

2023 Annual Report, Hall's Glen Waste Transfer Station



Provisional Compliance Approval No. A341004

March 26, 2024

Prepared for:

The Corporation of the Township of Douro-
Dummer

Cambium Reference: 12987-002

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Executive Summary

The Hall's Glen Waste Transfer Station is owned and operated by the Township of Douro-Dummer under Ministry of the Environment, Conservation and Parks Provisional Certificate of Approval No. A341004. The site is on Lot 25, Concession 4, geographic Township of Dummer, Township of Douro-Dummer, County of Peterborough. The municipal address is 1951 County Road 6, about 10 km north of the community of Warsaw. The total site area is 48.5 ha and has an approved landfill area of 1.0 ha. Closure activities were completed at the site from 2003 to 2005. Currently, the site operates as a non-hazardous solid waste and materials transfer station.

This report presents the results of the 2023 activities that were completed at the Hall's Glen Waste Transfer Station. The report and activities have been completed and reported on in general conformance with the November 2010 Ministry of the Environment Technical Guidance Document entitled "*Monitoring and Reporting for Waste Disposal Sites – Groundwater and Surface Water*". The "*Monitoring and Screening Checklist*" is provided in Appendix A.

Natural attenuation is occurring at the site as concentrations decreased with distance from the waste mound. Non-waste related sources may be influencing groundwater quality in some areas of the Site.

A supplemental monitoring program for the analysis of Per- and Polyfluoroalkyl Substances at select wells was completed in 2023. There were no detectable Per- and Polyfluoroalkyl Substances concentrations at any down-gradient wells installed in the upper bedrock aquifer. The only detectable Per- and Polyfluoroalkyl Substances concentrations were at MW10-1, MW11-1, and R1; however, the signature was dissimilar to the leachate characterization. This suggests that there is a potential non-waste related source contributing to the down-gradient water quality. All Per- and Polyfluoroalkyl Substances concentrations in the down-gradient monitoring wells complied with the Canadian Drinking Water Guidelines and the Drinking Water Screening Values as prescribed by Health Canada.



Groundwater is interpreted to potentially discharge to surface down-gradient of the waste mound for at least a portion of the year. As such, groundwater results are compared against the Provincial Water Quality Objectives and Canadian Water Quality Guidelines. Results indicated minor impacts and were attributed, at least in part, to non-waste related sources such as saturated organic soils, decaying organic vegetation, and surrounding agricultural land use.

Groundwater samples collected from MW08, MW09, MW10, MW11, MW12, and R1 were used to assess compliance with Ministry Guideline B-7 - Reasonable Use. Although select parameters continued to exceed the compliance criteria, these exceedances were considered to be naturally occurring or attributed to a non-waste related source. Furthermore, the only parameter to continually exceed the Ontario Drinking Water Quality Standards is manganese which is an aesthetic objective.

A new down-gradient surface water monitoring station was established near monitoring well MW12 in 2023. Initial results indicated similar to or better water quality than the background quality. Downgradient surface water results at station S2 indicated a significant decrease in most parameter concentrations since the last sample collection.

About 1,010 tonnes of waste was accepted at the Site in 2023 and transferred to the Peterborough Waste Management Facility. About 95 tonnes of divertible materials (e.g., blue box recyclables, scrap metal, electronics, etc.) was collected at the Site.

The Township of Douro-Dummer operated the Hall's Glen waste transfer station in compliance with the Provisional Certificate of Approval in 2023.

Recommendations have been made regarding the future operation of the Hall's Glen waste transfer station and work to be completed in 2024.



Respectfully submitted,

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1.0 Introduction

The Corporation of the Township of Douro-Dummer (Township) retained Cambium Inc. (Cambium) to complete the 2023 annual monitoring program for the Hall's Glen Waste Transfer Station (Site). The Site operates under the Ontario Ministry of the Environment, Conservation and Parks (Ministry) Provisional Certificate of Approval (PC of A) No. A341004, most recently amended August 22, 2016 (Appendix B).

To aid in the understanding of the history and development of the Site, the following information is included digitally in the report package:

- *Closure Report* (TSH, 2002a)
- *Design, Operations, Maintenance and Closure Report* (TSH, 2002b)
- *Historical Correspondence*

1.1 Site Location

The Site is on Lot 25, Concession 4, geographic Township of Dummer, Township of Douro-Dummer, County of Peterborough (Figure 1). The municipal address for the Site is 1951 County Road 6, about 10 km north of the community of Warsaw. The Universal Transverse Mercator (UTM) coordinates for the site entrance area Zone 17, 727911 m east, 4933207 m north, North American Datum 83.

1.2 Site Description

The Township has owned and operated the Site as a natural attenuation landfill since 1970. The PC of A which approved landfill operations was granted in 1980. Closure activities began in the summer of 2003, where the landfill area was mounded and capped. Final closure activities were completed from 2003 to 2005. An area of Fill Beyond Acceptable Limits (FBAL) on the north side of the waste mound was identified in Drawing 1 of the *Closure Report* (TSH, 2002a). It is understood that the Township addressed the FBAL in 2004 and 2005. To



Cambium's knowledge there is no FBAL at the Site. Currently the Site operates as a non-hazardous solid waste and materials transfer station.

The Site is in a rural area and is surrounded by agricultural fields and forest; surrounding land use is primarily passive agriculture. An abandoned residential dwelling and an old barn used for farm equipment storage is present near the southeast property boundary. Site details are in Embedded Table 1. A Local Topography Plan and an Existing Conditions Plan are included as Figure 2 and Figure 3, respectively.

Embedded Table 1 Site Details

Total Site Area	48.5 ha
Approved Area of Refuse Placement	1.0 ha

1.3 Scope of Work

The scope of the 2023 work program was based on the results of the 2022 groundwater monitoring program (Cambium, 2023), requirements outlined in the PC of A, and included:

- Groundwater elevation monitoring
- Surface water and groundwater sampling and analysis
- Evaluation of groundwater quality against the Ontario Drinking Water Quality Standards (ODWQS) and Reasonable Use Concept (RUC) values developed in accordance with Ministry Guideline B-7
- Evaluation of groundwater quality at select monitoring wells against the Provincial Water Quality Objectives (PWQO), the Canadian Water Quality Guidelines (CWQG) for the Protection of Aquatic Life and the British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife, & Agriculture (BCG)
- Evaluation of surface water quality against the PWQO, the CWQG, and the BCG
- An overview of site development and operations
- Preparation of this annual report



This report presents the results of the 2023 work program, provides an assessment of the current landfill impact on the surrounding groundwater and surface water environments, and a summary of the operational activities. Cambium has provided recommendations for the 2024 monitoring program and site operations based on the 2023 results and assessment. Furthermore, this report addresses the findings of the Ministry Inspection Report Gary Muloin, Senior Environmental Officer, Peterborough District Office conducted on May 12, 2023 (Appendix C).

1.3.1 Supplemental Work Program

The existing groundwater monitoring program is in the process of being redefined to reflect current environmental conditions. After on-going discussions between Cambium and the Ministry in 2022 and 2023, agreement was reached to enact changes to the approved monitoring program in a two-stage approach. Approval for Stage 1 reductions have been granted and are detailed in Section 2.1 and shown on Table 1. Further changes to the monitoring program (referred to as Stage 2 reductions – and not yet fully defined) would be contingent on a Per- and Polyfluoroalkyl Substances (PFAS) sampling program at select wells to delineate leachate impacts at the Site. The specific details of the PFAS sampling program are outlined in Section 2.6. Cambium personnel completed the PFAS monitoring program in October and December 2023. The results of the PFAS sampling program and the recommended changes to the approved monitoring program are outlined in Section 4.2 and 4.6.



2.0 Methodology

The 2023 work program was completed to maintain compliance with the PC of A and Ministry requirements. As such, the environmental monitoring work program was completed consistent with *Guidance Manual for Landfill Sites Receiving Municipal Waste* (MOEE, 1993), *Landfill Standards* (MECP, 2021) and *Monitoring and Reporting for Waste Disposal Sites, Groundwater and Surface Water, Technical Guidance Document* (MOE, 2010).

Field tasks were completed following Cambium's Standard Operating Procedures developed from recognized standard procedures such as those listed above and *Guidance on Sampling and Analytical Methods for use at Contaminated Sites in Ontario* (MOEE, 1996). A health and safety program was developed for site-specific conditions and all Cambium personnel working on the project were familiarized and required to follow the identified protocol.

Groundwater and surface water samples were stored in coolers with freezer packs and maintained at less than 10°C during transport to Caduceon Environmental Laboratories (Caduceon) in Kingston, Ontario. Caduceon is accredited by the Canadian Association for Laboratory Accreditation Inc. for specific environmental tests listed in the scope of accreditation. Groundwater and surface water samples were submitted at the frequency and for analysis of the parameters outlined in Table 1.

2.1 Groundwater Monitoring Program

Following, on-going discussions between Cambium and the Ministry throughout 2022 and 2023, support has been received for Stage 1 reductions to the monitoring program as detailed in Table 1. Stage 1 reductions were implemented in 2023 and included the following:

- Reduction to the groundwater sampling frequency to once annually (to be completed in the autumn).
- Removal of wells MW03-1, MW03-2, MW04-1, MW04-2, MW07-1, and MW07-2 from the monitoring program. These wells will remain intact for groundwater elevation purposes.
- A reduction in analytical parameters.



The following tasks were completed as part of the 2023 groundwater monitoring program:

- Prior to sampling, water levels were measured at each monitoring well using an electronic water level tape.
- The purge volume was calculated on-site during each monitoring event using the measured water level, well depth, and the borehole diameter. Each groundwater monitoring well to be sampled was purged about three well bore volumes. For wells with low recovery, at least one saturated borehole volume was purged prior to sampling. Purged water was disposed on-site, down-gradient of each respective well.
- Samples were collected using dedicated polyethylene tubing equipped with inertial-lift foot valves to prevent potential cross contamination and reduce waste.
- Groundwater samples for metals and dissolved organic carbon (DOC) analysis were field filtered.
- Field measurements were recorded for pH, conductivity, temperature, dissolved oxygen (DO), and oxygen reduction potential (ORP).

Groundwater samples were collected on October 23 from the on-site monitoring wells listed below. The only deviation from the monitoring program was that no samples were collected from MW01-2, MW02-1, MW02-2, MW03-2, and MW05-2 as these wells were reported to be dry.

- MW01-1 • MW01-2 • MW02-1 • MW02-2 • MW03-1*
- MW03-2* • MW04-1* • MW04-2* • MW05-1 • MW05-2
- MW06-1 • MW06-2 • MW07-1* • MW07-2* • MW08-1
- MW08-2 • MW09-1 • MW09-2 • MW 10-1 • MW10-2
- MW11-1 • MW11-2 • MW12-1 • MW12-2 • MW12-3



- MW13-1
- MW13-2

**Indicates water level only*

Monitoring wells included in the groundwater monitoring program are shown on Figure 2. The UTM coordinates for the monitoring locations are in Table 2. Groundwater results are discussed in Section 4.2. Field data sheets are in Appendix D. Laboratory Certificates of Analysis are in Appendix E. Photographs of each monitoring location are in Appendix F.

2.2 Residential Well Monitoring Program

Residential well sampling was completed on October 23 at the locations listed below. Water samples were collected prior to filtration or softening, from a tap that was purged for about five minutes. Of note, Cambium staff has yet to receive permission from residential well RW3 to continue routine sample collection at this location.

- R1
- R2
- R3
- R4

Well locations are on Figure 2. It is noted that R1 is not technically a residential supply well but a 0.05 m diameter PVC monitoring well that was installed to replace the abandoned stone dug well that was sampled historically (also identified as R1) (GHD, 2021). To Cambium's knowledge the original R1 well has not recently been used as a private water supply and the existing R1 (monitoring well) is not used as a water supply. The suspected Ministry well record for R1 is no.:7338879 (MECP, 2021). The record indicates that gravel overburden was encountered to a depth of 2.7 m bgs (below ground surface). Limestone bedrock extended from 2.7 mbgs to 4.7 mbgs. R1 was installed to a depth of 4.7 mbgs and the screen crosses the overburden bedrock interface.

The other three residential wells are water supply wells for single-family residences to the east and west of the Site. Installation details and age of the wells R2, R3 and R4 are not known, and specific well records could not be assigned to each location. However, suspected well records for these locations were identified (7265867, 5106571 and 5110084, respectively (MECP, 2021)) and indicated that the wells are likely installed in bedrock and ranged in depth



between 10.7 mbgs and 16.2 mbgs. Results from the residential well sampling are discussed in Section 4.3. Field data sheets are in Appendix D and Laboratory Certificates of Analysis as provided by Caduceon are in Appendix E.

2.3 Surface Water Monitoring Program

The following tasks were completed as part of the 2023 surface water monitoring program:

- Weather conditions prior to and during field events were recorded.
- Surface water samples were collected by immersing the sample container into the water body.
- When sample bottles were prefilled with preservatives, a clean bottle was used to collect and decant the water directly into the sample bottle.
- Surface water samples for mercury (0.45 µm) analysis were filtered by the laboratory.
- Field measurements including pH, conductivity, temperature, DO, and ORP were recorded at each sample location.
- Where possible, depth, width, and flow velocity measurements were collected at each surface water location.

The surface water monitoring program included an attempt to collect samples from on-site sampling stations S1, S2, and S3 on April 12 and October 23. Samples were only collected during the spring sampling event as all the surface water stations were dry in the autumn. Of note, station S3 was introduced to the monitoring program in 2023 following Ministry support to implement a new sampling location near the southeast property boundary (Appendix C).

Surface water sampling locations are shown on Figure 2. The UTM coordinates for the monitoring locations are in Embedded Table 3. Surface water results are discussed in Section 4.4. Field data sheets are in Appendix D. Laboratory Certificates of Analysis provided by Caduceon are in Appendix E. Photographs of each surface water sample location are in Appendix F.



2.4 Quality Assurance / Quality Control Program

Quality Assurance/Quality Control (QA/QC) measures are in place to ensure the integrity of sample collection and analysis. Cambium collects blind field duplicate samples for groundwater and surface water as part of the QA/QC program. A minimum of 10% of the total samples are collected. In addition to these samples, the laboratory completes an internal QA/QC. The duplicate samples are collected at the same time and location as the original samples. Duplicate samples are collected by filling the bottles for the same analysis at the sample time to ensure samples are consistent. Other key parts of Cambium's QA/QC program may include:

- Calibration of field equipment at the start of each day. Equipment is checked throughout the day, as necessary.
- Laboratory grade detergent and distilled water are used for decontamination of non-disposable equipment. Care is taken to avoid cross contamination.
- Use of new nitrile gloves at each sample location.
- Use of dedicated tubing and inertial foot-valves at each groundwater wells to prevent potential cross-contamination and reduce waste.

Blind duplicate samples were collected from the following locations as part of the QA/QC program. The results of QA/QC program are presented in Section 4.1.

- Surface water station S2 in April.
- Monitoring wells MW09-2 and MW12-1 in October.

2.5 Landfill Gas Monitoring Program

Landfill gas monitoring was conducted at all existing groundwater monitoring wells in 2023 in conjunction with the autumn monitoring event. The purpose of the monitoring is to assess compliance with Section 4.10 of *Landfill Standards, A Guideline on the Regulatory and Approval Requirements for New and Expanding Landfilling Sites* (MOEE, 1998), which states



the concentration of methane gas in the subsurface may not exceed 2.5% by volume at the property boundary.

An RKI Eagle II calibrated for methane, and hydrogen sulphide was used to collect landfill gas measurements. Equipment was calibrated for methane and hydrogen sulphide by Maxim Environmental and Safety Inc. prior to heading out to site. Calibration standards were brought to Site in the event the instrument needed to be recalibrated (e.g., due to elevated readings, equipment malfunction, etc.).

Gas measurements were collected prior to measuring groundwater levels or collecting samples. The following methodology was used to collect landfill gas measurements:

- Upon arrival to site, the RKI Eagle II was turned on and ran for five minutes prior to any measurements to allow the equipment to acclimatize.
- Weather conditions for the monitoring event and previous day were recorded including barometric pressure.
- Prior to each reading, the ambient air methane concentration was recorded.
- The well cap was removed and the gas probe was inserted into the top headspace of the well. A hand was used to cap the top of the well to reduce the amount of gas lost to the atmosphere.
- The peak methane concentration was recorded.
- Water levels measurements were taken at all monitoring locations.

LFG monitoring is conducted on an annual basis at the Site; the LFG concentrations for the 2023 monitoring program are discussed in Section 4.5.

2.6 Supplemental Monitoring Program (PFAS)

As discussed in Section 1.3.1, a supplemental groundwater monitoring program for PFAS analysis was completed in 2023 at the request of the Ministry to delineate site-related impacts.



Due to the commonality of PFAS compounds and their relatively low reportable detection limits (RDLs), the chance of cross-contaminating samples is high. As such, the report entitled *Per- and Polyfluoroalkyl Substances (PFAS) Field Sampling Guidance* (Transport Canada, 2016) was referenced by Cambium to develop sampling protocols. The following sampling protocols were followed to prevent PFAS cross-contamination during the sampling program.

- Only well laundered cotton clothing was worn during sample collection. Clothes were washed with PFAS free laundry detergent prior to the sampling program. Two sets of clothing were utilized during the sampling event: one for loading the vehicle/transportation, and one for sample collection. Coated Tyvek materials, a material known to contain PFAS, were not worn during any part of the sampling program.
- Field staff avoided the use of waterproof field books/paper, plastic clipboards, binders, spiral hard covered notebooks, gel pens, and markers. All field notes were written in pencil.
- Well laundered cotton sheets were used to cover the seats in the vehicle as they may be treated with an anti-stain substance.
- Field staff used PFAS free personal hygiene products prior to the sampling event. In the morning of the event, staff rinsed their bodies with water as a precaution.
- Prior to collecting the sample, field staff washed their hands with PFAS free soap and put on a new pair of nitrile gloves. Field staff ensured that the gloved hands were only used to collect the sample and did not touch any papers, pens, clothes, etc.
- During sample collection, the bottle cap remained in the sampler's hand at all times. Following sample collection, the cap was reapplied promptly to avoid volatilization.
- Field staff ensured that the rim of the bottles did not come into direct contact with the sampling equipment (i.e., pump) or tubing.
- To reduce the chance of volatilization, samples were collected using low-flow sampling methodology at the lowest speed setting possible.



- All samples were stored in coolers with ice made from PFAS free water and submitted to SGS North America, Inc. in Lakefield, Ontario.

The PFAS compounds analyzed in groundwater and surface water as part of this assessment consisted of 33 parameters (considered the “long list” by the Ministry and laboratory review).

The compounds included in this assessment are summarized in Embedded Table 2.



Embedded Table 2 PFAS Compounds – Analytical Suite

Perfluorobutanoate (PFBA)	Perfluorodecanesulfonate (PFDS)
Perfluoropentanoate (PFPeA)	Perfluorododecanesulfonate (PFDoS)
Perfluorohexanoate (PFHxA)	4:2 fluorotelomersulfonate (4:2 FTS)
Perfluoroheptanoate (PFHpA)	6:2 fluorotelomersulfonate (6:2 FTS)
Perfluorooctanoate (PFOA)	8:2 fluorotelomersulfonate (8:2 FTS)
Perfluorononanoate (PFNA)	N-Methylperfluorooctanesulfonamidoacetic acid (N-MeFOSAA)
Perfluorodecanoate (PFDA)	N-Methylperfluorooctanesulfonamidoacetic acid (N-EtFOSAA)
Perfluoroundecanoate (PFUnA)	Perfluorooctanesulfonamide (PFOSA), a.k.a FOSA
Perfluorododecanoate (PFDoA)	N-Methylperfluorooctanesulfonamide (N-MeFOSA)
Perfluorotridecanoate (PFTrDA)	N-Ethylperfluorooctanesulfonamide (N-EtFOSA)
Perfluorotetradecanoate (PFTeDA)	N-Methylperfluorooctanesulfonamidoethanol (N-MeFOSE)
Perfluorobutanesulfonate (PFBS)	N-Ethylperfluorooctanesulfonamidoethanol (N-EtFOSE)
Perfluoropentanesulfonate (PFPeS)	Perfluoro-2-propoxypropanoate (HFPO-DA)
Perfluorohexanesulfonate (PFHxS)	4-dioxa-3H-perfluorononanoate (ADONA)
Perfluoroheptanesulfonate (PFHpS)	9-chlorohexadecafluoro-3-oxanonane-1-sulfonate (9Cl-PF3ONS)
Perfluorooctanesulfonate (PFOS)	11-chloroeicosafluoro-3-oxaundecane-1-sulfonate (11Cl-PF3OUdS)
Perfluorononanesulfonate (PFNS)	

Groundwater samples were collected from the following approved monitoring locations on October 24.



- Background: MW13-1 and MW13-2
- Leachate: MW05-1, MW05-2, MW06-1, and MW06-2
- Down-gradient: MW08-1, MW08-2, MW09-1, MW09-2, MW10-1, MW10-2, MW11-1, MW11-2, and residential well R1

The only exception was that no samples were collected from MW05-2 due to dry conditions. Of note, a secondary sampling event was completed on December 7 at monitors MW08-1, MW08-2, MW10-2, MW11-2, and MW13-1 as the laboratory misplaced half the bottles sets which would not allow them to confirm the analyzed values. As such, although the attached chain of custody dated October 24 does report values for the locations which had missing bottle sets these values could not be reported with confidence.

In addition to the above, Quality Assurance/Quality Control (QA/QC) measures were implemented to maintain sample integrity which included:

- Blind duplicate groundwater samples collected from MW11-1 and MW05-1 in October, and MW11-2 in December.
- Field Blank: Sampling container was filled adjacent MW08-1 and MW08-2 in October, and MW10-2 in December with laboratory supplied PFAS-free water during the collection of the groundwater sample. This method was used to identify if outside biases (e.g., clothing, the sample environment, etc.) influenced the results.
- Trip Blank: This blank was pre-filled with PFAS-free water by the laboratory to monitor impacts associated with the transportation of the coolers to and from the lab.

Monitoring well locations are shown on Figure 2. Groundwater results are discussed in Section 4.2. Field data sheets are in Appendix D. Laboratory Certificates of Analysis are included digitally with this submission.

2.7 Site Review and Operations Overview

Operations were observed during site visits completed in April and October 2023. During these visits, the items listed below were inspected on the accessed areas of the Site and



observations were noted in the field file. In February 2024, the Township provided additional 2023 site operations information. Site inspection results are presented in Section 5.0.

- Litter control
- Condition and layout of recycling bins
- Status of monitoring well security
- Condition and layout of access roads, access gates
- Final cover integrity



3.0 Geological and Hydrogeological Context

3.1 Topography and Drainage

The Site is in the Indian River quaternary watershed, which is within the Otonabee River tertiary watershed. The surface water drainage systems on and near the Site have generally been characterized as poorly drained/stagnant and discontinuous. As such, surface water at and around the Site will either evaporate or infiltrate into the subsurface. An unevaluated wetland is within the central portion of the Site, east of the waste mound, and extends to the north and south. Various disconnected unevaluated wetlands have also been identified off-site to the north, southeast, and southwest. In general, surface water flow is only interpreted to occur during wetter times of the year. The nearest mapped watercourse is an unnamed tributary about 1.5 km south of the Site which eventually discharges into the Indian River. Topographic maps suggest that surface water flow within the area is generally south (during times of year when surface water flow occurs).

A surface water reconnaissance was completed by Cambium field personnel in autumn 2022. The purpose was to identify any defined surface water channels between monitoring wells MW11 and MW12 which has been an area speculated to receive groundwater discharge. The presence of a surface water channel would identify a primary flow path; however, no channels were observed during the reconnaissance. As such, it is likely that any groundwater discharging to surface will remain ponded and either evaporate or re-infiltrate the subsurface (as water levels fluctuate throughout the year). No defined flow channels have been observed by Cambium staff anywhere on-site. Nonetheless, a new surface water monitoring station was established near the southeast property boundary in April 2023, identified as S3. Although there was no defined channel identified when establishing this monitoring station, this location will assist in determining surface water compliance to the southeast.

There are three surface water stations incorporated in the existing monitoring program. These stations were established within topographic depressions which exhibit periods of low or no flow. The following describes the surface water stations in the approved monitoring program:



- S1 is about 700 m southeast of the waste mound and near residential well R1.
- S2 is about 200 m east-northeast of the waste mound and has historically monitored the background surface water quality. Station S2 is where, according to available mapping, surface water flows south onto the Site from areas north of the property (making this location a background surface water monitoring station). Due to the proximity of station S2 to the waste mound, and the discontinuous nature of the flow surface water systems on-site, this station may be influenced from landfill leachate. Alternatively, this station may be in an area where impacted groundwater discharges to surface. See Section 4.3 for more details.
- S3 is about 225 m southeast of the waste mound near the property boundary.

The geospatial coordinates (NAD 83) for the surface water monitoring stations are outlined in Embedded Table 3. Flow and discharge rates measured during the monitoring events are included in Appendix D. There was no staining observed at any of the surface water monitoring stations that would be indicative of leachate impacted groundwater discharge.

Embedded Table 3 Surface Water Stations Coordinates

Surface Water Station	UTM (Zone 17)
S1	729187, 4933099
S2	728686, 4933486
S3	728599, 4933228

3.1.1 Precipitation Data

A review of the 2023 precipitation data for Trent U Farms (Government of Canada, 2024) in comparison to the average precipitation data for 1981 to 2010 for Peterborough A (Government of Canada, 2015) indicated that the annual precipitation was normal; however, varied month to month. In 2023, the wettest months of the year were February, March, July, and December which had above average precipitation when compared to the climate normal. The driest month of the year were from September to November which received about 30% to 70% less than normal. The monthly precipitation, as well as the amount of precipitation during



and in the three days prior to the sampling events is summarized in Embedded Table 4. Refer to Appendix D for field sheets and climate data.

Embedded Table 4 Historical and 2023 Precipitation Data

Sampling Date	Average Monthly Precipitation (mm) (1981 – 2010)	2023 Monthly Precipitation (mm)	Precipitation During and Prior to Sampling (mm)
April 12	68.6	91.7	0.0
October 23, 24	76.9	53.8	11.1
December 7	64.2	85.7	2.7

3.2 Hydrogeology

Based on the assessment completed by GHD (GHD, 2021) and other consultants, the following summary of the hydrogeological conditions of the Site is provided. The Site is in the physiographic region known as the Dummer Moraine. This area can be characterized as relatively flat, stoney ground covered with shallow deposits of glacial till. The average overburden depth in the area is 3.25 m bgs. The overburden unit is underlain by limestone bedrock from the Lindsay Formation. The bedrock is part of the Trenton-Black River Group and is of Middle Ordovician age.

The current monitoring program consist of 13 multi-level groundwater wells. Available information indicates that the monitoring wells intercepted four water bearing units (an overburden aquifer and three bedrock aquifers; Appendix G). The aquifers in which each well has been installed are outlined below. It is noted that the well groupings listed below were based off available information. In some cases, the water bearing strata in which a well is installed was estimated based on available information and assumptions regarding well construction.

- Overburden: MW01-2, MW02-2, MW03-2, MW04-2, MW05-2, MW06-2, MW07-2, and MW13-2
- Shallow Bedrock (determined to be either the first bedrock aquifer encountered beneath overburden, or the shallowest bedrock well in a multi-level bedrock well grouping):



MW01-1, MW02-1, MW03-1, MW04-1, MW05-1, MW06-1, MW07-1, MW08-2, MW09-2, MW10-2, MW11-2, MW12-1, and MW13-1

- Deep Bedrock: MW08-1, MW09-1, MW10-1, MW11-1, and MW12-2
- Monitoring well MW12-3 is the deepest well installed in bedrock from the MW12 multilevel well. This well was not included in any of the other aquifer groupings outlined above as no other wells were installed beneath the deep aquifer system.

3.2.1 Well Records

A well record search completed in 2021 indicated that there are 30 wells within 500 m of the Site (MECP, 2021)(Appendix H); 14 well records indicate they are used for domestic water supply, 14 records were for monitoring wells, and two records are for drilled test holes. The wells were reported to be from 4.3 to 44.8 mbgs and completed in bedrock (Appendix H). There are 12 well records plotted within the Site boundaries; all of which are identified as monitoring wells that are included in the existing groundwater monitoring program.

3.2.2 Groundwater Flow Direction

Historically, the regional direction of groundwater flow within the overburden and bedrock deposits has been to the southeast towards Indian River (GHD, 2021). To determine the current groundwater elevation, water table gradient, and groundwater flow direction, water level measurements were collected in the autumn. The water level data was used to calculate the groundwater elevations summarized in Table 2 and shown on Figure 4 (overburden), Figure 5 (shallow bedrock) and Figure 6 (deep bedrock). Groundwater elevation contours and flow directions are shown on Figure 7 (overburden), Figure 8 (shallow bedrock) and Figure 9 (deep bedrock). The predominant direction of groundwater flow in all three aquifers is to the east/southeast. It is noted that a portion of flow in the deep aquifer radiates away to the north, west and south from well MW09-1. The water chemistry at monitor MW01-1, northwest of the waste mound, suggested that there is likely a degree of groundwater mounding within the waste mound which would contribute a component of radial flow. Refer to Section 4.2 for additional detail.



Background monitoring wells MW13-1 and MW13-2 were surveyed in 2022 and confirmed that groundwater flow from these monitors was eastwards. Results of the supplementary PFAS monitoring program indicated that a component of radial flow from the waste mound may be present in the overburden unit. Refer to Section 4.2.1, for additional detail.

Embedded Table 5 provides a summary of horizontal hydraulic gradients calculated in 2023.

Embedded Table 5 Summary of Horizontal Hydraulic Gradients

Unit	October
Overburden (southeast)	0.015 m/m
Shallow Bedrock (east/southeast)	0.007 m/m
Deep Bedrock (variable)	0.001(flat) – 0.006 m/m

3.2.3 Hydraulic Conductivity

Slug tests were conducted in 2009 by GHD on four wells to assess the permeability of some of the water bearing strata on-site. The results of the slug tests indicated that the overburden soils were silty sand with a relatively high hydraulic conductivity. The bedrock results indicated that the underlying limestone was fractured, also yielding a high conductivity.

Embedded Table 6 summarizes the results of the slug tests as reported by GHD (GHD, 2021) .

Embedded Table 6 Summary of Hydraulic Conductivity

Well	Test Type	Hydraulic Conductivity (cm/s)	Geometric Mean, K (cm/s)	Aquifer
MW03-1	Falling Head	6×10^{-3}	10×10^{-3}	Fractured limestone
	Rising Head	3×10^{-3}		
MW07-2	Falling Head	3×10^{-2}	10×10^{-2}	Silty sand, clean sand
	Rising Head	2×10^{-2}		
MW08-2	Falling Head	2×10^{-2}	10×10^{-2}	Silty sand, clean sand
	Rising Head	4×10^{-2}		
MW08-1	Falling Head	4×10^{-3}	10×10^{-3}	Fractured limestone
	Rising Head	2×10^{-3}		



3.2.4 Vertical Gradients

Vertical hydraulic gradients were calculated between all clustered wells at the Site (Table 3). In general, hydraulic gradients for the wells near the waste mound were downwards between overburden and the shallow bedrock aquifer (i.e., MW03, MW04, MW05, MW06 and MW07). Farther away from the waste mound, at wells MW08, MW09, MW10, MW11, and MW12 vertical gradients were upward between shallow and deep bedrock aquifers. The only exception is downward gradients were present at wells MW13. Wells MW08, MW09, MW10, MW11, and MW12 do not include overburden monitors, as such the hydraulic gradient between overburden and bedrock aquifers in the areas south and east of the waste mound cannot be confirmed. However, the shallow bedrock is considered to be hydraulically connected to the overburden. The consistent upwards vertical hydraulic gradients reported at wells MW08, MW09, MW10, MW11, and MW12 suggest that groundwater may discharge to surface for at least a portion of the year.

3.3 Conceptual Site Model

As noted in Section 2.6, a supplementary PFAS monitoring program was completed in 2023 to delineate site-related impacts. Using the results of the additional monitoring event in conjunction with the known hydrogeological factors, the following conceptual model was determined.

The Site is underlain by a thin veneer of overburden soils identified as silty-sand till. Underlying the soil is regionally extensive limestone bedrock, with trending drumlins and moraines in a northeast-southwest orientation. These features create natural basins and poor drainage conditions.

In general, precipitation infiltrates the overburden soil around the waste mound. Leachate impacted groundwater migrates down into the overburden and bedrock aquifers, where it then flows to the southeast. Upward vertical gradients were present at down-gradient monitors MW08 through MW12 indicating that any leachate laden groundwater which migrated into the bedrock aquifer near the waste mound will migrate upwards into the shallow bedrock aquifer. The vertical hydraulic gradients between the bedrock and overburden around wells MW08



through MW12 have not been confirmed since there were no overburden monitors included at these locations. However, it is possible that groundwater discharges to surface during some periods of the year when conditions permit.

Groundwater flow in the overburden and shallow bedrock aquifers are generally to the southeast. Groundwater flow in the deeper bedrock aquifer is also considered to be toward the southeast, but with variable portions of flow directed to the north and south, around MW09-1. Based on this conceptual model, primary receptors of leachate impacted water are the downstream surface water systems and potentially overburden/shallow bedrock groundwater users.



4.0 Results and Discussion

Water quality results from the monitoring program are used to assess the existence, extent, and degree of impacts to the groundwater and surface water environments related to waste disposal site activities at the Site.

To ensure appropriate actions are in place to respond to degradation in surface water or groundwater quality beyond an acceptable level, site-specific trigger levels and contingency measures aid in the assessment of impacts from leachate contamination and help to prevent adverse impacts to the environments surrounding the waste disposal site. This section presents the results of the 2023 routine monitoring program and the supplemental PFAS sampling event.

4.1 Quality Assurance / Quality Control

Results from the analyses completed on the blind duplicate QA/QC samples were evaluated. Parameter concentrations were considered significantly different if the relative percent difference (RPD) between the duplicate and the parent samples was greater than 30% when both results were greater than five times the reported detection limit (RDL).

