Real-Time Water Quality Report

Grieg NL Nurseries Ltd Monitoring Well

Deployment:
August 21, 2025 to November 24, 2025

Newfoundland Labrador

Government of Newfoundland & Labrador
Department of Environment, Conservation & Climate Change
Water Resources Management Division

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Grieg Monitoring Well

The Water Resources Management Division (WRMD) in partnership with Grieg NL Nurseries Ltd, maintain a real-time water quality groundwater monitoring station. The station is located near the Marystown YMCA and Track and Field Complex.

Grieg Seafood has two wells: a main production well that provides new water to the facility as needed; and a monitoring/backup well that houses the WRMD monitoring equipment. Both wells are functioning in good condition. In the event of a catastrophic failure of the main well, the monitoring well can serve as a backup.

To ensure the pump installed in the monitoring/backup well is functioning, the pump is operated periodically. Due to the groundwater well sharing its aquifer with the main pumping well, variations in the water parameters could be a result of pumping from either well. The water monitoring equipment, a YSI EXO1, is not removed during the pump test and as a result, there may be disruptions to the water quality data for a short period of time. Data can also be disrupted during routine calibration and maintenance of equipment by WRMD.

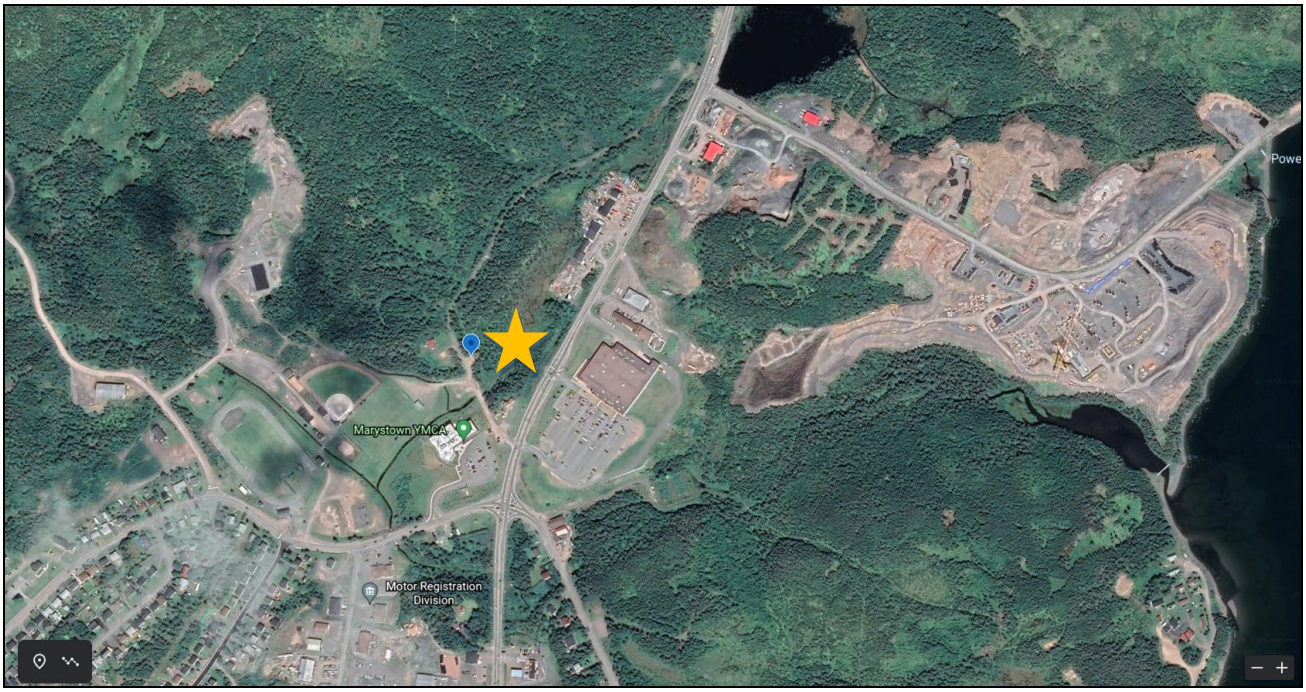

Figure 1: Location of Real-Time Groundwater Well

Figure 2: Hut Structure for groundwater well

Figure 3. View standing in front of well looking toward main road in Marystown, NL

