CALIFORNIA
Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

TULARE LAKE SUBBASIN PROBATIONARY HEARING DRAFT STAFF REPORT

Appendix A – Summary Table of Proposed Deficiencies and Potential Actions to Address Deficiencies

October 2023

Deficiency	What SGMA Requires	Deficiency Summary	Potential Actions to Correct the Deficiency
Deficiency Groundwater Levels (GL)-1 – The 2022 GSP does not clearly describe the groundwater level conditions that would result in an undesirable result for the basin.	The GSP Regulations require a GSA to "describe...the processes and criteria relied upon to define undesirable results applicable to the basin." This description must include the cause of past or potential undesirable results, "the criteria used to define when and where the effects of the groundwater conditions cause undesirable results," and the potential effects of undesirable results on groundwater uses and users and land uses and property interests (Cal. Code Regs., tit. 23, § 354.26).	**DWR Inadequate Determination summary**: The 2022 GSP has not addressed the deficiency related to the definition of the undesirable result for lowering groundwater levels; it does not provide additional detail nor quantitative analysis describing the prevalence and effects of the three types of impacts to beneficial uses and users that would constitute an undesirable result.	**Potential Action GL-1** – Define the undesirable result for the chronic lowering of groundwater levels consistent with SGMA. Meaningfully engage with users in the subbasin to seek and incorporate feedback on the definition of an undesirable result for chronic lowering of groundwater levels specific to the subbasin and protective of drinking water users.

Deficiency	What SGMA Requires	Deficiency Summary	Potential Actions to Correct the Deficiency
Deficiency GL-2 – The GSAs did not consider all beneficial uses and users in setting SMC for groundwater levels in the 2022 GSP or adequately describe the impacts of criteria on beneficial uses and users. MTs in the A-zone would allow for significant and unreasonable water level declines.	The GSP Regulations require GSAs to set their MTs for chronic lowering of groundwater levels at "the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results" (Cal. Code Regs., tit. 23, § 354.28, subd. (c)(1)). In describing MTs, GSPs must describe how MTs "may affect the interests of beneficial uses and users of groundwater or land uses and property interests" (Cal. Code Regs., tit. 23, § 354.28, subd. (b)(4)). MOs for chronic lowering of groundwater levels must be based on the same metrics and monitoring sites used for MTs. MOs must "provide a reasonable margin of operational flexibility under adverse conditions" (Cal Code Regs., tit. 23, § 342.30, subds. (c) & (d)).	**DWR Inadequate Determination summary**: The GSP does not describe the impacts to beneficial uses and users under the given definition of undesirable results. There are issues for all three aquifer zones and the R-zone. For the A-zone, the approach will allow for significant and unreasonable conditions to occur. For the B-zone, the MTs are on average about 65 feet lower than the most historical groundwater elevations. For the B- and C-zones, it is unclear whether impacts to agricultural and industrial wells are considered undesirable results. Additionally, the well impact analysis did not consider agricultural or industrial users, and therefore it is unclear how the approach will avoid significant and unreasonable impacts for these users. For the C-zone, the approximations used for the elevation of the E-clay may lead to greater impacts that occur sooner than expected, and some wells may have been incorrectly assigned to the B-zone (and therefore subject to the B-zone SMC), rather than the C-zone. For the R-zone, it is unclear why the R-zone would be managed separately from the A-zone, and the SMC were not adequately established for this area. The 2022 GSP did not update any groundwater level MOs for any aquifer zone. **Board additional issues**: A Board staff analysis determined that nearly a third (31%, or 650 wells) of the 2,080 domestic wells with adequate information for analysis would dry at MTs, and nearly a quarter (23%, or 12 wells) of the 53 public supply wells with adequate information for analysis would be dry at MTs. Virtually all wells in the A-zone would go dry at the proposed MTs. In the B-zone, a significant number of older, shallower wells or wells not reflected in the OSWCR dataset, all of which are excluded from the analysis, may still be in use and could be at risk of dewatering if groundwater levels declined to the MTs	**Potential Action GL-2** – Fill data gaps in the subbasin water budget and use the data to update the SMC to avoid undesirable results. • **Potential Action GL-2a** – Further investigate and quantify components of the basin water budget inflows and outflows to support resolution of basin overdraft. • **Potential Action GL-2b** – Set groundwater level sustainable management criteria to protect drinking water wells from dewatering at the minimum threshold elevations. Describe how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests relative to 2015 conditions

