



# Real-Time Water Quality Report

## Grieg NL Nurseries Ltd Monitoring Well

Deployment Period:  
November 23<sup>rd</sup>, 2022 to March 7<sup>th</sup>, 2023



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

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## General

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, NL YMCA and Track and Field Complex.

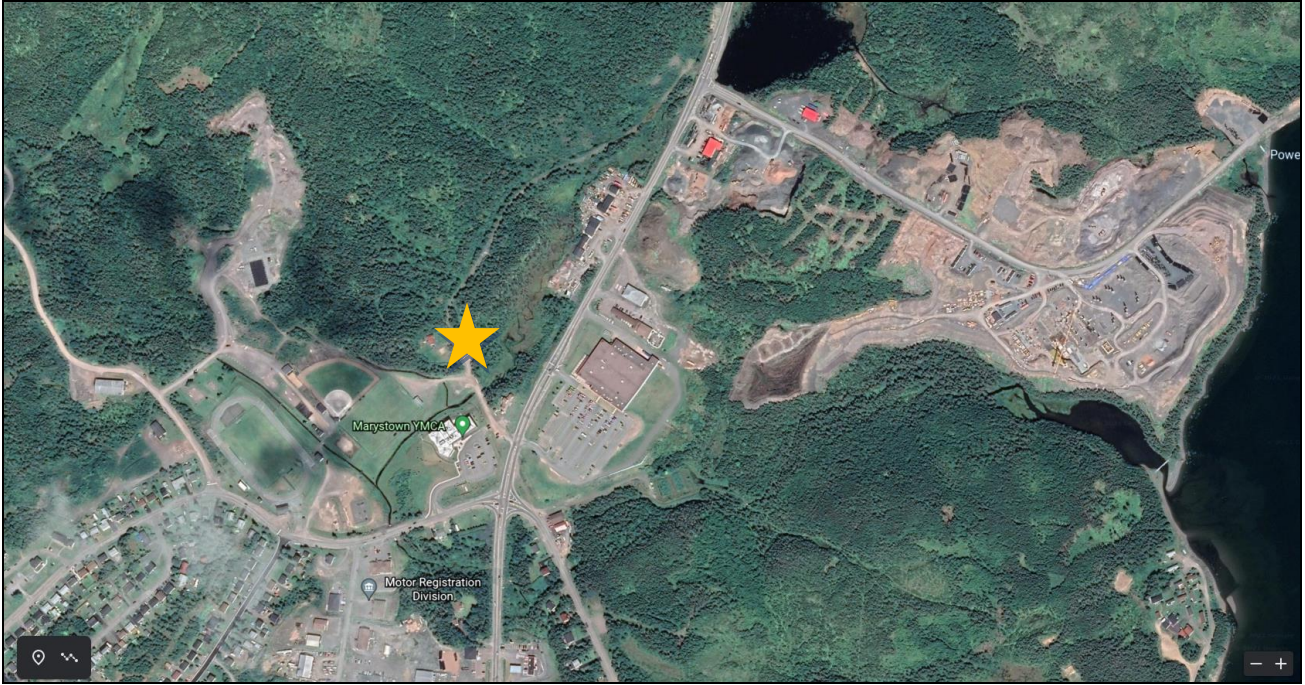


Figure 1: Location of Real-Time Groundwater Well



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 hut



Figure 5: View looking into well

### Deployment Issues November 23<sup>rd</sup>, 2022 to March 7<sup>th</sup>, 2023

Due to power issues encountered at the station and lack of logfile due to instrument malfunction, the following report only covers data for November 23<sup>rd</sup>, 2022 to February 18<sup>th</sup>, 2023 when the station last transmitted data. Unfortunately, there is no data available for February 19<sup>th</sup>, 2023 to March 7<sup>th</sup>, 2023.

## Quality Assurance and Quality Control

WRMD staff (Environment & Climate Change (ECC)) 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. Grab samples compliment 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).

