APPENDIX M. STANDARD OPERATING PROCEDURES FOR REGULAR MONITORING

Appendix M-1: Standard Operating Procedure for Water Level Measurements and Reporting

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M-1.1 SCOPE AND APPLICATION

This Water Level (WL) Standard Operating Procedure (SOP) provides guidance for collecting water level measurements and reporting data that is consistent with the Subbasin's Groundwater Sustainability Plan (GSP). The Kern County Subbasin has 20 Groundwater Sustainability Agencies (GSAs) and one Water Management Area, which are collectively responsible for complying with the Sustainable Groundwater Management Act (SGMA). Collecting water level measurements that are representative of groundwater conditions is one of the GSAs obligations. To employ a consistent process between all GSAs, this SOP provides guidance for procedures following industry-wide best management practices. Additionally, pertinent information on Quality Assurance/Quality Control (QA/QC) procedures, and data reporting are covered in this document.

M-1.2 SUMMARY OF APPROACH

The objective of water level measurements is to collect accurate data that is representative of groundwater conditions across the Kern Subbasin that will be compared against baseline conditions presented in the GSP and used to assess the effects of SGMA implementation. Section 15 of the GSP establishes monitoring networks for the four sustainability indicators applicable to the Kern County Subbasin: groundwater levels, groundwater quality, reduction of groundwater in storage, and subsidence.

The Kern Subbasin GSAs have designated groundwater level Representative Monitoring Wells (RMW-WLs), which are also used for calculating reduction of groundwater in storage. The Kern Subbasin GSAs have also designated groundwater quality Representative Monitoring Wells (RMW-WQs) in the monitoring network, some of which are a subset of the RMW-WLs.

These wells were strategically selected to represent groundwater conditions across each Hydrogeologic Conceptual Model (HCM); some RMWs are designated to represent the relationship between sustainability indicators or SGMA related projects (refer to Section 13, Table 13-2).

M-1.3 DEFINITIONS

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.

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

Proxy Well – When a RMW is not available for measurements, a nearby well with a similar elevation 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.

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 – A water level measurement/reading collected from a representative monitoring well for the purpose of SGMA compliance.

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

M-1.4 SAFETY

Wear appropriate field attire, such as long pants and work boots. Wearing heavy duty work gloves is recommended to avoid hand injury. A kneeling pad or knee pads are also recommended to avoid knee discomfort and injury while collecting water level measurements.

Prior to each workday, the forecasted temperature and humidity for the worksite should be reviewed to compare against the National Weather Service Heat Index to evaluate the risk level for heat illness. When the temperature equals or exceeds 95°F, or during a heat wave, high heat procedures should be used, which include additional preventive measures including pre-shift meetings to encourage employees to drink plenty of water, working in the buddy system or regular communication so observations can be made for heat related illness, and to remind employees of their right to take a cool-down rest when necessary. To prevent heat-related illness, proper hydration (drinking plenty of water), acclimatization (getting used to weather conditions), and schedules that alternate work with rest shall take place.

Well sites may be located in remote locations such as farmland where access could be limited, or road conditions may not be easily traversable. If water level measurements will be conducted in remote locations, inform other colleagues where the sampling will be in case of an emergency. It may also be prudent to bring a GPS unit in case the site is hard to locate and there is no cell phone reception. When arriving to the well site be aware of your site conditions and surroundings to avoid potential slip, trip and fall hazards near the well.

M-1.5 EQUIPMENT AND SUPPLIES

The following is a checklist of supplies needed to collecting water level measurements.

1. Water level meter such as electric well sounder, steel tape, plopper, transducer, acoustic sounder, or airline
   a.) Manufacturer's manual instructions, if available
2. Engineers tape with 0.1-foot increments
3. Water to rinse water level meter
4. Disposable absorbent wipes, towel and or rag to clean the water level meter
   a.) Note: Disposable absorbent wipes are dry, chemical-free wipes. Do not use disinfectant or scented wipes.
5. Groundwater Level Measurement Form (Attachment A)
6. Blue or black ballpoint pen
7. Extra batteries for digital camera and water level meter
8. Proper attire for collecting water level measurements
9. Heavy duty work gloves, if necessary
10. GPS unit, if necessary
11. Kneeling/knee pad, if necessary
12. Phone camera/digital camera to take pictures of measurement location, recommended
13. Disposable gloves, optional

M-1.6 WATER LEVEL MEASUREMENT SCHEDULE

Water level measurements are collected a minimum of ***twice per year*** to align with the Subbasin's seasonal monitoring protocols. The Kern Subbasin Data Management System (DMS) is the best reference for a current list of Groundwater Level Representative Monitoring Wells (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

Spring levels represent a seasonal high prior to summer irrigation demands while fall levels represent a seasonal low after summer irrigation demands. Groundwater pumping typically peaks during the summer growing season and slows in the winter. Water level measurement data will be used for analysis of long-term water level trends.

Due to operational differences between agricultural, municipal wells, and monitoring wells and conflicts between protocols to sample representative water level measurements and water quality samples (see Water Quality Sampling SOP), the following is the recommended coordination to collect representative water level measurements that align with the water quality sampling protocols:

- Water level measurements should be collected within two weeks of water quality samples.
    - For seasonally (agricultural) operated wells:
        - Fall water level measurements should be collected when the well has remained offline for at least 24 hours after collection of water quality samples.
        - Spring water level measurements should be collected prior to the well running for the season.
    - For year-round (municipal) operated wells:
        - Fall and Spring water level measurements should be collected when the well has been resting for sufficient time to return to static water level (at least 24 hours, if possible). Note: It is recommended to coordinate with landowners to determine well operation status and schedule well water level measurement reading. If well water level reading is inconsistent with historical readings, reference Section 8 for troubleshooting options.
    - Note: Agencies may collect water level readings while a well is pumping for informational purposes. Pumping water level reading should not be used for SGMA compliance reporting.

If measurements cannot be made from the monitoring well during the outlined timeframes, a measurement can be taken from a nearby well that has a similar water elevation profile to serve as a proxy. When using a proxy on the Kern County Subbasin Data Management System (DMS), a no measurement code will be selected, and a description of the proxy well should be provided as follows: “used proxy well, XX, located XX distance from well. DTW= XX; RPE XX; GWE= XX.”

If no alternate well is available, water levels can be estimated from Spring and Fall water level trends. This measurement should be flagged appropriately within the DMS and reported to the Department of Water Resources (DWR). If a water level measurement cannot be collected from a monitoring well for two consecutive years, a plan to replace or repair the well must be in place prior to the next monitoring period or submittal of the annual report, whichever occurs first.

M-1.7 PROCEDURE

M-1.7.1 Pre-field Preparation

Conduct pre-field preparation at least a day before planning on collecting water level measurements to ensure equipment and supplies are available and functioning.