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Deficiency GL-3 – The monitoring network does not provide sufficient coverage to monitor for impacts to beneficial uses and users in the three aquifers in the subbasin (due to data gaps in A-zone coverage and inconsistent sampling).	The GSP Regulations require GSPs to include a description of the monitoring network objectives for the basin including how the GSA will "monitor impacts to the beneficial uses or users of groundwater" (Cal. Code Regs., tit. 23, § 354.34, subd. (b)(2)). GSAs "may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin...", known as Representative Monitoring Sites (RMSs; Cal Code Regs., tit. 23, § 344.36). GSAs identify MTs, MOs, and Interim Milestones at these sites. "The designation of [an RMS] shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area" (Cal Code Regs., tit. 23, § 354.36, subds. (a) & (c)).	**DWR Inadequate Determination summary**: The GSP does not identify any RMS wells in the R-zone, the shallow aquifer zone near the Kings River. Without data regarding this area, the GSAs will not be able to monitor or manage groundwater conditions in that area. **Board additional issues**: The RMS wells for which the GSAs report data have changed from year-to-year, and the GSAs' inconsistent use of RMS locations may mask whether undesirable results in particular areas are occurring. The GSAs identified 70 RMS wells in the 2020 GSP and 56 in the 2022 GSP, and then reported groundwater levels for 49, 50, and 53 RMS wells in the WY-20, WY-21, and WY-22 Annual Reports, respectively. Some sites are monitored only once a year and very few sites are monitored more than twice a year.	**Potential Action GL-3** – Fill data gaps in the groundwater level monitoring network. • **Potential Action GL-3a** – Use a consistent set of monitoring network wells from year to year. • **Potential Action GL-3b** – Establish additional monitoring wells in the A-zone and establish monitoring wells in the R-zone to monitor impacts to drinking water users and begin gathering data on surface water-groundwater interactions.
Deficiency GL-4 – The 2022 GSP's discussion of well impact mitigation lacks important details and the GSP does not explain how well impact mitigation fits into the GSAs' approach for avoiding undesirable results.	Although SGMA and the GSP Regulations do not require development of a well impact mitigation plan, many GSAs have proposed to couple such plans with MTs to allow for greater groundwater level declines while avoiding undesirable results.	**DWR Inadequate Determination summary**: The Mitigation Plan Framework proposed in the 2022 GSP does not provide details on how claims for well mitigation will be evaluated. The mitigation plan framework does not say whether impacted agricultural or industrial wells will be mitigated, nor whether wells in the C-zone will be mitigated at all. The DWR 2022 GSP Inadequate Determination states, "Department staff do not believe sufficient details related to the framework have been provided; therefore, are unable to assess whether the GSAs have established sustainable management criteria based on a commensurate level of understanding of the basin setting or whether the interests of beneficial uses and users have been considered." **Board additional issues**: The Mitigation Plan Framework (Appendix D) suggests that GSAs will not mitigate impacted public supply wells, irrigation wells, or industrial wells. Due to the lack of details, Board staff cannot assess how the future mitigation plans may work in tandem with SMC to avoid undesirable results related to chronic lowering of groundwater levels.	**Potential Action GL-4** – Establish accessible, comprehensive, and appropriately funded well impact mitigation programs that mitigate impacts to wells affected by lowering of groundwater levels and degradation of water quality. • **Potential Action GL-4a** – Develop well mitigation programs with clear triggers, eligibility requirements, metrics, and funding sources. (This action supports addressing both Deficiency GL-4 and Deficiency GWQ-5b.) • **Potential Action GL-4b** – Evaluate how small farms wells will be impacted.

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Deficiency GL-5 – The 2022 GSP does not describe a feasible path for halting chronic lowering of groundwater levels.	Each GSP is required to include a description of the projects and management actions the GSA has determined will achieve groundwater sustainability in the basin. The description must include project management actions, summary of data used to support proposed actions, and a review of the uncertainty associated with the basin setting when developing projects or management actions (Cal. Code Regs., tit. 23, § 354.44). More fundamentally, for basins in a condition of overdraft, the GSP "shall describe projects or management actions, including a quantification of demand reduction or other methods, for the mitigation of overdraft" (Cal. Code Regs., tit. 23, § 354.44, subd. (b)(2)). GSPs need to include a description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods (Cal. Code Regs., tit. 23, § 354.44, subd. (b)(9)). In reviewing GSPs, DWR must consider, among other questions, "whether sustainable management criteria and projects and management actions are commensurate with the level of understanding of the basin setting, based on the level of uncertainty, as reflected in the plan" (Cal. Code Regs., tit. 23, § 355.4, subd. (b)(3)).	**DWR Inadequate Determination summary**: If the GSP retains MTs that allow for continued groundwater level decline then the GSP should explain the anticipated effects of that decline on beneficial uses and users and should clearly explain whether PMAs have been identified to address impacts to those uses and users. The 2022 GSP does not have any discussion on how PMAs were factored into the establishment of the MTs for groundwater levels. If the GSP does not include PMAs to address impacts to uses and users, then it should clearly explain the rationale and analysis that led to that decision. **Board additional issues**: Board staff has determined that the 2022 GSP does not demonstrate that projects and management actions are feasible or sufficient to prevent undesirable results. The 2022 GSP relies substantially on new surface water supplies to mitigate overdraft, but the GSP does not assess the feasibility of new supply projects based on water availability and climate change impacts to surface supplies. The 2022 GSP does not contain a groundwater allocations plan, though it indicates that groundwater assessment and allocation plans will be developed in 2023 and implemented in 2025 (2022 GSP Addendum, Table 6-5). Otherwise, demand management actions in the 2022 GSP appear voluntary and therefore unlikely to provide sufficient contingency in case GSAs fail to secure new supplies or overdraft is greater than estimated	**Potential Action GL-5** – Plan ahead for drought conditions and commit to managing demand. • **Potential Action GL-5a** – Evaluate the feasibility of proposed supply augmentation projects. • **Potential Action GL-5b** – Develop basin-wide allocations or utilize another demand management structure to help bring the subbasin into balance and meet basin sustainability goals. • **Potential Action GL-5c** – Identify key indicator wells in each aquifer, with sufficient spatial coverage to represent beneficial uses and users in each aquifer and identify groundwater levels that will trigger specific demand management.