It should be noted that the temperature sensor on any sonde is the most important. All other parameters can be divided into subgroups of temperature dependent, temperature compensated and temperature independent. Due to the temperature sensor's location on the sonde, the entire sonde must be at a constant temperature before the temperature sensor will stabilize. The values may take some time to adjust to the appropriate reading.

### Status of Station

Grieg Seafood has two available 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. To ensure the pump installed in the monitoring/backup well is functioning, the pump is started periodically (about once per week). The WRMD's monitoring equipment is not removed during the pump test and as a result may disrupt the water parameter recordings. This groundwater well shares its aquifer with the main pumping well for the hatchery and variations in the water parameters could be a result of pumping from either well.

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**

Parameter of Comparison	In-Situ Instrument	Grab Sample Result	Comparison Ranking
pH (pH units)	7.3	7.93	Fair
Specific Conductivity ( $\mu\text{S}/\text{cm}$ )	310.33	300.00	Good

**Table 2: QAQC Comparison Ranking Chart**

Parameter	Excellent	Good	Fair	Marginal	Poor
pH (pH units)	$\leq \pm 0.2$	$> \pm 0.2$ to 0.5	$> \pm 0.5$ to 0.8	$> \pm 0.8$ to 1	$> \pm 1$
Specific Conductivity ( $\mu\text{S}/\text{cm}$ )	$\leq \pm 3$	$> \pm 3$ to 10	$> \pm 10$ to 15	$> \pm 10$ to 15	$> \pm 20$
Specific Conductivity ( $\mu\text{S}/\text{cm}$ ) > 35 (%)	$\leq \pm 3$	$> \pm 3$ to 10	$> \pm 10$ to 15	$> \pm 10$ to 15	$> \pm 20$

## Grieg Monitoring Well

### Water Temperature

Water temperature ranged from 7.28°C to 7.53°C during the deployment period (Figure 6). The average water temperature across the deployment is 7.39°C.

Grieg's monitoring station is a groundwater well; generally, the water temperatures will remain consistent throughout the deployment. This is evident during this deployment with the small range between minimum and maximum values.

