



CALIFORNIA DEPARTMENT OF WATER RESOURCES

# SUSTAINABLE GROUNDWATER MANAGEMENT OFFICE

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November 18, 2021

Doug Welch  
Chowchilla Subbasin Plan Manager  
327 S. Chowchilla Blvd., Chowchilla, CA 93610  
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RE: Chowchilla Subbasin - 2020 Groundwater Sustainability Plan

Dear Doug Welch,

The Chowchilla Water District, Madera County, County of Merced Chowchilla, and Triangle T Water District Groundwater Sustainability Agencies (GSAs) submitted the Chowchilla Subbasin (Subbasin) Groundwater Sustainability Plan (GSP) to the Department of Water Resources (Department) for evaluation and assessment as required by the Sustainable Groundwater Management Act (SGMA).<sup>1</sup>

Department staff have substantially completed an initial review of the GSP and have identified potential deficiencies (see the enclosed document) that may preclude the Department's approval.<sup>2</sup> Department staff have also developed potential corrective actions<sup>3</sup> for each potential deficiency. The potential deficiencies do not necessarily represent all deficiencies or discrepancies that the Department may identify in the GSP but focus on those deficiencies that staff believe, if not addressed, could lead to a determination that the GSP is incomplete or inadequate. This letter initiates consultation between the Department and the GSAs regarding the time needed to address the potential deficiencies and corrective actions. The Department will issue a final determination as described under the GSP Regulations<sup>4</sup> no later than January 29, 2022.

If the Department determines the GSP to be incomplete, the deficiencies precluding approval would need to be addressed within a period not to exceed 180 days from the determination. A determination of incomplete would allow the GSAs to formally address identified deficiencies and submit a revised GSP to the Department for further review and evaluation. Department staff will contact you before making the final determination to discuss the potential deficiencies and the amount of time needed by the GSAs to address the potential corrective actions detailed in the enclosed document.

Materials submitted to the Department to address deficiencies must be part of the GSP. The GSAs must justify that any materials submitted are part of the revised GSP; this justification is also part of the submittal. To facilitate the Department's review of the

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

<sup>2</sup> 23 CCR § 355.2(e)(2).

<sup>3</sup> 23 CCR § 355.2(e)(2)(B).

<sup>4</sup> 23 CCR Division 2, Chapter 1.5, Subchapter 2.

revised GSP, the GSAs should also provide a companion document with tracked changes of modifications made to address deficiencies. The GSAs must submit their revised GSP through the DWR SGMA Portal where, as is currently available, interested parties may provide comments on submitted materials to the Department.

Department staff will work expeditiously to review materials submitted to address deficiencies and to evaluate compliance of the revised GSP. The Department will keep a GSP status designated as incomplete during its review of the submitted materials. The Department could subsequently approve an incomplete GSP if the GSAs have taken corrective actions to address deficiencies identified by the Department within a period not to exceed 180 days from the determination. The Department could also issue a determination of inadequate for an incomplete GSP if the Department, after consultation with the State Water Resources Control Board, determines the GSAs have not taken sufficient actions to correct the deficiencies identified by the Department.

If you have any questions, please do not hesitate to contact the Sustainable Groundwater Management Office staff by emailing [sgmps@water.ca.gov](mailto:sgmps@water.ca.gov).

Thank you,

*Paul Gosselin*

Paul Gosselin  
Deputy Director for Sustainable Groundwater Management

Enclosure:

1. Potential Deficiencies and Corrective Actions

2020 Groundwater Sustainability Plan  
Chowchilla Subbasin (Basin No. 5-022.05)

## Potential Deficiencies and Corrective Actions

Department of Water Resources (Department) staff have identified deficiencies regarding the Chowchilla Subbasin (Subbasin) Groundwater Sustainability Plan (GSP) that may preclude the Department's approval. Therefore, consistent with the GSP Regulations, Department staff are considering corrective actions the Subbasin's groundwater sustainability agencies (GSAs) should review to determine whether and how the deficiencies can be addressed. The deficiencies and potential corrective actions are explained below, including the general regulatory background, the specific deficiencies identified in the GSP, and specific actions to address the deficiencies. The specific actions identified are potential corrective actions until the Department makes a final determination.

### **General Background**

Potential deficiencies identified in the Chowchilla Subbasin GSP relate to the development and documentation of sustainable management criteria, including undesirable results and minimum thresholds that define when undesirable results may occur.

