valley GSP, Section 9.7, p. 212.

<sup>70</sup> 2024 Big Valley GSP, Table 9-3, p. 191 and Section 9.7, p. 213.

<sup>71</sup> 2024 Big Valley GSP, Table 9-3, p. 191.

<sup>72</sup> 2024 Big Valley GSP, Section 9.7, p. 212.

<sup>73</sup> 2024 Big Valley GSP, Section 9.7, p. 214.

Based on the information provided, Department staff conclude the 2024 GSP sufficiently addresses Component 2a of the Deficiency.

#### *4.2.2.2 Corrective Action 2b – Minimum Thresholds Indicating Depletion of Supply*

The Department's Incomplete Determination directed the GSAs that the 2022 Plan minimum thresholds were developed at "the level where the energy cost to lift groundwater exceeds the economic value of the water for agriculture"<sup>74</sup> and not developed to represent a depletion of supply that would lead to undesirable results.<sup>75</sup>

In response to the corrective action, minimum thresholds in the 2024 Plan are revised to levels for most monitoring sites by raising by approximately 90 feet across the Basin. Specifically, minimum thresholds in the 2024 Plan are established 50 feet below—compared to 140 feet below—the spring 2015 or spring 2022 groundwater elevations. The spring 2022 measurement is used, as the 2024 GSP explains if the monitoring well was built after 2015, and spring 2022 measurements are stated to be generally higher than spring 2015.<sup>76</sup> A review of the hydrographs provided<sup>77</sup> shows this assertion to be generally true. The 2024 Plan also justifies the established minimum thresholds with a well impact analysis (see [Section 4.2.2.3](#)) that projects the number and location of wells that would go dry at minimum thresholds and relates the impact to the potential effects that constitute undesirable results. Further details of the monitoring network are assessed in [Section 5.4](#).

Department staff note that the minimum thresholds are established near historical lows based on a review of the contour maps and hydrographs provided. Department staff conclude that by revising the minimum threshold to be set at or near historical lows experienced near 2015, the GSAs are attempting to provide criteria to establish and justify minimum thresholds that represent the level where depletion of supply across the Basin may lead to undesirable results. Using a recent historic low measurement at the minimum threshold should limit new dry wells from occurring should the GSAs manage the Basin to maintain levels above the minimum thresholds, as there is no further lowering of the water table that may impact wells into the future.

Overall, Department staff believe this revision represents a substantial improvement over the 2022 GSP because the 2024 Plan establishes minimum thresholds to avoid significant and unreasonable effects to beneficial uses and users as defined in the Plan and justifies minimum thresholds with an analysis of minimum thresholds causing a depletion of supply.

Based on the information provided, Department staff conclude the 2024 GSP sufficiently addresses Component 2b of the Deficiency.

---

<sup>74</sup> 2022 Big Valley GSP, Section 7.3.1., p. 141.

<sup>75</sup> 23 CCR 354.28 (c)(1).

<sup>76</sup> 2024 Big Valley GSP, Section 7.3.1, p. 156.

<sup>77</sup> 2024 Big Valley GSP, Appendix 5A, pp. 302-324.

#### 4.2.2.3 Corrective Action 2c – Evaluation of Effects to Beneficial Uses and Users

The Department's Incomplete Determination directed the GSAs that while the 2022 Plan evaluated the effects to agricultural uses, the Plan did not evaluate the effects of minimum thresholds on other beneficial uses and users of groundwater.<sup>78</sup> Therefore, the Department recommended the GSAs take action to revise the Plan to include an evaluation which considers the affect to interests of all beneficial uses and users of groundwater, including land uses and property interests.<sup>79</sup>

In response to the corrective action, the 2024 Plan provided a detailed and thorough well impact analysis that demonstrates that the Plan has reasonably considered beneficial uses and users. The 2024 Plan utilizes the Department's Online Well Completion Report (OSWCR) database information and evaluates the impacts to wells with known construction information, comparing total depth of the well to minimum thresholds.<sup>80</sup> The OSWCR database has a record of 125 domestic, 197 irrigation, and 4 public supply wells. The results of the analysis indicate that 15 domestic, 3 irrigation, and no public supply wells would go dry when groundwater levels fall to minimum thresholds.<sup>81</sup> The 2024 GSP also provides maps with locations of wells that would be dry at minimum thresholds.<sup>82</sup> Minimum thresholds in the 2024 Plan significantly limit the number of impacted wells in the Basin compared to the 2022 GSP. The revision equates to reducing well impacts from 25% to 8% of total wells in the analysis. Additionally, while the 2022 GSP provided no details on mitigation strategies, the 2024 Plan proposes a Domestic Well Mitigation Program (see [Section 4.2.2.1](#)).

Overall, Department staff believe the revisions provided in the 2024 Plan demonstrate that the GSAs have thoroughly considered beneficial uses and users of groundwater. The well impact analysis provides an evaluation of effects to beneficial uses and users that is sufficiently detailed and thorough because the 2024 Plan clearly provides the number and type of wells projected to be impacted, explains the details of the well inventory used for the analysis, maps the location of vulnerable domestic wells, and provides details on a domestic well mitigation program that will be developed by the GSAs to support well owners affected by chronic lowering of groundwater levels.

Based on the information provided, Department staff conclude the 2024 GSP sufficiently addresses Component 2c of the Deficiency.

#### 4.2.3 Conclusion

Overall, Department staff believe the GSAs have taken sufficient action to address the identified deficiencies by providing a definition of undesirable results and minimum thresholds that reasonably consider how the criteria will affect beneficial uses and users of groundwater in the Basin and represent a depletion to supply. The well impact analysis

---

<sup>78</sup> 23 CCR 355.4 (b)(4)

<sup>79</sup> 23 CCR 354.28 (b)(4).

<sup>80</sup> 2024 Big Valley GSP, Section 7.3.1, p. 157.

<sup>81</sup> 2024 Big Valley GSP, Figure 7-5, p. 162.

<sup>82</sup> 2024 Big Valley GSP, Figure 7-6, p. 163.

provided in support of undesirable results and minimum thresholds appears to reasonably and thoroughly describe the projected impact to well infrastructure from planned groundwater management.

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

#### **4.3.1 Corrective Action 1**

As described in the Department's Staff Report released on October 26, 2023, Department staff determined the 2022 GSP did not establish sustainable management criteria for degraded water quality, as required in the GSP Regulations<sup>83</sup>, based on the best available information and science.

Department staff recommended the GSAs consider and address the following:

- a. The GSAs should evaluate the occurrence of constituents of concern in the Basin, to either explain why each constituent of concern is not likely to affect sustainability or cause undesirable results in the Basin or, alternatively, the GSAs should include monitoring and sustainable management criteria for each constituent of concern, which would allow the GSAs to develop an understanding of the connection between pumping in the Basin and the migration or concentration of constituents of concern over the GSP's planning and implementation horizon.
- b. Department staff also encouraged the GSAs to continue coordinating with the appropriate groundwater users, including drinking water, environmental, and agricultural users as identified in the Plan, and water quality regulatory agencies and programs in the Basin to understand and develop a process for determining if groundwater management and extraction is resulting in migration or concentration of constituents of concern or degraded water quality in the Basin.

#### **4.3.2 Evaluation of Resubmitted Plan**

In response to the identified deficiencies, the GSAs have supplemented portions of the Plan related to groundwater conditions<sup>84</sup> with an assessment of more recent monitoring data and developed sustainable management criteria<sup>85</sup> for degraded water quality.

Current and historical groundwater quality conditions in the Basin are described based on information from the state water Groundwater Ambient Monitoring and Assessment Groundwater Information System (also known as GAMA GIS), primarily spanning 1983 to 2023.<sup>86</sup> The Plan discusses arsenic, iron, manganese, nitrate (as N), Perfluorooctanesulfonic Acid (PFOS), and specific conductance and total dissolved solids (TDS) as constituents to consider given recorded exceedances above acceptable levels.

---

<sup>83</sup> 23 CCR §§ 354.26, 354.28, 354.30.

<sup>84</sup> 2024 Big Valley GSP, Section 5.4, pp. 112-131.

<sup>85</sup> 2024 Big Valley GSP, Section 7.3.4, pp. 165-168.

<sup>86</sup> 2024 Big Valley GSP, Table 5-3, p. 115 and Table 5-4, p. 116.

From 2004 to 2023, the 2024 Plan reports there have been concentrations in the Basin above the maximum contaminant level (MCL) for arsenic (2 of 18 wells), iron (9 of 16 wells), and manganese (11 of 16 wells).<sup>87</sup> On the contrary, Nitrate has not been detected above the MCL in the Basin since 1978, nearly 45 years ago.<sup>88</sup> TDS levels above the secondary MCL have not been detected in the Basin since 1983 and generally show a decreasing trend over the last 40 years.<sup>89</sup> PFOS was detected in two wells on December 12, 2019, and the areas around these wells were assigned as high water quality risk for domestic wells and state small water systems by the State Water Board in their 2024 assessment; samples collected before and after December 12, 2019, measured below the notification level and the 2024 Plan asserts that the anomaly is most likely due to “inadvertently introducing PFOS during sample collection, transport, or analysis.”<sup>90</sup> The revisions in the 2024 Plan provide a reasonable explanation, supported by recent, comprehensive information and science for how relevant constituents of concern in the Basin are determined.

Unlike the 2022 Plan, the 2024 Plan establishes sustainable management criteria, defining the undesirable result for degraded water quality as “when the degradation of quality results in significant and undesirable impacts to the long-term viability of agriculture, community, domestic, and natural/wildlife uses in the Basin.”<sup>91</sup> Minimum thresholds to avoid undesirable results are established following the state’s drinking water standards and are set based on the maximum contaminant level: 500 milligrams per liter (mg/L) for TDS (secondary MCL) and 10 mg/L for nitrate (primary MCL).<sup>92</sup> Additionally, the 2024 Plan defines three or more wells with a TDS and/or nitrate measurements that are above the MCL for three consecutive years as the criteria to determine when and where the effects of groundwater conditions cause undesirable results in the Basin.<sup>93</sup> The 2024 GSP states this “occurrence would indicate changed conditions that would require management actions” but does not provide the rationale to support this claim. Measurable objectives are established at the current quality, which is about 300 mg/L for TDS and less than 1 mg/L for nitrate.<sup>94</sup> The establishment of sustainable management criteria that considers local and state water quality standards represents significant action in response to the Department’s identified deficiency.

The 2024 Plan asserts most constituents are naturally occurring<sup>95</sup> and, therefore, sustainable management criteria “should be developed for TDS and nitrate [only] due to their nexus to the sustainability goal, the definition of undesirable results regarding groundwater quality, and the ability of the GSAs to measurably impact TDS and nitrate

---

<sup>87</sup> 2024 Big Valley GSP, Section 5.4.1, p. 117.

<sup>88</sup> 2024 Big Valley GSP, Section 5.4.1, p. 120.

<sup>89</sup> 2024 Big Valley GSP, Section 5.4.1, p. 122.

<sup>90</sup> 2024 Big Valley GSP, Section 5.4.1, p. 128.

<sup>91</sup> 2024 Big Valley GSP, Section 7.3.4, p. 166.

<sup>92</sup> 2024 Big Valley GSP, Section 7.3.4, p. 167.

<sup>93</sup> 2024 Big Valley GSP, Section 7.3.4, p. 167.

<sup>94</sup> 2024 Big Valley GSP, Section 7.3.4, p. 167.