The duplicate groundwater and surface water analyses were compared to the originals. Overall, the duplicate samples correlated well with the parent samples and met the data quality objective of 30%.

Parent/duplicate samples with only one measurable concentration or with results reporting less than five times the RDL were assessed qualitatively. Evaluation of these parent/duplicate samples did not identify significant data quality issues. Considering the low variation between the parent and duplicate groundwater and surface water samples, the results were interpreted with confidence.

4.2 Groundwater Quality

Groundwater analysis data for 2011 to 2023 are in Table 4 through Table 8. In addition, groundwater results for the supplementary PFAS monitoring program are in Table 9.



To assess water quality impacts related to landfill site operations, the analytical results for groundwater samples collected were compared to background water quality and historical data, and site compliance was assessed using the ODWQS (MOE, 2006) and RUC (MOEE, 1994a). Furthermore, as groundwater is interpreted to discharge to surface for at least a portion of the year, results from select monitors were also compared against the PWQO (MOEE, 1994b), the CWQG (CCME, 2007), and BCG (BC MOE, 2016).

To aid in interpreting groundwater results from the supplementary monitoring program, the following regulatory compliance criteria was used for guideline purposes:

- The Canadian Drinking Water Guidelines (CDWGs) provide comparison criteria for two PFAS compounds.
- Health Canada generated drinking water screening values (DWSVs) for seven other PFAS compounds, if exceeded, are likely to be of concern to human health (Health Canada, 2019).

4.2.1 Background Groundwater Quality

When evaluating the impact of any waste disposal site on a groundwater resource, a reference point or value must be established to assist in determining the magnitude of the impact. In this respect, the quality of the groundwater that is not impacted by the waste disposal site operation (background water quality) should be used for comparison purposes. Nested wells MW01 and MW13 are about 53 and 105 m up-gradient/cross-gradient of the waste mound, respectively. These well are considered representative of background groundwater conditions due to their location in respect to the direction of groundwater flow; however, water levels suggest a component of radial flow away from the waste mound toward MW01-1. Monitoring wells MW01-1 and MW13-1 are installed in the bedrock, and MW01-2 and MW13-2 are installed in the overburden (or at/just within the overburden/bedrock interface).

Historical water quality results from MW01-1 indicated low but detectable concentrations of most metals. Numerous parameters associated with road de-icing activities were elevated at this monitor including sodium, magnesium, calcium, chloride, hardness, alkalinity, and total



dissolved solids (TDS). This location is within 10 m of the landfill access road, so road salt impacts were not unexpected. Water chemistry results in 2023 were generally consistent with historical ranges. Of note, laboratory and field pH concentrations have been decreasing since May 2019.

Only one sample has been collected historically at MW01-2. Results indicated most metal concentrations and parameters associated with road de-icing activities were less than adjacent monitor MW01-1.

The water quality at monitoring well MW13-1 is generally similar to or better than MW01-1. In most cases, parameters concentrations were significantly less than MW01-1. This includes decreasing field and laboratory pH concentrations since May 2019. Water quality results in 2023 were consistent with historical concentrations. There were no detectable PFAS concentrations at MW13-1 indicating that this aquifer has not been impacted by leachate.

Historical results at monitoring well MW13-2 indicated similar to or slightly elevated parameter concentrations when compared to adjacent overburden monitor MW13-1. Results of the supplementary monitoring program indicated detectable concentrations of Perfluorooctane sulfonic acid (PFOS), Perfluorobutanoic acid (PFBA), Perfluorohexanoic acid (PFHxA), Perfluoropentanoic acid (PFPeA), Perfluoroheptanoic acid (PFHpA), and Perfluorooctanoic acid (PFOA) at monitor MW13-2. The PFAS signature was generally similar to leachate monitor MW06-2 indicating that there may be a component of radial flow from the waste mound towards this monitor (Figure 10). However, given the slight variation in the signature there may also be other sources influencing the water chemistry at MW13-2 including the on-site gravel pit (located between the waste mound and monitor), transfer station staging areas, and surrounding residential and agricultural properties. There were no detectable PFAS concentrations in the adjacent lower bedrock aquifer (i.e., MW13-1). Caution should be used when comparing down-gradient upper bedrock quality to MW13-2.

Cambium agrees with the Ministry Groundwater reviewer comments regarding potential impacts to background nested monitors MW01 (Cambium, 2023). As these wells were not included in the supplemental monitoring program impacts can only be speculated. The water



quality at monitor MW13-1 was similar to or better than MW01-1 including parameters that were not associated with road de-icing activities (i.e., magnesium, boron, and barium). Given the proximity of nested well MW01 to the historical waste mound, there is potential that this well(s) may be impacted by a component of groundwater radial flow or run-off from transfer station operations. As such, caution should be used when comparing down-gradient water quality to nested background wells MW01.

4.2.2 Leachate Characteristics

Nested wells MW02 were installed centrally within the waste mound to characterize leachate quality. No samples have been collected from these wells as was the case in 2023.

Nested wells MW05 and MW06 were installed on the northeastern and southern toe of the waste mound for the purpose of leachate characterization, respectively. Identified Leachate Indicator Parameters (LIP) are outlined in Embedded Table 7, and were chosen if the average concentration from the leachate wells was at least two times greater than the average concentration from the background wells. The LIPs were reassessed for the 2023 monitoring period, and it was determined that total Kjeldahl nitrogen (TKN) should be added to the list of indicator parameters. Of note, this parameter was removed from the monitoring during recent Ministry approvals; however, will be included as part of the analytical assessment going forward.

Embedded Table 7 Leachate Indicator Parameters

arsenic	barium	boron	alkalinity	iron
ammonia	manganese	magnesium	phosphorus	potassium
COD	DOC	TKN		

In addition to the above, the supplemental monitoring program characterized leachate as having detectable concentrations of the following parameters.

- MW05-1 (bedrock): Perfluoropentane sulfonic acid (PFPeS), Perfluorohexane sulfonic acid (PFHxS), Perfluoroheptane sulfonic acid (PFHpS), Perfluorononanoic acid (PFNA), PFOS, PFBA, PFHxA, PFPeA, PFHpA, and PFOA.



- MW06-1 (bedrock): Perfluorobutane sulfonic acid (PFBS), PFHxS, PFOS, PFBA, PFHxA, PFPeA, PFHpA, and PFOA.
- MW06-2 (overburden): 6:2 Fluorotelomer sulfonic acid (6:2 FTS), PFBS, PFHxS, PFHpS, PFOS, PFBA, PFHxA, PFPeA, PFHpA, PFNA, and PFOA.

A radial plot illustrating the leachate signature is shown on Figure 10. Overall, the leachate signature between the overburden and bedrock monitors was generally similar; however, greater concentrations were typically observed in the overburden at MW06-2. This supports that conceptual site model that impacts would migrate from the overburden to the bedrock aquifer in close proximity to the waste mound.

Leachate monitors MW05-1 and MW06-2 were the only locations which reported exceedances of the CDWG and DWSV in the supplemental monitoring program. The exceedances reported included: PFOA and Sum of PFAS at MW05-1, and PFHxA, PFOA, and Sum of PFAS at MW06-2.

Groundwater results indicated that all LIP concentrations at MW05-1 (shallow bedrock) were generally similar to or less than the overburden monitor MW05-2. It should be noted that only a limited number of samples have been collected from monitor MW05-2 and observations may change as additional samples are collected. While the water quality at MW05-1 has historically exhibited variability, concentrations were considered stable. The water quality in 2023 was consistent with historical concentration ranges. Of note, TKN (non-LIP) concentrations have been significantly elevated at this monitor since June 2021. Further monitoring is required to determine the significance of the elevated TKN concentrations.

Only five samples have been collected from monitoring well MW05-2 since installation as this well has historically reported low volumes of water. No samples were collected in 2023 as this monitor was reported to be dry. This includes sample collection during the supplemental monitoring program. Further monitoring is required to fully assess impacts at this monitor.

Similar to nested monitors MW05, impacts in the shallow bedrock aquifer at MW06-1 were less than those reported in the overburden monitor MW06-2. The only exception phosphorus and manganese concentrations which were greater in the bedrock. Furthermore, impacts were



slightly more elevated at shallow bedrock monitor MW05 on the northeast toe of the waste mound than to the south. Historical water quality results at MW06-1 were highly variable with no increasing or decreasing trends evident. Groundwater results in 2023 were consistent with historical ranges.

Overburden monitor MW06-2 has historically reported highly variable water chemistry. As such, it is difficult to discern trends at this monitor; however, ammonia concentrations have been slowly increasing at this monitor since May 2019. The water quality results in 2023 were consistent with historical ranges. Ammonia concentrations should be reviewed annually to determine the significance of these elevated concentrations.

Overall, it is evident that site-related impacts were in somewhat greater concentration in the overburden at monitors MW05-2 and MW06-2 when compared to the shallow bedrock leachate monitors. The water chemistry is considered relatively stable at these monitors, although some potential increasing trends were noted.

4.2.3 Down-Gradient Groundwater Quality

Nested wells MW08, MW09, MW10, MW11, and MW12 monitor the groundwater chemistry in the areas east/southeast and hydraulically down-gradient the waste mound. Furthermore, although a part of the residential well sampling program well R1 is discussed herein to assess the results of the supplemental monitoring program. Historically, monitors MW03, MW04, and MW07 were included as part of the monitoring program but received Ministry approval to be removed in 2023 (Appendix C).

Nested wells MW08, MW09, MW10, and MW11 are about 250 to 300 m hydraulically down-gradient of the waste mound, to the east-southeast. These locations include wells installed in the shallow and deep bedrock aquifers. Historical results indicated that LIP concentrations were generally greater in the deep bedrock aquifer. The only exception is iron which was reported to be greater in the shallow bedrock aquifer (i.e., MW09-2, MW10-2, and MW11-2) suggesting potential impacts from the wetland type environment on-site. Results of the supplemental monitoring program indicated the presence of PFHxA at MW10-1, and PFHxA and PFBA at MW11-1. Both PFAS compounds were also detected at the leachate monitoring



wells; however, given the notable difference in signature (as shown on Figure 10) attributing the PFAS concentrations to leachate impacts cannot be confirmed. There were no detectable PFAS concentrations at MW08 and MW09. This suggests that there may be a preferential flow path for leachate laden groundwater to the southeast (toward MW10 and MW11). The farthest down-gradient monitoring location to the southeast is R1. Although technically apart of the residential well monitoring program, this well is used to assess impacts in the shallow overburden aquifer. Detectable concentrations of PFBS, PFBA, and PFHxA were detected during the supplementary monitoring program. The presence of PFAS at R1 and similarity in signature when compared to MW10 and MW11 suggest that there may be an alternative source to the PFAS concentrations (i.e., passive agricultural space, nearby farmhouse, and outdoor storage). Overall, water quality results from the supplemental monitoring program indicated that there was a potential for site-related impacts to the southeast (toward MW10, MW11, and R1). The absence of PFAS at monitors MW08 and MW09 indicate that site-related impacts were limited in this area, if any.

The water quality at the down-gradient monitors was generally considered stable and results were consistent with historical concentrations in 2023. The following is noted:

- Potassium, magnesium, and boron concentrations have been slowly decreasing at MW08-1 since at least 2020. With the inclusion of 2023 results, boron may be stabilizing. Conversely, barium concentrations have been increasing since June 2021.
- Most parameter concentrations at MW08-2 and MW09-2 continued to exhibit a great level of variability.
- No discernible trends were apparent at MW09-1, MW11-1 and MW11-2.
- Boron, magnesium, sodium, TDS, and potassium concentrations have been decreasing at MW10-1 since 2020.

Nested wells MW12 are about 105 m south and down-gradient of the waste mound and about 35 m down-gradient of historical nested well MW04. Monitoring wells MW12-1, MW12-2 and MW12-3 are all installed in the bedrock, with MW12-1 being the shallowest and MW12-3 the deepest. Monitor MW12-1 was completed at a slightly deeper depth than MW04-1, and



MW12-2 and MW12-3 were installed at greater depths. The greatest LIP concentrations were reported from MW12-2. Vertical hydraulic gradients were upwards between all three MW12 wells, therefore leachate influences were considered to be restricted from entering the deeper bedrock aquifer at this location. Conversely, vertical hydraulic gradients were downwards at MW04 between the shallow overburden/bedrock aquifer and the deeper bedrock aquifer. Well nest MW04 is about 50 m northwest of MW12. These data indicate that the area between MW04 and MW12 is a transitional area where vertical hydraulic gradients change from down to up (between the lower and upper bedrock monitors). Due to the proximity of well nest MW12 to the southwest property boundary and the potential for groundwater to discharge to surface (upward gradients), the Ministry supported the implementation of a new surface water station near nest well MW04/MW12 in June 2022 (Appendix C). Due to dry sampling conditions this station could not be established in autumn 2022; however, wetter conditions allowed for sample collection from this area (sample ID: S3) in spring 2023. Visual observations to date suggest that any potential groundwater discharging to surface would be limited seasonally. Furthermore, as there were no observed surface water channels in this area, this station is likely to remain ponded when present with flow only anticipated during times of increased precipitation.

The water quality in 2023 was generally consistent with historical concentrations. Of note, numerous LIPs and non-LIPs (i.e., ammonia, barium, boron, TDS, magnesium, potassium, sodium, and sulphate) at MW12-2 have begun to decrease in concentration since 2021.

4.2.4 Volatile Organic Compounds

Reductions to the Volatile Organic Compound (VOC) monitoring program were approved in 2023. This included reducing the sampling locations to only include MW05-1 and MW05-2 once every five years (next in 2027). The most recent VOC analyses was completed on all wells at least once in 2022. There were no detectable VOC concentrations reported. Refer to Table 7 for VOC results.



4.2.5 Groundwater/Surface Water Interaction

As indicated by the Ministry in their 2014 memorandum, the shallow overburden aquifer may discharge to the wetland southeast of the landfill. As such, the groundwater from down-gradient overburden and shallow bedrock wells should be compared against the PWQO criteria (MOEE, 1994b) to determine compliance with provincially regulated surface water standards. For boron concentrations, the Canadian Water Quality Guideline (CWQG) objective for the Protection of Aquatic Life of 1,500 µg/L (CCME, 2007) which is based on more current toxicological information, was used in replacement of the PWQO criteria.

As discussed in Section 3.2.4, vertical gradients around nested wells MW08, MW09, MW10, MW11 and MW12 were upwards. The vertical gradients were noted between the shallow and deeper bedrock wells at these locations. None of the wells outlined have an accompanying shallow overburden aquifer, as such groundwater quality comparisons (from the shallow bedrock wells) to the PWQO are for reference only. Embedded Table 8 provides a summary of exceedances of federal or provincial guidelines for in the autumn 2023 monitoring event. Refer to Table 8 for a full comparison.

Embedded Table 8 Summary of PWQO/CWQG Exceedances at Select Monitors

Monitoring Well	Parameters
MW08-2	DO (low)
MW09-2	phosphorus and DO (low)
MW10-2	iron, phosphorus, field pH, and DO
MW11-2	iron, phosphorus, field pH, and DO
MW12-1	phosphorus, and DO (low)

Monitors MW08-2, MW09-2, MW10-2, MW11-2, and MW12-1 are all installed in an area where groundwater may discharge to surface for at least a portion of the year. Phosphorus (LIP) was reported at concentrations greater than PWQO criteria at each well except for MW08-2. It is noted that the phosphorus concentrations have persistently been at or greater than the PWQO criteria at background well MW13-2. Although results of the PFAS sampling event indicated that background well MW13-2 may be impacted by leachate, there is speculation that



alternative sources (e.g., surrounding agricultural fields) may also be a contributing factor to the water chemistry at this location.

Iron (LIP) consistently exceeds PWQO criteria at MW10-2 and MW11-2 and is consistently elevated compared with background water quality. Iron is considered to have naturally variable concentrations which exceed the PWQO within low-lying, stagnant areas due to natural reducing conditions caused by decaying organic vegetation. The elevated iron concentrations at MW10-2 and MW11-2 is likely attributed to this natural variation.

The absence of any PFAS compound in the down-gradient upper bedrock aquifer (i.e., MW08-2, MW09-2, MW10-2, MW11-2) suggest that these wells have not been impacted by leachate and any elevated LIP concentration (i.e., iron and phosphorus) were attributed to non-waste related sources.

Due to the nature of DO in groundwater, low DO measurements are not unexpected and are not considered significant for groundwater quality comparisons. Furthermore, DO concentrations are known to fluctuate throughout the year as DO is directly related to temperature and environmental conditions.

Comparing the water quality from shallow wells MW08, MW09, MW10, MW11 and MW12 is used as a general reference for potential impacts to surface water quality. As discussed in Section 4.2.3, an area of potential concern was identified at monitoring well MW12 near the southwest property boundary. Based on the conceptual site model, it is possible that groundwater discharges to surface within this area. As discussed in Section 3.1, a new surface water monitoring station identified as S3 during the spring 2023 monitoring event. Initial water quality results are discussed in Section 4.4.

4.2.6 Groundwater Compliance Assessment

The conceptual site model indicates that groundwater may discharge to surface in the areas east of the waste mound. However, there is potential for leachate impacted groundwater to migrate laterally off the Site in the overburden and bedrock aquifers. Migration of leachate into



deeper bedrock aquifers is restricted since there are upwards hydraulic gradients between deep and shallow bedrock wells onsite.

To ensure appropriate recognition and response to potential degradation in groundwater quality beyond an acceptable level at the down-gradient property boundary occurs, site-specific trigger values and contingency plans have been developed for the Site. These are the RUC values developed in accordance with Ministry Guideline B-7 (MOEE, 1994a). The Ministry Guideline B-7 states that, in accordance with the appropriate criteria for particular uses, a change in quality of the groundwater on an adjacent property will be accepted only as follows (Ministry Procedure B-7-1):

The quality cannot be degraded by an amount more than 50% of the difference between background and the Ontario Drinking Water Standards (ODWQS) for non-health related parameters and in excess of 25% of the difference between background and the ODWQS for health-related parameters. Background is to be the quality of the groundwater prior to any man-made contamination. The maximum concentration of a particular contaminant that is considered acceptable in the groundwater beneath an adjacent property is calculated in accordance with the following relationship:



$$C_m = C_b + x (C_r - C_b)$$

Where,

C_m is maximum concentration accepted

C_b is background concentration

C_r is maximum concentration permitted in accordance with the ODWQS

x is a constant that reduces the contamination to a level that is considered by the Ministry to have a negligible effect on water use (i.e., 0.5 for non-health related parameters and 0.25 for health-related parameters)

The RUC values were calculated using the median value of the background concentration (C_b) from a minimum of the previous five sampling events as required by Ministry Eastern Region Technical Support Section. Where background concentrations were less than the laboratory RDL, the RDL was used as the background concentration. Where the background concentrations exceeded ODWQS, the C_b value was set as the RUC value. The calculated C_m values for the Site were set as the RUC values.

The RUC values were calculated for all LIPs with an ODWQS criteria at the Site using background water quality at nested monitors MW01 and MW13 for the overburden and bedrock, respectively. RUC compliance criteria of the shallow and deep bedrock wells is assessed at MW08, MW09, MW10, MW11 and MW12.

The predominant direction of groundwater flow in the overburden was reported to be toward the southeast, away from the waste mound. There are no overburden monitoring wells installed near the property boundary, except for R1. As such R1 is referenced as the RUC compliance well for the overburden.

There were no RUC exceedances at R1 in 2023 (Table 4).

The following parameters exceeded the RUC criteria within the shallow bedrock wells in 2023 (Table 5):

- MW08-2: no exceedances



- MW09-2: DOC
- MW10-2: barium, iron, DOC, and manganese
- MW11-2: barium, iron, DOC, and manganese
- MW12-1: barium

The following parameters exceeded the RUC criteria in the lower bedrock aquifer in 2023 (Table 6).

- MW08-1: iron, manganese, and DOC
- MW09-1: barium and manganese
- MW10-1: barium and DOC
- MW11-1: barium, manganese, and DOC
- MW12-2: manganese and DOC
- MW12-3: DOC

As discussed in Section 4.2.3, results of the supplementary monitoring program were able to confirm that no waste related impacts were occurring at nested wells MW08 and MW09 (i.e., there were no detectable PFAS concentrations). Furthermore, there were no detectable PFAS concentrations at any shallow bedrock monitoring well. As such, any RUC exceedances reported at these wells (i.e., iron, barium, DOC, and manganese) were attributed to non-waste related sources.

A PFAS signature was present at MW10-1, MW11-1, and R1 suggesting that potential leachate impacts may be extending to the southeast from the waste mound. However, there is a level of uncertainty with these results given that the PFAS signature between these three wells is dissimilar to the PFAS signature present at leachate monitors MW05-1 and MW06-1. Although this may suggest that natural attenuation is occurring at the Site, results may also suggest that an alternative source down-gradient of the waste mound may be responsible for the differing leachate signature. This is because PFBA was not detected at MW10-1 but was reported at farthest down-gradient monitor R1 (Figure 10) at a concentration slightly less than



leachate (i.e., MW06-1). Given the surrounding property use near R1, MW10-1, and MW11-1, it would not be unexpected that the passive agricultural space, outdoor storage, and residential dwelling be the source of the noted PFAS concentrations in this area.

Barium, manganese, and DOC were the only RUC exceedances reported at MW10-1 and MW11-1 (i.e., locations with detectable PFAS concentrations); however, concentrations also exceeded the RUC criteria at similar concentrations at MW08-1 and MW09-1 where no PFAS were detected. This would indicate that the elevated concentrations were from a non-waste related source. Embedded Table 9 provides a summary of average manganese, barium, DOC concentrations at the down-gradient lower monitoring wells.

Embedded Table 9 Average manganese, barium, and DOC concentrations at select wells

Monitor	Average Manganese Concentration (µg/L)	Average Barium Concentration (µg/L)	Average DOC Concentrations (mg/L)
MW08-1	81	113	2.3
MW09-1	66	684	2.0
MW10-1	99	848	1.9
MW11-1	76	627	2.1
MW12-2	160	422	1.9

Although there were RUC exceedances at the down-gradient monitors, results suggest that they could be attributed to a non-waste related source. Detectable PFAS concentrations at the down-gradient monitoring wells (i.e., MW11-1, MW10-1, and R1) all complied with the CDQG and DWSV. Furthermore, manganese is the only parameter which continually exceeded the ODWQS – aesthetic objective at MW10-1, MW11-1, and R1. Of note, manganese did not exceed the ODWQS at R1 or MW10-1 in 2023 and concentrations were considered stable. Downgradient drinking water users are limited to R2 (included in the monitoring program) where results reported that the well has not been impacted by waste disposal operations (Section 4.3).



Based on the above, Cambium recommends that the standard monitoring program continue as outlined herein (not-including PFAS sampling). The Site is not considered to be a threat to local groundwater and surface water users, as such Cambium respectfully requests the Ministry's approval to reduce the reporting frequency from once annual to biennially (once every two years).

4.2.7 Groundwater Trigger Mechanism

Groundwater comments received in 2022 supported the discontinuation of the existing trigger mechanism which used VOCs concentrations to determine Site compliance at select wells (Appendix C). As such, compliance will be assessed using Ministry Guideline B-7. Refer to Section 4.2.6.

4.3 Residential Groundwater Quality

To ensure that residential groundwater supplies around the Site are not influenced from leachate, four residential wells are sampled as part of the monitoring program. Results of the residential monitoring program are detailed in Table 4 for R1 and Table 10 for R2 to R4. The following describes the residential well monitoring locations.

- R1 is within the Site boundaries about 620 m southeast of the waste mound. The original well was a stone dug well; however, was abandoned in the summer of 2019 and replaced with a monitoring well installed to a similar depth within the overburden.
- R2 is about 750 m east-southeast of the waste mound on the eastern side of 5th Line Road North Dummer.
- R3 and R4 are hydraulically up-gradient of the waste mound about 500 m southwest and 435 m west, respectively.

Historical water quality results from residential well R1 indicated variable results for certain parameters (i.e., barium, magnesium, iron, manganese, nitrate, potassium, and TDS) but similar to or better than the quality reported from wells MW08, MW09, MW10 and MW11. Water quality results in 2023 were consistent with historical concentration ranges and there



were no ODWQS exceedances. As discussed in Section 4.2.3, although PFAS were detected at R1 the signature was different than results from any leachate monitoring well suggesting that the water quality at R1 may be being influencing adjacent residential dwelling, outdoor storage, and surrounding property use.

Historical water chemistry at residential well R2 reported low but detectable concentrations of most metals and a neutral pH. There has been the sporadic ODWQS exceedance for TDS and iron. Results in 2023 were generally consistent with historical concentrations ranges, though phosphorus was notably elevated. There were no ODWQS exceedances.

Permission has not been obtained from resident well owner R3. Historical water quality results indicated low but detectable concentrations of most metals, a neutral pH, and the sporadic exceedance of the ODWQS for iron, lead, TDS, and manganese.

Historical water quality at R4 indicated low but detectable concentrations of metals, sporadic exceedances of the ODWQS for chloride, and a persistent exceedance of the ODWQS for TDS. Water quality results in 2023 were generally consistent with historical concentrations including the ODWQS exceedances for TDS and chloride.

4.4 Surface Water Quality

The 2014 to 2023 surface water quality data are in Table 11. The surface water data have been compared with background water quality and historical data, and compliance was assessed using the PWQO (MOEE, 1994b).

It is important to note that analysis for manganese, magnesium, potassium, and DOC (identified LIPs, Embedded Table 7) have been inadvertently missed in the surface water monitoring program since 2020. It is recommended that these parameters be included in future analysis.

4.4.1 Background Surface Water Quality

Historically station S2 was selected to represent background surface water quality; however, chemistry results over time indicated that this station was not suitable for comparison



purposes. Comments received from the Ministry's Surface Water Reviewer supported Cambium's recommendations that since the water quality at station S1 (down-gradient) was interpreted to be unimpacted, it could be used for background purposes. This is under the agreement that the data is reviewed annually to determine if a negative change in water quality has occurred.

Ministry comments recommended that station S2 remain in the monitoring program to determine if this station is being impacted by surface water runoff from the waste mound and/or potential groundwater discharge. Runoff generated from the waste mound generally flows in a southeastern direction; however, it is suspected that there is a component of radial flow around S2 due to a northeast-southwest trending topographical high that would deflect surface water flow in the northeastern to northwestern direction and potentially towards station S2. Although, the water chemistry at S2 may suggest site-related impacts, the variability in the water chemistry may also suggest that the elevated concentrations may be attributed to poor sampling conditions (ponded) in an area that does not receive regular, sustained surface water flow.

Historically, phenols and copper frequently exceeded the PWQO and total phosphorus has sporadically exceeded the criteria at station S2. The first sample was collected at S2 in April 2023 since 2020; however, only one sample was collected during the monitoring period due to dry conditions in the autumn. Water chemistry results in 2023 generally reported a significant decrease in concentration for most parameters than those reported in 2020. This would suggest that the elevated concentrations reported in 2020 were likely attributed to sampling technique. Total phosphorus was the only parameter to exceed the PWQO in 2023.

Station S1 is 695 m southeast of the waste mound. As mentioned above, historically S1 was used to assess downstream water quality. Given the generally low concentrations of most parameters and the infrequent PWQO exceedances, this location was deemed suitable for background purposes. The only exception is that alkalinity and TDS concentrations are slightly elevated at this station. Only one sample was collected at this station in 2022 as it was reported dry during the autumn monitoring event. The water quality results remained consistent with historical concentration ranges with the exception of elevated concentrations of



iron, lead, and phosphorus greater than the historical range since November 2011. The only parameter to exceed the PWQO criteria was total phosphorus in 2023.

4.4.2 Downstream Surface Water Quality

As discussed in Section 4.4.1, the Ministry agreed with Cambium's interpretation of the former background and downstream surface water monitoring locations. A new downstream surface water station was proposed in the area of monitor MW12. During the autumn 2022 site visit, Cambium staff noted that the area was dry and the reconnaissance area was expanded to determine any potential monitoring locations which would accommodate drier conditions; however, no new surface water stations were established in the autumn. These initial observations in 2022 suggest that any groundwater discharging to surface (if any) would be limited seasonally. Station S3 was established in spring 2023 about 20 m down-gradient of MW12. Field observations noted ponded conditions suggesting that flow may only be present during times of increased precipitation.

No samples were collected during the autumn event due to dry conditions. Initial water quality results indicated concentrations similar to or less than background station S1. Total phosphorus was the only parameter to exceed the PWQO criteria.

4.5 Landfill Gas Monitoring

Landfill gas (LFG), specifically methane and carbon dioxide, is derived from the decomposition of organic wastes. Production of LFG from landfilled wastes normally reaches a maximum rate about two years after placement and may continue at this rate for many years. The biological decomposition process results in the generation of LFG until some period, likely decades, after the landfilling of that waste ceases. Methane is explosive at volumes of 5% to 17% methane by volume (50,000 ppm to 170,000 ppm) in air (Werner Sölken, 2021). The 2023 LFG results are included in Table 12 and Appendix D. Landfill gas measurements for methane, and hydrogen sulphide were measured at all groundwater monitoring wells during the spring and autumn sampling events in 2023.



Most measurements collected in 2023 were less than 0.05 % methane by volume. The only exceptions were at nested monitor MW02 where concentrations were significantly less than the lower explosive limit for methane. There were no detectable concentrations of hydrogen sulphide at any monitoring wells in 2023.

As there were no methane concentrations at the property boundaries greater than 2.5% by volume the Site complied with Section 4.10 of *Landfill Standards, A Guideline on the Regulatory and Approval Requirements for New and Expanding Landfilling Sites* (MOEE, 1998).

4.6 Adequacy of Monitoring Program

As discussed in Section 1.3, Ministry support has been received for Stage 1 reductions of a two-stage process. These changes were implemented in 2023 which included a reduction in sample locations, frequency, and parameters analyzed (Table 1). Stage 2 reductions were contingent on the results of the supplementary monitoring program discussed in Section 4.2.6. Proposed stage 2 reductions included the following:

- Further reductions to groundwater sample locations.
- Reductions to the reporting frequency from annual to biennial.

Based on the results of the supplementary monitoring program, it was difficult to confirm with confidence if site-related impacts were occurring at down-gradient monitors MW10, MW11, and R1. This is due to a dissimilar PFAS signature between the leachate monitors and down-gradient monitors lower bedrock monitors MW10-1, MW11-1, and residential well R1 which suggest that a non-waste relate source may be influencing the water chemistry within this area. Of note, there were no detectable PFAS concentrations in the upper bedrock aquifer at any down-gradient monitoring well or in the lower bedrock wells at MW08-1 and MW09-1 (to the east).

Cambium recommends that the standard monitoring program continue as outlined herein (not-including PFAS sampling). However, Cambium respectfully requests the Ministry's approval to



reduce the reporting frequency from once annual to biennially (once every two years), based on the following conclusions:

- All detectable PFAS concentrations at MW10-1, MW11-1, and R1 were less than the CDQG and DWSV.
- In general, manganese is the only parameter which exceeds the ODWQS criteria at MW10-1, MW11-1, and R1. The ODWQS criterion for manganese is an aesthetic objective.
- All LIPs are stable or decreasing at down-gradient monitors MW10-1, MW11-1, and R1.
- There have been no exceedances of any health related ODWQS criteria at the farthest down-gradient monitoring well R1 other than lead in 2016. Of note, this exceedance was considered anomalous.
- The only down-gradient residential well user is included in the current monitoring program as R2. Results to date indicate that the water quality at this well has not been impacted by waste disposal operations.
- Groundwater sample collection is once annually.

Once an agreement of all the changes to the monitoring program is understood between the Ministry and the Township, then an application must be submitted to the Ministry to amend the PC of A to formally reflect the approved changes.



5.0 Site Operations

This section summarizes operations as reported by the Township for 2023 and discusses the following requirements of PC of A Condition 62. Furthermore, this section addresses the findings of the Ministry Site Inspection Reported conducted on May 12, 2023 (Appendix C)

- a monthly summary of the type and quantity of all incoming and outgoing wastes, and the destination of all outgoing waste (Section 5.6.1, and Table 13)
- a discussion of any operational or environmental problems encountered at the Site and corrective action taken (Section 5.3)
- any changes to the Emergency Response Plan or Design and Operations Report that have been approved by the Director since the last Annual Report (Section 5.7)
- Recommendations respecting any proposed changes in the operation of the Site (Section 5.8)

5.1 Site Access and Security

The Site is not visible from County Road 6 and Fourth Line Road as it is well screened by surrounding trees, thick vegetation, and natural topography. A lockable gate at the entrance controls access. Signs were posted at the Site entrance which detailed the hours of operation, acceptable and prohibited materials, and tipping fees.

The Site services the residents of the Township of Douro-Dummer, though signage at the gate directs contractors to use the Bensfort Road Waste Facility in Peterborough or the nearby Stoney Lake transfer station managed by Waste Connections. Ratepayers are required to show a pass for Site access. A site attendant is present during the hours of operation. The hours of operation in 2023 were:



Summer – May 1 to October 31

Monday, Wednesday, Friday, and Saturday: ... 10:00 AM to 2:00 PM

Sunday: 10:00 AM to 6:00 PM

Winter – November 1 to April 30

Saturday, Sunday, and Wednesday: 10:00 AM to 2:00 PM

5.2 Training

Staff from the Township and Township appointed contractors operate the Site. As required by PC of A Condition 30, all employees working at the Site are properly trained for the tasks that they are expected to perform and are provided with continued on-the-job training.

- Controlling admission of authorized vehicles with acceptable wastes
- The terms and conditions of the PC of A and any relevant waste management legislation and regulation (e.g., EPA, and O. Reg. 347)
- Ensuring proper daily litter control
- Controlling collection and transport of materials by a licensed hauler
- Maintaining a daily record of all operations, which are available for inspection by the Ministry
- Emergency response procedures (e.g., spills, and first aid)
- Equipment and Site inspection procedures
- Record keeping of quantities of waste being delivered to the Site and records of all incidents of illegal dumping, complaints, and unauthorized waste disposal.

The Township reported that the Public Works Manager, Lead Hand, and the site attendant completed a training course provided by the Solid Waste Association of North America (SWANA) in December 2022 (Cambium, 2023). Written records of the training completed are kept on-file as required by PC of A Condition 31.



