KERN COUNTY SUBBASIN STAFF REVIEW OF THE 2025 DRAFT GSPS

September 2025

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Executive Summary

State Water Resources Control Board (State Water Board or Board) staff developed the Staff Review of the 2025 Draft Groundwater Sustainability Plans for the Kern County Subbasin (subbasin) to help inform the Board's decision pursuant to the Sustainable Groundwater Management Act (SGMA or Act) as to whether to designate the Kern County Subbasin a probationary basin.

SGMA Background

SGMA authorizes local public agencies to form Groundwater Sustainability Agencies (GSAs) and develop Groundwater Sustainability Plans (GSPs) to manage groundwater basins. The California Department of Water Resources (DWR) is responsible for reviewing GSPs. If DWR determines a GSP (or GSPs) developed for a basin is inadequate, it will refer that basin to the State Water Board, which initiates the state intervention process. The Board may return the basin to DWR's oversight if subsequent revisions to the GSP(s) adequately address groundwater management issues. Otherwise, the Board may designate the basin as "probationary" through a public hearing process.

Kern County Subbasin

The Kern County Subbasin (subbasin or basin) is a critically overdrafted subbasin in the southern portion of the San Joaquin Valley with an area of about 1.78 million acres. The subbasin is currently managed by 20 GSAs. DWR determined the subbasin's 2022 GSPs were inadequate and referred the subbasin to the State Water Board in March 2023, which initiated the state intervention process. The subbasin GSAs submitted their revised, adopted GSPs to the Board in December 2024, and Board staff determined that these updated GSPs did not resolve all of the deficiencies identified by staff in the previous GSPs. On February 20, 2025, the State Water Board held a hearing to determine whether to designate the subbasin as probationary. In recognition of the substantial progress the subbasin made, the Board continued the hearing to September 17, 2025, giving the GSAs additional time to resolve the remaining deficiencies and directing the GSAs to submit revised draft GSPs to the Board by June 20, 2025 for review. On June 20, 2025, the GSAs submitted seven amended draft GSPs to the Board (2025 Draft GSPs). Board staff reviewed the 2025 Draft GSPs and concludes that the GSAs substantially, though not completely, address the deficiencies identified in the previous GSPs. Staff recommends returning the subbasin to DWR for review of the updated GSPs pursuant to Water Code section 10733.4 if the GSAs resolve three of the remaining issues: (1) providing an adequate mitigation program for drinking water wells impacted by any constituent for which a minimum threshold is established in the GSPs, including 1,2,3-TCP, where groundwater management activities cause concentrations to

exceed those minimum thresholds; (2) providing an adequate mitigation program for state small water system wells (or domestic wells with more than four service connections) impacted by groundwater management activities; and (3) eliminating the Kern Non-Districted Land Authority GSA Joint Exercise of Powers Agreement May 2026 sunset provision, which would result in unmanaged areas of the subbasin that are a potential basis for state intervention.

Improvements in 2025 Draft Groundwater Sustainability Plans

Some of the improvements in the 2025 Draft GSPs include:

- The GSAs use basin-wide, coordinated approaches to establish minimum thresholds and measurable objectives (collectively known as sustainable management criteria) for all applicable sustainability indicators.
- The GSAs identify gaps in groundwater level and groundwater quality representative monitoring networks and commit to addressing all identified data gaps by the end of 2026.
- The GSAs set most of the water level minimum thresholds at levels that are protective of groundwater uses and users in the subbasin. The GSAs commit to mitigating potential impacts to drinking water wells due to declining water levels before or after exceeding these thresholds.
- The GSAs commit to mitigate dry wells impacted by GSA-related activities after January 1, 2015. The GSAs have a revolving reserve fund of $3.5 million per year for well mitigation. The mitigation plan has two tracks for assistance: a mitigation track for domestic wells with less than five service connections (up to $90,000 per well) and a technical assistance track for public supply wells (up to $50,000 per well). The GSAs will collaborate with Self-Help Enterprises to administer the well mitigation program. The mitigation of dry domestic wells includes emergency drinking water supplies within 24 hours of notification and hauled tank water within 72 hours.
- The GSAs set minimum thresholds that are designed to protect water quality from impacting beneficial uses and users (or from further degradation where water quality was already degraded by January 1, 2015). Of the 330 individual thresholds set at 55 representative monitoring wells across the subbasin for arsenic, nitrate, nitrite, uranium, 1,2,3-trichloropropane (1,2,3-TCP), and total dissolved solids concentrations, 308 were set at the drinking water standard. The remaining 22 minimum thresholds were set above the drinking water standard due to water quality degradation that was already occurring when SGMA took effect in 2015, which GSAs are not required to address under SGMA.

- The GSAs commit to mitigate domestic wells impacted by degraded groundwater quality caused by GSA-related activities in most instances. Mitigation may include installation of point of use or point of entry treatment systems with filter replacement for three years.
- The GSAs have plans to ramp down subsidence (the sinking of land caused by groundwater removal) prior to 2040 with no additional subsidence to occur after 2040. The GSAs expect that only a section along the Friant Kern Canal could be impacted by future subsidence. Applicable GSAs are collaborating with the Friant Water Authority on establishing a subsidence mitigation cost-sharing framework to address the impacts of post-2020 subsidence in the area of the Friant Kern Canal. Some potential impacts to local canals will be managed by the GSAs through ongoing maintenance and improvements to facilities.
- After a single reported exceedance of any sustainable management criterion at a representative monitoring site, the GSAs will follow the newly developed minimum threshold exceedance policy. The GSAs will investigate the cause of the exceedance, notify potentially impacted groundwater users (for groundwater quality exceedances), and implement the well mitigation program, if necessary. The exceedance investigation report(s) will be included in the GSP Annual Reports submitted to DWR.

