

**Groundwater Research, Science, and Data
Collection Grants**

Fiscal Year 2026 Application Form

Submit this completed application form and all required attachments by email to GCDGrants@twdb.texas.gov by **March 13, 2026, 2:00pm**. Use the subject: "FY2026 Groundwater Grant Application – <Your District Name>".

Refer to the FY2026 Groundwater Grants Guidelines for deadlines and detailed instructions. All information on this form is required to be considered a complete application. Incomplete applications will not be accepted.

I. Applicant Information

Official name of applicant (groundwater conservation district name)

Physical address:

Mailing address:

Authorized official (has legal authority to sign a grant agreement)

Name:

Title:

Phone number:

Email address:

Designated representative (primary contact for this application)

Same as authorized official

Complete the information below if designated representative is different from the authorized official.

Name:

Title:

Phone number:

Email address:

II. Eligibility Confirmation

Check all that apply

Applicant is a groundwater conservation district as defined by Texas Water Code § 36.001(1).

Applicant is authorized to accept grants under Texas Water Code § 36.158.

Only one application is being submitted by this applicant.

Eligibility documentation

Attach ONE of the following to confirm applicant eligibility, intent, and authorized representatives. *Select which form of documentation is included in this application:*

An affidavit from the individual with the authority to act on behalf of the applicant, OR

A copy of an adopted resolution, OR

Minutes approved by the groundwater conservation district board with the authority to act on behalf of the applicant.

Eligibility documentation must include:

- Amount requested;
- Any local match (not required);
- A statement that grant funds will supplement, not replace, applicant funds;
- Authorization to submit application; AND
- Designation of a representative the TWDB can contact regarding the application.

III. Applicant Financial Information

Annual operating budget (amount)

For example, \$1,250,000

Link to most recent annual operating budget OR enter "file attached" and attach file

Last financial audit (date):

Link to most recent financial audit OR enter "file attached" and attach file

Explain the need for financial assistance

V. Project Information

Project cost

Total project cost

Amount requested from the Texas Water Development Board

TWDB will only award grants for \$50,000 to \$300,000

Applicant will provide supplemental funding for this project (local match not required)

Yes No To be determined

If yes, amount of supplemental funding and source(s)

Grant Category

Project title

Short project description (brief statement of purpose)

No more than 175 words.

Project duration

Months to complete. Awarded projects must be completed by May 31, 2028.

Category-specific narrative

Complete the prompt that matches your selected category.

For Category 1: Describe how this project furthers best available science¹ in the state and supports the implementation of effective groundwater resource management and planning.

For Category 2: Describe how this project enhances the collection, quality, and availability of groundwater data used by groundwater conservation districts and the TWDB to support effective groundwater resource management and planning within the district and across the state.

No more than 300 words.

¹ See Texas Water Code § 36.0015 for the definition of *best available science*.

Scope of work (attach)

Attach a scope of work that includes:

- Clearly identified tasks,
- Clearly defined project team,
- Estimated completion times for each task (project timeline,
- Proposed equipment purchases (if applicable, and
- Deliverables the TWDB will receive through this project (data, reports, or other products).

Note: All deliverables must be provided to the TWDB. Data deliverables must follow data requirements as provided in the grant agreement.

Project budget (attach)

Attach a proposed project budget (using example budget tables in Appendix B of Guidelines) that includes:

- Total project cost,
- The cost of each significant element of the project,
- TWDB costs and local match costs (if applicable; local match not required), and
- Equipment cost list (if applicable).

VI. Additional Documentation

If you would like to provide any additional information or documentation to support your application, you may attach that to the application. Please list any additional documentation provided with the application:

Before submitting your application, please review all the information provided on this application form carefully, and ensure all required attachments are appended to this PDF or included as email attachments.

Submit this completed application form and all required attachments by email to GCDGrants@twdb.texas.gov by **March 13, 2026, 2:00pm**. Use the subject: "FY2026 Groundwater Grant Application – <Your District Name>".

Explain the need for financial assistance

BVGCD budget is smaller than some other districts in the region. The District reserves are currently less than 50% of our annual operating budget leaving no room for needed expenditures on equipment and work being requested. Much of the District budget is tied up with attorney fees associated with ongoing federal litigation and hydrological work being performed for Round 4 of DFC planning.