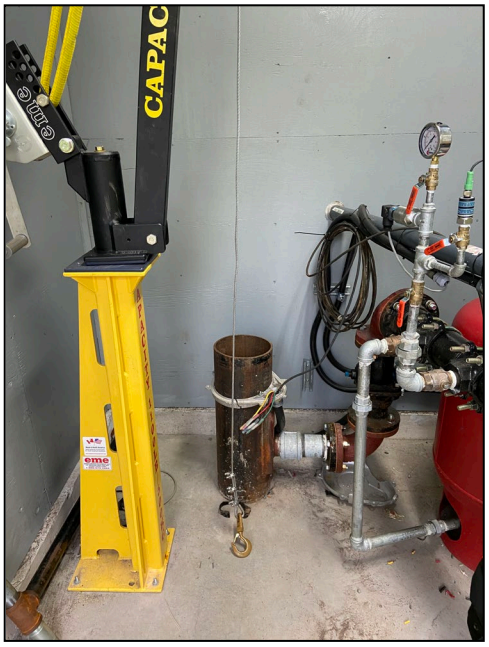

Figure 4: Well Casing in the hu

Figure 5: View looking into well

Quality Assurance and Quality Control

WRMD staff (Environment, Conservation & Climate Change (ECCC)) are responsible for maintenance of the real-time water quality monitoring equipment, as well as recording and managing the water quality data. Grab samples are collected at the beginning of each deployment period to compare against the initial in-situ logged data. The samples are collected from an internal tap located in the station hut. Grab samples complement the real-time data and provide an extra source of water quality data for comparisons when tracking changes over time at the station (Table 1). Combining both types of data can offer a more comprehensive understanding of water quality.

Initial in-situ instrument measurements are recorded shortly after the freshly calibrated instrument is deployed. The limited time for the sonde to reach equilibrium with its surroundings can occasionally lead to variations in values between grab sample results and instrument measurements.

Table 1: Comparison of the In-Situ instrument vs. Grab Sample Results at deployment of new instrument

Date	Parameter	Grab Sample Result	In-Situ Result
Deployment: August 21, 2025	**pH (pH units)**	8.01	7.57
	Specific Conductivity (µS/cm)	320	334.2
Removal: November 24, 2025	**pH (pH units)**	8.00	7.58
	Specific Conductivity (µS/cm)	290	276.0

Water Temperature

Between August 21, 2025, to November 24, 2025 the water temperature fluctuated within the range of 7.39°C to 7.58°C, as illustrated in Figure 6. The average water temperature across the deployment was at 7.48°C.

The water temperatures remain consistent throughout the deployment. Due to the depth of the instrument in the well, there is very little influence from air temperatures on the water, therefore there is minimal variance between the minimum and maximum values.

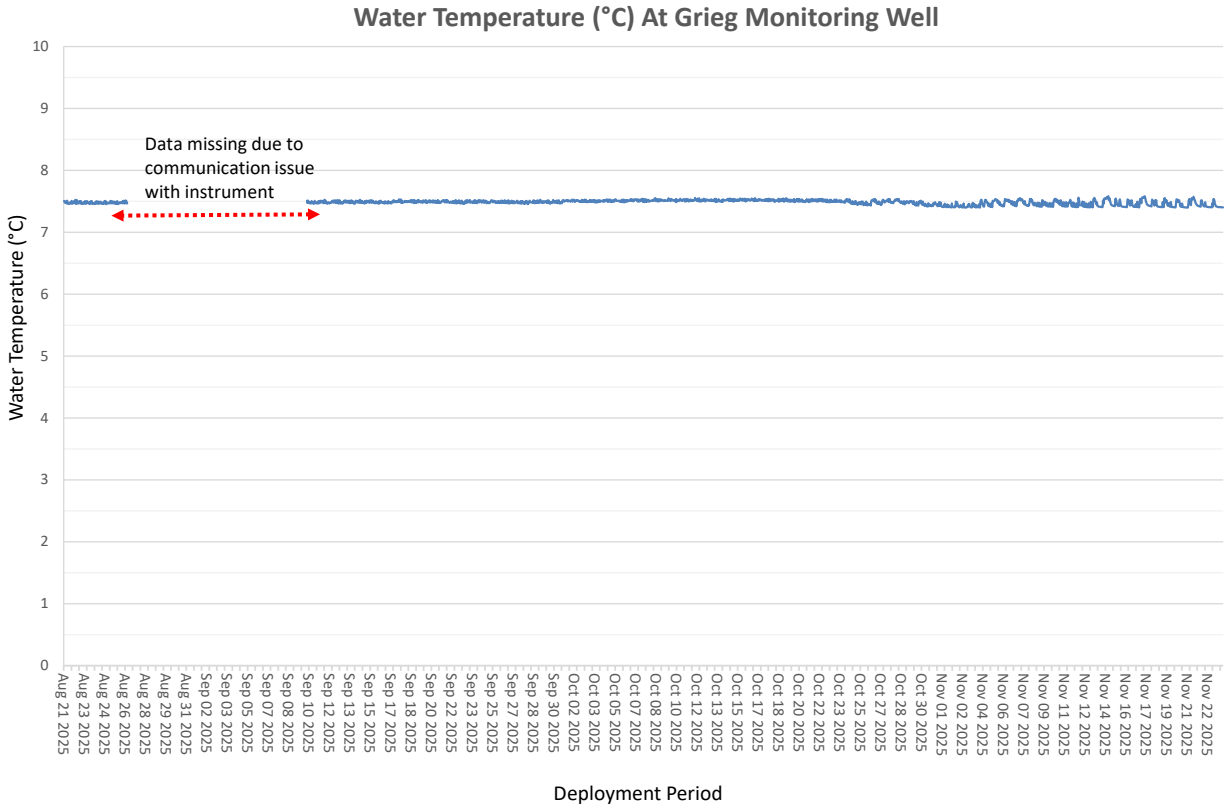

Figure 6: Water temperature (°C) values

pH

Between August 21, 2025, to November 24, 2025 pH values exhibited a range from 7.51 pH units to 7.75 pH units. Throughout the deployment, pH remained reasonably consistent, with an average of 7.60 pH units.

