

TECHNICAL MEMORANDUM

DATE: February 7, 2025

Project No. 24-1-057

TO: Augustine C. Ramirez

FROM: Andrew Francis, PG

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SUBJECT: Fresno County Management Area A&B Pumping Reduction Plan

INTRODUCTION

This Technical Memorandum (TM) describes the Fresno County Management Area & Management Area B (FCMA) GSA Pumping Reduction Plan (PRP). As outlined in the 2024 Delta-Mendota Subbasin (Subbasin) Groundwater Sustainability Plan (GSP) prepared by EKI, the PRP consists of six sections:

1. Monitoring and Data Collection Plan
2. Overdraft Mitigation Plan
3. Groundwater Level Minimum Threshold Avoidance Plan
4. Water Quality Minimum Threshold Exceedance Plan
5. Subsidence Avoidance Plan
6. Groundwater Allocation Backstop

This TM conforms with all requirements of the PRP outlined in Section 16.1.1 of the GSP and all monitoring protocols described in Section 14.3. For applicable PRP components, specific triggers and procedures are defined. These include an entry trigger to activate the PRP, a zone of impact (ZOI) to determine where the PRP will be applied, a cutback approach to provide quantitative estimates of pumping reductions, an exit trigger to conclude the cutback once objectives are met, and enforcement measures to ensure successful implementation. Additional monitoring and reporting requirements are outlined in each component, aligning with the Monitoring and Data Collection Plan.

1 MONITORING AND DATA COLLECTION PLAN

The Monitoring and Data Collection plan includes eight components that establish minimum standards for all GSA groups. This will facilitate the implementation of the Subbasin GSP and will help prevent undesirable results. The individual components include the items listed in **Table 1**. FCMA has committed to complying with all eight components of the plan as described in section 16.1.1.1 in the Subbasin GSP.

Table 1 – Monitoring and Data Collection Plan	
Requirement	Commitment
1. Regular monitoring network(s) assessment	FCMA
2. Quarterly groundwater level monitoring	FCMA
3. Semiannual water quality monitoring	FCMA
4. Well registration policy	FCMA
5. Well metering policy	FCMA
6. Well extraction reporting policy (including estimation of pumping from composite wells)	FCMA
7. Provide well construction information for all monitoring wells	FCMA
8. Replacing composite/production wells in the monitoring network with dedicated monitoring wells by 2030	FCMA

2 OVERDRAFT MITIGATION PLAN

2.1 Objective and Requirement

FCMA GSA is a member of Zone 1 which includes the Farmers Water District GSA Group, Aliso GSA Group, and a portion of the Central GSA Group (Tranquility Irrigation District). Zone 1 is required to reduce its average pumping by approximately 2,800 AF/year in the Upper Aquifer and 2,900 AF in the Lower Aquifer by 2030, based on the overdraft evaluation period (Water Year [WY] 2003 to WY 2023). FCMA will actively coordinate with adjacent GSAs within Zone 1 to meet this goal.

2.2 Implementation Approach

The proposed path for pumping reductions over the next five years for Zone 1 is presented in **Table 2**.

Table 2 - Zone 1 Overdraft Reduction				
Implementation Year	Reduction in overdraft	Upper Aquifer Reduction (AF)	Lower Aquifer Reduction (AF)	Total Reduction (AF)
2025	0	0	0	0
2026	0.2	560	580	1140
2027	0.4	1120	1160	2280
2028	0.6	1680	1740	3420
2029	0.8	2240	2320	4560
2030	1	2800	2900	5700

FCMA does not pump from the Lower Aquifer. FCMA will continue to measure Upper Aquifer groundwater pumping and coordinate with other GSAs to achieve sustainability. FCMA has monitored water levels and pumping amounts for more than 20 year and the data suggests that the historical pumping average will result in sustainable conditions.

2.3 Coordination with other GSAs to Achieve Required Pumping Reduction

Following the end of each water year, FCMA will meet with other Zone 1 members to determine the total pumping. The volume of pumping for each entity will be compared to the average from 2003 to 2023. These annual meetings will also include a discussion of planned pumping for the upcoming water year.