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Deficiency GL-6 – The GSAs do not consider the effects on other sustainability indicators, such as groundwater storage, subsidence, degradation of groundwater quality, and depletions of interconnected surface water.	In describing MTs, a GSA must explain "how the [GSA] has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators" (Cal. Code Regs., tit. 23, § 354.28, subd. (b)(3)).	**DWR Inadequate Determination summary:** The DWR Inadequate Determination noted that the B-zone MTs at most of the RMS wells are substantially below historical lows, which are in turn often below 2015 levels. Consequently, "given these changes, Department staff believe the revised GSP should have included an updated discussion on impacts to other sustainability indicators, such as subsidence." DWR also noted that, for C-zone MTs, "the GSAs did not consider...effects on groundwater storage and subsidence." **Board additional issues**: Board staff notes that the 2022 GSP did not describe the effects of MTs on degradation of groundwater quality if groundwater levels decline to the MTs in the A-, B-, and C-zones. The potential migration of de-designated water if groundwater elevations decline to MTs was not addressed in the 2022 GSP. Board staff also notes that declining groundwater levels may result in the migration of shallow constituents into wells. Additionally, declining groundwater levels may require existing wells to be deepened; newly deepened wells may be impacted by an existing constituent of concern, prohibiting the intended beneficial use for those wells. The 2022 GSP also does not discuss the impact of MTs in the R-zone and the A-zone on depletions of interconnected surface water.	**Potential Action GL-6** – Describe the relationship between MTs for each sustainability indicator. Revise groundwater level MTs as necessary to avoid undesirable results for other sustainability indicators.
Deficiency Land Subsidence (LS)-1 - The 2022 GSP does not clearly describe the subsidence conditions that would result in an undesirable result for the basin.	The GSP Regulations require a GSA to "describe...the processes and criteria relied upon to define undesirable results applicable to the basin." This description must include the cause of past or potential undesirable results, "the criteria used to define when and where the effects of the groundwater conditions cause undesirable results," and the potential effects of undesirable results on groundwater uses and users, land uses, and property interests (Cal. Code Regs., tit. 23, § 354.26).	**DWR Inadequate Determination summary:** "The GSP has not defined the limits of what is considered economically feasible nor the tolerable amount of subsidence for the critical infrastructure." This is problematic, because the 2022 GSP defines an undesirable result as "the significant loss of functionality of critical infrastructure or facility, so the feature(s) cannot be operated as designed, requiring either retrofitting or replacement to a point that is economically unfeasible." **Board additional issues**: None.	**Potential Action LS-1** – Clearly define the subsidence conditions that would result in an undesirable result for the basin and provide enough detail that associated MTs can be determined (Cal. Code Regs., tit. 23 § 354.28).

