

ANTELOPE SUBBASIN COMMUNITY
DOMESTIC WELL MONITORING PLAN

PREPARED FOR

TEHAMA COUNTY FLOOD CONTROL AND WATER
CONSERVATION DISTRICT

DWR DELIVERABLE COMPONENT 0, CATEGORY (D), TASK 5

PREPARED BY



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LIST OF ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
DWR	California Department of Water Resources
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
LSCE	Luhdorff and Scalmanini Consulting Engineers
TCFCWCD	Tehama County Flood Control and Water Conservation District
UR	Undesirable results
SGM	Sustainable Groundwater Management

1. INTRODUCTION

The Antelope Subbasin Groundwater Sustainability Plan (GSP), revised and approved in 2024, recognized the impact lowering groundwater levels have on beneficial users in the subbasin, including domestic wells used for drinking water. The revised GSP acknowledges that the enhanced domestic well dataset makes positive steps towards addressing DWR's determination letter (deficiency 1c), it still includes uncertainty. The Tehama County Flood Control and Water Conservation District (TCFCWCD) serving as the Groundwater Sustainability Agency (GSA) is committed to enhancing the dataset and domestic well monitoring to further refine the understanding of the domestic well dataset and make more informed management decisions. A monitoring program focused on domestic wells is also intended to support the efforts of the planned well mitigation program. Currently, the well mitigation program is based on the volunteer dry well reporting system. Well owners can report when their well is no longer producing sufficient water to meet their needs. The GSA then investigates to determine the cause of the dry well and the best course of action to remedy the issue. Implementing a volunteer-based community domestic monitoring program will aid the GSA to manage groundwater in the Subbasin to avoid groundwater level declines in domestic wells.

2. OBJECTIVES

The domestic well monitoring program aims to provide the GSA, the volunteer well owners, and the general public with additional data. This additional data will aid in groundwater management, and has the following objectives:

- **Avoiding Groundwater Level Declines**– Having real time water level data in domestic wells will allow the GSA to anticipate groundwater level declines that could lead to dry domestic wells. The GSA will have the ability to be proactive in regard to dry wells rather than reactive.
- **Accurately and Efficiently Identifying when Water Levels are Adversely Affecting Domestic Wells** – The GSA will have verifiable accurate groundwater level data in domestic wells that can serve as a representative for other domestic wells nearby. This data will be real time so the GSA will be able to respond if groundwater levels are declining and causing adverse effects rather than waiting until dry wells are reported by the owners.
- **Aiding the Reported Dry Well Mitigation Process** – Having representative water levels in domestic wells across the subbasin will give the GSA a data point that will aid in reviewing whether reported dry wells are caused by GSA management actions. If a dry well is reported in an area where the community domestic monitoring program wells show no decline in water levels, it will be more likely that the reported well is dry due to other reasons. The inverse would also hold true if reported dry wells are in areas where domestic monitoring program wells indicate a groundwater level decline.
- **Increasing stakeholder engagement and outreach** – Stakeholder engagement and community outreach is a priority of the GSA. Well owners can be more engaged if they are able to see what is happening directly in their own wells, in real time. This can help drive interest in SGMA related activities occurring in the Subbasin.

These objectives will be met through the installation of groundwater level sensors and telemetry devices on selected domestic wells.

3. METHODOLOGY

3.1. Participant and Site Selection

All domestic well owners within the Subbasin are eligible and encouraged to participate in the program. The Sustainable Groundwater Management (SGM) Implementation Program Grant provides enough funding for 25 pieces of equipment and operational costs for five years. The GSA have and will continue to perform public outreach to potential volunteers through public open houses, newsletters, and webinars. Interested parties are encouraged to access a short online registration form to indicate to the GSA that they are potentially interested in participating and to provide location and well details to help determine the effectiveness of including the well in the program.

As the grant funding deadline is April of 2026, the intended timeline to install equipment on volunteer wells is by the end of the Summer of 2025. In the event the GSA receive more than 25 interested participants by the end of the Summer 2025, final program participants will be chosen by the GSA to ensure the wells that will provide data that is representative of the domestic well beneficial users are included. Selected participants will be given notice if they are selected, and the GSA will move forward with obtaining owner consent to provide, install, monitor, and service the WellIntel system.