<sup>95</sup> 2024 Big Valley GSP, Section 5.4.1, p. 117.

via PMAs.”<sup>96</sup> Department staff understand that the GSAs are not responsible for improving the degraded water quality conditions that existed before SGMA was enacted. However, the GSAs are required to manage the Basin to not exacerbate the existing degraded water quality conditions, whether it is caused by natural occurrences or human activities. Department staff recommend that the GSAs should provide additional justification and explanation for how water quality constituents of concern, other than TDS, will be managed and monitored, and how impacts to beneficial uses and users will be addressed should there be degradation of water quality during plan implementation. The GSAs should also consider developing sustainable management criteria for additional water quality constituents (see [Recommended Corrective Action 3a](#)).

A monitoring network is established in the 2024 Plan which consists of 4 wells regulated by the State Water Board’s Division of Drinking Water (DDW) and 3 wells installed by the GSAs to measure electrical conductivity (EC) and specific conductance (SC), which is used as a proxy for TDS. Given that the GSAs will rely on data from monitoring wells managed by DDW, Department staff recommend that the GSAs coordinate with the appropriate water quality regulatory programs and agencies in the Basin to understand and develop a process for determining when groundwater management and extraction is resulting in degraded water quality in the Basin (see [Recommended Corrective Action 3b](#)).

#### **4.3.3 Conclusion**

Overall, Department staff believe the GSAs have taken sufficient action to address the identified deficiency by providing a reasonable assessment of current groundwater quality issues in the Basin, establishing sustainable management criteria based on MCLs for TDS and nitrate, and establishing a network to monitor degraded water quality using a combination of DDW and the GSAs wells.

---

<sup>96</sup> 2024 Big Valley GSP, Section 7.3.4, p. 167.

## 5 PLAN EVALUATION

---

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

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

### 5.1 ADMINISTRATIVE INFORMATION

The GSP Regulations require each Plan to include administrative information identifying the submitting Agency, its decision-making process, and its legal authority;<sup>97</sup> a description of the Plan area and identification of beneficial uses and users in the Plan area;<sup>98</sup> and a description of the ability of the submitting Agency to develop and implement a Plan for that area.<sup>99</sup>

The 2024 GSP describes the GSAs, discusses their decision-making process, and provides their legal authority;<sup>100</sup> a description of the Plan area and identification of beneficial uses and users in the Plan area;<sup>101</sup> and a description of the ability of the submitting Agencies to develop and implement a Plan for that area.<sup>102</sup>

The two GSAs, Lassen and Modoc counties, were established in 2017 as required by the SGMA legislation. In 2019, the GSAs executed a Memorandum of Understanding establishing the Big Valley Basin Advisory Committee (BVAC). The Memorandum of Understanding is provided as Appendix 2B in the 2024 GSP.<sup>103</sup> The BVAC is responsible for providing formalized, local stakeholder input and guidance to the GSAs’ governing bodies, GSAs’ staff, and consultants in developing and implementing the GSP.<sup>104</sup> The 2024 GSP lists one Lassen County GSA staff representative, Gaylon Norwood, as the GSP Plan Manager.<sup>105</sup>

---

<sup>97</sup> 23 CCR § 354.6 *et seq.*

<sup>98</sup> 23 CCR § 354.8 *et seq.*

<sup>99</sup> 23 CCR § 354.6(e).

<sup>100</sup> 2024 Big Valley GSP, Section 2, pp. 35-36.

<sup>101</sup> 2024 Big Valley GSP, Section 3, pp. 37-71.

<sup>102</sup> 2024 Big Valley GSP, Section 2, p. 36; Appendix 2A, pp. 262-269; Appendix 2B, pp. 270-286.

<sup>103</sup> 2024 Big Valley GSP, Appendix 2B, pp. 270-286.

<sup>104</sup> 2024 Big Valley GSP, Section 2.2, p. 35.

<sup>105</sup> 2024 Big Valley GSP, Section 2.3, p. 36.

The 2024 GSP briefly describes the legal authority of the GSAs stating the GSAs were formed in accordance with CWC §10723 *et seq.* and—as counties—have land-use responsibility in the Basin area.<sup>106</sup> Cost is a “fundamental concern to the GSAs”<sup>107</sup> and the counties are described as disadvantaged communities with declining populations that have no ability to cover the costs of GSP development and implementation. Therefore, the GSAs will rely on outside funding for the Basin’s “unfunded mandated Plan.”<sup>108</sup> The 2024 GSP provides implementation costs based on statistics for GSPs submitted to the Department in 2020, which was the statutory deadline for critically overdrafted basins to submit GSPs.<sup>109</sup> These cost estimates summarize the information presented in the 2020 GSPs and are not specific to the Basin. Department staff recommend that GSAs provide an estimate of the cost of implementing the 2024 Plan and a general description of how the GSAs plan to meet those costs as required by the GSP Regulations<sup>110</sup> (see [Recommended Corrective Action 4](#)).

The 2024 GSP provides a description of the Plan area. The medium priority Basin (DWR Basin No. 5-004) is located within Modoc County and Lassen County, encompassing an area of about 144 square miles or 92,057 acres in northeastern California (Figure 1).<sup>111</sup> The 2024 GSP describes the Basin as being located in one of the most remote and untouched areas of the state, full of rich biodiversity of wildlife and native species.<sup>112</sup> The Pit River is the largest stream and only surface-water outflow in the Basin.<sup>113</sup>

Utilizing land use data from 2016, the 2024 GSP organizes the Basin by water use sector into the following: (1) Community (250 acres or <1% by area); (2) Industrial (196 acres or <1%); (3) Agricultural (22,246 acres or 24%); (4) State Wildlife Area (14,583 acres or 16%); (5) Managed Recharge (0 acres or 0%); (6) Native Vegetation and Rural Domestic (54,782 acres or 60%).<sup>114</sup> The Basin has two water source types: groundwater and surface water; recycled water and desalinated water are not formally utilized in the Basin though informal reuse of irrigation water occurs with capture and reuse of tail water by farmers and ranchers.<sup>115</sup> No imported water supplies exist within the Basin as all surface water used in the Basin originates in the Pit River watershed.<sup>116</sup> Maps depicting water use sectors, water source types, and well density for domestic, production, and public supply wells are provided in the 2024 GSP.<sup>117</sup>

---

<sup>106</sup> 2024 Big Valley GSP, Section 2.4, p. 36.

<sup>107</sup> 2024 Big Valley GSP, Executive Summary, p. 24.

<sup>108</sup> 2024 Big Valley GSP, Executive Summary, p. 24.

<sup>109</sup> 2024 Big Valley GSP, Table 10-3, p. 226.

<sup>110</sup> 23 CCR § 354.6(e).

<sup>111</sup> 2024 Big Valley GSP, Section 3.1, p. 37.

<sup>112</sup> 2024 Big Valley GSP, Section 1.1, pp. 25-27.

<sup>113</sup> 2024 Big Valley GSP, Section 1.1, p. 25.

<sup>114</sup> 2024 Big Valley GSP, Table 3-2, p. 45.

<sup>115</sup> 2024 Big Valley GSP, Section 3.3.1, p. 47.

<sup>116</sup> 2024 Big Valley GSP, Section 4.10, p. 99.

<sup>117</sup> 2024 Big Valley GSP, Figure 3-5, p. 46; Figure 3-6, p. 48; Figures 3-7 to Figure 3-9, pp. 50-53.



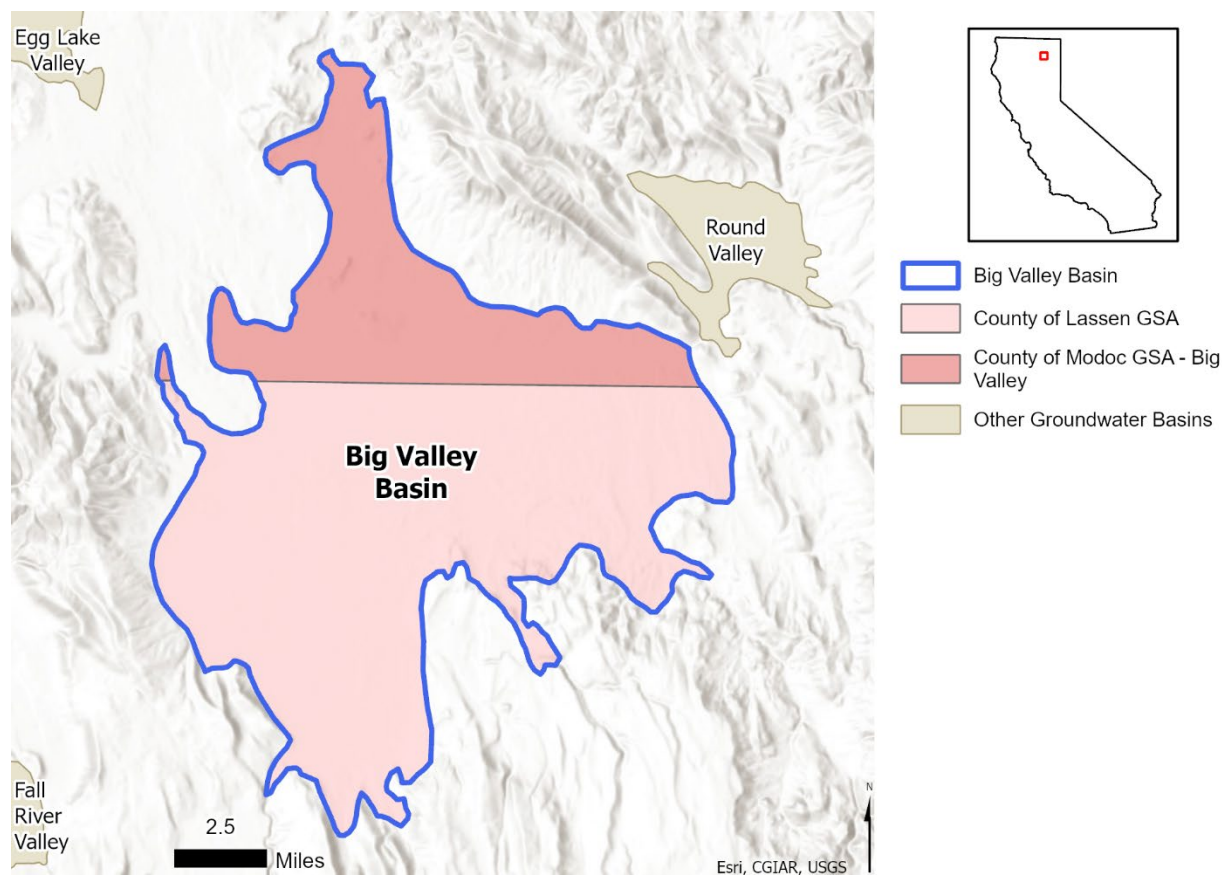


Figure 1: Big Valley Basin Location Map.

The 2024 GSP describes the beneficial uses and users in the Basin. The 2024 GSP states that beneficial uses and users of groundwater in the Basin include agriculture, industrial, environmental, municipal, and domestic use.<sup>118</sup> Other significant uses include industrial uses such as logging, construction, and fire suppression.<sup>119</sup> Well inventory for the Basin is provided and data shows a total of 476 wells (217 domestic wells, 253 production wells, and 6 public supply wells using 2018 well completion report data from the Department) across Lassen and Modoc Counties.<sup>120</sup> The 2024 GSP identifies this number of wells as “unverified” and considers this a data gap.<sup>121</sup> The highest densities of domestic wells are located near Adin, Bieber, and Lookout.<sup>122</sup> The highest densities of production wells are located between the towns of Bieber and Adin, to the southeast of Bieber, and one section northeast of Lookout.<sup>123</sup> Three of the six public supply wells are inactive, with the active wells being located near Bieber and Adin.<sup>124</sup>

<sup>118</sup> 2024 Big Valley GSP, Section 4.6, p. 93.