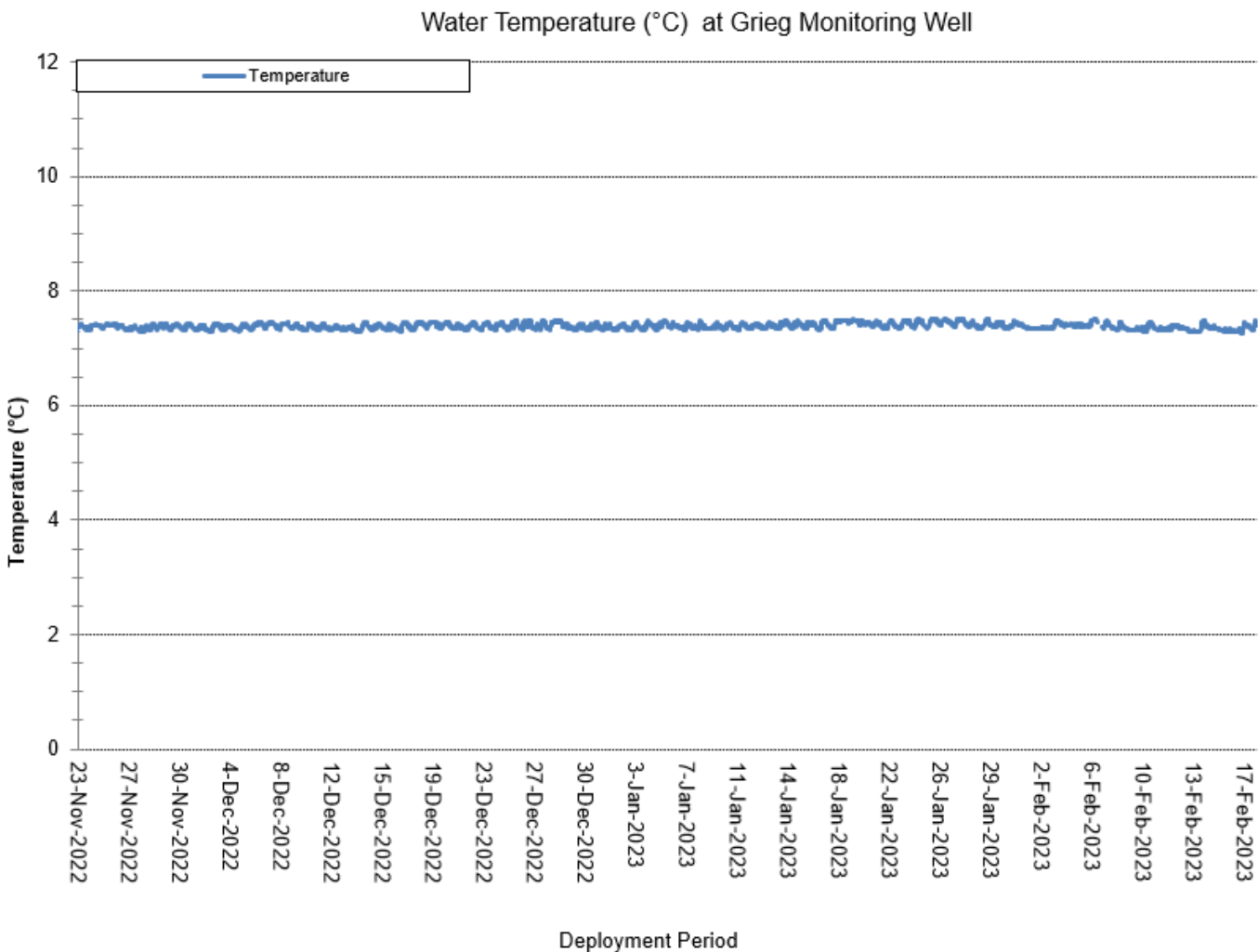


Figure 6: Water temperature (°C) values

### pH

Throughout the deployment period, pH values ranged between 7.19 pH units and 7.77 pH units. The pH data remained consistent for the duration of the deployment, with an average of 7.53 pH units.

Small changes in pH were likely the result of pumping within the aquifer. As the well refills and the level adjusts, there will be movement in the pH levels for a short period of time (Figure 7).

