



SUSTAINABLE GROUNDWATER
MANAGEMENT (SGM)
GRANT PROGRAM



The following is an excerpt from the Demand Reduction Monitoring Method [MM-13]

SGM Grant Program Requirements for Post-Performance Monitoring and Reporting

Demand Reduction Monitoring Method

Project / Action Type	Water Demand Reduction encompasses a range of projects or actions, including allocation and measurement, land repurposing (irrigated land fallowing), water use efficiency (efficient irrigation that reduces net water use); change in crop mix, reducing real losses in the delivery system (e.g., by infrastructure upgrades); customer water conservation and water-efficiency measures such as water-efficient appliances, drought tolerant landscape programs, and behaviour-based measures (including water pricing, conservation messaging, norms-based messaging etc.).
Similar / Related Project Types	Other demand management projects.
Metrics	Net water savings or reduced net depletion (extractions less recharge). Groundwater levels. Groundwater quality.
Measurement Units	Water demand reduction measured in acre-feet and measured as reduced consumptive use plus reduction in other losses to the basin. Groundwater levels measured in feet in a consistent vertical datum. Concentration of applicable constituent of concern.
Beneficial Users	Municipal and domestic water supply (MUN) Industrial service supply (IND) Industrial process supply (PROC) Agricultural water supply (AGR)

Groundwater Demand Reduction Monitoring

This Monitoring Method potentially applies to a wide range of demand reduction activities. Given the broad range of applicable projects and management actions, these monitoring methods are developed to apply generally to demand reduction activities and their potential effect on groundwater resources.

Background and Context

Demand reduction program monitoring should include measurements of assess the effects on groundwater resources, and determine the net amount of water saved. For example, if an agricultural field is fallowed in a closed basin, the net water savings would be the evapotranspiration of applied water plus any other unrecoverable losses. Eliminating percolation of irrigation water back to the usable aquifer is not a savings if the demand reduction project does not change the net extraction.

Physical groundwater aquifer monitoring metrics relate to groundwater elevation (to make sure that demand reduction results in water levels increasing or maintained) and groundwater quality (to make sure that no unintended impacts due to moving of constituents of concern occur) in the vicinity of the demand reduction activities footprint. If demand reduction occurs in an area of seawater intrusion, or subsidence, specific monitoring to assess these two sustainability indicators needs to be considered.

Examples of project-specific monitoring for the purpose of sustainable groundwater requirements for different types of demand reduction activities include:

- **Agricultural water use efficiency:** Measures that would generally reduce the amount of water applied to a crop including efficient irrigation, on-farm water management, irrigation scheduling, and crop changes.

Monitoring - quantify the change in net water use (evapotranspiration of applied water) specifically as it applies to groundwater use.

- **Agricultural land repurposing (crop changes or fallowing):** Measures that would change crop types or repurpose previously irrigated lands to non-irrigated uses.

Monitoring - quantify the change in net water use (evapotranspiration of applied water) specifically as it applies to groundwater use.

- **Conveyance water loss reduction:** Projects designed to reduce leaks, seepage, spills, or other losses from the delivery system.

Monitoring - quantify the reduced depletion by estimating reduced losses less reduced percolation to usable groundwater.

- **Urban Water Conservation:** Urban water conservation and water efficiency measures such as:

- **Water-efficient appliances:** Programs that assist or otherwise incentivize businesses and individuals to upgrade appliances.

Monitoring – The change in water use can be approximated based on the water-saving volume per appliance, and the number of appliances and frequency of use per household. Monitoring should calculate the change in consumptive use and irrecoverable losses.

- **Drought-tolerant landscape programs:** Programs that incentivize, or require, businesses and individuals to reduce outdoor irrigation.

Monitoring – The change in water use can be approximated based on the number of homes upgrading to drought-tolerant landscapes and the area of improvement. Monitoring should calculate the change in evapotranspiration and irrecoverable losses of applied water in outdoor landscaping.

- **Behavior-based measures:** Programs could include water pricing mechanisms, conservation messaging, or norms-based messaging.

Monitoring – The change in water use can be approximated based on household meter data. Monitoring should calculate the change in consumptive use and irrecoverable losses. Use data to relate the change in consumptive use to changes in groundwater conditions over time.

- **Infrastructure upgrades:** Capital Improvement Projects that allow agencies to use groundwater and surface water more efficiently.

Monitoring – The change in water deliveries can be approximated using district meter data. For the purposes of sustainability, monitoring should calculate the change in consumptive use and irrecoverable losses.

Monitoring requirements will be tailored to the specific demand reduction project. The important requirement for monitoring is to be able to measure the reduction in net depletion. It is noted that quantifying irrecoverable losses may be quite difficult and imprecise. Estimates may need to be refined over time as more data are collected.