Remaining Issues in 2025 Draft Groundwater Sustainability Plans

The following is a summary of remaining deficiencies identified during staff review of the 2025 Draft GSPs.

- The current Joint Exercise of Powers Agreement between the Kern County Water Agency and member agencies of the Kern Non-Districted Land Authority, which intends to be the GSA to manage groundwater in the non-districted areas in the subbasin, will expire in May 2026. This could result in certain areas in the subbasin becoming unmanaged, which is a potential basis for state intervention. Board staff recommends amending the Joint Exercise of Powers Agreement to ensure the GSA has proper authorities to implement SGMA within its management areas throughout the planning and implementation horizon of SGMA.
- Water level minimum thresholds for all five monitoring wells in the Henry Miller Water District GSA appear too deep for local conditions and are not supported by historical trends and projected water demand of the subbasin. Staff recommends raising water level minimum thresholds to account for local conditions.

- Mitigation for state small water system wells that could be impacted due to GSA-related activities is not adequate. Staff recommends that the GSAs: (1) place state small water system wells on the mitigation track rather than the technical assistance track, and (2) consider funding, in an amount at least equivalent to well replacement, for consolidation of impacted state small water systems with existing public water systems, where that option is available and feasible.
- GSAs are not yet able to separately quantify subsidence caused by GSA from non-GSA activities, which is required to determine undesirable results for land subsidence. Board staff recommends that the GSAs improve methodologies for characterizing GSA and non-GSA contributions to subsidence.
- Many of the subsidence mitigation and implementation plans are pending guidance from DWR (DWR's final Land Subsidence Best Management Practices document and California Aqueduct Subsidence Program's framework for California Aqueduct long-term rehabilitation). Board staff recommends that the GSAs develop infrastructure mitigation programs with clear initiation thresholds, eligibility requirements, actionable timelines, and funding sources.
- GSPs do not clearly state how they will address impacted wells if the cause of groundwater quality degradation is either partially attributed to groundwater management or attribution is inconclusive. Board staff recommends that the GSAs provide additional information on how they plan to address impacts if the cause of degradation is partially attributed to GSA groundwater management or attribution is inconclusive.
- Proposed mitigation for wells impacted by high concentrations of constituents of concern appears to be inadequate. Board staff recommends the GSAs provide an adequate mitigation program for drinking water wells impacted by any constituent for which a minimum threshold is established in the GSPs, including 1,2,3-TCP, where groundwater management activities cause concentrations to exceed those minimum thresholds.

Staff Recommendations and Next Steps

Board staff concludes that the GSAs have substantially, though not completely, resolved the previously identified deficiencies and that with the substantial resolution of deficiencies the GSPs are likely to achieve the sustainability goal for the basin. Therefore, Board staff recommends that the Board return the Kern County Subbasin to DWR for review of the updated GSPs pursuant to Water Code section 10733.4 if the GSAs resolve three of the remaining issues: (1) providing an adequate mitigation program for drinking water wells impacted by any constituent for which a minimum threshold is established in the GSPs, including 1,2,3-TCP, where groundwater

management activities cause concentrations to exceed those minimum thresholds; (2) providing an adequate mitigation program for state small water system wells (or domestic wells with more than four service connections) impacted by groundwater management activities; and (3) eliminating the Kern Non-Districted Land Authority GSA Joint Exercise of Powers Agreement May 2026 sunset provision, which would result in unmanaged areas of the subbasin that are a potential basis for state intervention.

1. SGMA Background

In 2014, the state Legislature passed the historic Sustainable Groundwater Management Act (SGMA), which authorizes local public agencies to form Groundwater Sustainability Agencies (GSAs) in alluvial groundwater basins and requires that basins designated as high-priority and medium-priority by the California Department of Water Resources (DWR) be managed by Groundwater Sustainability Plans (GSPs) unless otherwise exempted.

Under SGMA, DWR is responsible for reviewing GSPs to determine if plans are adequate and are being implemented in a manner that will likely achieve the sustainable use of groundwater. If DWR determines that proposed management of a groundwater basin is inadequate due to deficiencies in the GSP(s), it will refer that basin to the State Water Resources Control Board (State Water Board or Board) for what is known as the state intervention process. Upon referral, Board staff begins working with the GSA or GSAs to correct the GSP deficiencies. If the State Water Board determines that the GSAs are incorporating revisions that adequately address groundwater management issues, the Board may end the state intervention process and return the basin to DWR's oversight. Otherwise, the Board may designate the basin as "probationary" and begin to collect groundwater pumping information from extractors in the basin. The probationary designation can only occur following a noticed public hearing before the Board, and the legislature has directed that the Board's state intervention activities be funded by fees charged to pumpers in basins designated probationary and unmanaged areas of basins.

2. Kern County Subbasin

The Kern County Subbasin (subbasin or basin) is a critically overdrafted subbasin in the southern portion of the San Joaquin Valley with an area of about 1.78 million acres. The subbasin is currently managed by 20 GSAs, and the primary uses of groundwater in the subbasin are for irrigated agriculture and drinking water. Section 3 of the January 2025 Kern County Subbasin Probationary Hearing Final Staff Report (Final Staff Report) includes a detailed description of the Kern County Subbasin.