1. Review and gather supplies from checklist of supplies discussed in Section 5.
2. Inspect water level meter device, calibrate according to manufacturer's instruction (if applicable) and ensure equipment is functioning correctly.
3. Review water level SOP sampling instructions and USGS's groundwater technical procedures (Cummingham and Schalk, 2011) if there are questions on specific water level meter devices and measurement procedures.
4. If available, review well information such as well construction, historical water level measurements and well operations to be familiar with well conditions. Populate Groundwater Level Measurement Form (Attachment A) with the following well information for reference in the field:
   a.) Well identifier.
   b.) GPS Coordinates.
   c.) Reference point (RP) distance from the ground surface.
   d.) Reference point elevation (RPE).
   e.) Ground surface elevation (GSE).
   f.) Previous fall and spring depths to water (DTW) measurements.
5. Clean water level meter with water and wipe dry with disposable absorbent wipe or clean towel/rag if meter appears to be dirty to avoid potential contamination of the wells during water level measurements.

M-1.7.2 Collecting Water Level Measurements

Water level measurements shall be reported to the nearest 0.1 feet (ft) when possible and may be measured by an electric well sounder, steel tape, plopper, and transducer. An acoustic sounder and airline may also be used, but measurements are typically not as accurate as the above methods. Each of the measurement methods is described in detail in Cummingham and Schalk (2011) and briefly summarized below.

- Electric sounder: Electric sounders typically include an electrode (probe) that is lowered within a well by a single or dual lines of conductive wire. When the tip of the probe contacts water, an electric circuit is completed which registers on a current meter built into the sounder box.

    - Once the water level has been located by the probe, an engineer's tape is used to determine the depth to groundwater. Groundwater levels are confirmed when two consecutive measurements are within 0.1 ft of one another.
- Steel tape: Steel tapes are typically used where a well's construction prevents measurement of water levels by electric sounders or ploppers. Similar to the electric sounders, the depth to water is confirmed by two consecutive measurements where the depth to water is within 0.1 ft.
- Plopper: A plopper is a capped ¾-inch threaded reduced bushing attached to an engineer's tape graduated to hundredths of a foot. The air pocket trapped in the capped bushing produces a distinctive plopping noise when the bushing strikes the standing water within the well casing. Under ideal conditions, water levels can be measured to an accuracy of 0.1 ft.
- Transducer: Transducers are installed at fixed well depth and measure and record pressures in the water column. Pressure readings are used to calculate static water level depths. Transducers are calibrated and the data is downloaded according to manufacturers' specifications.
- Acoustic sounder: Acoustic well sounders measure depth to water by bouncing sound waves off the water surface. Measurements taken by acoustic sounders have a measurement error of 3% to 5% and, due to this inaccuracy, are not recommended for use in this monitoring program. However, in instances where depth to water exceeds 500 ft, acoustic sounders may be the only practical device for measuring depths to groundwater. Groundwater level readings collected by acoustic sounder will be labeled as "questionable" when reported.
- Airline: An airline measurement uses a compressed air source, a small diameter tube, and pressure gauge to determine distance from a reference point to the water surface. Air is pumped into the line until all water is displaced, and the resulting pressure is used to calculate water levels.

When collecting a water level measurement use the following as guidance:

1. When arriving at the well site, if possible, confirm that the well has been resting for the appropriate time outlined in Section 6 to collect a representative static water level measurement.
2. Verify pre-populated well information on Groundwater Level Measurement Form (Attachment A).
    a.) Well identifier.
    b.) GPS Coordinates.
    c.) Reference point (RP) distance from the ground surface.
    d.) Reference point elevation (RPE).
    e.) Ground surface elevation (GSE).

3. Ensure the field equipment (water level meter) is calibrated, clean and functioning properly.
    a.) Note: Field equipment should be checked prior to leaving for the field to minimize setup needed.
4. It is recommended to wear heavy-duty gloves when collecting water level measurements.
5. Remove the appropriate cap, lid, or plug covering the monitoring access point and listen for any pressure release. If a release is detected, the measurement should be taken after allowing some time for the water level to stabilize.
6. Measure DTW in the well using procedures appropriate for the measuring device. Equipment must be operated and maintained in accordance with manufacturer's instructions. DTW should be measured to the nearest 0.1 ft relative to the RP.
    a.) Confirm the water level measurement by collecting two consecutive measurements within 0.1 ft of one another.
    b.) If measuring wells that are under pressure, allow a period of time for the groundwater levels to stabilize by collecting multiple measurements. The groundwater level is considered stable when no significant changes in water level are observed. Every effort should be made to ensure that a representative stable depth to groundwater is recorded. If a well does not stabilize, the quality of the reading should be appropriately qualified as a questionable measurement.
7. Record the date, time (24-hour format), DTW, measured by and comments regarding any factors that may influence the depth to water readings on the Groundwater Level Measurement Form (Attachment A)
    a.) It is recommended to refer to existing well and sounding port photos, if available, or take photos of the well and sounding port used to collect the water level measurement to assure that the same well and port are being used each time. This is especially important when it comes to collecting from multi-completion wells.
8. Verify all field information (date, time (24-hour format), DTW, measured by and comments) on Groundwater Level Measurement Form (Attachment A) is populated before departing. Ensure all measurements are in consistent units of ft, tenths of ft, and hundredths of ft.
    a.) Note: Avoid recording measurements in ft and inches.
    b.) Note: It is recommended to calculate and record GWE prior to leaving the well site to verify field readings are reasonable.
9. See Section 10 for reporting.

M-1.8 TROUBLESHOOTING

M-1.8.1 Unusual Water Level Readings

When collecting water level measurements in the field, there may be times where an unusual measurement will occur. To ensure that the measurement is correct, record the initial measurement and then take at least two more confirmation measurements. It is also best to document these on the Groundwater Level Measurement Form (Attachment A). If the water level measurements are unusual compared to historic groundwater levels, confirm that the correct well is being measured by checking the GPS coordinate and previously documented field measurement photos. The water level device should also be calibrated per the manufacturer's instructions.

M-1.9 QUALITY ASSURANCE AND CONTROL

Quality assurance and control measures for collecting, recording, and reviewing water level measurements are in place to ensure data is representative and may be used for compliance purposes. During each field visit, prior Spring and Fall DTW measurements will be compared to the new measurements to provide a benchmark and approximate location of water levels. The well name, GPS coordinates, date, time, DTW to the nearest 0.1 ft, operator initials, observations and pertinent information as comments are required entries on the Groundwater Level Measurement Form (Attachment A). Additionally, a Water Level Questionable Measurement (QM) (Table 1) and Water Level No Measurement (NM) code (Table 2) will be assigned on the Groundwater Level Measurement Form (Attachment A), if applicable.