<sup>119</sup> 2024 Big Valley GSP, Section 11.4, p. 233.

<sup>120</sup> 2024 Big Valley GSP, Table 3-3, p. 49.

<sup>121</sup> 2024 Big Valley GSP, Section 3.4.1, p. 49.

<sup>122</sup> 2024 Big Valley GSP, Section 3.4.2, p. 50.

<sup>123</sup> 2024 Big Valley GSP, Section 3.4.2, p. 50.

<sup>124</sup> 2024 Big Valley GSP, Section 3.4.2, p. 50.

The 2024 GSP describes existing water resource monitoring, management, and regulatory programs, including: enrollment in groundwater elevation collection via CASGEM<sup>125</sup>; water quality is regulated and monitored under 11 separate programs listed in Table 3-4<sup>126</sup>; streamflow gages and watermasters conduct surface-water monitoring in the Basin<sup>127</sup>; two inactive NOAA stations are located in the Basin, providing historical climate data<sup>128</sup>; a single continuous global positioning satellite station conducts subsidence monitoring in the Basin<sup>129</sup>; two water management plans, the Lassen County Groundwater Management Plan and the Upper Pit River Integrated Regional Water Management Plan, exist that cover the Basin<sup>130</sup>; county ordinances and permitting for, both, Lassen and Modoc counties for groundwater management and use<sup>131</sup>. Implementation of the 2024 GSP is not expected to affect existing designations of land use, and influence water supply, according to the GSP.<sup>132</sup>

The administrative information section included in the 2024 GSP is substantially compliant with the requirements outlined in the GSP Regulations. Department staff consider the information presented in the 2024 Plan to satisfy the general requirements of the GSP Regulations for administrative information.<sup>133</sup>

## 5.2 BASIN SETTING

GSP Regulations require information about the physical setting and characteristics of the basin and current conditions of the basin, including a hydrogeologic conceptual model; a description of historical and current groundwater conditions; and a water budget accounting for total annual volume of groundwater and surface water entering and leaving the basin, including historical, current, and projected water budget conditions.<sup>134</sup>

### 5.2.1 Hydrogeologic Conceptual Model

The hydrogeologic conceptual model is a non-numerical model of the physical setting, characteristics, and processes that govern groundwater occurrence within a basin, and represents a local agency's understanding of the geology and hydrology of the basin that support the geologic assumptions used in developing mathematical models, such as those that allow for quantification of the water budget.<sup>135</sup> The GSP Regulations require a

---

<sup>125</sup> 2024 Big Valley GSP, Section 3.5.1.1, p. 54

<sup>126</sup> 2024 Big Valley GSP, Section 3.5.1.1, pp. 54-58.

<sup>127</sup> 2024 Big Valley GSP, Section 3.5.1.2 pp. 58-60.

<sup>128</sup> 2024 Big Valley GSP, Section 3.5.1.3, pp. 60-61.

<sup>129</sup> 2024 Big Valley GSP, Section 3.5.1.4, pp. 61-62.

<sup>130</sup> 2024 Big Valley GSP, Section 3.5.2, p. 63.

<sup>131</sup> 2024 Big Valley GSP, Section 3.5.3, pp. 63-65.

<sup>132</sup> 2024 Big Valley GSP, Section 3.7, p. 70.

<sup>133</sup> 23 CCR §§ 354.2 *et seq.*

<sup>134</sup> 23 CCR § 354.12 *et seq.*

<sup>135</sup> DWR Best Management Practices for the Sustainable Management of Groundwater: Hydrogeologic Conceptual Model, December 2016: [https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-3-Hydrogeologic-Conceptual-Model\\_ay\\_19.pdf](https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-3-Hydrogeologic-Conceptual-Model_ay_19.pdf).

descriptive hydrogeologic conceptual model that includes a written description of geologic conditions, supported by cross sections and maps,<sup>136</sup> and includes a description of basin boundaries and the bottom of the basin,<sup>137</sup> principal aquifers and aquitards,<sup>138</sup> and data gaps.<sup>139</sup>

The 2024 GSP contains a description of the hydrogeologic conceptual model of the Big Valley Basin that describes the physical components in the Plan area, including, but not limited to, geology, aquifers, surface water bodies, and primary uses of groundwater in the Basin. The Basin is centrally positioned in the Modoc Plateau and features numerous north and northwest-trending faults.<sup>140</sup> The Basin was formed during concurrent volcanism and tectonism, which disrupted the drainage patterns of the area and resulted in the formation of the ancestral lake in Big Valley.<sup>141</sup> The ancestral lake disappeared over time, forming the Big Valley Basin. Basalt and basaltic andesite flows, volcanic ash, and mudflows combined with sedimentary materials comprise many of the deposits found in the Basin.<sup>142</sup>

The Pliocene-Pleistocene age Bieber Formation is identified as the Basin's sole principal aquifer.<sup>143</sup> The 2024 Plan provides a map that highlights an area of the Basin demarcated as having confining conditions, but the Plan states there is not enough data to define a broad-scale aquitard.<sup>144</sup> Therefore, the 2024 Plan does not specify whether the Basin's principal aquifer is confined or unconfined. The lateral boundaries are described in the 2024 Plan, although a majority of the discussion focuses on perceived Basin boundary inaccuracies.<sup>145</sup> Furthermore, the 2024 Plan states that identifying the Basin's physical bottom is not currently possible with the available data. Instead, the 2024 Plan analyzes an inventory of wells to determine a practical bottom which is set at 1,200 ft—the current depth at which groundwater can be accessed and monitored for beneficial use.<sup>146</sup> Exploratory geothermal test wells have been drilled to depths of 2,125 and 7,000 feet but are not considered the effective bottom due to water quality conditions.<sup>147</sup> Aquifer testing of monitoring wells resulted in hydrologic conductivity values ranging between 2 to 19 feet per day, and storativity values ranging between highly confined  $3.0 \times 10^{-6}$  and unconfined  $1.0 \times 10^{-1}$ .<sup>148</sup>

---

<sup>136</sup> 23 CCR §§ 354.14(a), 354.14(c).

<sup>137</sup> 23 CCR §§ 354.14(b)(2-3).

<sup>138</sup> 23 CCR § 354.14(b)(4) *et seq.*

<sup>139</sup> 23 CCR § 354.14(b)(5).

<sup>140</sup> 2024 Big Valley GSP, Figure 4-2, p. 75.

<sup>141</sup> 2024 Big Valley GSP, Section 4.2, p. 73, Figure 4-2, p. 75.

<sup>142</sup> 2024 Big Valley GSP, Figure 4-2, p. 75.

<sup>143</sup> 2024 Big Valley GSP, Section 4.4.1, p. 79.

<sup>144</sup> 2024 Big Valley GSP, Figure 4-5, p. 80.

<sup>145</sup> 2024 Big Valley GSP, Section 4.2.1, p. 76, Figure 4-4, p. 78.

<sup>146</sup> 2024 Big Valley GSP, Section 4.4.3, pp. 81-84, Table 4-1, p. 84.

<sup>147</sup> 2024 Big Valley GSP, Section 4.4.3, p. 81.

<sup>148</sup> 2024 Big Valley GSP, Table 4-2, p. 87.

Numerous faults occur within and around the Basin, with several southeast-northwest trending faults traversing the entirety of the Basin.<sup>149</sup> The 2024 Plan states that there is currently insufficient evidence to determine the impact to groundwater flow from these faults and suggests that future pumping tests may help determine the impact to groundwater flow posed by faulting in the Basin.<sup>150</sup> The 2024 GSP also provides a map which delineates surrounding upland areas that provide recharge to the Basin.<sup>151</sup> These upland areas of fractured Basalt provide underflow recharge in addition to infiltration and surface flows. However, the Basin is predominately occupied by Hydrologic Soil Groups C and D, 30% and 58% respectively, which contain soils that have moderately high runoff values and inhibit infiltration.<sup>152</sup>

The general water quality of the principal aquifer contains naturally occurring elevated levels of sulfate, fluoride, boron, and arsenic, influenced by hot spring localized areas along faults.<sup>153</sup> Water quality sampling results indicate the Basin's groundwater is characterized as sodium-rich with higher amounts of calcium and magnesium.<sup>154</sup> Basin groundwater is identified geologically as generally young due to being strongly bicarbonate. Groundwater quality sampling also indicates an elevated presence of high specific conductivity and total dissolved solids (TDS), but sampling suggests a declining trend of these indicators over the last 40 years ([see Section 5.2.2](#)).<sup>155</sup>

Primary beneficial uses of the Basin's principal aquifer include agricultural, domestic, environmental, municipal, and industrial.<sup>156</sup> The vast majority of water supply wells are dedicated to agricultural and domestic water supply, with less than 5% for municipal and industrial uses.<sup>157</sup> Primary crops in the Basin are described as grain, alfalfa, and some wild rice.<sup>158</sup> Most of the Basin population (1,046 residents) receives their water from domestic wells (734 residents) with the remaining receiving water from municipal wells (314 residents).<sup>159</sup> Groundwater wells in the Ash Creek Wildlife Area supply flow to the riparian corridor, providing water supply to wetlands and riparian habitat.<sup>160</sup>

The 2024 Plan identifies data gaps involving hydrogeologic uncertainties resulting from the lack of detailed studies of the Basin.<sup>161</sup> These data gaps are listed and include, but not limited to, the Basin's boundary, specific confining conditions, the Basin's definable bottom, flow obstructing faults, soil permeability, and recharge. Solutions to address data

---

<sup>149</sup> 2024 Big Valley GSP, Figure 4-8, p. 86.

<sup>150</sup> 2024 Big Valley GSP, Section 4.4.4, p. 85.

<sup>151</sup> 2024 Big Valley GSP, Figure 4-5, p. 80.

<sup>152</sup> 2024 Big Valley GSP, Section 4.5.2, p. 91, Figure 4-11, p. 92.

<sup>153</sup> 2024 Big Valley GSP, Section 4.7, p. 95.

<sup>154</sup> 2024 Big Valley GSP, Section 4.7, p. 95.

<sup>155</sup> 2024 Big Valley GSP, Section 5.4.1, p. 122.

<sup>156</sup> 2024 Big Valley GSP, Section 4.6, pp. 93-95.

<sup>157</sup> 2024 Big Valley GSP, Section 3.4.1, p. 49.

<sup>158</sup> 2024 Big Valley GSP, Section 4.6, p. 93.

<sup>159</sup> 2024 Big Valley GSP, Section 4.6, p. 95.

<sup>160</sup> 2024 Big Valley GSP, Section 4.6, p. 93.

<sup>161</sup> 2024 Big Valley GSP, Section 4.11, pp. 99-100.

gaps are mentioned, but no solution is discussed in detail and no projects or management actions to refine the hydrogeologic conceptual model are mentioned.<sup>162</sup> Interconnected surface water-groundwater systems are also discussed, with preliminary data being used to classify certain reaches as being potentially interconnected.<sup>163</sup> Although the 2024 GSP acknowledges limitations in addressing data gaps related to interconnected surface waters, it does not provide future project details or schedules for resolving these issues.<sup>164</sup> Instead, addressing these data gaps is dependent on available funding and level of need, which is to be reassessed at the GSP's five-year evaluation. Department staff recommend the GSAs develop and implement appropriate projects and management actions to fill these identified data gaps (see [Recommended Corrective Action 5](#)).