Deficiency	What SGMA Requires	Deficiency Summary	Potential Actions to Correct the Deficiency
Deficiency LS-2 - The GSAs did not consider all beneficial uses and users in setting quantitative criteria for subsidence in the 2022 GSP or adequately describe the impacts of criteria on beneficial uses and users. • **Deficiency LS-2a** – MTs were not established based on avoiding undesirable results. • **Deficiency LS-2b** – Some MTs appear to exceed subsidence limits set in other pre-existing agreements. • **Deficiency LS-2c** – MOs and IMs were not established.	Minimum thresholds are the numeric values used to define undesirable results. Measurable objectives are specific, quantifiable goals for the maintenance or improvement of groundwater conditions to achieve the sustainability goal for the basin. The GSP Regulations state that MTs 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 use or property interests potentially affected by land subsidence; an explanation of how impacts to those land use or property interests were considered when establishing minimum thresholds; and maps or graphs showing the rates and extents of land subsidence defined by the minimum thresholds (Cal. Code Regs., tit. 23, § 354.28, subd. (c)(5)). MOs for land subsidence must be based on the same metrics and monitoring sites used for MTs. MOs must "provide a reasonable margin of operational flexibility under adverse condition." (Cal Code Regs., tit. 23, § 342.30, subds. (c) & (d)). GSAs must also establish interim milestones (IMs) for each sustainability indicator, "using the same metric as the measurable objective, in increments of five years." These IMs support the GSP's description of "a reasonable path to achieve the sustainability goal for the basin within 20 years of implementation" (Cal Code Regs., tit. 23, § 342.30, subd. (e)).	**DWR Inadequate Determination summary:** • **LS-2a** - The DWR Inadequate Determination found that "the GSAs have not established minimum thresholds based on the level of subsidence that would substantially interfere with land surface use and avoid undesirable results." Instead, the 2022 GSP established MTs by estimating the cumulative subsidence that would occur by 2040 if GSAs took no action, and then adjusted the estimated subsidence based on the anticipated benefits of projects and management actions. • **LS-2b** - The DWR Inadequate Determination notes that MTs for eight RMS appear to exceed the maximum subsidence allowed along the California Aqueduct per an agreement with the DWR State Water Project managers. • **LS-2c** - The DWR Inadequate Determination found that "measurable objectives have not been established for subsidence." Instead, the 2022 GSP claimed that the "measurable objective for subsidence will ultimately be achieved through the MTs and MOs set for groundwater levels and storage, which is expected to result in decreasing subsidence over time." **Board additional issues:** • **LS-2a** - The 2022 GSP indicates that subsidence MTs are listed in GSP Table 3-2; however, GSP Table 3-2 does not list MTs. Instead, it lists baseline and implementation subsidence values. Board staff therefore must interpret that the implementation subsidence values are the minimum thresholds based on MT methodology language. MTs are fundamental to GSPs and should not be left to interpretation. • **LS-2b –** None. • **LS-2c –** Board staff note that, because MTs and MOs will need to be updated, IMs will need to be updated as well.	**Potential Action LS-2** – Develop quantitative criteria that avoid undesirable results and conform with other legal agreements. • **Potential Action LS-2a** – Define and clearly list MTs based on the level of subsidence at each RMS that would cause the undesirable results conditions that the GSAs are trying to avoid. • **Potential Action LS-2b** – Ensure MTs conform with current agreements with other agencies. • **Potential Action LS-2c** – Establish MOs that avoid undesirable results and provide operational flexibility so that potential future droughts do not cause MT exceedances. Establish IMs that provide a reasonable path to achieving sustainable management.

Deficiency	What SGMA Requires	Deficiency Summary	Potential Actions to Correct the Deficiency
Deficiency LS-3 – The GSAs did not adequately consider the impacts of subsidence on flood protection infrastructure.	MTs for land subsidence must be supported by, in part, "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 [GSA] has determined and considered those uses and interests, and the [GSA's] rationale for establishing minimum thresholds in light of those effects" (Cal. Code Regs., tit. 23, § 354.28, subd. (c)(5)(A)). The GSP must also include a description of beneficial uses and users in the basin, "the types of parties representing those interests, and the nature of consultation with those parties" (Cal. Code Regs., tit. 23, § 354.10, subd. (a)).	**DWR Inadequate Determination summary:** • **Infrastructure Impacts** - The 2022 GSP did not adequately consider the impacts of subsidence on flood protection infrastructure. Specifically, the DWR Inadequate Determination noted problems with how the GSP considered impacts from reduced crown elevations and differential subsidence. • **Lowered Crown Elevations** - The 2022 GSP states that "the elevation of the flood protection levees and the elevation of the flood-prone areas (i.e., floodplain) generally decrease uniformly. With little or no differential movement between the crown of the levee and the floodplain, the performance of the levee is unaffected." The DWR Inadequate Determination found that the GSP "fails to mention that if subsidence occurs, there is a risk of reducing the conveyance capacity of the channels and reduction of freeboard." • **Differential Subsidence** - The 2022 GSP states that "levees are flexible earthen structures that can tolerate typical differential longitudinal settlement that occurs due to variability of soils in their foundation. As such, there is very little literature on performance limits of levees affected by differential settlement along their longitudinal axis." DWR notes that "Regulations do not differentiate between residual and differential subsidence; therefore, total subsidence must be considered." • **Failure to coordinate with flood management agencies** - The DWR Inadequate Determination found that the 2022 GSP did not adequately coordinate with flood management agencies, despite being asked to do so. **Board additional issues**: • **Infrastructure Impacts** - Areas with increased subsidence rates landside of levees can experience higher inundation if flooded. • **Lowered Crown Elevations** - Reduced channel capacity also increases risk of slope failure and piping through and under the levee due to increased hydraulic head above the landside levee toe. • **Differential Subsidence** - The extent and magnitude of differential settlement from foundational soils is substantially different than the extent and magnitude of differential subsidence. Moreover, the uncertainty of impacts of longitudinal differential subsidence should be a reason for GSAs to minimize subsidence, especially in areas where levees may be constructed with dispersive soils (soils which may easily dissolve into solution and erode), which substantially increase risks of piping in cracks through levees. • **Failure to coordinate with flood management agencies** - None; however, Board staff note that the 2022 GSP noted conversations with flood management agencies but failed to explain how those conversations were considered in developing SMC.	**Potential Action LS-3** – Consult with flood management agencies and expand the GSP's analysis of land subsidence impacts on flood infrastructure. • **Potential Action LS-3a** – Engage with flood management agencies. • **Potential Action LS-3b** – When establishing undesirable results and MTs, evaluate the impacts of reduced channel capacity, uncertainty around longitudinal differential subsidence, and increased inundation depths.