Table 1. Water Level No Measurement (NM) Error Codes

Value	Description	Code Key	Definition
0	Measurement Discontinued	1	
1	Pumping	2	The well is actively pumping while measurements were collected.
2	Pumping house locked	3	Pumping house is locked with no other way to access to take measurement.
3	Tape hung up	4	Unable to collect measurement due to technical issue with tape.
4	Can't get tape in casing	5	Unable to collect measurement due to technical issue with tape.
5	Unable to locate well	6	Cannot find well with given information. Include expected well location and state unable to locate.
6	Well has been destroyed	7	The well is no longer in use and has been destroyed. State date of destruction.
7	Special/Other	8	Use when no other codes are available. If used, need to include reason to Agency Admin or QA/QC Reviewer.
8	Casing leaking or wet	9	
9	Temporarily inaccessible	10	Cannot access well site. Document reason why well is inaccessible.
D	Dry well	11	The well is dry; therefore, there is no water level to take measurement from.
F	Flowing artesian well	12	Water is overflowing from the casing vent; therefore, water level is at ground surface.

Table 2. Water Level Questionable Measurement (QM) Error Codes

Value	Description	Code Key	Definition
0	Caved or deepened	1	Well has had its casings integrity compromised, and/or had its casings pulled and borehole drilled deeper. Include a comment for future reference in the notes section.
1	Pumping	2	The well is actively pumping while measurements were collected.
2	Nearby pump operating	3	Another well is close enough to hear the motor running.
3	Casing leaking or wet	4	If there is pooling water in or around the well head monument at the surface, usually while well is pumping you will see this.
4	Pumped recently	5	Water level is rising in the well and two consistent measurements cannot be collected.
5	Air or pressure gauge measurement	6	When the method of measurement is an air pressure gauge or barometric transducer instead of electric or steel tape. This method is notoriously inaccurate and can be used to explain fluctuation in reported values.
6	Other	7	Use when no other codes are available. If used, need to include reason to Agency Admin or QA/QC Reviewer.
7	Recharge or surface water effects near well	8	Use if there is a designated recharge basin nearby, or if there are field flood irrigation practices. Commonly applied at walnut or peach orchards.
8	Oil or foreign substance in casing	9	Use if there is significant amount of oil, remnant from the motor lubricant dripping downhole, sitting on top of the water level. It is most noticeable if the sounding tape has several inches or more of residue.
9	Acoustical sounder	10	Sounder that utilizes sound to measure distance to water.
E	Recently flowing	12	Well had been flowing artesionally (water is flowing out of the well casing) in previous measurement attempts, but no longer.
F	Flowing	13	Aquifer is under pressure and water is flowing out of the well casing.
G	Nearby flowing	14	Nearby well is flowing artesionally, if well is pressure capped and is screened in same aquifer as the nearby flowing well, then can infer that this well is flowing as well.
H	Nearby recently flowing	15	Water is flowing out of the casing from a well close enough to see from the well you are measuring. Only occurs in pressurized aquifer.

Water levels measurement data are recorded in notebooks, iPads, or mobile application into an electronic spreadsheet or database which will be used to import water level data into the DMS. The groundwater level measurements should be reviewed for accuracy within five days of obtaining the measurements. Instruction to review the imported data are included in Section 3.3 of the DMS User Manual. Should a measurement appear inconsistent with historical readings, a confirmation reading shall be obtained.

M-1.10 REPORTING

M-1.10.1 Data Entry

M-1.10.1.1 Data Management System (DMS)

RMW-WL water level data will be entered into Kern County Subbasin Data Management System (DMS). Data may be entered manually or imported via an import template. See Attachment B for Quick Guide for Entering Water Level Data. Groundwater level measurements should be imported and reviewed for accuracy within five days of obtaining the measurements (Refer to DMS User Manual Section 3.3).

M-1.10.1.2 Compliance Evaluation

While entering data, review data for SMC compliance. QA/QC procedure in the DMS presents sample results on a water level elevation graph with historical results as well as the RMW-WL's Measurable Objective (MO) and Minimum Threshold (MT). Any MT exceedance may trigger additional action. The Kern Subbasin Exceedance Policy and Action Plans (Appendix K-1) should be referenced in the event of an exceedance. It should also be noted that the DMS will distribute email notification to the Kern Subbasin GSA Manager's and Point-of-Contact once the sample result(s) is approved.

M-1.10.2 Data Accessibility

Water level data collected for SGMA compliance is publicly available data. Users may view water quality data via the guest portal of the DMS. Data will also be made publicly available through the SGMA Portal.

M-1.10.3 Annual Reporting to Department of Water Resources (DWR)

RMW-WL data is provided to DWR as part of annual reporting. Annual Reports will also contain a written narrative and hydrographs addressing water level compliance in the Kern Subbasin.

M-1.11 REFERENCES

Cunningham, W. L., & Schalk, C. W. 2011, Groundwater technical procedures of the US Geological Survey (No. 1-A1). US Geological Survey. https://pubs.usgs.gov/tm/1a1/pdf/tm1-a1.pdf

Trevor Joseph et al., 2016, Groundwater Monitoring Protocols, Standards, and Sites Best Management Practice. Department of Water Resources. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-1-Monitoring-Protocols-Standards-and-Sites_ay_19.pdf

ATTACHMENT A

Groundwater Level Measurement Form

Groundwater Level Measurement Form

Local Well ID _____

GPS Coordinates _____

Date & Time	NM Code	QM Code	RP (ft)*	RPE (ft)*	GSE (ft)*	DTW (ft)	WSE (ft)	Measured by	Notes
									Previous Spring DTW*: Previous Fall DTW*:
									Previous Spring DTW*: Previous Fall DTW*:
									Previous Spring DTW*: Previous Fall DTW*:
									Previous Spring DTW*: Previous Fall DTW*:

Date & Time	NM Code	QM Code	RP (ft)*	RPE (ft)*	GSE (ft)*	DTW (ft)	WSE (ft)	Measured by	Notes
									Previous Spring DTW*: Previous Fall DTW*:
Well and sounding port picture:									

* Populate information prior to water level measurement event NM Code - No Measurement Code

QM Code - Questionable Measurement Code

RP - Reference Point (Distance in feet from the ground surface) RPE - Reference Point Elevation

GSE - Ground Surface Elevation

DTW - Depth to Water (feet below Reference Point)

WSE - Water Surface Elevation (RPE - DTW frome RP= WSE)

Table 1 Water Level No Measurement (NM) Error Codes

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H	Nearby recently flowing	15	Water is flowing out of the casing from a well close enough to see from the well you are measuring. Only occurs in pressurized aquifer.

ATTACHMENT B

Quick Guide for Entering Water Level Data

Entering Water Level Data for an Existing Well

Entering water level data is a primary task for Kern DMS users. This help topic will step you through the process. If you have questions, please email the developer at dmshelp@geiconsultants.com.

How to Log In

1. In a web browser, visit https://dms.geiconsultants.com/kern.
2. In the Email field, enter your email address.
3. In the Password field, enter the password assigned by GEI and emailed to you.
4. NOTE: If you need help resetting your password, email a request to Stephanie Hearn at shearn@geiconsultants.com.
5. Click the Sign In button. *The welcome screen appears.*

How to View Existing Wells

1. In the navigation bar along the top of the screen, hover over (do not click on it) Data Management (**Figure 1**). *A menu of options appears.*
2. Under the View/Edit heading, click Wells. *The Well Data table appears.*
3. **IMPORTANT**: One data table will load followed by a series of empty tables below. This is not an error. The tables below display data for a single well, not for all wells. Therefore, these tables do not populate until a well row is selected in the top table.