Short project description (brief statement of purpose)

The Brazos Valley Groundwater Conservation District (BVGCD) is experiencing increasing pressure on its groundwater resources as a major production and export project advances within the District, with significant impacts expected in Simsboro Aquifer screened wells. To respond effectively, BVGCD must obtain groundwater data more frequently and reliably than is possible through manual measurements, especially while monitoring eight aquifers with limited staff capacity.

This project upgrades the District's monitoring network by installing modern sensors and pressure transducers in existing and new wells and integrating them into BVGCD's current data system. These instruments will provide continuous, real time water level data in the Simsboro Aquifer and Brazos River Alluvium, improving the District's ability to track Desired Future Conditions (DFC) and understand aquifer behavior to support mitigation of local wells.

By modernizing its monitoring infrastructure, BVGCD will strengthen its ability to manage groundwater resources more effectively, communicate with the public, respond to mitigation requests, and support regional and statewide groundwater planning efforts.

Category-specific narrative - For Category 2: *Describe how this project enhances the collection, quality, and availability of groundwater data used by groundwater conservation districts and the TWDB to support effective groundwater resource management and planning within the district and across the state.*

The Brazos Valley Groundwater Conservation District (BVGCD) is facing increasing demands on its groundwater resources as a large production and export project develops within the District, with substantial impacts anticipated in Simsboro Aquifer screened wells. Although BVGCD collects extensive water level data, manual measurements have limits in providing the timeliness or resolution needed to monitor and manage pumping impacts, maintain Desired Future Conditions (DFCs), or monitor eight aquifers effectively. This project directly addresses those limitations by enhancing the collection, quality, and availability of groundwater data through a modernized, integrated monitoring network.

By installing advanced sensors and pressure transducers in existing and new wells and linking them to BVGCD's data platform, the project transforms the District's monitoring system into a continuous, real-time network. This greatly improves data collection, allowing BVGCD to detect rapid drawdown responses, seasonal irrigation fluctuations, and aquifer wide trends that manual measurements might miss.

The project also improves data quality. High resolution measurements from strategically located wells, including those in the graben north of Calvert, provide essential calibration points for local groundwater models and regional Groundwater Availability Models. These areas are sensitive to model assumptions in the aquifer outcrop, making accurate data critical for improving Modeled Available Groundwater estimates and long-term supply projections used across Groundwater Management Area 12 and in the State Water Plan.

Finally, integrating these sensors into a modern data platform increases data availability for BVGCD, TWDB, regional planners, and the public. Continuous monitoring in Brazos River Alluvium wells further strengthens the understanding of groundwater–surface water interactions, supporting effective management of the alluvium and its connection to the Carrizo Wilcox Aquifer and the Brazos River.

Together, these improvements ensure that BVGCD and TWDB have the timely, accurate, and accessible data needed for effective groundwater management and statewide planning.

Appendix B – Project Budget and Equipment Cost List Tables

PROJECT BUDGET

| Item/Task | Description | District Funds | TWDB Funds | Total Cost |
|------------------|--|-----------------------|-------------------|-------------------|
| 1 | Purchase equipment (transducers, sonic sounders, transducers, telemetry (VuLink & SignalFire, cable, antennas, batteries, hand-held sounder, subscriptions, extended warranties, | \$6,000.00 | \$75,431.24 | \$81,431.24 |
| 2 | Database for collection & assimilation of measurements) | \$25,931.24 | \$24,068.76\$ | \$50,000.00 |
| 3 | Drilling of Simsboro monitoring well not to exceed 1,000' TD | \$0.00 | \$190,000.00 | \$190,000.00 |
| 4 | Installation of well seals, pulling equipment, electrical services | \$0.00 | \$6,000.00 | \$6,000.00 |
| 5 | Miscellaneous installation supplies & shipping costs | \$0.00 | \$4,500.00 | \$4,500.00 |
| 6 | District In-kind services (labor & staff to install measuring devices) | \$8,320.00 | \$0.00 | \$8,320.00 |
| | Total | \$40,251.24 | \$300,000.00 | \$340,251.24 |