3. Issues with the 2022 and 2024 Groundwater Sustainability Plans

DWR determined the subbasin's 2022 GSPs were inadequate and referred the subbasin to the State Water Board in March 2023, which initiated the state intervention process. Following the State Water Board staff's review of the 2022 GSPs and preliminary review of 2024 Draft GSPs,[1] the subbasin GSAs submitted their adopted GSPs in December 2024 (2024 Final GSPs). Upon review of the 2024 Final GSPs, Board staff determined that these updated GSPs did not resolve all of the deficiencies identified by staff with respect to the previous GSPs. Implementing these GSPs could result in further declines in groundwater levels, potential degradation of groundwater quality, adverse impacts to drinking water wells, and damage to critical infrastructure such as canals and levees, due to continued land subsidence. For details of Board staff's review of past GSPs, please refer to Section 4, Appendix A and Appendix D of the Final Staff Report released in January 2025. On February 20, 2025, the State Water Board held a hearing to determine whether to designate the subbasin as probationary. In recognition of the substantial progress the subbasin made, the Board adopted Resolution 2025-0007 directing the GSAs to submit revised draft GSPs to the Board by June 20, 2025 for review, and continuing the hearing to September 17, 2025.

4. 2025 Groundwater Sustainability Plan Improvements

On June 20, 2025, the GSAs submitted seven amended draft GSPs to the Board; one Main GSP (2025 Kern Draft GSP) and six GSA-specific GSPs with supplemental pages, which were then posted for public review and comment. Board staff reviewed the 2025 Draft GSPs and concluded that the GSAs substantially, though not completely, address the deficiencies identified in the previous GSPs. Staff recommends returning the subbasin to DWR for review of the updated GSPs pursuant to Water Code section 10733.4 if the GSAs resolve three of the remaining issues: (1) providing an adequate mitigation program for drinking water wells impacted by any constituent for which a minimum threshold is established in the GSPs, including 1,2,3-TCP, where groundwater management activities cause concentrations to exceed those minimum thresholds; (2) providing an adequate mitigation program for state small water system wells (or domestic wells with more than four service connections) impacted by groundwater management activities; and (3) eliminating the Kern Non-Districted Land Authority GSA Joint Exercise of Powers Agreement May 2026 sunset provision, which would result in unmanaged areas of the subbasin that are a potential basis for state intervention.

[1] A GSP is considered draft if it is not adopted by the GSAs at the time of submission to the Board.

Deficiencies identified in the 2024 Final GSPs, actions taken to address deficiencies in the 2025 Draft GSPs, and potential actions to resolve remaining deficiencies are summarized in the following sections. The potential actions recommended in this report are expected to, if adopted and implemented, resolve the corresponding deficiencies, while the additional recommendations are for the GSAs' consideration to address currently less-critical issues in the GSPs. Deficiencies identified in the 2022 GSPs that were addressed in the 2024 GSPs are not described in this report. Table 1 includes a complete list of deficiencies that staff identified in the 2022, 2024, and 2025 Draft GSPs, and their status following review of the 2025 Draft GSPs.

4.1 Status of Coordination Deficiencies

Deficiency CRD-3: The GSAs in the subbasin have not demonstrated basin-wide management.

This deficiency appears to be partially addressed. In June 2025, Board staff advised the Kern Non-Districted Land Authority that there was no record of it on file with the State Controller's Office, which meant it lacked critical legal authorities. Thereafter, Kern Non-Districted Land Authority filed as an official GSA with the authority to manage groundwater in the non-districted areas per the Joint Exercise of Powers Agreement. However, Article 2.3 of the Third Amended and Restated Joint Exercise of Powers Agreement between the member agencies of the Kern Non-Districted Land Authority and Kern County Water Agency signed in May 2024 states that the agreement "will remain in effect for a period of two years following the Effective Date unless earlier terminated." On the date of the hearing, as per the terms of the agreement, the Kern Non-Districted Land Authority will sunset in approximately seven months. This could result in certain areas in the subbasin becoming unmanaged, which is a potential basis for state intervention. Board staff is unaware of any other GSA that has a fixed date termination clause in its Joint Exercise of Powers Agreement.

Potential Action CRD-3: Board staff recommends that the Kern Non-Districted Land Authority amend the Joint Exercise of Powers Agreement to ensure the GSA has proper authorities to fully implement and enforce SGMA within its identified management areas throughout the planning and implementation horizon of SGMA.

4.2 Status of Groundwater Level Deficiencies

Deficiency GL-1b: Sustainable management criteria were not established consistent with the requirements of SGMA.

This deficiency is mainly associated with a methodology to establish groundwater level minimum thresholds at individual monitoring wells that relied on regional groundwater

level declining trends.[2] The methodology was updated in the 2024 Final GSPs to add a depth limit of 61 feet below recent lows (Water Year 2013 – Water Year 2023). However, this update does not appear to sufficiently account for spatial variability of hydrogeology in the subbasin. This deficiency appears to be addressed by 19 of the 20 GSAs. Those GSAs supplemented their existing basin-wide minimum threshold methodology by: (1) adjusting some minimum thresholds to shallower depths to ensure none fall within the Corcoran clay, where it is present, and (2) adopting other more protective minimum thresholds based on local conditions (2025 Kern Draft GSP, pp.13-9 – 13-16). The minimum thresholds set by 19 GSAs appear adequately protective of beneficial uses and users as long as the GSAs implement their mitigation plans.

The Henry Miller Water District GSA set the minimum thresholds following the basin-wide methodology including the 61 feet limit below recent lows, but did not make other adjustments considering local conditions, eliciting Board staff concerns about the meaningfulness and adequacy of those minimum thresholds in relation to historical trends, projected water use, and the sustainability goal. The GSA claims that increasing water demand to support maturation of new permanent crops (planted between 2014 and 2018), with the option for additional annual row crops, is consistent with its established projects and management actions to reduce water demand (2025 Henry Miller Draft GSP, p. BP 9-5), however, it remains unclear how increased pumping beyond historical or current needs is consistent with reducing water demand; thus, the minimum thresholds do not appear to be supported by either historical trends or projected water use. Setting minimum thresholds that water levels may only approach or exceed on a temporary basis, due to drought or other conditions (*id*., p. BP 8-4), is neither necessary nor appropriate under SGMA. (Wat. Code, § 10721, subd. (x)(1)). Additionally, Henry Miller Water District GSA's assertion that "the GSA's [project and management action] efforts will ensure that lowering of groundwater levels and reduction in temporary storage during drought will be offset by increases in groundwater levels and storage during other periods" (*id*., p. BP 14-13) does not appear to be adequately supported given the future demand increase and the lack of water level thresholds to activate projects and management actions.