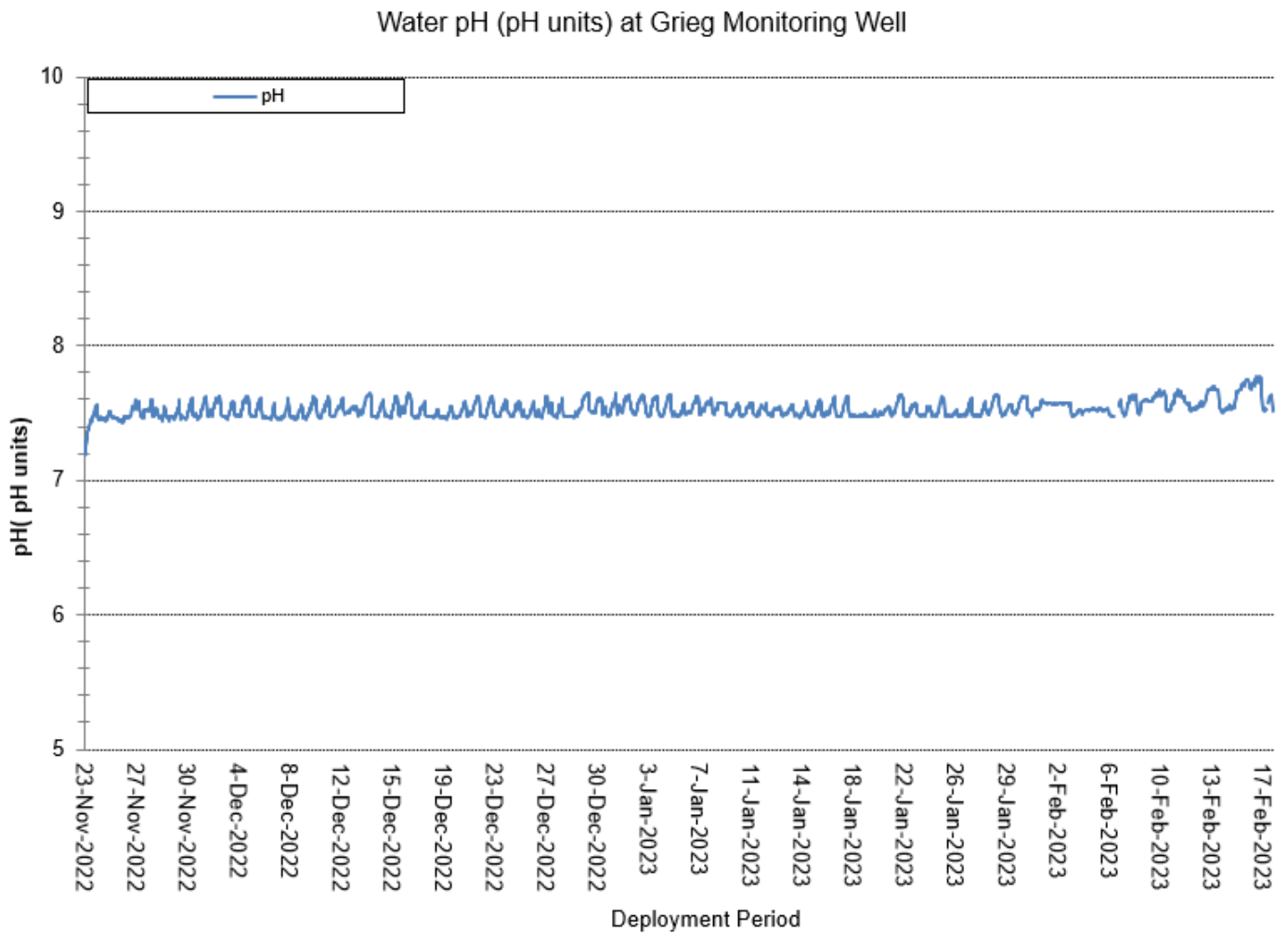


Figure 7: pH (pH units) values at Grieg Monitoring Well

### Specific Conductivity & Total Dissolved Solids (TDS)

During the deployment, conductivity levels were within 267.94  $\mu\text{S}/\text{cm}$  and 342.09  $\mu\text{S}/\text{cm}$ , with an average of 283.56  $\mu\text{S}/\text{cm}$  (Figure 8). The water quality instrument is programmed to calculate an estimated TDS value from a conductivity value. For the deployment period, TDS ranged within 0.18 g/L to 0.22 g/L with an average of 0.18 g/L (Figure 9).

Due to minimal or no influence from an outside source, the conductivity in groundwater well is generally stable. Any significant changes in the conductivity data at this site are likely due to pumping the well and any associated movement of the equipment in the well casing. Pumping can disrupt the diluted salts and inorganic materials that are present in the groundwater. A notable increase in conductivity was observed on January 10th, 2023, the same time as a decrease to the water level in the well casing (Figure 8). This could indicate that water was being pumped from the aquifer at this time.