The Department's GSP Regulations describe several required elements of a GSP under the heading of "Sustainable Management Criteria"<sup>5</sup>, including undesirable results, minimum thresholds, and measurable objectives. These components of sustainable management criteria must be quantified so that GSAs, the Department, and other interested parties can monitor progress towards sustainability consistently and objectively.

A GSA relies on local experience, public outreach and involvement, and information about the basin it has described in the GSP basin setting (i.e., the hydrogeologic conceptual model, the description of current and historical groundwater conditions, and the water budget), among other factors, to develop criteria for defining undesirable results and setting minimum thresholds and measurable objectives for the basin.<sup>6</sup>

The Sustainable Groundwater Management Act (SGMA) defines sustainable groundwater management as the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.<sup>7</sup> The avoidance of undesirable results is thus explicitly part of sustainable groundwater management as established by SGMA and critical to the success of a GSP.

The definition of undesirable results is critical to establishing an objective method to define and measure sustainability for a basin. As an initial matter, SGMA provides a

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<sup>5</sup> 23 CCR § Article 5, Subarticle 3.

<sup>6</sup> 23 CCR §§ 354.8, 354.10, 354.12 *et seq.*

<sup>7</sup> Water Code § 10721(v).

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qualitative definition of undesirable results as “one or more” of six specific “effects caused by groundwater conditions occurring throughout the basin.”<sup>8</sup>

GSA define, in their GSPs, the specific significant and unreasonable effects that would constitute undesirable results and the groundwater conditions that would produce those results in their basins.<sup>9</sup> The GSAs’ definition needs to include a description of the processes and criteria relied upon to define undesirable results and must describe the effect of undesirable results on the beneficial uses and users of groundwater, surface land uses (for subsidence), and surface water (for interconnected surface water).<sup>10</sup>

SGMA leaves the task of establishing undesirable results and setting thresholds largely to the discretion of the GSA, subject to review by the Department. In its review, the Department requires a thorough and reasonable analysis of the groundwater conditions and the associated effects the GSA must manage the groundwater basin to avoid, and the GSAs’ stated rationale for setting objective and quantitative sustainable management criteria to prevent those undesirable conditions from occurring.<sup>11</sup> If the GSP does not meet this requirement, the Department cannot evaluate the GSAs’ likelihood of achieving their sustainability goal. That does not necessarily mean that the GSP or its objectives are inherently unreasonable; rather, the Department cannot evaluate whether the GSP’s implementation would successfully achieve sustainable management if it is unclear what undesirable conditions the GSAs seek to avoid.

**Potential Deficiency 1. The GSP does not provide sufficient information to support the selection of the chronic lowering of groundwater levels sustainable management criteria.**

**Background**

The GSP Regulations state that the description of minimum thresholds shall include the relationship between the minimum thresholds for each sustainability indicator, including an explanation of how the GSA has determined that basin conditions at each minimum threshold would avoid undesirable results for each of the sustainability indicators.<sup>12</sup>

The GSP Regulations state that minimum thresholds for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results. These quantitative values should be supported by:

- The rate of groundwater elevation decline based on historical trends, water year type, and projected water use in the basin;

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<sup>8</sup> Water Code § 10721(x).

<sup>9</sup> California Department of Water Resources, Best Management Practices for the Sustainable Management of Groundwater: Sustainable Management Criteria (Draft), November 2017.

<sup>10</sup> 23 CCR §§ 354.26(b), 354.28(c)(5), 354.28(c)(6).

<sup>11</sup> 23 CCR § 355.4(b)(1).

<sup>12</sup> 23 CCR § 354.28(b)(2).

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- Potential effects on other sustainability indicators.<sup>13</sup>

### Potential Deficiency Details

Department staff find that the Chowchilla Subbasin GSP's explanation of the chronic lowering of groundwater levels sustainable management criteria, particularly for undesirable results and minimum thresholds, does not include sufficient detail and analysis required by the GSP Regulations.