Potential Action GL-1b: The Henry Miller Water District GSA should raise minimum thresholds consistent with the requirements of SGMA (Cal. Code Regs., tit. 23, §354.28, subd.(c)(1)). Board staff recommends that the GSA raise minimum thresholds consistent with the basin's method to account for local conditions. Alternatively, the GSA could establish its minimum thresholds (and measurable objectives) at levels that

[2] Representative groundwater level monitoring for the subbasin currently has 185 wells with established minimum thresholds, measurable objectives and interim milestones.

account for expected local groundwater level rebounds after irrigation pumping ends to avoid the influence of seasonal fluctuations discussed below. Additionally, staff recommends that the GSA commit to reducing groundwater demand, consistent with SGMA and the subbasin's sustainability goals.

Historical spring and late-fall water levels of all Henry Miller Water District's monitoring wells have remained relatively stable. Water levels rapidly recover when drought conditions and seasonal pumping cease (2025 Henry Miller Draft GSP, BP 8-1). This rapid recovery can be attributed to aquifer characteristics and recharge from groundwater inflow from the surrounding areas. For instance, the GSA's operational water budget shows approximately 59,000 acre-feet of cumulative groundwater pumping from Water Year 2013 to Water Year 2015 (2025 Kern Draft GSP, Appendix H). From spring 2013 to fall 2015, water level declines at the GSA's monitoring wells ranged from approximately 33 to 49 feet, indicating a groundwater storage decline range of approximately 17,000 to 26,000 acre-feet[3] in the GSA area during that time. A large difference between the storage decline and pumping volume observed during these three consecutive critically dry years indicates substantial groundwater flow to the GSA area and suggests that water level changes do not necessarily indicate the magnitude of extractions. The GSA's native yield (groundwater volume equivalent to natural recharge) is approximately 3,500 acre-feet per year (2025 Kern Draft GSP, Appendix H). The native yield serves as the baseline to estimate the overdraft in each GSA area (2025 Draft Kern GSP, Appendix J and Appendix H); thus, excessive groundwater extraction exceeding the native yield by any GSA undermines the subbasin's sustainability goal. For this reason, staff recommends that the Henry Miller Water District GSA commits to reducing groundwater demand, consistent with SGMA and the subbasin's sustainability goals.

Deficiency GL-2a: The monitoring network was not developed consistent with the requirement of SGMA.

This deficiency appears to be mostly addressed. The GSAs conducted a spatial analysis using a grid of 111 hexagons of approximately 24-square miles in area and incorporating a statistical approach, local hydrogeologic conditions, and well construction details to identify data gaps relevant to domestic and agricultural well users (2025 Kern Draft GSP, pp. 15-35 – 15-39). Beyond the GSAs-identified gaps, Board staff, particularly focusing on monitoring shallow domestic wells, identified additional hexagons with inadequate monitoring for the GSAs' consideration. The GSAs committed to address these identified data gaps by the end of 2026 and conduct

[3] Estimated using a storage coefficient of 0.02 (provided to the Board staff by the GSA) and approximately 26,000 acres of GSA area

supplementary shallow groundwater monitoring in the interim (2025 Kern Draft GSP, p. 15-38). It appears that the GSAs overlooked or did not prioritize addressing two data gaps (hexagons[4] 21 and 87) that staff identified.

Potential Action GL-2a: Board staff recommends prioritizing filling data gaps in areas with a high density of shallow domestic wells, such as hexagon 87, which contains up to 64 domestic wells screened above the confining clay layer and resolving the data gap in hexagon 21. When identifying new representative monitoring wells, the GSAs should continue to consider site-specific characteristics at individual wells in addition to local geology, particularly in areas where confining/semi-confining clay layers are present, to ensure the wells adequately represent all beneficial uses and users in the area.

Deficiency GL-2b: The well impact mitigation plan is incomplete.

This deficiency appears to be partially addressed. The GSAs commit to mitigate drinking water wells impacted by GSA-related activities after January 1, 2015 (2025 Draft GSP, p.13-6, Appendix G-1). The GSAs have a revolving reserve fund of $3.5 million per year for well mitigation. The dry well mitigation plan has two tracks for assistance: a mitigation track for domestic wells with less than five service connections (up to $90,000 per well) and a technical assistance track for public supply wells (up to $50,000 per well) (2025 Kern Draft GSP, p. 13-6; 2025 Kern Draft GSP, Appendix G). The GSAs will collaborate with Self-Help Enterprises to administer the well mitigation program. The mitigation of dry domestic wells includes emergency drinking water supplies within 24 hours of notification and hauled tank water within 72 hours. The GSAs allocated adequate funding reserves to mitigate wells beyond those of worst-case scenario projections (*id*., p. 13-31). However, Board staff cautions that the actual number of impacted wells could be greater than the projections.

Board staff noted that state small water system wells (wells with 5 to 14 service connections that do not serve more than 25 people per day for more than 60 days out of the year) would be placed on the technical assistance track and not be eligible for well replacement, which staff are concerned is not sufficient.