Figure 1. Data Management Menu

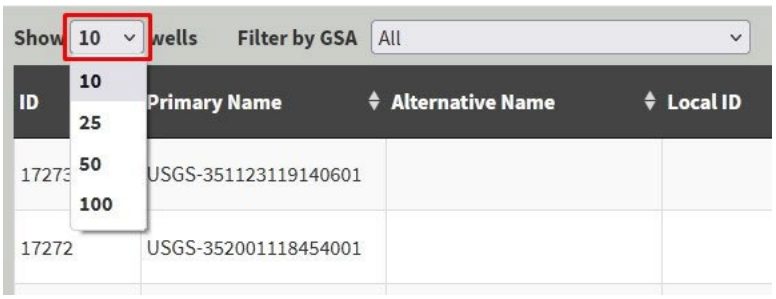
How to Search for an Existing Well

1. From the Well Table, in the upper right corner, click inside the search bar (**Figure 2**).
2. Type a word, number, or letters relevant to your search. *The data filters as you type.*
3. Look for your desired search term in the table rows. You may need to show more rows or look on the next page.
   - To look at data on the next page, find the page numbers along the bottom right side of the table and click Next. (**Figure 3**)
   - To show more rows, find the number of rows drop-down menu in the upper left corner of the table. (**Figure 4**) Click the number and change to a higher value.

Figure 2. Table Search Bar

Figure 3. Table Page Numbers

Figure 4. Table Number of Rows



How to Enter Water Level Data for an Existing Well

1. On the Well Table, click the row with the well associated with the water level values you want to enter. *The row is highlighted and the lower tables refresh with data associated with your selected well.*
2. Scroll down to the table titled Water Elevation Data and click Add New. *The Water Level Reading Form appears.*
3. Enter your data in the form and click Save. *The data is updated.*
   - If an error is displayed, modify the form and click Save. *The data is updated.*

If you have questions, please email the DMS Help Desk at the email below.

NEED HELP?
Send an email to: dmshelp@geiconsultants.com

Appendix M-2: Standard Operating Procedure for Water Quality Sampling and Reporting

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M-2.1 SCOPE AND APPLICATION

This Water Quality (WQ) Standard Operating Procedure (SOP) provides guidance for sample data collection and reporting that is consistent with the Subbasin's Groundwater Sustainability Plan (GSP). The Kern County Subbasin has 20 Groundwater Sustainability Agencies (GSAs) and one Water Management Area, which are collectively responsible for complying with the Sustainable Groundwater Management Act (SGMA). Collecting water quality samples that are representative of groundwater conditions is one of the GSAs' obligations. To employ a consistent process between all GSAs, this SOP provides guidance for sample procedures following industry-wide best management practices. Additionally, pertinent information on sampling timeframes, Quality Assurance/Quality Control (QA/QC) procedures, and data reporting are covered in this document.

M-2.2 SUMMARY OF APPROACH

The objective of water quality sampling is to collect data that is representative of groundwater conditions across the Subbasin that will be compared against baseline conditions presented in the GSP and used to assess the effects of SGMA implementation. Section 15 establishes monitoring networks for the four sustainability indicators applicable to the Kern County Subbasin: groundwater levels, groundwater quality, reduction of groundwater in storage, and subsidence.

The Kern Subbasin GSAs designated groundwater level Representative Monitoring Wells (RMWs), which are also used for calculating reduction of groundwater in storage. The Kern Subbasin GSAs have also designated groundwater quality RMWs (RMW-WQs) in the monitoring network, some of which are a subset of the groundwater level RMWs.

These wells were strategically selected to represent groundwater conditions across each Hydrogeologic Conceptual Model (HCM); some RMWs are designated to represent the relationship between sustainability indicators or SGMA related projects (Section 13, Table 13-2). Since RMWs will change over time, the Kern Subbasin Data Management System (DMS) is the most accurate reference for a current list of RMW-WQs.

Water quality samples will be analyzed for the Kern Subbasin's constituents of concern:

- 1,2,3–Trichloropropane (1,2,3-TCP)
- Arsenic (As) (total)
- Nitrate as Nitrogen (NO_3)*
- Nitrite as Nitrogen (NO_2)*
- Total Dissolved Solids (TDS)
- Uranium (U)

  *Sum of Nitrate and Nitrite will also be reported

M-2.3 DEFINITIONS

Chain of Custody (COC) – A legal document which accompanies the sample from beginning of sampling to completion of analysis.

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.

Trip Blank (TB) – A sample bottle/vial pre-filled with reagent water by the laboratory. The TB follows the sample bottles and is treated as a sample in all respects, including shipment to the sampling site, exposure to the sampling site, storage, preservation, and analysis. The purpose of the trip blank is to determine if analysis method or other interferences are present in the environment.

Water Quality Sample – A water sample taken from a representative monitoring well for the purpose of SGMA compliance.

M-2.4 SAFETY

Wear appropriate field attire, such as long pants and work boots. If sampling a full day, or more than one day, it may also be appropriate to be prepared with a pop-up tent to provide shade and a folding table and chair to conduct field measurements and write field notes. Sample bottles may contain acids, such as hydrochloric acid and nitric acid.

Wear gloves when sampling. Use fresh gloves at each sampling location, if possible.

Prior to each workday, the forecasted temperature and humidity for the worksite should be reviewed to compare against the National Weather Service Heat Index to evaluate the risk level for heat illness. When the temperature equals or exceeds 95°F, or during a heat wave, high heat procedures should be used, which include additional preventive measures including pre-shift meetings to encourage employees to drink plenty of water, working in the buddy system or regular communication so observations can be made for heat related illness, and to remind employees of their right to take a cool-down rest when necessary. To prevent heat-related illness, proper hydration (drinking plenty of water), acclimatization (getting used to weather conditions), and schedules that alternate work with rest shall take place.

Sample site may be located on farmland where access may be limited, or road conditions may not be easily traversable. If sampling will be conducted in remote locations, inform other colleagues where the sampling will be in case of an emergency. It may also be prudent to bring a GPS unit in case the sampling site is hard to locate and there is no cell phone reception. When arriving at the well site be aware of your site conditions and surroundings to avoid potential slip, trip and fall hazards near the well.

M-2.5 EQUIPMENT AND SUPPLIES

Refer to Attachment A for a checklist of supplies needed prior to sampling.