EQUIPMENT COST LIST

| Description | Cost per Unit | Number of Units | District Funds | TWDB Funds | Total Cost |
|---|-----------------------------|------------------------|-----------------------|---------------------|---------------------|
| Eno Scientific Well Watch 670 Sounder (0670) | \$995.00 | 10 | \$0.00 | \$9,995.00 | \$9,995.00 |
| Eno Scientific Well Watch 700 Sounder (0700) | \$2,915.00 | 1 | \$0.00 | \$2,915.00 | \$2,915.00 |
| Eno Scientific Controller Housing & Pole Mount | \$215.00 | 2 | \$0.00 | \$430.00 | \$430.00 |
| Eno Scientific 10W Solar Power Kit | \$609.00 | 2 | \$0.00 | \$1,218.00 | \$1,218.00 |
| In-Situ LEVEL TROLL 400 stainless steel pressure transducer | \$897.00 | 8 | \$0.00 | \$7,176.00 | \$7,176.00 |
| In-Situ VuLink CI telemetry | \$1,007.40 | 8 | \$0.00 | \$8,059.20 | \$8,059.20 |
| In-Situ twisted lock cable (2,500' of cable) | \$180.00 + \$5/cable foot | 8 | \$0.00 | \$11,113.32 | \$11,113.32 |
| HydroVu Professional Cloud-Based Prepaid Code | \$242.88/unit (annual cost) | 8 | \$0.00 | \$1,943.04 | \$1,943.04 |
| VuLink 4G/LTE/2G Cellular Antenna | \$37.72 | 8 | \$0.00 | \$301.76 | \$301.76 |
| VuLink Lithium Battery Set (MnO2) | \$84.64 | 8 | \$0.00 | \$678.72 | \$678.72 |
| In-Situ 2-year Extended Warranty | \$156.40 | 8 | \$0.00 | \$1,251.20 | \$1,251.20 |
| SignalFire RANGER datalogger/transmitter | \$1,825.00 | 19 | \$6,000.00 | \$28,675.00 | \$34,675.00 |
| Eno Scientific Well Sounder 2010 Pro (2010P) | \$1,675.00 | 1 | \$0.00 | \$1,675.00 | \$1,675.00 |
| Materials/Labor for installation of well seals | \$700/well Seal/install | 5 | \$0.00 | \$3,500.00 | \$3,500.00 |
| Miscellaneous materials for mounting & installing devices | \$2,500.00 | Misc. | \$0.00 | \$2,500.00 | \$2,500.00 |
| Enhancement of Data collection & assimilation | \$50,000.00 | 1 | \$25,931.24 | \$24,068.76 | \$50,000.00 |
| Electrician Services | \$500.00 | 5 | \$0.00 | \$2,500.00 | \$2,500.00 |
| In-kind Services (Labor) | \$8,320.00 | Misc. | \$8,320.00 | \$0.00 | \$8,320.00 |
| Drill & Complete Simsboro Monitor Well up to 1,000' deep | \$190,000.00 | 1 | \$0.00 | \$190,000.00 | \$190,000.00 |
| Shipping costs | \$2,000.00 | Misc. | \$0.00 | \$2,000.00 | \$2,000.00 |
| | | | | | |
| Total | | | \$40,251.24 | \$300,000.00 | \$340,251.24 |

Eno Scientific LLC
 PO Box 1586
 Hillsborough, NC 27278
 www.enoscientific.com



Estimate

| | |
|-----------|------------|
| Date | Estimate # |
| 2/24/2026 | 1698 |

| |
|--|
| Name / Address |
| Brazos Valley GCD Alan Day 112 W. 3rd St Hearne, TX 77859 |

| |
|---------|
| Project |
| |

| Description | Qty | U/M | Cost | Total |
|--|-----|-----|--------------|-------------|
| Well Watch 670 | 10 | ea | 995.00 | 9,950.00 |
| Well Watch 700- 710 Controller with 730 Probe | 1 | | 2,915.00 | 2,915.00 |
| 10x8x6" Polycarbonate Enclosure, Opaque cover, Low profile hinge, Integrated lock NEMA 4X (IP68), with pole mount kit. | 2 | ea | 215.00 | 430.00 |
| 10W Solar Power Kit | 2 | ea | 609.00 | 1,218.00 |
| 2010 Wellsounder PRO Meter, LF Probe, and case kit | 1 | ea | 1,675.00 | 1,675.00 |
| RANGER LTE M1 Transmitter- 4D Cell Pack, Expansion Module with RS485 Modbus Serial port w/3yr Service | 19 | ea | 1,825.00 | 34,675.00 |
| | | | Total | \$50,863.00 |

Customer Signature _____



Quote – Q-160792

In-Situ, Inc.
221 E. Lincoln Avenue
Fort Collins, CO 80524
U.S.A.