The well impact analysis in the 2025 Draft GSPs has some notable limitations. It does not differentiate between upper and lower aquifer wells in areas where varying completion depths and clay layers result in differences in groundwater levels. This can affect the accuracy of the estimated number of potentially impacted wells. The GSAs

[4] Hexagons 21 is in the Semitropic Water Storage District GSA and hexagon 87 is in the Kern River GSA. The GSAs originally identified hexagon 22 as a data gap. Board staff identified hexagon 21 as a higher priority data gap, noting that resolving it would also address hexagon 22 because of their proximity. The GSAs removed hexagon 22 from the data gap list without first addressing the gap in hexagon 21, contrary to Board staff recommendations.

revised their definition of a "dewatered well" used to estimate the number of wells that would be impacted if water levels reach the minimum thresholds. The original definition was based on where the water level of a well falls within the bottom 20 percent of its depth, and has been modified to where the water level falls within 50 feet of a well's bottom (2025 Kern Draft GSP, p. 13-32). The new definition is more protective of wells shallower than 250 feet, but may not be appropriate for deeper, higher capacity pumping wells because a 50-foot water column may be insufficient to support their operation.

Potential Action GL-2b: Board staff recommends that the GSAs: (1) place state small water systems on the mitigation track rather than the technical assistance track, and (2) consider funding, in an amount at least equivalent to well replacement, for consolidation of impacted state small water systems with existing public water systems, where that option is available and feasible.

Additional Recommendations for GSP improvement: Board staff recommends that the GSAs revise their well impact analysis methodology to include separate estimates for wells impacted by water levels reaching minimum thresholds in the upper and lower aquifers, where applicable. This would enhance the accuracy of analytical results. Alternatively, in areas where multiple depth-dependent minimum thresholds exist, the most conservative threshold should be used to estimate maximum potential impacts on the most vulnerable users (typically, domestic wells in the upper part of the aquifer). Board staff further recommends adequately increasing the minimum water column height used to define dewatering for higher capacity production wells.

Deficiency GL-3: The GSPs do not describe a feasible path for halting chronic lowering of groundwater levels.

This deficiency appears to be addressed. Proposed demand reduction in the subbasin exceeds the deficit derived under the 2030 climate change scenario (2025 Kern Draft GSP, p. 14-15).

Additional Recommendations for GSP improvement: The subbasin's projects and management actions for demand reduction are currently at various stages of implementation, including feasibility assessment and permitting. Board staff recommends the GSAs: (1) review interim milestones for groundwater levels to ensure alignment with implementation timelines and expected outcomes of projects and management actions, and (2) develop contingency demand management strategies in case of worsening conditions or proposed supply augmentation projects not being fully implemented or achieving expected augmentation. Additionally, Board staff recommends continuous evaluation of changing land use and climate conditions and adapting management approaches to be responsive to changes in groundwater demand.

Deficiency GL-4: The GSPs do not define groundwater storage sustainable management criteria consistent with SGMA requirements.

This deficiency appears to be addressed. The GSAs use groundwater levels as a proxy for groundwater storage in the 2025 Draft GSPs. Consequently, 25 percent of groundwater level representative monitoring wells exceeding their water level minimum thresholds over a single year defines an undesirable result for reduction of groundwater storage. Board staff recognizes the strong correlation between groundwater levels and storage. Though the GSAs did not define a groundwater volume that can be withdrawn without causing undesirable results, the new definition of an undesirable result appears adequate as the GSAs commit to conduct an exceedance investigation when a groundwater level minimum threshold exceedance occurs (2025 Kern Draft GSP, Appendix K-1, p. 4)

Additional Recommendations for GSP improvement: Board staff find that the groundwater volume corresponding to a 25 percent of water level minimum thresholds exceedance can be relatively large or small depending on the combination of the wells that exceed minimum thresholds. Board staff recommends that the GSAs establish a threshold volume that is (1) representative of a depletion of storage that would lead to an undesirable result, or (2) consistent with the defined undesirable result of 25 percent of representative monitoring wells exceeding water level minimum thresholds.

4.3 Status of Land Subsidence Deficiencies

Deficiency LS-1a: Undesirable results are poorly described, unworkably complex, and inconsistently implemented.

This deficiency appears to be partially addressed. The GSAs updated the exceedance policy and action plan for land subsidence to address inconsistent language in the 2024 Final GSPs (2025 Kern Draft GSP, Appendix K). The definition of an undesirable result for land subsidence requires the GSAs to separately quantify subsidence caused by GSA from non-GSA activities (2025 Kern Draft GSP, p. 13-78). However, the GSAs do not demonstrate the ability to accurately quantify and attribute subsidence extents to GSA and non-GSA activities, particularly along certain sections of the California Aqueduct where both types of activities are present.

Potential Action LS-1a: Board staff recommends that the GSAs improve methodologies for characterizing GSA and non-GSA contributions to subsidence in areas where that can be an important distinction. The GSAs should work with government agencies such as DWR (relating to inadequate pre-construction hydrocompaction along the California Aqueduct) and the California Geologic Energy Management Division (relating to oil and gas field operations in the subbasin), as well as non-government entities such as oil and gas extraction companies (relating to

contributions to subsidence near the Lost Hills Oil Fields), to ensure accurate assessment of GSA and non-GSA contributions by all parties.

Additional Recommendations for GSP improvement: The GSAs evaluated projected changes in slope for linear infrastructure (e.g., canals, highways, and railroads) based on average historical subsidence rates, comparing them to the maximum acceptable slope changes for these structures. However, the 2025 Draft GSPs do not characterize the magnitude of subsidence that various structures can withstand. Board staff recommends that the GSAs work to understand how much subsidence various land uses and infrastructure in the subbasin can tolerate before experiencing significant and unreasonable impacts. This analysis would help inform the development of sustainable management criteria throughout the subbasin, particularly for isolated areas experiencing relatively higher rates and extents of subsidence.

