

# Appendix W

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Exceedance Policy

W1. MT Exceedance Policy

W2 Standard Operating Procedure for MT Exceedance Investigation



## MINIMUM THRESHOLDS EXCEEDANCE POLICY

### INTRODUCTION

The 2024 Groundwater Sustainability Plan (2024 Plan) established Minimum Thresholds (MT) for three sustainability indicators in the Kern County Subbasin (Subbasin): Chronic Lowering of Groundwater Levels, Degraded Groundwater Quality, and Land Subsidence. This MT Exceedance Policy is hereby developed to provide protocols and guidelines for groundwater sustainability agencies (GSA or GSAs) in the Kern County Subbasin (Subbasin) to investigate the cause and contributing factor(s) of an MT exceedance and take correction actions. This policy is developed in conjunction with the Subbasin Well Mitigation Program, which identifies mitigation strategies for vulnerable communities as detailed in the 2024 Plan.<sup>1</sup> The foundational elements of a successful exceedance policy are described below.

### PURPOSE

While a single or isolated exceedance of a MT will not, by itself, cause an Undesirable Result<sup>2</sup>, such an exceedance may be indicative of a trend and can serve as an indicator of future exceedances which could result in Subbasin-wide Undesirable Results. Each GSA within the Subbasin is responsible for monitoring groundwater conditions, ensuring compliance with the 2024 Plan within their respective GSA boundary, and coordinating with neighboring GSAs. Additionally, GSAs are responsible for communicating groundwater conditions to their stakeholders, which include beneficial users of groundwater (e.g., cities, community water systems, domestic users, etc.).

To maintain compliance with the 2024 Plan, all GSAs must also work cooperatively to avoid Subbasin-wide Undesirable Results.<sup>2</sup> As part of this coordination, all GSAs within the Subbasin will collectively compile and submit an annual report to the Department of Water Resources (DWR) each year by April 1. Information that reflects compliance with or exceedance of MTs will be included in each annual report, if present. The MT Exceedance Policy below supplements the Subbasin's annual reporting efforts to further document actionable progress towards avoiding future MT Exceedances.

### POLICY

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<sup>1</sup> The Subbasin Well Mitigation Program is described under Appendix K of the Kern County Subbasin Groundwater Sustainability Plan.

<sup>2</sup> Undesirable Results are defined in the Kern County Groundwater Sustainability Plan as URs are the significant and unreasonable occurrence of conditions, for any of the six Sustainability Indicators, that adversely affect beneficial uses and users and substantially interfere with surface land uses in the Subbasin.

As prescribed in the Kern Subbasin Monitoring Network & Protocols in the 2024 Plan, groundwater levels and groundwater quality must be measured by the GSAs at all RMWs for both Spring (January 15 to March 30) and Fall (August 15 to November 15) monitoring events, at a minimum. While some GSAs may take more frequent readings, only the Spring and Fall monitoring events are currently utilized for the MT Exceedance and Undesirable Results calculation. Land subsidence must be monitored annually by the GSAs through compilation and review of Interferometric Synthetic Aperture Radar (InSAR) subsidence data, continuous Global Positioning System (GPS), extensometer compaction data, benchmark, and survey results from the California Aqueduct Subsidence Program (CASP) the Friant Water Authority (FWA), and other publicly available datasets. After each official Spring and Fall groundwater monitoring event, GSAs are required to report their results to the Subbasin data management system (DMS) to be aggregated and included in the Subbasin's annual report. If an individual well MT has been exceeded, a notification is sent to all GSAs in the Subbasin through the DMS including the location and date of the MT Exceedance.

Within 60 days of submitting an MT Exceedance to the Subbasin DMS, any GSA/management area with an MT Exceedance at a RMW shall complete the following steps.