1. Calibrated field meters for conductivity, pH, temperature, and turbidity (for dedicated monitoring well only) analysis. Field meter selection considerations:
   a.) Meter should allow for calibration and verification for conductivity, pH and turbidity against standards to ensure accurate readings. (Pen meters that do not allow for calibration should not be used).
   b.) Calibration range should encompass expected sample reading.
   c.) Conductivity probe sensitivity should encompass expected sample reading.
2. Clean sample container for conducting field measurements.
3. Disposable wipes for field meters.
4. Deionized water (DI water) to rinse field meters.
5. Sample bottles – Defer to laboratory for sample bottle type and preservative. Example bottles include:
   a.) 3 x 40-mL Amber glass vials with hydrochloric acid dropper.
   b.) 250-mL HDPE with no preservatives.
   c.) 250-mL HDPE with nitric acid.
   d.) 1-L HDPE or amber glass with no preservative.
6. Disposable gloves
7. Ice chest
8. Frozen ice pack or wet ice
9. Sharpie
10. Blue or black ballpoint pen
11. Chain of Custody (COC)
12. Field Sampling Log Sheet (Attachment C)
13. Sampling instructions
14. Spare sample bottles and vials
15. Spare batteries for field meters

M-2.6 SAMPLING SCHEDULE COORDINATION

Samples are collected ***twice a year*** to align with the Kern Subbasin's seasonal monitoring protocols for the wells listed in the DMS. Due to operational differences between agricultural, municipal supply wells, and dedicated monitoring wells, and conflicts between the protocols for collecting water level measurements and water quality samples, the following is the recommended coordination to collect representative water quality samples that align with water level measurement protocols (see Water Level Measurement SOP).

Agricultural Wells

- In Spring, collect water level measurements prior to turning the well on for the season. Water quality samples should be collected within two weeks of water level measurements. Ideally, the well would be operational for at least one week before samples are collected to allow stagnant water in the well column and casing to be thoroughly flushed. Testing field parameters (conductivity, pH, temperature and turbidity) are an import measurement to validate water quality is stable before collecting samples for laboratory analysis.
- In Fall, collect water quality samples prior to turning the well off for the season. After sampling, allow the well to remain offline for at least 24 hours before collecting water level measurements but not more than two weeks later.

Municipal Wells

- For wells that operate year-round but a limited number of hours per day, water quality samples should be collected when the well has been running for at least two hours. For example, if a well normally operates 12 hours per day from 5 pm to 5 am, and the sampler arrives at 9 am, the well switch should be on hand or auto until field parameters (conductivity, pH, temperature) are stable (typically 5 – 15 minutes).
- If the well operates seasonally, samples should be collected on a normal daily operating schedule, at least one week after turning the well on for the season but no more than two weeks after water level measurements. It should also run continuously for a minimum of two hours before sample collection.
- Water level data should be collected when the well has been resting for at least 24 hours.

Monitoring Wells

- For dedicated monitoring wells, the well must be purged before a sample is collected. It is recommended to purge at least three times the well volume or until the field parameters (conductivity, pH, temperature and turbidity) stabilize to obtain a representative water quality sample.

Offline Wells

- If a well is not operational and has not been pumped in the past 30 days, it should be purged a minimum of three times the well volume, consistent with the monitoring well protocol if a representative sample can be collected. However, most agricultural or municipal supply wells are constructed with mild steel casing which takes more than three times the well volume to obtain a representative sample due to tuberculation on the casing and its perforations. In this circumstance, samples should not be collected. Well operation should be documented with an explanation that can be included in the Annual Report to DWR.

M-2.7 PROCEDURE

M-2.7.1 Pre-field Preparation

There are preparation steps that should occur in advance of sampling. Coordination with well owners and current operation will take time and should be initiated early in the monitoring period. The following tasks need to be completed prior to field sampling to ensure equipment and supplies are available and functioning.

1. Order sample bottles from the contract lab. Note that preserved sample bottles expire; samples should be collected within one month of receiving the bottles, or before the noted expiration date.
2. Review and gather supplies from the checklist of supplies (Attachment A).
3. Inspect bottles for correct bottle type, quantity and preservative based on contract lab requirements/bottle order form. Contact the lab if additional sample bottles are needed.
4. Review lab provided sampling instructions. Ask the Project Manager or contact the lab if there are questions on sampling procedures.
5. Pre-populate COC with GSA contact, sample site and analysis required information. See Attachment B for COC template.
   a.) **NOTE:** When filling out a COC, use a non-erasable, waterproof blue or black pen. **DO NOT use white out**. If there is an error, cross out the error with one strikethrough, initial, date, and write in the correct value.
   b.) Constituents and associated analysis methods are listed in Table 1.

Table 1. Constituents and Lab Analysis Methods

Analyte	Method
1,2,3 - TCP	SRL 524M-TCP
Arsenic	EPA 200.8
Nitrate	EPA 300.0
Nitrite	EPA 300.0
Nitrate + Nitrite (calculated result)	EPA 300.0
Uranium	EPA 200.8
TDS	SM 2540C

6. Pre-populate sample bottle label with GSA name and sample site.
7. Pre-populate Field Sampling Log Sheet (Attachment C) with sampling site information.
8. Freeze ice packs or prepare Ziploc bags with fresh wet ice.

a.) NOTE: Extra, thoroughly frozen ice packs or fresh wet ice packs will be needed if samples will be shipped to the lab after sampling.

b.) NOTE: Wet ice may be more effective at getting samples to temperature as it encompasses the sample bottle.

M-2.7.2 Sampling

1. Calibrate field equipment (conductivity, pH, temperature and turbidity) in accordance with manufacturer's instructions, each day that samples will be collected.
   a.) Note: Field equipment should be calibrated prior to leaving for the field to minimize the setup needed in the field.
2. Pack lab provided trip blank (TB) in sample cooler. TBs should accompany sample bottles throughout the sampling process, including exposure from the shipment to the sampling site, exposure to the sampling site, storage and shipment to the lab.
3. At the sampling site, flush sample port to clear stagnant water from piping. Reference Section 6 for recommended flushing time to obtain a representative sample.
4. Adjust flow of the sample tap to be approximately 500 mL/min, if needed, prior to collection of any field or lab samples. Maintain this flow throughout sample collection, on both field analyses and lab samples.
5. Wear latex or laboratory-style (such as neoprene) gloves when sampling. A new set of gloves needs to be worn for each sampling location.
6. Conduct field analyses for conductivity, pH, temperature and turbidity (if applicable) following manufacturer’s manual.
   a.) General procedure for conductivity, pH and temperature field analysis:
      i. Dip the probe in and out and stir it in the sample water occasionally before taking a measurement. Watch the reading and wait for it to stabilize before recording.
      ii. Do not touch the sampling device on the walls or the bottom of the sampling container while taking the reading.
      iii. Rinse the probe immediately after use with Deionized (DI) water to keep the field instrument clean and avoid cross contamination.

   b.) General procedure for turbidity field analysis:
      i. Rinse vial with sample water.
      ii. Fill vial with sample and cap.
      iii. Place vial in meter, cap/close the meter lid and wait for reading to stabilize.

iv. Rinse vial with DI water.

c.) Store field equipment probes and sample containers as specified in the manufacturer's instructions when not in use and between samples. Rinse probe before and after being placed in any storage solution, if applicable.