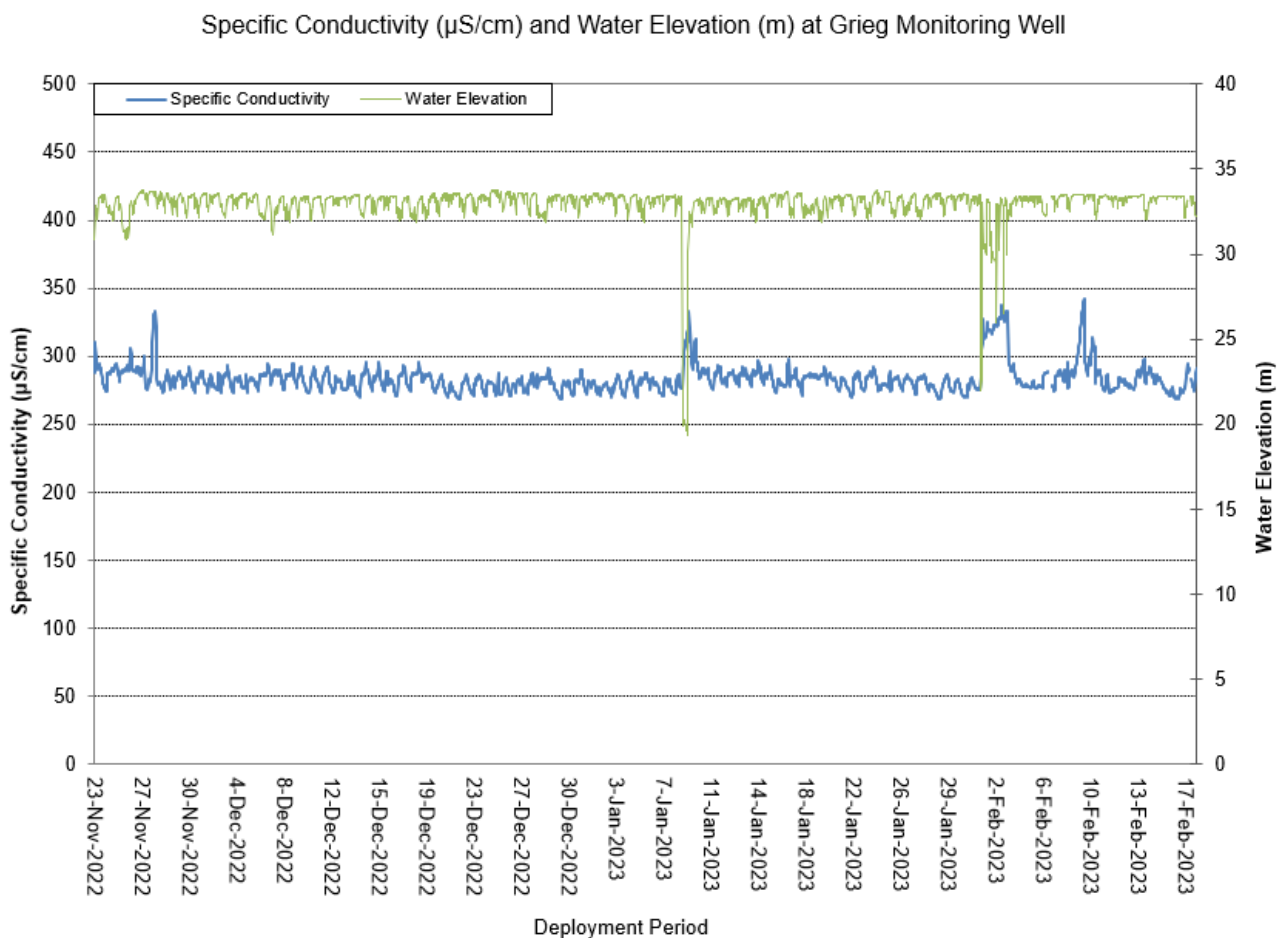


Figure 8: Specific conductivity ( $\mu\text{S}/\text{cm}$ ) and water elevation (m) at Grieg Monitoring Well