A pH sensor measures the acidity or alkalinity of a water body and is a measure of the concentration of hydrogen ions (H^+) in a solution. Minor pH fluctuations were likely a consequence of aquifer pumping activities. The well's refilling process and subsequent level adjustments led to temporary variations in pH levels, as depicted in Figure 7.

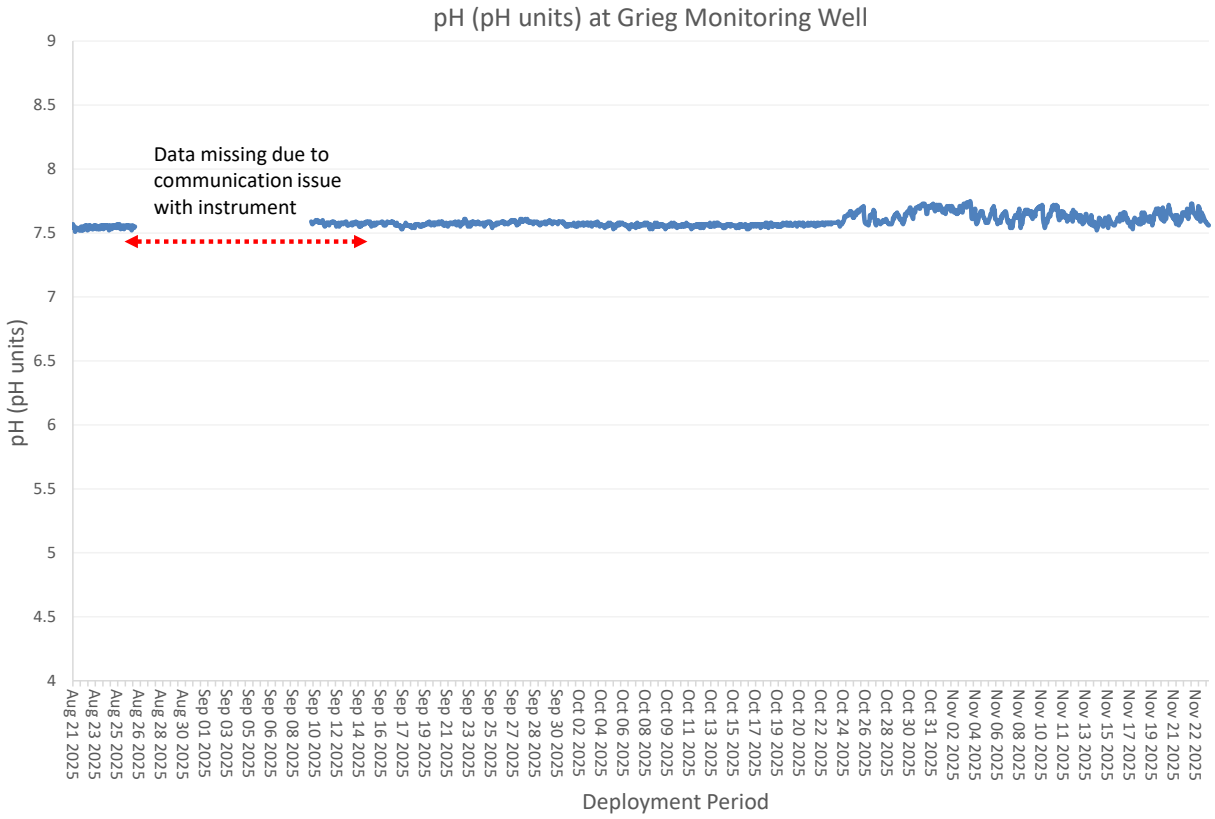

Figure 7: pH (pH units) values

Specific Conductivity & Total Dissolved Solids (TDS)

Throughout the deployment, conductivity levels were within 260.3 µS/cm and 351.94 µS/cm (Figure 8), with an average of 303 µS/cm. The specific conductivity probe measures the presence of diluted salts and inorganic materials in a water source. In instances where there is minimal or no external influence, the conductivity in the groundwater well remains relatively stable, experiencing minimal fluctuations (Figure 8). Elevated spikes in conductivity are likely attributed to pumping activities and disturbances within the aquifer which can disrupt the water column (Figure 9).

Total Dissolved Solids data is derived from the specific conductivity data. The water quality instrument is programmed to calculate an estimated TDS value from a conductivity value. TDS data will mirror the movement of the specific conductivity data, however the TDS is calculated in g/L (Figure 10). For the deployment, TDS ranged within 0.17 g/L to 0.23 g/L.