7. Fill out COC and Field Sampling Log Sheet (Attachment C) with the following:
   a.) Sample date and time.
   b.) Sampler initials.
   c.) Field analyses results.
   d.) Flow conditions/observations.
      iv. Observations may include water quality (such as odor or color), weather conditions that may cause environmental contamination (wind debris, rain, etc.), the sampling site itself, and anything else that may be important to note for the sampling event.
   e.) If not pre-populated during pre-field preparation, also populate GSA contact, sample site and analysis required (Table 1).
8. Fill out sample bottle label with the following information:
   a.) Sample date and time.
   b.) Sampler initials.
   c.) If not pre-populated during pre-field preparation, also populate sample site information.
9. Fill sample bottles in accordance with sampling instructions. Note:
   a.) **DO NOT overflow** sample bottles with preservatives. Insufficient preservatives may lead to invalidation of the sample.
   b.) Fill each sample bottle at least to the neck of the sample bottle to ensure adequate sample volume for analysis.
   c.) Fill VOA vials so that there is a convex meniscus, leaving **NO headspace** when capped. **DO NOT overflow** VOA vials. Air bubble(s) may lead to sample invalidation.
10. Place samples immediately after collection in designated coolers/ice chests with frozen ice packs or wet ice to begin the cooling process.
11. Note: Do not put anything other than sample bottles in the cooler since this may cause contamination.
12. Take pictures of the sample tap and location. (Optional: record GPS coordinates of sample location). This supporting documentation may be referenced if there are uncertainties during data interpretation, pictures of the sampling location may help explain the results.

M-2.7.3 Sample Storage

Samples should be delivered to the lab as soon as possible. If samples will be shipped, repack the sample cooler with fresh frozen ice packs or wet ice to ensure the sample arrives at the lab within the temperature requirements, which is typically 4ºC and samples are scheduled for overnight delivery. Nitrate and nitrite analysis have short hold times (48 hours) and should be sent to the lab the same day as collection to ensure hold time is met. Labs will provide a sticker to affix to the sample cooler stating "Short Hold" samples. In addition, **do not** ship samples on Fridays. Most labs are not open for Saturday receiving from shipping/mail carriers.

M-2.8 TROUBLESHOOTING

M-2.8.1 Unusual Field Readings

When sampling in the field, there may be times where an unusual field reading will occur. To ensure that the field reading is correct, record the initial reading and then take at least two more field readings to confirm the original reading. It is also best to document these on the Field Sampling Log Sheet (Attachment C). If the unusual field reading is confirmed, in addition to documenting it on the Field Sampling Log Sheet (Attachment C), also notify the Project Manager or supervisor to see if there are any other actions that he/she recommends before leaving the well site.

M-2.9 QUALITY ASSURANCE AND CONTROL

Quality assurance and control measures for sample collection and recording, preservation and transportation, analyses, and data review are in place to ensure data is representative and suitable to demonstrate compliance. Most, if not all the time, the lab will notify the client of samples with issues, such as sample missing hold time, not meeting temperature requirements upon receipt, incorrect amount of preservative or incorrect preservative used.

M-2.9.1 Water Quality Sampling Best Practices

1. Recognize the samples represent a single point in time (e.g., grab samples). When samples are representative of groundwater conditions, results will be within a consistent range and align with other wells in the area. However, if there are anomalies, it can be very difficult to interpret or explain. Good documentation of the sample site and conditions, and following procedures outlined in this SOP are important to collect representative samples.
2. Samples are collected from designated RMW-WQs. Changes to designated RMW-WQs require approval from the Kern Subbasin GSAs and the Department of Water Resources (DWR).
3. Field equipment is calibrated per the manufacturer's instructions. Calibration standards need to be identified and labeled upon opening and periodically checked that they have not expired. Readings from calibrating field instruments should be recorded in a logbook including any issues that arise from calibration of the field units. If a probe cannot be calibrated with an acceptable slope, a new probe should be obtained and used for field measurements.
4. Trip blanks (TBs), provided by the laboratory, follow the sample bottles and are treated as a sample in all respects, including shipment to the sampling site, exposure to the sampling site, storage, preservation, and analysis.
5. Samples are collected after sufficient flushing of the well (reference Section 6).
6. Chain of Custody is filled out completely. Samples may require recollection, if they do not meet laboratory sample acceptance requirements, such as:
   a.) Incomplete sample collection information
   b.) COC filled out with erasable ink
   c.) White out was used on COC

M-2.9.2 Sample Preservation and Transportation

1. Sample bottles are provided by the laboratory to ensure sufficient sample volume is collected with appropriate preservation.

2. Samples are collected and transported to the lab in accordance with laboratory and method requirements. Samples may require recollection for the following reasons:
    a.) Missed hold time
    b.) Inadequate preservation
    c.) Sample not meeting temperature requirements
    d.) Laboratory invalidated sample due to sample not meeting laboratory sample acceptance requirements (ex. Insufficient sample, broken bottle, etc.)

M-2.9.3 Sample Analysis

Analytical methods for constituents of concern are approved methods for drinking water analysis and laboratory performing analysis has state certification for the analysis method. If alternative methods are used, it should be addressed with the appropriate GSA representative to ensure the preferred method will provide consistent results: issues to consider are the appropriate method detection limit, potential laboratory interferences, etc.

M-2.9.4 Data Package Review

Most, if not all the time, the laboratory would notify the client of samples with potential issues so that recollection can be scheduled in a timely manner. In an event where the client is not notified, timely review of the data package allows the client to identify any anomalies and schedule confirmation sampling during the same period of groundwater conditions, if needed.

1. Review data package narrative and sample results for QA/QC flags. If flags are present, determine if data is suitable for compliance purposes.
2. If samples cannot be used for compliance purposes, confirm samples have been recollected or are scheduled for recollection, if needed.
3. If sample results exceed SMCs, confirmation samples should be collected within two weeks of being notified of the first sample results and the Kern Subbasin's Exceedance Policy and Action Plans should be referenced. Current groundwater conditions should also be evaluated to determine if changes in well operation, groundwater levels, or other conditions influenced the result. Additional sampling, such as collecting time series samples, may also be considered to validate the results.

M-2.10 REPORTING

M-2.10.1 Data Entry

M-2.10.1.1 Data Management System (DMS)

RMW-WQ sample results will be entered into the DMS. Data may be entered manually or imported via an import template. See Attachment D for DMS Data Import guide. All sample results are then extracted into DWR's template and reported to the SGMA Portal.

M-2.10.1.2 Compliance Evaluation

While entering data, review data for SMC compliance. QA/QC procedure in the DMS presents sample results on a chemograph with historical results as well as the Measurable Objective (MO) and Minimum Threshold (MT). Any MT exceedance may trigger additional action. The Kern Subbasin Exceedance Policy and Action Plans should be referenced in the event of an exceedance. It should also be noted that the DMS will distribute email notification to the Kern Subbasin GSA Managers and Point-of-Contact once the sample result(s) are approved.