Physical characteristics of the Basin are presented in maps and figures in the 2024 GSP. Two cross sections are provided in the 2024 GSP depicting geologic conditions in the Basin with over 30 lithologic logs from well completion reports being depicted.<sup>165</sup> Cross-section A-A' trends east-northeast while cross section B-B' trends north-northwest. The cross-sections depict the major stratigraphic and structural components of the Basin and the vertical thickness and lateral extent of the Basin's geologic units, with areas of uncertainty represented by question marks. A topographic map derived from the U.S. Geological Survey depicting the Basin's ground surface elevations is included in the 2024 GSP.<sup>166</sup> Two geologic maps covering the Basin are included in the 2024 GSP. First, a geologic map depicting the surficial geology with cross section lines, compiled by Keonig and Gardner, is illustrated in Figure 4-3.<sup>167</sup> A second geologic map, taken from the Department's Northeastern Counties Ground Water Investigation, is provided in Figure 4-4.<sup>168</sup> The Basin's taxonomic soils classifications are depicted on Figure 4-10.<sup>169</sup> Soils data were obtained from the Soil Survey Geographic Database provided by the National Resources Conservation Service. Recharge areas are depicted on Figure 4-5, which also derives from the Department's Northeastern Counties Ground Water Investigation.<sup>170</sup> Springs, seeps, swamps, marshes, surface water bodies within the Basin are depicted on Figure 4-14.<sup>171</sup> Information depicted on this figure derives from the National Hydrography Dataset and the Department's Northeastern Counties Ground Water Investigation.

The hydrogeologic conceptual model section included in the 2024 GSP substantially complies with the requirements outlined in the GSP Regulations<sup>172</sup> at this time.

---

<sup>162</sup> 2024 Big Valley GSP, Table 9-2, p. 188.

<sup>163</sup> 2024 Big Valley GSP, Section 5.6, p. 135, Figure 5-22, p. 137.

<sup>164</sup> 2024 Big Valley GSP, Table 9-2, p. 188.

<sup>165</sup> 2024 Big Valley GSP, Figures 4-6, 4-7, pp. 82-83.

<sup>166</sup> 2024 Big Valley GSP, Figure 4-1, p. 74.

<sup>167</sup> 2024 Big Valley GSP, Figure 4-3, p. 77.

<sup>168</sup> 2024 Big Valley GSP, Figure 4-4, p. 78.

<sup>169</sup> 2024 Big Valley GSP, Figure 4-10, p. 90.

<sup>170</sup> 2024 Big Valley GSP, Figure 4-5, p. 80.

<sup>171</sup> 2024 Big Valley GSP, Figure 4-14, p. 98.

<sup>172</sup> 23 CCR § 354.14 *et seq.*

Department staff have provided recommended corrective actions for this section which the GSAs should consider and address by the next periodic evaluation.

## 5.2.2 Groundwater Conditions

The GSP Regulations require a written description of historical and current groundwater conditions for each of the applicable sustainability indicators and groundwater dependent ecosystems that includes the following: groundwater elevation contour maps and hydrographs,<sup>173</sup> a graph depicting change in groundwater storage,<sup>174</sup> maps and cross-sections of the seawater intrusion front,<sup>175</sup> maps of groundwater contamination sites and plumes,<sup>176</sup> maps depicting total subsidence,<sup>177</sup> identification of interconnected surface water systems and an estimate of the quantity and timing of depletions of those systems,<sup>178</sup> and identification of groundwater dependent ecosystems.<sup>179</sup>

The 2024 GSP describes the historical groundwater elevation conditions for a period of record largely from the 1980s to 2020.<sup>180</sup> Groundwater elevation data provided contains two measurements per year, recorded during spring and fall. Groundwater contour maps are also provided for the sole principal aquifer utilizing spring and fall groundwater elevation measurements from spring 1983 through fall 2019.<sup>181</sup> Data from well records provided suggests that 19 of 22 wells exhibit groundwater elevation declines across the Basin ranging from -0.044 to -1.3 feet per year over the period of record; 3 of the 22 well records depict positive trends in groundwater elevation ranging from 0.11 feet per year to 0.82 feet per year.<sup>182</sup> Fall 2015 groundwater level measurements are described as generally the lowest on record.<sup>183</sup> Using water level measurements collected in 2018, gradient of elevation and flow travel depict a trend from east to west in the Basin.<sup>184</sup> In addition to the 22 wells (6 in Modoc County, 16 in Lassen County) which have been historically monitored, five new well clusters have been constructed in 2019 and 2020 to capture water level information in target locations of the Basin to support GSP implementation.<sup>185</sup>

Change in groundwater storage was developed from spring groundwater level measurement data for each year between 1983 to 2023.<sup>186</sup> The total change in groundwater in storage was calculated by determining the average depth to water for a

---

<sup>173</sup> 23 CCR §§ 354.16(a)(1-2).

<sup>174</sup> 23 CCR § 354.16(b).

<sup>175</sup> 23 CCR § 354.16(c).

<sup>176</sup> 23 CCR § 354.16(d).

<sup>177</sup> 23 CCR § 354.16(e).

<sup>178</sup> 23 CCR § 354.16(f).

<sup>179</sup> 23 CCR § 354.16(g).

<sup>180</sup> 2024 Big Valley GSP, Section 5.1, pp. 101-108.

<sup>181</sup> 2024 Big Valley GSP, Appendix 5B, pp. 325-399.

<sup>182</sup> 2024 Big Valley GSP, Section 5.1.1, p. 105; Figure 5-1, p.102; Appendix 5A, pp. 302-324.

<sup>183</sup> 2024 Big Valley GSP, Section 7.3.1, p. 154.

<sup>184</sup> 2024 Big Valley GSP, Figure 5-5, p. 107; Figure 5-6, p. 108.

<sup>185</sup> 2024 Big Valley GSP, Section 5.1, p. 101.

<sup>186</sup> 2024 Big Valley GSP, Table 5-2, p. 110.

given year based on spring measurements of groundwater levels, subtracting the depth to water from the previous year's average spring depth to water, multiply by the area of the Basin, and the multiply by the specific yield for the Basin (estimated to be 6.85 percent average).<sup>187</sup> Since setting the baseline groundwater storage value to 1983, the groundwater storage has generally declined and only to recover once to its baseline value in 1999 during concurrent years of above average precipitation. After 1999, regardless of the amount of precipitation, groundwater storage has not fully recovered. The lowest point of groundwater storage appears to have occurred around 2015 during years of below average precipitation levels.<sup>188</sup> The cumulative change in storage from 1983 to then, 2015, was -158,374 acre-feet. The largest storage loss over a single year seems to have occurred in 2001, a dry year, with a change of -35,965 acre-feet. The largest storage gain over a single year was 10,110 acre-feet which occurred in 2020, also a dry year. The cumulative change in storage from 1983 to 2023 is calculated to be -126,000 acre-feet.<sup>189</sup>

The 2024 GSP states that the Basin is located far from coastal areas and seawater intrusion is not a relevant sustainability indicator for the Basin.<sup>190</sup> Given the geographic setting of the Basin, Department staff regard the reasoning of the 2024 GSP as sufficient to demonstrate that seawater intrusion is not present in the Basin and is not likely to occur in the future.

Water quality sampling data has been recorded since the 1950s, of which data from 1983 to 2023 is analyzed by the 2024 GSP to correspond with the prevalence groundwater monitoring data.<sup>191</sup> The Basin contains potentially elevated, naturally occurring concentrations of arsenic, boron, fluoride, iron, manganese, and sulfate.<sup>192</sup> Constituents selected to assess water quality in the Basin were assigned thresholds based on limits determined by different beneficial uses, such as for drinking water and agricultural uses.<sup>193</sup> Constituents of concern include arsenic, iron, manganese, specific conductivity, and TDS. For the specified constituents of concern, the 2024 GSP provides figures displaying sampling detect results relative to their chosen thresholds (lower of either MCL or agricultural threshold).<sup>194</sup> Over the last 20 years (2004 to 2023), the 2024 GSP documents 2 exceedances of primary MCL for arsenic, 9 exceedances of secondary MCL for iron, and 11 exceedances of secondary MCL for manganese.<sup>195</sup> The data shows no exceedances of specific conductivity or TDS from 2004 to 2023.

Groundwater contamination sites and plumes are concentrated near the towns of Bieber and Nubieber. A map and table that lists and displays cleanup sites within the Basin are

---

<sup>187</sup> 2024 Big Valley GSP, Section 5.2, p. 109.

<sup>188</sup> 2024 Big Valley GSP, Figure 5-7, pp. 111.

<sup>189</sup> 2024 Big Valley GSP, Table 5.2, p. 110.

<sup>190</sup> 2024 Big Valley GSP, Section 5.3, p. 112.

<sup>191</sup> 2024 Big Valley GSP, Table 5-3, p. 115; Table 5-4, p. 116.

<sup>192</sup> 2024 Big Valley GSP, Section 5.4.1, p. 114.

<sup>193</sup> 2024 Big Valley GSP, Section 5.4.1, p. 114.

<sup>194</sup> 2024 Big Valley GSP, Figures 5-9 through 5-15, pp. 118-124.

<sup>195</sup> 2024 Big Valley GSP, Table 5-4, p. 116.

provided.<sup>196</sup> Sites such as the Bieber landfill are subject to ongoing semi-annual monitoring of groundwater levels and groundwater quality at nearby shallow wells.<sup>197</sup>

The 2024 GSP presents land subsidence in the Basin with data from one continuous GPS (CGPS) station between 2007 and 2019 and vertical displacement from Interferometric Synthetic Aperture Radar (InSAR) data between 2015 and 2019. Subsidence at the CGPS station near the eastern boundary of the Basin (near Adin) is occurring at an average rate of -0.05 inches per year from 2007 to 2009.<sup>198</sup> The average yearly rate of subsidence at this station is -0.05 inch per year, with a cumulative total change during this 11-year period of -0.6 inches.<sup>199</sup> Department staff note that the trend appears to have increased to an annual mean of -0.5 inches per year after 2015, the year the Basin experienced its lowest level of groundwater in storage. InSAR data between 2015 and 2019 displays localized areas of negative surface displacement near the center and southwest areas of the Basin,<sup>200</sup> with a maximum total downward displacement of -3.3 inches over the 4-year period.<sup>201</sup> The 2024 GSP notes that most of the InSAR data displays a displacement value between 0 to -1 inches, and the accuracy of the InSAR survey is calculated to be 0.7 inches at a 95% confidence level; indicating the Basin has experienced rates of subsidence that are potentially negligible.<sup>202</sup>

The 2024 GSP indicates there may be areas where surface water is interconnected. These are identified as areas where spring groundwater level contours near the stream are less than 15 feet below ground surface. The 2024 GSP also states two shallow well clusters in the Basin are used to provide a near stream estimate of groundwater flow direction.<sup>203</sup> The 2024 GSP states timing and quantity of depletions cannot be determined with existing data.<sup>204</sup> Department staff believe that an estimate of quantity and timing of depletion is needed because interconnected surface water is identified as likely occurring in multiple areas within the Basin and recommend the GSAs follow guidance to be released by the Department.

The 2024 GSP defines groundwater-dependent ecosystems (GDEs) per SGMA's definition as "ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface." The 2024 GSP states GDEs are considered a beneficial use of groundwater.<sup>205</sup> Wetlands habitats of palustrine and riverine, and vegetation areas of Wet Meadows and Willow, are the largest habitat areas in the Basin.<sup>206</sup> The 2024 GSP provides a map of the Basin with potential

---

<sup>196</sup> 2024 Big Valley GSP, Table 5-5, p. 130; Figure 5-19, p. 131.

<sup>197</sup> 2024 Big Valley GSP, Section 5.4.2, pp. 128-129.

<sup>198</sup> 2024 Big Valley GSP, Figure 5-20, p. 133.

<sup>199</sup> 2024 Big Valley GSP, Section 5.5.1, p. 133.

<sup>200</sup> 2024 Big Valley GSP, Figure 5-21, p. 134.

<sup>201</sup> 2024 Big Valley GSP, Section 5.5.2, p. 133.