Deficiency	What SGMA Requires	Deficiency Summary	Potential Actions to Correct the Deficiency
Deficiency LS-4 – The GSP does not provide adequate implementation details.	Each GSP is required to include a description of the projects and management actions the GSA has determined will achieve groundwater sustainability in the basin. The description must include project management actions, summary of data used to support proposed actions, and a review of the uncertainty associated with the basin setting when developing projects or management actions (Cal. Code Regs., tit. 23, § 354.44). In reviewing GSPs, DWR must consider, among other questions, "whether sustainable management criteria and projects and management actions are commensurate with the level of understanding of the basin setting, based on the level of uncertainty, as reflected in the plan" and "whether the projects and management actions are feasible and likely to prevent undesirable results and ensure that the basin is operated within its sustainable yield" (Cal. Code Regs., tit. 23, § 355.4, subd. (b)(3), (b)(5)).	**DWR Inadequate Determination summary:** The DWR Inadequate Determination found that the 2022 GSP did not provide adequate project and management action detail to "determine if projects and management actions will assist in minimizing and avoiding subsidence in the Subbasin beyond 2040." DWR further noted that "two monitoring sites (LEMA and CRCN) have exceeded their identified cumulative allowable subsidence." **Board additional issues**: None.	**Potential Action LS-4** – Plan ahead to avoid significant and unreasonable land subsidence. • **Potential Action LS-4a** – Develop a plan to trigger management actions when subsidence exceeds defined thresholds, especially near critical infrastructure/facilities. • **Potential Action LS-4b** – Update the Well Registration Program to meet subsidence goals in the subbasin; Do not allow new wells in areas where subsidence threatens critical infrastructure. • **Potential Action LS-4c** – Develop infrastructure mitigation programs with clear triggers, eligibility requirements, metrics, and funding sources.

Deficiency	What SGMA Requires	Deficiency Summary	Potential Actions to Correct the Deficiency
Deficiency Groundwater Quality (GWQ)-1 – The 2022 GSP's definition of an undesirable result is not consistent with GSP Regulations. • **Deficiency GWQ-1a** – The 2022 GSP does not clearly describe the water quality conditions and impacts that would result in an undesirable result or the basin. • **Deficiency GWQ-1b** – The triggers for determining an undesirable result set by the 2022 GSP would result in delayed identification of an undesirable result and therefore delayed management of the basin. • **Deficiency GWQ-1c** – The GSP does not describe how it would determine whether significant and unreasonable degradation of water quality was associated with basin management.	The GSP Regulations require a GSA to "describe...the processes and criteria relied upon to define undesirable results applicable to the basin." This description must include the cause of past or potential undesirable results, "the criteria used to define when and where the effects of the groundwater conditions cause undesirable results," and the potential effects of undesirable results on groundwater uses and users and land uses and property interests (Cal. Code Regs., tit. 23, § 354.26).	**DWR Inadequate Determination summary**: • **Deficiency GWQ-1a** Neither the water quality undesirable result nor its impacts to beneficial uses and users is adequately described. The 2022 GSP describes the undesirable results as "...significant and unreasonable reduction in long-term viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of this GSP." DWR staff note that "it is unclear... what constitutes a significant and unreasonable reduction in viability of groundwater use for the identified beneficial uses," and specifically note that it is unclear what "long-term viability means to the GSAs." • **Deficiency GWQ-1b** - The GSAs would "not be actively monitoring the Subbasin to avoid an undesirable result..." GSAs will not evaluate constituent data to determine if undesirable results may be occurring unless analysis indicates a positive trend. This trend analysis, however, will not even be conducted until "at least six samples have been collected for each analyte at each representative monitoring site." Some analytes at some monitoring sites are sampled only once every four years, indicating that trend analysis would sometimes not be conducted until the year 2046. • **Deficiency GWQ-1c** - The GSP does not describe how it will determine whether degradation of water quality is associated with basin management. The GSP describes an undesirable result occurring only if it is "stemming from a causal nexus between groundwater-related GSP activities... and a degradation in groundwater quality..." **Board additional issues**: • **Deficiency GWQ-1a** - Without a clear description of impacts that are significant and unreasonable, GSAs and Board staff cannot evaluate whether MTs or broader quantitative definitions of an undesirable result that would guide day-to-day basin management are appropriate for avoiding undesirable results. • **Deficiency GWQ-1b** - Board staff is also concerned that trend analysis may result in avoiding undesirable results on paper only, no matter the impacts to beneficial uses and users. Depending on the analysis time period, monitoring frequency, the selected confidence interval, and other technical details, trend analysis may delay or effectively prevent identification of undesirable results. Unless trends are detected, the 2022 GSP identifies an undesirable result only when a full quarter of all wells exceed MTs for two consecutive measurements. • **Deficiency GWQ-1c** – Board staff note that an undesirable result does not require a "causal nexus" with groundwater management; it instead must simply be caused by groundwater conditions occurring throughout the basin (Water Code § 10721 subd. (x)). Moreover, Board staff is concerned that "causal nexus" criterion might be infeasible and impractical to determine absent a substantially more robust monitoring network and sophisticated, well-performing basin model. Additionally, the 2022 GSP lacks crucial, related information on (1) the impact of projects and management actions on water quality, and (2) the impact of subsidence on water quality.	**Potential Action GWQ-1** – Update the definition of an undesirable result to be consistent with GSP Regulations. • **Potential Action GWQ-1a** – Clearly describe the water quality conditions and impacts that would result in an undesirable result or the basin. • **Potential Action GWQ-1b** – Do not rely on trend detection or other methods that may delay identification of undesirable results. • **Potential Action GWQ-1c** – Remove the "causal nexus" requirement and add information about the impacts of basin management on water quality.