5.3 Site Inspections

This section discusses observations during site inspections conducted by Cambium and summarizes information provided by the Township in 2023.

In 2023, the Township completed regular routine site inspections to meet PC of A Condition 32. Site inspections included observations of the following:

- Waste material staging areas including: the condition of disposal bins, waste oil tank, and divertible material, and if any waste quantity exceeded the maximum allowable capacity described in PC of A Condition 20, 21, 22, and 24.
- On-site equipment, buildings, and barriers
- General housekeeping (e.g., first aid, security, personal protective equipment, etc.)

A written record of the areas inspected are maintained at the Site as required by PC of A Condition 32. The records include: the names of the trained personnel conducting the inspection, date and time, areas inspected, any maintenance completed, and recommendations for remedial action.

In addition to the regular routine inspections, the Ministry conducted a site inspection on May 12, 2023. The Ministry did not report any operational deficiencies or remedial actions required (Appendix C).

5.3.1 Litter Control

As noted by Cambium staff, the Site was in good condition. Minimal evidence of blown litter was observed during site visits in 2023.

The intent of good housekeeping practices is to protect on-site worker health and safety, and the surrounding environment from nuisance effects. Nuisance effects are minimized by adopting good housekeeping measures as part of the Site operations. Regular housekeeping is essential to control such nuisances as:

- Blowing and loose litter



- Odour
- Rodents and insects
- Scavenging birds

5.3.2 Roads

The access road has sufficient width at the entrance and within the Site to allow unimpeded winter travel and access for emergency and snow removal equipment. The site access roads were observed to be well maintained and graded and were reported to be regularly cleared of snow with a sand mixture applied as needed by the Township during the winter months.

5.3.3 Final Cover Integrity

The waste mound was adequately covered and there was minimal evidence of erosion observed from the areas accessed during visits in 2023. Furthermore, the waste mound was well vegetated, which is an effective erosion control measure. No seeps were noted during any site visits conducted in 2023.

5.4 Complaints and Incidents

The Township reported that there were no complaints or incidents regarding the Site in 2023.

5.5 Monitoring Well Security

As part of the 2023 groundwater monitoring program, all monitoring wells listed in Table 1 were inspected for compliance with R.R.O. 1990 Regulation 903 - Wells. Field staff noted a blockage, suspected to be bentonite, was preventing water level measurements and potential sample collection at MW02-1. As no samples have been collected from nest monitor MW02 historically, it is recommended that these wells be decommissioned. Refer to Appendix F for photographs of the monitoring wells.



5.6 Materials Summary

The following waste types are collected at the Site; refer to Figure 3 for the collection locations of each material. In 2022, the Township reported that the Site no longer accepts mattresses and box springs (Cambium, 2023).

- Domestic solid, non-hazardous waste
- Blue box recycling
- Organic waste
- Scrap metal and white goods
- Freon Appliances
- Brush
- Wood waste
- Waste Electrical and Electronic Equipment (WEEE)
- Propane tanks
- Used oil

5.6.1 Site Usage

Site usage, as documented by the Township, is summarized in Embedded Table 10. The Site is equipped with a scale, such that the tonnage of waste accepted can be determined annually. Waste collected is transferred to the Peterborough Waste Management Facility (Bensfort Road Landfill). Refer to appended Table 13 for a monthly summary of materials accepted and transferred at the Site.

Embedded Table 10 Summary of Site Usage

	2023	2022	2021
Household Garbage (tonnes)	1,008.12	976.90	200.51



In addition to the above, the Township reported that the Site accepted the following tonnages in 2023:

- Clean wood: 46.12 tonnes
- C&D materials: 17.95 tonnes

5.6.2 Material Diversion

Embedded Table 11 provides a summary of the materials diverted from the Site in 2023, as provided by the Township and the County of Peterborough. Blue box recyclables are hauled to the Peterborough County Material Recycling Facility – Pido Road.

Embedded Table 11 Summary of Diverted Materials

Material	tonnes	tonnes
Containers	21.98	
Fibres	26.84	
<i>Blue Box Subtotal</i>		<i>48.82</i>
Alcohol Containers		3.99
MHSW (May 27 and August 12)		4.26
Scrap Metal and White Goods		11.29
WEEE		7.29
Organics		20.01
TOTAL		95.66
Other		
Tires		341 units
Freon Appliances ¹		39 units

Notes:

1. Includes white goods quantities.

Embedded Table 12 summarizes additional waste the County manages, and reports as diverted from within the Township in 2023.



Embedded Table 12 Summary of Divertible Materials - Private and Curbside

Curbside Recyclables Pick-up (entire Township) ¹	461.50 tonnes
Depot – Leaf and Yard Waste (Warsaw) ²	99.59 tonnes
Curbside Leaf and Yard ³	20.45 tonnes
Campground Recyclables	3.43 tonnes

Notes:

- 1. Curbside and Campground recyclable materials are hauled directly to 390 Pido Road*
- 2. Leaf and Yard Waste Collected at the Warsaw Public Works Yard from Spring to Autumn*
- 3. Curbside Leaf and Yard and Organics materials are hauled to County's Harper Road Composting Facility*

5.7 Site Documentation Reviews and Updates

The following documents are maintained by the Township and updated as required. There were no changes to these documents in 2023.

- Hall's Glen Landfill Site Transfer Station: Design, Operation, Maintenance, and Closure Report (TSH, 2002)*

5.8 Operations, Equipment, and Procedures

The Township has made conscientious efforts to mitigate risk to the surrounding environment and promote a safe location for the disposal of waste for the site attendants and residents. As such, Cambium has no recommendation regarding the operation of the Site.

5.9 Compliance with Ministry Approval

The Hall's Glen transfer station was operated in compliance with all PC of A conditions in 2023. Furthermore, the Township operated the Site in compliance with all required inspection and reporting requirements contained in the PC of A.



6.0 Conclusions and Recommendations

Based on the 2023 routine monitoring program and supplemental monitoring program, Cambium makes the following conclusions regarding the Hall's Glen waste disposal site:

- The water level measurements indicated that the predominant direction of groundwater flow in all three aquifers is to the southeast.
- Natural attenuation is occurring at the Site as concentrations decreased with distance from the waste mound. The down-gradient water quality suggest that non-waste related impacts may be influencing the water chemistry (i.e., saturated organic soils, and decaying organic vegetation).
- Results of the supplemental monitoring program for PFAS analysis indicated a similar leachate signature between background monitoring well MW13-2 and the leachate monitoring wells suggesting a potential component of radial flow to the southwest. There were no detectable PFAS concentrations in the down-gradient wells installed in the upper bedrock aquifer. PFAS were detected at down-gradient monitors MW10-1, MW11-1, and residential well R1; however, the signature present was different that what was reported in the leachate quality suggesting a potential non-waste related is influencing the water quality in this area. All down-gradient results complied with the CDQG and DWSV.
- Groundwater samples collected from MW08, MW09, MW10, MW11, MW12, and R1 were used to assess compliance with Ministry Guideline B-7 - Reasonable Use. Although select parameters continued to exceed the compliance criteria, these exceedances were considered to be naturally occurring or attributed to a non-waste related source. Furthermore, the only parameter to continually exceed the Ontario Drinking Water Quality Standards is manganese which is an aesthetic objective.
- A new down-gradient surface water monitoring station was established in 2023. Initial results indicated similar to or better water quality than the background quality. Downgradient surface water results at station S2 indicated a significant decrease in most parameter concentrations since the last sample collected.



- About 1,010 tonnes of waste accepted at the Site and transferred to the Peterborough Waste Management Facility.
- About 95 tonnes of blue box recycling, scrap metal, organics, MHSW, alcohol containers, and WEEE were collected at the Site.
- The Township of Douro-Dummer operated the Hall's Glen waste transfer station in compliance with the Provisional Certificate of Approval in 2023.

Based on the results of the work completed in 2023, Cambium recommends the following:

- The groundwater and surface water monitoring program should continue as outlined in Table 1.
- Surface water samples should be analyzed for manganese, magnesium, potassium, and DOC (identified LIPs) for all future monitoring events. In addition, TKN should be analyzed in the groundwater.
- As discussed in Section 4.6, the reporting frequency should be reduced from annually to biennially.
- Nest well MW02 should be decommissioned. Field staff noted MW02-1 to be compromised during the autumn sampling event and no samples have been collected at either MW02-1 and MW02-2 since installation.
- Once an agreement of all the monitoring program and reporting changes is understood between the Ministry and the Township, then an application to amend the PC of A should be formally submitted to reflect these changes.



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Glossary of Terms

- **Active Face/Area**
The portion of the landfill facility where waste is currently being deposited, spread and/or, compacted prior to the placement of cover material.
- **Adverse Environmental Impact**
Any direct or indirect undesirable effect on the environment resulting from an emission or discharge that is caused or likely to be caused by human activity.
- **Annual Report**
Report documenting the results of water quality, environmental quality, and operations monitoring for the year, or for a period as prescribed in the Certificate of Approval.
- **Approved Design and Operations Plan**
The design of a landfill site and its facilities which have been submitted along with the application documents for which formal Ministry approval has been issued through the Certificate of Approval.
- **Approved Site or Facility**
A landfill site/facility for which there is an existing and current Certificate of Approval.
- **Aquifer**
A geologic unit (soil or rock) that contains sufficient saturated permeable material to yield measurable quantities of water to wells and springs.
- **Attenuation**
Natural process through which the concentrations of landfill generated contaminants are reduced to safe levels.
- **Borehole**
A hole drilled for soil sampling purposes.
- **Buffer Area**
An area of land situated within the peripheral area surrounding an active filling area, but limited in extent to the property boundary, assigned to provide space for remedial measures, contaminant control measures, and for the reduction or elimination of adverse environmental impact caused by migrating contaminants.
- **Certificate of Approval**
The license or permit issued by the Ministry for the operation of a landfill site. Issued to the owner of the site with conditions of compliance stated therein.
- **Contaminant**
A compound, element, or physical parameter, usually resulting from human activity, or found at elevated concentrations that have or may have a harmful effect on public health or the environment.
- **Contaminant Migration Path**
Route by which a contaminant will move from the site into adjacent properties or the natural environment. Usually a route that offers the least resistance to movement.
- **Contamination Attenuation Zone**
The zone beneath the surface, located beyond the landfill site boundary, where contaminants will be naturally attenuated to predetermined levels. Also, see Reasonable Use Policy.
- **Contingency Plan**
A documented plan detailing a co-ordinated course of action to be followed to control and remediate occurrences such as a fire, explosion, or release of contaminants in an uncontrolled manner that could threaten the environment and public health.
- **Cover Material**
Material approved by the Ministry that is used to cover compacted solid waste. Usually, a soil with suitable characteristics for specific end-use.
- **Site Development Plan and Operations Report**
Development and Operations Plan or Report is a document detailing the planned sequence of activities through the landfill site's active life, the control systems, site facilities and monitoring systems that are necessary. This document is required for obtaining a Certificate of Approval.
- **Design Capacity**
The maximum amount of waste that is planned to be disposed of at a landfill site.
- **Detection Limit**
Concentration under which a parameter cannot be quantitatively measured.



- **EAA or EA Act**
Environmental Assessment Act, Revised Statutes of Ontario, 1990. One of the primary acts of legislation intended to protect, conserve, and wisely manage Ontario's environment through regulating planning and development.
- **Environmental Compliance Approval**
The license or permit issued by the Ministry for the operation of a landfill site. Issued to the owner of the site with conditions of compliance stated therein.
- **EPA**
Environmental Protection Act, Revised Status of Ontario, 1990. EPA is another of the primary pieces of Provincial legislation governing the protection of the natural environment of the Province.
- **Evapotranspiration**
The evaporation of all water from soil, snow, ice, vegetation and other surfaces, including the water absorbed by plants, that is released to the atmosphere as vapour.
- **Fill Area**
The area of a landfill site designed and designated for the disposal of waste.
- **Final Cover**
Soil material or soil in combination with synthetic membranes, overlain by vegetation in a planned landscape, placed over a waste cell that has reached the end of its active life.
- **Groundwater**
Subsurface water that occurs beneath the water table in soils and rocks that are fully saturated.
- **Hydraulic Conductivity**
The rate of flow of water through a cross-section under a specific hydraulic gradient. It is a property of the geologic formation and the fluid, in hydrogeologic applications where the fluid is water (Units of m/day or cm/s).
- **Hydraulic Gradient**
The head drop per unit distance in the direction of flow, the driving force for groundwater flow.
- **Hydrogeology**
The study of subsurface waters and related geologic aspects of surface waters.
- **Impermeable Fill**
Soil material that is placed as filling material that is sufficiently cohesive and fine grained to impede and restrict the flow of water through it.
- **In situ Testing**
Testing done on-site, in the field, of material or naturally occurring substances in their original state.
- **Landfill Gas**
Combustible gas (primarily methane and carbon dioxide) generated by the decomposition of organic waste materials.
- **Landfill Site**
A parcel of land where solid waste is disposed of in or on land for the purposes of waste management.
- **Leachate**
Water or other liquid that has been contaminated by dissolved or suspended particles due to contact with solid waste.
- **Leachate Breakout**
Location where leachate comes to the ground surfaces; a seep or spring.
- **Limit of Filling**
The outermost limit at which waste has been disposed of, or approved or proposed for disposal at a landfill.
- **Ministry**
Ontario Ministry of the Environment, Conservation and Parks.
- **Monitoring**
Regular or spontaneous procedures used to methodically inspect and collect data on the performance of a landfill site relating to environmental quality (i.e., air, leachate, gas, ground or surface water, unsaturated soils, etc.).
- **Monitoring Well**
The constructed unit of casing (riser and screen) installed in a borehole.
- **Multi-Level Monitoring Well**
More than one monitoring well installed at a given test well location.
- **Native Soil**
Soil material occurring naturally in the ground at a location.



- **Natural Attenuation**
Where contaminants are reduced to acceptable concentration levels by natural mechanisms (dilution, absorption onto the soil matrix, etc.), biological action, and chemical interaction.
- **Occupational Health and Safety Act**
The primary act of legislation enacted by Ontario Ministry of Labour to regulate and control the safety in the workplace; also Occupational Health and Safety Act, Revised Statutes of Ontario, 1990.
- **Odour Control**
Minimizing or eliminating the nuisance and undesirable impact of objectionable or unpleasant odours arising from waste disposal operations.
- **Open Burning**
Burning any matter whereby the resultant combustion products are emitted directly to the atmosphere without passing through an adequate stack, duct, or chimney.
- **Operations Plan**
A document detailing the waste disposal operations in a planned, and if necessary, a staged manner, that ensure compliance with regulatory provisions concerning the operations of a landfill site.
- **Operator (Site Operator)/Attendant**
The individual or organization who, through ownership or under contract, manages and operates a landfill site for the purpose of waste disposal.
- **Owner**
A person, persons, organization, or municipal authority who own a landfill facility or part of a landfill facility, and in whose name the Certificate of Approval for the site is issued.
- **Percolation**
The movement of infiltrating water through soil.
- **Permeability**
Often used interchangeable with hydraulic conductivity, but not strictly correct. Permeability is a property of the porous media only. Dependent upon media properties that affect flow, diameter, sphericity, roundness, and packing of the grains.
- **Piezometer**
A well that intersects a confined aquifer.
- **Provisional Certificate of Approval (Provisional C of A)**
Same as Certificate of Approval.
- **Reasonable Use Policy**
A policy developed by the Ministry to stipulate limits to the level of groundwater quality impairment that may be permitted to occur at site property boundaries, to allow the reasonable use of adjacent properties or land without adversely affecting public health and the environment.
- **Recharge Zone**
An area where precipitation or surface run-off infiltrates into the ground and then, through natural percolation enters an aquifer.
- **Recycling**
Sorting, collecting or processing waste materials that can be used as a substitute for the raw materials in a process or activity for the production of (the same or other) goods. For example, the "Blue Box" system, in-plant scrap handling, or raw material recovery systems. Recycling is also the marketing of products made from recycled or recycled materials.
- **Reduction (of waste or component of 3Rs program)**
Those actions, practices, or processes that result in the production or generation of less waste.
- **Remedial Action**
Corrective action taken to clean-up or remedy a spill, an uncontrolled discharge of a contaminant, or a breach in a facility or its operations, in order to minimize the consequent threat to public health and the environment.
- **Representative Sample**
A small portion of soil, water, etc. which can be subjected to testing and analysis, that is expected to yield results that will reliably represent the identical characteristics of the source of the material or of a larger body of material.
- **Reuse (component of 3Rs program)**
The use of an item again in its original form, for a similar purpose as originally intended, or to fulfil a different function.
- **Run-off**
The part of precipitation (rainwater, snowmelt) that flows overland and does not infiltrate the surface material (soil or rock).



- **Saturated Zone**
The zone of a subsurface soil where all voids are filled with water.
- **Sedimentation**
The deposition of fine grained soil in an undesirable location, caused by the scouring, erosion and transportation of earth materials by surface run-off.
- **Sensitive Land Use**
A land use where humans or the natural environment may experience an adverse environmental impact.
- **Settlement**
The subsidence of the top surface and underlying waste of a landfill or waste cell as a result of densification under its own weight.
- **Site Capacity**
The maximum amount of waste that is planned to be disposed (design capacity) or that has been disposed of at a landfill site.
- **Site Closure**
The planned and approved cessation or termination of landfilling activities at a landfill site upon reaching its site capacity.
- **Site Life**
The period from its inception through active period of waste disposal, to the time when a landfill site reaches its' site capacity, when it ceases to receive any further waste, including and up to closure.
- **Solid Waste**
Any waste matter that cannot be characterized by its physical properties as a liquid waste product.
- **Solid Waste Disposal Site or Facility**
A site or facility such as a landfill site where solid waste is disposed of.
- **Source Separation**
The separation of various wastes at their point of generation for the purposes of recycling or further processing.
- **Standpipe**
A monitoring well that intersects the water table aquifer.
- **Storm water**
Run-off that occurs as a direct result of a storm event or thaw.
- **Storm water Detention**
Control of storm water by the construction of impoundments of structures for the purpose of regulating storm water flows during high intensity rainfall events that would otherwise transport excessive amounts of sediment, cause soil erosion or cause flooding.
- **Stratigraphy**
The geologic sub-structuring, usually layered with different distribution, deposition and age.
- **Surface Run-off (Drainage)**
See Run-off.
- **Surface Water**
Water that occurs at the earth's surface (ponds, streams, rivers, lakes, oceans).
- **Sub-Soil**
Soil horizons below the topsoil.
- **Test hole**
A hole drilled for soil sampling purposes.
- **Topsoil**
The uppermost layer of the soil containing appreciable organic materials in mineral soils. Adequate fertility to support plant growth.
- **Unsaturated Zone**
The zone (also vadose zone) in a porous sub-soil, where the voids are not completely water-filled, but contain some air-filled voids. Limited above by the land surface and below by the water table.
- **Vector**
A disease carrier and transmitter; usually an insect or rodent.
- **VOC**
Volatile organic compounds are those compounds that will readily volatilize (convert from liquid to gas phase) at conditions normally found in the environment.



- **Waste**
Ashes, garbage, refuse, domestic waste, industrial waste, or municipal refuse and other used products as are designated or interpreted by the provisions of the Environmental Protection Act.
- **Waste Disposal Site (Facility)**
Any land or land covered by water upon, into, in or through which, or building or structure in which, waste is deposited or processed and any machinery or equipment or operation required for the treatment or disposal of waste.
- **Waste Management System**
All facilities, equipment and operations for the complete management of waste, including the collection, handling, transportation, storage, processing and disposal thereof, and may include one or more waste disposal sites.
- **Water Table**
The water level attained in a monitoring well, which screens the surficial unconfined aquifer.
- **Water Balance**
Amounts of water to various components in a system so that water entering the system equals the amount of water contained within and discharged out of a system.
- **Water Level**
The level of water in a well.
- **Well Casing**
The pipe that is used to construct a well.
- **Well Screen**
A filtering device used to keep sediment from entering a well.
- **Wetlands**
Areas where water is at, near or above the land surface long enough to be capable of supporting aquatic or hydrolytic vegetation, and which have soils indicative of wet conditions.



Abbreviations

RFP	Request For Proposal	BTU	British Thermal Unit
ha	hectare	µg	microgram
Ministry	Ontario Ministry of the Environment, Conservation and Parks	°C	temperature in degrees Celsius
tonne	metric ton	g	gram
MNRF	Ontario Ministry of Natural Resources and Forestry	N/A	not available
t	metric tonne	kg	kilogram
ECA	Environmental Compliance Approval	%	percent
µS	microSiemens	L	Litre
EPA	Environmental Protection Act	cfm	cubic feet per minute
ODWQS	Ontario Drinking Water Quality Standards	mg/L	milligrams per litre
EAA	Environmental Assessment Act	ppmdv	part per million by dry volume
PC of A	Provisional Certificate of Approval	mm	millimetre
MW	monitoring well	ppmv	part per million by volume
PWQO	Provincial Water Quality Objectives	m	metre
masl	metres above sea level	ppm	part per million
TOC	Total Organic Carbon	km	kilometre
pg	picogram	min	minimum
VOC	Volatile Organic Compound	m ³	cubic metre
ng	nanogram	max	maximum
		m ²	square metre



Standard Limitations

Limited Warranty

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

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Appended Figures

2023 ANNUAL REPORT
HALL'S GLEN WASTE TRANSFER STATION
 1951 County Road 6
 Hall's Glen, Ontario
 The Corporation of the Township of Douro – Dummer

LEGEND

-  Highway
-  Major Road
-  Railroad
-  Watercourse
-  Water Area
-  Provincial Park
-  Wooded Area
-  Built Up Area
-  Lower Tier Municipality

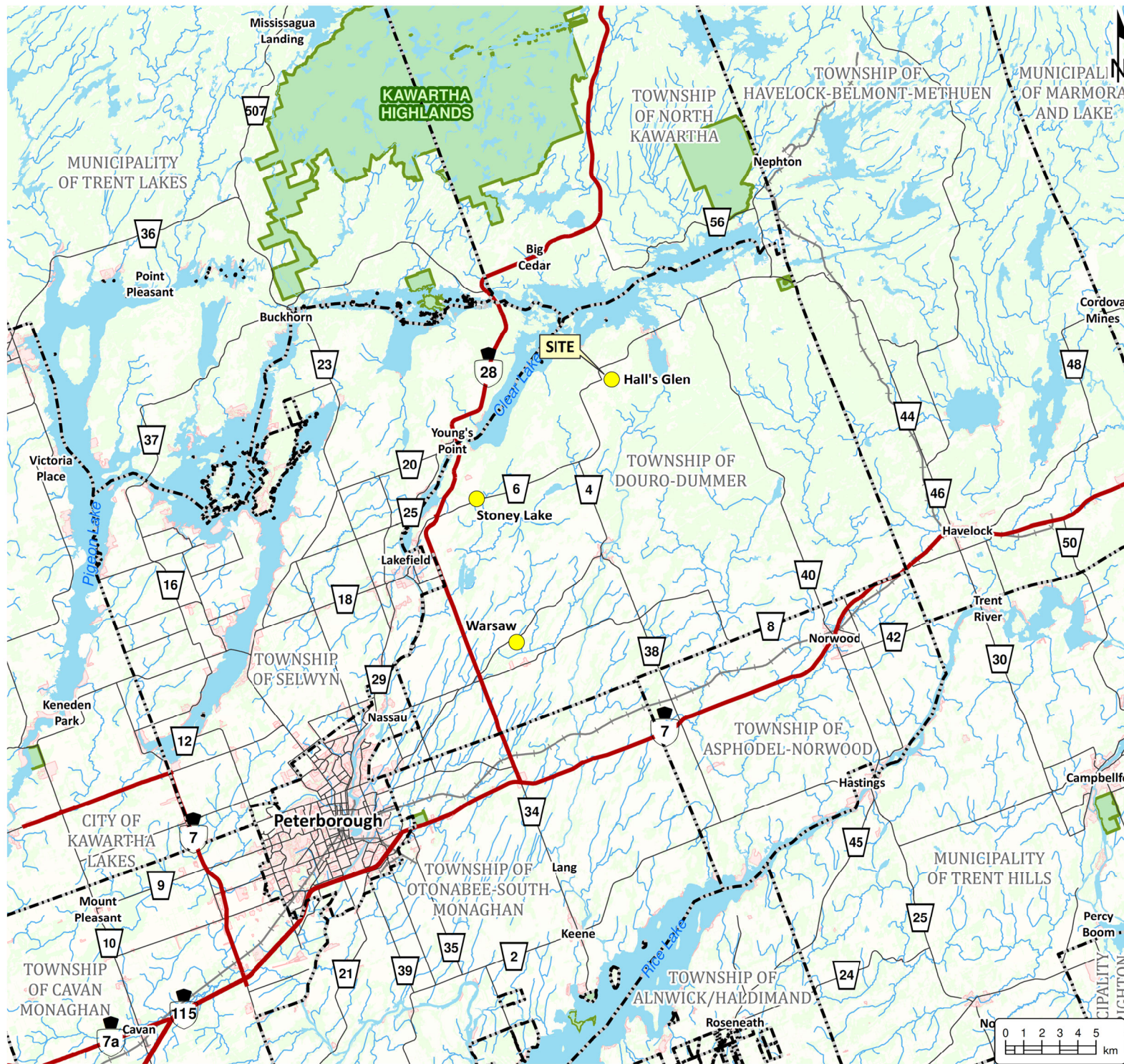
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SITE LOCATION PLAN
















Project No.:	12987-002	Date:	March 2024
Scale:	1:300,000	Rev.:	
Created by:	TLC	Projection:	NAD 1983 UTM Zone 17N
Checked by:	CM	Figure:	1



O:\GIS\MXD\12987\12987-002_TDD - Hall's Glen\2023-03-07 FIG 1 - Site Location Plan.mxd

2023 ANNUAL REPORT
HALL'S GLEN WASTE TRANSFER STATION
 1951 County Road 6
 Hall's Glen, Ontario
 The Corporation of the Township of Douro – Dummer

LEGEND

-  Surface Water Location
-  Monitoring Well
-  Historical Monitoring Well
-  Residential Well
-  Supplemental Monitoring Program (Monitoring and Residential Well)
-  Major Road
-  Minor Road
-  Contour 5m Interval (Major)
-  Contour 5m Interval (Minor)
-  Lot / Concession
-  Unevaluated Wetlands
-  Water Area
-  Wooded Area
-  Landfill Footprint
-  Site (approximately 48.5 ha.)

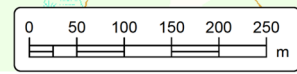
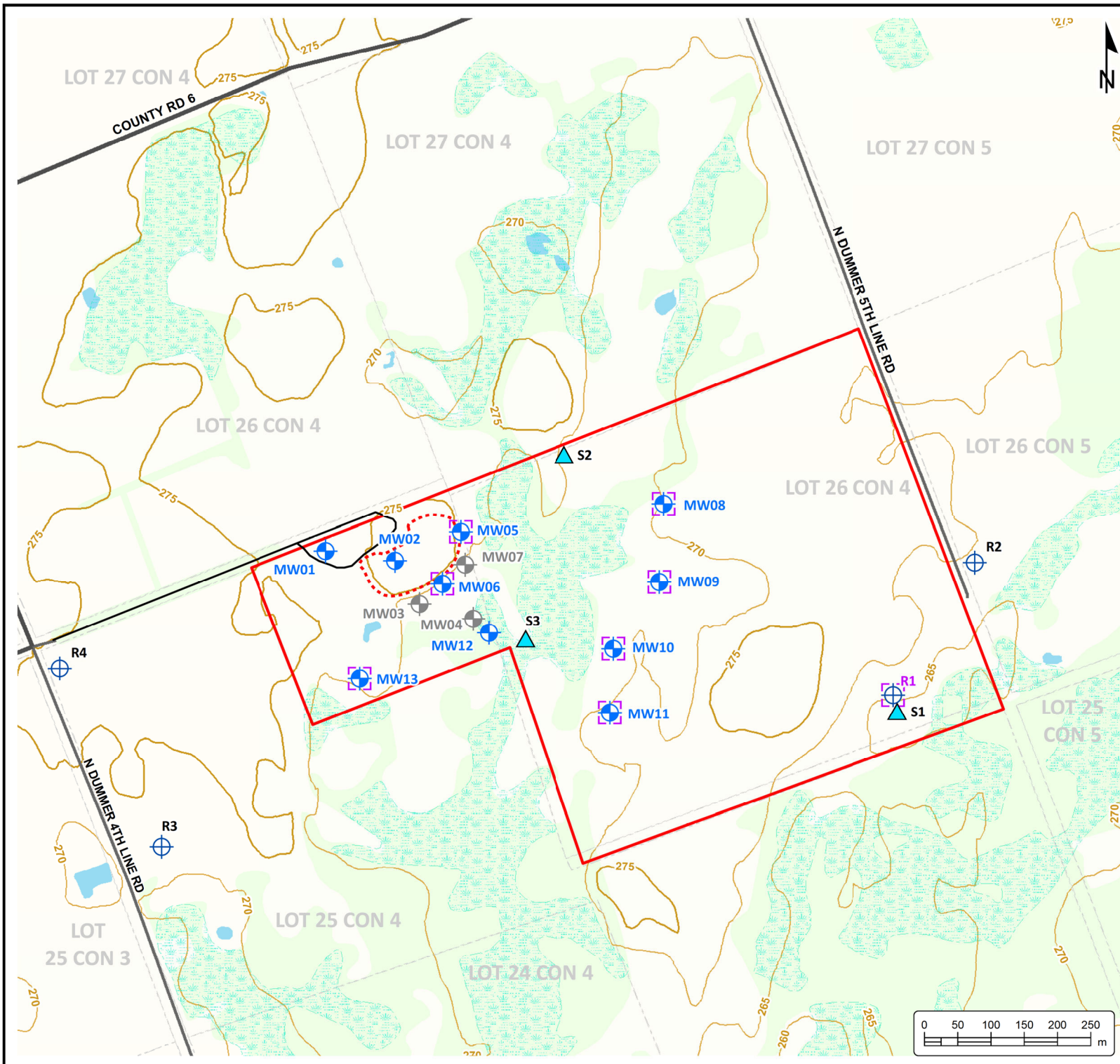
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SAMPLE LOCATION PLAN

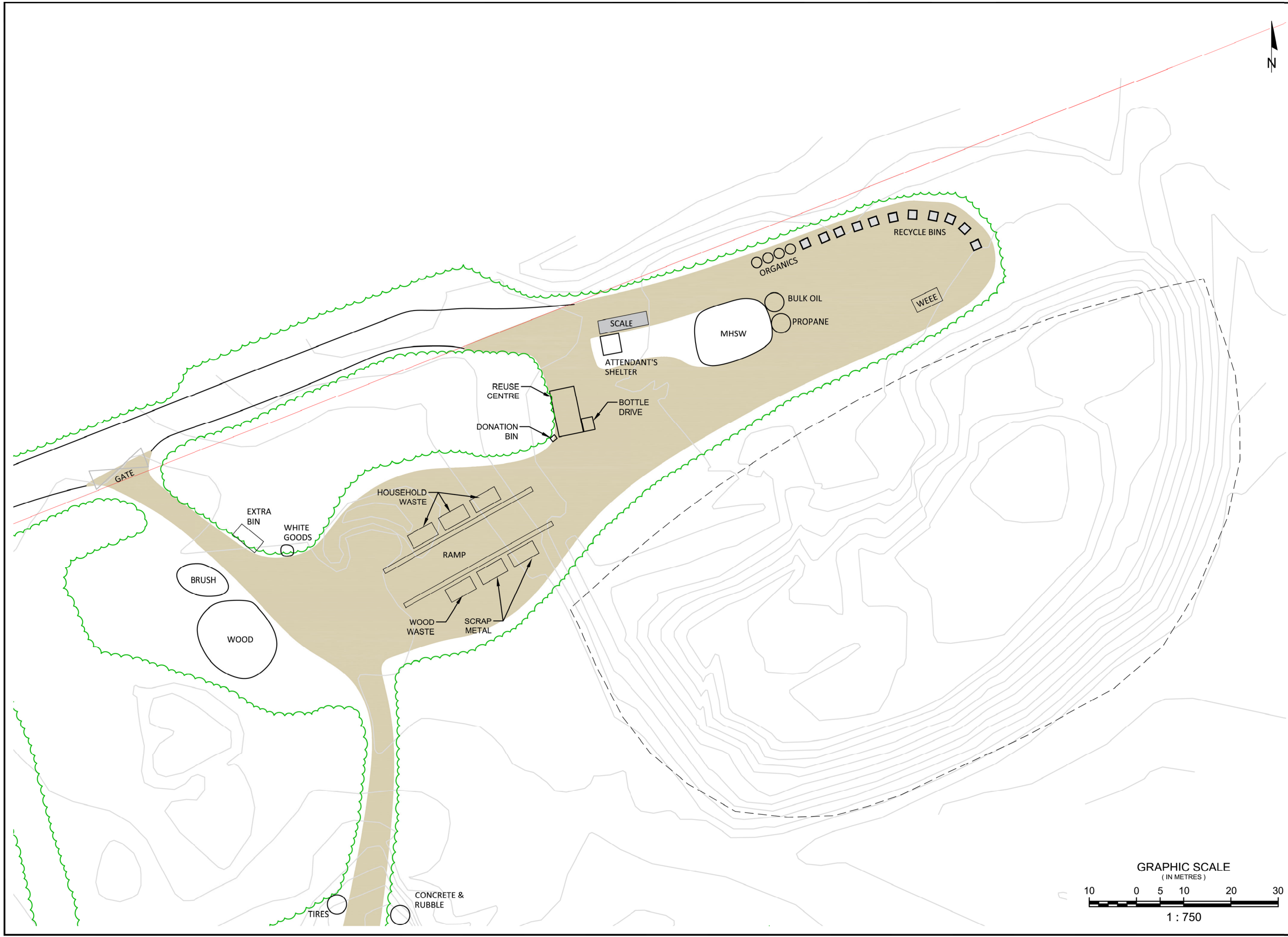
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Scale:	1:8,000	Rev.:	
Created by:	TLC	Projection:	NAD 1983 UTM Zone 17N
Checked by:	CM	Figure:	2