Tel: (800) 446-7488
Fax: (970) 498-1598
Email: sales@in-situ.com
Web: www.in-situ.com

Issued By: Cody Preiss
Date: February 23, 2026
Quote Valid for 30 days

| | | | | | |
|-----------------------------------|--------------------|-----------------------------|--|-------------------|---|
| Sales Manager Mark Null | Customer ID | Payment Terms TBD | Shipping Method FedEx Ground | INCO Terms | Final Destination United States Texas |
|-----------------------------------|--------------------|-----------------------------|--|-------------------|---|

| |
|--|
| Quote To: |
| Brazos Valley Ground Water Conservation District PO Box 528 Hearne, Texas 77859 United States |
| Attn: |
| Alan Day aday@brazosvalleygcd.org |

| |
|---|
| Ship To: |
| Brazos Valley Ground Water Conservation District 112 W 3rd St Hearne, Texas 77859-2502 United States |
| Comments: |
| |

| Equipment | | | | | | | | |
|------------------|---|-------------|--------------|------|-----------------|------------------|-------|----------------------|
| Line | Product Description | Part Number | Unit of Sale | Qty. | Unit List Price | Total List Price | Disc. | Customer Total Price |
| 1. | Level TROLL 400, Level Sensor Range - 60m, 197 ft (100 Psia) | 0099250 | Each | 2 | \$975.00 | \$1,950.00 | 8.00% | \$1,794.00 |
| 2. | Rugged Twist-Lock Cable Non-Vented Poly Twist-Lock No Adapter SM Spool | 0052000 | 150ft | 2 | \$831.80 | \$1,663.60 | 8.00% | \$1,530.52 |
| 3. | VuLink CI (Global Cellular, does not include antenna) | 0094840 | Each | 2 | \$1,095.00 | \$2,190.00 | 8.00% | \$2,014.80 |
| 4. | HydroVu Professional Prepaid Code (Months) | 0102510 | Each | 24 | \$22.00 | \$528.00 | 8.00% | \$485.76 |
| 5. | VuLink 4G/LTE/2G Cellular Antenna with 1.5m cable (IP67, recommended for VuLink CI) | 0043630 | Each | 2 | \$41.00 | \$82.00 | 8.00% | \$75.44 |
| 6. | VuLink Lithium Battery Set (Lithium MnO2) | 0103050 | Each | 2 | \$92.00 | \$184.00 | 8.00% | \$169.28 |
| 7. | 2-Year Extended Warranty | 0063030 | Each | 2 | \$170.00 | \$340.00 | 8.00% | \$312.80 |
| 8. | Level TROLL 400, Level Sensor Range - 60m, 197 ft (100 Psia) | 0099250 | Each | 1 | \$975.00 | \$975.00 | 8.00% | \$897.00 |
| 9. | Rugged Twist-Lock Cable Non-Vented Poly Twist-Lock No Adapter SM Spool | 0052000 | 325ft | 1 | \$1,558.05 | \$1,558.05 | 8.00% | \$1,433.41 |
| 10. | VuLink CI (Global Cellular, does not include antenna) | 0094840 | Each | 1 | \$1,095.00 | \$1,095.00 | 8.00% | \$1,007.40 |
| 11. | HydroVu Professional Prepaid Code (Months) | 0102510 | Each | 12 | \$22.00 | \$264.00 | 8.00% | \$242.88 |
| 12. | VuLink 4G/LTE/2G Cellular Antenna with 1.5m cable (IP67, recommended for VuLink CI) | 0043630 | Each | 1 | \$41.00 | \$41.00 | 8.00% | \$37.72 |
| 13. | VuLink Lithium Battery Set (Lithium MnO2) | 0103050 | Each | 1 | \$92.00 | \$92.00 | 8.00% | \$84.64 |
| 14. | 2-Year Extended Warranty | 0063030 | Each | 1 | \$170.00 | \$170.00 | 8.00% | \$156.40 |
| 15. | Level TROLL 400, Level Sensor Range - 60m, 197 ft (100 Psia) | 0099250 | Each | 3 | \$975.00 | \$2,925.00 | 8.00% | \$2,691.00 |
| 16. | Rugged Twist-Lock Cable Non-Vented Poly Twist-Lock No Adapter SM Spool | 0052000 | 350ft | 3 | \$1,661.80 | \$4,985.40 | 8.00% | \$4,586.58 |
| 17. | VuLink CI (Global Cellular, does not include antenna) | 0094840 | Each | 3 | \$1,095.00 | \$3,285.00 | 8.00% | \$3,022.20 |
| 18. | HydroVu Professional Prepaid Code (Months) | 0102510 | Each | 36 | \$22.00 | \$792.00 | 8.00% | \$728.64 |
| 19. | VuLink 4G/LTE/2G Cellular Antenna with 1.5m cable (IP67, recommended for VuLink CI) | 0043630 | Each | 3 | \$41.00 | \$123.00 | 8.00% | \$113.16 |
| 20. | VuLink Lithium Battery Set (Lithium MnO2) | 0103050 | Each | 3 | \$92.00 | \$276.00 | 8.00% | \$253.92 |