M-2.10.2 Data Accessibility

WQ data collected for SGMA compliance is publicly available data. Users may view water quality data via the guest portal of DMS (map viewer). Data will also be made publicly available through the SGMA Portal. At this time, there is no requirement to submit SGMA sample results to GeoTracker or other State water quality databases. However, the SGMA portal may be publicly available through GAMA.

M-2.10.3 Annual Reporting to Department of Water Resources (DWR)

RMW-WQ data is provided to DWR as part of seasonal data reporting (July 1 and January 1). Annual Reports to DWR will also contain a written narrative and chemographs addressing water quality compliance in the Kern Subbasin.

M-2.11 REFERENCES

Berg, E. Handbook for Sampling and Sample Preservation of Water and Wastewater. U.S. Environmental Protection Agency. EPA/600/4-82/029

USGS, National Field Manual for the Collection of Water-Quality Data (NFM), https://www.usgs.gov/mission-areas/water-resources/science/national-field-manual-collection-water-quality-data-nfm, February 28, 2019.

ATTACHMENT A

Field Sampling Supplies Checklist

FIELD SAMPLING SUPPLIES CHECKLIST

The following is a supplies checklist for field sampling. Items listed below are the minimum supplies needed. Depending on the project, more items may be required.

- ☐ Calibrated pH probe
- ☐ Calibrated conductivity probe
- ☐ Calibrated turbidity meter
- ☐ Sufficiently charged pH, conductivity and turbidity meters
- ☐ Clean sample cup/container for conducting field measurements
- ☐ Deionized water (DI Water) to rinse field meters
- ☐ Disposable wipes for field meters
- ☐ Ice chest/sampling cooler
- ☐ Frozen ice packs or wet ice
- ☐ Chain of Custody
- ☐ Field Sampling Log Sheet
- ☐ Fine point Sharpie pen to write on sample bottle/vial label
- ☐ Ballpoint pen for Chain of Custody and Field Sampling Log Sheet
- ☐ Verify correct type and quantity of sample bottles/vials
- ☐ Extra sample bottles/vials
- ☐ Two 1-Liter Amber glass bottle with no preservative for each sampling site
- ☐ Disposable gloves for each sampling location
- ☐ Review sampling instructions
- ☐ Phone camera/digital camera to take pictures of sampling location
- ☐ Extra batteries for digital camera or car charger/external battery charger
- ☐ Proper attire for sampling

- ☐ GPS unit, if necessary
- ☐ Extra batteries for field equipment, if necessary
- ☐ Pop-up tent and folding table/chair, if necessary

ATTACHMENT B

Chain of Custody Template

ANALYTICAL CHAIN OF CUSTODY

☐ **Turnaround Time Request**
Standard - 10 business days
Rush (Surcharge may apply)
Date needed:

*Required Fields Temp: Thermometer ID:

Company/Client Name*:	Report Attention*: / Additional cc's:	Invoice To*: / PO#:	Phone*: / E-mail*:	Fax:
<AGENCY/CLIENT NAME>	<ATTN NAME>		<PHONE>, <E-MAIL>	

Address*	City*	State*	Zip*
<ADDRESS>	<CITY>	CA	<ZIP>

Project: Project #:

☐ Reporting Option ☐ Swamp ☐ EDD Type: _____

☐ Regulatory Carbon Copies SWRCB (Drinking Water)
☐ Other: _____

☐ Regulatory Compliance
EDT to California SWRCB (Drinking Water)
System Number*: _____
Geotracker #: _____

Sampler Name (Printed/Signature)*:

Matrix Types: SW=Surface Water BW=Bottled Water GW=Ground Water WW=Waste Water STW=Storm Water DW=Drinking Water SO=Solid

#	Sample Description*	Sampled* Date	Sampled* Time	Matrix*	Comments / Station Code / WTRAX	1,2,3 - Trichloropropane (SRL 524M-TCP)	Arsenic (EPA 200.8)	Nitrate (N), Nitrite	Nitrite+Nitrite (N) (EP	Uranium (EPA 200.8) A 300.0)	Total (SM 2540	ved Solids)			
	RMW-XXX					x	x	x		x	x				

Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
Received for Lab by: (Signature and Printed Name)		Date	Time	Payment Received at Delivery: Date: Amount: PIA#:	Chec k / Cash Init .

Shipping Method: ONTRAC UPS GSO WALK-IN FED EX Courier: _____
Cooling Wet Blue None

Custody Seal: Y / N
Chilling Process Begun: Y / N

ATTACHMENT C

Field Sampling Log Sheet

FIELD SAMPLING LOG SHEET

GSA and Well Name: _____ Date: _____

Arrival Time: _____ First Sample Time: _____

Departure Time: _____ End Sample Time: _____

Site ID: _____ Sample Lat. & Long.: _____

Water Depth: _____ Sampler Initials: _____

Sampler Observations
Estimated well **run time** prior to sampling:
Sample Tap: Hose Bib Stainless Steel, down-turn dedicated sample tap Other (describe)
Water Color: Colorless White Yellow Brown Other (describe)
Water Clarity: Clear Cloudy/Milky Floaters/Precipitate
Water Odor: None Sulfides Sewage Petroleum Other (describe)

Field Analysis						
Water Temp°C	pH	EC (µS/cm)	Turbidity (NTU)			Analyst Initials

Picture Name/No.:

Notes:

ATTACHMENT D

DMS Data Import

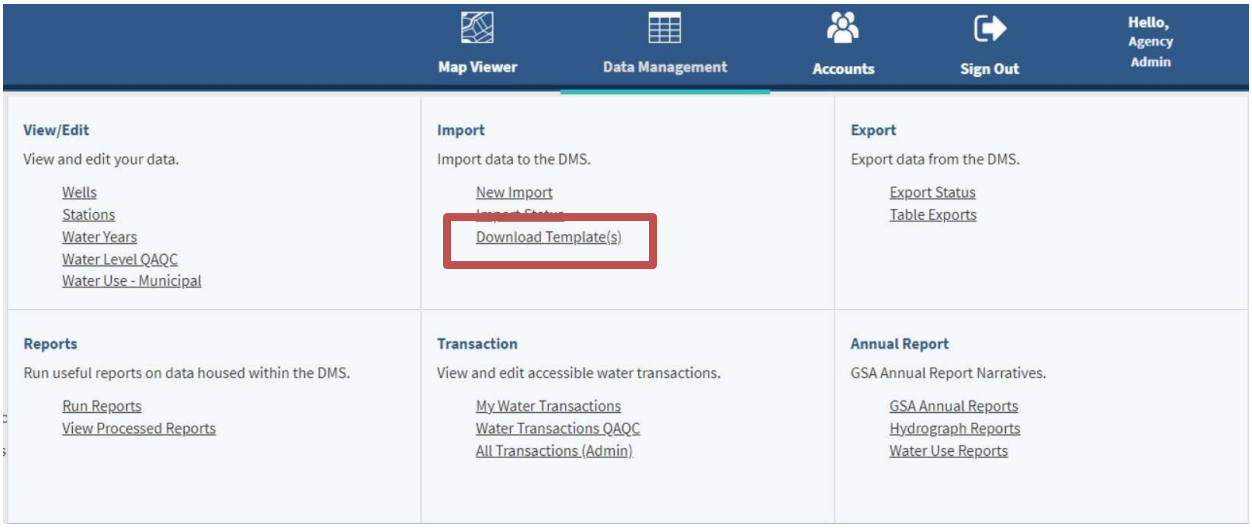
Entering Water Quality Data

This help topic steps through the process for entering water quality data for wells in DMS for SGMA Annual Report. Water Quality Representative Monitoring Well (RMW-WQ) well data may be imported or manually entered into DMS. If you have questions or need additional help entering your data, please email dmshelp@geiconsultants.com.