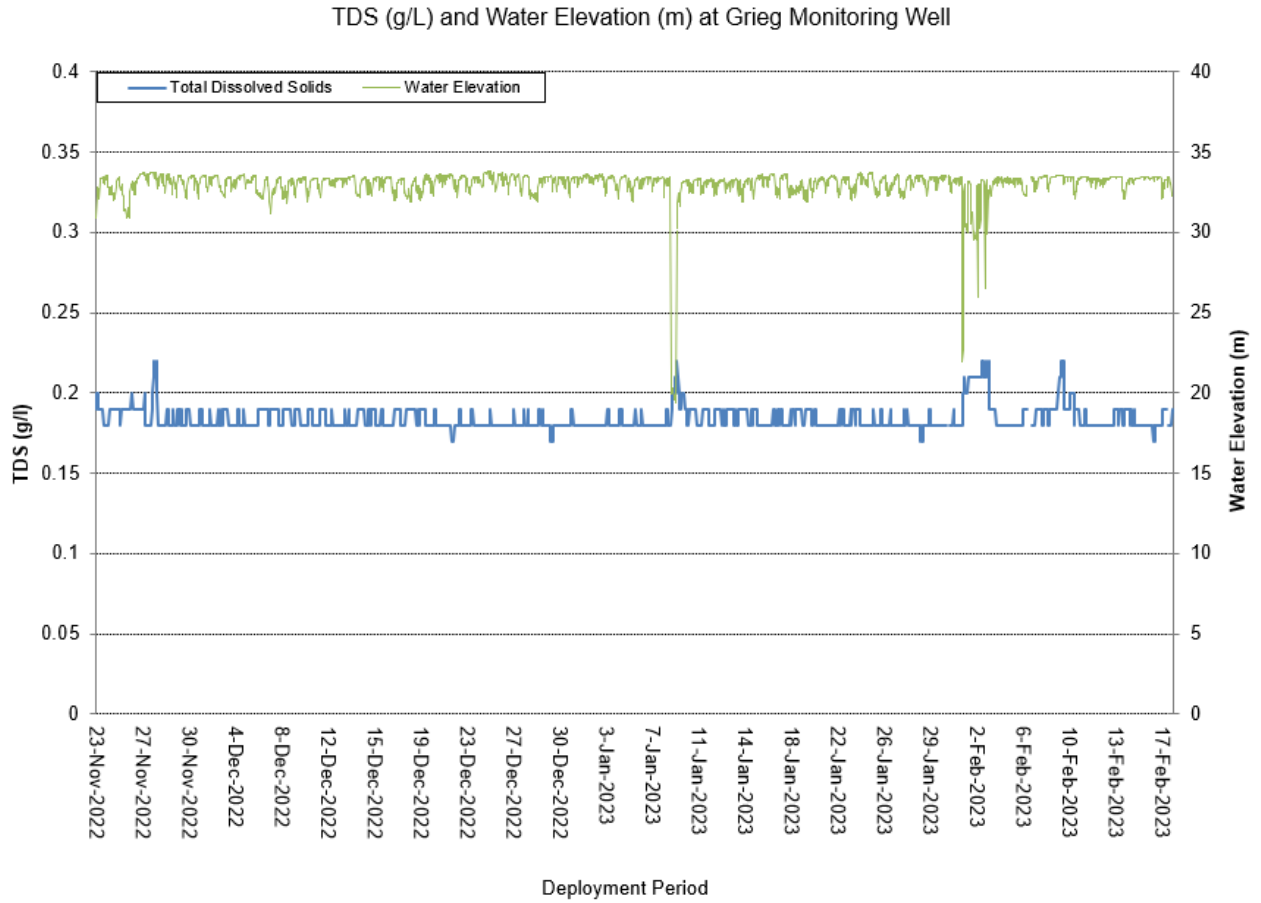