Board staff further recommends that the GSAs work to verify that groundwater wells in areas with greater subsidence (such as areas along the northern boundary of the subbasin) are fitted with compression sections, as is suggested in the GSPs. For wells lacking compression sections, as may be the case for many domestic wells, the GSAs should evaluate their construction to determine susceptibility to damage from intersecting compactable clay layers. The GSAs should update the well impact analysis and mitigation plans if susceptible wells are found in the subbasin.

The GSPs also state that Project and Management Action KSB-1 would address localized subsidence impacts through mitigation (2025 Kern Draft GSP, p.13-92). However, KSB-1 is a project and management action that focuses on mitigating subsidence impacts along the Friant-Kern Canal, and there are no indications that these efforts would be extended to other areas in the subbasin. Board staff recommends that the GSPs include a management action that would address localized subsidence impacts throughout the subbasin, similar to the way KSB-1 addresses subsidence along the Friant-Kern Canal.

Deficiency LS-1b: Sustainable management criteria were not established consistent with the requirements of SGMA.

This deficiency appears to be addressed. The GSAs have plans to ramp down subsidence prior to 2040 with no additional subsidence to occur after 2040. Accordingly, the GSAs updated the sustainable management criteria tables for the California Aqueduct, Friant-Kern Canal, and Hydrogeological Conceptual Model Areas (HCM Areas) (2025 Kern Draft GSP, pp. 13-101 – 13-104, 13-110, 13-112).

The GSPs state that no areas within the subbasin exhibit high subsidence potential (i.e., more than three feet of cumulative subsidence from 2015 to 2023). Moderate subsidence potential (one to three feet) is present near the northern boundary and in

isolated areas along the western and eastern margins of the subbasin. The majority of the subbasin has minimal subsidence potential, with less than 0.33 feet of subsidence during the same period (2025 Kern Draft GSP, p.13-80). The GSAs define three categories of infrastructure potentially affected by subsidence: (1) “Regional Critical Infrastructure,” which includes the California Aqueduct and the Friant-Kern Canal, (2) “GSA Area Critical Infrastructure,” which includes some water conveyance canals, Interstate-5 and, Highway 99, and (3) “Other Infrastructure,” which includes water supply, water conveyance, transportation, and interstate gas distribution infrastructure not included under the two other categories.

The GSAs expect that only a section along the Friant-Kern Canal could be impacted by future subsidence caused by GSA-related activities (2025 Kern Draft GSP, p. 13-92). For the California Aqueduct and Friant Kern Canal, minimum thresholds are based on either: (1) the rate and extent of subsidence that would not lead to a loss of conveyance capacity, or (2) the historical rate of subsidence projected to 2040, where the projected subsidence would not lead to loss of conveyance capacity or can be adequately mitigated by the GSAs (*id*., p. ES-26). Applicable GSAs are collaborating with the Friant Water Authority on establishing a subsidence mitigation cost-sharing framework to address the impacts of post-2020 subsidence along the Friant-Kern Canal. Mitigation costs will be partially funded by the subbasin GSAs, based on the relative impact of post-2020 pumping and groundwater overdraft on subsidence along the canal. The minimum thresholds for the GSA Area Critical Infrastructure are set using historical subsidence rates. Some potential impacts to local canals will be managed by the GSAs through ongoing maintenance and improvements to facilities (*id*., p. 13-116).

Deficiency LS-2: The GSPs do not provide adequate implementation details.

This deficiency appears to be partially addressed. The GSPs state that the GSAs plan to coordinate with entities such as DWR’s California Aqueduct Subsidence Program, including quarterly check-in meetings, to ensure subsidence impacts along major infrastructure are avoided (2025 Kern Draft GSP, pp. 13-92, 14-75). The GSPs further state that the action plan for subsidence will be updated within six months of the release of DWR’s final Land Subsidence Best Management Practices document[5] to reflect any standardized protocols, actionable timelines, and projects and management actions responses. Additionally, GSAs expect to revise their mitigation action plan to include mitigation alternative(s), as appropriate, once the California Aqueduct Subsidence Program publishes “the framework for California Aqueduct long-term rehabilitation” (2025 Kern Draft GSP, Appendix K). Many of the substantial updates to the mitigation

[5] DWR released its Draft Land Subsidence Best Management Practices document on July 24, 2025 and is accepting public comment until September 22, 2025.

and implementation details appear to be pending further guidance from DWR.

Potential Action LS-2: Board staff recommends that the GSAs develop infrastructure mitigation programs with clear initiation thresholds, eligibility requirements, actionable timelines, and funding sources. For more details, refer to the feedback provided in the Final Staff Report (Section 3 and Appendix A), with particular emphasis on Potential Action LS-2c. Staff additionally recommends the GSAs start reviewing and considering elements of DWR's draft Land Subsidence Best Management Practices document, so that the recommendations in the final document can be incorporated into the GSPs in a timely manner.

Additional Recommendations for GSP Improvement: Board staff recommends that the GSAs provide details on how they will address impacts if the attribution is inconclusive following a subsidence minimum threshold exceedance investigation.

Board staff further recommends that the GSAs develop projects and management actions that can directly counter depressurized confined aquifers and subsequent compaction of clays to mitigate subsidence. Groundwater pumping reductions may help slow the subsidence rate and reduce the subsidence extent. However, it is vital for groundwater levels to be quickly returned to, or above, critical head to prevent the progression of subsidence. Thus, the GSAs may consider targeted managed (or enhanced) aquifer recharge projects or demand reduction programs in areas that experience localized subsidence.