A Step-by-Step Guide to Applying the Demand Reduction Monitoring Method

1. **Safety plan:** All projects with fieldwork related activities should produce a Safety Plan. Planning for fieldwork and availability of access to the site, such as monitoring wells, is necessary to maintain project safety. Demand reduction projects may require a Safety Plan to address these and other potential safety concerns.
2. **Area of Interest:** Identify the purpose of the demand reduction program (i.e., what groundwater sustainability indicators are being addressed?) and where the program will be targeted.
3. **Monitoring Plan:** Develop a monitoring plan that will apply to the specific demand reduction program and project area and define program baseline conditions.
 - The existing GSP monitoring wells may be helpful for monitoring broader subbasin conditions. Additional groundwater monitoring may be needed to better assess effects from implementation of demand reduction activities. Additional activity-specific monitoring is required for targeted demand reduction projects that allows water managers to measure changes in net groundwater use attributable to the program. The plan must consider whether metering will be available, and if not, how consumptive use can be calculated at the field level.
 - The monitoring plan must also define baseline conditions used to measure reduced water use. Baseline conditions must carefully define how water would have been used in the absence of the demand reduction program.
4. **Data collection:** Collect data required to support the implementation of the demand reduction program, baseline conditions, and associated monitoring.
5. **Implement the demand reduction project:** Implement the demand reduction program. This may be done through an initial pilot program.
6. **Monitoring:** Monitor the changes in net water use and groundwater conditions and update the demand reduction program as needed.
 - Assess if data gaps exist and if additional monitoring is necessary. Use monitoring to improve estimates of water balance, such as percolation and irrecoverable losses.
 - Continue to monitor groundwater conditions as required for the Groundwater Sustainability Plan (GSP), if applicable.
 - Monitor program implementation and effects on groundwater conditions and applicable sustainability indicator metrics.
7. **Review and Adaptive Management:** Review data at least annually to determine if and/or how the demand reduction program should be updated. Concurrently, review broader GSP implementation, other projects, and progress towards sustainable management criteria. Expand or refine monitoring network adaptively, as needed.
8. **Reporting:** The monitoring data should be reported annually to the GSA to support demand reduction program monitoring and SGMA reporting requirements.
 - Upload project-specific monitoring data to the DWR SGMA data portal on an annual basis. This step will need to be coordinated with and completed by the GSAs.

Data and Protocols - Fundamentals

Demand reduction projects should be designed to achieve a reduction in net groundwater use. Monitoring should be developed so that the GSA can evaluate the net water savings and adaptively manage the program, as well as determine its impacts or benefits on groundwater sustainability metrics.

Protocols for specific demand reduction measures will need to be investigated by the grantee to find the most recent data and regional standards for the specific activity or management action. DWR has published the Urban Water Management Plan Guidebook (2020), which provides recommendations for demand management measures and how they could be applied. However, as described earlier, for the purposes of groundwater management, the demand reduction program must result in a reduction in net groundwater use.

Data Analysis and Reporting

The GSA or agency responsible for implementing the demand reduction program should analyze data periodically and use that to improve the program.

1. **Analyze monitoring data:** Monitoring data should be used to evaluate the effectiveness and performance of the demand reduction management actions, determine any limiting factor(s) on performance, and identify options for improving performance if needed. This assessment also includes evaluating any new stakeholder concerns once the project has been implemented.
2. **Prepare reports and manage data:** Reports and data management includes compliance with regulatory and grant requirements and providing data to DWR, which is addressed in the Data Management and Monitoring Method [MM-12]. Generally, data will be uploaded to the DWR system annually and progress on project implementation and monitoring will be provided in the GSP Annual Report. A full assessment of the project performance will be provided in the GSP 5-Year Assessment Report.

Data Standards

Groundwater, surface water, and water quality monitoring data should conform to the technical and reporting standards of the California Water Code (CWC) §352 *et seq.*

Groundwater levels - Groundwater elevation measurements should be recorded relative to a consistent vertical datum.

Water budget – the water budget should be developed using best practices, consistent with DWR GSP Water Budget Best Management Practices (BMP). This should be used to calculate the net change in consumptive water use and must account for all changes under the demand reduction program.

Groundwater quality - Concentrations of groundwater quality constituents of concern should be compared to maximum contaminant levels available from the SWRCB.

Key Protocols

The following protocols should be followed for required monitoring:

- Standard groundwater level and groundwater quality monitoring protocols as described in DWR's Best Management Practice (BMP) 1 Monitoring Protocols, Standards, and Sites (DWR, 2016).
- Guidelines for establishing monitoring networks and resolving data gaps to reduce uncertainty are provided in DWR's BMP 2 Monitoring Networks and Identification of Data Gaps (DWR, 2016).
- Standard water budget development as described in DWR's Best Management Practice (BMP) 4 Water Budget (DWR, 2016).
- Technical and reporting standards included in CWC §352 *et seq.*