3.2. Equipment

WellIntel is a groundwater-information system that allows residential wells to monitor groundwater levels in real time. The system and equipment are designed to be cost-effective and easy to use, while maintaining accuracy standards. Each registered volunteer will receive a WellIntel Water-Level Sensor, a Communication Gateway, and access to the WellIntel user portal. Ownership of the equipment will remain with the GSA but will be provided to the well owner at no cost during the program timeline.

In addition to the WellIntel equipment. The GSA intends to purchase an electronic water level tape to provide manual measurements if accuracy of the WellIntel equipment is questioned, and to provide a way for well owners in the subbasin to manually measure their wells if they are interested. The GSA will provide a way for users to lease or check out the equipment if necessary.

3.3. Installation Procedure

Program volunteers will be chosen so that all wells support monitoring and telemetry equipment provided by WellIntel. The general installation procedure is summarized below.

1. Install the Communications Gateway by connecting it to a domestic, business, or industrial broadband router or cellular modem to activate the telemetry system. WellIntel does not use Wi-Fi or access the well owner's private network.
2. Shut off the pump.
3. Install the sensor in an existing ½" NPT access port. If an access port is unavailable or blocked, create a new ½" access port on the well seal or monitoring well cap.

4. Install the current transducer, wrapping the monitoring end around the black, yellow or white power cables to the pump and connecting the leads in the P1 and P2 terminal ports.
5. Power on and connect the Sensor and Communication Gateway radios to initiate telemetry.
6. Complete sensor commissioning, including forcing test readings for calibration and telemetry verification.
7. Measure traditional “stick-up” or monitoring point locations, along with WellIntel monitoring points, to enable automatic conversion to feet below groundwater level.
8. Record installation details and upload photos to WellIntel’s well database for reference and remote calibration.

4. MONITORING AND MAINTENANCE

4.1. System Maintenance

The WellIntel payment structure utilizes a subscription model. As such, though maintenance is expected to be minimal, WellIntel is committed to providing technical assistance to service and troubleshoot systems as needed.

For battery powered sensors, maintenance includes battery replacement every 12-24 months. To reduce maintenance needs, alternative power options are available, including solar and AC power lines. Additionally, the microphone cable, which extends 3–5 inches below the well seal to collect readings, may also need replacement every 12–24 months.

WellIntel systems make it easy for users to perform routine maintenance through the system’s weekly health status reports. These reports will be available in each user’s system portal. System functionality, including battery life, is easily checked remotely, which helps reduce data gaps, and to answer any system questions. Directions for how to conduct system maintenance will be provided to each user and WellIntel is available to provide support as needed.

4.2. Data Quality Assurance

To ensure data quality, manual measurements during system installation will be recorded. Using this measurement, the WellIntel staff will conduct an initial calibration for each instrument installed.

Unlike some continuous measurement devices that rely on periodic physical calibration, such as pressure transducers, WellIntel’s digital acoustic signal remains stable over time without drift or change. To verify accuracy, annual manual measurements can be taken and cross referenced with recorded measurements as needed.

4.2.1. System Accuracy Standard

The WellIntel system complies with industry standards for groundwater-level monitoring applications. The accuracy and precision of the WellIntel Groundwater Information System is within 0.1 foot from 10 to 1,000 ft depth to water when installation and initial calibration is complete. The five factors that control the accuracy and ensure operation of the system are listed below:

1. Basic sensor operation
2. Data processing and verification
3. Acoustic sensor precision
4. Characterization of well air temperature profile
5. Reference to datum

5. DATA REPORTING

The data collected from the program is intended to help inform the GSA and the public. To achieve this, data collected from the program will be visible to the public through the GSA' online data viewing tool hosted on their website. The well owner dashboard contains detailed reports to the volunteer well including indication of pumping water levels and accurate location data. This data are intended to remain confidential on public facing websites and dashboards. The public facing data viewing tool is intended to include static (non-pumping) water levels representative of domestic wells and only generalized location information. The program will be evaluated annually and modified if needed to best meet the objectives of the program.