LEGEND

- Site (approximate)
- - - - - Approximate Landfill Footprint (1.0 ha)
- Topographic Contour
- ~ Approximate Treeline



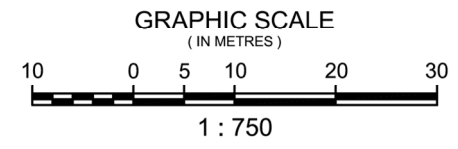
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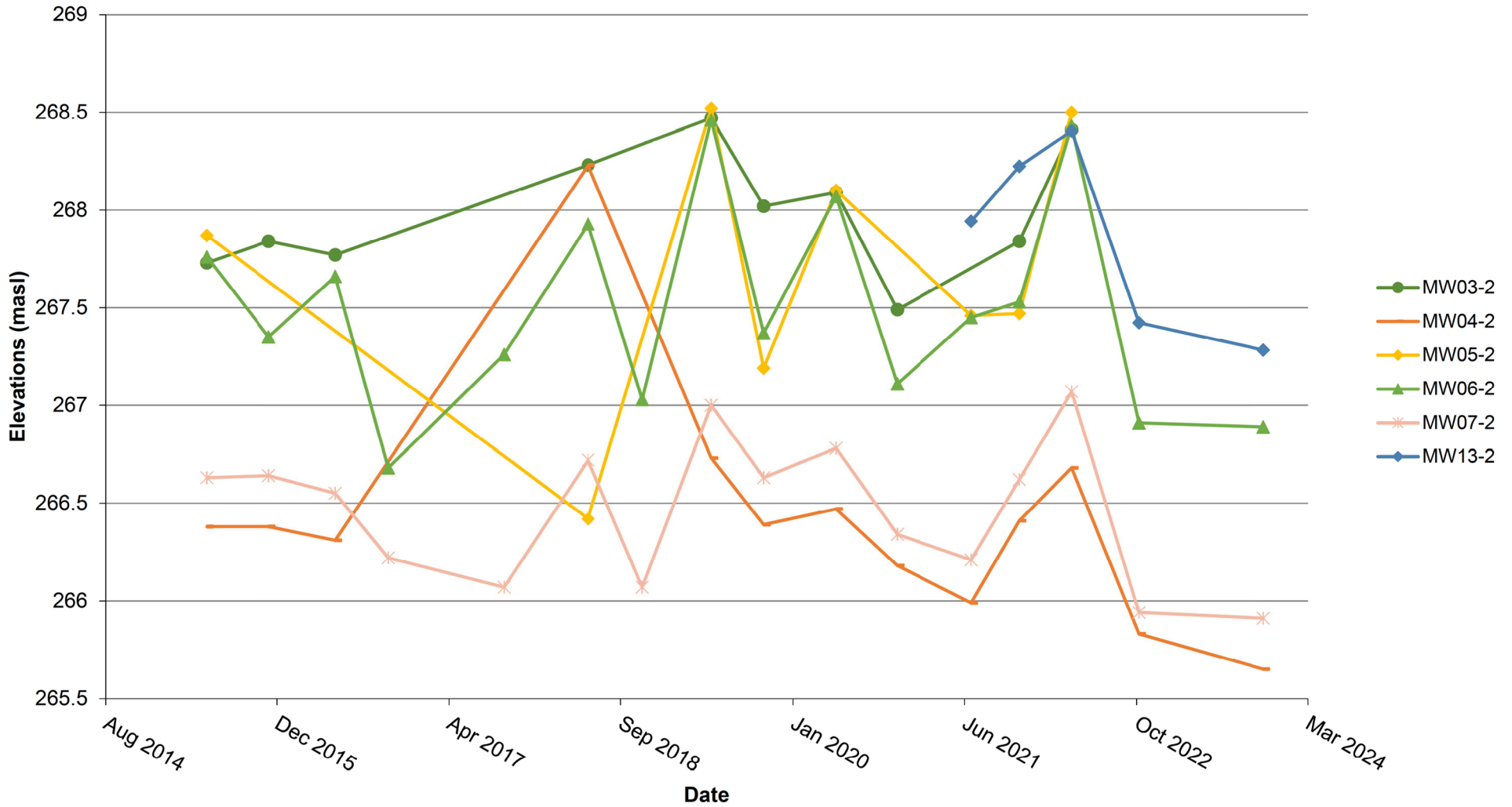


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EXISTING CONDITIONS

Project No.: 12987-002	Date: March 2024
Horizontal Scale: 1:750	Rev.: UTM Zone 17N
Drawn By: TLC	Checked By: CM
Figure: 3	



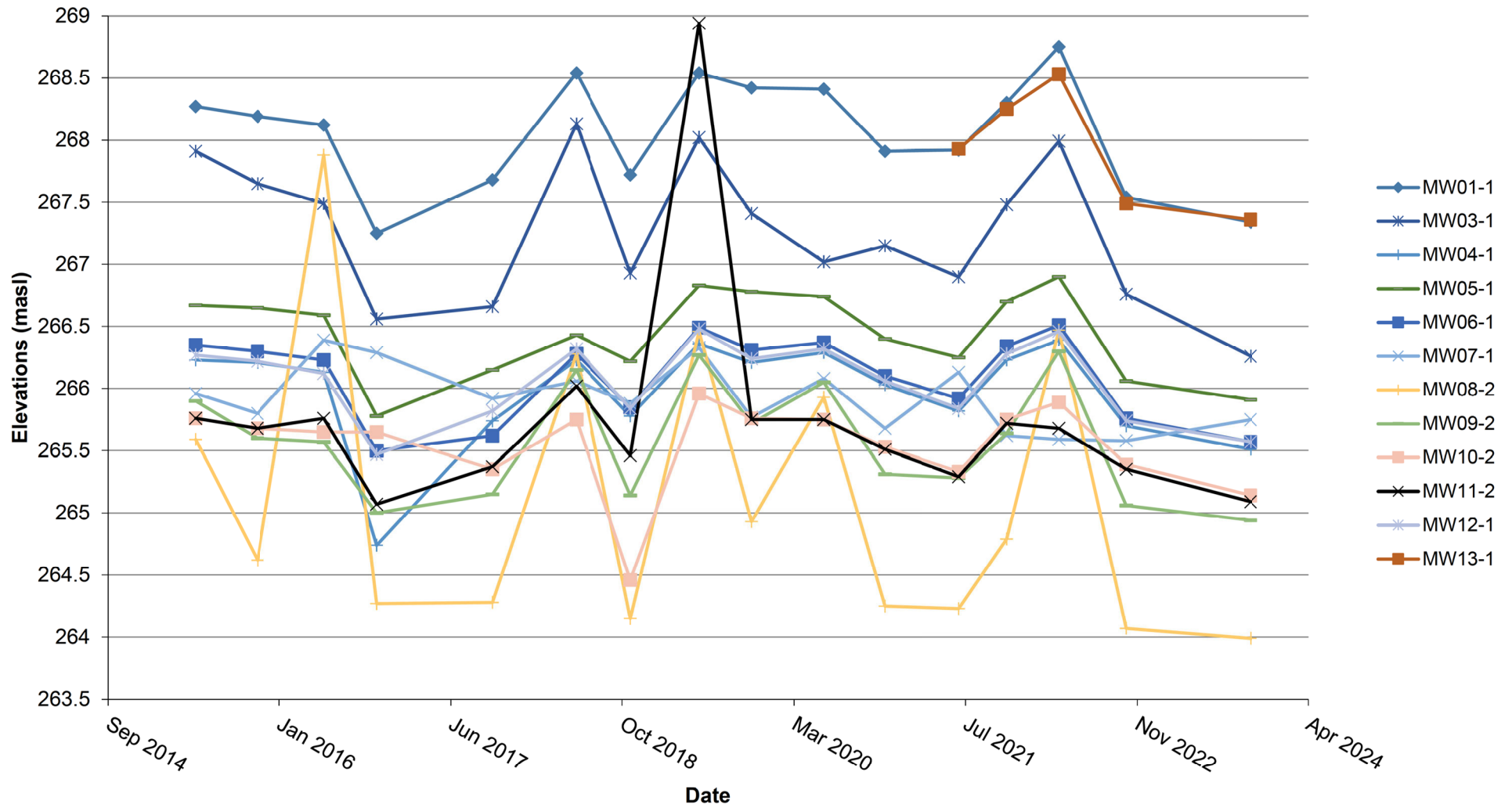


Groundwater Elevations (Overburden)

2023 Annual Report, Hall's Glen Waste Transfer Station
 1951 County Road 6, Hall's Glen
 The Corporation of the Township of Douro-Dummer

Figure:	4
Date:	20-Mar-24
Project Manager:	Cameron MacDougall
Project No.:	12987-002

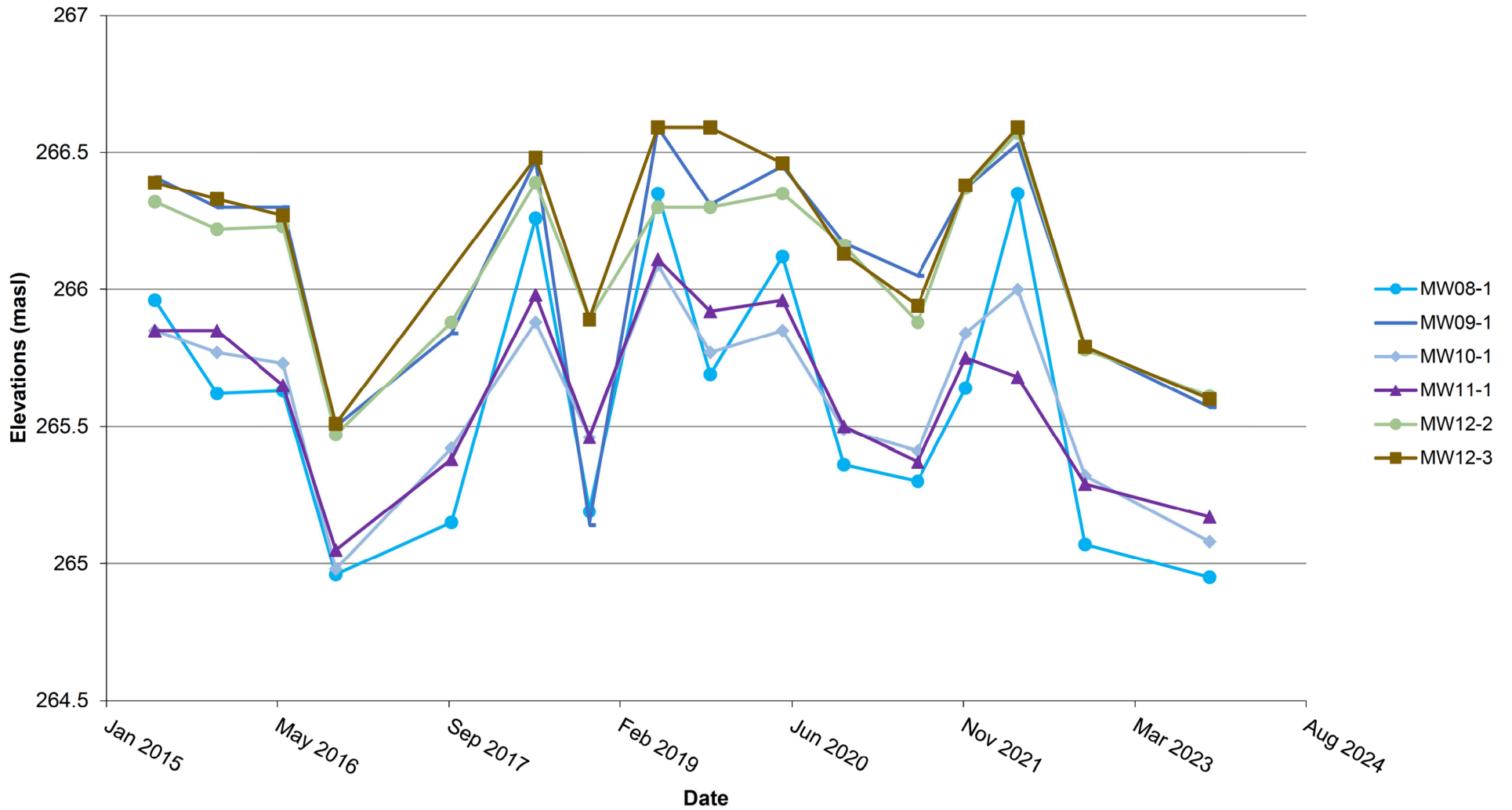




Groundwater Elevations (Shallow Bedrock)

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 1951 County Road 6, Hall's Glen
 The Corporation of the Township of Douro-Dummer

Figure:	5	
Date:	20-Mar-24	
Project Manager:	Cameron MacDougall	
Project No.:	12987-002	



Groundwater Elevations (Deep Bedrock)










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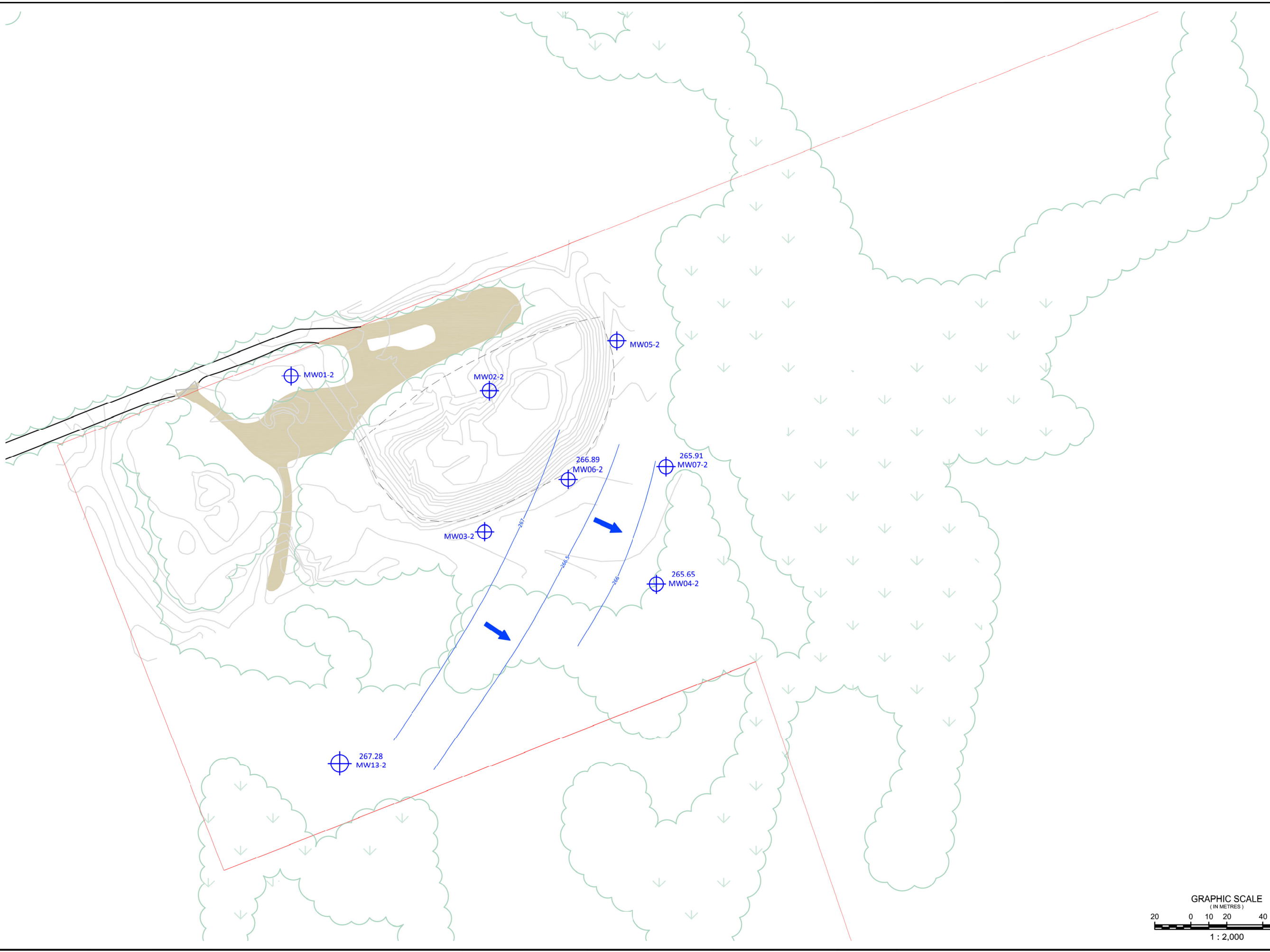
Figure:	6
Date:	20-Mar-24
Project Manager:	Cameron MacDougall
Project No.:	12987-002



**2023 ANNUAL REPORT
HALL'S GLEN WASTE
TRANSFER STATION**
1951 COUNTY ROAD 6
HALL'S GLEN, ONTARIO
THE CORPORATION OF THE
TOWNSHIP OF DOURO-DUMMER

LEGEND

-  Overburden Monitoring Well
-  Groundwater Elevation
October 2023
-  Groundwater Contour
October 2023
-  Topographic Contour
-  Site (approximate)
-  Approximate Landfill Footprint
(1.0 ha)
-  Approximate Treeline
-  Wetland Area
-  Groundwater Flow Direction
October 2023



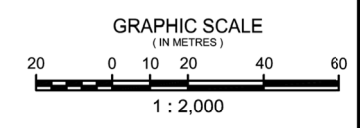
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**OVERBURDEN GROUNDWATER
CONFIGURATION**










Project No.: 12987-002	Date: March 2024
Horizontal Scale: 1:2,000	Rev.: UTM Zone 17N
Drawn By: TLC	Checked By: CM
Figure: 7	

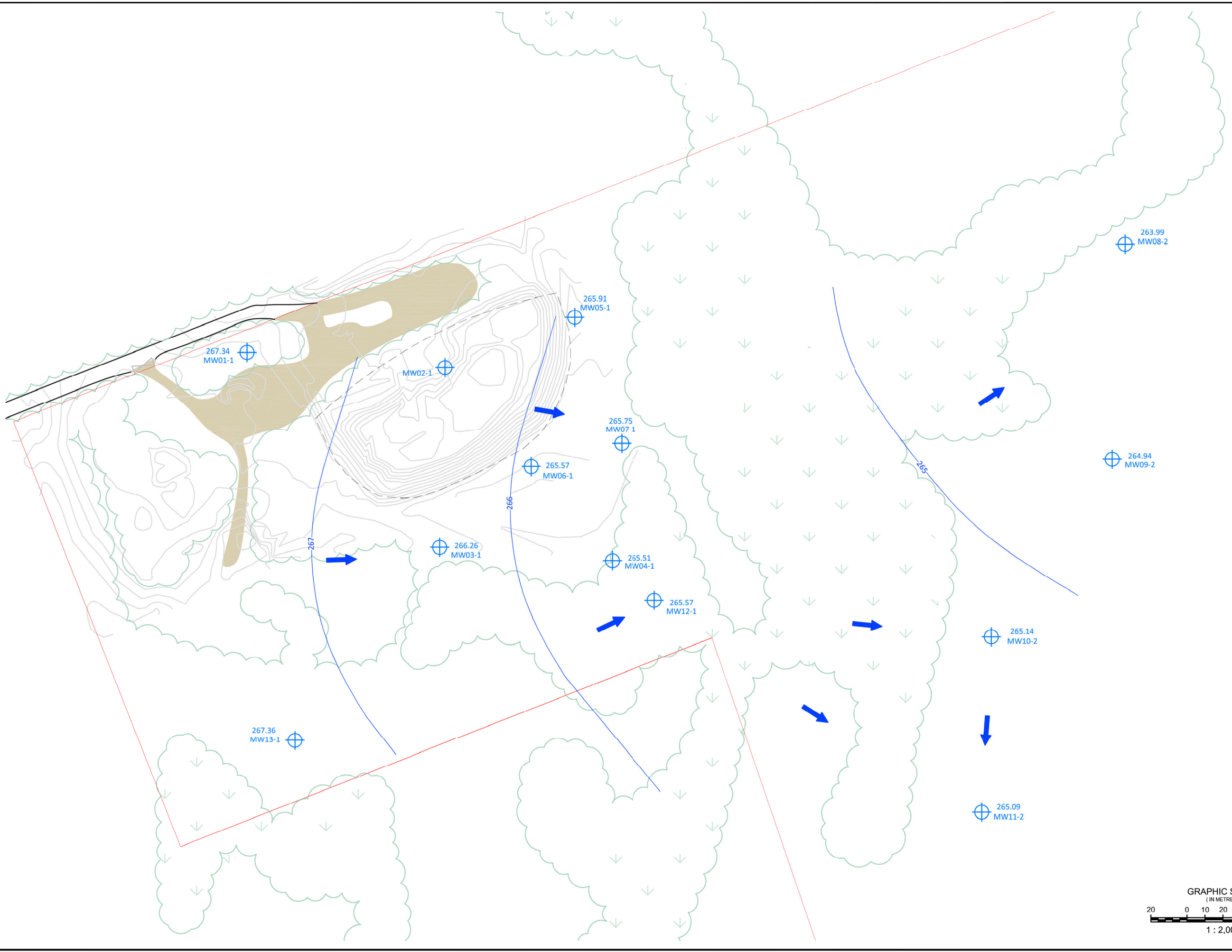


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LEGEND

-  Shallow Bedrock Monitoring Well
-  266.25 Groundwater Elevation October 2023
-  Groundwater Contour October 2023
-  Topographic Contour
-  Site (approximate)
-  Approximate Landfill Footprint (1.0 ha)
-  Approximate Treeline
-  Wetland Area
-  Groundwater Flow Direction October 2023

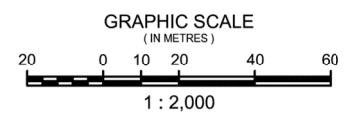


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SHALLOW BEDROCK
 GROUNDWATER
 CONFIGURATION

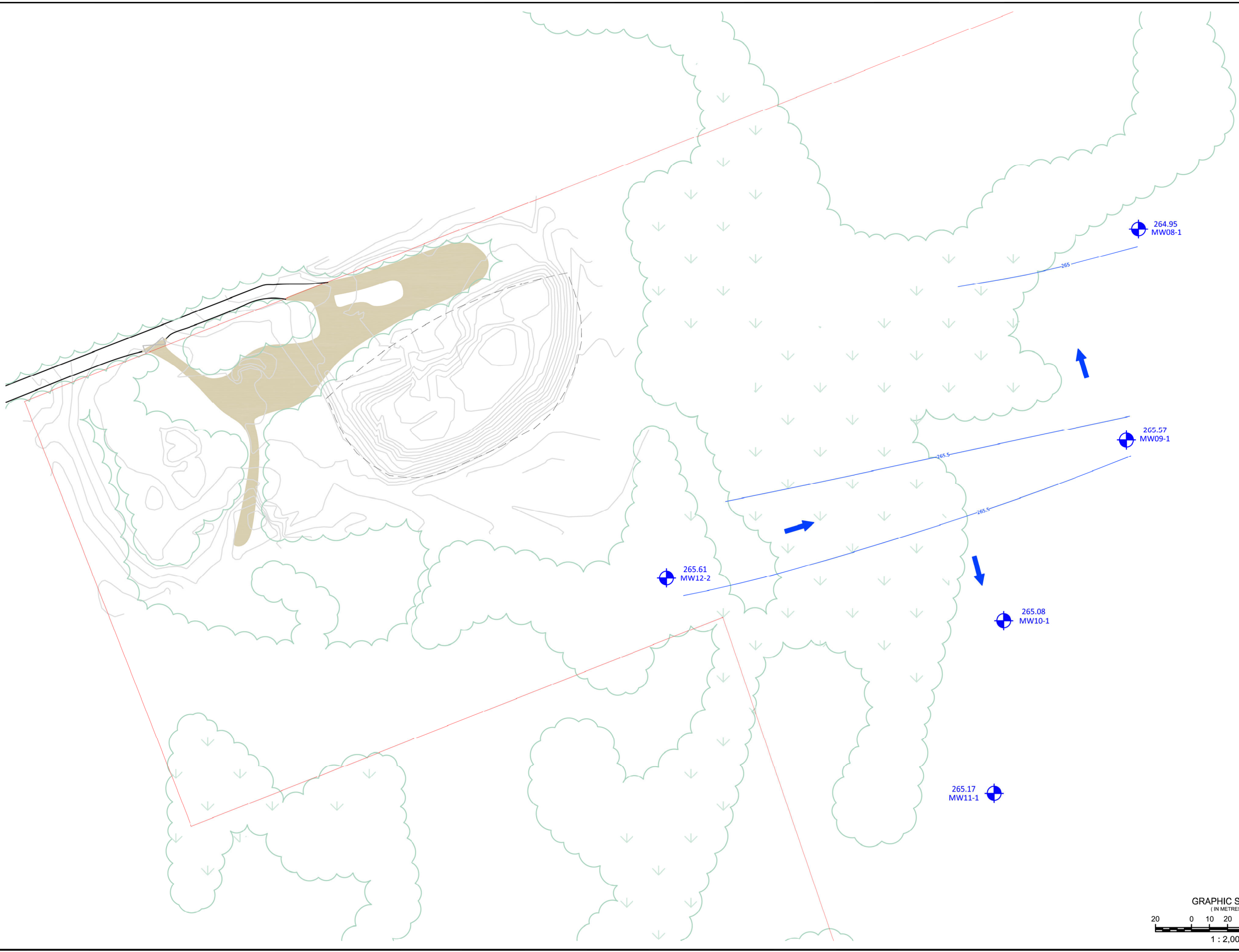
Project No.:	12987-002	Date:	March 2024
Horizontal Scale:	1:2,000	Projection:	UTM Zone 17N
Drawn By:	TLC	Checked By:	CM
Figure:	8		



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HALL'S GLEN WASTE
TRANSFER STATION**
1951 COUNTY ROAD 6
HALL'S GLEN, ONTARIO
THE CORPORATION OF THE
TOWNSHIP OF DOURO-DUMMER

LEGEND

-  Deep Bedrock Monitoring Well
-  Groundwater Elevation
266.25
October 2023
-  Groundwater Contour
October 2023
-  Topographic Contour
-  Site (approximate)
-  Approximate Landfill Footprint
(1.0 ha)
-  Approximate Treeline
-  Wetland Area
-  Groundwater Flow Direction
October 2023



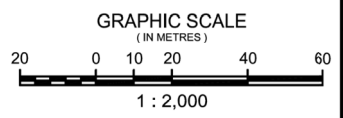
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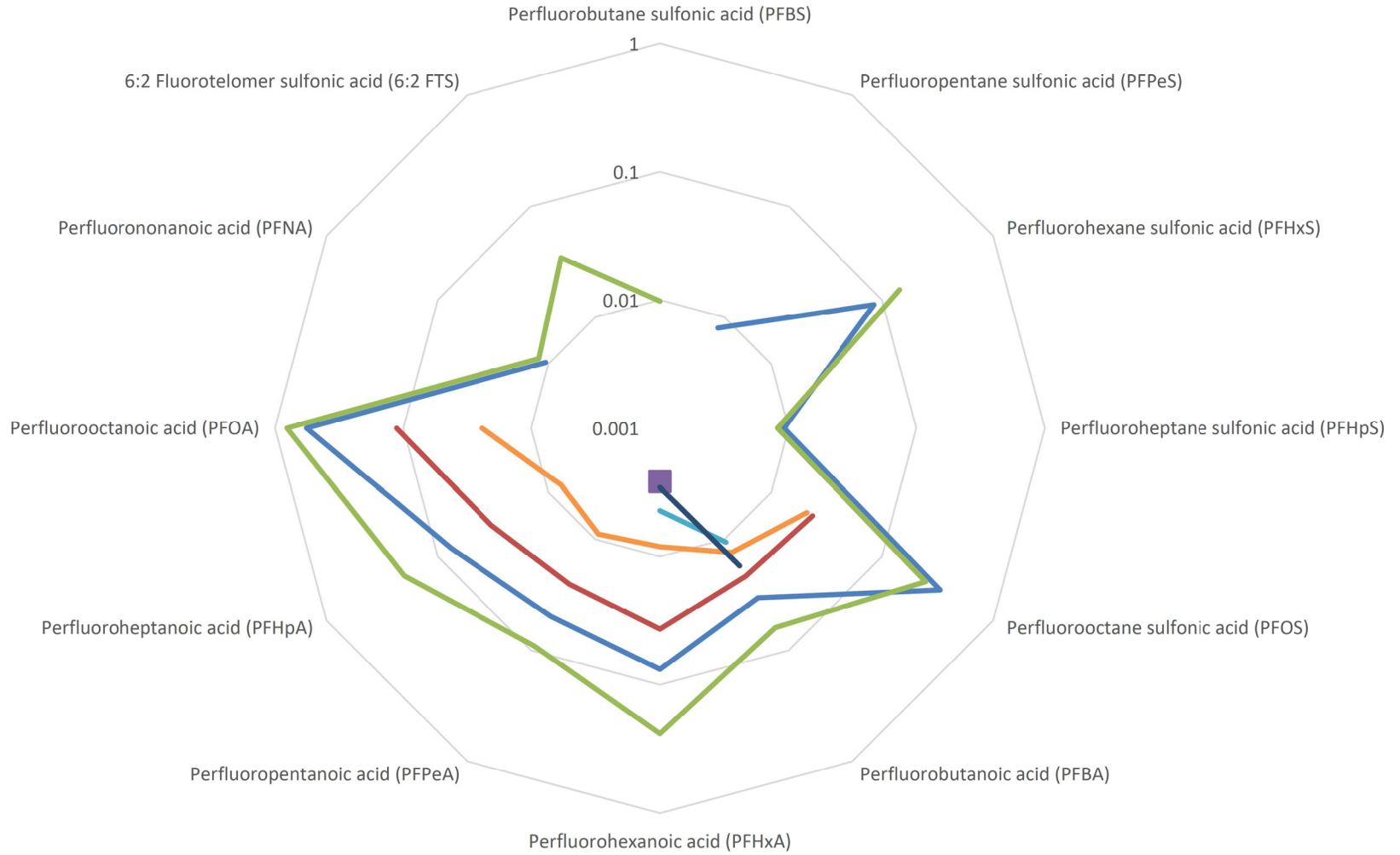
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**DEEP BEDROCK
GROUNDWATER
CONFIGURATION**

Project No.:	12987-002	Date:	March 2024
Horizontal Scale:	1:2,000	Projection:	UTM Zone 17N
Drawn By:	TLC	Checked By:	CM
Figure:	9		



MW05-1 MW06-1 MW06-2 MW10-1 MW11-1 MW13-2 R1



PFAS Signature

2023 Annual Report, Hall's Glen Waste Transfer Station
 1951 County Road 6, Hall's Glen
 The Corporation of the Township of Douro-Dummer

Figure:	10
Date:	20-Mar-24
Project Manager:	Cameron MacDougall
Project No.:	12987-002





Appended Tables



Table Notes

EQL - reported detection limit for the current year

RUC - Reasonable Use Criteria

CWQG - Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2011)

ODWQS - Ontario Drinking Water Quality Standards, O.Reg. 169/03

PWQO - Water Management, Policies, Guidelines, Provincial Water Quality Objectives
(MOEE, 1994b)

PWQO for cadmium, copper, and lead depend on hardness

NV - No Value

"-" Parameter not analyzed or measured

Unionized ammonia calculated using total ammonia and field data for pH and temperature



Table 1 Groundwater and Surface Water Monitoring Program

Location	Task	Frequency	Analytical Parameters
Groundwater			
MW01-1, MW01-2, MW02-1, MW02-2, MW05-1, MW05-2, MW06-1, MW06-2, MW08-1, MW08-2, MW09-1, MW09-2, MW10-1, MW10-2, MW11-1, MW11-2, MW12-1, MW12-2, MW12-3, MW13-1, MW13-2 R1, R2, R3, R4 QA/QC 1 QA/QC 2	<ul style="list-style-type: none"> • Measure groundwater levels • Groundwater sampling • Field measurements (pH, temperature, ORP, dissolved oxygen, conductivity) 	Once Annually (Autumn)	alkalinity, ammonia, barium, boron, calcium, chloride, conductivity, iron, magnesium, nitrate, pH, sodium, TDS, sulphate, COD, DOC, phenols, arsenic, manganese, phosphorus, potassium, hardness
MW05-1, MW05-2, trip blank	<ul style="list-style-type: none"> • VOCs 	Once every five years (Autumn, next in 2027)	benzene, 1,4 dichlorobenzene, dichloromethane, toluene, vinyl chloride, monochlorobenzene
All Wells	<ul style="list-style-type: none"> • Landfill Gas Measurements 	Once Annually (Autumn)	CH4 and H2S
Surface Water			
S1, S2 New Downstream SW location (S3) QA/QC 1	<ul style="list-style-type: none"> • Surface water sampling • Flow estimates • Field measurements (pH, temperature, ORP, conductivity, dissolved oxygen) 	Twice Annually (Spring & Autumn)	alkalinity, ammonia, arsenic, barium, boron, cadmium, chloride, chromium, conductivity, copper, iron, lead, nitrite, nitrate, TKN, pH, total phosphorus, TSS, TDS, sulphate, zinc, BOD, COD, phenols, hardness, unionized ammonia (field, calc) dissolved mercury

Dissolved mercury to be lab filtered with a 0.45 micron filter for all surface water samples.
 Lab to provide calculated unionized ammonia with provided field pH and temperature.