<sup>202</sup> 2024 Big Valley GSP, Section 5.5.2, p. 133.

<sup>203</sup> 2024 Big Valley GSP, Figure 5-22, p. 137.

<sup>204</sup> 2024 Big Valley GSP, Section 5.6, p. 137.

<sup>205</sup> 2024 Big Valley GSP, Section 5.7, p. 135.

<sup>206</sup> 2024 Big Valley GSP, Section 5.7, p. 138.



GDE species relative to groundwater levels in Fall 2015.<sup>207</sup> The 2024 GSP provides a table with common plant species and their maximum root depths.<sup>208</sup>

The groundwater conditions section included in the 2024 GSP substantially complies with the requirements outlined in the GSP Regulations<sup>209</sup> at this time. Department staff have provided recommended corrective actions for this section which the GSA should consider and address by the next periodic evaluation.

### 5.2.3 Water Budget

GSP Regulations require a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical; current; and projected water budget conditions,<sup>210</sup> and the sustainable yield.<sup>211</sup>

In the Department's Incomplete Determination, the Department identified deficiencies related to the water budget and the assessment of overdraft. The GSAs revised this portion of the 2022 Plan, and Department staff have evaluated this aspect of the water budget in [Section 4.1.2.1](#), including the assessment of overdraft and the effectiveness of the non-modeling spreadsheet approach. As presented above, Department staff concluded that the GSAs took sufficient action to correct this deficiency, but Department staff also provided recommended corrective actions based on the revised 2024 GSP. Further details evaluating the water budget are provided below.

The 2024 GSP uses a "non-modeling (spreadsheet) approach"<sup>212</sup> for water budget assessment to provide historical, current, and projected water budgets and an estimated sustainable yield. The water budget information is provided in tabular<sup>213</sup> and graphical form.<sup>214</sup>

The 2024 GSP provides a historical water budget for water years 1984 to 2018.<sup>215</sup> Based on the historical water budget, the Basin overdraft is approximately 5,000 acre-feet per year. This is equal to the cumulative change in storage of the historical period divided by the number of years in the historical water budget. The 2024 GSP provides an estimate of the sustainable yield for the Basin at 39,300 acre-feet per year.<sup>216</sup> The estimate uses the difference between average annual groundwater pumping over the historical period and subtracts out the estimate of overdraft.

---

<sup>207</sup> 2024 Big Valley GSP, Figure 5-23, p.140.

<sup>208</sup> 2024 Big Valley GSP, Table 5-6, p.138.

<sup>209</sup> 23 CCR § 354.16 *et seq.*

<sup>210</sup> 23 CCR §§ 354.18(a), 354.18(c) *et seq.*

<sup>211</sup> 23 CCR § 354.18(b)(7).

<sup>212</sup> 2024 Big Valley GSP, Section 6.1, p. 142.

<sup>213</sup> 2024 Big Valley GSP, Appendix 6B, pp. 409-432.

<sup>214</sup> 2024 Big Valley GSP, Appendix 6C, pp. 433-445.

<sup>215</sup> 2024 Big Valley GSP, Section 6.2, pp. 143-148.

<sup>216</sup> 2024 Big Valley GSP, Section 6.2, p. 148.

The GSP indicates the projected baseline water budget is used as the current water budget under the assumption that land use and water use are held constant at current (2014) levels.<sup>217</sup> The projected climate data uses 1962 to 2011 conditions. These years align with the data availability of the DWR-provided climate change dataset.

The 2024 GSP provides a projected water budget using 50 years of the historical hydrology in the Basin over water years 1962 to 2011.<sup>218</sup> This corresponds to the last 50 years of the DWR climate change data at this time. The 2024 GSP uses 2014 land use for the projected water budget baseline and does not indicate any expected land use changes in the future. The 2024 GSP estimates the Basin will experience overdraft of 2,000 acre-feet per year under the projected baseline scenario. The 2024 GSP indicates precipitation, evapotranspiration, and streamflow change factors are provided by the Department which estimates anticipated climate change by 2070. The 2024 GSP states the change factors were applied to the baseline water budget resulting in a projected overdraft of 1,000 acre-feet per year.

The Department's climate change data include three 2070 projections. Department staff believes the GSP may have used the 2070 central tendency; however, this is not clearly stated. Additionally, the 2024 GSP indicates the precipitation, evapotranspiration, and streamflow change factors were applied, but it does not provide any supporting information to understand how this is done. The precipitation and evapotranspiration are provided as spatially variable datasets, so there are multiple different ways this could be applied in the projected water budget but descriptions detailing this step are not provided. Department staff recommend the GSP provide this level of detail by the next periodic evaluation of the plan.

The water budget described in the 2024 GSP substantially complies with the GSP Regulations and appears to be developed using the best available science. The 2024 GSP provides the required historical, current, and future accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the Basin including an estimate of the sustainable yield of the Basin.

#### **5.2.4 Management Areas**

The GSP Regulations provide the option for one or more management areas to be defined within a basin if the GSA has determined that the creation of the management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives, provided that undesirable results are defined consistently throughout the basin.<sup>219</sup>

The 2024 GSP does not use management areas.

---

<sup>217</sup> 2024 Big Valley GSP, Section 6.3, p. 148.

<sup>218</sup> 2024 Big Valley GSP, Section 6.4, pp. 149-151.

<sup>219</sup> 23 CCR § 354.20.

### 5.3 SUSTAINABLE MANAGEMENT CRITERIA

GSP Regulations require each Plan to include a sustainability goal for the basin and to characterize and establish undesirable results, minimum thresholds, and measurable objectives for each applicable sustainability indicator, as appropriate. The GSP Regulations require each Plan to define conditions that constitute sustainable groundwater management for the basin including the process by which the GSA characterizes undesirable results and establishes minimum thresholds and measurable objectives for each applicable sustainability indicator.<sup>220</sup>

#### 5.3.1 Sustainability Goal

GSP Regulations require that GSAs establish a sustainability goal for the basin. The sustainability goal should be based on information provided in the GSP's basin setting and should include an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation.<sup>221</sup>

The 2024 GSP establishes a sustainability goal for the Basin which is described as:

“The sustainability goal for the Big Valley Groundwater Basin is to maintain a locally governed, economically feasible, sustainable groundwater basin and surrounding watershed for existing and future legal beneficial uses with a concentration on agriculture. Sustainable management will be conducted in context with the unique culture of the basin, character of the community, quality of life of the Big Valley residents, and the vested right of agricultural pursuits through the continued use of groundwater and surface water.”<sup>222</sup>

The 2024 GSP describes the reasons for its development, including to comply with SGMA's unfunded mandates, maintain local control, preclude intervention by the State Water Resources Control Board (State Water Board), and prove that the Basin is sustainable and should be ranked as low priority.<sup>223</sup> The 2024 GSP describes an approach to achieve the sustainability goal through implementation of various projects and management actions and will be “culminated through DWR's better understanding of the surface-water and groundwater conditions over time and with the implementation of projects and actions described in this GSP.”<sup>224</sup> It is unclear how the Department's understanding of surface- and groundwater conditions would help achieve the sustainability goal for the Basin since specific required activities by the Department are not cited, the sustainability goal mostly references local aspects of the Basin, and it is the responsibility of the GSAs to implement a plan can achieve the sustainability goal established in a basin. Therefore, Department staff recommend the 2024 GSP clarify the statement.

---

<sup>220</sup> 23 CCR § 354.22 *et seq.*

<sup>221</sup> 23 CCR § 354.24.

<sup>222</sup> 2024 Big Valley GSP, Section 7.2, p. 153.

<sup>223</sup> 2024 Big Valley GSP, Section 1.2, p. 28.

<sup>224</sup> 2024 Big Valley GSP, Section 1.2, p. 29.

In regard to projects and management actions, the 2024 GSP states that the implementation of projects such as winter recharge studies will help establish the feasibility of immediate actions the GSAs can take to improve Basin conditions. Furthermore, when funding is available, additional research will be conducted to fill data gaps such as the availability of additional water supply and a more accurate accounting of surface water entering the Basin from the Pit River. The 2024 GSP describes the projects and management actions (Chapter 9) and the stages of implementation (Chapters 10) in more detail to achieve of the sustainability goal.<sup>225</sup>

The 2024 GSP describes that in consultation with GSA staff, ad-hoc committees determined whether significant and unreasonable effects for each sustainability indicator have occurred historically and the likelihood of significant and unreasonable effects occurring in the future.<sup>226</sup> While the 2024 GSP states that sustainable management criteria were developed to “account for the interests of the Basin’s legal beneficial groundwater uses and users”<sup>227</sup>, the 2024 GSP also emphasizes agriculture production as having “paramount importance due to its economic, cultural, and environmental benefits.”<sup>228</sup> Department staff note that a GSA is responsible to consider the interests of all beneficial uses and users of groundwater, which include, but are not limited to those listed in the Act.<sup>229</sup> Therefore, Department staff encourage the GSAs to take steps such as those taken to address Deficiency 2 ([Section 4.2](#)) to ensure that the interests of all beneficial uses and users applicable to the Basin are considered and discourage approaches that are overly narrow when making this assessment.

### 5.3.2 Sustainability Indicators

Sustainability indicators are defined as any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results.<sup>230</sup> Sustainability indicators thus correspond with the six undesirable results – chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon, significant and unreasonable reduction of groundwater storage, significant and unreasonable seawater intrusion, significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies, land subsidence that substantially interferes with surface land uses, and depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water<sup>231</sup> – but refer to groundwater conditions that are not, in and of themselves, significant and unreasonable. Rather, sustainability indicators refer to the effects caused by changing groundwater conditions that are monitored, and for which criteria in the form

---

<sup>225</sup> 2024 Big Valley GSP, Section 9 and 10, pp. 184-230.

<sup>226</sup> 2024 Big Valley GSP, Section 7.1, p. 153.

<sup>227</sup> 2024 Big Valley GSP, Section 1.2, p. 28.

<sup>228</sup> 2024 Big Valley GSP, Section 7.3.1, p. 155.

<sup>229</sup> Water Code §10723.2.

<sup>230</sup> 23 CCR § 351(ah).

<sup>231</sup> Water Code § 10721(x).

of minimum thresholds are established by the agency to define when the effect becomes significant and unreasonable, producing an undesirable result.

GSP Regulations require that GSAs provide descriptions of undesirable results including defining what are significant and unreasonable potential effects to beneficial uses and users for each sustainability indicator.<sup>232</sup> GSP Regulations also require GSPs provide the criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.<sup>233</sup>

GSP Regulations require that the description of minimum thresholds include the information and criteria relied upon to establish and justify the minimum threshold for each sustainability indicator.<sup>234</sup> GSAs are required to describe how conditions at minimum thresholds may affect beneficial uses and users,<sup>235</sup> and the relationship between the minimum thresholds for each sustainability indicator, including an explanation for how the GSA has determined conditions at each minimum threshold will avoid causing undesirable results for other sustainability indicators.<sup>236</sup>

GSP Regulations require that GSPs include a description of the criteria used to select measurable objectives, including interim milestones, to achieve the sustainability goal within 20 years.<sup>237</sup> GSP Regulations also require that the measurable objectives be established based on the same metrics and monitoring sites as those used to define minimum thresholds.<sup>238</sup>

The following subsections thus consolidate three facets of sustainable management criteria: undesirable results, minimum thresholds, and measurable objectives. Information, as presented in the Plan, pertaining to the processes and criteria relied upon to define undesirable results applicable to the Basin, as quantified through the establishment of minimum thresholds, are addressed for each applicable sustainability indicator. A submitting agency is not required to establish criteria for undesirable results that the agency can demonstrate are not present and are not likely to occur in a basin.<sup>239</sup>

#### *5.3.2.1 Chronic Lowering of Groundwater Levels*

In addition to components identified in 23 CCR §§ 354.28 (a-b), for the chronic lowering of groundwater, the GSP Regulations require the minimum threshold for chronic lowering of groundwater levels to be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results that is supported by information

---

<sup>232</sup> 23 CCR §§ 354.26(a), 354.26(b)(c).