3 GROUNDWATER LEVEL MINIMUM THRESHOLD AVOIDANCE PLAN

3.1 Objective and Requirements

The Groundwater Level Minimum Threshold (GWL-MT) Avoidance Plan is intended to prevent GWL-MT exceedances and provide corrective action when GWL-MT exceedances occur. FCMA GSA has six groundwater level representative monitoring sites (RMW-WL). Two of these sites were constructed in the Fall/Winter 2024 and do not have established Sustainable Management Criteria. The Sustainable Management Criteria for these sites is presented in **Table 3**.

By the end of February of each year, GSAs will compare the water level data at each RMW-WL to the defined triggers. If a GWL-MT exceedances occurs or is projected to occur, an investigation will be conducted to determine if an area should be designated as an MT “hotspot” and will require an RMW-WL

specific PRP. This PRP will define pumping reductions or other management actions to be implemented in the designated hotspot.

Table 3 – FCMA GWL Monitoring Wells					
Site ID	Local ID	GSA	Aquifer	MO (ft NAVD 88)	MT (ft NAVD 88)
12-001	SPRECK-MW-7	MAA	Upper Aquifer	99	79
13-001	HANS-7C1	MAB	Upper Aquifer	120.5	100.5
13-003	TL-HS-3	MAB	Upper Aquifer	116.1	57.4
TBD	Traction Ranch UA	MAB	Upper Aquifer	TBD	TBD
13-004	USGS-31J6	MAB	Lower Aquifer	-27	-50.6
TBD	Traction Ranch LA	MAB	Lower Aquifer	TBD	TBD

3.2 Investigation Trigger

The GWL-MT for each monitoring site is equal to the seasonal low measured in 2015, or equivalent method as described in 13.1.2 of the GSP. Traction Ranch UA and Traction Ranch LA were not constructed at the time of GSP development and are pending GWL-MT. The occurrence of any of the following conditions at an RMW-WL triggers a GWL-MT investigation to determine whether an area should be designated as an MT “hotspot” and will require pumping reductions:

- Exceedance of the GWL-MT, determined by comparing the most recent seasonal low measurement (Fall) to the defined MTs.
- Projected exceedance of the GWL-MT, based on the linear trend of the previous four Fall groundwater level measurements (using the seasonal average if multiple measurements are taken).

3.3 Investigation Approach

In the event of a GWL-MT exceedance or projected exceedance, an investigation will be conducted to determine if declining water levels are a result of FCMA groundwater management. The following is an outline of the steps to be taken during an investigation.

3.3.1 Data Collection & Timeline

The following describes the data to be collected and timeline for completion of the GWL-MT exceedance investigation.

- Monitoring at the site will increase quarterly to monthly.
- FCMA will request pumping and groundwater level data from all surrounding GSAs within 14 days of the reported GWL-MT exceedance.
 - Identify other RMW-WL that have experienced GWL-MT exceedances or have projected exceedances.
 - For non-RMW, compare current water levels to conditions in 2015. Use 2022 if data is not available going back to 2015.
 - Compare current pumping numbers to historical average (2003-2023)
- Complete evaluation within 60 days of GWL-MT exceedance utilizing the best available information.

3.3.2 Methods for Investigation

The following steps will be used to determine if FCMA is responsible for a GWL-MT exceedance or projected exceedance.

1. Determine if declining groundwater levels are confined to a single GSA or if the problem is regional. Water levels in the Zone 1 area will be compared to the established GWL-MT values. Current water levels in relation to the established MT will inform the ZOI (discussed in 3.3).
2. The second step to determine the cause of a GWL-MT exceedance will be a review of pumping from FCMA and surrounding GSAs that are within Zone 1. Pumping values for the current water year leading up to the MT exceedance will be compared to the average pumping that occurred from the period 2003 to 2023. Comparing these pumping values will be an important factor in determining the party responsible.
3. Evaluate drawdown at the GWL-MT site where the exceedance occurred or will occur. Using either a numerical model and/or analytical solution, the proportional amount of drawdown respective GSAs are responsible for will be determined. This analysis will be conducted in a coordinated effort to ensure all parties agree on the amount and timing of pumping.
4. The final step of the analysis will be to decide as to whether FCMA or an outside GSA is responsible for the GWL-MT exceedance. FCMA will prepare a TM describing the investigation and making a conclusion on the responsible part. This TM will be provided to the Coordination Committee for review by all interested parties within 60 days.
5. If FCMA is determined to be responsible for the GWL-MT exceedance, the ZOI will be designated as a “hotspot”.