The GSP provides quantitative values for the minimum thresholds and includes a combination of those minimum threshold exceedances that the GSAs consider to be an undesirable result.<sup>14</sup> However, the GSP does not appear to base its minimum thresholds on groundwater levels that indicate "a depletion of supply at a given location that may lead to undesirable results," as required by the GSP Regulations.<sup>15</sup> Nor does the GSP explain the GSAs' understanding of the effects those corresponding groundwater conditions would have on beneficial uses and users of groundwater. In the absence of documented analysis and explanation for selecting the minimum thresholds and undesirable results, the GSP does not satisfy the requirements of the GSP Regulations.<sup>16</sup> Due to this deficiency, Department staff cannot determine whether the sustainable management criteria for chronic lowering of groundwater levels are reasonable.<sup>17</sup>

The GSP defines significant and unreasonable lowering of groundwater levels as "*conditions that:*

- 1) *cause significant financial burden to local agricultural interests or others who rely on subbasin groundwater resources,*
- 2) *cause groundwater level conditions at private domestic wells that cannot be mitigated, and*
- 3) *interfere with other sustainability indicators.*<sup>18</sup>

The GSP describes undesirable results due to chronic lowering of groundwater levels as having been present during the historical period and during existing conditions,<sup>19</sup> but does not describe what those undesirable results specifically were, who or what they affected, or where they occurred in the Subbasin.

Department staff review of the minimum thresholds presented in the GSP indicates that the GSAs consider that further groundwater level declines below historical groundwater level lows in the Upper Aquifer of the Western Management Area and the Lower Aquifer

<sup>13</sup> 23 CCR § 354.28(c)(1)(B).

<sup>14</sup> Chowchilla Subbasin GSP, Table 3-6, p. 253-254, p. 271.

<sup>15</sup> 23 CCR § 354.28(c)(1).

<sup>16</sup> 23 CCR §§ 354.26, 354.28.

<sup>17</sup> 23 CCR § 355.4(b)(1).

<sup>18</sup> Chowchilla Subbasin GSP, p. 271.

<sup>19</sup> Chowchilla Subbasin GSP, Table 3-1, p. 232.

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in the Eastern Management Area are tolerable and acceptable. A review of the minimum thresholds for each representative monitoring site (and the site's respective historic low reading) indicate that proposed management under the GSP could allow groundwater level declines of up to 85 feet in the Upper Aquifer of the Western Management Area and 190 feet in the Lower Aquifer of the Eastern Management Area.<sup>20</sup>

In its discussion of these groundwater level minimum thresholds and their relation to the three defined significant and unreasonable conditions, the GSP states that the predominant financial burden on agricultural interests in the Subbasin would be costs associated with executing direct and in-lieu recharge projects and lost crop yield associated with converting farmland to recharge areas. The GSP anticipates that impacts to private domestic wells would be mitigated via the Potential Domestic Well Mitigation Program detailed in Appendix 3.C. of the GSP.<sup>21</sup> Lastly, in its discussion of groundwater level minimum thresholds and their relation to subsidence, the GSP fails to examine the relationship between allowable groundwater level declines and land subsidence in the Subbasin.<sup>22</sup>

Although the referenced Potential Domestic Well Mitigation Program provides a first step in addressing impacts to domestic wells in the Subbasin, it is still in the development phase, with a more accurate survey of domestic wells in the Subbasin underway.<sup>23</sup> It is unclear to Department staff when the program will be implemented and financed by the GSAs in the Subbasin, or how rapidly the GSAs will be able to respond to developing domestic well impacts. Also, the GSP does not provide explanation of how established groundwater level minimum thresholds will affect land subsidence in the Eastern Management Area of the Subbasin. Without commitment to the Potential Domestic Well Mitigation Program or an analysis of how groundwater level minimum thresholds may affect land subsidence included in the GSP, Department staff cannot determine whether the sustainable management criteria for chronic lowering of groundwater levels will avoid conditions that cause groundwater level conditions at private domestic wells that cannot be mitigated or interfere with other sustainability indicators.<sup>24</sup>

### Potential Corrective Action 1

The GSP must explain how the chronic lowering of groundwater level minimum thresholds, defined at representative monitoring sites, represent groundwater levels that indicate a depletion of supply at that location that may lead to undesirable results. Support the explanation by describing the specific significant and unreasonable effects on groundwater supply uses and users that the GSA intends to avoid. The GSP should include specific details about those effects, supported by the best available information and science. If the GSAs intended that the minimum thresholds values in the GSP do not

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<sup>20</sup> Chowchilla Subbasin GSP, Appendix A2.E, p. 735-836.

<sup>21</sup> Chowchilla Subbasin GSP, Appendix 3.C., p. 1137-1147.

<sup>22</sup> Chowchilla Subbasin GSP, p. 256.