Quote – Q-160792

In-Situ, Inc.
221 E. Lincoln Avenue
Fort Collins, CO 80524
U.S.A.

Tel: (800) 446-7488
Fax: (970) 498-1598
Email: sales@in-situ.com
Web: www.in-situ.com

Issued By: Cody Preiss
Date: February 23, 2026
Quote Valid for 30 days

| | | | | | | | | |
|------------------|---|---------|-------|----|------------|------------|-------|--------------------|
| 21. | 2-Year Extended Warranty | 0063030 | Each | 3 | \$170.00 | \$510.00 | 8.00% | \$469.20 |
| 22. | Level TROLL 400, Level Sensor Range - 60m, 197 ft (100 Psia) | 0099250 | Each | 1 | \$975.00 | \$975.00 | 8.00% | \$897.00 |
| 23. | Rugged Twist-Lock Cable Non-Vented Poly Twist-Lock No Adapter LG Plastic Spool | 0052000 | 375ft | 1 | \$1,775.25 | \$1,775.25 | 8.00% | \$1,633.23 |
| 24. | VuLink CI (Global Cellular, does not include antenna) | 0094840 | Each | 1 | \$1,095.00 | \$1,095.00 | 8.00% | \$1,007.40 |
| 25. | HydroVu Professional Prepaid Code (Months) | 0102510 | Each | 12 | \$22.00 | \$264.00 | 8.00% | \$242.88 |
| 26. | VuLink 4G/LTE/2G Cellular Antenna with 1.5m cable (IP67, recommended for VuLink CI) | 0043630 | Each | 1 | \$41.00 | \$41.00 | 8.00% | \$37.72 |
| 27. | VuLink Lithium Battery Set (Lithium MnO2) | 0103050 | Each | 1 | \$92.00 | \$92.00 | 8.00% | \$84.64 |
| 28. | 2-Year Extended Warranty | 0063030 | Each | 1 | \$170.00 | \$170.00 | 8.00% | \$156.40 |
| 29. | Level TROLL 400, Level Sensor Range - 60m, 197 ft (100 Psia) | 0099250 | Each | 1 | \$975.00 | \$975.00 | 8.00% | \$897.00 |
| 30. | Rugged Twist-Lock Cable Non-Vented Poly Twist-Lock No Adapter LG Plastic Spool | 0052000 | 450ft | 1 | \$2,086.50 | \$2,086.50 | 8.00% | \$1,919.58 |
| 31. | VuLink CI (Global Cellular, does not include antenna) | 0094840 | Each | 1 | \$1,095.00 | \$1,095.00 | 8.00% | \$1,007.40 |
| 32. | HydroVu Professional Prepaid Code (Months) | 0102510 | Each | 12 | \$22.00 | \$264.00 | 8.00% | \$242.88 |
| 33. | VuLink 4G/LTE/2G Cellular Antenna with 1.5m cable (IP67, recommended for VuLink CI) | 0043630 | Each | 1 | \$41.00 | \$41.00 | 8.00% | \$37.72 |
| 34. | VuLink Lithium Battery Set (Lithium MnO2) | 0103050 | Each | 1 | \$92.00 | \$92.00 | 8.00% | \$84.64 |
| 35. | 2-Year Extended Warranty | 0063030 | Each | 1 | \$170.00 | \$170.00 | 8.00% | \$156.40 |
| Subtotal: | | | | | | | | \$30,511.64 |