3.4 Zone of Impact

If it is determined that FCMA is responsible for the GWL-MT exceedance and is to be designated a hotspot, a ZOI will be determined to delineate the area where management actions are to be implemented. The ZOI will be determined based on a spatially interpolated surface representing the minimum threshold across the basin. The following outlines how the ZOI will be de when an MT exceedances has occurred:

1. Create a groundwater level contour map that represents the GWL-MT at all RMW-WL in Zone 1.
2. Create a groundwater level contour map using groundwater levels measured at the time of the MT exceedance.
3. Areas where water levels are lower than the GWL-MT will be delineated as the ZOI.

The following outlines how the ZOI will be delineated when an GWL-MT exceedance is projected to occur:

1. Create a groundwater level contour map that represents the GWL-MT at all RMW-WL in Zone 1.
2. Create a groundwater level contour map using groundwater levels measured at the time of the MT projected exceedance. Water levels will be projected a year in advance using water levels from the previous four fall measurements.
3. Area areas where the projected water levels are lower the GWL-MT will be delineated as the ZOI.

3.5 Mitigation and Cutback Approach

After a ZOI for a hotspot is determined, a cutback approach is implemented with specific pumping reductions. When groundwater levels are projected to exceed the GWL-MT mitigation measures include a reduction in pumping by 0.25 acre-feet (AF)/acre. If groundwater levels have exceeded the GWL-MT, the reduction in pumping will be increased to 0.5 AF/acre. These reductions are calculated based on the average pumping that occurred within the ZOI from 2003 to 2023.

Pumping reductions may be adjusted for the subsequent water year if conditions do not show improvement. Conversely, the GSA may decide to suspend these pumping limits if trends in ground water levels improve, ensuring avoidance of GWL-MT.

Additional monitoring of groundwater levels will also be incorporated as a management action. This will provide useful data to better understand how pumping affects groundwater levels. FCMA will modify the mitigation and cutback approach as more information is collected to improve groundwater management and prevent future GWL-MT exceedances. Pumping reductions will not apply to groundwater pumping related to the mitigation of degraded water quality or the recovery of recharge surface water.

3.6 Cutback Exit Trigger

Following a year when a GWL PRP is implemented, water level and pumping data will be evaluated to determine the impact of the mitigation actions. The pumping cutback will remain in place until water levels have recovered above the MT and there are no projected exceedances for the upcoming fall. An MT exceedance will no longer be projected when four consecutive measurements have shown an increasing trend that above the MT, When MT exceedances are no longer projected and water levels are above the MT, FCMA will resume normal pumping. Example PRP scenarios are provided in the next section to describe action that will be taken.

3.7 Example Scenarios

Example 1. Based on seasonal low measurements, groundwater levels are projected to exceed the GWL-MT in the following year. An investigation has determined FCMA is responsible:

- FCMA will increase its monitoring frequency from quarterly to monthly.
- Delineate the ZOI and reduce pumping from the historical average from 2003-2023 by 0.25 acre/feet within that area.
- ZOI is determined to have an area of 1000 acres where the average historical pumping is 2000 AF/year (2 AF/acre).
- Allowable pumping within the ZOI will be 1.75 AF/acre or 1,750 AF.
- Maintain pumping reduction of 0.25 AF/acre until water levels no longer are projected to exceed the MT. Four consecutive measurements have shown an increasing trend with projected water levels above MT.
- Modify future PRPs based on the data collected during implementation of this PRP.