Deficiency	What SGMA Requires	Deficiency Summary	Potential Actions to Correct the Deficiency
Deficiency GWQ-2 – Minimum thresholds set by the 2022 GSP are not consistent with GSP Regulations. • **Deficiency GWQ-2a** – The 2022 GSP establishes minimum thresholds that exceed regulatory water quality thresholds without explaining how that would not cause significant and unreasonable results or impacts to beneficial uses and users. • **Deficiency GWQ-2b** – Some MTs are inexplicably based on data that may represent undesirable results. • **Deficiency GWQ-2c** – The GSP does not explain how it quantifies "current conditions," yet uses current conditions to justify establishing MTs that exceed MCLs or SMCLs. • **Deficiency GWQ-2d** – MTs are sometimes set to the highest detected concentrations. • **Deficiency GWQ-2e** – MTs at some wells are based on data from wells nearby the RMS wells, rather than from the RMS wells themselves, without justification.	The GSP Regulations require GSAs to base their MTs for degradation of water quality on "the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin." Also, GSAs must consider "local, state, and federal water quality standards applicable to the basin" in setting MTs (Cal. Code Regs., tit. 23, § 354.28, subd. (c)(4)). In describing MTs, GSPs must describe how MTs "may affect the interests of beneficial uses and users of groundwater or land uses and property interests" (Cal. Code Regs., tit. 23, § 354.28, subd. (b)(4)). The plan may, but is not required to, address undesirable results that occurred before, and have not been corrected by, January 1, 2015.	**DWR Inadequate Determination summary:** • **Deficiency GWQ-2a** – The 2022 GSP establishes many MTs that exceed primary MCLs or upper SMCLs yet does not explain how exceeding health- or quality-protective standards is not an undesirable result. While GSAs are not required to address undesirable results for groundwater quality that occurred prior to January 1, 2015, pre-2015 undesirable results should still be identified and MTs established accordingly. • **Deficiency GWQ-2b** – The 2022 GSP appears to establish MTs from historical data when current conditions exceed MCLs or SMCLs; however, the DWR Inadequate Determination notes that this historical data ranges from 2000 to 2020, which "may include data that would be considered undesirable results." • **Deficiency GWQ-2c** – None. • **Deficiency GWQ-2d** – None. • **Deficiency GWQ-2e** – The DWR Inadequate Determination notes that some MTs are calculated with data from nearby wells. DWR staff note that 1) it is not clear why MTs for a specific RMS would be based on data from other wells, and 2) the GSP does not provide supporting information, making review of nearby data impossible. **Board additional issues**: • **Deficiency GWQ-2a** – None. • **Deficiency GWQ-2b** – GSAs should not use exceedances between 2015 and 2020 to establish MTs that exceed MCLs or SMCLs or may otherwise indicate undesirable results. • **Deficiency GWQ-2c** – The 2022 GSP appears to establish MTs from historical data when current conditions exceed MCLs or SMCLs; however, Board staff note that the GSP does not appear to explain how it determines current conditions. For example, it does not explain how many exceedances the GSP requires before it concludes that current conditions exceed MCLs or SMCLs or whether it relies on a percentage of exceedances. This information is crucial for reviewing divergence from established, health-protective standards like MCLs. • **Deficiency GWQ-2d** – Board staff note that the 2022 GSP appears to set MTs at the highest observed concentration in these cases. While GSAs are not required to address undesirable results for groundwater quality that occurred before 2015, Board staff strongly object to using the highest detected concentration as a baseline for pre-2015 conditions. • **Deficiency GWQ-2e** – The GSP does not clearly indicate which MTs rely on nearby data. Without supporting information, these MTs cannot be reviewed to assess whether use of nearby well data is appropriate.	**Potential Action GWQ-2** – Update minimum thresholds to be consistent with GSP Regulations. • **Potential Action GWQ-2a** – Establish minimum thresholds that do not inexplicably exceed regulatory water quality thresholds. • **Potential Action GWQ-2b** – Don't base pre-2015 conditions and MTs on current conditions; use pre-2015 conditions instead. • **Potential Action GWQ-2c** – Fully explain how pre-2015 conditions are characterized. • **Potential Action GWQ-2d** – Do not establish MTs that would allow for substantial degradation of water quality. • **Potential Action GWQ-2e** – Do not use data from nearby wells when developing MTs without justification.