Quote Total

*Tax is not normally quoted due to State & local variability. If you need to have Tax included in this quotation, please contact us.
If your organization is a tax-exempt entity, please email or fax a copy of your tax-exempt certificate to taxcerts@in-situ.com or fax to (970) 498-1598.
Tax rates will be based on delivery address of the order. If your organization qualifies for GSA pricing, please verify eligibility requirements on the GSA website at [GSA Eligibility Determinations](#) and confirm if you intend to use the GSA contract for this purchase.*

Sales Tax: \$0.00

For further information regarding the Warranty or Terms and Conditions, please refer to our website at <https://in-situ.com/us/terms-conditions/>

All quoted product & service prices are in U.S. Dollars unless specifically noted otherwise.

Shipping: \$488.19

Total Amount (Excludes Optional Items): USD \$30,999.83



In-Situ, Inc.
221 E. Lincoln Avenue
Fort Collins, CO 80524
U.S.A.

Tel: (800) 446-7488
Fax: (970) 498-1598
Email: sales@in-situ.com
Web: www.in-situ.com

Quote – Q-160792

Issued By: Cody Preiss
Date: February 23, 2026
Quote Valid for 30 days

Managing your data has never been this easy!

Our intuitive [VuSitu Mobile App](#) allows you to view data from the field on your smartphone or tablet. For long-term or remote sites, integrate In-Situ instruments with our [remote wireless monitoring](#) and cloud-based [HydroVu Data Services](#) for real-time, decision-quality data. Ask your sales rep for more information.



Automated Telemetry Integration & Real-Time Monitoring Dashboard

Brazos Valley Groundwater Conservation District

| | |
|-----------------|----------------------------------|
| Date | February 23 rd , 2026 |
| Version | 1.0 – Draft |
| Author | Halff Associates |
| Client | Brazos Valley GCD |
| Platform | .NET / SQL Server / Azure |

1. Problem Statement

The Brazos Valley Groundwater Conservation District (GCD) currently operates seven In Situ transducer-equipped monitor wells that transmit water level readings to the cloud. However, there is no automated mechanism to pull these readings into the GCD’s hosted groundwater management database. Staff must rely on manual data entry or ad hoc retrieval, which introduces delays and data gaps. The district is also preparing to deploy 19 additional Signal Fire telemetry wells, creating an urgent need for a unified, automated data collection and visualization system. Without this system, the GCD cannot efficiently monitor groundwater levels across their expanding well network, detect equipment failures in a timely manner, or provide stakeholders with current and reliable water level data.

2. Goals

1. Automate daily water level data collection from all telemetry-equipped wells (In Situ and Signal Fire) into the hosted SQL Server database with zero manual intervention.
2. Provide a configurable administration dashboard where GCD staff can manage telemetry sources, set collection schedules, and view real-time and historical readings.
3. Allow GCD staff to manually trigger a reading collection in real time as needed.
4. Support extensibility so that future telemetry providers can be onboarded through configuration rather than custom development.
5. Deliver alerts when expected readings are not received, enabling rapid response to equipment or connectivity failures.
6. Ensure collected telemetry data integrates seamlessly with the existing water level query tool and public-facing water level widgets.

3. Non-Goals

- **Public-facing telemetry dashboard:** Telemetry data will flow into the existing public water level widget over time, but a dedicated public real-time dashboard is not in scope.

4. User Stories

GCD Administrator

1. As a GCD administrator, I want to configure which wells are included in automated data collection and set a daily collection time for each, so that I can control when and from where data is gathered.
2. As a GCD administrator, I want to add new telemetry wells by entering a well ID, API key/token, and provider type in a configuration screen, so that I can onboard new monitoring equipment without developer assistance.
3. As a GCD administrator, I want to receive an email alert when an expected reading is not returned by the API, so that I can investigate equipment or connectivity issues promptly.

GCD Field Staff

4. As a GCD field technician, I want to manually trigger a water level reading from the application while I am at a well site, so that I can get an on-demand measurement recorded in the database at the exact time I need it.
5. As a GCD staff member, I want to view all telemetry-collected readings for a specific well, filtered and sorted by date, so that I can review the data history from automated collection.