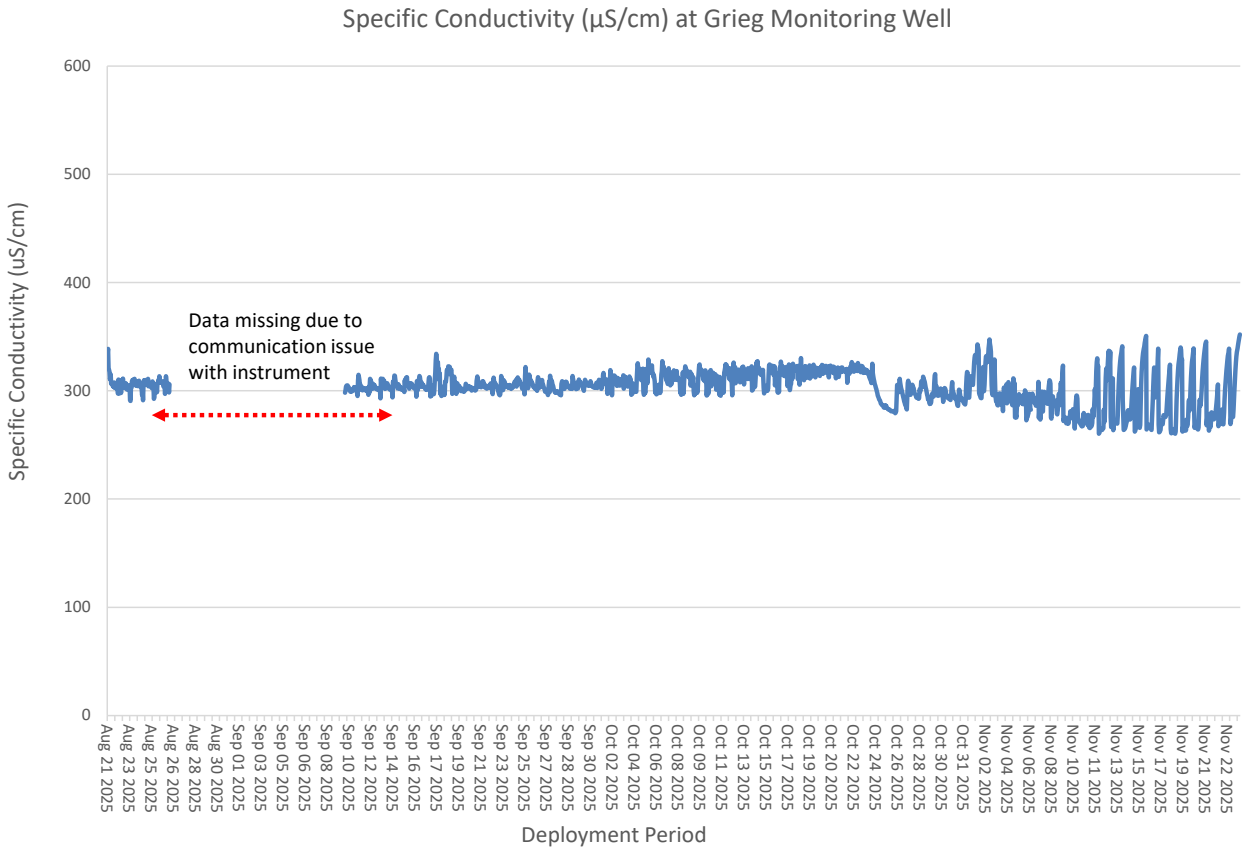

Figure 8: Specific conductivity (µS/cm) values

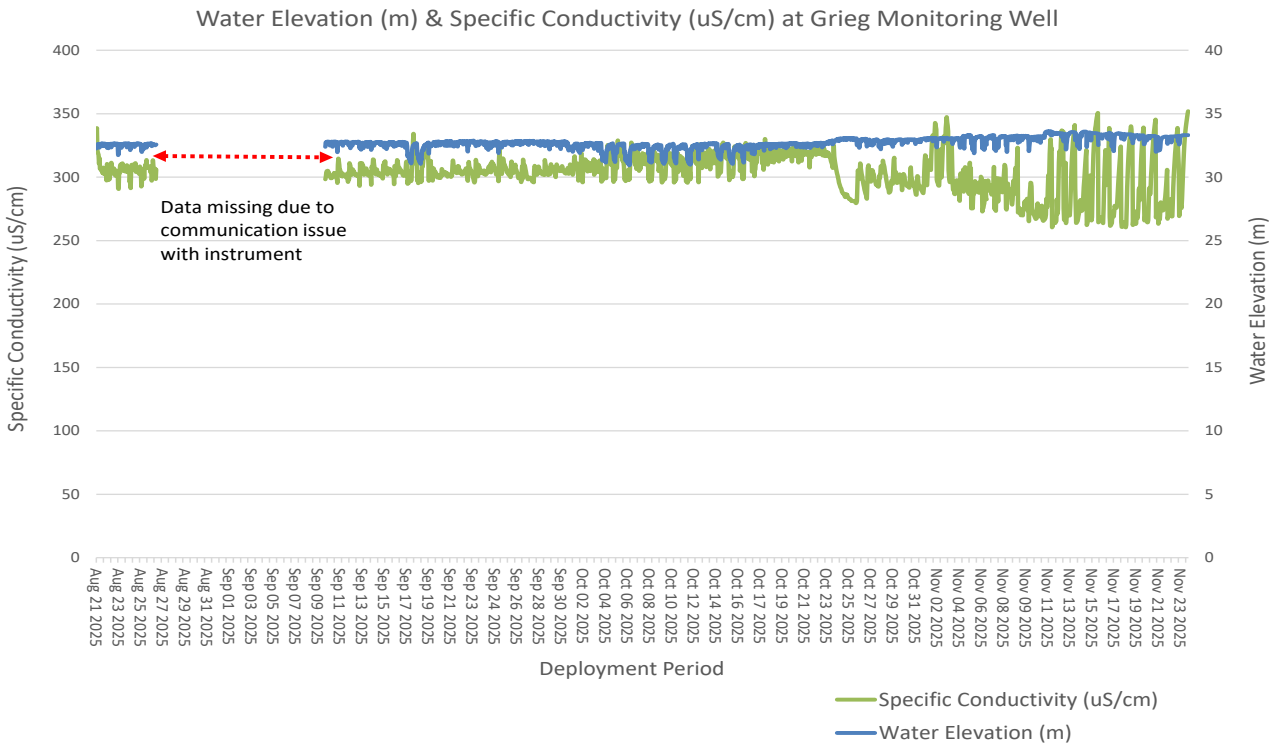

Figure 9: Water Elevation & Specific Conductivity

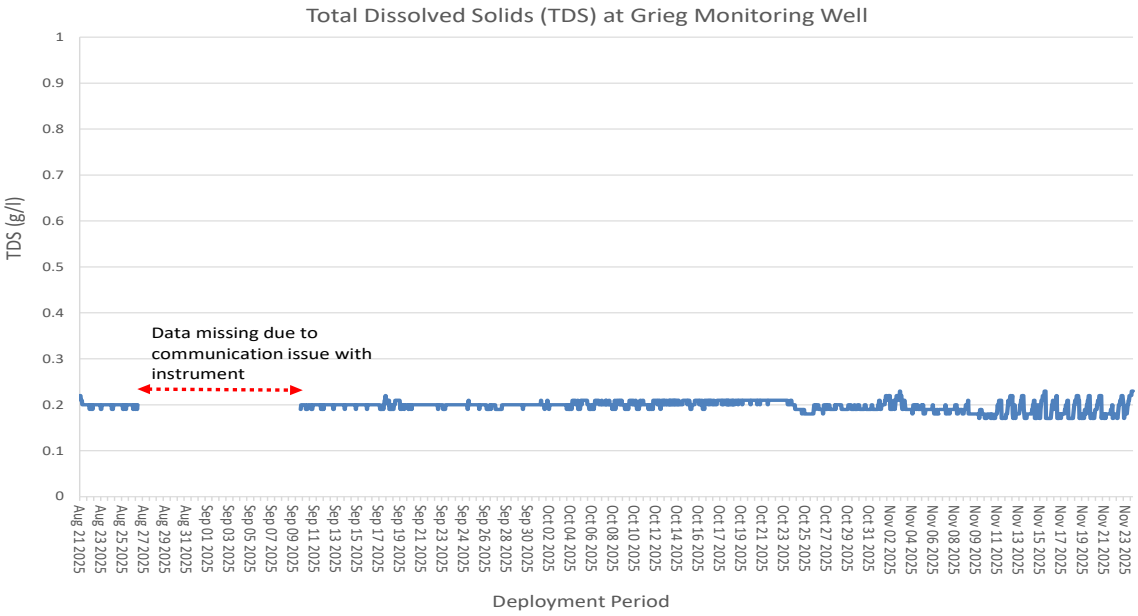

Figure 10: Total Dissolved Solids (TDS)

Oxidation-Reduction Potential (ORP)

ORP levels during the deployment ranged within 87.7 mV to 375.6 mV, with an average of 336.2 mV. As expected, due to periodic pumping of the well, fluctuations in ORP levels were observed, but values generally remained within typical ranges over the course of the deployment. The variations in ORP values throughout the deployment are visually evident in Figure 11, showcasing dips and increases. It's worth noting that ORP can take days to weeks to equilibrate in groundwater, which may explain the lower values observed at the beginning of the deployment period.

ORP, measuring the oxidizing-reduction potential of groundwater, plays a crucial role in identifying the mobility and persistence of contaminants that could impact water quality. The values can be influenced by local conditions, the presence of specific contaminants, and the geochemical characteristics of the aquifer. Natural aquifer materials may release specific chemicals, leading to concentration changes over time. pH and ORP are inversely related, therefore pH can also play a role in influencing ORP (Figure 12). ORP values are unique to each water body and collecting background data is essential for understanding the significance of changes in the data and their potential implications.