Deficiency	What SGMA Requires	Deficiency Summary	Potential Actions to Correct the Deficiency
Deficiency GWQ-3 – Measurable Objectives set by the 2022 GSP for groundwater quality are not consistent with GSP Regulations. • **Deficiency GWQ-3a** – The 2022 GSP allows MOs that exceed regulatory water quality thresholds (e.g., MCLs) without explaining how that would not cause significant and unreasonable results or impacts to beneficial uses and users. • **Deficiency GWQ-3b** – Some MOs are inexplicably based on data that may represent undesirable results. • **Deficiency GWQ-3c** – The GSP does not explain how it quantifies current conditions, yet the GSP uses current conditions to justify establishing MOs that exceed MCLs or SMCLs. • **Deficiency GWQ-3d** – MOs are sometimes effectively set to 95th percentile concentrations. • **Deficiency GWQ-3e** – MOs at some wells are based on data from wells nearby the RMS wells, rather than from the RMS wells themselves, without justification. • **Deficiency GWQ-3f** – The 2022 GSP establishes measurable objectives that may vary over time without explanation of how that would provide operational flexibility while avoiding significant and unreasonable results or impacts to beneficial uses and users.	MOs for water quality degradation must be based on the same metrics and monitoring sites used for MTs. MOs must "provide a reasonable margin of operational flexibility under adverse conditions" (Cal Code Regs., tit. 23, § 342.30, subds. (c) & (d)).	**DWR Inadequate Determination summary**: • **Deficiency GWQ-3a** – The 2022 GSP establishes many MOs that exceed primary MCLs or upper SMCLs yet does not explain how exceeding health- or quality-protective standards is not an undesirable result. While GSAs are not required to address undesirable results for groundwater quality that occurred prior to January 1, 2015, pre-2015 undesirable results should still be identified and MOs established accordingly. • **Deficiency GWQ-3b** – 2022 GSP appears to establish MOs from historical data when current conditions exceed MCLs or SMCLs; however, this historical data ranges from 2000 to 2020. While GSAs are not required to address undesirable results for groundwater quality that occurred prior to 2015, GSAs are responsible for addressing degradation of water quality after 2015. GSAs should therefore not use exceedances between 2015 and 2020 to establish MOs that exceed MCLs or SMCLs or may otherwise indicate undesirable results. • **Deficiency GWQ-3c & 3d** – None. • **Deficiency GWQ-3e** – Some MOs are calculated with data from nearby wells. • **Deficiency GWQ-3f** – The MO approach results in "dynamic measurable objectives that may change from year to year." Specifically, if MOs are always set to the 95th percentile, then they will become less protective of water quality as water quality degrades, because the 95th percentile will increase along average concentrations increase. Moreover, if average concentrations increase steadily without significant variation, it is possible for indefinite degradation of water quality to never exceed MOs. **Board additional issues**: • **Deficiency GWQ-3a & 3b** – None. • **Deficiency GWQ-3c** – The 2022 GSP appears to establish MOs from historical data when current conditions exceed MCLs or SMCLs; however, the GSP does not explain how it determines current conditions. It does not explain how many exceedances the GSP requires before it concludes that current conditions exceed MCLs or SMCLs, or whether it relies on a percentage of exceedances. The 2022 GSP appears to assess current conditions from data between 2000 and 2020. GSAs should therefore not use exceedances between 2015 and 2020 to justify abandoning MCLs. • **Deficiency GWQ-3d** – The 2022 GSP appears to set some MOs at concentrations representing the 95th percentile. Board staff interpret that MOs are effectively set at concentrations that are higher than 95% of all other observed concentrations. These concentrations do not actually represent current conditions and that managing to these MOs would result in degradation of groundwater quality. • **Deficiency GWQ-3e** –It is not clear why MOs for a specific RMS would be based on data from other wells. The GSP does not provide supporting information, making review of nearby data impossible. It appears the GSP does not clearly indicate which MOs rely on nearby data. • **Deficiency GWQ-3f** – None.	**Potential Action GWQ-3** – Update MOs to be consistent with GSP Regulations. • **Potential Action GWQ-3a** – Establish measurable objectives that do not inexplicably exceed regulatory water quality thresholds. • **Potential Action GWQ-3b** – Don't base pre-2015 conditions and MOs on current conditions; use pre-2015 conditions instead. • **Potential Action GWQ-3c** – Do not establish MOs that would allow for substantial degradation of water quality. • **Potential Action GWQ-3d** – Do not inexplicably use data from nearby wells when developing MOs. • **Potential Action GWQ-3e** – Do not use measurable objectives that may vary over time.