<sup>23</sup> Chowchilla Subbasin WY2020 Annual Report, p. 50.

<sup>24</sup> Chowchilla Subbasin GSP, p. 271.

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explicitly represent a depletion of supply that may lead to undesirable results, but that those users impacted by planned depletion of supply (via lowering of groundwater levels and reduction of storage) would be mitigated, then the GSAs should more clearly describe, with specific detail, the Subbasin-wide mitigation program. Department staff note that, while the GSP states significant adverse impacts to domestic wells are expected to be addressed through a temporary domestic well mitigation program that the Chowchilla Subbasin GSAs are currently developing with the assistance of Proposition 68 grant funding,<sup>25</sup> it is unclear when the program will be implemented and financed by the GSAs in the Subbasin, or how rapidly the GSAs will be able to respond to developing domestic well impacts. Department staff recommend the GSA include additional information regarding the implementation of the mitigation program in responding to this potential deficiency. In addition to domestic wells, the GSAs should explain whether and how the mitigation program extends to other drinking water users that rely on shallow wells, such as public water systems and state small water systems.

The GSP should also clearly explain the relationship between the chronic lowering of groundwater levels minimum thresholds and those developed for subsidence, and explain how allowing continued lowering of groundwater levels would avoid undesirable results for subsidence.

**Potential Deficiency 2. The GSP does not provide sufficient information to support the selection of land subsidence sustainable management criteria.**

**Background**

The GSP Regulations state that minimum thresholds for land subsidence should identify the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. These quantitative values should be supported by:

- The identification of land uses or property interests potentially affected by land subsidence;
- An explanation of how impacts to those land uses or property interests were considered when establishing minimum thresholds;
- Maps or graphs showing the rates and extents of land subsidence defined by the minimum thresholds.<sup>26</sup>

The GSP Regulations allow the use of groundwater elevations as a proxy for land subsidence. However, GSAs must demonstrate a significant correlation between groundwater levels and land subsidence and must demonstrate that the groundwater level minimum threshold values represent a reasonable proxy for avoiding land subsidence undesirable results.<sup>27</sup>

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<sup>25</sup> Chowchilla Subbasin WY2020 Annual Report, p. 50.

<sup>26</sup> 23 CCR § 354.28(c)(5).

<sup>27</sup> 23 CCR § 354.28(d).

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## Potential Deficiency Details

The GSP states that significant and unreasonable conditions due to land subsidence are significant impacts to infrastructure and, specifically for the Western Management Area, significant continued subsidence that impacts infrastructure.<sup>28</sup> However, the GSP does not define or identify what infrastructure is susceptible to impacts from land subsidence. (See Potential Corrective Action 2a.)

The GSP creates two management areas, the Western and Eastern management areas, in the Subbasin to address undesirable results due to land subsidence observed in the western side of the Subbasin. In describing the rationale for creating two management areas in the Subbasin, the GSP states that a distinguishing hydrogeologic feature is that the Western Management Area is comprised of two distinct aquifers, the Upper Aquifer and the Lower Aquifer, which are situated above and below the Corcoran Clay, respectively, and the Eastern Management Area is largely unsaturated or contains a thin perched aquifer, or the Corcoran Clay layer is not present.<sup>29</sup>

In the Western Management Area, where the GSP explains historical subsidence has been significant, Lower Aquifer groundwater levels are used as a proxy to establish subsidence minimum thresholds.<sup>30</sup> Minimum thresholds for the Lower Aquifer in the Western Management Area are set at “the higher of:

- projected lowest future groundwater level at the end of an estimated 10-year drought; or
- recent historic groundwater level lows observed in the well, which in most cases occurred during 2014-2016.”<sup>31</sup>

As defined in the GSP, 50 percent of the representative monitoring site wells (four out of seven) for the Lower Aquifer in the Western Management Area would need to exceed the established minimum thresholds for two consecutive fall readings to trigger an undesirable result for land subsidence.<sup>32</sup> In justifying the monitoring of groundwater levels as proxy for land subsidence in the Western Management Area, the GSP states, “the recent drought from 2012 to 2015 resulted in historic low groundwater elevations in many Lower Aquifer wells in the 2014 to 2016 time frame, which correlates recent rates of subsidence.”<sup>33</sup> While Department staff agree that there will always be some correlation between groundwater levels and subsidence, the GSP fails to provide adequate evidence to further evaluate this correlation, specifically with regard to potential subsidence caused by groundwater levels falling below historical lows, as would occur if groundwater levels are allowed to decline below historical lows at up to 50 percent of representative

<sup>28</sup> Chowchilla Subbasin GSP, p. 272.