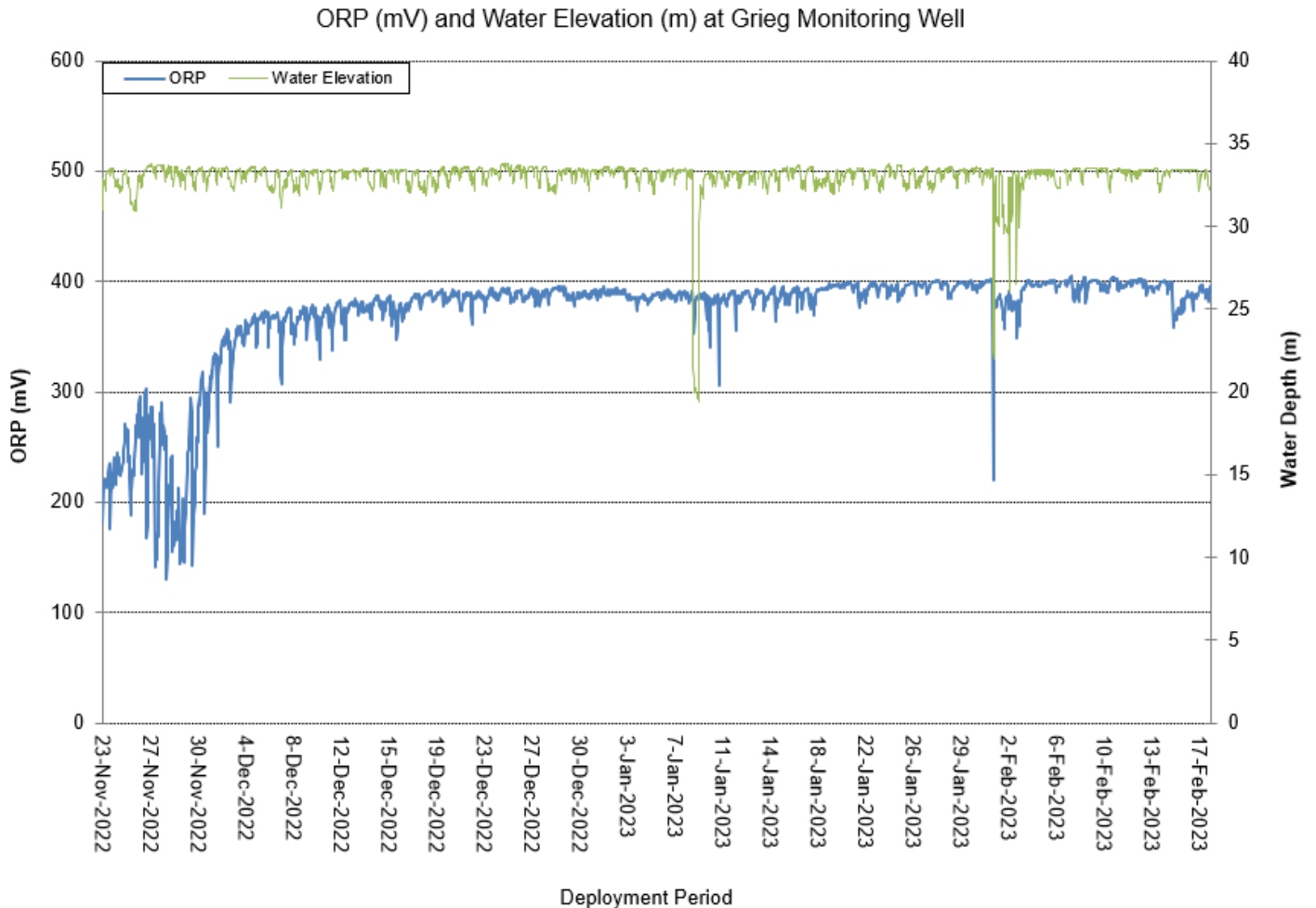