Table 2 - Groundwater Elevation Data

Monitor	UTM (Zone 17)		Top of Casing Elevation (m)	Ground Elevation (m)	Measured Stick-Up (m)	Well Depth (mTOP)	Well Depth (m)	Screened Unit	Water Level Elevation (mASL)					
	mN	mE							22-May-15	19-Nov-15	31-May-16	01-Nov-16	31-May-17	04-Oct-17
MW01-1	4933341	728326	271.24	270.42	0.82	7.65	6.83	Limestone/Shale	268.27	268.19	268.12	267.25	268.71	267.68
MW01-2			271.24	270.42	0.82	2.74	1.92	Clay/Gravel	dry	dry	dry	dry	dry	dry
MW02-1	4933327	728431	282.49	282.27	0.22	15.33	15.11	Limestone/Shale	dry	na	dry	dry	dry	dry
MW02-2			282.53	282.32	0.21	5.45	5.24	Sand/Gravel	dry	dry	dry	dry	dry	dry
MW03-1	4933262	728468	269.23	268.80	0.66	5.51	4.85	Limestone	267.91	267.65	267.49	266.56	267.90	266.66
MW03-2			269.53	268.80	0.49	1.72	1.23	Clay/Sand/Gravel	267.73	267.84	267.77	dry	267.90	dry
MW04-1	4933239	728549	268.28	267.36	0.92	5.62	4.70	Limestone/Shale	266.23	266.21	266.13	264.74	266.37	265.74
MW04-2			268.28	267.43	0.85	2.99	2.14	Gravel/Limestone	266.38	266.38	266.31	dry	266.74	dry
MW05-1	4933370	728530	271.35	-	Below Grade	7.68	7.68	Limestone	266.67	266.65	266.59	265.78	266.93	266.15
MW05-2			271.35	271.13	0.22	4.38	4.16	Clay/Sand/Gravel	267.87	dry	dry	dry	dry	dry
MW06-1	4933292	728502	271.01	270.40	0.61	7.85	7.24	Limestone/Shale	266.35	266.30	266.23	265.50	266.48	265.62
MW06-2			271.01	270.41	0.60	5.13	4.53	Sand/Gravel	267.76	267.35	267.66	266.68	268.40	267.26
MW07-1	4933309	728559	269.03	268.24	0.79	6.98	6.19	Limestone	265.96	265.80	266.39	266.29	266.07	265.92
MW07-2			269.03	268.29	0.74	3.37	2.63	Limestone	266.63	266.64	266.55	266.22	266.90	266.07
MW08-1	4933413	728836	270.74	270.05	0.69	11.31	10.62	Limestone	265.96	265.62	265.63	264.96	266.33	265.15
MW08-2			270.74	270.04	0.70	7.70	7.00	Gravel/Limestone	265.59	264.62	267.88	264.27	266.39	264.28
MW09-1	4933295	728829	267.25	266.57	0.68	9.92	9.24	Limestone	266.41	266.30	266.30	265.50	266.55	265.84
MW09-2			267.25	266.57	0.68	6.16	5.48	Limestone	265.90	265.60	265.57	265.00	266.23	265.15
MW10-1	4933194	728760	267.97	267.23	0.74	9.89	9.15	Limestone	265.85	265.77	265.73	264.98	265.97	265.42
MW10-2			267.97	267.24	0.73	6.65	5.92	Limestone	265.76	265.68	265.65	265.65	265.85	265.35
MW11-1	4933098	728755	268.50	267.80	0.70	9.96	9.26	Limestone	265.85	265.85	265.65	265.05	265.99	265.38
MW11-2			268.50	267.78	0.72	6.74	6.02	Limestone	265.76	265.68	265.76	265.07	265.85	265.37
MW12-1	4933218	728573	268.00	267.11	0.89	6.84	5.95	Limestone	266.27	266.22	266.12	265.47	265.47	265.82
MW12-2			268.00	267.09	0.91	10.21	9.30	Limestone	266.32	266.22	266.23	265.47	266.45	265.88
MW12-3			268.00	267.10	0.90	13.09	12.19	Limestone	266.39	266.33	266.27	265.51	266.55	na
MW13-1	4933149	728378	270.07	269.11	0.86	6.04	5.18	Limestone	-	-	-	-	-	-
MW13-2			269.96	269.11	0.86	3.76	2.90	Gravel/Limestone	-	-	-	-	-	-

Notes:

1. All measurements are reported relative to an assumed elevation of the site benchmark.



Table 2 - Groundwater Elevation Data

Monitor	UTM (Zone 17)		Top of Casing Elevation (m)	Ground Elevation (m)	Measured Stick-Up (m)	Well Depth (mTOP)	Well Depth (m)	Screened Unit	Water Level Elevation (mASL)					
	mN	mE							June 6/7, 2018	November 11/12, 2018	30-May-19	29-Oct-19	26-May-20	20-Nov-20
MW01-1	4933341	728326	271.24	270.42	0.82	7.65	6.83	Limestone/Shale	268.54	267.72	268.54	268.42	268.41	267.91
MW01-2			271.24	270.42	0.82	2.74	1.92	Clay/Gravel	dry	dry	dry	dry	-	-
MW02-1	4933327	728431	282.49	282.27	0.22	15.33	15.11	Limestone/Shale	dry	dry	dry	dry	-	-
MW02-2			282.53	282.32	0.21	5.45	5.24	Sand/Gravel	dry	dry	dry	dry	-	-
MW03-1	4933262	728468	269.23	268.80	0.66	5.51	4.85	Limestone	268.13	266.93	268.02	267.41	267.02	267.15
MW03-2			269.53	268.80	0.49	1.72	1.23	Clay/Sand/Gravel	268.23	dry	268.47	268.02	268.09	267.49
MW04-1	4933239	728549	268.28	267.36	0.92	5.62	4.70	Limestone/Shale	266.23	265.78	266.36	266.21	266.29	266.03
MW04-2			268.28	267.43	0.85	2.99	2.14	Gravel/Limestone	268.23	dry	266.73	266.39	266.47	266.18
MW05-1	4933370	728530	271.35	-	Below Grade	7.68	7.68	Limestone	266.43	266.22	266.83	266.78	266.74	266.40
MW05-2			271.35	271.13	0.22	4.38	4.16	Clay/Sand/Gravel	266.42	dry	268.52	267.19	268.10	-
MW06-1	4933292	728502	271.01	270.40	0.61	7.85	7.24	Limestone/Shale	266.28	265.85	266.49	266.31	266.37	266.10
MW06-2			271.01	270.41	0.60	5.13	4.53	Sand/Gravel	267.93	267.03	268.46	267.37	268.07	267.11
MW07-1	4933309	728559	269.03	268.24	0.79	6.98	6.19	Limestone	266.06	265.88	266.33	265.77	266.08	265.68
MW07-2			269.03	268.29	0.74	3.37	2.63	Limestone	266.72	266.07	267.00	266.63	266.78	266.34
MW08-1	4933413	728836	270.74	270.05	0.69	11.31	10.62	Limestone	266.26	265.19	266.35	265.69	266.12	265.36
MW08-2			270.74	270.04	0.70	7.70	7.00	Gravel/Limestone	266.28	264.15	266.46	264.93	265.93	264.25
MW09-1	4933295	728829	267.25	266.57	0.68	9.92	9.24	Limestone	266.47	265.14	266.59	266.31	266.45	266.17
MW09-2			267.25	266.57	0.68	6.16	5.48	Limestone	266.15	265.14	266.27	265.72	266.05	265.31
MW10-1	4933194	728760	267.97	267.23	0.74	9.89	9.15	Limestone	265.88	265.46	266.09	265.77	265.85	265.49
MW10-2			267.97	267.24	0.73	6.65	5.92	Limestone	265.75	264.46	265.96	265.76	265.75	265.53
MW11-1	4933098	728755	268.50	267.80	0.70	9.96	9.26	Limestone	265.98	265.46	266.11	265.92	265.96	265.50
MW11-2			268.50	267.78	0.72	6.74	6.02	Limestone	266.02	265.46	268.94	265.75	265.75	265.51
MW12-1	4933218	728573	268.00	267.11	0.89	6.84	5.95	Limestone	266.32	265.84	266.48	266.24	266.32	266.06
MW12-2			268.00	267.09	0.91	10.21	9.30	Limestone	266.39	265.89	266.30	266.30	266.35	266.16
MW12-3			268.00	267.10	0.90	13.09	12.19	Limestone	266.48	265.89	266.59	266.59	266.46	266.13
MW13-1	4933149	728378	270.07	269.11	0.86	6.04	5.18	Limestone	-	-	-	-	-	-
MW13-2			269.96	269.11	0.86	3.76	2.90	Gravel/Limestone	-	-	-	-	-	-

Notes:

1. All measurements are reported relative to an assumed elevation of the site benchmark.



Table 2 - Groundwater Elevation Data

Monitor	UTM (Zone 17)		Top of Casing Elevation (m)	Ground Elevation (m)	Measured Stick-Up (m)	Well Depth (mTOP)	Well Depth (m)	Screened Unit	Water Level Elevation (mASL)				
	mN	mE							6/24 and 28/2021	11-Nov-21	12-Apr-22	25-Oct-22	23-Oct-23
MW01-1	4933341	728326	271.24	270.42	0.82	7.65	6.83	Limestone/Shale	267.92	268.30	268.75	267.54	267.34
MW01-2			271.24	270.42	0.82	2.74	1.92	Clay/Gravel	-	-	268.91	-	-
MW02-1	4933327	728431	282.49	282.27	0.22	15.33	15.11	Limestone/Shale	268.17	-	-	-	-
MW02-2			282.53	282.32	0.21	5.45	5.24	Sand/Gravel	-	-	-	-	-
MW03-1	4933262	728468	269.23	268.80	0.66	5.51	4.85	Limestone	266.90	267.48	267.99	266.76	266.26
MW03-2			269.53	268.80	0.49	1.72	1.23	Clay/Sand/Gravel	-	267.84	268.71	-	-
MW04-1	4933239	728549	268.28	267.36	0.92	5.62	4.70	Limestone/Shale	265.82	266.23	266.39	265.70	265.51
MW04-2			268.28	267.43	0.85	2.99	2.14	Gravel/Limestone	265.99	266.41	266.68	265.83	265.65
MW05-1	4933370	728530	271.35	-	Below Grade	7.68	7.68	Limestone	266.25	266.70	266.90	266.06	265.91
MW05-2			271.35	271.13	0.22	4.38	4.16	Clay/Sand/Gravel	267.46	267.47	268.50	-	-
MW06-1	4933292	728502	271.01	270.40	0.61	7.85	7.24	Limestone/Shale	265.92	266.34	266.51	265.76	265.57
MW06-2			271.01	270.41	0.60	5.13	4.53	Sand/Gravel	267.45	267.53	268.43	266.91	266.89
MW07-1	4933309	728559	269.03	268.24	0.79	6.98	6.19	Limestone	266.13	265.62	265.59	265.58	265.75
MW07-2			269.03	268.29	0.74	3.37	2.63	Limestone	266.21	266.62	267.07	265.94	265.91
MW08-1	4933413	728836	270.74	270.05	0.69	11.31	10.62	Limestone	265.30	265.64	266.35	265.07	264.95
MW08-2			270.74	270.04	0.70	7.70	7.00	Gravel/Limestone	264.23	264.79	266.47	264.07	263.99
MW09-1	4933295	728829	267.25	266.57	0.68	9.92	9.24	Limestone	266.05	266.37	266.53	265.79	265.57
MW09-2			267.25	266.57	0.68	6.16	5.48	Limestone	265.28	265.64	266.30	265.06	264.94
MW10-1	4933194	728760	267.97	267.23	0.74	9.89	9.15	Limestone	265.41	265.84	266.00	265.32	265.08
MW10-2			267.97	267.24	0.73	6.65	5.92	Limestone	265.33	265.75	265.89	265.39	265.14
MW11-1	4933098	728755	268.50	267.80	0.70	9.96	9.26	Limestone	265.37	265.75	265.68	265.29	265.17
MW11-2			268.50	267.78	0.72	6.74	6.02	Limestone	265.29	265.72	265.68	265.35	265.09
MW12-1	4933218	728573	268.00	267.11	0.89	6.84	5.95	Limestone	265.84	266.28	266.46	265.74	265.57
MW12-2			268.00	267.09	0.91	10.21	9.30	Limestone	265.88	266.37	266.57	265.78	265.61
MW12-3			268.00	267.10	0.90	13.09	12.19	Limestone	265.94	266.38	266.59	265.79	265.60
MW13-1	4933149	728378	270.07	269.11	0.86	6.04	5.18	Limestone	267.93	268.25	268.53	267.49	267.36
MW13-2			269.96	269.11	0.86	3.76	2.90	Gravel/Limestone	267.94	268.22	268.40	267.42	267.28

Notes:

1. All measurements are reported relative to an assumed elevation of the site benchmark.



Table 3: Vertical Hydraulic Gradients

Monitor	Geologic Unit in Which Screen is Completed	Difference in Elevation of Bottom of Screen	Vertical Gradient (+ downward gradient, - upward gradient)						
			26-May-20	20-Nov-20	6/24 and 28/2021	11-Nov-21	12-Apr-22	25-Oct-22	23-Oct-23
MW01-1	Limestone/Shale	-4.91	-	-	-	-	0.03	-	-
MW01-2	Clay/Gravel								
MW02-1	Limestone/Shale	-9.92	-	-	-	-	-	-	-
MW02-2	Sand/Gravel								
MW03-1	Limestone	-3.79	0.28	0.09	-	0.09	0.11	-	-
MW03-2	Clay/Sand/Gravel								
MW04-1	Limestone/Shale	-2.63	0.07	0.06	0.06	0.07	0.11	0.07	0.05
MW04-2	Gravel/Limestone								
MW05-1	Limestone	-3.30	0.41	-	0.37	0.23	0.48	-	-
MW05-2	Clay/Sand/Gravel								
MW06-1	Limestone/Shale	-2.72	0.62	0.37	0.56	0.44	0.71	0.62	0.49
MW06-2	Sand/Gravel								
MW07-1	Limestone	-3.61	0.19	0.18	0.02	0.28	0.41	0.19	0.04
MW07-2	Clay/Gravel								
MW08-1	Limestone	-3.61	-0.05	-0.31	-0.30	-0.24	0.03	-0.05	-0.27
MW08-2	Gravel/Limestone								
MW09-1	Limestone	-3.76	-0.11	-0.23	-0.20	-0.19	-0.06	-0.11	-0.17
MW09-2	Limestone								
MW10-1	Limestone	-3.24	-0.03	0.01	-0.02	-0.03	-0.03	-0.03	0.02
MW10-2	Limestone								
MW11-1	Limestone	-3.22	-0.07	0.00	-0.02	-0.01	0.00	-0.07	-0.02
MW11-2	Limestone								
MW12-1	Limestone	-3.37	-0.01	-0.03	-0.01	-0.03	-0.03	-0.01	-0.01
MW12-2	Limestone								
MW12-1	Limestone	-6.25	-0.02	-0.01	-0.02	-0.02	-0.02	-0.02	0.00
MW12-3	Limestone								
MW12-2	Limestone								
MW12-3	Limestone	-2.88	0.04	-0.01	-0.02	0.00	-0.01	-0.04	0.00
MW12-3	Limestone								
MW13-1	Limestone	-2.17	-	-	-0.01	0.01	0.06	0.03	0.04
MW13-2	Gravel/Limestone								

Note:

1. All measurements are in meters unless otherwise stated.



Table 4 - Groundwater Quality - Overburden

	Unit	EQL	OB RUC	ODWQS	Location Code													
					MW01-2 Date 12 Apr 2022	MW03-2 01 Nov 2011	MW03-2 24 May 2012	MW03-2 12 Jun 2013	MW03-2 05 Nov 2013	MW03-2 25 Jun 2014	MW03-2 11 Nov 2014	MW03-2 22 May 2015	MW03-2 19 Nov 2015	MW03-2 30 May 2016	MW03-2 30 May 2019	MW03-2 29 Oct 2019	MW03-2 26 May 2020	MW03-2 18 Nov 2020
Metals																		
Arsenic (filtered)	µg/L	0.1	6.4	25	<0.1	-	-	-	-	-	1.3	0.7	1.0	0.4	0.2	0.3	0.3	0.3
Barium (filtered)	µg/L	0.01	352	1,000	171	598	576	455	480	375	596	494	475	402	175	237	157	240
Boron (filtered)	µg/L	0.2	2,521	5,000	6	315	343	326	324	355	397	420	305	303	563	827	466	408
Calcium (filtered)	µg/L	10			112,000	241,000	193,000	177,000	183,000	122,000	235,000	192,000	229,000	191,000	246,000	325,000	222,000	296,000
Cadmium (filtered)	µg/L	0.003		5	<0.015	-	-	-	-	-	0.003	0.009	0.013	0.004	0.018	0.03	0.039	0.078
Chloride	µg/L	200		250,000	26,600	35,000	17,000	12,000	18,000	28,000	28,000	26,000	28,000	12,000	37,000	100,000	54,000	59,000
Chromium (III+VI) (filtered)	µg/L	0.03		50	<1	-	-	-	-	0.22	0.18	0.22	0.54	0.19	0.3	0.32	0.58	
Copper (filtered)	µg/L	0.02		1,000	4.1	-	-	-	-	1.28	1.70	0.74	1.75	1.1	3.1	2	6.1	
Iron (filtered)	µg/L	2	159	300	8	25,500	22,300	19,300	7,270	7,850	14,600	9,160	4,410	4,820	132	20	28	1,390
Lead (filtered)	µg/L	0.01		10	0.08	-	-	-	-	0.04	0.01	0.16	0.07	0.02	0.03	0.01	1.27	
Magnesium (filtered)	µg/L	1			1,720	31,000	26,700	22,200	26,800	18,300	26,600	23,200	22,300	21,600	22,000	24,400	27,200	24,100
Manganese (filtered)	µg/L	0.01	26	50	1	-	-	-	-	6,210	4,860	4,530	3,180	3,240	52	822	1,010	
Mercury (filtered)	µg/L	0.01		1	<0.02	-	-	-	-	-	-	<0.01	0.01	<10	<10	20	<10	
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	-	-	-	-	-	-	-	
Phosphorus total (P2O5)	µg/L	3			1,150	-	-	-	-	-	<30	<30	8	-	110	270	560	
Potassium (filtered)	µg/L	2			200	-	-	-	-	24,800	20,000	20,100	19,100	16,900	21,100	22,900	26,600	
Sodium (filtered)	µg/L	10		200,000	19,500	43,200	34,600	45,400	88,100	126,000	29,500	65,800	26,600	57,700	38,300	43,300	107,000	45,700
Zinc (filtered)	µg/L	2		5,000	6	-	-	-	-	2	3	3	4	3	4	<2	5	
Inorganics																		
Alkalinity (total) as CaCO3	mg/L	2	392	500	270	685	650	615	772	689	717	655	380	286	536	559	674	841
Total Dissolved Solids	mg/L	3		500	311	849	760	786	920	830	851	809	671	389	677	1,120	814	900
Hardness as CaCO3 (filtered)	mg/L	0.02		500	287	-	-	-	-	-	-	-	-	-	-	-	-	
Chemical Oxygen Demand	mg/L	5			127	70	48	44	22	28	27	33	35	26	11	20	26	<8
Total Suspended Solids	mg/L	2			-	47	-	-	-	-	-	26	29	10	713	183	379	1,200
Biochemical Oxygen Demand	mg/L	2			-	<2	-	-	-	-	<4	<4	<4	<4	<4	14	5	
Dissolved Organic Carbon (filtered)	mg/L	0.2	4.2	5	4.4	4.4	11.3	4.0	10.0	11.5	8.9	-	-	-	-	-	-	
Phenols (4AAP)	mg/L	0.001			<0.001	-	-	-	-	-	-	0.002	<0.002	0.004	<0.001	0.002	<0.001	<0.001
Sulphate (filtered)	mg/L	0.2		500	3	17	24	59	23	95	50	80	84	35	70	210	89	62
Ammonia as N	mg/L	0.01			0.09	1.0	2.3	0.8	0.6	2.5	2.5	3.2	0.6	1.9	0.7	0.1	0.6	1.5
Nitrate (as N)	mg/L	0.05		10	0.18	<0.05	0.59	<0.06	0.19	<0.06	0.32	0.09	1.23	0.12	1.01	5.39	1.76	5.18
Nitrite (as N)	mg/L	0.03		1	<0.05	<0.06	-	-	-	-	<0.03	<0.03	<0.03	0.33	0.03	0.05	0.49	
Total Kjeldahl Nitrogen	mg/L	0.1			7.5	-	-	-	-	-	3.4	0.6	2.3	0.6	<0.5	1.3	2.2	
Electrical Conductivity (Lab)	µS/cm	1			599	1,360	1,220	1,230	1,470	1,360	1,360	1,280	1,120	710	1,110	1,630	1,360	1,360
pH (Lab)	-	0.05		6.5-8.5	8.17	7.82	7.51	7.59	7.85	7.47	7.99	7.89	7.46	7.86	7.42	7.58	7.36	7.63
Field																		
DO (Field)	mg/L				10.56	-	-	-	-	-	-	-	-	-	3.7	-	-	7.2
Redox (Field)	mV				25	-	-	-	-	-	-	-	-	-	86	-	-	29
Temperature (Field)	°C				6.9	-	-	-	-	-	-	-	-	-	11.3	-	13.6	10
Conductivity (field)	µS/cm				519	-	-	-	-	-	-	-	-	-	490	-	-	973
pH (Field)	-			6.5-8.5	6.9	-	-	-	-	-	-	-	-	-	7	-	6.9	7.1



Table 4 - Groundwater Quality - Overburden

	Unit	EQL	OB RUC	ODWQS	Location Code															
					MW03-2	MW03-2	MW04-2	MW04-2	MW04-2	MW04-2	MW04-2	MW04-2	MW04-2	MW04-2	MW04-2	MW04-2	MW04-2	MW04-2		
					Date	11 Nov 2021	12 Apr 2022	01 Nov 2011	28 May 2012	12 Jun 2013	05 Nov 2013	25 Jun 2014	11 Nov 2014	22 May 2015	19 Nov 2015	30 May 2016	04 Oct 2017	30 May 2019	29 Oct 2019	
Metals																				
Arsenic (filtered)	µg/L	0.1	6.4	25		0.3	0.2	-	-	-	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Barium (filtered)	µg/L	0.01	352	1,000		320	264	139	120	88.0	103	99.7	140	115	156	99.5	177	87.7	156	
Boron (filtered)	µg/L	0.2	2,521	5,000		550	445	29.4	30.7	15.3	13.0	13.2	42.1	85.3	68.2	28	45	34	36	
Calcium (filtered)	µg/L	10				296,000	257,000	123,000	104,000	83,200	97,400	98,200	130,000	102,000	140,000	110,000	128,000	92,900	120,000	
Cadmium (filtered)	µg/L	0.003		5		0.057	0.024	-	-	-	-	-	<0.003	0.006	0.048	0.007	0.007	0.003	0.004	
Chloride	µg/L	200		250,000		67,700	21,200	48,000	12,000	4,700	2,900	7,300	23,000	16,000	32,000	35,000	70,000	2,000	34,000	
Chromium (III+VI) (filtered)	µg/L	0.03		50		<1	<1	-	-	-	-	-	0.06	0.07	0.09	0.33	0.24	0.13	0.18	
Copper (filtered)	µg/L	0.02		1,000		2	1.9	-	-	-	-	-	0.89	1.09	0.76	1.05	0.96	0.2	1.4	
Iron (filtered)	µg/L	2	159	300		147	248	<3	<3	5	<3	<2	<2	<2	16	16	<7	<7	<7	
Lead (filtered)	µg/L	0.01		10		0.06	0.05	-	-	-	-	-	0.03	0.01	0.07	0.04	<0.01	<0.01	0.02	
Magnesium (filtered)	µg/L	1				28,500	27,600	3,390	3,320	2,230	2,410	2,000	2,930	2,990	5,260	2,490	4,240	2,200	3,750	
Manganese (filtered)	µg/L	0.01	26	50		1,400	2,820	-	-	-	-	-	0.28	0.26	200	3.31	1.13	0.41	0.99	
Mercury (filtered)	µg/L	0.01		1		<0.02	<0.02	-	-	-	-	-	-	-	0.01	0.01	<10	<10	<10	
Phosphorus (filtered)	µg/L	100				-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Phosphorus total (P2O5)	µg/L	3				90	80	-	-	-	-	-	<30	<30	3	<30	-	-	390	
Potassium (filtered)	µg/L	2				25,100	19,800	-	-	-	-	-	903	960	3,970	608	2,170	729	1,560	
Sodium (filtered)	µg/L	10		200,000		59,200	45,200	20,000	11,700	7,010	8,390	5,820	12,000	13,600	27,400	7,230	26,000	5,320	24,400	
Zinc (filtered)	µg/L	2		5,000		<5	<5	-	-	-	-	-	2	<2	3	<2	<2	<2	2	
Inorganics																				
Alkalinity (total) as CaCO3	mg/L	2	392	500		745	694	265	269	226	242	274	321	272	270	279	302	218	287	
Total Dissolved Solids	mg/L	3		500		907	771	434	289	254	231	320	394	329	300	303	463	186	374	
Hardness as CaCO3 (filtered)	mg/L	0.02		500		857	756	-	-	-	-	-	-	-	-	-	-	-	-	
Chemical Oxygen Demand	mg/L	5				40	26	11	<8	<8	<8	<8	<8	12	<8	11	<8	<8	<8	
Total Suspended Solids	mg/L	2				-	-	2,490	-	-	-	-	-	<2	39	<2	5	653	1,130	
Biochemical Oxygen Demand	mg/L	2				-	-	<2	-	-	-	-	-	<4	<4	<4	10	<4	<4	
Dissolved Organic Carbon (filtered)	mg/L	0.2	4.2	5		10.1	11.8	2.2	2.8	2.1	1.1	2.4	3.9	-	-	-	-	-	-	
Phenols (4AAP)	mg/L	0.001				<0.002	<0.001	-	-	-	-	-	-	0.001	0.004	0.002	<0.001	<0.001	<0.001	
Sulphate (filtered)	mg/L	0.2		500		51	31	14	10	6.8	3.6	6.8	8.1	11	9	14	13	<2	6	
Ammonia as N	mg/L	0.01				0.62	0.54	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	0.4	<0.1	<0.1	<0.1	<0.1	
Nitrate (as N)	mg/L	0.05		10		0.42	1.4	0.72	0.15	0.06	0.44	<0.06	0.21	0.20	0.64	0.89	0.68	<0.06	0.45	
Nitrite (as N)	mg/L	0.03		1		<0.05	<0.05	<0.06	-	-	-	-	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	
Total Kjeldahl Nitrogen	mg/L	0.1				1.7	1.1	-	-	-	-	-	-	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	
Electrical Conductivity (Lab)	µS/cm	1				1,660	1,420	710	549	468	474	520	679	569	537	558	769	320	705	
pH (Lab)	-	0.05		6.5-8.5		7.53	7.56	7.98	7.82	7.88	8.25	7.95	8.14	8.06	7.94	7.99	7.94	7.77	7.93	
Field																				
DO (Field)	mg/L					4.28	2.97	-	-	-	-	-	-	-	-	-	-	8.6	10.5	
Redox (Field)	mV					85	4	-	-	-	-	-	-	-	-	-	-	-23	134	
Temperature (Field)	°C					9.7	7.2	-	-	-	-	-	-	-	-	-	-	10.3	10.3	
Conductivity (field)	µS/cm					671	1,236	-	-	-	-	-	-	-	-	-	-	295	565	
pH (Field)	-			6.5-8.5		6.78	6.81	-	-	-	-	-	-	-	-	-	-	7.8	8.1	



Table 4 - Groundwater Quality - Overburden

	Unit	EQL	OB RUC	ODWQS	Location Code													
					Date	MW04-2	MW04-2	MW04-2	MW04-2	MW04-2	MW04-2	MW05-2	MW05-2	MW05-2	MW05-2	MW05-2	MW06-2	MW06-2
					26 May 2020	18 Nov 2020	24 Jun 2021	11 Nov 2021	12 Apr 2022	25 Oct 2022	30 May 2019	26 May 2020	24 Jun 2021	11 Nov 2021	12 Apr 2022	01 Nov 2011	24 May 2012	24 Oct 2012
Metals																		
Arsenic (filtered)	µg/L	0.1	6.4	25	<0.2	<0.2	0.1	<0.1	<0.1	0.1	0.7	1.4	3.1	4.2	0.9	-	-	-
Barium (filtered)	µg/L	0.01	352	1,000	90	128	136	160	101	223	667	700	910	936	517	458	390	488
Boron (filtered)	µg/L	0.2	2,521	5,000	22	34	33	41	24	49	401	427	662	477	273	649	612	772
Calcium (filtered)	µg/L	10			90,800	115,000	122,000	121,000	95,100	160,000	281,000	264,000	269,000	245,000	258,000	305,000	304,000	269,000
Cadmium (filtered)	µg/L	0.003		5	<0.003	0.004	<0.015	<0.015	<0.015	<0.01	0.012	0.017	<0.029	<0.015	<0.015	-	-	-
Chloride	µg/L	200		250,000	5,000	53,000	26,200	31,400	9,700	92,000	93,000	110,000	172,000	149,000	36,800	98,000	65,000	110,000
Chromium (III+VI) (filtered)	µg/L	0.03		50	0.2	0.25	<1	<1	<1	0.72	0.79	1	1	1	<1	-	-	-
Copper (filtered)	µg/L	0.02		1,000	0.7	0.8	4	1.7	2.7	3.1	1.6	1	2.3	2	1.8	-	-	-
Iron (filtered)	µg/L	2	159	300	<7	11	135	<5	8	250	13,300	26,100	34,400	42,100	10,800	714	731	2,370
Lead (filtered)	µg/L	0.01		10	0.01	0.04	0.28	0.04	0.02	0.52	0.14	0.11	2.49	0.2	0.16	-	-	-
Magnesium (filtered)	µg/L	1			2,640	3,240	4,040	3,960	3,000	5,200	27,800	29,000	33,400	26,800	23,300	41,600	46,700	46,300
Manganese (filtered)	µg/L	0.01	26	50	0.73	2.54	20	2	1	37	6,610	8,520	6,230	4,300	4,680	-	-	-
Mercury (filtered)	µg/L	0.01		1	20	<10	<0.02	<0.02	<0.02	<0.02	<10	20	<0.02	<0.02	<0.02	-	-	-
Phosphorus (filtered)	µg/L	100			-	-	-	-	<100	-	-	-	-	-	-	-	-	-
Phosphorus total (P2O5)	µg/L	3			50	520	420	1,270	580	600	-	320	410	760	440	-	-	-
Potassium (filtered)	µg/L	2			911	1,280	1,600	2,000	800	2,400	24,400	27,200	41,800	40,700	16,900	-	-	-
Sodium (filtered)	µg/L	10		200,000	7,430	16,100	16,300	26,000	10,000	41,100	63,600	77,100	117,000	83,800	38,700	88,200	87,800	107,000
Zinc (filtered)	µg/L	2		5,000	<2	<2	<5	<5	<5	<5	4	6	6	7	<5	-	-	-
Inorganics																		
Alkalinity (total) as CaCO3	mg/L	2	392	500	382	490	263	270	226	299	806	780	826	700	679	860	1,030	969
Total Dissolved Solids	mg/L	3		500	251	406	308	334	251	470	934	900	1,080	983	752	1,260	1,420	1,450
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	322	319	250	422	-	-	810	723	741	-	-	-
Chemical Oxygen Demand	mg/L	5			10	<8	42	13	50	60	47	62	113	160	79	60	56	71
Total Suspended Solids	mg/L	2			3,020	1,420	-	-	-	-	124	800	-	-	-	5	-	-
Biochemical Oxygen Demand	mg/L	2			4	<4	-	-	-	6	66	-	-	-	-	<2	-	-
Dissolved Organic Carbon (filtered)	mg/L	0.2	4.2	5	-	-	3.4	1.7	2.5	0.4	-	-	14.1	10.5	14	14.0	26.2	28.0
Phenols (4AAP)	mg/L	0.001			0.001	<0.001	<0.002	<0.002	<0.001	<0.001	0.005	0.005	<0.002	<0.002	<0.001	-	-	-
Sulphate (filtered)	mg/L	0.2		500	4	13	13	10	7	14	9	9	7	9	15	120	120	110
Ammonia as N	mg/L	0.01			<0.1	<0.1	0.02	0.03	0.01	0.01	11	13.6	26.4	23.2	7.8	10.0	8.4	16.6
Nitrate (as N)	mg/L	0.05		10	<0.06	1.49	0.55	0.49	0.16	1.44	0.23	0.07	0.2	0.1	<0.05	<0.05	0.30	0.99
Nitrite (as N)	mg/L	0.03		1	<0.03	<0.03	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.06	-	-
Total Kjeldahl Nitrogen	mg/L	0.1			<0.5	<0.5	0.3	0.5	0.4	0.4	11.8	13.5	30.3	30.4	10	-	-	-
Electrical Conductivity (Lab)	µS/cm	1			415	680	594	644	485	887	1,600	1,560	1,960	1,790	1,390	1,980	2,090	2,260
pH (Lab)	-	0.05		6.5-8.5	7.79	7.76	7.8	7.75	7.55	7.78	6.86	7.18	7.67	7.56	7.44	7.76	7.43	7.36
Field																		
DO (Field)	mg/L				-	8.5	9.71	7.53	7.32	5.98	9.6	-	6.67	6.47	4.49	-	-	-
Redox (Field)	mV				-	32	145	28	45	-141	101	-	140	121	-37	-	-	-
Temperature (Field)	°C				13	10.6	9	9.5	5.8	13	12.1	13.1	9.3	8.5	6.9	-	-	-
Conductivity (field)	µS/cm				-	458	569	277	412	841	1,236	-	1,962	786	1,294	-	-	-
pH (Field)	-			6.5-8.5	7.6	7.6	7.53	7.1	7.11	7.13	7	6.7	7.15	6.63	6.62	-	-	-