<sup>233</sup> 23 CCR § 354.26 (b)(2).

<sup>234</sup> 23 CCR § 354.28 (b)(1).

<sup>235</sup> 23 CCR § 354.28 (b)(4).

<sup>236</sup> 23 CCR § 354.28 (b)(2).

<sup>237</sup> 23 CCR § 354.30 (a).

<sup>238</sup> 23 CCR § 354.30 (b).

<sup>239</sup> 23 CCR § 354.26 (d).

about groundwater elevation conditions and potential effects on other sustainability indicators.<sup>240</sup>

In the Department's Incomplete Determination, the Department identified deficiencies related to the sustainable management criteria for the chronic lowering of groundwater levels. The GSAs revised this portion of the 2022 Plan, and Department staff have evaluated this aspect of the water budget in [Section 4.2](#), including undesirable results and minimum thresholds. As presented above, Department staff concluded that the GSAs took sufficient action to correct this deficiency, but Department staff also provided recommended corrective actions based on the revised 2024 GSP. Further details evaluating this sustainability indicator are provided below.

Furthermore, the minimum thresholds listed Table 8-1<sup>241</sup> of the "Monitoring Networks" section correspond to the methodology employed in the 2022 GSP, which established minimum thresholds at 140 feet below 2015 elevations. In contrast, the revised 2024 GSP methodology sets minimum thresholds 50 feet below reference spring 2015 (or higher spring 2022) elevations in response to deficiency identified by the Department.

Measurable objectives in the 2024 GSP are established at the fall 2015 levels. The 2024 GSP states that undesirable results have not occurred in the past and fall 2015 is a recent measurement when a wide distribution of wells were generally at their lowest recorded groundwater elevation. This level allows groundwater to be feasible for use for agricultural, community, domestic, and natural/wildlife uses.<sup>242</sup> Department staff note that since the 2024 GSP revised its methodology for minimum thresholds and did not update measurable objectives, some measurable objectives (established at fall 2015 levels) are now below the 2024 GSP minimum thresholds. For instance, the fall 2015 measured elevation for well 01A1 is 4,035 feet above mean sea level, while the spring 2015 measured elevation is 4,092 feet above mean sea level.<sup>243</sup> Consequently, the minimum threshold is 4,042 feet above mean sea level (50 feet below 4,092 feet), which is 7 feet above the measurable objective of 4,035 feet above mean sea level, the fall 2015 level. Department staff recommend the GSAs reconcile this issue by revising measurable objectives to levels that represent the Basin's desired groundwater condition<sup>244</sup> given that the newly established minimum thresholds represent a point in the Basin, that if exceeded, may cause undesirable results.

The sustainable management criteria for chronic lowering of groundwater levels sustainability indicator included in the 2024 GSP substantially complies with the requirements outlined in the GSP Regulations<sup>245</sup> at this time. Department staff have

---

<sup>240</sup> 23 CCR § 354.28(c)(1) *et seq.*

<sup>241</sup> 2024 Big Valley GSP, Table 8-1, p. 172.

<sup>242</sup> 2024 Big Valley GSP, Section 7.3.1, p. 154.

<sup>243</sup> 2024 Big Valley GSP, Figure 8-1, p. 173; Appendix 5A, p. 318; Appendix 5B, pp. 390-391.

<sup>244</sup> 23 CCR § 354.30 *et seq.*

<sup>245</sup> 23 CCR §§ 354.22-30.

provided recommended corrective actions for this sustainability indicator which the GSA should consider and address by the next periodic evaluation.

#### *5.3.2.2 Reduction of Groundwater Storage*

In addition to components identified in 23 CCR §§ 354.28 (a-b), for the reduction of groundwater storage, the GSP Regulations require the minimum threshold for the reduction of groundwater storage to be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.<sup>246</sup>

The 2024 GSP states that change in storage is “directly correlated to changes in groundwater elevation.”<sup>247</sup> Therefore, the 2024 GSP utilizes the chronic lowering of groundwater levels sustainability indicator as a proxy for sustainable management criteria for the reduction of groundwater storage.

Department staff consider it reasonable to use groundwater levels as a proxy to manage reduction of groundwater storage sustainability indicator. Department staff conclude that the 2024 GSP substantially complies with this part of the GSP Regulations.

#### *5.3.2.3 Seawater Intrusion*

In addition to components identified in 23 CCR §§ 354.28 (a-b), for seawater intrusion, the GSP Regulations require the minimum threshold for seawater intrusion to be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results.<sup>248</sup>

The 2024 GSP states that the Basin is not located near an ocean, that ground surface elevations are over 4,000 feet above mean sea level, and that seawater intrusion is not present and not likely to occur. Therefore, the 2024 GSP describes that sustainable management criteria are not required and were not established for seawater intrusion.<sup>249</sup>

Department staff agree with the GSAs’ rationale for not setting sustainable management criteria for seawater intrusion in the Basin.

#### *5.3.2.4 Degraded Water Quality*

In addition to components identified in 23 CCR §§ 354.28 (a-b), for degraded water quality, the GSP Regulations require the minimum threshold for degraded water quality to be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicators of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds

---

<sup>246</sup> 23 CCR § 354.28(c)(2).

<sup>247</sup> 2024 Big Valley GSP, Chapter 7.3.2, p. 165.

<sup>248</sup> 23 CCR § 354.28(c)(3).

<sup>249</sup> 2024 Big Valley GSP, Chapter 7.3.3, p. 165.

concentrations of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.<sup>250</sup>

In the Department's Incomplete Determination, the Department identified deficiencies related to the sustainable management criteria for degraded water quality. The GSAs revised this portion of the 2022 Plan, and Department staff have evaluated this sustainability indicator in [Section 4.3](#) of this Staff Report. As presented above, Department staff concluded that the GSAs took sufficient action to correct this deficiency, but Department staff also provided recommended corrective actions based on the revised 2024 GSP.

#### 5.3.2.5 Land Subsidence

In addition to components identified in 23 CCR §§ 354.28 (a-b), the GSP Regulations require the minimum threshold for land subsidence to be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results.<sup>251</sup> Minimum thresholds for land subsidence shall be supported by identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency's rationale for establishing minimum thresholds in light of those effects and maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum thresholds and measurable objectives.<sup>252</sup>

The 2024 GSP explains that due to the lack of what the GSAs consider to be significant subsidence, and that because some subsidence is acceptable to stakeholders in the absence of impacts on infrastructure (roadways, railroads, conveyance canals, and wells among others), no undesirable results have occurred and none are likely to occur in the Basin.<sup>253</sup> The 2024 GSP states that "micro-subsidence" is likely due to either agricultural land leveling operations or natural geologic activity. Therefore, the GSAs did not establish sustainable management criteria for land subsidence.

The 2024 GSP states that at the five-year evaluation, data from the one CGPS monitoring site in the Basin (GPS P347) and InSAR data provided by the Department will be assessed for notable subsidence trends that can be correlated with groundwater pumping. The 2024 GSP explains that sustainable management criteria and undesirable results for subsidence will be established at the five-year evaluation only if trends indicate significant and unreasonable subsidence is likely to occur in the subsequent five years.<sup>254</sup>

---

<sup>250</sup> 23 CCR § 354.28(c)(4).

<sup>251</sup> 23 CCR § 354.28(c)(5).

<sup>252</sup> 23 CCR §§ 354.28(c)(5)(A-B).

<sup>253</sup> 2024 Big Valley GSP, Chapter 7.3.5, p. 168.

<sup>254</sup> 2024 Big Valley GSP, Chapter 7.3.5, p.168.



Department staff agree with the 2024 GSP that available data should continue to be used to monitor for notable subsidence trends that can be correlated with groundwater pumping and groundwater management activities in the Basin. However, as explained in [Section 4.2](#), the minimum thresholds for the chronic lowering of groundwater levels are established 50 feet below the historic lows experienced in 2015—representing a level when the Basin had its lowest level of cumulative groundwater storage and an increase in the rate of mean annual subsidence at the CGPS station (see [Section 5.2.2](#)). Given that planned groundwater management allows for groundwater levels to decline potentially below levels experienced in 2015 via established chronic lowering of groundwater level minimum thresholds, Department staff do not believe the 2024 GSP has demonstrated that undesirable results from land subsidence are not likely to occur in the Basin. Therefore, the 2024 GSP should proactively define undesirable results and develop sustainable management criteria. The sustainable management criteria should be based on direct measurements of groundwater surface elevation changes such as extensometers, continuous global positioning stations, or remote sensing techniques (such as InSAR) (see [Recommended Corrective Action 6](#)).

#### *5.3.2.6 Depletions of Interconnected Surface Water*

SGMA defines undesirable results for the depletion of interconnected surface water as those that have significant and unreasonable adverse impacts on beneficial uses of surface water and are caused by groundwater conditions occurring throughout the basin.<sup>255</sup> The GSP Regulations require that a Plan identify the presence of interconnected surface water systems in the basin and estimate the quantity and timing of depletions of those systems.<sup>256</sup> The GSP Regulations further require that minimum thresholds be set based on the rate or volume of surface water depletions caused by groundwater use, supported by information including the location, quantity, and timing of depletions, that adversely impact beneficial uses of the surface water and may lead to undesirable results.<sup>257</sup>

The 2024 GSP reiterates data gaps identified in earlier sections (i.e., Chapters 4 and 5 of the 2024 GSP) related to the GSAs' understanding of interconnected surface water, including the effect of Ash Creek, Pit River, and smaller streams on recharge; quantifying surface-water depletion impacts with the available information; pumping data in the Basin; the connection between upland recharge areas and the unique volcanic geologic features surrounding the Basin; and the unknown number of wells located next to streams and river in the Basin.<sup>258</sup> Despite these data gaps, the 2024 GSP included a figure that shows potential locations,<sup>259</sup> and states “the streams in Big Valley which *may* be interconnected by a ‘...continuous saturated zone to the underlying aquifer and the overlying surface

---

<sup>255</sup> Water Code § 10721(x)(6).

<sup>256</sup> 23 CCR § 354.16(f).

<sup>257</sup> 23 CCR § 354.28(c)(6).

<sup>258</sup> 2024 Big Valley GSP, Chapter 7.3.6, p. 169.

<sup>259</sup> 2024 Big Valley GSP, Figure 5-22, p. 137.

water...’ (DWR 2016c), there is currently no evidence to support interconnected surface water.”<sup>260</sup>

The 2024 GSP does not describe the occurrence of significant and unreasonable depletion of interconnected surface water and does not establish sustainable management criteria due to what the GSP states is insufficient evidence to determine that undesirable results are present or likely to occur.<sup>261</sup> The 2024 GSP does not quantify the rate or volume of surface water depletions due to groundwater pumping as the sustainable management criteria as required by the GSP Regulations.<sup>262</sup> Instead, the 2024 GSP states that at the five-year evaluation, data obtained from implementing projects and management actions such as newly established well clusters, new and historic stream gages, and the monitoring network (detailed in Chapter 9 of the 2024 GSP) will be assessed to determine if undesirable trends occur in the principal aquifer. No modeling attempts were made to estimate the depletion of interconnected surface water due to groundwater pumping. GSP Regulations require GSAs to estimate the quantity and timing of depletions of interconnected surface water systems,<sup>263</sup> and Department staff recommend the GSA prepare this analysis prior to the next periodic evaluation (see [Recommended Corrective Action 7a](#)).