### **Step 1: MT Exceedance Investigation**

During the investigation after an MT Exceedance, the GSA(s) will gather information to evaluate whether the issue is associated with one RMW or is systemic to a larger geographic area. The investigation will evaluate various conditions surrounding the RMW that may be contributing to the MT Exceedance. The investigation shall be conducted as outlined in the *Standard Operating Procedure for MT Exceedance Investigation* Action Plan (see Appendix W-2). The Action Plan in Section 4 outlines the general steps that will be taken when an MT Exceedance occurs in a Representative Monitoring Well for Chronic Lowering of Groundwater Levels (RMW-WL) or a Representative Monitoring Well for Degraded Water Quality (RMW-WQ) in order to protect identified beneficial uses and users. The Action Plan in Section 5 outlines the general steps that will be taken when an MT Exceedance occurs for Land Subsidence.

### **Step 2: Confer with Subbasin Coordination Committee**

Individual GSAs will provide a copy of the Exceedance Report to the Subbasin coordination committee (coordination committee). Within 60 days of receipt, the coordination committee will review the Exceedance Report to determine if the MT Exceedance is contributing to localized Undesirable Results due to SGMA-related activities. The coordination committee may make recommendations to the GSA(s) to consider implementing projects, management actions, or other actions as applicable to prevent a continued exceedance in adherence to the Subbasin Mitigation Program.



Kern County Subbasin  
Groundwater Sustainability Agencies

# STANDARD OPERATING PROCEDURE FOR MT EXCEEDANCE INVESTIGATION ACTION PLAN

Effective Date: December 2024

# 1. SCOPE AND APPLICATION

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This Standard Operating Procedure (SOP) for Minimum Threshold (MT) Exceedance Investigation Action Plan provides general guidelines that Groundwater Sustainability Agencies (GSA or GSAs) in the Kern County Subbasin (Subbasin) are required to follow in the instance where an MT Exceedance of any Sustainability Indicator has been observed, as defined by the 2024 Groundwater Sustainability Plan (2024 Plan or GSP).

This SOP may be revised as lessons are learned, data gaps are resolved, new monitoring data and/or tools become available, and as technical analyses evolve. This SOP is designed as an iterative document with adaptive management anticipated, as needed. Section 2 provides preliminary definitions, Section 3 will be expanded to include a an outline of safety precautions for field work, Section 4 contains the six step Action Plan for an MT exceedance related to the Chronic Lowering of Groundwater Levels or Degraded Water Quality Sustainability Indicators, and Section 5 contains a five step Action Plan for an Interim Milestone (IM) or MT Exceedance related to the Land Subsidence Sustainability Indicator.

## 2. DEFINITIONS

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**California Aqueduct or Friant-Kern Canal Mile Post (MP)** – Location of a survey point on either the California Aqueduct (Aqueduct) or the Friant- Kern Canal (FKC) described by the distance along the Aqueduct or FKC (in miles) referenced to the northern-most point of each respective feature.

**Depth to Water (DTW)** – Vertical distance between the reference point and the water table.

**Ground Surface Elevation (GSE)** – Vertical distance between ground surface and mean sea level.

**Groundwater Elevation (GWE)** – Vertical distance between the water table and mean sea level. Distance is calculated by:  $GWE = RPE - DTW$

**Interferometric Synthetic Aperture Radar (InSAR)** – Satellite-based technique for mapping ground surface elevation changes (i.e., subsidence) using radar images.

**Proxy Well** – When a Representative Monitoring Well (RMW) is not available for measurements, a nearby well with a similar GWE profile and well construction can be used for water level measurements.

**Reference Point (RP)** – An established point where the water level measurements are collected for each RMW.

**Reference Point Elevation (RPE)** – Vertical distance between the reference point and mean sea level. Ideally this is referenced to the North American Vertical Datum of 1988 (NAVD88)

**Representative Sample** – A sample taken from a location at which specific conditions or parameters may be measured in a manner to characterize the quality or condition of the underlying groundwater.

**Water Level Measurement / Groundwater Level Measurement** – For the purpose of this SOP, a water level measurement/reading collected from a representative monitoring well for the purpose of SGMA compliance.

**Water Level Measurement Device** – For the purpose of this SOP, a water level measurement device is a collective term used to reference the electric well sounder, steel tape, plopper, transducer, acoustic sounder, and airline water level measurement devices.