Example 2. A seasonal low water level measurement has exceeded the GWL-MT and the investigation has determined FCMA is responsible:

- FCMA will increase its monitoring frequency from quarterly to monthly.
- Delineate the ZOI and reduce pumping from the historical average from 2003-2023 by 0.5 AF/acre within that area.
- ZOI is determined to have an area of 1000 acres where the average historical pumping is 2000 AF/year (2 AF/acre).
- Allowable pumping within the ZOI will be 1.5 AF/acre or 1,500 AF.
- Maintain the pumping reduction of 0.5 AF/acre until water levels are recovered above GWL-MT and future MT exceedances are not projected.
- Modify future PRPs based on the data collected during implementation of this PRP.

3.8 Enforcement

Groundwater Allocation Backstop will be enforced in cases of implementation lapses, or if a GSA fails to implement policy within two quarters. Further actions will be governed by the dispute resolution mechanisms in the Subbasin GSAs' MOA.

4 WATER QUALITY MINIMUM THRESHOLD EXCEEDANCE PLAN

4.1 Objective and Requirements

The Groundwater Quality Minimum Threshold (WQ-MT) Exceedance Plan is intended to prevent WQ-MT exceedances and provide corrective action when WQ-MT exceedances occur. FCMA has three water quality representative monitoring wells (RMW-WQ). WQ-MT values are based on Title 22 Drinking Water Standards or value greater if measurements have historically exceeded the MCL value. A full description of the methods used to develop WQ-MT is provided in section 13.4.2.1 in the Subbasin GSP. FCMA is responsible for identifying exceedances or projected exceedances of WQ-MT. GSAs must investigate the

cause to determine if such exceedances are linked to Subbasin management. If it is determined that FCMA is responsible for a WQ-MT exceedance, the GSP must design and implement appropriate mitigation measures, including pumping cutbacks or other strategies, to prevent future WQ-MT exceedances caused by Subbasin management. The RMW-WQ network is presented in **Table 4**.

The WQ-MT Plan triggers pumping cutbacks only when a direct relationship or convincing linkage is established between changes in water quality concentrations exceeding or projected to exceed their MTs and management actions of the GSAs in the Basin or changes in groundwater levels. In the absence of such correlations or due to data gaps, continued monitoring and data collection are prioritized. When necessary, pumping cutbacks are implemented using the same approach outlined in the GWL-MT Plan.

Table 4 – FCMA RMW-WQ					
Site ID	Local ID	GSA	Aquifer	Constituents of Concern	Minimum Threshold
12-001	SPRECK-MW-32	MAA	Upper Aquifer	Arsenic, Nitrate as N, TDS, 1,2,3, -TCP, Gross Alpha, Hexavalent Chromium	Title 22 Drinking Water Standards or historical high (2010-2014)
TBD	Traction Ranch UA	MAB	Upper Aquifer		
TBD	Traction Ranch LA	MAB	Lower Aquifer		

4.2 Investigation Trigger

The occurrence of any of the following conditions at an identified RMW-WQ triggers a 60-day investigation requirement:

- Exceedance of the WQ-MT.
- Projected exceedance of the WQ-MT, based on a statistically significant linear trend of the previous three Fall groundwater quality measurements (using the seasonal average if multiple measurements are taken).

4.3 Investigation Approach

In the event of a WQ-MT exceedance, an investigation will be conducted to determine if degraded water quality is a result of FCMA groundwater management. The following is an outline of the steps to be taken during an investigation.

4.3.1 Data Collection and Timeline

- Re-test water quality from RMS site that exceeds WQ-MT within 14 days of lab results indicating MT exceedance.
- Request all water quality and pumping data from surrounding GSAs within 14 days of the reported WQ-MT Exceedance
 - Identify other RMW-WQ that have experienced WQ-MT exceedances.

- For non-RMW, compare water quality values to drinking water standards and historical highs.
 - Compare current pumping to the historical average (2003-2023).
- Evaluate all RMW-WQ from surrounding GSAs and determine if other wells have increasing trends.
- Evaluation of groundwater level for FCMA and surrounding GSAs.
- Statistical analysis of the relationship between water level and water quality at the RMW-WQ where the exceedance occurred.
- Complete evaluation with 60 days of WQ-MT Exceedances utilizing the best available information.