GCD Data Analyst / Stakeholder

6. As a data analyst, I want to distinguish between manually collected and telemetry-collected water level readings in the database, so that I can filter and analyze data by collection method.
7. As a stakeholder, I want hydrographs that aggregate daily telemetry readings into monthly averages for long-term display, with the ability to drill down into 30-day detail, so that visualizations remain performant and readable over years of data.

5. Requirements

5.1 Automated Data Collection

| Priority | Requirement | Acceptance Criteria |
|----------|---|--|
| P0 | Support API integration with In Situ transducers (Hydro View API) using per-client API key and per-gauge ID | System retrieves the most recent water level reading for each configured In Situ well via the Hydro View API |
| P0 | Support API integration with Signal Fire telemetry using bearer token (JWT) authentication and per-gauge ID | System retrieves the most recent water level reading for each configured Signal Fire well |

| | | |
|-----------|--|---|
| P0 | Run an hourly scheduled job that checks each well's configured collection time and triggers an API call only when the current hour matches | Cron job executes every hour; only wells whose configured time matches the current hour are queried |
| P0 | Store each reading with: well ID, date/time stamp, water level value, and collected-by source type | Database record includes all four fields for every telemetry reading |
| P0 | Deduplicate readings: validate that a retrieved reading does not already exist before inserting | No duplicate records are created when the same most-recent reading is returned on retry |
| P0 | Tag each telemetry reading with a "collected by" category (e.g., "In Situ Telemetry" or "Signal Fire Telemetry") | Collected-by field is auto-populated based on provider type in configuration |
| P1 | Retry logic: if a reading fails at the scheduled time, attempt again in the next hourly cycle | System records the failure and retries within 1 hour |
| P2 | Support configurable API root URLs per provider type so that new telemetry systems can be added without code changes | Admin can add a new provider type with base URL, auth method, and gauge ID pattern |

5.2 Configuration Dashboard

| Priority | Requirement | Acceptance Criteria |
|-----------|--|---|
| P0 | Configuration screen to add/edit/remove telemetry wells with fields: well ID, API key or bearer token, gauge ID, provider type, and daily collection time (hour) | Admin can manage telemetry well configurations through the UI without database access |
| P0 | Collected-by source type is selectable per well from a managed list (In Situ, Signal Fire, etc.) | Admin can assign the correct collection source to each well |
| P0 | Display a filterable list of all telemetry readings in the database, filterable by well | Admin can select a well and see all readings collected via telemetry for that well |
| P0 | Show the most recent reading for each configured telemetry well on the dashboard | Dashboard displays last reading timestamp and value for every active telemetry well |
| P1 | Manual trigger button: allow staff to initiate an on-demand API call for a specific well and display the result immediately | Clicking the button retrieves and stores the current reading and shows it to the user |
| P1 | Email alert configuration: set notification recipients for failed readings | Admin can configure email addresses that receive alerts when readings fail |

5.3 Data Visualization & Integration

| Priority | Requirement | Acceptance Criteria |
|----------|--|--|
| P0 | Telemetry readings appear in the existing water level query tool with collection type filterable | Users can query water levels and filter by collected-by type to isolate telemetry data |
| P0 | Telemetry readings flow into the public water level widget automatically | Public widget displays telemetry-sourced water levels alongside manually collected ones |
| P2 | Interactive map inset on the telemetry dashboard (ESRI JavaScript API) showing telemetry well locations | Map displays points for all configured telemetry wells; clicking a point shows the most recent reading |
| P2 | Click-to-detail: selecting a well on the map or table displays a 30-day hydrograph popup | Popup renders a line chart of daily readings for the selected well over the past 30 days |
| P2 | Long-term hydrograph aggregation: aggregate daily readings into monthly averages after a configurable period, with drill-down to daily detail on hover | Hydrographs display monthly averages for data older than the configured threshold; hovering shows the underlying daily data for that month |

5.4 Scheduling Infrastructure

| Priority | Requirement | Acceptance Criteria |
|----------|--|--|
| P0 | Implement the hourly scheduling mechanism to evaluate and trigger API calls | Scheduled job runs reliably every hour and processes the full list of configured wells |
| P0 | Evaluate Hangfire vs. Azure Functions for the scheduling engine and select the approach that provides the best reliability for this use case | Architecture decision documented; chosen approach deployed and tested |
| P1 | Logging: log every API call attempt, response status, and any errors for troubleshooting | Half can review logs to diagnose collection failures |