For areas outside the Regional Critical Infrastructure monitoring corridors, the action plan for land subsidence is activated if the average subsidence for an HCM Area exceeds an interim milestone or the minimum threshold. Board staff recommends including a pathway to initiate the action plan in the case that significant localized subsidence occurs outside of Regional Critical Infrastructure monitoring corridors, before an HCM Area average exceedance occurs. Otherwise, localized subsidence that could impact infrastructure may persist without any investigation or mitigation.

4.4 Status of Groundwater Quality Deficiencies

Deficiency GWQ-1a: Undesirable result definitions are not protective of beneficial uses and users.

This deficiency appears to be addressed. The GSAs established minimum thresholds and a quantitative definition of an undesirable result that are designed to protect water quality from impacting beneficial uses and users or prevent further degradation of groundwater quality beyond January 1, 2015 conditions due to groundwater management activities. Of the 330 individual thresholds set at 55 representative monitoring wells across the subbasin for arsenic, nitrate, nitrite, uranium, 1,2,3-trichloropropane (1,2,3-TCP), and total dissolved solids concentrations, 308 were set at

the drinking water standards. The remaining 22 minimum thresholds were set above the drinking water standards due to water quality degradation that was already occurring when SGMA took effect in 2015, which GSAs are not required to address under SGMA. The updated undesirable result definition is if any of the following occur at any time: (1) 15 percent of representative monitoring wells exceed the minimum threshold for any constituent of concern due to groundwater management actions, or (2) five percent of domestic wells in the subbasin annually or 15 percent cumulatively through 2040 are estimated[6] to have minimum threshold exceedance, or (3) a GSA is unable to meet well mitigation needs (2025 Kern Draft GSP, pp. 13-60, 13-61).

Deficiency GWQ-1b: The GSPs are missing critical information about how the GSAs will determine whether an undesirable result has occurred.

This deficiency appears to be addressed. The GSAs revised their minimum threshold exceedance investigation methodology for groundwater quality to specify a timeline, who will conduct it, required tasks, and factors to be evaluated, including potential driving mechanisms that can lead to groundwater quality degradation (2025 Kern Draft GSP, Appendix K-1, pp. 8 -15).

Deficiency GWQ-2a: The monitoring network is not protective of all beneficial uses and users in the subbasin.

This deficiency appears to be addressed. The GSAs conducted a spatial analysis based on a grid of 111 hexagons of approximately 24-square miles in area to identify gaps in the groundwater quality monitoring network (2025 Kern Draft GSP, pp. 15-43 - 15-47). Board staff, particularly focusing on monitoring shallow domestic wells, recommended additional potential gaps for the GSAs' consideration. Through this analysis, 32 data gaps[7] (hexagons) were identified (*id*., p. 15-44, Appendix L). The GSAs plan to add some existing representative groundwater level monitoring wells to groundwater quality monitoring network to fill some of the data gaps by the end of 2025 and add up to 30 additional monitoring wells as needed to fill all identified data gaps by the end of 2026 (*id*., p.15-45).

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[6] The GSAs estimate impacted domestic well percentage based on radius of influence analyses around the representative monitoring wells that exceed minimum thresholds. The subbasin's well Inventory included 2,322 domestic wells as of February 2025.

[7] Hexagon numbers: 3, 6, 8, 9, 13, 14, 15, 16, 18, 23, 29, 39, 42, 43, 44, 46, 53, 55, 56, 58, 59, 60, 68, 69, 70, 73, 74, 75, 82, 83, and 87. Seven hexagons are in the Kern River GSA and four hexagons are in the Semitropic Water Storage District GSA. The other hexagons fall across GSA boundaries. Figure 15-17 in the 2025 Kern Draft GSP shows only 27 hexagons as data gaps. Table 2 in Appendix L-2 of the Draft GSP identify only 30 hexagons as data gaps. Board staff recommends GSA correct the map and the table to accurately identify 32 data gaps.

Deficiency GWQ-2c: It is unclear how the GSAs will assess the impacts of projects and management actions.

This deficiency appears to be addressed. As stated under deficiency GWQ-2a, the GSAs identified gaps in the groundwater quality monitoring network and committed to fill all identified gaps. The GSAs also identified potential driving mechanisms of water quality degradation related to projects and management actions (Appendix K-2, pp. 11-13).

Deficiency GWQ-3a: Management actions are not protective of beneficial uses and users once a minimum threshold exceedance is triggered.

This deficiency appears to be addressed. The GSAs improved their action plan and minimum threshold exceedance investigation methodology for groundwater quality (2025 Kern Draft GSP, Appendix K-1, pp. 8 -15, Appendix K-2, pp. 12, 13). The action plan outlines when and how GSAs will notify drinking water well owners within the zone of influence of a water quality minimum threshold exceedance. When a minimum threshold is exceeded at a representative monitoring well and confirmed by a follow-up sample, the GSAs will notify domestic and non-public drinking water well owners within a 3-mile radius of that monitoring well of the exceedance. Notification will occur within 30 days of the confirmation sample for nitrate exceedances, and within 60 days for exceedances of arsenic, nitrite, total dissolved solids, 1,2,3-TCP, and uranium (2025 Kern Draft GSP, Appendix K-1, pp. 8-15, Appendix K-2, pp. 17, 18).

Deficiency GWQ-3b: The well mitigation plan does not address water quality degradation.

This deficiency appears to be partially addressed. The GSAs developed a plan for mitigating drinking water wells impacted by degraded groundwater quality resulting from groundwater management activities. If a groundwater quality minimum threshold is exceeded at a representative monitoring well, a qualified professional will investigate it to determine the potential cause. If the exceedance is caused by groundwater management activities, the GSAs will mitigate the impacted domestic wells (2025 Kern Draft GSP, Appendix G; 2025 Kern Draft GSP, Appendix K). Board staff finds a number of shortcomings in that plan. It is unclear how the GSAs will address impacts if the cause of groundwater quality degradation is either partially attributed to groundwater management or attribution is inconclusive.