Table 4 - Groundwater Quality - Overburden

	Unit	EQL	OB RUC	ODWQS	Location Code														
					Date	MW06-2	MW06-2	MW06-2	MW06-2	MW06-2	MW06-2	MW06-2	MW06-2	MW06-2	MW06-2	MW06-2	MW06-2	MW06-2	
					12 Jun 2013	05 Nov 2013	25 Jun 2014	11 Nov 2014	22 May 2015	19 Nov 2015	30 May 2016	01 Nov 2016	04 Oct 2017	30 May 2019	29 Oct 2019	26 May 2020	18 Nov 2020	24 Jun 2021	
Metals																			
Arsenic (filtered)	µg/L	0.1	6.4	25	-	-	-	1.4	1.1	0.8	0.6	1.4	1.4	1.6	1.2	0.6	1	2.4	
Barium (filtered)	µg/L	0.01	352	1,000	360	408	528	432	453	399	403	499	529	685	467	544	401	699	
Boron (filtered)	µg/L	0.2	2,521	5,000	486	603	754	836	737	551	589	876	688	831	753	739	557	1,080	
Calcium (filtered)	µg/L	10			308,000	285,000	372,000	302,000	354,000	276,000	319,000	271,000	344,000	372,000	322,000	342,000	305,000	310,000	
Cadmium (filtered)	µg/L	0.003		5	-	-	-	<0.003	0.024	<0.003	0.015	0.011	0.005	0.012	0.016	0.014	0.014	<0.029	
Chloride	µg/L	200		250,000	75,000	82,000	100,000	120,000	120,000	74,000	62,000	140,000	130,000	80,000	110,000	92,000	140,000	167,000	
Chromium (III+VI) (filtered)	µg/L	0.03		50	-	-	-	0.78	0.99	0.60	0.96	1.40	1.81	1.18	0.8	1.13	1.04	2	
Copper (filtered)	µg/L	0.02		1,000	-	-	-	2.43	4.02	3.01	2.29	1.81	4.18	5.4	8.7	5.1	14.5	7.4	
Iron (filtered)	µg/L	2	159	300	645	855	6,020	1,070	4,100	1,960	3,110	4,360	8,920	15,600	8,860	7,210	4,590	21,700	
Lead (filtered)	µg/L	0.01		10	-	-	-	0.01	0.05	0.05	0.07	0.03	0.02	0.2	0.01	0.02	0.09	0.46	
Magnesium (filtered)	µg/L	1			39,400	39,100	52,700	41,000	46,100	34,100	32,200	43,000	43,400	48,000	30,800	42,400	33,100	47,100	
Manganese (filtered)	µg/L	0.01	26	50	-	-	-	8,730	12,400	6,730	6,390	7,320	10,500	8,400	5,340	8,490	6,340	8,580	
Mercury (filtered)	µg/L	0.01		1	-	-	-	-	<0.01	0.01	0.01	0.01	<10	<10	20	40	<10	<0.02	
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Phosphorus total (P2O5)	µg/L	3			-	-	-	<30	<30	72	23	<30	-	60	80	40	40	40	
Potassium (filtered)	µg/L	2			-	-	-	54,900	33,900	42,500	36,400	48,400	36,000	40,300	33,900	38,400	33,400	51,400	
Sodium (filtered)	µg/L	10		200,000	83,500	87,300	97,300	103,000	123,000	73,400	76,600	135,000	107,000	109,000	101,000	90,800	91,000	158,000	
Zinc (filtered)	µg/L	2		5,000	-	-	-	<2	3	2	4	6	<2	5	<2.00000	3	3	6	
Inorganics																			
Alkalinity (total) as CaCO3	mg/L	2	392	500	1,050	865	1,066	1,020	1,100	938	971	1,050	1,048	792	951	1,090	973	1,120	
Total Dissolved Solids	mg/L	3		500	1,430	1,310	1,650	1,350	1,520	1,190	1,310	1,300	1,710	1,010	1,240	1,370	1,200	1,350	
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	-	-	-	-	-	-	-	-	-	-	-	969	
Chemical Oxygen Demand	mg/L	5			70	54	102	69	101	58	69	82	99	70	68	102	98	119	
Total Suspended Solids	mg/L	2			-	-	-	-	10	3	17	11	29	228	110	115	92	-	
Biochemical Oxygen Demand	mg/L	2			-	-	-	-	<4	<4	<4	<4	<4	<4	21	6	<4	-	
Dissolved Organic Carbon (filtered)	mg/L	0.2	4.2	5	28.4	30.6	48.4	36.1	-	-	-	-	-	-	-	-	-	22.3	
Phenols (4AAP)	mg/L	0.001			-	-	-	-	0.001	0.003	0.003	0.002	0.005	0.006	0.006	0.005	<0.001	<0.002	
Sulphate (filtered)	mg/L	0.2		500	140	130	240	100	140	87	150	55	210	170	61	150	64	83	
Ammonia as N	mg/L	0.01			8.3	13.1	20.0	17.1	10.4	21.1	17.0	25.4	18.7	22.1	23.3	31.8	27	43	
Nitrate (as N)	mg/L	0.05		10	<0.06	0.11	<0.06	0.11	<0.06	<0.06	0.10	<0.06	0.08	<0.06	3.72	<0.06	0.14	0.06	
Nitrite (as N)	mg/L	0.03		1	-	-	-	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.04	<0.03	<0.03	<0.05	
Total Kjeldahl Nitrogen	mg/L	0.1			-	-	-	-	12.7	21.9	17.5	26.2	22.6	22.5	25.4	32.8	28.7	48	
Electrical Conductivity (Lab)	µS/cm	1			2,190	1,980	2,350	2,140	2,070	1,940	2,090	2,170	2,490	1,640	2,010	2,190	1,940	2,440	
pH (Lab)	-	0.05		6.5-8.5	7.50	7.67	7.45	8.00	7.25	7.50	7.47	7.31	7.25	6.98	7.6	7.25	7.67	7.54	
Field																			
DO (Field)	mg/L				-	-	-	-	-	-	-	-	-	3.3	11.8	-	7.4	8.96	
Redox (Field)	mV				-	-	-	-	-	-	-	-	-	-88	55	-	-72	162	
Temperature (Field)	°C				-	-	-	-	-	-	-	-	-	11.7	10.9	12.9	10.6	10	
Conductivity (field)	µS/cm				-	-	-	-	-	-	-	-	-	1,953	832	-	973	2,433	
pH (Field)	-			6.5-8.5	-	-	-	-	-	-	-	-	-	6.9	6.7	6.6	7	7.29	



Table 4 - Groundwater Quality - Overburden

	Unit	EQL	OB RUC	ODWQS	Location Code													
					MW07-2 Date 30 May 2019	MW07-2 29 Oct 2019	MW07-2 26 May 2020	MW07-2 18 Nov 2020	MW07-2 24 Jun 2021	MW07-2 11 Nov 2021	MW07-2 12 Apr 2022	MW07-2 25 Oct 2022	MW13-2 24 May 2012	MW13-2 24 Oct 2012	MW13-2 18 Jun 2013	MW13-2 05 Nov 2013	MW13-2 26 Jun 2014	MW13-2 11 Nov 2014
Metals																		
Arsenic (filtered)	µg/L	0.1	6.4	25	<0.2	0.4	<0.2	<0.2	0.2	0.2	0.2	0.2	-	-	-	-	-	0.2
Barium (filtered)	µg/L	0.01	352	1,000	87.6	211	83.8	183	416	364	175	643	105	117	146	117	135	141
Boron (filtered)	µg/L	0.2	2,521	5,000	55	138	46	62	324	294	110	550	35.0	28.4	46.8	36.5	43.2	53.7
Calcium (filtered)	µg/L	10			72,100	130,000	74,600	134,000	200,000	177,000	106,000	211,000	107,000	110,000	126,000	111,000	110,000	131,000
Cadmium (filtered)	µg/L	0.003		5	0.003	0.003	<0.003	<0.003	<0.015	<0.015	0.018	0.022	-	-	-	-	-	<0.003
Chloride	µg/L	200		250,000	6,000	35,000	10,000	53,000	104,000	80,300	35,200	118,000	40,000	15,000	64,000	36,000	51,000	44,000
Chromium (III+VI) (filtered)	µg/L	0.03		50	0.17	0.3	0.19	0.34	<1	9	<1	<1	-	-	-	-	-	0.07
Copper (filtered)	µg/L	0.02		1,000	0.7	3.1	0.6	1.5	4.6	3.9	3.5	8.6	-	-	-	-	-	0.75
Iron (filtered)	µg/L	2	159	300	8	<7	<7	16	51	31	129	11	6	64	6	<3	6	67
Lead (filtered)	µg/L	0.01		10	0.02	0.03	<0.01	0.07	0.25	0.3	0.69	0.07	-	-	-	-	-	0.01
Magnesium (filtered)	µg/L	1			3,710	10,100	3,180	7,130	21,300	16,900	9,810	27,000	3,440	2,990	4,250	3,440	3,690	3,620
Manganese (filtered)	µg/L	0.01	26	50	0.92	0.29	0.3	2.94	22	7	42	218	-	-	-	-	-	5.92
Mercury (filtered)	µg/L	0.01		1	<10	20	20	<10	<0.02	<0.02	<0.02	<0.02	-	-	-	-	-	-
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	-	<100	-	-	-	-	-	-
Phosphorus total (P2O5)	µg/L	3			60	60	90	60	80	50	190	390	-	-	-	-	-	-
Potassium (filtered)	µg/L	2			1,330	5,410	631	2,600	10,300	8,200	3,900	18,700	-	-	-	-	-	3,800
Sodium (filtered)	µg/L	10		200,000	17,300	29,800	12,600	17,000	82,800	69,900	36,800	105,000	23,300	16,000	36,200	24,100	27,300	23,200
Zinc (filtered)	µg/L	2		5,000	2	<2	<2	<2	<5	<5	<5	<5	-	-	-	-	-	<2
Inorganics																		
Alkalinity (total) as CaCO3	mg/L	2	392	500	191	322	212	397	510	474	291	593	242	290	289	279	283	312
Total Dissolved Solids	mg/L	3		500	209	451	223	611	659	659	372	871	410	369	460	400	383	417
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	-	-	588	511	304	639	-	-	-	-	-	-
Chemical Oxygen Demand	mg/L	5			<8	<8	10	<8	33	33	17	99	29	<8	11	8	<8	<8
Total Suspended Solids	mg/L	2			148	178	264	323	-	-	-	-	-	-	-	-	-	-
Biochemical Oxygen Demand	mg/L	2			<4	<4	<4	<4	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon (filtered)	mg/L	0.2	4.2	5	-	-	-	-	9.1	6.7	5.6	5.8	2.5	<1	3.6	2.9	4.8	4.4
Phenols (4AAP)	mg/L	0.001			<0.001	<0.001	0.002	<0.001	<0.002	<0.002	<0.001	<0.001	-	-	-	-	-	-
Sulphate (filtered)	mg/L	0.2		500	11	15	5	19	37	29	18	38	20	13	26	22	17	16
Ammonia as N	mg/L	0.01			<0.1	<0.1	<0.1	<0.1	0.39	0.06	0.03	2.21	<0.1	<0.1	<0.1	<0.1	0.5	<0.1
Nitrate (as N)	mg/L	0.05		10	0.08	1.36	<0.06	1.62	0.48	4.96	0.59	10.9	0.48	0.67	1.10	1.31	0.57	1.23
Nitrite (as N)	mg/L	0.03		1	<0.03	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-
Total Kjeldahl Nitrogen	mg/L	0.1			<0.5	<0.5	<0.5	<0.5	0.9	0.7	0.5	4	-	-	-	-	-	-
Electrical Conductivity (Lab)	µS/cm	1			331	691	383	840	1,220	1,220	717	1,590	636	634	784	696	675	724
pH (Lab)	-	0.05		6.5-8.5	7.84	7.92	7.95	7.78	7.72	7.8	7.59	7.75	7.87	7.69	7.79	8.10	7.95	8.10
Field																		
DO (Field)	mg/L				9.8	9.8	-	10.2	6.88	7.35	9.28	5.43	-	-	-	-	-	-
Redox (Field)	mV				63	86	-	31	132	135	36	-151	-	-	-	-	-	-
Temperature (Field)	°C				11.3	11.1	14.4	9.4	11.1	9	7.8	11.4	-	-	-	-	-	-
Conductivity (field)	µS/cm				370	1,662	-	579	1,048	503	648	1,525	-	-	-	-	-	-
pH (Field)	-			6.5-8.5	7.7	6.7	7.1	8	7.51	6.98	7.33	6.8	-	-	-	-	-	-



Table 4 - Groundwater Quality - Overburden

	Unit	EQL	OB RUC	ODWQS	Location Code													
					MW13-2 Date 22 May 2015	MW13-2 19 Nov 2015	MW13-2 31 May 2016	MW13-2 01 Nov 2016	MW13-2 04 Oct 2017	MW13-2 30 May 2019	MW13-2 29 Oct 2019	MW13-2 26 May 2020	MW13-2 18 Nov 2020	MW13-2 28 Jun 2021	MW13-2 11 Nov 2021	MW13-2 12 Apr 2022	MW13-2 25 Oct 2022	MW13-2 23 Oct 2023
Metals																		
Arsenic (filtered)	µg/L	0.1	6.4	25	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	<0.2	0.1	0.1	0.1	0.1	0.2
Barium (filtered)	µg/L	0.01	352	1,000	113	567	337	370	132	137	155	158	113	135	168	190	108	109
Boron (filtered)	µg/L	0.2	2,521	5,000	41.2	30.6	33	43	38	51	46	49	50	27	46	77	27	24
Calcium (filtered)	µg/L	10			107,000	307,000	230,000	176,000	118,000	139,000	144,000	149,000	126,000	123,000	143,000	165,000	95,400	95,900
Cadmium (filtered)	µg/L	0.003		5	0.018	0.027	0.007	0.010	0.011	0.004	0.007	0.024	0.006	<0.015	<0.015	<0.015	<0.01	-
Chloride	µg/L	200		250,000	40,000	1,100,000	110,000	710,000	70,000	51,000	58,000	85,000	38,000	70,300	56,700	79,000	31,000	32,900
Chromium (III+VI) (filtered)	µg/L	0.03		50	0.34	0.13	0.42	0.65	0.69	0.15	0.22	0.26	0.31	<1	<1	<1	<1	-
Copper (filtered)	µg/L	0.02		1,000	1.52	1.39	1.55	7.97	0.88	0.7	2	1.6	1	1.6	1.4	1.6	0.7	-
Iron (filtered)	µg/L	2	159	300	385	9	<7	23	71	27	19	16	46	6	<5	<5	41	125
Lead (filtered)	µg/L	0.01		10	0.96	0.08	<0.01	0.02	<0.01	0.03	0.04	0.08	0.05	0.08	0.03	0.03	0.02	-
Magnesium (filtered)	µg/L	1			3,480	7,690	5,930	4,510	3,750	4,420	4,680	5,680	3,550	3,930	4,390	6,690	3,020	3,050
Manganese (filtered)	µg/L	0.01	26	50	55.7	0.69	0.93	4.37	137	1.44	2.27	1.27	3.28	<1	<1	<1	4	4
Mercury (filtered)	µg/L	0.01		1	-	0.01	<0.01	<0.01	<10	<10	<10	20	<10	<0.02	<0.02	<0.02	<0.02	-
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	-	-	-	-	-	-	<100	-
Phosphorus total (P2O5)	µg/L	3			<30	<30	<30	22	50	-	100	30	40	70	20	30	310	130
Potassium (filtered)	µg/L	2			2,850	5,120	4,270	4,660	3,990	3,480	3,640	4,010	2,970	3,200	4,500	4,500	2,900	3,300
Sodium (filtered)	µg/L	10		200,000	21,600	436,000	267,000	442,000	38,200	30,000	36,500	46,800	25,600	43,700	36,500	43,600	23,600	21,700
Zinc (filtered)	µg/L	2		5,000	3	3	4	2	2	3	4	12	<2	<5	<5	<5	<5	-
Inorganics																		
Alkalinity (total) as CaCO3	mg/L	2	392	500	268	252	261	393	285	230	331	318	314	268	318	345	250	278
Total Dissolved Solids	mg/L	3		500	403	2,000	491	1,600	454	329	474	526	391	399	436	527	311	322
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	-	-	-	-	-	-	-	324	375	440	251	252
Chemical Oxygen Demand	mg/L	5			<8	39	9	<8	<8	10	<8	15	10	<5	10	8	46	12
Total Suspended Solids	mg/L	2			49	<2	<2	<2	<2	28	69	56	45	-	-	-	-	-
Biochemical Oxygen Demand	mg/L	2			<4	<4	<4	<4	5	<4	<4	<4	<4	<4	<4	<4	<4	-
Dissolved Organic Carbon (filtered)	mg/L	0.2	4.2	5	-	-	-	-	-	-	-	-	-	3.3	2.7	3.8	1.3	5
Phenols (4AAP)	mg/L	0.001			<0.001	0.010	0.003	0.001	<0.001	0.002	<0.001	0.003	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001
Sulphate (filtered)	mg/L	0.2		500	15	20	17	45	13	18	26	22	12	12	23	22	10	12
Ammonia as N	mg/L	0.01			<0.1	<0.1	<0.1	<0.1	0.2	0.4	<0.1	0.2	<0.1	0.02	0.02	0.16	0.03	<0.05
Nitrate (as N)	mg/L	0.05		10	0.82	1.20	0.92	2.42	0.52	0.65	2.36	1.27	1.12	1.71	1.28	2.42	0.4	0.16
Nitrite (as N)	mg/L	0.03		1	<0.03	<0.3	<0.03	<0.3	<0.03	<0.03	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.05	-
Total Kjeldahl Nitrogen	mg/L	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	0.2	0.2	0.5	0.5	-
Electrical Conductivity (Lab)	µS/cm	1			632	3,680	895	3,030	774	569	833	862	666	763	827	989	599	621
pH (Lab)	-	0.05		6.5-8.5	7.94	7.79	7.99	7.60	7.47	7.51	7.82	7.41	7.77	7.68	7.72	7.4	7.72	7.46
Field																		
DO (Field)	mg/L				-	-	-	-	-	7.1	8.7	-	4.8	6.56	2.51	2.45	4.53	10.37
Redox (Field)	mV				-	-	-	-	-	129	10	-	38	131	45	39	-142	-25
Temperature (Field)	°C				-	-	-	-	-	8.9	10.8	16.6	12.6	12.4	10.1	6.5	12	9.9
Conductivity (field)	µS/cm				-	-	-	-	-	292	502	-	485	715	353	859	575	592
pH (Field)	-			6.5-8.5	-	-	-	-	-	7.9	7.6	7.5	7.6	7.23	6.9	6.72	7.24	7.07



Table 4 - Groundwater Quality - Overburden

	Unit	EQL	OB RUC	ODWQS	Location Code					
					Date	R1	R1	R1	R1	R1
					18 Nov 2020	28 Jun 2021	11 Nov 2021	12 Apr 2022	25 Oct 2022	23 Oct 2023
Metals										
Arsenic (filtered)	µg/L	0.1	6.4	25	<0.2	0.3	0.2	0.1	0.2	0.1
Barium (filtered)	µg/L	0.01	352	1,000	175	165	144	68	226	112
Boron (filtered)	µg/L	0.2	2,521	5,000	33	20	12	5	34	11
Calcium (filtered)	µg/L	10			131,000	123,000	112,000	80,700	122,000	78,400
Cadmium (filtered)	µg/L	0.003		5	0.005	0.054	0.02	<0.015	0.014	-
Chloride	µg/L	200		250,000	92,000	51,700	70,900	37,200	58,100	37,400
Chromium (III+VI) (filtered)	µg/L	0.03		50	0.89	1	<1	<1	<1	-
Copper (filtered)	µg/L	0.02		1,000	1.1	2.5	0.8	1.7	0.8	-
Iron (filtered)	µg/L	2	159	300	22	577	150	44	202	20
Lead (filtered)	µg/L	0.01		10	0.03	0.83	0.26	0.09	0.03	-
Magnesium (filtered)	µg/L	1			4,910	4,640	3,750	2,770	5,090	3,240
Manganese (filtered)	µg/L	0.01	26	50	3.43	940	726	132	1,390	13
Mercury (filtered)	µg/L	0.01		1	-	<0.02	<0.02	<0.02	<0.02	-
Phosphorus (filtered)	µg/L	100			-	-	-	<100	-	-
Phosphorus total (P2O5)	µg/L	3			-	960	2,070	9,480	10,200	20
Potassium (filtered)	µg/L	2			1,920	1,500	1,000	400	2,200	1,200
Sodium (filtered)	µg/L	10		200,000	45,900	36,500	45,200	26,600	39,100	9,400
Zinc (filtered)	µg/L	2		5,000	3	<5	<5	<5	<5	-
Inorganics										
Alkalinity (total) as CaCO3	mg/L	2	392	500	298	254	259	204	287	273
Total Dissolved Solids	mg/L	3		500	460	353	382	270	405	329
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	327	295	213	326	209
Chemical Oxygen Demand	mg/L	5			<8	450	82	342	355	28
Total Suspended Solids	mg/L	2			-	-	-	-	-	-
Biochemical Oxygen Demand	mg/L	2			-	-	-	-	-	-
Dissolved Organic Carbon (filtered)	mg/L	0.2	4.2	5	1	3.7	2.8	2.9	2	3.8
Phenols (4AAP)	mg/L	0.001			-	<0.002	<0.002	<0.001	<0.001	<0.001
Sulphate (filtered)	mg/L	0.2		500	15	10	10	7	13	10
Ammonia as N	mg/L	0.01			<0.1	0.08	<0.01	0.07	0.23	<0.05
Nitrate (as N)	mg/L	0.05		10	1.78	1.58	0.39	0.14	1.7	1.32
Nitrite (as N)	mg/L	0.03		1	-	<0.05	<0.05	<0.05	<0.05	-
Total Kjeldahl Nitrogen	mg/L	0.1			-	1.1	2.4	13.8	15.3	-
Electrical Conductivity (Lab)	µS/cm	1			864	679	732	521	773	634
pH (Lab)	-	0.05		6.5-8.5	8.14	7.74	8.03	7.54	7.79	7.5
Field										
DO (Field)	mg/L				-	4.89	4.1	4.48	5.97	9.24
Redox (Field)	mV				-	125	8	81	-148	56
Temperature (Field)	°C				-	10.4	9.4	8	11.6	10.1
Conductivity (field)	µS/cm				-	678	319	456	727	407
pH (Field)	-			6.5-8.5	-	7.18	7.06	7.24	7.06	7.3



Table 5 - Groundwater Quality - Shallow Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code														
					Date	MW01-1	MW01-1	MW01-1	MW01-1	MW01-1	MW01-1	MW01-1	MW01-1	MW01-1	MW03-1	MW03-1	MW03-1	MW03-1	MW03-1
					29 Oct 2019	26 May 2020	18 Nov 2020	24 Jun 2021	11 Nov 2021	12 Apr 2022	25 Oct 2022	23 Oct 2023	01 Nov 2011	24 May 2012	24 Oct 2012	12 Jun 2013	05 Nov 2013	25 Jun 2014	
Metals																			
Arsenic (filtered)	µg/L	0.1	6.4	25	<0.2	<0.2	<0.2	<0.1	0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-
Barium (filtered)	µg/L	0.01	423	1,000	278	243	227	233	245	284	301	271	208	343	204	146	129	250	262
Boron (filtered)	µg/L	0.2	2,536	5,000	105	98	102	73	93	84	84	70	118	395	93.3	118	45.5	262	262
Calcium (filtered)	µg/L	10			178,000	178,000	177,000	165,000	156,000	191,000	185,000	176,000	186,000	163,000	147,000	126,000	121,000	183,000	183,000
Cadmium (filtered)	µg/L	0.003		5	0.003	0.009	0.003	<0.015	<0.015	<0.015	<0.012	-	-	-	-	-	-	-	-
Chloride	µg/L	200		250,000	170,000	190,000	180,000	175,000	153,000	216,000	221,000	218,000	97,000	75,000	92,000	50,000	75,000	96,000	96,000
Chromium (III+VI) (filtered)	µg/L	0.03		50	0.17	0.19	0.87	4	1	<1	<1	-	-	-	-	-	-	-	-
Copper (filtered)	µg/L	0.02		1,000	1.4	1.9	1.6	1.3	1.2	2	1.1	-	-	-	-	-	-	-	-
Iron (filtered)	µg/L	2	153	300	<7.00000	<7	<7	<5	<5	<5	<5	10	10	5,920	15	12	6	5	5
Lead (filtered)	µg/L	0.01		10	0.14	0.02	0.01	0.13	0.09	<0.04	<0.04	-	-	-	-	-	-	-	-
Magnesium (filtered)	µg/L	1			14,200	17,500	15,200	13,700	14,900	15,100	14,300	13,000	8,420	17,500	6,900	6,570	4,300	10,300	10,300
Manganese (filtered)	µg/L	0.01	25	50	1.85	0.02	1.09	<1	<1	<1	2	1	-	-	-	-	-	-	-
Mercury (filtered)	µg/L	0.01		1	-	10	-	<0.02	<0.02	<0.02	<0.02	-	-	-	-	-	-	-	-
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	<100	-	-	-	-	-	-	-	-
Phosphorus total (P2O5)	µg/L	3			-	-	-	60	880	110	2,370	60	-	-	-	-	-	-	-
Potassium (filtered)	µg/L	2			5,450	5,000	5,170	4,500	5,600	5,000	5,200	4,800	-	-	-	-	-	-	-
Sodium (filtered)	µg/L	10		200,000	69,400	87,800	75,500	83,300	83,800	102,000	96,200	85,600	54,000	69,800	48,900	34,900	27,200	50,900	50,900
Zinc (filtered)	µg/L	2		5,000	<2.00000	2	3	<5	<5	<5	<5	-	-	-	-	-	-	-	-
Inorganics																			
Alkalinity (total) as CaCO3	mg/L	2	396	500	261	297	304	313	292	331	333	333	414	669	369	381	337	615	615
Total Dissolved Solids	mg/L	3		500	666	746	737	680	627	798	800	753	680	870	629	534	523	900	900
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	-	469	451	540	522	493	-	-	-	-	-	-	-
Chemical Oxygen Demand	mg/L	5			<8.0	<8	<8	<5	16	9	116	6	23	26	14	20	12	33	33
Total Suspended Solids	mg/L	2			-	-	-	-	-	-	-	-	<2	-	-	-	-	-	-
Biochemical Oxygen Demand	mg/L	2			-	-	-	-	-	-	-	-	<2	-	-	-	-	-	-
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	<1.0	2	2	2.2	1.1	1.6	0.3	3	4.6	11.2	3.2	4.9	3.5	12.6	12.6
Phenols (4AAP)	mg/L	0.001			-	<0.002	-	<0.002	<0.002	<0.001	<0.001	<0.001	-	-	-	-	-	-	-
Sulphate (filtered)	mg/L	0.2		500	74	90	87	79	63	74	73	66	34	68	26	28	23	72	72
Ammonia as N	mg/L	0.01			<0.1000	<0.1	<0.1	0.04	0.06	<0.01	0.03	0.05	1.7	17.6	1.7	2.3	<0.1	12.6	12.6
Nitrate (as N)	mg/L	0.05		10	2.4	2.92	2.84	2.54	1.85	2.52	2.51	2.13	0.61	0.12	4.79	0.76	0.97	0.08	0.08
Nitrite (as N)	mg/L	0.03		1	-	<0.03	-	<0.05	-	<0.05	<0.05	-	<0.06	-	-	-	-	-	-
Total Kjeldahl Nitrogen	mg/L	0.1			-	<0.5	-	0.3	-	0.4	2.8	-	-	-	-	-	-	-	-
Electrical Conductivity (Lab)	µS/cm	1			1,150	1,210	1,250	1,260	1,170	1,470	1,470	1,390	1,110	1,530	1,090	962	894	1,480	1,480
pH (Lab)	-	0.05		6.5-8.5	7.98	7.79	7.81	7.73	7.85	7.7	7.59	7.6	8.00	7.39	7.41	7.67	7.87	7.63	7.63
Field																			
DO (Field)	mg/L				6.6	-	9.6	5.17	9.03	7.78	8.5	9.9	-	-	-	-	-	-	-
Redox (Field)	mV				75	-	2	151	173	43	-160	27	-	-	-	-	-	-	-
Temperature (Field)	°C				10.8	16.3	10.7	10.9	10.7	7.5	11.6	12	-	-	-	-	-	-	-
Conductivity (field)	µS/cm				9	-	885	1,216	435	1,240	1,442	1,365	-	-	-	-	-	-	-
pH (Field)	-			6.5-8.5	6.5	7.5	7.5	7.04	7.18	6.79	6.79	6.94	-	-	-	-	-	-	-



Table 5 - Groundwater Quality - Shallow Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code														
					MW03-1	MW03-1	MW03-1	MW03-1	MW03-1	MW03-1	MW03-1	MW03-1	MW03-1	MW03-1	MW03-1	MW03-1	MW03-1	MW03-1	
					Date	11 Nov 2014	22 May 2015	19 Nov 2015	30 May 2016	01 Nov 2016	04 Oct 2017	30 May 2019	29 Oct 2019	26 May 2020	18 Nov 2020	24 Jun 2021	11 Nov 2021	12 Apr 2022	25 Oct 2022
Metals																			
Arsenic (filtered)	µg/L	0.1	6.4	25		0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1
Barium (filtered)	µg/L	0.01	423	1,000		130	83.4	100	105	203	82.9	83.6	118	120	105	112	186	88	188
Boron (filtered)	µg/L	0.2	2,536	5,000		53.2	46.4	35.5	58	87	33	25	50	107	40	29	54	18	69
Calcium (filtered)	µg/L	10				134,000	100,000	114,000	124,000	205,000	92,600	106,000	137,000	120,000	118,000	132,000	169,000	97,600	165,000
Cadmium (filtered)	µg/L	0.003		5		0.022	0.009	0.021	0.007	0.025	0.006	<0.003	0.012	0.016	0.007	<0.015	<0.015	<0.015	<0.01
Chloride	µg/L	200		250,000		73,000	22,000	68,000	43,000	110,000	32,000	24,000	56,000	57,000	43,000	73,800	104,000	27,700	87,100
Chromium (III+VI) (filtered)	µg/L	0.03		50		<0.03	0.08	0.08	0.30	0.54	0.83	0.18	0.19	0.24	0.75	<1	<1	<1	<1
Copper (filtered)	µg/L	0.02		1,000		1.24	1.51	1.04	0.67	0.98	1.1	0.4	1.6	0.5	1.2	1.2	0.7	1.4	0.8
Iron (filtered)	µg/L	2	153	300		9	7	<7	14	10	12	<7	<7.00000	8	<7	16	<5	<5	299
Lead (filtered)	µg/L	0.01		10		0.03	0.01	0.04	0.04	0.12	0.01	0.01	0.05	0.01	0.01	0.07	<0.04	<0.02	0.02
Magnesium (filtered)	µg/L	1				4,420	3,520	3,990	4,070	5,780	3,280	2,960	3,350	5,100	4,130	4,190	5,140	3,050	6,050
Manganese (filtered)	µg/L	0.01	25	50		120	0.32	12.4	20.8	32.8	6.11	0.24	6.2	21.9	3.96	1	4	<1	175
Mercury (filtered)	µg/L	0.01		1		-	0.03	<0.01	<0.01	<0.01	-	<10	-	20	-	<0.02	<0.02	<0.02	<0.02
Phosphorus (filtered)	µg/L	100				-	-	-	-	-	-	-	-	-	-	-	-	-	<100
Phosphorus total (P2O5)	µg/L	3				-	70	-	<30	-	-	-	-	-	-	20	30	40	130
Potassium (filtered)	µg/L	2				4,760	3,040	3,580	3,990	4,780	4,170	2,860	3,590	5,120	4,750	3,300	5,100	3,200	5,600
Sodium (filtered)	µg/L	10		200,000		38,200	14,900	27,200	23,900	57,300	16,500	21,100	43,000	30,400	30,200	25,200	59,500	19,600	44,600
Zinc (filtered)	µg/L	2		5,000		4	2	2	2	5	4	7	4	2	<2	<5	<5	<5	<5
Inorganics																			
Alkalinity (total) as CaCO3	mg/L	2	396	500		354	267	400	289	406	278	248	330	364	343	266	347	227	361
Total Dissolved Solids	mg/L	3		500		506	351	703	394	849	394	294	534	480	451	378	558	288	530
Hardness as CaCO3 (filtered)	mg/L	0.02		500		-	-	-	-	-	-	-	-	-	-	347	443	257	438
Chemical Oxygen Demand	mg/L	5				<8	17	8	<8	8	<8	<8	<8.0	14	<8	<5	11	<5	15
Total Suspended Solids	mg/L	2				-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical Oxygen Demand	mg/L	2				-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5		4.7	2.6	3.5	2.2	5	2	-	2	6	2	2.9	2.5	2.5	1.8
Phenols (4AAP)	mg/L	0.001				-	0.003	-	0.002	-	-	<0.001	-	<0.002	-	<0.002	<0.002	<0.001	<0.001
Sulphate (filtered)	mg/L	0.2		500		19	10	14	13	39	9	20	24	14	11	27	7	17	
Ammonia as N	mg/L	0.01				0.3	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.1000	3.1	<0.1	<0.01	0.01	0.03	0.03
Nitrate (as N)	mg/L	0.05		10		1.52	1.01	1.06	1.43	2.97	-	1.41	2.51	1.22	1.26	1.48	1.64	1.02	2.02
Nitrite (as N)	mg/L	0.03		1		-	<0.03	-	<0.03	-	1.74	<0.03	-	0.07	-	<0.05	<0.05	<0.05	<0.05
Total Kjeldahl Nitrogen	mg/L	0.1				-	<0.5	-	<0.5	-	-	<0.5	-	3.3	-	0.2	0.4	0.3	1
Electrical Conductivity (Lab)	µS/cm	1				881	576	1,150	707	1,300	666	526	920	876	772	726	1,040	555	993
pH (Lab)	-	0.05		6.5-8.5		8.12	7.97	7.44	7.96	7.59	7.51	7.34	7.9	7.5	7.39	7.74	7.68	7.57	7.67
Field																			
DO (Field)	mg/L					-	-	-	-	-	-	3.7	9.5	-	4.8	9.56	5.73	7.27	7.39
Redox (Field)	mV					-	-	-	-	-	-	29	49	-	28	132	69	18	-144
Temperature (Field)	°C					-	-	-	-	-	-	11.7	10.9	13.1	10.5	10	10.1	7.8	13.7
Conductivity (field)	µS/cm					-	-	-	-	-	-	729	621	-	514	653	378	511	5
pH (Field)	-			6.5-8.5		-	-	-	-	-	-	7.4	6.7	7	7.6	7.84	6.99	7.06	6.9