### **3. SAFETY**

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Outline of safety precautions that must be followed for any field work, including:

- Field attire
- Temperature and Weather conditions
- Monitoring site access (i.e., road conditions, remote locations, fall or slip hazards)

### **4. ACTION PLAN FOR MT EXCEEDANCES RELATED TO CHRONIC LOWERING OF GROUNDWATER LEVELS OR DEGRADED WATER QUALITY**

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This section outlines the Action Plan general steps that will be taken if an MT Exceedance occurs in a Representative Monitoring Well for Chronic Lowering of Groundwater Levels (RMW-WL) or a Representative Monitoring Well for Degraded Water Quality (RMW-WQ) in order to protect beneficial uses and users.

## Initial Notification

Water level measurements are collected a minimum of **twice per year** to align with the Subbasin's seasonal monitoring protocols. The Subbasin Data Management System (DMS) is the best reference for a current list of RMWs. Seasonal measurements must be collected during the following time frames:

- Spring (seasonal high) - January 15 to March 30
- Fall (seasonal low) – August 15 to November 15

Refer to the 2024 Plan for monitoring requirements for all Sustainability Indicators.

After an MT Exceedance has been observed, data will be uploaded to the Subbasin DMS, and GSAs will be notified. Once this initial notification has occurred, the Action Plan steps in Sections 4.1 through 4.6 will be taken. If this Action Plan is initiated, the general steps outlined in Sections 4.1 through 4.6 will be taken; however, some Sustainability Indicators have additional requirements that must be completed to augment the general steps and are denoted as such.

### **4.1 Sample Confirmation**

- Confirm or resample well
- Document location, well construction, lithology, condition of well
- Review lab sheets or field notes

If the new sample does not confirm results, no additional action is required.

### **4.2 Identify Exceedance and Investigate**

- Locate nearby production wells, document any new wells or groundwater users
- Map land use and compare changes in local land use
- Describe local geology
- Plot hydrographs of nearby wells (1.5 miles radius)
- Document water district/GSA operating conditions (i.e. surface water availability, water demand patterns, or changes in system)
- For water quality:

- Plot time concentration for all constituents of nearby wells (1.5 miles radius) Identify nearby recharge and sample source water

### **4.3 Review Outside Contributing Factors**

- Communicate with neighboring GSAs and/or Subbasins
- Review regional contour maps and/or DMS for the RMW-WL network water levels
- Document water year type, precipitation, and evapotranspiration (ET)

### **4.4 Evaluate Root Cause**

- Provide assessment of well construction and/or well condition
- For water levels:
  - Analyze water level trends since 2015 using observed hydrograph data, Mann-Kendall test, or equivalent
  - Assess seasonal variation and range of water levels
  - Document changes in local demand
  - Identify whether current water levels have exceeded the estimated critical head (if available) or historical low groundwater level.
- For groundwater storage:
  - Identify whether groundwater extraction volumes within 2.5 miles of the exceedance location have increased or decreased in the last 1-3 years relative to the period of time preceding the exceedance.
  - Identify whether groundwater extraction concentration within 2.5 miles of the exceedance location have increased or decreased in the last 1-3 years relative to the period of time preceding the exceedance.
- For water quality:
  - Consider source of contaminant
  - Include statistical and/or spatial analyses between water levels and water quality to determine causation, depending on the availability of data. For example, in an RMW-WQ that has at least five sampling points with water



level data that temporally overlaps with water quality data, a granger causality test between water levels and water quality could be conducted.

- Identify potential beneficial users at risk

#### **4.5 Initiate Projects or Management Actions (P/MAs)**

- Direct mail to nearby well owners (1.5 mile radius) directing them to resources related to well mitigation.
- Consider targeted P/MAs
  - Create new adaptive P/MAs
  - Accelerate planned P/MA schedules
- Consider need for increased monitoring until the next semi-annual measurement:
  - For water levels, monitor monthly
  - For water quality, monitor monthly for the specific constituent that exceeded MT
  - For groundwater storage, collect monthly data

#### **4.6 Report to Coordination Committee**

- Confirm whether exceedance is related to GSA actions:
  - If yes, report on P/MAs initiated
  - If no, continue to monitor
- Evaluate if/what additional monitoring is needed
- Describe notification procedures (i.e., who should be notified, venue for notification, timeline for notification, recordkeeping in Annual Report, etc.)