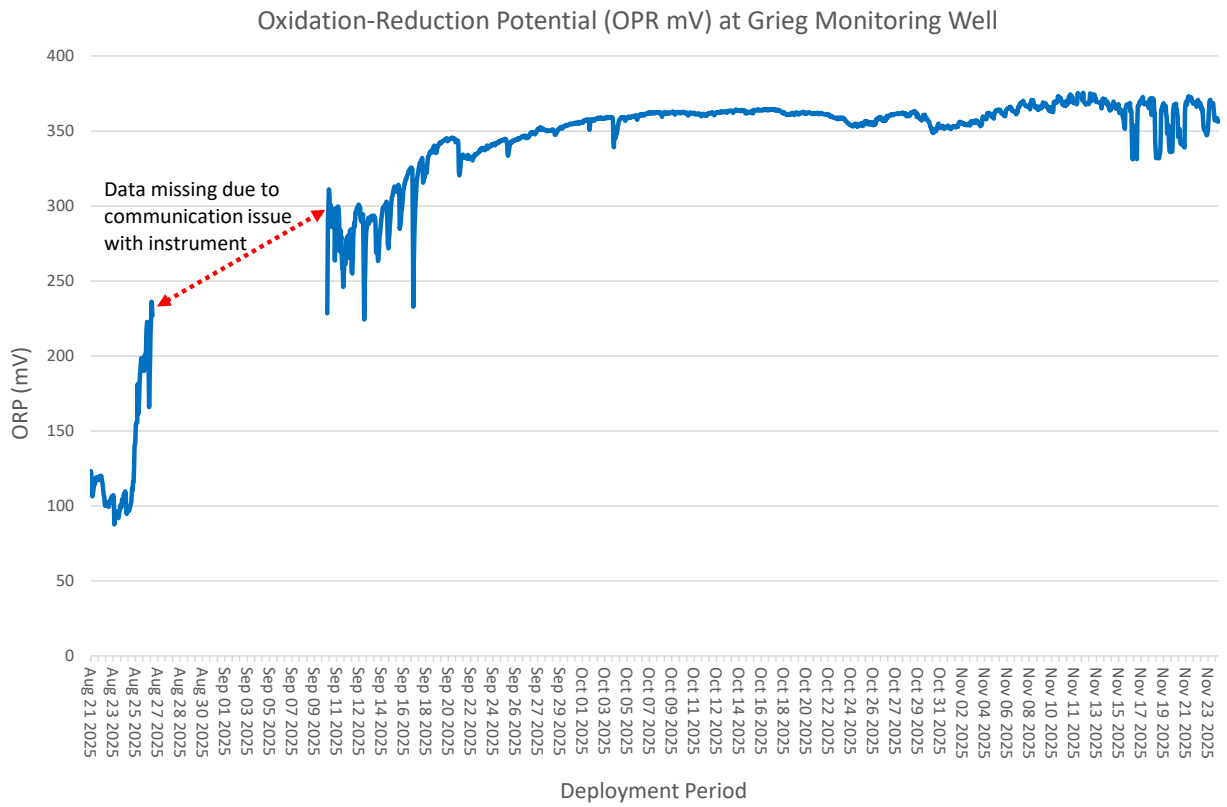

Figure 11: ORP values (mV)