The GSAs plan to mitigate for constituents of concern that have established primary maximum contaminant levels by installing point-of-entry reverse osmosis systems in impacted households (2025 Kern Draft GSP, Appendix G-1, p. 38). Staff has concerns with the plan’s mitigation prerequisite, because the water quality standard for total dissolved solids is a secondary maximum contaminant level, making total dissolved solids ineligible for mitigation under the current plan. Although concerning to staff, a

corrective action is not recommended for this issue because the occurrence of high total dissolved solid concentrations is largely limited[8] to the western portion of the subbasin with few drinking water wells. Staff also has concerns about the GSAs' reliance on reverse osmosis systems to address 1,2,3-TCP because these systems only partially remove 1,2,3-TCP from water. Granular activated carbon has been identified as the best available technology for the removal of 1,2,3-TCP by the State Board's Division of Drinking Water (Cal. Code Regs., tit. 22, § 64447.4).

The well mitigation plan states that the cause of degraded groundwater quality will be determined through a case-by-case evaluation considering many essential factors including:

- "Whether GSA projects and management actions at issue are related to ongoing, standard basin operations that are consistent with operations taking place prior to 2015," and
- "If the presence of the constituents/contaminants in the aquifer are due to the actions of others that are likely responsible parties" (2025 Kern Draft GSP, Appendix G-1, p. 38).

SGMA is not remedial, meaning it is not meant to restore physical conditions that existed prior to January 1, 2015. However, it was passed by the Legislature explicitly to address undesirable results that were occurring because of ongoing, standard basin operations at the time. Stated another way, an "ongoing, standard basin operation" that is continuing to cause undesirable results (e.g., exacerbate contamination due to groundwater pumping) is subject to SGMA. This means that any degradation of groundwater quality caused by projects and management actions after January 1, 2015 (post-SGMA implementation) should be addressed by the GSAs (Cal. Code Regs., tit. 23, §355.4 (b)(5)). Groundwater management activities like pumping and managed recharge can cause existing contaminants to migrate from zones of higher concentrations into previously unaffected zones of the aquifer. SGMA recognizes the migration of existing constituents of concern that impair water supplies as an undesirable result (Wat. Code, § 10721, subd. (x)(4)). The GSAs should address groundwater quality degradation resulting from contaminant migration or mobilization due to groundwater management actions, except for undesirable results occurring prior to 2015.

Potential Actions GWQ-3b: Board staff recommends that the GSAs: (1) provide additional information on how they plan to address impacted wells if the cause of

[8] Only two of the 55 representative monitoring wells have minimum thresholds for total dissolved solids greater than the drinking water quality standard.

groundwater quality degradation is partially attributed to groundwater management actions or attribution is inconclusive, and (2) clearly describe a plan for effectively mitigating drinking water wells impacted by increasing concentrations of any constituent for which a minimum threshold is established in the GSPs, including 1,2,3-TCP, attributed to groundwater management activities.

Board staff also recommends that the GSAs reevaluate whether "ongoing standard basin operations that are consistent with operations taking place prior to 2015" are causing groundwater quality undesirable results as defined by SGMA and, if so, incorporate projects and management actions to avoid or mitigate those undesirable results. The GSAs should ensure their groundwater management activities do not exacerbate groundwater quality issues associated with contaminants that exist in some zones of the aquifer system. Additionally, Board staff recommends that the GSAs consider the potential for lateral or vertical migration of existing constituents of concern caused by groundwater management activities when evaluating minimum threshold exceedances.

4.5 Additional Areas of Statewide Policy Concern

Several public comment letters were submitted prior to the February 17, 2025, hearing and during the Board's public comment period on the 2025 Draft GSPs regarding the no net loss of wetlands policy and privately held wetlands (subject to permanent federal easements) within the Semitropic Water Storage District GSA. These managed wetlands are approximately 3,600 acres and comprise valuable habitat within North America's Pacific Flyway. Many of the comments expressed concern that groundwater and surface water would no longer be available to support these managed wetlands and/or that the cost of water would prohibit these wetlands from continuing to be managed. Staff encourage the Semitropic Water Storage District GSA to continue engaging with parties representing wetland interests and to consider approaches that can meet the needs of this habitat given its statewide importance.

5.0 Staff Recommendations and Next Steps

Board staff found that the GSAs have taken substantial steps toward adequately, though not completely, addressing most of the deficiencies identified in the previous GSPs. Therefore, Board staff recommends that the State Water Board return the Kern County Subbasin to DWR's oversight under chapter 10 of SGMA if the GSAs resolve three of the remaining issues: (1) providing an adequate mitigation program for drinking water wells impacted by any constituent for which a minimum threshold is established in the GSPs, including 1,2,3-TCP, where groundwater management activities cause concentrations to exceed those minimum thresholds; (2) providing an adequate

mitigation program for state small water system wells (or domestic wells with more than four service connections) impacted by groundwater management activities; and (3) eliminating the Kern Non-Districted Land Authority GSA Joint Exercise of Powers Agreement May 2026 sunset provision, which would result in unmanaged areas of the subbasin that are a potential basis for state intervention.

Board staff additionally recommends that The Kern County Subbasin GSAs continue to implement their 2025 GSPs and consider Board staff recommended improvements listed above in preparing future plan amendments to fill data gaps, refine sustainable management criteria, improve mitigation programs, develop demand management plans, and enhance the basin's approach to reaching sustainability.

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