<sup>29</sup> Chowchilla Subbasin GSP, p. 158.

<sup>30</sup> Chowchilla Subbasin GSP, p. 261-262.

<sup>31</sup> Chowchilla Subbasin GSP, p. 262.

<sup>32</sup> Chowchilla Subbasin GSP, p. 272-273.

<sup>33</sup> Chowchilla Subbasin GSP, p. 290.



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monitoring wells. The GSP does not provide an analysis of how much subsidence may be expected if up to 50 percent of representative monitoring site wells exceed their established minimum thresholds. Additionally, the GSP does not provide an analysis of how much land subsidence may be expected if groundwater levels exceed their historical lows in the Lower Aquifer of the Western Management Area, as MCSim groundwater model simulation results show that, even after implementing all the projects proposed in the GSP, groundwater levels may still decline below historical lows.<sup>34</sup> Without these analyses, and a discussion of how continued subsidence relates to sensitive infrastructure, Department staff are unable assess whether representative groundwater level values are a reasonable proxy for monitoring for subsidence in the Western Management Area.<sup>35</sup> (See Potential Corrective Action 2b.)

The GSP defines an adaptive management strategy for land subsidence in the Eastern Management Area which establishes a minimum threshold of 0.25 feet per year of land subsidence over a three-year period but, should the threshold be exceeded or should significant and unreasonable impacts be observed, groundwater level minimum thresholds as a proxy will be developed and implemented.<sup>36</sup> The GSAs provided no discussion or evidence for why they selected 0.25 feet per year as the minimum threshold in the Eastern Management Area. The GSAs should document their understanding, through efforts such as coordination and technical studies, of the amount of subsidence that would be significant and unreasonable, because it would substantially interfere with groundwater and land surface beneficial uses and users. Department staff note that public comments were received which expressed concern about impacts to infrastructure due to allowable continued land subsidence under the GSP. Without a discussion of what would constitute a significant and unreasonable impact or how 0.25 feet per year of continued land subsidence relates to sensitive infrastructure in the Eastern Management Area, Department staff are unable to assess whether this minimum threshold and the adaptive management strategy are reasonable.

Also, because the GSP, in its current form, allows for continuation of subsidence in perpetuity in the Eastern Management Area, Department staff note that it was the intent of the legislature that implementation of SGMA would avoid or minimize subsidence<sup>37</sup> once basins achieve their sustainability goals. To be consistent with that intent, and in the absence of compelling information as to why additional long-term subsidence is acceptable for the Subbasin, Department staff suggest that the Eastern Management Area minimum threshold be revised and set commensurate with expected residual subsidence. It may be that those rates are exceeded during the implementation period (i.e., between 2020 and 2040), as projects and management actions are implemented and sustainability is achieved, but that result can be acceptable if the GSAs are making adequate progress in implementing their GSP. The rates at which projects and

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<sup>34</sup> Chowchilla Subbasin GSP, pp. 1947 and 1951.

<sup>35</sup> 23 CCR § 354.28(d).

<sup>36</sup> Chowchilla Subbasin GSP, p. 262.

<sup>37</sup> Water Code § 10720.1(e).

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management actions are implemented should be consistent with the cumulative subsidence that the GSAs determines needs to be avoided, as informed by the understanding of potential impacts or interference to beneficial uses and users of groundwater and surface land uses. (See Potential Corrective Action 2c.)

Department staff do not believe that the GSP, in a Subbasin with significant historical subsidence that has been identified as an undesirable result, should be recommended for approval without identifying minimum thresholds and undesirable results that reflect the level of additional subsidence that would interfere with surface land uses. Department staff recognize that the total allowable cumulative subsidence may be modified as the GSP is implemented, data gaps are filled, and additional analyses are conducted; therefore, Department staff encourage the GSAs to actively evaluate and adjust management criteria as new information and data are acquired.