Entering Data via Import Template

Downloading Templates

In the navigation bar along the top of the screen, hover over Data Management. A menu of options appears.



4. Click Download Templates. The Templates page appears.
5. Under Well Data Templates, select “Well Water Quality Template” if importing multiple reports at once and select “Well Water Quality Template Single” if only importing one report’s data.

Populating Templates

The Excel template has three sheets:

- **Data Entry** – Data to be imported to the DMS. Enter your data on this tab.
- **Lookup Table** – Selections for cells with drop-down choices. **CAUTION**: Do not edit the lookup tables. The DMS will not accept new lookup entries.
- **Description** – Descriptions of the data columns on the Data Entry tab. Refer to this tab if you are unsure what information should go in a column.

Enter your data in the appropriate columns. If you have a question about what data belongs in a column, refer to the Description tab. Some fields must be populated by a drop-down menu. Other fields may require numerical or alphabetical entries only. These constraints are designed to normalize data entry.

Uploading Templates

1. In the navigation bar along the top of the screen, hover over Data Management. A menu of options appears.

   Under the Import heading, click New Import. The New Import page appears.

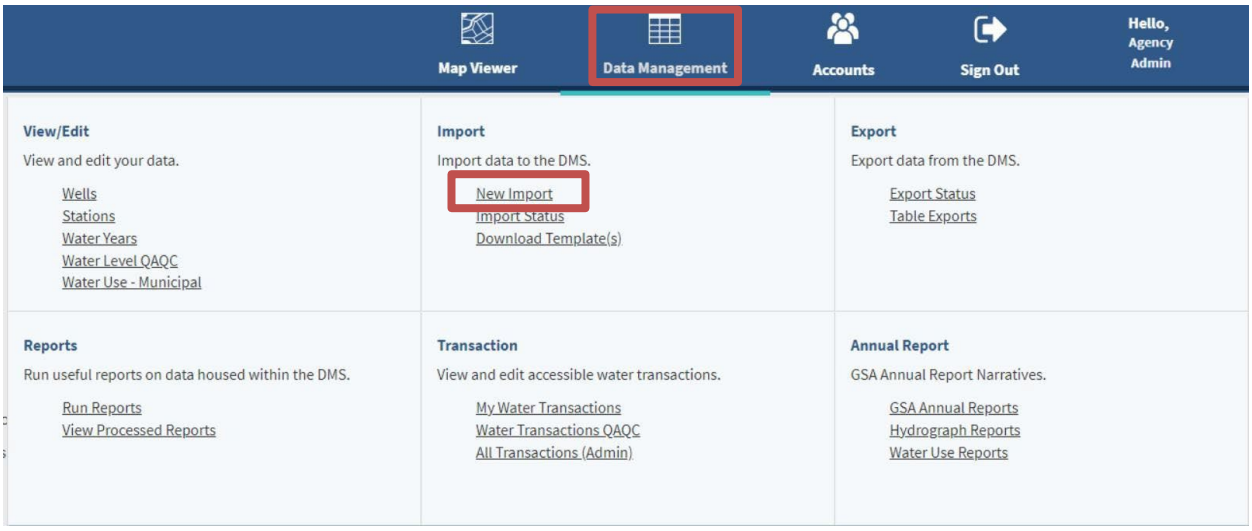


Figure 1. New Import on the Data Management Menu

1. Under Step 1, click the drop-down menu and select “Well Data”. Step 2 appears.
2. Under Step 2, select appropriate template: Water Quality Data (for multiple report entry) or Water Quality Data (for single report entry). Step 3 appears.
3. Under Step 3, click the box or drag files into the box to upload. Step 4 appears.
4. Click Submit. The batch number appears.
5. To see the results of your upload, check the Status column on the Import Status table.

- If your batch number status is Success, your data was successfully loaded to the DMS.
- If your batch number status is Processing, your data is still being validated by the system before import. Check again later.
- If your batch number status is Error(s). Refer to “Resolving Data Errors”.

Resolving Data Errors

1. Under the Data Management module, navigate to Import Status page.
2. Select the row with errors (highlight blue).

3. Scroll down to Error Table (Figure 16).
4. Click the > and the error details will appear.
5. Click the ✎ to correct the error, then save.
6. Once all errors are resolved, your full template should be uploaded, and data will be uploaded to the DMS.

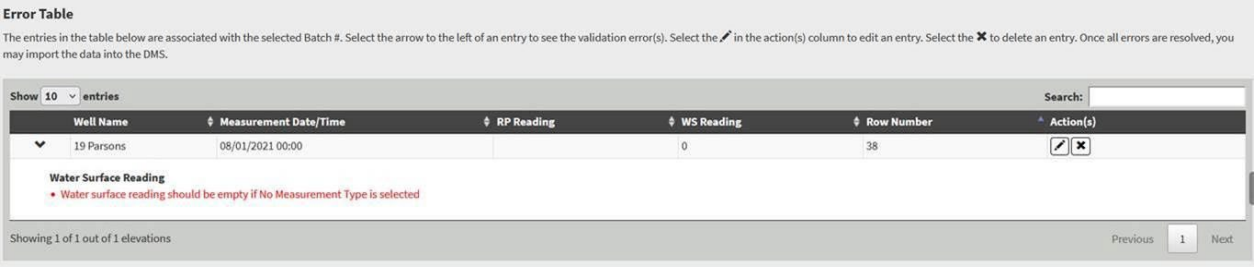


Figure 2. Error Table

Entering Data via Manual entry

1. Select the "Wells" *Data Management* module in the navigation bar.
2. On the *Well Data Table*, enter the number of the well you want to edit in the search bar.

   Note: Well Name is the Priority Name in the DMS and has to be entered exactly as it is in the DMS.

3. Select the well (highlight blue).
4. Scroll down to the *Water Quality Data* section.
5. Select *Add New*.

   Note: All fields with a * must be completed.

6. Once entered, click Save.

If you have questions, please email the DMS Help Desk at the email below.

NEED HELP?
Send an email to: dmshelp@geiconsultants.com