The 2024 GSP states that rivers and streams in the Basin are an important and vital resource for all interested parties, the agricultural industry has operated using surface water for over a century, many of the surface-water rights on farms and ranches are pre-1914 water rights, and that all surface water flowing in the Basin during irrigation season is fully allocated.<sup>264</sup> The 2024 GSP also states there is a need for better tracking of surface-water allocations.

The GSAs did not develop sustainable management criteria despite the acknowledgment in the GSP that interconnected surface water may be present in portions of the Basin, and that utilizing the margin of operational flexibility by agriculture could have impacts on users of surface water if it is determined to be interconnected, which could potentially include groundwater-dependent ecosystems and surface-water rights holders.<sup>265</sup> Department staff note that for a GSA to determine that undesirable results and other criteria are not required, the GSP Regulations call for the GSA to demonstrate that the undesirable result is both not present and not likely to occur.<sup>266</sup> If the GSAs are uncertain about the extent to which interconnected surface water is present in the Basin, it is not appropriate to dismiss the development of sustainable management criteria (i.e., absence of evidence is not evidence of absence).

---

<sup>260</sup> 2024 Big Valley GSP, Chapter 7.3.6, p. 169.

<sup>261</sup> 2024 Big Valley GSP, Chapter 7.3.6, p. 169.

<sup>262</sup> 23 CCR § 354.28(c)(6).

<sup>263</sup> 23 CCR 354.16(f).

<sup>264</sup> 2024 Big Valley GSP, Chapter 7.3.6, p. 169.

<sup>265</sup> 2024 Big Valley GSP, Chapter 7.3.1, pp. 141 and 144.

<sup>266</sup> 23 CCR § 354.26(d).

Department staff understand that quantifying depletions of surface water from groundwater extractions is a complex task that likely requires developing new, specialized tools, models, and methods to understand local hydrogeologic conditions, interactions, and responses. During the initial review of GSPs, Department staff have observed that most GSAs have struggled with this new requirement of SGMA. However, Department staff believe that most GSAs will more fully comply with regulatory requirements after several years of Plan implementation that includes projects and management actions to address the data gaps and other issues necessary to understand, quantify, and manage depletions of interconnected surface waters. Accordingly, Department staff believes that affording GSAs adequate time to refine their Plans to address interconnected surface waters is appropriate and remains consistent with SGMA's timelines and local control preferences.

The Department will continue to support GSAs in this regard by providing, as appropriate, financial and technical assistance to GSAs, including the development of guidance describing appropriate methods and approaches to evaluate the rate, timing, and volume of depletions of interconnected surface water caused by groundwater extractions. Once the Department's guidance related to depletions of interconnected surface water is publicly available, the GSA, where applicable, should consider incorporating appropriate guidance approaches into their future periodic evaluations of the GSP ([Recommended Corrective Action 7b](#)). GSAs should consider availing themselves of the Department's financial or technical assistance, but in any event must continue to fill data gaps, collect additional monitoring data, and implement strategies to better understand and manage depletions of interconnected surface water caused by groundwater extractions and define segments of interconnectivity and timing within their jurisdictional area (see [Recommended Corrective Action 7c](#)). Furthermore, GSAs should coordinate with local, state, and federal resources agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion (see [Recommended Corrective Action 7d](#)).

## 5.4 MONITORING NETWORK

The GSP Regulations describe the monitoring network that must be developed for each sustainability indicator including monitoring objectives, monitoring protocols, and data reporting requirements. Collecting monitoring data of a sufficient quality and quantity is necessary for the successful implementation of a groundwater sustainability plan. The GSP Regulations require a monitoring network of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan.<sup>267</sup> Specifically, a monitoring network must be able to monitor impacts to beneficial uses and users,<sup>268</sup> monitor changes in groundwater conditions relative to measurable objectives

---

<sup>267</sup> 23 CCR § 354.32.

<sup>268</sup> 23 CCR § 354.34(b)(2).

and minimum thresholds,<sup>269</sup> capture seasonal low and high conditions,<sup>270</sup> include required information such as location and well construction and include maps and tables clearly showing the monitoring site type, location, and frequency.<sup>271</sup> Department staff encourage GSAs to collect monitoring data as specified in the GSP, follow SGMA data and reporting standards,<sup>272</sup> fill data gaps identified in the GSP prior to the first periodic evaluation,<sup>273</sup> update monitoring network information as needed, follow monitoring best management practices,<sup>274</sup> and submit all monitoring data to the Department's Monitoring Network Module immediately after collection including any additional groundwater monitoring data that is collected within the Plan area that is used for groundwater management decisions. Department staff note that if GSAs do not fill their identified data gaps, the GSA's basin understanding may not represent the best available science for use to monitor basin conditions.

The 2024 GSP established sustainable management criteria and monitoring networks for chronic lowering of groundwater levels, reduction of groundwater storage, and degraded water quality. The 2024 GSP proposes to use the chronic lowering of groundwater levels monitoring network as a proxy for the reduction of groundwater storage sustainability indicator. The 2024 GSP proposes the use of existing sources of data for tracking conditions related to degraded groundwater quality.

Additionally, the 2024 GSP established monitoring for land subsidence, and depletions of interconnected surface water which will be evaluated on a 5-year frequency to determine if sustainable management criteria should be established. The 2024 GSP proposes the use of existing sources of data for tracking conditions related to the land subsidence. The 2024 GSP also proposes to use groundwater levels as a proxy to monitor the depletions of interconnected surface water sustainability indicator.

The 2024 GSP does not establish a dedicated monitoring network for the purposes of assessing sustainable management criteria for the seawater intrusion, because the GSAs have determined the sustainability indicator is not applicable to the Basin.

The GSP's discussion of monitoring networks is comprehensive and includes adequate support, justification, and information to understand the GSA's process, analysis, and rationale. In arriving at this conclusion, Department staff have not determined that the GSA's choices are reasonable or appropriate under the law or that staff would necessarily conduct the same analysis and reach the same conclusions as used in the GSP if Department staff were to prepare such an analysis itself; Department staff finds only that the GSP adequately explains how and why the GSA performed the analyses and arrived

---

<sup>269</sup> 23 CCR § 354.34(b)(3).

<sup>270</sup> 23 CCR § 354.34(c)(1)(B).

<sup>271</sup> 23 CCR §§ 354.34(g-h).

<sup>272</sup> 23 CCR § 352.4 *et seq.*

<sup>273</sup> 23 CCR § 354.38(d).

<sup>274</sup> Department of Water Resources, 2016, [Best Management Practices and Guidance Documents](#).

at the conclusions it did and that this effort is within the range of what Department staff considers professional and acceptable under the circumstances.

The 2024 GSP has identified 12 wells for representative monitoring in the Basin for the evaluation of chronic lowering of groundwater levels, representing a density of 8.3 wells per 100 square miles.<sup>275</sup> The wells included in the representative monitoring network are depicted on Figure 8-1.<sup>276</sup> Table 8-1<sup>277</sup> indicates that 7 of the 12 representative monitoring wells will be monitored twice per year (spring and fall) and that 5 have continuous data monitoring frequency. Table 8-1 also provides the depth and screened interval for the representative monitoring wells.

Department staff conclude that the distribution, density, and frequency of measurement of the representative and contour wells shown in Figure 8-1 is sufficient to meet the regulatory requirements. Department staff also conclude that, although the 2024 GSP does not provide clear justification for the use of spring and fall water levels to represent seasonal highs and lows, the analysis of continuous groundwater level from multiple areas of the Basin will demonstrate what time of year is best for these representative measurements. Because a single principal aquifer was identified for the Basin, the depths of the identified wells also appear to be sufficient to meet requirements.

Monitoring protocols and data reporting as described in the 2024 GSP indicates that the GSAs have the expectation that Department staff will do all the groundwater level data collection, including the downloading of the continuous data, the management of all data, and upload all data to the required and appropriate state data platforms.<sup>278</sup> While the SGMA allows the Department to provide technical assistance to a GSA to assist in implementation of a plan, the GSA is responsible to develop a monitoring network capable of collecting sufficient data to demonstrate trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate Plan implementation. Department staff recommend that the GSAs be responsible to collect all data necessary for the 2024 GSP and annual reporting and that the 2024 GSP be updated to reflect that change.

The 2024 GSP proposes to use the representative monitoring network for the chronic lowering of groundwater levels sustainability indicator as a proxy for the reduction of groundwater storage monitoring network because changes in groundwater storage are directly dependent on changes in groundwater levels.<sup>279</sup> Department staff determine the utilization of the representative groundwater level monitoring network as a proxy for the groundwater storage network in the Basin is reasonable.

---

<sup>275</sup> 2024 Big Valley GSP, Section 8.2.1.1, p. 174.

<sup>276</sup> 2024 Big Valley GSP, Figure 8-1, p. 173.

<sup>277</sup> 2024 Big Valley GSP, Table 8-1, p. 172.

<sup>278</sup> 2024 Big Valley GSP, Section 8.2.1.4, p. 176.

<sup>279</sup> 2024 Big Valley GSP, Section 7.3.2, p. 165.

The 2024 GSP states this sustainability indicator is not applicable to this Basin; therefore, no monitoring network is proposed.<sup>280</sup> Department staff agree that the sustainability indicator for seawater intrusion is not present in this Basin and, therefore, the monitoring of seawater intrusion is not required.

The 2024 GSP proposes to establish a monitoring network for degraded water quality by leveraging data collection from 4 wells regulated by the State Water Resources Control Board's Division of Drinking Water (DDW). Three wells are located near Adin and Bieber, where most of the known contaminants are located. One DDW well is also located in the western portion of the Basin. The GSAs have installed electric conductivity transducers EC in three dedicated monitoring wells<sup>281</sup>. Additionally, the GSAs will implement a voluntary arsenic and nitrate monitoring program. The 2024 GSP does not provide the monitoring frequency for the DDW monitoring network wells while the EC sites will be monitored continuously.

The 2024 GSP proposes to use DWR InSAR satellite data and a CGPS station for the evaluation of subsidence in the Basin.<sup>282</sup> The 2024 GSP states that data from these sources will be evaluated on a five-year frequency to determine if "significant subsidence" is occurring.<sup>283</sup> Evaluation of past and current subsidence conditions in the Basin included in the 2024 GSP (see [Section 5.2.2](#)) indicates that displacement, though relatively minor, has been recorded in both the InSAR data and CGPS data.<sup>284</sup>

As discussed above in [Section 5.3.2.5](#), the Basin did not establish sustainable management criteria for land subsidence and Department staff have provided recommended corrective actions that the GSAs should address by the next periodic evaluation of the 2024 Plan.

The 2024 GSP describes a dedicated "Shallow Groundwater Monitoring Network" to evaluate shallow groundwater conditions and potential depletion of interconnected surface water.<sup>285</sup> The 2024 GSP states that insufficient data is currently available to characterize or quantify potential depletion of interconnected surface water, but that further analysis will be included with the five-year evaluation.<sup>286</sup> The shallow groundwater monitoring network includes two wells with biannual data collection frequency and 15 wells with continuous data collection. The 2024 GSP states that the wells with the continuous data collection were designed to measure the magnitude and direction of groundwater flow and located so that correlations with stream gauges could be made.<sup>287</sup>

---

<sup>280</sup> 2024 Big Valley GSP, Section 5.3, p. 112.

<sup>281</sup> 2024 Big Valley GSP, Section 8.2.2, p. 176.

<sup>282</sup> 2024 Big Valley GSP, Section 8.2.3, p. 180.

<sup>283</sup> 2024 Big Valley GSP, Section 8.2.3, p. 180.