### **Potential Corrective Action 2**

- a) The GSP should be revised to include discussion of land surface beneficial uses and users in the Subbasin (e.g., infrastructure such as canals or levees) that may be susceptible to substantial interference as a result of continued subsidence. This information should be used to inform other revisions to the GSP necessitated by this potential corrective action.
- b) The GSAs should provide supporting information for using groundwater levels as a proxy for subsidence in the Western Management Area. The GSP should be revised to include analysis that demonstrates a significant correlation between groundwater levels, which are allowed to decline below the historical low at up to 50 percent of monitoring sites, and land subsidence. Evaluate the potential for subsidence impacts (i.e., substantial interference for surface land uses) related to any allowable further groundwater level decline. The GSAs should also consider incorporation of remotely-sensed subsidence data made available by the Department on an ongoing basis to verify the appropriateness of the groundwater level proxy.
- c) The GSAs should revise their minimum thresholds and measurable objectives for land subsidence in the Eastern Management Area to reflect the intent of SGMA that subsidence be avoided or minimized once sustainability is achieved. Explain how implementation of the projects and management actions is consistent both with achieving the long-term avoidance or minimization of subsidence and with not exceeding the tolerable amount of cumulative subsidence.

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**Potential Deficiency 3. The GSP does not provide sufficient information to support the determination that interconnected surface water or undesirable results related to depletions of interconnected surface water are not present and are not likely to occur in the Subbasin.**

**Background**

The GSP Regulations require a GSP to identify interconnected surface water systems in the basin and evaluate the quantity and timing of depletions of those systems using the best available information.<sup>38</sup>

The GSP Regulations state that a GSA that is able to demonstrate one or more sustainability indicators are not present and are not likely to occur in the basin is not required to develop sustainable management criteria for those indicators.<sup>39</sup> Absent an explanation of why a sustainability indicator is inapplicable, the Department assumes all sustainability indicators apply.<sup>40</sup> Demonstration of applicability (or non-applicability) of sustainability indicators must be supported by best available information and science and should be provided in descriptions throughout the GSP (e.g., information describing basin setting, discussion of the interests of beneficial users and uses of groundwater).

The Department's assessment of a GSP's likelihood to achieve its sustainability goal for its basin is based, in part, on whether a GSP provides sufficiently detailed and reasonable supporting information and analysis for all applicable indicators. The GSP Regulations require the Department to evaluate whether establishment of sustainable management criteria is commensurate with the level of understanding of the basin setting.<sup>41</sup>

**Potential Deficiency Details**

The GSP explains that the primary surface water features in the Subbasin are the Chowchilla River, Ash Slough, Berenda Slough, and the San Joaquin River and that, while each of these are a source of natural groundwater recharge, none are interconnected with groundwater. For the development of the GSP, a comparison of the historical regional groundwater levels to stream thalweg elevations was performed and regional groundwater levels were determined to be "relatively far below"<sup>42</sup> the thalweg elevations. The GSP states that the analysis indicated the San Joaquin River, along the western boundary of the Subbasin, was connected through 2008 but that from 2009 to 2016 the groundwater levels were "generally below (and apparently disconnected from)" the river.<sup>43</sup> The GSP lacks adequate documentation of the analysis used for the development of this conclusion. The GSP provides and references maps showing the

<sup>38</sup> 23 CCR §§ 354.28(c)(6)(A), 354.28(c)(6)(B).

<sup>39</sup> 23 CCR §§ 354.22, 354.26(d), 354.28(e).

<sup>40</sup> DWR Best Management Practices for the Sustainable Management of Groundwater: Sustainable Management Criteria (DRAFT), November 2017.

<sup>41</sup> 23 CCR § 355.4(b)(3).

<sup>42</sup> Chowchilla Subbasin GSP, p. 99.

<sup>43</sup> Chowchilla Subbasin GSP, p. 99-100.

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depth to shallow groundwater for 2014 and 2016 but does not provide details regarding the wells selected for these maps.<sup>44</sup> It is unclear if these wells are screened in only the Upper Aquifer or if composite wells or wells with unknown construction details were also included. The GSP does not provide the stream thalweg depths that were used for comparison to the groundwater levels, nor does it quantify what “relatively far below” the thalweg is.

