CASE STUDY: Groundwater Investigations with the MTSRN

The MTSRN Delivers Higher Accuracy at Lower Costs

Overview

The Montana Bureau of Mines and Geology is the state's official geologic survey, tasked with conducting focused groundwater investigations and geologic mapping across Montana. Through its Ground Water Investigation Program, MBMG helps communities and water managers better understand aquifer systems, groundwater/surface-water interactions, and long-term water availability.

Tyler Storey works on focused groundwater investigations where precise elevation and location data are critical to building hydrogeologic frameworks and groundwater models. These models enable stakeholders to make informed water management decisions in both agricultural and municipal areas.

MTSRN being used to measure the location of a staff gage for Greenfields project.

The Challenge

By adopting the Montana State Reference Network (MTSRN), MBMG now has an efficient means of collecting elevation data. The MBMG uses an Emlid receiver connected via Bluetooth on a cell phone, enabling real-time centimeter-level accuracy in the field within 30 seconds. This process is used for:

- **Well Monitoring:** Collecting accurate elevations at well sites to calculate groundwater table elevations.
- **Surface Water Sites:** Establishing elevation benchmarks at canal and stream sites.
- **Groundwater Modeling:** Using precise data to build models of aquifer behavior and surface water-groundwater interactions

The Solution: MTSRN

Traditionally, MBMG relied on contracted services, LiDAR elevation data, or Google Earth to establish well and surface water monitoring elevations. This process was:

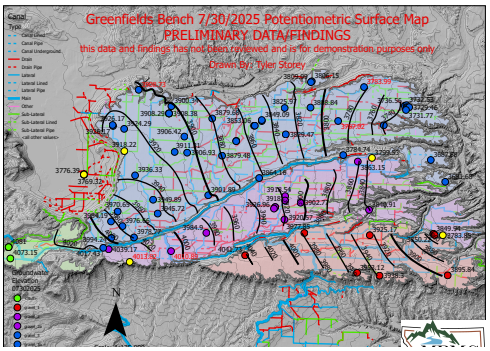
- **Higher Cost:** Hiring outside contractors added an additional expense.
- **Timing:** Data analysis was sometimes delayed until accurate survey information was obtained.
- **Limited in Accuracy:** Alternatives like LiDAR data may not deliver the same level of precision required for hydrogeologic investigations.

Key Benefits

- **Significant Cost Savings:** Eliminated the need for contracted services.
- **Time Savings:** MBMG can capture elevations and locations on-site without waiting, accelerating project timelines.
- **Ease of Use:** Quick setup and reliable accuracy and results.
- **Research Impact:** Supports hydrogeologic research and modeling of large-scale irrigation districts like Greenfields (80,000 acres) and provides valuable data to manage Montana's water resources.

Real-World Impact

The Greenfields Irrigation District project, covering over **80,000 acres of shallow gravel aquifer**, depends on accurate data to understand how canal leakage recharges groundwater. Thanks to the MTSRN:



Greenfields Bench 7/30/2025 Potentiometric Surface Map: These data and findings have not been reviewed and are for demonstration purposes only.

- **Models are more accurate,** allowing for better predictions of groundwater availability.
- **Communities and water managers gain insight** into how aquifers interact with surface water, leading to smarter resource management.
- **Research timelines are shortened,** meaning that actionable results are delivered faster to the people who need them.

This data-driven approach supports agriculture, public utilities, and long-term water planning for Montana communities.

Why the MTSRN?

For the MBMG, the MTSRN isn't just a tool—it's a game-changer.

- **Cost savings:** Eliminated dependence on contracted surveyors.
- **Time efficiency:** Immediate on-site data collection without waiting for outside crews.
- **Ease of use:** "30 seconds to a fix" and seamless integration with existing receivers.
- **Reliability:** Delivers the consistent centimeter-level accuracy needed for complex groundwater models.

"MTSRN has been a valuable tool for us at the Montana Bureau of Mines Geology. I have been using it extensively for inventorying wells and surface water sites for groundwater investigations."

—Tyler Storey, hydrogeologist