6. Technical Context

- **Platform:** Existing .NET application hosted on an IIS server, SQL Server database
- **In Situ API:** Hydro View REST API. Authentication via per-client API key. Individual gauges identified by gauge ID parameter.
- **Signal Fire API:** REST API. Authentication via JWT bearer token. Individual gauges identified by gauge ID in the request.
- **Scheduling options:** Hangfire (current team experience) vs. Azure Functions / Logic Apps (potentially more reliable). Decision required.
- **Mapping:** ESRI JavaScript API (required for interactive widgets with hydrograph popups).

- **Existing patterns:** Collected-by category already exists in the data model. New telemetry source types must be added to this enumeration.

7. Effort Estimate

The following estimate includes development, internal testing, user acceptance testing, and deployment for each area.

| Functional Area | Cost | Notes |
|---|-----------------|---|
| Database & Data Model (Phase 1) | \$2,800 | Collected-by types, config tables, indexing |
| API Integration Layer (Phase 1) | \$7,000 | In Situ + Signal Fire providers, abstraction layer, error handling, deduplication |
| Scheduling Infrastructure (Phase 1) | \$4,300 | Hourly job, config-driven dispatch, Hangfire vs. Azure spike |
| Configuration Dashboard (Phase 1) | \$8,800 | CRUD for telemetry wells, secure key storage, form validation |
| Readings Dashboard & Filtering (Phase 1) | \$5,600 | Most recent readings view, historical filter by well, manual trigger button |
| Alert / Notification System (Phase 1) | \$2,800 | Email integration, configurable recipients, missed-reading detection |
| Map Inset (ESRI JavaScript) (Phase 2) | \$7,000 | Interactive well pins, linked table interaction, hydrograph popups |
| Hydrograph Aggregation (Phase 2) | \$6,000 | Monthly averaging, drill-down hover, configurable threshold |
| Testing (Phase 1 and 2) | \$4,200 | Unit, integration, and functional tests |
| Deployment & DevOps (Phase 1 and 2) | \$1,500 | Azure environment, deployment scripts, config management, production verification |
| TOTAL | \$50,000 | |

Phasing Impact

- **Phase 1 only (defer map inset + hydrograph aggregation): \$37,000**
- **Full scope (Phase 1 + Phase 2): \$50,000**

8. Open Questions

| # | Question | Owner | Status |
|---|---|----------------|--------|
| 1 | How does Signal Fire handle API key scoping – per-client (single key for all gauges) or per-gauge (individual keys)? | Engineering | Open |
| 2 | Hangfire vs. Azure Functions: which scheduling engine should we use? Azure may be more reliable but Hangfire is a known quantity. | Engineering | Open |
| 3 | Should the map inset be included in Phase 1 or deferred? It requires ESRI JavaScript API integration. | Product/Client | Open |
| 4 | What is the desired behavior when a well's API returns the same reading on consecutive daily calls (no new measurement)? Store or skip? | Product/Client | Open |
| 5 | What is the monthly average aggregation threshold for hydrographs? (e.g., aggregate data older than 6 months, 1 year?) | Product/Client | Open |
| 6 | Should the configuration dashboard support adding entirely new provider types (new API root URL + auth pattern), or is that a developer task? | Engineering | Open |
| 7 | Who should receive failed-reading alert emails? Individual well owners, all GCD admin staff, or configurable per well? | Product/Client | Open |

9. Timeline Considerations

- **Hard dependency:** Signal Fire API documentation and credentials must be obtained before Signal Fire integration work can begin. In Situ integration can proceed independently.
- **Phasing recommendation:** Phase 1 delivers core automated collection, configuration dashboard, and query tool integration for the existing 7 In Situ wells and 19 anticipated Signal Fire wells. Phase 2 adds Signal Fire support for the map inset and hydrograph aggregation.
- **Infrastructure decision:** The Hangfire vs. Azure Functions decision should be made before development begins, as it affects the scheduling architecture.
- **Well deployment:** The 19 Signal Fire wells are being deployed on a separate timeline. Integration development should be ready before or concurrent with their activation.