Deficiency	What SGMA Requires	Deficiency Summary	Potential Actions to Correct the Deficiency
Deficiency GWQ-4 – The water quality monitoring plan in the 2022 GSP is not consistent with GSP regulations. • **Deficiency GWQ-4a** – The GSP does not monitor or manage the aquifer below the de-designated zone. • **Deficiency GWQ-4b** – The proposed monitoring frequency is insufficient to detect short-term and seasonal trends. • **Deficiency GWQ-4c** – The proposed monitoring network does not adequately monitor key aquifers. • **Deficiency GWQ-4d** – The proposed sampling plan relies entirely on other agencies.	The GSP Regulations require GSPs to include a description of the monitoring network objectives for the basin including how the GSA will "monitor impacts to the beneficial uses or users of groundwater" (Cal. Code Regs., tit. 23, § 354.34, subd. (b)(2)). The monitoring network must be "capable of collecting sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate [GSP] implementation" (Cal. Code Regs., tit. 23, § 354.34, subd. (a)). Data collected must be of "sufficient quality, frequency, and distribution" to characterize and evaluate groundwater conditions (Cal. Code Regs., tit. 23, § 354.32).	**DWR Inadequate Determination summary**: • **Deficiency GWQ-4a** – The DWR Inadequate Determination finds that "the GSAs are not monitoring zones which fall outside the de-designated areas" and that "the GSAs are overextending the de-designated area". The 2022 GSP does not monitor the aquifer below the de-designated area. The de-designation resolution includes a depth boundary; the aquifer below the de-designated area has not been de-designated and should therefore be monitored. • **Deficiency GWQ-4b** – The 2022 GSP has not explained how the proposed monitoring frequency is sufficient to demonstrate short-term and seasonal trends. • **Deficiency GWQ-4c** – There are data gaps in the 2022 GSP monitoring network. • **Deficiency GWQ-4d** – The DWR 2022 GSP Inadequate Determination notes that, while GSAs can leverage other programs that monitor water quality, the GSP fails to "explain how activities in those programs are consistent with SGMA and the GSP Regulations...". **Board additional issues**: • **Deficiency GWQ-4a** – None. • **Deficiency GWQ-4b** – Board staff note that nearly a third of wells appear to be sampled for arsenic only once every four years. Additionally, it is not clear in which seasons wells will be sampled, given irregular sampling frequencies (e.g., three or nine times a year). • **Deficiency GWQ-4c** – The monitoring plan does not include sampling wells known to be screened in the A aquifer zone at all, while only three wells known to be screened in the B aquifer zone are included in the planned sampling. Additionally, the GSAs do not know which aquifer six of its wells are screened within, and therefore, they do not know which aquifer the samples represent. • **Deficiency GWQ-4d** – GSAs have a statutory obligation to avoid undesirable results associated with degradation of water quality, no matter the availability of other sampling programs that they can leverage.	**Potential Action GWQ-4** – Update the water quality monitoring plan in the 2022 GSP to be consistent with GSP regulations. • **Potential Action GWQ-4a** – Monitor and manage the aquifer below the de-designated zone. • **Potential Action GWQ-4b** – Increase monitoring frequency and better describe monitoring schedules. • **Potential Action GWQ-4c** – Adequately monitor key aquifers. • **Potential Action GWQ-4d** – Add GSA monitoring capacity.
Deficiency GWQ-5 – Management actions should be responsive to water quality degradation. • **Deficiency GWQ-5a** – Additional sampling should be triggered when MTs are exceeded. • **Deficiency GWQ-5b** – Well mitigation plans need to address MT exceedances.	Each GSP is required to include a description of the projects and management actions the GSA has determined will achieve groundwater sustainability in the basin. The GSAs must include projects and management actions "that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent" (Cal. Code Regs., tit. 23, § 354.44, subd. (b)(1)).	**DWR Inadequate Determination summary**: • **Deficiency GWQ-5a** – None. • **Deficiency GWQ-5b** – None. **Board additional issues**: • **Deficiency GWQ-5a** – The 2022 GSP does not include management actions that are responsive to MT exceedances. is difficult to understand how the GSAs can avoid significant and unreasonable impacts from degradation of groundwater quality if MT exceedances don't trigger additional monitoring to better characterize risks to drinking water users. • **Deficiency GWQ-5b** – It is difficult to understand how GSAs can avoid significant and unreasonable impacts from degradation of groundwater quality if the GSAs have not even developed—let alone implemented—a well mitigation plan to address MT exceedances.	**Potential Action GWQ-5** – Plan additional sampling when water quality is degraded. **Potential Action GL-4a** – Develop well mitigation programs with clear triggers, eligibility requirements, metrics, and funding sources. (This action supports addressing both Deficiency GL-4 and Deficiency GWQ-5b.)