4.3.2 Method of Investigation

To investigate the cause of a WQ-MT exceedance, FCMA will evaluate the relationship between declining water levels (i.e. GWL-MT exceedance or projected exceedance) and degraded water quality by using an integrated approach combining a visual and statistical analysis. The following provides a general overview of the methods to be used during the WQ-MT exceedance investigation.

1. FCMA will utilize water quality time series graphs to visually assess trends in water quality parameters over time. These graphs will allow us to observe any concurrent patterns between water level decline and changes in water quality.
2. Historical isoconcentration maps will also be incorporated to spatially analyze how groundwater quality has shifted in relation to changing water levels across the Subbasin.
3. Additionally, statistical analysis will be used to further examine the causality of water levels and water quality.

In addition to the evaluation of water quality and water level data, the investigation will consider the natural migration of degraded water quality (e.g. Western Saline Front) and impacts to beneficial users of groundwater. In the event a WQ-MT exceedance is due to the migration of naturally degraded groundwater and there have been no impacts to beneficial users, FCMA will continue with groundwater management that maintains water levels above GWL-MT levels.

4.4 Zone of Impact

The ZOI will be delineated by evaluating both water level and water quality data. First it will be determined if there is a significant cone of depression around that site that had the WQ-MT exceedance. Second, a geospatial analysis will be conducted to determine if increases in water quality have any spatial relationship or if increases are random. The overlap between the cone of depression and wells with degrading water quality will be the ZOI.

4.5 Mitigation Approach

Following an investigation that has determined FCMA is responsible for the WQ-MT exceedance, actions will be taken depending on whether the exceedance was due to a decline in GWL or due to recharge from a recharge project.

- Degradation due to GWL decline (GWL-MT exceedance or projected exceedance)):
 - Establish a temporary GWL-MT hotspot at the well

- Temporary GWL trigger equals the previous year's seasonal high or Measurable Objective (whichever is lower).
- Follow GWL-MT curtailment process:
 - Initial cutback will be consistent with Section 3.5. Pumping reduction will be equal over the AOI.
 - Projected GWL-MT exceedance will result in a pumping reduction of 0.25AF/acre over the AOI.
 - GWL-MT exceedance results in a pumping reduction of 0.5 AF/acre over the AOI.
 - Maintain pumping reduction until water quality has improved or stabilized and water levels have recovered above the temporary GWL-MT.
 - If exit trigger is not met, pumping reductions may be modified in the following year based on information collected from the increased monitoring.
- In the event of WQ-MT exceedances due to recharge from a recharge project, FCMA will modify future recharge as necessary to correct for degraded water quality. This is not anticipated as data collection from existing recharge projects has been a net positive for water quality.

4.6 Mitigation Exit Trigger

A PRP for a WQ-MT exceedances is to be maintained for at least three years as described in the Subbasin GSP. At the end of a year when a PRP is implemented, water level, water quality, and pumping data will be reviewed to evaluate the impact of mitigation actions. Utilizing the additional water quality and water level data that has been collected from increased monitoring, FCMA will modify the PRP based on changes to water level and water quality data. The following are mitigation exit triggers:

- If groundwater quality has improved and no longer exceeds the WQ-MT for three consecutive sampling events, pumping reductions will no longer be required. The increased monitoring frequency will remain in place.
- If groundwater quality has stabilized, meaning that three consecutive measurements have not shown an increasing trend, and water levels have recovered above the temporary GWL-MT, pumping reductions will no longer be required. The increased monitoring frequency will remain in place.

If groundwater quality continues to degrade while groundwater levels have recovered above the temporary GWL-MT after three-years of implementing the PRP, FCMA will develop an alternative mitigation approach that considers all beneficial uses of groundwater and maintain water levels above GWL-MT.