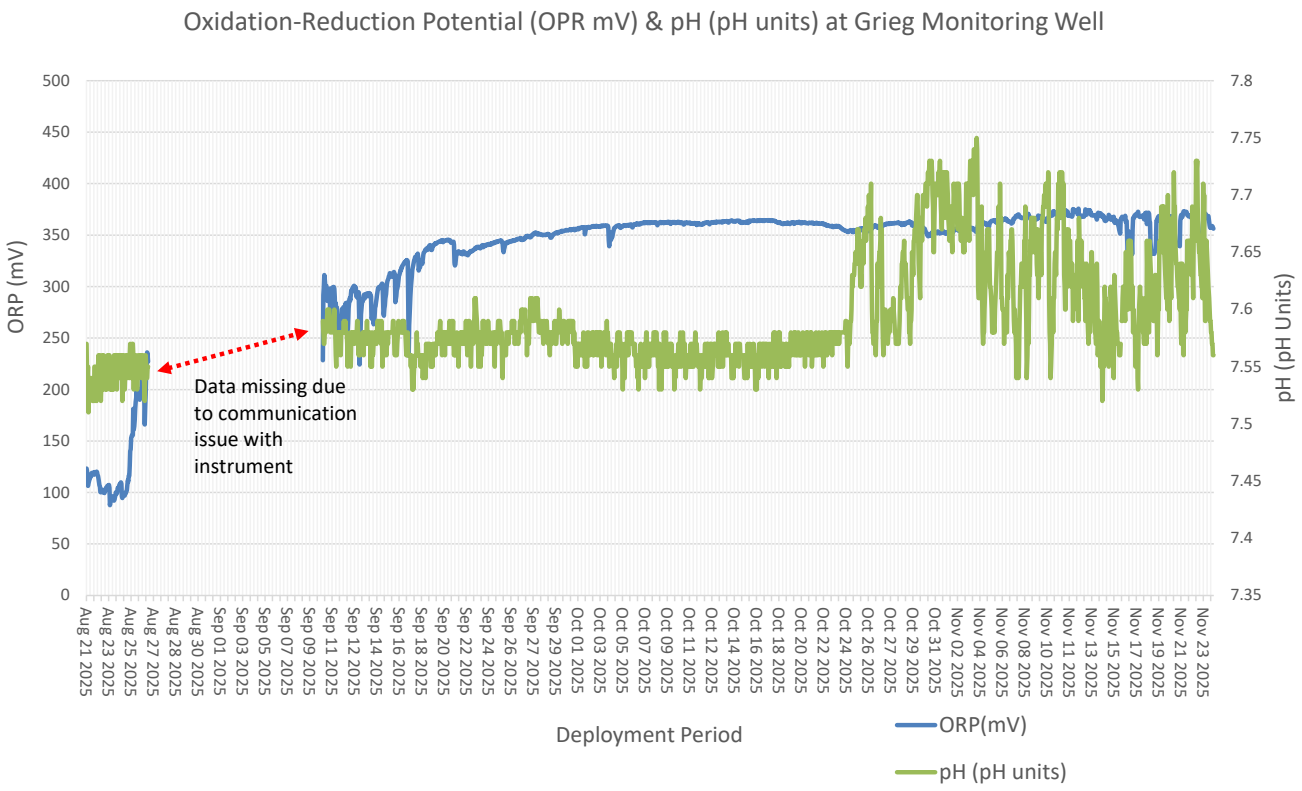

Figure 12: ORP (mV) graphed with pH (pH units) at Grieg Monitoring Well

Water Elevation

Water Elevation monitors the height of the water surface in the well measured to an assumed datum. Water Elevation at the monitoring well, ranged within 30.9 m to 33.6 m throughout the deployment, with an average of 32.7 m. Generally, the water elevation within this groundwater well remains constant. This well and its aquifer are intermittently accessed through pumping. There will be fluctuations in water elevation during deployment (Figure 13). Despite the larger dips in water elevation, the range of the elevation was reasonably consistent across the deployment.

Fluctuations in the water elevation do influence the other water parameters covered in this report. Figure 14 displays this relationship.

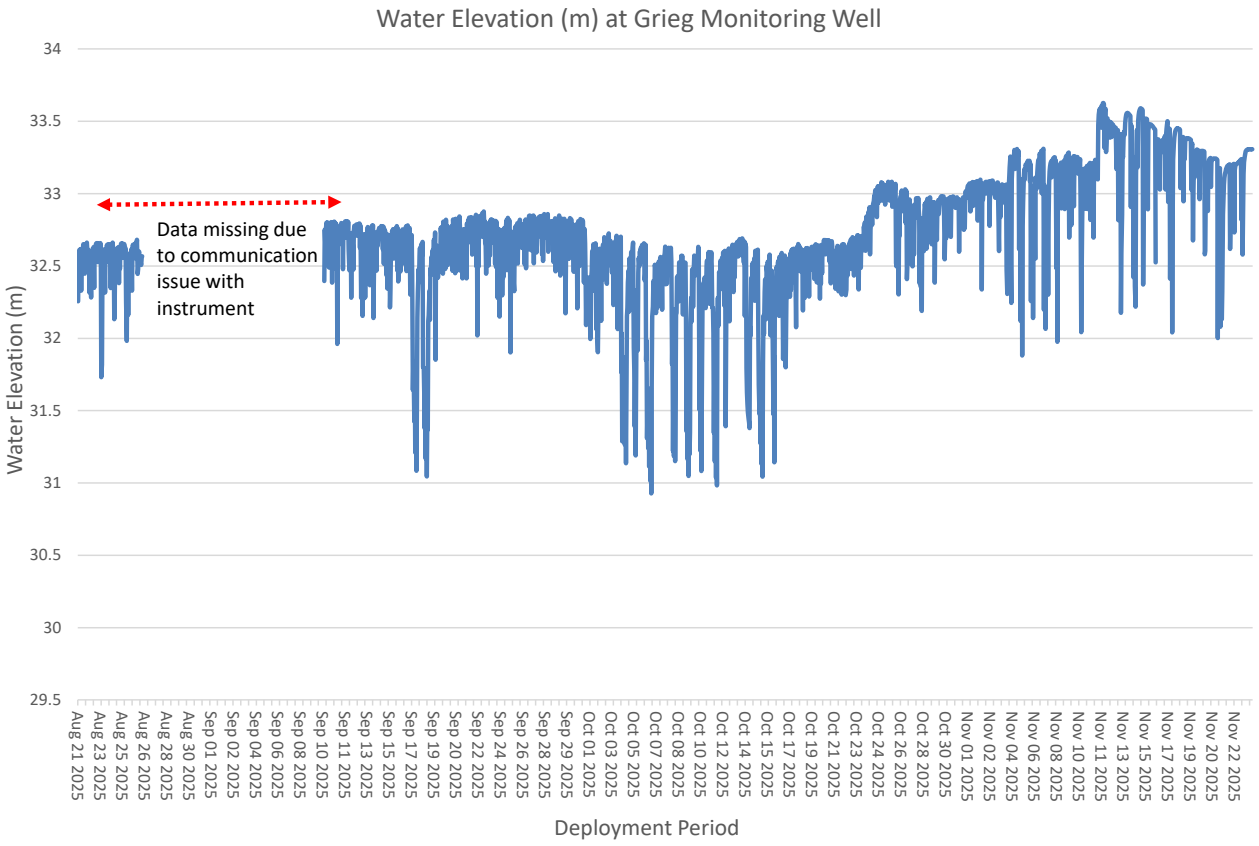

Figure 13: Water Elevation (m)