## **5. ACTION PLAN FOR LAND SUBSIDENCE IM OR MT EXCEEDANCE**

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This section outlines the Subsidence Action Plan general steps that will be taken if either an Interim Milestone (IM) or an MT Exceedance occurs for Land Subsidence.

## Initial Notification

If Land Subsidence IM rate and extent exceedance occurs for 1) a single California Aqueduct or Friant-Kern Canal MP (based on precise survey data) or 2) within a GSA or Hydrogeological Conceptual Model (HCM) area average after 6 consecutive quarterly sampling events (based on California Department of Water Resources [DWR] InSAR data), notification will be initiated to Subbasin GSAs.

GSAs will determine if the exceedance has been previously identified, and if so, will examine previous management actions taken to address the exceedance. If the exceedance persists such that the average rate after 6 consecutive quarterly sampling events exceeds the MT rate, additional GSA management actions (such as pumping restrictions, etc.) must be initiated in a focused area identified as part of the following investigation steps 5.1 through 5.3.

If no prior exceedance has been identified and no management actions have been taken to address the exceedance, the Action Plan (outlined in Sections 5.1 through 5.5 below) will be initiated. GSAs will also identify potential beneficial users at risk due to the exceedance.

### **5.1 Identify Exceedance and Investigate**

- Locate nearby wells and identify status and use, document any new wells or groundwater users.
- Map land use and compare changes in local land use
- Describe local geology
- Plot hydrographs of nearby Subbasin wells
- Plot cumulative displacement since 2015 based on InSAR and DWR/Friant precise survey
- Document GSA operating conditions (i.e. water demand patterns, surface water availability etc.)
- Document GSA-related groundwater extractions using either direct methods (metered data) or indirect methods (Land IQ, or best available data). If data availability allows, estimate critical head using 1-D modeling.
- The GSAs may develop a coordinated field investigation protocol as part of this SOP.

## 5.2 Review Outside Contributing Factors

- Communicate with neighboring GSAs and Subbasins
- Review regional contour maps and/or DMS for the RMW-WL network groundwater levels
- Review for potential non-GSA factors: map local soil types, identify nearby faults, identify nearby oil and gas operations and quantify extractions and reinjections using data provided on CalGEM dashboard.

## 5.3 Evaluate Root Cause

- For direct measurements of land subsidence (land-based survey or InSAR):
  - Analyze trends
  - Assess for seasonal variations
  - Identify exceedance cause:
    - Compare DWR TRE-Altamira quarterly Subbasin InSAR Data for previous six consecutive quarters at the reported IM/MT Exceedance location (i.e., including surrounding 2.5-mile radius) with previously available data at the MP or HCM location with the IM/MT Exceedance.
    - Identify all wells and uses in the assessment area. If non-GSA activities are identified, collect and review supplemental evidence (e.g., CalGEM production information, Underground Injection Control (UIC) Application data, etc.) and published hydrogeologic information.
    - Determine if a more refined InSAR analysis is required (e.g., InSAR Time Series utilizing 12-step data processing utilized for refined assessment provided in the 2024 GSP Section 8.5).

## 5.4 Evaluate and Initiate P/MAs

- Evaluate need for targeted P/MAs
  - Identify area of influence for P/MAs
- Identify & initiate targeted P/MAs (e.g., well registration, new well moratorium, metered production, pumping restrictions).
- Consider need for increased monitoring until the next survey measurement:

- For land subsidence, compile available direct measurement data (e.g. quarterly DWR InSAR)

## **5.5 Report to Coordination Committee and California Aqueduct Subsidence Program (CASP)/Friant Water Authority, as appropriate, or local infrastructure owner**

- Identify whether the exceedance is related to GSA-related activities.
  - If yes, report on P/MA(s) initiated
  - If no, continue to monitor
- Evaluate if/what additional monitoring is needed
- Refer to Section 4.6 above for notification to Coordination Committee, GSA/GSP Group, Stakeholders, etc.