4.7 Example Scenario

Example 1. A WQ-TM exceedance is projected to occur based on a statistically significant trend in TDS concentration for three consecutive years and it has been determined that FCMA is responsible due to declining water levels (projected GWL-MT exceedance):

- FCMA will increase its groundwater level monitoring frequency from quarterly to monthly. Water quality monitoring will be increased from semi-annual to quarterly.
- Increase frequency of water quality monitoring to quarterly at one upgradient well and one downgradient well for TDS.
- Establish a temporary GWL-MT equal to the previous year's seasonal high or measurable objective (whichever is lower).
- Delineate the ZOI and reduce pumping from the historical average from 2003-2023 by 0.25 acre/feet within that area.
- ZOI is determined to have an area of 1000 acres where the average historical pumping is 2000 AF/year (2 AF/acre).
- Allowable pumping within the ZOI will be 1.75 AF/acre or 1,750 AF.
- Maintain this pumping reduction until water levels have recovered above the temporary GWL-MT and water quality had either stabilized or improved (3 measurements have not shown increasing trend).
- Maintain increased monitoring frequency for three years.
- Evaluate additional data collected each to re-evaluate PRP and make any necessary adjustments to prevent water level and water quality MT exceedances.

4.8 Enforcement

Enforcement of this plan is governed by the dispute resolution mechanisms in the Basin GSAs' MOA. When pumping cutbacks are implemented, enforcement mirrors the procedures used for GWL-MT violations. In such cases, failure to comply with implementation or a delay of more than two quarters will trigger the Groundwater Allocation Backstop.

5 SUBSIDENCE AVOIDANCE PLAN

5.1 Objective and Requirements

The FCMA GSA group is required to proactively address progressing land subsidence that does not or is not projected to comply with the requirements of the 2024 GSP as soon as feasible and implement pumping cutbacks that will bring back the identified regions into sustainability path of the Basin. The Subsidence Avoidance Plan has two components that lead to different requirements. Critical Infrastructure Component only applies to critical, and the hotspot mitigation component applies to the entire Basin.

Pumping cutback under the Subsidence Avoidance Plan is triggered under the flowing conditions for each component:

- **Critical Infrastructure Component:** The three-year moving average subsidence rate exceeds 0.2 feet/year and is located within 0.5 miles of critical infrastructure. Critical infrastructure within 0.5 miles of FCMA includes the Fresno Slough and the Mendota Pool.
- **Hotspot Mitigation Component:** The five-year average subsidence rate exceeds 0.2 feet/year based on InSAR data indicates a projected subsidence of more than 2 feet by 2040 (MT), or more than 0.5 feet by 2030 interim milestone or any subsequent interim milestone.

Triggers under both components should be based on subsidence caused by Subbasin management, or under conditions that such causality cannot be justifiably established.

Currently, FCMA only pumps from the Upper Aquifer which does not significantly contribute to land subsidence. FCMA will continue to monitor subsidence within their GSA boundaries and notify the coordination committee in the event either of the subsidence triggers has been exceeded. FCMA will assist in surrounding GSAs with investigations to determine the responsible party for land subsidence that exceeds either the Critical Infrastructure or Hotspot Component.

6 GROUNDWATER ALLOCATION BACKSTOP

6.1 Objective and Requirements

In accordance with Exhibit C of the MOA, GSAs are required to implement the groundwater allocation backstop plan if they cannot sufficiently meet the requirements of the 2024 GSP.

6.2 Cutback Entry Trigger

Occurrence of any of the following conditions will result in groundwater allocation backstop:

- GWL-MT exceedances for two consecutive years and
- Failure to achieve allocated Overdraft Mitigation pumping reduction by 2030

6.3 Zone of Impact and Cutback Approach

This plan applies to the entire service area of the GSA subject to it. Pumping within the subjected GSAs will be limited to the estimated sustainable yield, as determined by the GSA, and implemented through AFY/acre allocations. The estimated sustainable yield will be developed based on the additional data collected during implementations of PRPs associated with GWL-MT and WQ-MT exceedances.

6.4 Enforcement

Enforcement of the groundwater allocation backstop is governed by the dispute resolution mechanisms in the Basin GSAs' MOA.