<sup>284</sup> 2024 Big Valley GSP, Section 5.5, 5.5.1, 5.5.2, pp. 132-134.

<sup>285</sup> 2024 Big Valley GSP, Section 8.2.1.3, p. 175.

<sup>286</sup> 2024 Big Valley GSP, Section 8.2.1.3, p. 175.

<sup>287</sup> 2024 Big Valley GSP, Section 8.2.1.3, p. 175.

As discussed in [Section 5.3.2.6](#), Department staff recommend the GSA follow the Department's future guidance to develop methods and approaches to evaluate the location, quantity, and timing of depletions of interconnected surface water as discussed in [Recommended Corrective Action 7](#). Department staff further recommend that the GSP establish a dedicated monitoring network for depletions of interconnected surface waters that includes surface water monitoring sites and shallow groundwater level monitoring sites.

## 5.5 PROJECTS AND MANAGEMENT ACTIONS

The GSP Regulations require a description of the projects and management actions the submitting Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.<sup>288</sup> Each Plan's description of projects and management actions must include details such as: how projects and management actions in the GSP will achieve sustainability, the implementation process and expected benefits, and prioritization and criteria used to initiate projects and management actions.<sup>289</sup>

The 2024 GSP presents 22 projects and management actions further grouped into 7 categories which are Basin recharge projects, research and data development, increased surface-water storage capacity, improved hydrologic function and upland recharge, water conservation, public education and outreach, and a domestic well mitigation program. If implemented, these projects and management actions will improve monitoring, address data gaps, provide supplemental water, plan for drought mitigation, and support engagement with beneficial users of groundwater. For some of the PMAs, the implementation trigger is securing funding or the need for addressing data gaps within the first five years of GSP implementation. Currently, Modoc County's SGMA Implementation Grant is funding several of these projects and management actions.

Basin recharge projects include agriculture managed aquifer recharge (AgMAR), drainage or Basin recharge, and aquifer storage and recovery and injection wells. AgMAR is currently being considered in the Basin with over 25,000 acres reported in the Basin as being available for AgMAR.<sup>290</sup> The expected benefit from 500 to 1,000 acres of land would result in an average annual benefit of 800 acre-feet per year, based on a water availability analysis that is being developed.<sup>291</sup> Diverting excess water into irrigation drainages or canals and recharge basins is also being investigated. Recharge could yield up to 700 acre-feet per year, though the number and length of irrigation canals or ditches needs to be determined.<sup>292</sup> If flood MAR is not able to stabilize groundwater levels, then aquifer storage and recovery wells may be investigated.

---

<sup>288</sup> 23 CCR § 354.44(a).

<sup>289</sup> 23 CCR § 354.44 (b) *et seq.*

<sup>290</sup> 2024 Big Valley GSP, Section 9.1.1, p. 194.

<sup>291</sup> 2024 Big Valley GSP, Section 9.1.1, p. 194.

<sup>292</sup> 2024 Big Valley GSP, Section 9.1.2, p. 195.

Research and data development efforts will aid in filling data gaps. Efforts entail installing additional stream gages along Pit River to address flow measurement data gap where the Pit River enters into the Basin, addressing data gaps to improve the accuracy of the water budget to better inform groundwater management in the Basin, and adapting management criteria and tools for existing practices as critical information becomes available from monitoring, data development, outreach, and collaborative interpretation. The 2024 GSP reports that two stream gages and one CIMIS station have been installed since 2022. These research and data development efforts will assist in filling data gaps detailed throughout the 2024 GSP, and by continuing to fill these gaps, participating in research, and data collection the 2024 GSP will assist in achieving sustainability.

Increased surface-water storage capacity entails the expansion of several existing reservoirs serving the Basin to increase the capacity of surface water by an additional 1,900 acre-feet for irrigation and recharge projects, and aiding in balancing the water budget.<sup>293</sup> A new feasibility study may be conducted for the Allen Camp Dam and Reservoir project that was authorized by the Department of the Interior in 1976, meant to regulate flows of the Pit River for, primarily, irrigation and fish and wildlife purposes, as well as flood control and recreation services. The 2024 GSP states that these increased surface-water storage capacity projects “could provide significant amounts of water for summer irrigation,” and “an increase in surface water available for irrigation would lessen the reliance on groundwater and thus improve the Basin’s ability to remain sustainable.”<sup>294</sup> Depending on funding, one or more feasibility studies could be initiated in the next two years.<sup>295</sup>

Improved hydrologic function and upland recharge entails tree thinning operations aimed at positively impacting water availability by reducing the interception of precipitation, as snow and rain, and reducing the rate of transpiration due to dense layered canopy and vigorous network of roots. Stream channel enhancement and meadow restoration techniques are also used in the Basin to return proper hydrologic function to montane and rangeland meadows, resulting in the reconnection of the stream channel with a functioning floodplain and restoration of a degraded meadow’s water table up to its historic level. Projects are already in the planning and implementation stages to reduce fire risk and improve wildlife habitat and programs such as CAL FIRE’s Forest Health Program support project implementation funding.<sup>296</sup> Specifics are not provided but these efforts could yield “several thousand AF [acre-feet] of water.”<sup>297</sup>

Water conservation efforts include promoting irrigation efficiency and reducing illegal diversions of groundwater. The 2024 GSP states that irrigation efficiency could be improved in the Basin by 5 to 10 percent, yielding 1,000 to 2,000 acre-feet per year.<sup>298</sup>

---

<sup>293</sup> 2024 Big Valley GSP, Section 9.3.1, p. 202.

<sup>294</sup> 2024 Big Valley GSP, Section 9.3, p. 201.

<sup>295</sup> 2024 Big Valley GSP, Section 9.3.1, p. 203.

<sup>296</sup> 2024 Big Valley GSP, Section 9.4.1, p. 208.

<sup>297</sup> 2024 Big Valley GSP, Table 9-3, p. 190.

<sup>298</sup> 2024 Big Valley GSP, Section 9.5.1, p. 210.



To a lesser degree, enhancing water conservation among domestic water users, particularly domestic landscaping, use of native drought adapted plants, irrigation timers, mulch, and rainwater/snow water catchments can also reduce water requirements.<sup>299</sup> Illegal diversions and groundwater uses can also be diminished by utilizing county resources to work in the field to identify and abate illegal marijuana cultivation on private land, relying on several agencies (Bureau of Land Management, United States Forest Service, California Department of Fish and Wildlife, State Water Board, and Bureau of Cannabis Control) to take an aggressive approach in the Basin with the objective of removing illegal groundwater pumping and surface-water diversions.<sup>300</sup>

The 2024 GSP states that public education and outreach are important in order to promote water conservation and protection of water resources. The 2024 GSP states “the GSAs support continued education on preventing illegal dumping, illegal marijuana growers, properly sealing abandoned wells and BMPs.”<sup>301</sup> Public education and outreach methods listed include public radio service announcements, cooperator workshops with the University of California Cooperative Extension, social media posts informing the public about upcoming meetings and deadlines, BMPs, Plan updates, recharge opportunities, and updated water conditions.

Overall, the 2024 GSP provides a reasonable discussion of how the projects and management actions are related to the Basin’s sustainability. The projects and management actions are developed to monitor Basin conditions, maintain sustainability or mitigate potential undesirable results. The 2024 GSP describes projects and management actions in a manner that substantially complies with the GSP Regulations.

## **5.6 CONSIDERATION OF ADJACENT BASINS/SUBBASINS**

SGMA requires the Department to “...evaluate whether a groundwater sustainability plan adversely affects the ability of an adjacent basin to implement their groundwater sustainability plan or impedes achievement of sustainability goals in an adjacent basin.”<sup>302</sup> Furthermore, the GSP Regulations state that minimum thresholds defined in each GSP be designed to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.<sup>303</sup>

The Big Valley Basin does not have any adjacent groundwater basins subject to SGMA.

---

<sup>299</sup> 2024 Big Valley GSP, Section 9.5.3, p. 211.

<sup>300</sup> 2024 Big Valley GSP, Section 9.5.3, p. 211.

<sup>301</sup> 2024 Big Valley GSP, Section 9.6, p. 211.

<sup>302</sup> Water Code § 10733(c).

<sup>303</sup> 23 CCR § 354.28(b)(3).

## 5.7 CONSIDERATION OF CLIMATE CHANGE AND FUTURE CONDITIONS

The GSP Regulations require a GSA to consider future conditions and project how future water use may change due to multiple factors including climate change.<sup>304</sup>

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

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

---

<sup>304</sup> 23 CCR § 354.18.

## 6 STAFF RECOMMENDATION

---

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

### RECOMMENDED CORRECTIVE ACTION 1

Provide a robust and accurate assessment of overdraft in annual reports<sup>305</sup>, a comparison of recent reported overdraft values to projected values from the water budget, and a description of additional reasonable, feasible projects or management actions for the mitigation of unanticipated levels of overdraft<sup>306</sup>, as needed.

### RECOMMENDED CORRECTIVE ACTION 2

Describe the specific undesirable results to be avoided through implementing the Plan. If, for example, significant and unreasonable impacts to wildlife and recreational activities are a primary management concern for the Basin, then the GSAs should sufficiently explain why that effect was selected and what type and level of potential effects<sup>307</sup> to those beneficial uses and users the GSAs consider to be significant and unreasonable.

### RECOMMENDED CORRECTIVE ACTION 3

Department staff recommend the following as it relates to degraded water quality:

- a. The GSAs should provide additional justification and explanation for how water quality constituents of concern, other than TDS, will be managed and monitored, and how impacts to beneficial uses and users will be addressed should there be degradation of water quality during plan implementation. The GSAs should also consider developing sustainable management criteria for additional water quality constituents.<sup>308</sup>

---

<sup>305</sup> 23 CCR §§ 356.2(b)(5)(A-B).

<sup>306</sup> 23 CCR § 354.44(b)(2).

<sup>307</sup> 23 CCR § 354.26(b)(2).

<sup>308</sup> 23 CCR § 354.26(a).

- b. Coordinate with the appropriate groundwater users, including drinking water, environmental, and irrigation users as identified in the Plan, and water quality regulatory agencies and programs in the Basin to understand and develop a process for monitoring and determining if groundwater management and extraction could cause migration of constituents of concern or degraded water quality in the Basin.

#### **RECOMMENDED CORRECTIVE ACTION 4**

Develop and disclose the estimated cost of implementing the Plan, including projects and management actions deemed likely to be required by GSAs, along with a general description of how the GSAs plan to meet those costs.<sup>309</sup>

#### **RECOMMENDED CORRECTIVE ACTION 5**

Identify all hydrogeologic conceptual model data gaps and their activities, priorities, and implementation schedules that will be necessary to fill them.

#### **RECOMMENDED CORRECTIVE ACTION 6**

Establish sustainability management criteria for land subsidence including defining undesirable results, minimum thresholds, measurable objectives, and interim milestones for land subsidence. The sustainable management criteria should be based on direct measurements of groundwater surface elevation such as extensometers, continuous global positioning stations, or remote sensing techniques (such as InSAR).

#### **RECOMMENDED CORRECTIVE ACTION 7**

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

- a. Estimate the quantity and timing of depletions of interconnected surface water systems prior to the next periodic evaluation.
- b. Consider utilizing the interconnected surface water guidance, as appropriate, when issued by the Department to establish quantifiable minimum thresholds, measurable objectives, and management actions.

---

<sup>309</sup> 23 CCR § 354.6(e).

- c. Continue to fill data gaps, collect additional monitoring data, and implement the current strategy to manage depletions of interconnected surface water and define segments of interconnectivity and timing.
- d. Prioritize collaborating and coordinating with local, state, and federal regulatory agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion within the GSA's jurisdictional area.