A brief analysis of groundwater levels in Upper Aquifer well SJRRP\_MW-10-89 (located approximately 100 feet from the San Joaquin River) is provided in the discussion of hydrologic conditions associated with the groundwater dependent ecosystems assessment. Recorded measurements at SJRRP\_MW-10-89 show groundwater levels approximately 2 feet below ground surface in early 2017.<sup>45</sup> Also in this analysis, the following statement is made: “The shallowest well depths indicate that the surface water may be temporarily connected with the perched/mounded groundwater beneath the well.”<sup>46</sup> Further, in its own discussion of groundwater and surface water interaction near the San Joaquin River, the GSP states, “given the apparent fully saturated water column at these locations [areas adjacent to the San Joaquin River], there is at least potential for regional groundwater pumping to impact groundwater dependent ecosystems (GDEs) with roots extending down 20 to 30 feet along the San Joaquin River.”<sup>47</sup> Department staff note that is generally understood that perched groundwater is separated from an underlying body of groundwater by an unsaturated zone.<sup>48</sup> Due to the presence of the fully saturated water column in areas adjacent to the San Joaquin River, it appears the GSP has identified areas of interconnected surface water, instead of identifying areas of perched/mounded groundwater that support riparian habitat. The possible presence of interconnected surface water along the San Joaquin River is further reinforced by information found in an adjacent subbasin’s GSP.

The Subbasin shares a boundary with the Delta-Mendota Subbasin, and that boundary is aligned with the San Joaquin River. The San Joaquin River Exchange Contractors (SJREC) GSP in the Delta-Mendota Subbasin, which is adjacent to the Chowchilla Subbasin, states, “The SJRRP [San Joaquin River Restoration Program] and the SJREC have established a series of shallow monitoring wells near the San Joaquin River as part of the Seepage Management Plan for the Program. Data from these wells were used to determine the location of potentially connected surface water and groundwater. Figure 52 in Appendix I has a map that shows the potential locations of the interconnected portions of the San Joaquin River.”<sup>49</sup> Appendix I is the hydrogeologic conceptual model for the SJREC GSP. In the hydrogeologic conceptual model section titled “Interconnected

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<sup>44</sup> Chowchilla Subbasin GSP, Figures 2-70 and 2-71, p. 226-227.

<sup>45</sup> Chowchilla Subbasin GSP, Figure A2.B-4, p. 468.

<sup>46</sup> Chowchilla Subbasin GSP, Appendix 2.B., p. 469.

<sup>47</sup> Chowchilla Subbasin GSP, p. 100.

<sup>48</sup> Water Basics Glossary. U.S. Geological Survey (USGS), [https://water.usgs.gov/water-basics\\_glossary.html](https://water.usgs.gov/water-basics_glossary.html).

<sup>49</sup> SJREC GSP, p. 130; Appendix I, Figure 52, p. 956.

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Surface Water and Groundwater Systems in the SJREC GSA” there are “several areas where the shallow groundwater is indicated to be in direct hydraulic continuity with streamflow.”<sup>50</sup> Department staff note that Figure 52 in Appendix I indicates potentially connected surface water and groundwater along the San Joaquin River at the southern portion of the boundary between the Delta-Mendota and Chowchilla subbasins.

Department staff do not believe the GSAs sufficiently demonstrate that interconnected surface water or undesirable results related to depletions of interconnected surface water are not present and are not likely to occur in the Subbasin.

### Potential Corrective Action 3

The GSAs must provide more detailed information, as required in the GSP Regulations,<sup>51</sup> regarding the presence of interconnected surface waters and, if present, depletions of those interconnected surface waters due to groundwater use. Department staff recommend the GSAs consider and address the following:

- a) The GSP must be revised to include a clear and comprehensive analysis of the potential for interconnected surface water to be present along the San Joaquin River in the Subbasin. The revision should provide data and complete analysis to support any conclusion regarding the presence or absence of interconnected surface water. Department staff suggest the GSAs review information from adjacent GSPs, as described above. If the GSAs find that there is insufficient data to justify the conclusion that interconnected surface water is, or is not, present in the Subbasin, a plan and schedule should be developed and submitted to the Department to address this data gap.
- b) Should data indicate the presence of interconnected surface water, the GSAs should develop sustainable management criteria, as required in the GSP Regulations,<sup>52</sup> based on best available information and science. The GSAs should evaluate and disclose, sufficiently and thoroughly, the potential effects of the GSP’s sustainable management criteria for depletion of interconnected surface water on beneficial uses of the interconnected surface water and on groundwater uses and users.

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<sup>50</sup> SJREC GSP, Appendix I, p. 951-956.

<sup>51</sup> 23 CCR §§ 354.26, 354.28, 354.30.

<sup>52</sup> 23 CCR §§ 354.26, 354.28, 354.30.