Table 5 - Groundwater Quality - Shallow Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code														
					MW04-1	MW04-1	MW04-1	MW04-1	MW04-1	MW04-1	MW04-1	MW04-1	MW04-1	MW04-1	MW04-1	MW04-1	MW04-1	MW04-1	
					Date	01 Nov 2011	24 May 2012	24 Oct 2012	12 Jun 2013	05 Nov 2013	25 Jun 2014	11 Nov 2014	22 May 2015	19 Nov 2015	30 May 2016	01 Nov 2016	04 Oct 2017	30 May 2019	29 Oct 2019
Metals																			
Arsenic (filtered)	µg/L	0.1	6.4	25	-	-	-	-	-	-	-	0.3	<0.2	<0.2	<0.2	0.8	<0.2	<0.2	0.2
Barium (filtered)	µg/L	0.01	423	1,000	206	55.3	147	135	194	153	198	166	196	117	114	131	115	193	
Boron (filtered)	µg/L	0.2	2,536	5,000	100	74.9	47.9	88.8	109	115	150	98.3	105	103	563	63	69	79	
Calcium (filtered)	µg/L	10			179,000	125,000	123,000	114,000	163,000	134,000	160,000	145,000	174,000	123,000	28,600	131,000	118,000	214,000	
Cadmium (filtered)	µg/L	0.003		5	-	-	-	-	-	-	0.021	0.047	0.070	0.021	0.012	0.017	0.006	0.045	
Chloride	µg/L	200		250,000	86,000	52,000	83,000	52,000	87,000	47,000	76,000	88,000	87,000	39,000	42,000	75,000	51,000	90,000	
Chromium (III+VI) (filtered)	µg/L	0.03		50	-	-	-	-	-	-	0.05	0.08	0.07	0.32	0.54	0.7	0.13	0.13	
Copper (filtered)	µg/L	0.02		1,000	-	-	-	-	-	-	1.32	1.35	1.25	1.14	0.45	0.65	0.5	0.9	
Iron (filtered)	µg/L	2	153	300	5	8	6	14	42	3	8	3	42	<7	<7	21	12	125	
Lead (filtered)	µg/L	0.01		10	-	-	-	-	-	-	0.04	0.03	0.05	0.03	0.05	0.1	0.01	0.02	
Magnesium (filtered)	µg/L	1			7,750	6,120	4,760	5,730	7,120	6,350	7,180	6,890	7,180	5,250	6,610	5,280	4,940	7,480	
Manganese (filtered)	µg/L	0.01	25	50	-	-	-	-	-	-	690	520	421	249	3.25	175	168	69.4	
Mercury (filtered)	µg/L	0.01		1	-	-	-	-	-	-	<0.01	<0.01	0.04	<0.01	<10	-	-		
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	-	-	-	-	-	-	-		
Phosphorus total (P2O5)	µg/L	3			-	-	-	-	-	-	180	-	<30	-	-	-	-		
Potassium (filtered)	µg/L	2			-	-	-	-	-	-	9,170	5,820	6,300	4,950	2,230	5,090	5,640	5,670	
Sodium (filtered)	µg/L	10		200,000	52,000	13,700	37,100	36,000	42,300	35,100	44,000	51,000	40,800	31,100	146,000	32,100	37,000	49,200	
Zinc (filtered)	µg/L	2		5,000	-	-	-	-	-	-	3	6	3	2	4	2	3	<2,00000	
Inorganics																			
Alkalinity (total) as CaCO3	mg/L	2	396	500	389	281	286	319	408	346	388	368	382	302	325	325	291	378	
Total Dissolved Solids	mg/L	3		500	609	460	529	449	617	470	543	566	546	417	463	500	434	597	
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	-	-	-	-	-	-	-	-	-	-	-		
Chemical Oxygen Demand	mg/L	5			20	<8	<8	10	17	11	11	18	8	10	<8	8	<8	<8.0	
Total Suspended Solids	mg/L	2			648	-	-	-	-	-	-	-	-	-	-	-	-		
Biochemical Oxygen Demand	mg/L	2			2	-	-	-	-	-	-	-	-	-	-	-	-		
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	4.5	2.1	1.6	4.1	9.2	6.4	7.5	5.0	4.1	2.2	<1	2	-	3	
Phenols (4AAP)	mg/L	0.001			-	-	-	-	-	-	-	0.004	-	0.004	-	-	0.002	-	
Sulphate (filtered)	mg/L	0.2		500	36	25	17	22	33	28	28	23	28	15	31	14	22	42	
Ammonia as N	mg/L	0.01			1.0	0.1	0.1	1.4	1.1	1.4	2.1	1.4	0.8	0.5	<0.1	0.6	1.2	0.4	
Nitrate (as N)	mg/L	0.05		10	0.52	<0.05	1.50	1.01	0.90	0.71	0.66	0.70	1.11	1.38	0.12	-	1.19	2.14	
Nitrite (as N)	mg/L	0.03		1	<0.06	-	-	-	-	-	-	<0.03	-	<0.03	-	1.17	<0.03	-	
Total Kjeldahl Nitrogen	mg/L	0.1			-	-	-	-	-	-	-	1.7	-	0.7	-	-	1.1	-	
Electrical Conductivity (Lab)	µS/cm	1			1,040	720	857	793	1,050	830	923	964	964	729	798	841	713	1,050	
pH (Lab)	-	0.05		6.5-8.5	7.99	7.87	7.72	7.74	7.83	7.61	8.11	7.87	7.71	7.94	8.20	7.44	8.08	7.57	
Field																			
DO (Field)	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	4.1	7.5	
Redox (Field)	mV				-	-	-	-	-	-	-	-	-	-	-	-	-9	138	
Temperature (Field)	°C				-	-	-	-	-	-	-	-	-	-	-	-	8.5	10	
Conductivity (field)	µS/cm				-	-	-	-	-	-	-	-	-	-	-	-	477	723	
pH (Field)	-			6.5-8.5	-	-	-	-	-	-	-	-	-	-	-	-	7.6	7.9	



Table 5 - Groundwater Quality - Shallow Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code													
					Date	MW05-1	MW05-1	MW05-1	MW05-1	MW05-1	MW05-1	MW05-1	MW05-1	MW05-1	MW05-1	MW05-1	MW05-1	MW06-1
					19 Nov 2015	30 May 2016	01 Nov 2016	04 Oct 2017	30 May 2019	29 Oct 2019	26 May 2020	18 Nov 2020	24 Jun 2021	11 Nov 2021	12 Apr 2022	25 Oct 2022	23 Oct 2023	01 Nov 2011
Metals																		
Arsenic (filtered)	µg/L	0.1	6.4	25	3.4	1.8	3.1	3.2	1.1	3.5	0.4	2.1	3	2.3	2.7	1.9	2.6	-
Barium (filtered)	µg/L	0.01	423	1,000	524	395	541	469	434	664	504	512	911	612	749	512	595	225
Boron (filtered)	µg/L	0.2	2,536	5,000	304	258	430	303	213	340	276	304	502	359	390	315	337	103
Calcium (filtered)	µg/L	10			214,000	231,000	223,000	243,000	203,000	249,000	230,000	225,000	255,000	215,000	234,000	151,000	166,000	152,000
Cadmium (filtered)	µg/L	0.003		5	0.012	<0.003	<0.003	<0.003	<0.003	0.003	0.007	0.009	<0.015	<0.015	<0.015	<0.012	-	-
Chloride	µg/L	200		250,000	86,000	72,000	150,000	87,000	29,000	120,000	83,000	110,000	147,000	80,700	57,600	94,900	124,000	77,000
Chromium (III+VI) (filtered)	µg/L	0.03		50	0.53	0.54	1.06	1.05	0.33	0.9	0.54	1.11	1	<1	<1	<1	-	-
Copper (filtered)	µg/L	0.02		1,000	0.59	0.47	0.52	0.23	0.3	1.1	1.8	0.6	0.2	1	0.5	0.3	-	-
Iron (filtered)	µg/L	2	153	300	22,400	14,000	23,100	21,400	11,100	32,600	3,740	25,000	44,500	32,000	39,100	26,400	30,700	1,690
Lead (filtered)	µg/L	0.01		10	0.04	0.06	0.03	<0.01	0.02	0.05	0.01	0.03	0.11	0.13	0.05	0.04	-	-
Magnesium (filtered)	µg/L	1			18,100	14,700	19,000	20,200	15,500	22,900	22,700	20,000	26,500	20,000	22,100	15,500	16,200	8,790
Manganese (filtered)	µg/L	0.01	25	50	1,680	1,180	1,960	1,720	1,170	2,680	2,590	2,000	3,120	2,310	2,980	1,990	1,980	-
Mercury (filtered)	µg/L	0.01		1	0.01	<0.01	<0.01	-	<10	-	20	-	<0.02	<0.02	<0.02	<0.02	-	-
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	-	-	-	-	<100	-	-	-
Phosphorus total (P2O5)	µg/L	3			-	<30	-	-	-	-	-	-	1,100	260	1,510	950	300	-
Potassium (filtered)	µg/L	2			20,900	15,500	24,800	19,800	16,100	32,200	21,800	25,100	30,000	25,500	25,300	24,300	23,600	-
Sodium (filtered)	µg/L	10		200,000	61,700	38,400	69,700	58,100	36,500	80,200	55,100	64,300	85,000	57,900	51,800	52,400	58,500	46,200
Zinc (filtered)	µg/L	2		5,000	2	5	15	2	2	2	<2	2	<5	<5	<5	<5	-	-
Inorganics																		
Alkalinity (total) as CaCO3	mg/L	2	396	500	696	606	619	738	536	653	609	661	757	588	674	480	544	346
Total Dissolved Solids	mg/L	3		500	843	689	934	1,000	574	874	711	823	946	761	787	669	751	563
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	-	-	-	-	-	-	746	620	676	442	482	-
Chemical Oxygen Demand	mg/L	5			45	40	40	36	17	47	39	49	134	80	129	137	66	20
Total Suspended Solids	mg/L	2			-	-	-	-	-	-	-	-	-	-	-	-	-	3
Biochemical Oxygen Demand	mg/L	2			-	-	-	-	-	-	-	-	-	-	-	-	-	<2
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	18.6	3.2	14	19	-	14	14	12	13.4	10.6	13.5	4.3	12.3	3.7
Phenols (4AAP)	mg/L	0.001			-	0.006	-	-	0.002	-	0.005	-	<0.002	<0.002	<0.001	<0.001	<0.001	-
Sulphate (filtered)	mg/L	0.2		500	13	14	10	21	12	7	13	10	8	10	11	9	7	33
Ammonia as N	mg/L	0.01			11.5	6.8	14.3	9.7	5.8	14.5	6.9	11.3	16.4	13.6	14.1	14.5	14.7	2.1
Nitrate (as N)	mg/L	0.05		10	<0.06	0.75	0.62	-	0.71	0.24	0.24	0.53	0.09	0.12	<0.05	0.09	0.09	0.10
Nitrite (as N)	mg/L	0.03		1	-	<0.03	-	0.24	<0.03	-	<0.03	-	<0.05	-	<0.05	<0.05	-	<0.06
Total Kjeldahl Nitrogen	mg/L	0.1			-	8.7	-	-	6.2	-	6.4	-	21.5	-	18.3	19.6	-	-
Electrical Conductivity (Lab)	µS/cm	1			1,450	1,204	1,570	1,660	980	1,510	1,200	1,470	1,730	1,400	1,450	1,240	1,380	953
pH (Lab)	-	0.05		6.5-8.5	7.45	7.69	7.22	7.25	7.44	7.21	7.48	7.31	7.35	7.38	7.23	7.3	7.39	8.04
Field																		
DO (Field)	mg/L				-	-	-	-	7.2	9	-	5.2	1.58	4.76	2.09	3.51	5.16	-
Redox (Field)	mV				-	-	-	-	-72	44	-	-66	96	123	-90	-152	-67	-
Temperature (Field)	°C				-	-	-	-	10.2	11.3	12.8	9.1	9	8.6	8.1	10.3	9.9	-
Conductivity (field)	µS/cm				-	-	-	-	958	1,124	-	973	1,747	600	1,352	1,175	1,361	-
pH (Field)	-			6.5-8.5	-	-	-	-	7.1	6.1	6.9	7.4	7.08	6.55	6.57	6.75	6.68	-



Table 5 - Groundwater Quality - Shallow Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code													
					Date	MW06-1	MW06-1	MW06-1	MW06-1	MW06-1	MW06-1	MW06-1	MW06-1	MW06-1	MW06-1	MW06-1	MW06-1	MW06-1
					24 May 2012	24 Oct 2012	12 Jun 2013	05 Nov 2013	25 Jun 2014	11 Nov 2014	22 May 2015	19 Nov 2015	30 May 2016	01 Nov 2016	04 Oct 2017	30 May 2019	29 Oct 2019	26 May 2020
Metals																		
Arsenic (filtered)	µg/L	0.1	6.4	25	-	-	-	-	-	0.5	0.3	0.3	0.3	0.6	0.4	0.2	0.4	0.3
Barium (filtered)	µg/L	0.01	423	1,000	223	277	239	256	301	279	283	231	219	331	268	402	337	330
Boron (filtered)	µg/L	0.2	2,536	5,000	157	135	121	144	190	193	225	144	192	263	198	246	227	207
Calcium (filtered)	µg/L	10			138,000	159,000	150,000	149,000	164,000	164,000	164,000	139,000	148,000	191,000	151,000	198,000	217,000	172,000
Cadmium (filtered)	µg/L	0.003		5	-	-	-	-	-	<0.003	0.004	0.005	0.035	<0.003	0.003	<0.003	0.005	0.006
Chloride	µg/L	200		250,000	70,000	110,000	100,000	97,000	97,000	100,000	88,000	79,000	78,000	120,000	94,000	130,000	120,000	92,000
Chromium (III+VI) (filtered)	µg/L	0.03		50	-	-	-	-	-	0.16	0.19	0.10	0.54	0.66	0.83	0.31	0.29	0.26
Copper (filtered)	µg/L	0.02		1,000	-	-	-	-	-	0.54	0.62	0.73	1.55	0.37	0.17	0.3	1.4	0.3
Iron (filtered)	µg/L	2	153	300	1,200	2,200	1,500	1,270	1,490	2,300	949	679	759	2,320	1,320	684	1,340	410
Lead (filtered)	µg/L	0.01		10	-	-	-	-	-	0.15	0.16	0.19	0.03	0.14	0.18	0.2	0.26	0.13
Magnesium (filtered)	µg/L	1			9,860	9,590	9,190	9,380	10,500	9,070	11,100	8,090	8,300	12,100	10,100	13,800	11,000	13,900
Manganese (filtered)	µg/L	0.01	25	50	-	-	-	-	-	1,440	1,270	1,030	338	1,270	1,150	1,530	1,460	1,720
Mercury (filtered)	µg/L	0.01		1	-	-	-	-	-	0.01	<0.01	<0.01	<0.01	<0.01	-	<10	-	20
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus total (P2O5)	µg/L	3			-	-	-	-	-	80	-	-	60	-	-	-	-	-
Potassium (filtered)	µg/L	2			-	-	-	-	-	11,900	11,900	9,690	10,500	15,000	12,000	18,300	16,400	16,800
Sodium (filtered)	µg/L	10		200,000	51,400	53,300	56,400	57,500	55,200	59,500	63,500	45,600	49,800	68,300	62,200	71,400	60,900	75,100
Zinc (filtered)	µg/L	2		5,000	-	-	-	-	-	2	7	3	5	2	5	3	4	<2
Inorganics																		
Alkalinity (total) as CaCO3	mg/L	2	396	500	387	401	388	370	453	412	473	382	413	485	490	468	429	470
Total Dissolved Solids	mg/L	3		500	560	654	609	597	640	634	703	571	609	754	654	749	671	617
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chemical Oxygen Demand	mg/L	5			12	10	25	11	19	<8	21	20	10	17	17	25	11	16
Total Suspended Solids	mg/L	2			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical Oxygen Demand	mg/L	2			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	5.2	4.3	10.3	5.6	9.2	5.8	6.5	4.4	5.4	8	6	-	6	7
Phenols (4AAP)	mg/L	0.001			-	-	-	-	-	-	0.003	-	0.004	-	-	0.006	-	<0.002
Sulphate (filtered)	mg/L	0.2		500	57	45	35	43	42	43	43	34	36	49	37	44	43	37
Ammonia as N	mg/L	0.01			3.5	3.1	2.4	3.3	3.7	3.3	3.5	3.5	3.2	4.4	4.5	6.6	9	7.3
Nitrate (as N)	mg/L	0.05		10	0.26	0.32	0.89	0.21	<0.06	0.66	0.37	0.08	0.81	0.26	-	0.65	0.5	<0.06
Nitrite (as N)	mg/L	0.03		1	-	-	-	-	-	-	<0.03	-	<0.03	-	0.11	0.28	-	<0.03
Total Kjeldahl Nitrogen	mg/L	0.1			-	-	-	-	-	-	3.7	-	3.2	-	6.6	-	6.8	
Electrical Conductivity (Lab)	µS/cm	1			967	1,180	1,090	1,070	1,150	1,100	1,160	977	1,058	1,350	1,180	1,260	1,210	1,130
pH (Lab)	-	0.05		6.5-8.5	7.57	7.53	7.76	7.86	7.57	8.01	7.81	7.70	7.85	7.63	7.45	7.21	7.94	7.6
Field																		
DO (Field)	mg/L				-	-	-	-	-	-	-	-	-	-	-	4.2	10.1	-
Redox (Field)	mV				-	-	-	-	-	-	-	-	-	-	-	-60	-	-
Temperature (Field)	°C				-	-	-	-	-	-	-	-	-	-	-	11.2	10.8	13.8
Conductivity (field)	µS/cm				-	-	-	-	-	-	-	-	-	-	-	918	919	-
pH (Field)	-			6.5-8.5	-	-	-	-	-	-	-	-	-	-	-	7.2	6.9	7



Table 5 - Groundwater Quality - Shallow Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code													
					Date	MW07-1 19 Nov 2015	MW07-1 30 May 2016	MW07-1 01 Nov 2016	MW07-1 04 Oct 2017	MW07-1 30 May 2019	MW07-1 29 Oct 2019	MW07-1 26 May 2020	MW07-1 18 Nov 2020	MW07-1 24 Jun 2021	MW07-1 11 Nov 2021	MW07-1 12 Apr 2022	MW07-1 25 Oct 2022	MW08-2 18 May 2012
Metals																		
Arsenic (filtered)	µg/L	0.1	6.4	25	0.9	0.7	<0.2	0.8	0.5	0.8	0.6	0.7	0.5	1.1	0.5	0.3	-	-
Barium (filtered)	µg/L	0.01	423	1,000	128	111	148	119	136	128	133	130	162	24	182	213	122	197
Boron (filtered)	µg/L	0.2	2,536	5,000	435	600	79	483	516	445	482	432	533	571	526	519	15.3	35.7
Calcium (filtered)	µg/L	10			32,000	31,700	153,000	32,000	34,000	40,100	32,300	35,400	36,900	34,500	48,100	45,000	98,000	131,000
Cadmium (filtered)	µg/L	0.003		5	0.012	0.006	<0.003	0.016	0.003	0.016	0.004	0.011	<0.015	0.053	<0.015	<0.01	-	-
Chloride	µg/L	200		250,000	42,000	42,000	100,000	46,000	47,000	45,000	51,000	48,000	53,600	53,100	51,600	49,200	48,000	110,000
Chromium (III+VI) (filtered)	µg/L	0.03		50	<0.03	0.40	0.61	0.68	0.13	0.17	0.12	0.81	<1	4	<1	<1	-	-
Copper (filtered)	µg/L	0.02		1,000	0.67	0.26	0.81	0.45	<0.2	0.5	0.5	0.9	1.5	4.5	1.6	0.5	-	-
Iron (filtered)	µg/L	2	153	300	16	24	12	108	7	9	<7	88	<5	292	614	18	<3	
Lead (filtered)	µg/L	0.01		10	0.07	<0.01	0.04	0.28	0.03	0.03	0.02	0.06	0.26	14.9	1.02	0.04	-	-
Magnesium (filtered)	µg/L	1			7,210	7,440	5,520	7,020	7,590	7,520	8,370	7,820	8,900	9,390	10,300	10,900	3,410	5,020
Manganese (filtered)	µg/L	0.01	25	50	13.3	0.22	8.70	24.9	0.76	8.31	0.21	2.71	6	1	21	49	-	-
Mercury (filtered)	µg/L	0.01		1	<0.01	<0.01	<0.01	-	<10	-	10	-	<0.02	0.04	<0.02	<0.02	-	-
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	-	-	-	-	<100	-	-	-
Phosphorus total (P2O5)	µg/L	3			-	<30	-	-	-	-	-	-	1,910	1,050	1,790	2,090	-	-
Potassium (filtered)	µg/L	2			2,250	2,310	3,910	2,240	2,250	2,550	2,160	2,290	2,300	2,900	2,300	3,200	-	-
Sodium (filtered)	µg/L	10		200,000	130,000	159,000	47,800	141,000	151,000	152,000	163,000	143,000	157,000	163,000	140,000	129,000	28,800	50,700
Zinc (filtered)	µg/L	2		5,000	2	<2	3	6	2	<2	3	7	<5	<5	<5	<5	-	-
Inorganics																		
Alkalinity (total) as CaCO3	mg/L	2	396	500	320	330	322	337	370	328	359	367	336	316	299	310	258	279
Total Dissolved Solids	mg/L	3		500	466	457	569	489	474	469	489	466	421	433	422	412	363	529
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	-	-	-	-	-	-	129	125	163	157	-	-
Chemical Oxygen Demand	mg/L	5			<8	<8	<8	<8	65	<8	<8	<8	125	76	75	182	15	<8
Total Suspended Solids	mg/L	2			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical Oxygen Demand	mg/L	2			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	1.2	1.5	3	2	-	2	1	1	4.5	2.4	2.2	1.8	2.4	1.4
Phenols (4AAP)	mg/L	0.001			-	0.004	-	-	0.002	-	0.003	-	<0.002	<0.002	<0.001	<0.001	-	-
Sulphate (filtered)	mg/L	0.2		500	29	30	17	31	34	33	32	29	31	30	29	29	10	19
Ammonia as N	mg/L	0.01			<0.1	<0.1	<0.1	0.1	<0.1	0.1	<0.1	<0.1	0.04	0.06	0.03	0.05	<0.1	0.2
Nitrate (as N)	mg/L	0.05		10	<0.06	<0.06	1.67	-	0.13	0.25	0.17	0.23	0.19	0.19	0.32	0.16	0.44	1.22
Nitrite (as N)	mg/L	0.03		1	-	<0.03	-	0.07	<0.03	-	<0.03	-	<0.05	-	<0.05	<0.05	-	-
Total Kjeldahl Nitrogen	mg/L	0.1			-	<0.5	-	-	<0.5	-	<0.5	-	1.3	-	1.8	1.9	-	-
Electrical Conductivity (Lab)	µS/cm	1			773	791	979	816	808	844	790	808	802	822	804	785	657	929
pH (Lab)	-	0.05		6.5-8.5	8.26	8.28	7.75	8.27	7.92	8.12	8.08	8.08	8.16	8.16	8.19	7.98	7.87	8.07
Field																		
DO (Field)	mg/L				-	-	-	-	6	10.6	-	5.4	9.94	6.7	11.6	6.41	-	-
Redox (Field)	mV				-	-	-	-	56	51	-	22	138	121	8	-152	-	-
Temperature (Field)	°C				-	-	-	-	10.1	10.3	12.8	9.4	11.1	9.3	8.4	10.8	-	-
Conductivity (field)	µS/cm				-	-	-	-	590	597	-	524	800	354	706	751	-	-
pH (Field)	-			6.5-8.5	-	-	-	-	8	7.3	7.4	8.1	8.71	7.73	7.88	7.68	-	-



Table 5 - Groundwater Quality - Shallow Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code														
					Date	MW08-2 10 Jun 2013	MW08-2 05 Nov 2013	MW08-2 26 Jun 2014	MW08-2 06 Nov 2014	MW08-2 22 May 2015	MW08-2 30 May 2016	MW08-2 31 Oct 2016	MW08-2 31 May 2017	MW08-2 04 Oct 2017	MW08-2 30 May 2019	MW08-2 29 Oct 2019	MW08-2 26 May 2020	MW08-2 18 Nov 2020	MW08-2 24 Jun 2021
Metals																			
Arsenic (filtered)	µg/L	0.1	6.4	25	-	-	-	0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1
Barium (filtered)	µg/L	0.01	423	1,000	107	161	116	184	88.0	113	197	87.5	148	53.1	158	81.1	162	135	
Boron (filtered)	µg/L	0.2	2,536	5,000	11.1	27.4	13.8	29.6	10.0	18	32	20	31	14	50	26	23	15	
Calcium (filtered)	µg/L	10			85,100	113,000	97,500	125,000	84,100	116,000	156,000	81,900	118,000	103,000	127,000	80,100	145,000	114,000	
Cadmium (filtered)	µg/L	0.003		5	-	-	-	0.004	<0.003	<0.003	0.004	<0.003	0.005	0.003	0.005	0.025	<0.003	<0.015	
Chloride	µg/L	200		250,000	56,000	69,000	38,000	74,000	24,000	55,000	150,000	45,000	68,000	3,000	69,000	9,000	120,000	65,500	
Chromium (III+VI) (filtered)	µg/L	0.03		50	-	-	-	2.70	0.28	0.34	0.34	0.61	0.67	0.27	0.25	0.26	0.31	73	
Copper (filtered)	µg/L	0.02		1,000	-	-	-	1.69	0.40	0.91	0.89	0.48	0.87	0.3	0.8	1.4	1.1	0.8	
Iron (filtered)	µg/L	2	153	300	20	12	6	15	20	8	26	<7	<7	7	10	24	15	19	
Lead (filtered)	µg/L	0.01		10	-	-	-	0.10	<0.01	0.02	0.04	<0.01	<0.01	0.02	0.03	0.09	0.04	0.13	
Magnesium (filtered)	µg/L	1			2,680	4,140	3,260	4,620	2,950	3,430	5,410	2,620	4,140	2,820	3,820	2,680	5,280	4,060	
Manganese (filtered)	µg/L	0.01	25	50	-	-	-	9.10	3.25	0.82	4.47	1.75	1.89	0.74	4.33	4.34	0.97	4	
Mercury (filtered)	µg/L	0.01		1	-	-	-	-	0.01	<0.01	<0.01	<10	<10	<10	<10	10	<10	<0.02	
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Phosphorus total (P2O5)	µg/L	3			-	-	-	-	<30	6	<30	<30	<30	-	30	<30	<30	100	
Potassium (filtered)	µg/L	2			-	-	-	2,220	1,000	979	1,710	817	1,370	472	1,400	738	1,210	1,000	
Sodium (filtered)	µg/L	10		200,000	29,500	35,900	23,900	43,200	23,500	28,700	60,700	30,500	36,500	3,740	36,800	23,500	29,400	38,300	
Zinc (filtered)	µg/L	2		5,000	-	-	-	2	<2	<2	3	<2	<2	2	3	9	<2	<5	
Inorganics																			
Alkalinity (total) as CaCO3	mg/L	2	396	500	226	267	208	305	254	261	285	221	300	235	272	235	283	276	
Total Dissolved Solids	mg/L	3		500	366	423	354	491	294	380	629	297	443	257	434	240	480	364	
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	-	-	-	-	-	-	-	-	-	-	-	302	
Chemical Oxygen Demand	mg/L	5			14	10	8	<8	10	<8	16	<8	<8	<8	16	<8	<8	7	
Total Suspended Solids	mg/L	2			-	-	-	-	<2	<2	<2	17	<2	23	37	20	22	-	
Biochemical Oxygen Demand	mg/L	2			-	-	-	-	<4	<4	<4	<4	5	<4	<4	<4	<4	-	
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	4.7	5.3	3.9	2.5	-	-	-	-	-	-	-	-	-	3.7	
Phenols (4AAP)	mg/L	0.001			-	-	-	-	<0.001	0.002	0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.002	
Sulphate (filtered)	mg/L	0.2		500	1.3	21	6.8	16	8	8	17	3	10	7	12	6	10	9	
Ammonia as N	mg/L	0.01			<0.1	<0.1	0.2	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	
Nitrate (as N)	mg/L	0.05		10	0.10	0.35	0.24	0.53	0.16	0.46	1.33	<0.06	0.35	<0.06	0.66	0.15	0.67	0.74	
Nitrite (as N)	mg/L	0.03		1	-	-	-	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.05	
Total Kjeldahl Nitrogen	mg/L	0.1			-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.4	
Electrical Conductivity (Lab)	µS/cm	1			604	757	615	807	559	700	1,040	535	781	429	748	452	838	700	
pH (Lab)	-	0.05		6.5-8.5	7.91	8.23	8.29	8.10	7.93	8.08	7.86	7.88	7.63	7.66	8.12	7.85	7.81	7.94	
Field																			
DO (Field)	mg/L				-	-	-	-	-	-	-	-	-	3.4	8.8	-	11.3	13.26	
Redox (Field)	mV				-	-	-	-	-	-	-	-	-	196	79	-	135	140	
Temperature (Field)	°C				-	-	-	-	-	-	-	-	-	8.5	13.4	16.4	6.2	9.3	
Conductivity (field)	µS/cm				-	-	-	-	-	-	-	-	-	419	803	-	486	652	
pH (Field)	-			6.5-8.5	-	-	-	-	-	-	-	-	-	7.7	6.1	8.1	8.6	8.78	



Table 5 - Groundwater Quality - Shallow Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code														
					MW09-2	MW09-2	MW09-2	MW09-2	MW09-2	MW09-2	MW09-2	MW09-2	MW09-2	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	
					Date	30 May 2019	29 Oct 2019	26 May 2020	18 Nov 2020	28 Jun 2021	11 Nov 2021	12 Apr 2022	25 Oct 2022	23 Oct 2023	18 May 2012	09 Oct 2012	10 Jun 2013	05 Nov 2013	26 Jun 2014
Metals																			
Arsenic (filtered)	µg/L	0.1	6.4	25		0.3	<0.2	0.4	<0.2	0.2	0.1	<0.1	<0.1	<0.1	-	-	-	-	-
Barium (filtered)	µg/L	0.01	423	1,000		158	184	285	176	210	203	846	229	207	923	710	620	587	587
Boron (filtered)	µg/L	0.2	2,536	5,000		26	65	143	39	40	45	567	47	48	147	141	119	130	116
Calcium (filtered)	µg/L	10				105,000	121,000	80,800	126,000	124,000	119,000	51,100	122,000	110,000	95,300	93,600	99,800	96,500	99,500
Cadmium (filtered)	µg/L	0.003		5		0.003	0.003	0.007	0.01	<0.015	<0.015	<0.015	<0.01	-	-	-	-	-	-
Chloride	µg/L	200		250,000		66,000	73,000	50,000	77,000	88,500	70,500	15,100	79,700	76,900	45,000	45,000	55,000	50,000	59,000
Chromium (III+VI) (filtered)	µg/L	0.03		50		0.15	0.16	0.23	0.28	<1	<1	<1	<1	-	-	-	-	-	-
Copper (filtered)	µg/L	0.02		1,000		0.8	1.4	<0.2	4.2	0.6	0.4	<0.1	0.8	-	-	-	-	-	-
Iron (filtered)	µg/L	2	153	300		293	38	302	15	87	43	13	26	17	9,270	6,760	4,190	4,380	6,210
Lead (filtered)	µg/L	0.01		10		0.02	0.02	0.01	0.04	0.03	<0.02	<0.02	0.03	-	-	-	-	-	-
Magnesium (filtered)	µg/L	1				3,890	3,820	8,760	4,270	4,640	4,550	21,900	4,730	4,390	13,600	12,700	11,500	11,000	11,900
Manganese (filtered)	µg/L	0.01	25	50		29.1	4.64	33.2	3.31	3	3	47	2	2	-	-	-	-	-
Mercury (filtered)	µg/L	0.01		1		<10	<10	<10	<10	<0.02	<0.02	<0.02	<0.02	-	-	-	-	-	-
Phosphorus (filtered)	µg/L	100				-	-	-	-	-	-	-	<100	-	-	-	-	-	-
Phosphorus total (P2O5)	µg/L	3				-	<30	<30	<30	40	20	40	20	60	-	-	-	-	-
Potassium (filtered)	µg/L	2				2,160	2,570	2,740	2,650	2,300	2,700	5,300	2,600	2,300	-	-	-	-	-
Sodium (filtered)	µg/L	10		200,000		42,900	46,500	44,400	44,600	55,600	48,200	51,300	57,700	45,600	8,870	7,070	6,180	5,160	7,250
Zinc (filtered)	µg/L	2		5,000		3	3	2	<2	<5	<5	<5	<5	-	-	-	-	-	-
Inorganics																			
Alkalinity (total) as CaCO3	mg/L	2	396	500		241	260	233	295	271	280	249	278	306	238	225	240	226	299
Total Dissolved Solids	mg/L	3		500		214	414	311	437	432	409	316	425	432	351	366	446	377	423
Hardness as CaCO3 (filtered)	mg/L	0.02		500		-	-	-	-	329	315	218	324	293	-	-	-	-	-
Chemical Oxygen Demand	mg/L	5				<8	<8	<8	<8	<5	11	38	7	<5	10	<8	8	<8	<8
Total Suspended Solids	mg/L	2				66	2	6	2	-	-	-	-	-	-	-	-	-	-
Biochemical Oxygen Demand	mg/L	2				<4	<4	<4	<4	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5		-	-	-	-	3.3	2.4	2.4	0.7	3.8	3.8	<1	2.0	1.5	1.9
Phenols (4AAP)	mg/L	0.001				0.003	<0.001	<0.001	<0.001	<0.002	<0.002	0.048	<0.001	<0.001	-	-	-	-	-
Sulphate (filtered)	mg/L	0.2		500		16	11	10	10	13	13	37	14	15	13	9.7	15	8.8	13
Ammonia as N	mg/L	0.01				<0.1	<0.1	<0.1	<0.1	0.03	0.03	0.69	0.02	<0.05	0.1	0.7	0.5	1.0	0.9
Nitrate (as N)	mg/L	0.05		10		<0.06	0.93	<0.06	1.17	1.21	0.73	<0.05	1	1.29	<0.05	<0.05	<0.06	<0.06	0.07
Nitrite (as N)	mg/L	0.03		1		<0.03	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-
Total Kjeldahl Nitrogen	mg/L	0.1				<0.5	<0.1	<0.5	<0.5	0.2	0.2	0.7	0.2	-	-	-	-	-	-
Electrical Conductivity (Lab)	µS/cm	1				653	737	591	791	821	780	609	809	821	613	615	667	619	686
pH (Lab)	-	0.05		6.5-8.5		8	8.11	7.9	7.91	7.69	7.66	7.7	7.71	7.46	7.91	8.13	7.89	8.15	8.13
Field																			
DO (Field)	mg/L					3.6	4.1	-	5	2.63	2.91	2.32	3.09	-	-	-	-	-	-
Redox (Field)	mV					-125	-86	-	60	160	30	-36	-140	-51	-	-	-	-	-
Temperature (Field)	°C					10.3	14.1	1.7	7.4	10.7	9.8	7.4	13.7	9.2	-	-	-	-	-
Conductivity (field)	µS/cm					404	655	-	471	792	332	496	801	771	-	-	-	-	-
pH (Field)	-			6.5-8.5		7.7	7.4	7.6	8	7.08	7.01	7.01	7.06	6.75	-	-	-	-	-