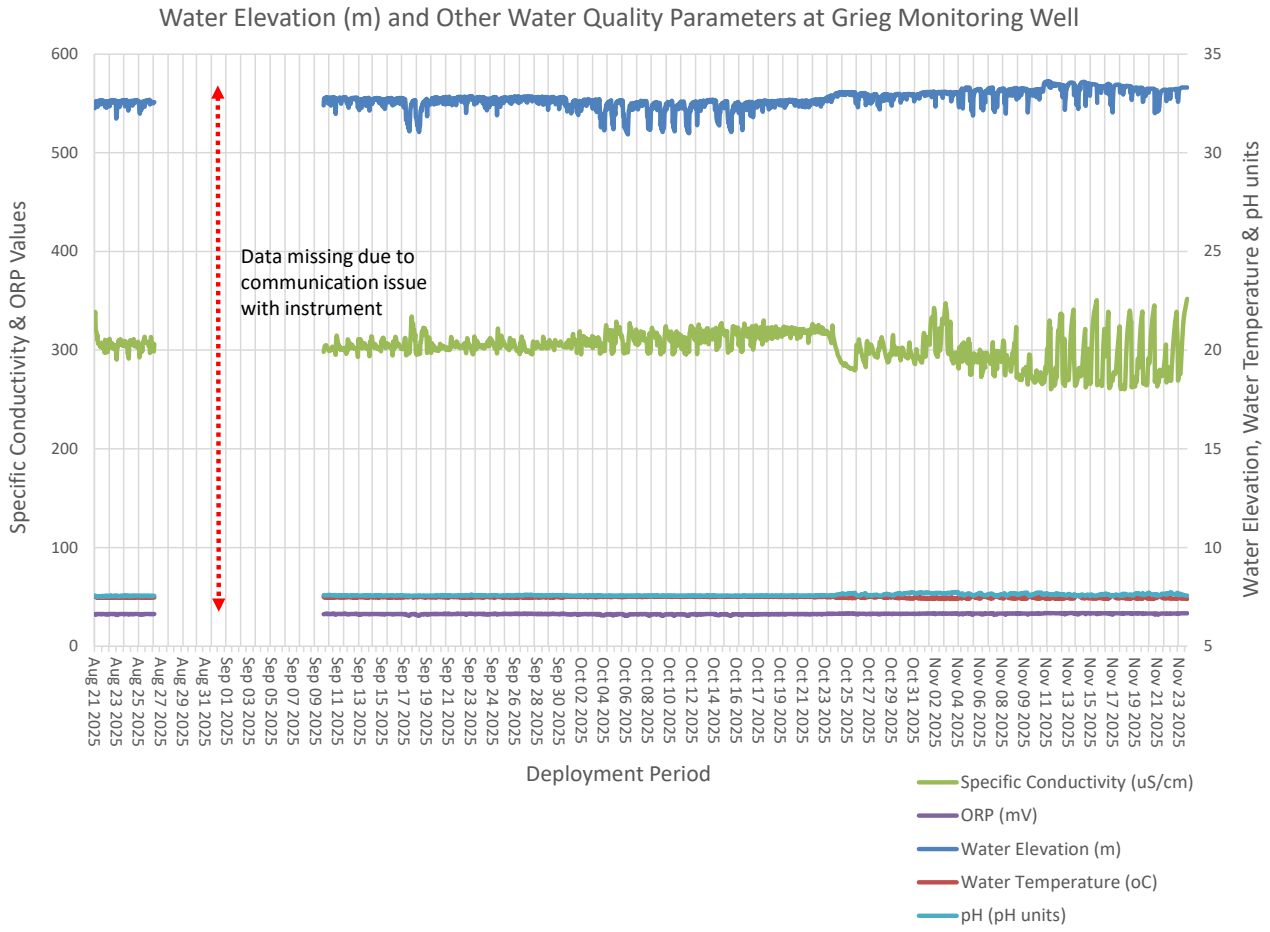

Figure 14: Water Elevation (m) and other water quality parameters.

Appendix I

Water Quality Statistics for Grieg Groundwater Well

Table 1: Water Quality Statistics for Grieg: August 21, 2025, to November 24, 2025

Water Quality Parameters	Minimum	Maximum	Median	Mean
Water Temperature (°C)	7.4	7.6	7.5	7.5
pH (pH Units)	7.5	7.8	7.6	7.6
Specific Conductivity (µS/cm)	260.3	351.9	304.4	303.0
Total Dissolved Solids (g/L)	0.2	0.2	0.2	0.2
ORP (mV)	87.7	375.6	358.2	336.2
Depth	31.2	33.6	32.9	32.9
Water Elevation (m)	30.9	33.6	32.7	32.7