

PROCEDURES FOR GROUNDWATER-LEVEL MEASUREMENTS CALIFORNIA GROUNDWATER ELEVATION MONITORING PROGRAM SELECT SONOMA COUNTY BASINS AND SUBBASINS

The purpose of these Procedures are to set guidelines for the determination of the depth to groundwater in wells incorporated into the California Statewide Groundwater Elevation Monitoring (CASGEM) program for which either the Sonoma County Water Agency or County of Sonoma Permit and Resource Management Department serve as the Monitoring Entity. The wells incorporated into the CASGEM program include a combination of private water-supply wells, inactive public water-supply wells, and dedicated monitoring wells (or piezometers). These standard operating procedures may be varied or changed as required, dependent on site conditions, and equipment limitations. In all instances, the actual procedures employed should be documented and described on the field form.

Data Gathering for New Well

- 1) General Information. General information, such as well site address, owner's contact information, clear notes regarding the location of the well (particularly for properties containing more than one well) should be recorded on a well information form and maintained in a project file.
- 2) GPS coordinates for latitude and longitude of well. Determine well owner's preference for reporting of latitude and longitude of the well location and select location for obtaining GPS coordinates. CASGEM Program requirements allow for the reported latitude and longitude to be within 1,000 feet of the actual well location. Utilize a hand-held GPS unit for recording the latitude and longitude referenced to the North American Datum of 1983.
- 3) Ground Surface Elevation. The ground surface elevation at the wellhead referenced to the North American Vertical Datum of 1983 will be obtained by either: (1) surveying to a benchmark; (2) using a USGS 7.5' topographic quadrangle map; or (3) using a digital elevation model. The location chosen for the vertical elevation should represent the average elevation of the ground around the wellhead.
- 4) Reference Point. The reference point is the point where groundwater-level measurements are recorded from and is typically either at the access plug on the well casing lid (for water supply wells) or at the top of the casing (for dedicated monitoring wells). A detailed description and/or photograph of the measurement reference point should be documented on a well information form.

Field Preparation

- 1) Determine the number of measurements needed, the methods to be employed, and the equipment and supplies needed.
- 2) Sanitize or pre-clean equipment, and ensure that it is in working order.

- 3) Coordinate schedule with well owners and staff, if appropriate. Arrange for a measurement time when the well is least likely to have been recently pumping.
- 4) If this is an initial visit, conduct a well information inventory, obtain well log and construction information if available, plan to identify and photograph measurement reference point, and measure distance from measurement reference point to ground surface.
- 5) Identify site information and documentation required and measurement locations.

Field Procedures

Procedures for measuring groundwater levels are as follows:

- 1) Ensure the pump is not currently operating. If the well is pumping either do not take a measurement and record QA/QC code 1 on the field form or contact well owner and have well shut off, if feasible, and take measurement after groundwater level has returned to static levels;
- 2) Remove well cap or plug, note well ID, time of day, and date on the groundwater level data form.
- 3) Place groundwater-level measuring device into the well.
- 4) For electrical tapes record the distance from the water surface, as determined by the audio signal or meter, to the reference measuring point and record. For sonic meter record the level displayed on the LED readout.
- 5) Wait for several minutes and repeat the measurement.
- 6) Repeat measurements consistently going up or down: if measurements are going up, ideally take measurements until the level stabilizes within 0.1 feet; otherwise note the measurements as questionable. If going down then note “questionable.”
- 7) If known, note the time since the well was last pumping.
- 8) Remove all downhole equipment, and replace well plug or cap.
- 9) Clean and rinse all downhole equipment and store for transport to the next well.
- 10) Note any changes in the well condition since the previous measurement (e.g., new reference point, new well enclosure, etc.)

Quality Assurance/Quality Control

The following general quality assurance/quality control (QA/QC) procedures apply:

- 1) Document measurements, notes and QA/QC codes on the groundwater level data forms or field notebook.
- 2) Operate instruments in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified.
- 3) Each well should be tested at least twice in order to compare results. If results do not agree to within 0.1 feet, a third measurement should be taken and the readings averaged. Consistent failure of consecutive readings to agree suggests that levels are changing because of one or more conditions as indicated in Section 1, and should be noted on the field form.
- 4) Results should be compared to historical measurements while in the field and significant discrepancies noted and resolved, if possible.

- 5) Wells for which no measurements or questionable measurements are obtained should have the codes entered on the field form as follows:

| No Measurement | | Questionable Measurement | |
|----------------|--------------------------------|--------------------------|---|
| 0 | Discontinued | 0 | Caved or deepened |
| 1 | Pumping | 1 | Pumping |
| 2 | Pumphouse locked | 2 | Nearby pump operating |
| 3 | Probe/tape hung up | 3 | Casing leaking or wet |
| 4 | Can't get probe/tape in casing | 4 | Pumped recently (if known, note time since pump shut off) |
| 5 | Unable to locate well | 5 | Air or pressure gauge measurement |
| 6 | Well destroyed | 6 | Other |
| 7 | Special | 7 | Recharge operation at or nearby well |
| 8 | Casing leaking or wet | 8 | Oil in casing |
| 9 | Temporarily inaccessible | | |
| D | Dry well | | |
| F | Flowing well | | |

- 6) Upon return from the field, appropriate corrective actions need to be communicated and completed prior to the next survey event.
- 7) All data entered into electronic spreadsheet or database should be double-keyed or hard copy printed and proofed by a second person.
- 8) Questionable wells or measurements noted during data compilation need to result in corrective actions, if applicable.

Sanitary Practices for Equipment

The water level measurement equipment should be handled carefully, both when transporting the equipment and when using the equipment to take water level measurements. In effect, only the water level measurement probe end should come in contact with the well water.

The water level measurement equipment should be kept and maintained clean by preventive and standard cleaning measures including:

- Placing the equipment in a clean space for storage and during transport to avoid contact with dirty surfaces
- At a minimum, cleaning the probe at the end of the tape with an appropriate cleaning agent at the beginning of field activities, whenever the probe appears dirty, and at the end of the measurement round
- Inspecting the probe tape carefully before and after each water measurement for any foreign materials.

In between each water level measurement, the probe should be carefully inspected. If the probe appears dirty at all or appears to have foreign material on it, the probe should be properly cleaned. If the probe appears clean, at a minimum the probe should be disinfected.

The sanitary practices outlined above should be considered as guidance only. Please note that this guidance only pertains to placing temporary water level monitoring equipment in a well.