Figure 9: Total Dissolved Solids -TDS- (g/L) and water elevation (m) at Grieg Monitoring Well

### Oxidation-Reduction Potential (ORP)

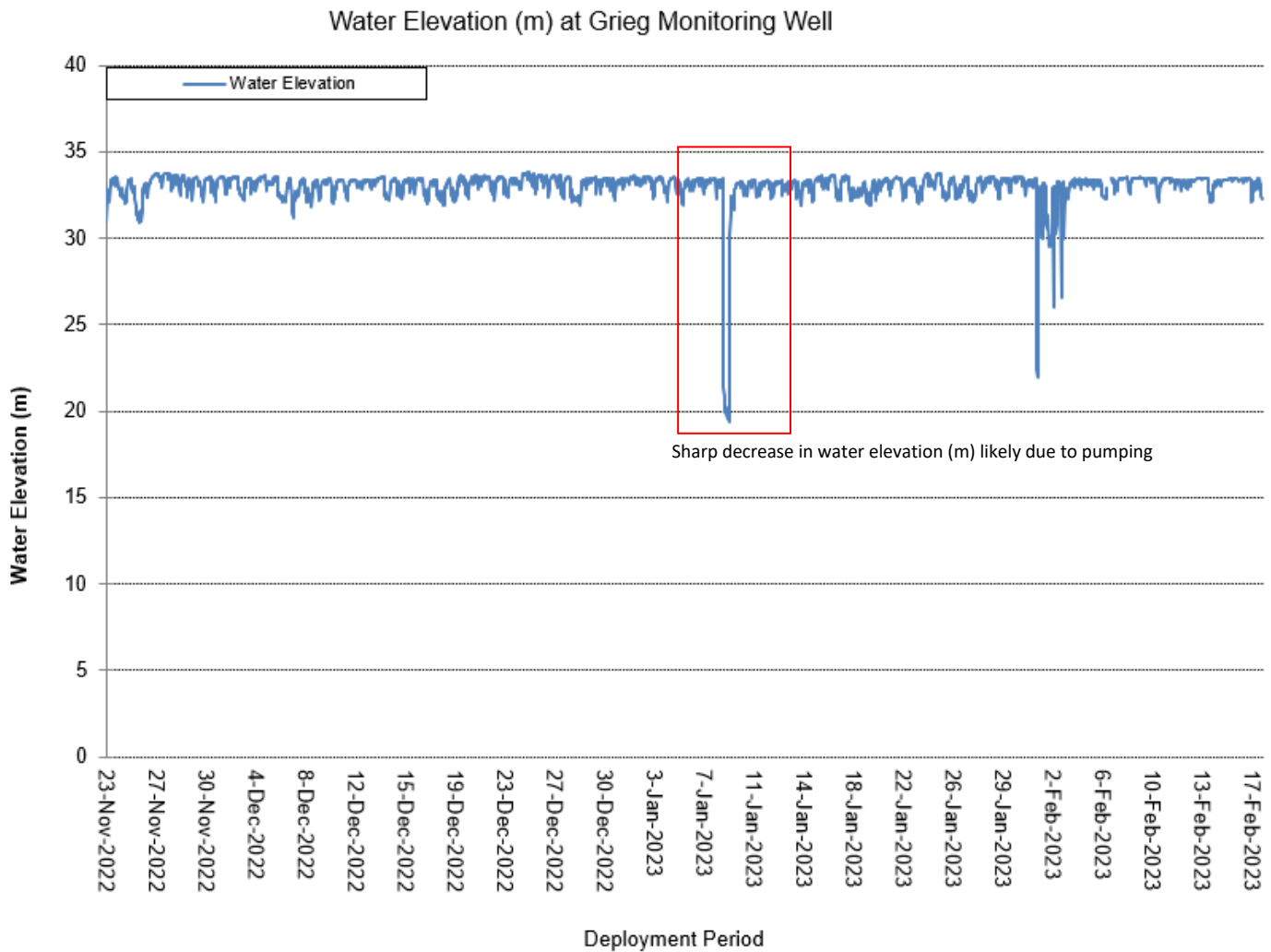
Oxidation-Reduction Potential (ORP) levels during the deployment ranged within 129.60 mV to 404.50 mV, with an average of 369.64 mV (Figure 10). Due to the disruption of the well with frequent pumping of the aquifer, it is expected that the ORP would fluctuate. The changes across the deployment are evident on Figure 10 as the ORP values rise and fall.



**Figure 10: ORP values (mV) at Grieg Monitoring Well**

### Water Elevation

Water elevation at the monitoring well, ranged within 19.38 m to 33.79 m, with an average of 32.98 m. Generally, water elevation within a groundwater well is consistent if the water is not drawn for use. The well is intermittently pumped, therefore there will be variations in water level as noted on Figure 11. Aside from a couple larger dips in water elevation, the range of the elevation was reasonably consistent across deployment.



**Figure 11: Water Elevation (m) at Grieg Monitoring Well**

## **Appendix I**

### Water Quality Statistics of Grieg Groundwater Well

Parameter	Max	Min	Median	Mean
Temperature('C)	7.53	7.28	7.38	7.39
pH	7.77	7.19	7.52	7.53
Specific Conductivity ( $\mu$ S/cm)	342.1	267.9	282.4	283.5
TDS (g/ml)	0.2200	0.1700	0.1800	0.1844
ORP (mV)	404.50	129.60	386.90	369.64
Water Elevation (m)	33.79	19.38	33.26	32.98