



FROM: Glen Bowers – TPNRD – Water Programs Field Coordinator

Date: January 24, 2023

RE: WSF 2022 Annual Report #5304

This report is an up dated outline for the WSF #5304 – “Twin Platte Natural Resources District Advanced Aquifer Monitoring System.” Beginning in early November 2020, planning, coordinating, and development of the project began. Work started in April of 2021 with installation of loggers in existing wells. In September of 2021 Drilling and installation of loggers began and were finished in April 2022.

Background:

Beginning in 2019 the Twin Platte Natural Resources District (TPNRD) launched their Water Data Program with the overarching goal of significantly enhancing their understanding of the water supplies and water uses in the TPNRD. A primary component of this program is the collection of real-time water use data on every irrigated parcel in the TPNRD. Now the TPNRD is seeking to expand on this program by deploying additional technology to the field for the collection real-time aquifer water levels. This additional dataset will be highly complementary to the real-time water use dataset that is already being generated, allowing for a significantly improved ability to understand the entire water budget in real time.

This will equip 135 wells (73 existing wells and 62 new monitoring wells) that are currently utilized for the collection of a spring and a fall groundwater level with real-time water level sensors. The water level sensors will be connected to a LoRaWAN network that is being deployed across Nebraska. This cutting-edge technology is what makes this project possible by providing reliable low-cost data transmission. This project is an additional component of the TPNRD’s Water Data Program, which was funded in 2019 as a large project with a then total budget of approximately \$3.5 million.

The TPNRD has historically sent staff into the field every spring and fall to obtain a single reading of the water level in all the wells in their monitoring network. Many of these wells are active irrigation wells, making it very difficult to obtain an accurate reading of the water level given the

pumping equipment that is installed in the wells. Over time, the TPNRD, along with various project partners, have installed many dedicated monitoring wells; however, these wells are still only measured twice a year.

The project involves two primary tasks: 1) drilling and installation of 62 dedicated monitoring wells at a location in close proximity to existing irrigation wells; and 2) installation of a pressure transducer and a LoRaWAN transmitter at 135 well sites that will jointly identify the water level in the well at regular intervals and transmit that data to the TPNRD's cloud-based data management platform. Costs were approximate, as well installation will be bid out and the most favorable bid was selected.

Time Frame:

November / December 2020 - The TPNRD began obtaining permission from landowners to drill wells on their land in close proximity to the existing irrigation well that had previously been measured for water levels. The TPNRD received permission to complete drilling and installation of loggers on 51 monitoring wells and install loggers in 66 existing monitoring wells.

During the permission process it was discovered that there were some sites that had existing wells near the irrigation wells that could be used instead of drilling new wells. This is the difference of the number of wells to be drilled and the actual number of wells drilled.

December 2020 / January 2021 – Well logs for the existing irrigation wells were reviewed and approximate depths of the wells to be drilled were determined. Well history from measured water levels for the irrigation and monitoring wells were studied and cable lengths for the loggers were determined.

January 29, 2021 - Bid letters were sent out to all well drillers in the TPNRD. The bids were due back on March 5, 2021.

February 2021 - Pressure transducers and LoRaWAN transmitters were ordered for the 51 wells to be drilled and the 52 monitoring wells.

Other loggers and LoRaWAN transmitters were ordered during the drilling and installation process.

March 11, 2021 - The bids were presented to the TPNRD Board of Directors. The Board approved the lowest bid and awarded Sargent Irrigation of Broken Bow the drilling contract. Sargent plans to start drilling when the PVC pipe order arrives.

April 13, 2021 - The 94 pressure transducers and LoRaWAN transmitters are due to start arriving. As they arrive, the TPNRD will start installing the devices.

April 16, 2021 – Loggers started arriving and installation of the 66 existing sites began.

September 2021 - Drilling started and continued thru April 2022. Installation of loggers were done as each well was completed.

April 2022 thru January 2023 follow up adjustments are being completed.

Work on the TPNRD's cloud-based data management platform is currently being developed.

Cost:

The total project cost is estimated to be \$416,650.

Total Amount Spent to Date is \$418,011.49.

Reimbursement Documentation Will Follow in additional Emails.