Table 5 - Groundwater Quality - Shallow Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code														
					Date	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	
					22 May 2015	30 May 2016	31 Oct 2016	31 May 2017	04 Oct 2017	30 May 2019	29 Oct 2019	26 May 2020	18 Nov 2020	24 Jun 2021	11 Nov 2021	12 Apr 2022	25 Oct 2022	23 Oct 2023	
Metals																			
Arsenic (filtered)	µg/L	0.1	6.4	25	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	0.3	<0.1	<0.1	<0.1	<0.1	<0.1
Barium (filtered)	µg/L	0.01	423	1,000	524	476	501	459	506	626	580	491	416	510	574	542	603	511	
Boron (filtered)	µg/L	0.2	2,536	5,000	100	121	122	123	131	118	145	106	96	109	125	95	135	118	
Calcium (filtered)	µg/L	10			106,000	113,000	107,000	91,200	104,000	117,000	129,000	98,500	99,900	118,000	119,000	118,000	112,000	102,000	
Cadmium (filtered)	µg/L	0.003		5	<0.003	<0.003	<0.003	<0.003	0.004	0.003	0.003	<0.003	<0.003	<0.015	<0.015	<0.015	<0.01	-	
Chloride	µg/L	200		250,000	57,000	52,000	49,000	48,000	51,000	48,000	48,000	54,000	53,000	59,600	56,700	54,700	50,300	48,400	
Chromium (III+VI) (filtered)	µg/L	0.03		50	0.14	0.31	0.38	0.68	0.59	0.14	0.12	0.16	0.22	<1	<1	<1	<1	-	
Copper (filtered)	µg/L	0.02		1,000	1.36	0.62	0.06	0.27	0.15	0.3	<0.2	0.4	0.8	1.2	0.6	0.8	0.5	-	
Iron (filtered)	µg/L	2	153	300	3,160	533	3,580	3,340	3,370	6,910	4,030	886	3,290	<5	5,280	3,750	4,080	3,630	
Lead (filtered)	µg/L	0.01		10	0.03	0.02	<0.01	<0.01	<0.01	0.12	0.01	<0.01	0.04	0.46	<0.02	<0.02	0.03	-	
Magnesium (filtered)	µg/L	1			11,900	11,200	10,100	11,300	11,000	11,200	10,900	12,700	10,400	11,400	11,300	11,300	11,000	9,950	
Manganese (filtered)	µg/L	0.01	25	50	92.4	29.8	49.7	97.3	60.1	171	54.4	95.1	58	38	42	39	28	32	
Mercury (filtered)	µg/L	0.01		1	<0.01	<0.01	<0.01	<10	<10	<10	<10	10	<10	<0.02	<0.02	<0.02	<0.02	-	
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	-	-	-	-	-	-	<100	-	
Phosphorus total (P2O5)	µg/L	3			<3	<3	<3	<30	30	-	60	40	80	110	90	420	60	110	
Potassium (filtered)	µg/L	2			2,340	2,370	2,140	2,580	2,600	2,420	2,690	2,460	2,600	2,000	2,500	1,900	2,400	2,200	
Sodium (filtered)	µg/L	10		200,000	6,690	7,750	5,520	8,990	6,070	7,470	5,540	9,830	6,930	6,100	6,500	6,100	5,900	4,900	
Zinc (filtered)	µg/L	2		5,000	4	<2	<2	<2	<2	5	<2	2	<2	<5	<5	<5	<5	-	
Inorganics																			
Alkalinity (total) as CaCO3	mg/L	2	396	500	254	245	240	171	233	243	245	243	258	260	250	222	254	272	
Total Dissolved Solids	mg/L	3		500	411	389	394	269	406	334	354	389	351	343	351	336	341	337	
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	-	-	-	-	-	-	-	342	343	341	326	296	
Chemical Oxygen Demand	mg/L	5			10	<8	<8	<8	<8	<8	<8	8	<8	53	9	7	11	7	
Total Suspended Solids	mg/L	2			5	<2	9	118	10	50	55	42	56	-	-	-	-	-	
Biochemical Oxygen Demand	mg/L	2			<4	<4	<4	<4	4	<4	<4	4	<4	-	-	-	-	-	
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	-	-	-	-	-	-	-	-	-	2.8	2.6	3	0.9	4.9	
Phenols (4AAP)	mg/L	0.001			<0.001	0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	0.001	<0.002	0.013	<0.001	<0.001	<0.001	
Sulphate (filtered)	mg/L	0.2		500	11	140	8	12	9	8	7	10	6	10	9	11	7	5	
Ammonia as N	mg/L	0.01			0.6	0.3	1.0	0.5	1	0.8	1.1	0.9	1	0.93	1.04	0.8	1.04	0.95	
Nitrate (as N)	mg/L	0.05		10	<0.06	0.21	<0.06	0.08	<0.06	0.08	0.08	<0.06	<0.06	0.07	<0.05	0.4	0.18	0.67	
Nitrite (as N)	mg/L	0.03		1	<0.03	<0.03	<0.03	0.03	<0.03	0.07	0.04	<0.03	<0.03	<0.05	<0.05	<0.05	<0.05	-	
Total Kjeldahl Nitrogen	mg/L	0.1			1.2	<0.5	1.0	0.8	1.1	0.7	1.1	0.8	1	1	1.1	1.2	1.2	-	
Electrical Conductivity (Lab)	µS/cm	1			645	639	633	483	631	599	621	618	623	660	675	647	657	649	
pH (Lab)	-	0.05		6.5-8.5	7.94	8.13	7.95	7.92	7.67	7.54	8.03	7.83	7.79	7.83	7.68	7.48	7.85	7.54	
Field																			
DO (Field)	mg/L				-	-	-	-	-	3.6	4	-	4.2	2.87	2.81	2.44	1.62	2.75	
Redox (Field)	mV				-	-	-	-	-	-109	-115	-	-148	-15	19	-117	-143	-85	
Temperature (Field)	°C				-	-	-	-	-	10.6	13.8	15.1	6.7	9	10.3	7.9	13.3	9.9	
Conductivity (field)	µS/cm				-	-	-	-	-	442	518	-	364	665	297	615	630	33	
pH (Field)	-			6.5-8.5	-	-	-	-	-	7.6	7.6	7.7	7.9	8.45	7.38	7.18	7.22	6.29	



Table 5 - Groundwater Quality - Shallow Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code														
					Date	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	
					18 May 2012	09 Oct 2012	10 Jun 2013	05 Nov 2013	26 Jun 2014	22 May 2015	30 May 2016	31 Oct 2016	31 May 2017	04 Oct 2017	30 May 2019	29 Oct 2019	26 May 2020	18 Nov 2020	
Metals																			
Arsenic (filtered)	µg/L	0.1	6.4	25	-	-	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.7	<0.2	<0.2	
Barium (filtered)	µg/L	0.01	423	1,000	495	376	416	469	437	473	407	433	419	449	381	40.8	504	358	
Boron (filtered)	µg/L	0.2	2,536	5,000	185	237	161	113	150	115	208	146	515	123	85	176	150	164	
Calcium (filtered)	µg/L	10			95,600	71,600	81,200	100,000	85,700	98,400	91,900	97,900	90,100	93,800	96,600	147,000	102,000	93,400	
Cadmium (filtered)	µg/L	0.003		5	-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	0.003	0.005	0.005	<0.003	
Chloride	µg/L	200		250,000	38,000	14,000	34,000	21,000	27,000	36,000	25,000	34,000	26,000	36,000	14,000	33,000	21,000	43,000	
Chromium (III+VI) (filtered)	µg/L	0.03		50	-	-	-	-	-	<0.03	0.35	0.31	0.68	0.53	0.59	0.2	0.18	0.21	
Copper (filtered)	µg/L	0.02		1,000	-	-	-	-	-	0.91	0.08	0.21	0.22	0.19	<0.2	1.1	0.5	0.4	
Iron (filtered)	µg/L	2	153	300	1,920	536	1,430	2,090	1,200	2,630	1,190	1,890	11	2,130	1,550	124	2,130	1,060	
Lead (filtered)	µg/L	0.01		10	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.02	0.03	0.04	
Magnesium (filtered)	µg/L	1			11,700	13,600	9,740	10,400	10,700	10,200	12,900	10,100	25,200	8,590	7,400	22,100	12,700	12,300	
Manganese (filtered)	µg/L	0.01	25	50	-	-	-	-	-	30.7	22.7	29.2	84.2	29.6	24.5	14.7	31.4	19.8	
Mercury (filtered)	µg/L	0.01		1	-	-	-	-	-	<0.01	<0.01	<0.01	<10	<10	<10	<10	30	<10	
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Phosphorus total (P2O5)	µg/L	3			-	-	-	-	-	30	14	<30	<30	40	-	40	<30	30	
Potassium (filtered)	µg/L	2			-	-	-	-	-	2,410	3,770	2,530	4,710	2,280	1,990	7,590	2,860	3,720	
Sodium (filtered)	µg/L	10		200,000	10,600	9,300	10,900	5,540	12,000	8,180	11,800	8,290	15,400	5,300	6,300	76,700	8,390	6,200	
Zinc (filtered)	µg/L	2		5,000	-	-	-	-	-	<2	<2	4	<2	3	4	4	8	<2	
Inorganics																			
Alkalinity (total) as CaCO3	mg/L	2	396	500	249	239	232	225	250	258	246	258	265	255	224	242	227	242	
Total Dissolved Solids	mg/L	3		500	380	363	391	311	340	366	303	371	400	391	274	320	274	343	
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Chemical Oxygen Demand	mg/L	5			9	<8	<8	<8	<8	17	<8	<8	<8	8	<8	<8	13	<8	
Total Suspended Solids	mg/L	2			-	-	-	-	-	5	2	6	-	3	5	6	8	17	
Biochemical Oxygen Demand	mg/L	2			-	-	-	-	-	<4	<4	7	-	<4	<4	<4	7	<4	
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	1.6	<1	2.1	1.4	3.7	-	-	-	<1	-	-	-	-	-	
Phenols (4AAP)	mg/L	0.001			-	-	-	-	-	0.001	0.001	0.001	<0.002	<0.001	<0.001	<0.001	0.002	0.001	
Sulphate (filtered)	mg/L	0.2		500	21	15	16	20	14	10	19	10	63	7	6	10	17	9	
Ammonia as N	mg/L	0.01			0.8	0.7	0.7	0.7	0.8	0.6	0.8	0.9	0.9	0.9	0.5	0.9	0.7	0.9	
Nitrate (as N)	mg/L	0.05		10	<0.05	<0.05	<0.06	<0.06	0.60	<0.06	<0.06	0.06	<0.06	<0.06	<0.06	0.18	0.13	<0.06	
Nitrite (as N)	mg/L	0.03		1	-	-	-	-	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	
Total Kjeldahl Nitrogen	mg/L	0.1			-	-	-	-	-	1.1	0.9	0.9	1.1	0.9	<0.5	1	0.6	0.8	
Electrical Conductivity (Lab)	µS/cm	1			618	603	602	550	560	599	560	628	658	603	465	584	520	547	
pH (Lab)	-	0.05		6.5-8.5	7.98	8.06	7.94	8.19	7.67	7.95	8.09	7.99	7.91	7.63	8.09	8.1	7.76	7.77	
Field																			
DO (Field)	mg/L				-	-	-	-	-	-	-	-	-	-	4	5.7	-	6.4	
Redox (Field)	mV				-	-	-	-	-	-	-	-	-	-	-93	-122	-	-60	
Temperature (Field)	°C				-	-	-	-	-	-	-	-	-	-	9.1	12.5	15.1	4.9	
Conductivity (field)	µS/cm				-	-	-	-	-	-	-	-	-	-	345	528	-	350	
pH (Field)	-			6.5-8.5	-	-	-	-	-	-	-	-	-	-	7.8	7.7	7.6	8.3	



Table 5 - Groundwater Quality - Shallow Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code														
					Date	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW13-1
					01 Nov 2016	04 Oct 2017	30 May 2019	29 Oct 2019	26 May 2020	18 Nov 2020	24 Jun 2021	11 Nov 2021	12 Apr 2022	25 Oct 2022	23 Oct 2023	24 May 2012	24 Oct 2012	18 Jun 2013	
Metals																			
Arsenic (filtered)	µg/L	0.1	6.4	25	<0.2	<0.2	<0.2	0.8	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	
Barium (filtered)	µg/L	0.01	423	1,000	723	152	713	230	621	311	743	994	694	1,080	1,010	118	122	92.1	
Boron (filtered)	µg/L	0.2	2,536	5,000	153	83	104	99	106	110	121	156	118	167	151	16.7	28.7	18.6	
Calcium (filtered)	µg/L	10			102,000	122,000	126,000	117,000	115,000	113,000	116,000	106,000	109,000	93,500	87,900	115,000	105,000	98,300	
Cadmium (filtered)	µg/L	0.003		5	0.004	<0.003	0.003	0.003	<0.003	<0.003	<0.015	<0.015	<0.015	<0.01	-	-	-	-	
Chloride	µg/L	200		250,000	42,000	54,000	51,000	44,000	55,000	44,000	40,700	39,400	41,300	37,500	36,300	120,000	71,000	63,000	
Chromium (III+VI) (filtered)	µg/L	0.03		50	0.39	0.58	0.16	0.13	0.13	0.28	<1	<1	<1	<1	-	-	-	-	
Copper (filtered)	µg/L	0.02		1,000	1.79	0.16	<0.2	0.5	0.3	0.4	<0.1	<0.1	<0.1	0.1	-	-	-	-	
Iron (filtered)	µg/L	2	153	300	20	18	10	19	20	24	<5	<5	<5	15	<5	<3	<3	6	
Lead (filtered)	µg/L	0.01		10	0.03	<0.01	<0.01	0.01	0.01	0.03	0.09	<0.02	<0.02	0.02	-	-	-	-	
Magnesium (filtered)	µg/L	1			11,800	6,760	11,500	7,580	12,900	9,820	13,400	14,300	12,400	15,200	13,900	3,500	3,210	2,710	
Manganese (filtered)	µg/L	0.01	25	50	4.94	15.6	3.52	20.1	5.18	16.4	3	3	3	10	3	-	-	-	
Mercury (filtered)	µg/L	0.01		1	<0.01	<10	<10	<10	30	<10	<0.02	<0.02	<0.02	<0.02	-	-	-	-	
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	-	-	-	<100	-	-	-	-	
Phosphorus total (P2O5)	µg/L	3			<3	<30	-	<30	<30	20	10	30	30	50	-	-	-	-	
Potassium (filtered)	µg/L	2			3,290	2,100	3,280	2,250	3,340	2,780	3,100	3,500	3,300	3,400	3,200	-	-	-	
Sodium (filtered)	µg/L	10		200,000	11,200	12,300	13,700	12,000	16,900	11,200	11,700	10,600	13,600	9,500	7,700	62,200	49,200	29,600	
Zinc (filtered)	µg/L	2		5,000	4	<2	3	3	2	<2	<5	<5	<5	<5	-	-	-	-	
Inorganics																			
Alkalinity (total) as CaCO3	mg/L	2	396	500	250	283	284	265	278	253	271	241	254	241	254	274	267	235	
Total Dissolved Solids	mg/L	3		500	360	460	403	403	397	351	338	336	353	321	320	620	483	374	
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	-	-	-	-	345	325	323	296	277	-	-	-	
Chemical Oxygen Demand	mg/L	5			9	<8	<8	<8	<8	<8	7	13	6	8	9	25	<8	<8	
Total Suspended Solids	mg/L	2			<2	<2	42	38	8	8	-	-	-	-	-	-	-	-	
Biochemical Oxygen Demand	mg/L	2			8	<4	<4	<4	5	<4	-	-	-	-	-	-	-	-	
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	-	-	-	-	-	-	2.2	1.9	2.3	0.7	2.8	2.4	1.4	2.1	
Phenols (4AAP)	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	0.002	<0.001	0.004	0.006	0.002	<0.001	<0.001	-	-	-	
Sulphate (filtered)	mg/L	0.2		500	20	24	22	28	23	25	20	26	23	25	28	9.8	21	9.3	
Ammonia as N	mg/L	0.01			0.1	0.1	0.1	<0.1	<0.1	0.1	0.14	0.16	0.14	0.16	0.16	<0.1	<0.1	<0.1	
Nitrate (as N)	mg/L	0.05		10	0.18	<0.06	<0.06	<0.06	<0.06	<0.06	0.08	<0.05	<0.05	<0.05	<0.05	1.09	1.31	1.81	
Nitrite (as N)	mg/L	0.03		1	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.05	-	-	-	-	
Total Kjeldahl Nitrogen	mg/L	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.2	0.2	0.2	0.2	-	-	-	-	
Electrical Conductivity (Lab)	µS/cm	1			616	710	675	649	684	595	650	647	680	618	617	1,000	801	682	
pH (Lab)	-	0.05		6.5-8.5	7.86	7.8	7.42	7.92	7.71	7.91	7.85	7.91	7.56	7.76	7.38	7.79	7.86	7.95	
Field																			
DO (Field)	mg/L				-	-	3	5.9	-	6.5	2.83	3.6	2.29	2.96	2.91	-	-	-	
Redox (Field)	mV				-	-	-92	-149	-	-128	-38	11	175	-141	-163	-	-	-	
Temperature (Field)	°C				-	-	8.5	9.9	14.4	8.6	9.4	9.4	7.2	10.8	9.4	-	-	-	
Conductivity (field)	µS/cm				-	-	457	477	-	388	651	280	589	586	584	-	-	-	
pH (Field)	-			6.5-8.5	-	-	7.6	7.6	7.3	8.1	7.2	7.45	7.08	7.37	6.97	-	-	-	



Table 5 - Groundwater Quality - Shallow Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code														
					Date	MW13-1	MW13-1	MW13-1	MW13-1	MW13-1	MW13-1	MW13-1	MW13-1	MW13-1	MW13-1	MW13-1	MW13-1	MW13-1	
					05 Nov 2013	26 Jun 2014	11 Nov 2014	22 May 2015	19 Nov 2015	31 May 2016	01 Nov 2016	04 Oct 2017	30 May 2019	29 Oct 2019	26 May 2020	18 Nov 2020	28 Jun 2021	11 Nov 2021	
Metals																			
Arsenic (filtered)	µg/L	0.1	6.4	25	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.1	0.1	
Barium (filtered)	µg/L	0.01	423	1,000	77.8	118	80.5	119	83.9	84.2	138	147	118	82.4	110	71.6	132	138	
Boron (filtered)	µg/L	0.2	2,536	5,000	15.5	19.0	42.3	20.7	28.3	21	42	42	21	19	17	23	20	23	
Calcium (filtered)	µg/L	10			81,700	110,000	88,800	114,000	88,300	91,700	119,000	117,000	132,000	96,500	108,000	79,100	114,000	125,000	
Cadmium (filtered)	µg/L	0.003		5	-	-	<0.003	0.011	<0.003	0.004	<0.003	0.006	<0.003	0.003	0.009	<0.003	<0.015	<0.015	
Chloride	µg/L	200		250,000	21,000	100,000	15,000	110,000	18,000	86,000	100,000	140,000	57,000	21,000	140,000	21,000	124,000	115,000	
Chromium (III+VI) (filtered)	µg/L	0.03		50	-	-	0.06	0.16	0.08	0.36	0.48	0.64	0.16	0.23	0.2	0.73	<1	<1	
Copper (filtered)	µg/L	0.02		1,000	-	-	0.68	1.53	0.85	0.82	0.47	0.64	0.4	0.5	1.1	0.7	1.2	3.8	
Iron (filtered)	µg/L	2	153	300	<3	<2	<2	283	7	<7	<7	<7	<7	<7,000,000	<7	<7	<5	<5	
Lead (filtered)	µg/L	0.01		10	-	-	0.04	0.63	0.06	0.04	0.05	0.03	0.04	0.02	0.06	<0.01	0.08	0.14	
Magnesium (filtered)	µg/L	1			2,340	3,040	2,480	3,190	2,550	2,600	3,440	3,340	3,110	2,590	3,020	2,220	3,270	3,500	
Manganese (filtered)	µg/L	0.01	25	50	-	-	0.16	3.15	0.21	0.08	0.06	0.1	0.15	0.13	0.07	0.12	<1	<1	
Mercury (filtered)	µg/L	0.01		1	-	-	-	<0.01	<0.01	<0.01	<0.01	-	<10	-	10	-	<0.02	<0.02	
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Phosphorus total (P2O5)	µg/L	3			-	-	<30	-	<30	-	-	-	-	-	-	-	20	90	
Potassium (filtered)	µg/L	2			-	-	2,130	2,020	1,740	1,970	2,700	3,000	1,880	2,240	2,510	2,160	2,600	2,600	
Sodium (filtered)	µg/L	10		200,000	17,800	51,200	21,100	67,300	21,400	33,000	74,900	87,600	38,200	28,400	70,300	34,000	91,500	87,000	
Zinc (filtered)	µg/L	2		5,000	-	-	2	2	3	4	<2	3	2	3	4	<2	<5	<5	
Inorganics																			
Alkalinity (total) as CaCO3	mg/L	2	396	500	246	267	257	272	262	270	276	290	249	250	251	245	262	309	
Total Dissolved Solids	mg/L	3		500	283	469	283	517	320	463	491	566	394	286	503	294	484	532	
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	-	-	-	-	-	-	-	-	-	-	298	328	
Chemical Oxygen Demand	mg/L	5			<8	<8	<8	<8	<8	<8	<8	<8	<8	<8.0	8	<8	17	56	
Total Suspended Solids	mg/L	2			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Biochemical Oxygen Demand	mg/L	2			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	2.1	3.1	3.9	1.5	2.5	2.0	<1	3	-	1	2	1	2.4	2	
Phenols (4AAP)	mg/L	0.001			-	-	-	<0.002	-	0.003	-	-	0.003	-	<0.002	-	<0.002	<0.002	
Sulphate (filtered)	mg/L	0.2		500	6.0	7.8	6.4	11	8	9	19	21	10	8	10	7	11	11	
Ammonia as N	mg/L	0.01			<0.1	0.2	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1000	<0.1	<0.1	<0.01	<0.01	
Nitrate (as N)	mg/L	0.05		10	0.37	0.63	0.27	1.56	0.24	1.12	1.56	-	2.42	0.26	<0.06	0.35	0.9	2.55	
Nitrite (as N)	mg/L	0.03		1	-	-	-	<0.03	-	<0.03	-	0.53	<0.03	-	<0.03	-	<0.05	-	
Total Kjeldahl Nitrogen	mg/L	0.1			-	-	-	<0.5	-	<0.5	-	-	<0.5	-	<0.5	-	0.2	-	
Electrical Conductivity (Lab)	µS/cm	1			521	878	516	884	558	859	917	1,020	628	534	884	517	913	998	
pH (Lab)	-	0.05		6.5-8.5	8.20	8.02	8.18	7.99	8.04	7.99	7.96	7.83	8.1	7.89	7.77	7.76	7.73	7.64	
Field																			
DO (Field)	mg/L				-	-	-	-	-	-	-	-	9.9	10.3	-	8.2	7.01	5.2	
Redox (Field)	mV				-	-	-	-	-	-	-	-	158	13	-	28	135	57	
Temperature (Field)	°C				-	-	-	-	-	-	-	-	9.1	9.6	12.8	12.8	10.1	10.6	
Conductivity (field)	µS/cm				-	-	-	-	-	-	-	-	385	652	-	370	848	412	
pH (Field)	-			6.5-8.5	-	-	-	-	-	-	-	-	7.9	7.8	7.3	7.6	7.23	7	



Table 5 - Groundwater Quality - Shallow Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code			
					MW13-1	MW13-1	MW13-1	
					Date	12 Apr 2022	25 Oct 2022	23 Oct 2023
Metals								
Arsenic (filtered)	µg/L	0.1	6.4	25	<0.1	<0.1	<0.1	
Barium (filtered)	µg/L	0.01	423	1,000	117	121	121	
Boron (filtered)	µg/L	0.2	2,536	5,000	13	24	26	
Calcium (filtered)	µg/L	10			124,000	104,000	103,000	
Cadmium (filtered)	µg/L	0.003		5	<0.015	<0.01	-	
Chloride	µg/L	200		250,000	105,000	102,000	102,000	
Chromium (III+VI) (filtered)	µg/L	0.03		50	<1	<1	-	
Copper (filtered)	µg/L	0.02		1,000	1.1	0.9	-	
Iron (filtered)	µg/L	2	153	300	<5	<5	<5	
Lead (filtered)	µg/L	0.01		10	0.04	0.03	-	
Magnesium (filtered)	µg/L	1			3,640	3,410	2,910	
Manganese (filtered)	µg/L	0.01	25	50	<1	1	<1	
Mercury (filtered)	µg/L	0.01		1	<0.02	<0.02	-	
Phosphorus (filtered)	µg/L	100			-	<100	-	
Phosphorus total (P2O5)	µg/L	3			30	740	70	
Potassium (filtered)	µg/L	2			1,900	2,900	2,300	
Sodium (filtered)	µg/L	10		200,000	53,900	84,700	70,500	
Zinc (filtered)	µg/L	2		5,000	<5	<5	-	
Inorganics								
Alkalinity (total) as CaCO3	mg/L	2	396	500	243	277	315	
Total Dissolved Solids	mg/L	3		500	463	474	486	
Hardness as CaCO3 (filtered)	mg/L	0.02		500	325	274	269	
Chemical Oxygen Demand	mg/L	5			<5	5	<5	
Total Suspended Solids	mg/L	2			-	-	-	
Biochemical Oxygen Demand	mg/L	2			-	-	-	
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	1.6	0.4	3.3	
Phenols (4AAP)	mg/L	0.001			<0.001	<0.001	<0.001	
Sulphate (filtered)	mg/L	0.2		500	12	15	16	
Ammonia as N	mg/L	0.01			<0.01	0.03	<0.05	
Nitrate (as N)	mg/L	0.05		10	3.35	1.42	1.92	
Nitrite (as N)	mg/L	0.03		1	<0.05	<0.05	-	
Total Kjeldahl Nitrogen	mg/L	0.1			0.2	0.2	-	
Electrical Conductivity (Lab)	µS/cm	1			875	895	916	
pH (Lab)	-	0.05		6.5-8.5	7.53	7.68	7.49	
Field								
DO (Field)	mg/L				8.75	5.93	8.76	
Redox (Field)	mV				48	-142	-29	
Temperature (Field)	°C				6.7	11.7	9.1	
Conductivity (field)	µS/cm				765	337	858	
pH (Field)	-			6.5-8.5	7	7.27	7.04	



Table 6 - Groundwater Quality - Deep Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code														
					Date	MW08-1	MW08-1	MW08-1	MW08-1	MW08-1	MW08-1	MW08-1	MW08-1	MW08-1	MW08-1	MW08-1	MW08-1	MW08-1	
					18 May 2012	09 Oct 2012	10 Jun 2013	05 Nov 2013	26 Jun 2014	06 Nov 2014	22 May 2015	30 May 2016	31 Oct 2016	31 May 2017	04 Oct 2017	30 May 2019	29 Oct 2019	26 May 2020	
Metals																			
Arsenic (filtered)	µg/L	0.1	6.4	25	-	-	-	-	-	0.3	<0.2	3.5	0.9	2.1	0.6	<0.2	<0.2	<0.2	
Barium (filtered)	µg/L	0.01	423	1,000	118	112	103	110	107	103	101	110	97.8	122	105	106	106	94.8	
Boron (filtered)	µg/L	0.2	2,536	5,000	92.1	86.6	92.7	80.4	92.6	76.0	82.0	128	91	116	105	114	102	101	
Calcium (filtered)	µg/L	10			112,000	108,000	94,300	103,000	100,000	106,000	103,000	118,000	110,000	115,000	108,000	125,000	121,000	105,000	
Cadmium (filtered)	µg/L	0.003		5	-	-	-	-	-	0.014	0.005	<0.003	0.004	0.017	<0.003	<0.003	0.009	<0.003	
Chloride	µg/L	200		250,000	65,000	69,000	74,000	71,000	75,000	75,000	71,000	71,000	70,000	78,000	79,000	83,000	78,000	86,000	
Chromium (III+VI) (filtered)	µg/L	0.03		50	-	-	-	-	-	2.35	0.10	0.37	0.38	0.81	0.66	0.12	0.16	0.17	
Copper (filtered)	µg/L	0.02		1,000	-	-	-	-	-	2.48	3.49	0.20	0.88	3.92	0.36	0.9	0.9	0.8	
Iron (filtered)	µg/L	2	153	300	41	531	1,200	250	3,030	184	28	3,890	1,040	3,820	881	16	18	17	
Lead (filtered)	µg/L	0.01		10	-	-	-	-	-	0.51	0.01	0.02	0.03	2.11	<0.01	0.01	0.14	<0.01	
Magnesium (filtered)	µg/L	1			9,260	9,150	9,240	9,030	11,300	9,620	9,820	10,500	10,100	11,600	11,200	11,700	11,300	12,000	
Manganese (filtered)	µg/L	0.01	25	50	-	-	-	-	-	30.6	9.63	190	97.7	188	156	5.23	83.7	4.05	
Mercury (filtered)	µg/L	0.01		1	-	-	-	-	-	<0.01	<0.01	<0.01	10	-	<10	-	10		
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	-	-	-	-	-	-	-		
Phosphorus total (P2O5)	µg/L	10			-	-	-	-	-	<30	<30	-	<30	-	-	-	-		
Potassium (filtered)	µg/L	2			-	-	-	-	-	3,840	3,200	3,490	3,220	3,810	3,410	3,770	3,640	3,150	
Sodium (filtered)	µg/L	10		200,000	43,800	42,600	39,400	42,000	45,100	46,600	44,500	48,400	43,800	45,500	44,200	48,400	45,900	52,100	
Zinc (filtered)	µg/L	2		5,000	-	-	-	-	-	5	2	<2	4	8	2	3	3	4	
Inorganics																			
Alkalinity (total) as CaCO3	mg/L	2	396	500	298	290	281	274	309	309	304	314	299	313	294	284	274	290	
Total Dissolved Solids	mg/L	3		500	454	471	426	434	440	457	440	437	457	454	460	489	454	451	
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	-	-	-	-	-	-	-	-	-	-	-		
Chemical Oxygen Demand	mg/L	5			13	9	<8	<8	<8	<8	13	9	<8	<8	8	<8	<8	<8	
Total Suspended Solids	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	-		
Biochemical Oxygen Demand	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	-		
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	1.8	1.5	2.5	3.1	2.7	2.8	<1	2.0	4	1	2	-	<1	2	
Phenols (4AAP)	mg/L	0.001			-	-	-	-	-	-	<0.002	0.004	-	0.006	-	0.001	-	<0.002	
Sulphate (filtered)	mg/L	0.2		500	16	17	16	18	15	16	17	15	13	15	16	18	19	19	
Ammonia as N	mg/L	0.01			<0.1	<0.1	<0.1	<0.1	0.1	0.2	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.2	<0.1	
Nitrate (as N)	mg/L	0.05		10	0.26	0.08	0.16	0.06	0.09	<0.06	0.25	0.08	0.13	<0.06	-	<0.06	<0.06	<0.06	
Nitrite (as N)	mg/L	0.03		1	-	-	-	-	-	-	<0.03	<0.03	-	<0.03	0.11	<0.03	-	<0.03	
Total Kjeldahl Nitrogen	mg/L	0.1			-	-	-	-	-	-	<0.5	<0.5	-	0.5	-	<0.5	-	<0.5	
Electrical Conductivity (Lab)	µS/cm	1			784	820	784	771	793	791	788	816	824	792	814	795	801	794	
pH (Lab)	-	0.05		6.5-8.5	7.89	8.02	7.96	8.16	7.50	8.09	7.92	8.07	7.99	7.83	7.83	7.53	7.94	7.84	
Field																			
DO (Field)	mg/L				-	-	-	-	-	-	-	-	-	-	-	4.8	3.7	-	
Redox (Field)	mV				-	-	-	-	-	-	-	-	-	-	-	198	21	-	
Temperature (Field)	°C				-	-	-	-	-	-	-	-	-	-	-	9.2	12.2	15.2	
Conductivity (field)	µS/cm				-	-	-	-	-	-	-	-	-	-	-	570	695	-	
pH (Field)	-			6.5-8.5	-	-	-	-	-	-	-	-	-	-	-	7.7	6.4	7.7	



Table 6 - Groundwater Quality - Deep Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code														
					Date	MW09-1	MW09-1	MW09-1	MW09-1	MW09-1	MW09-1	MW09-1	MW09-1	MW09-1	MW09-1	MW10-1	MW10-1	MW10-1	
					31 May 2017	04 Oct 2017	30 May 2019	29 Oct 2019	26 May 2020	18 Nov 2020	28 Jun 2021	11 Nov 2021	12 Apr 2022	25 Oct 2022	23 Oct 2023	18 May 2012	09 Oct 2012	10 Jun 2013	
Metals																			
Arsenic (filtered)	µg/L	0.1	6.4	25	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	0.1	<0.1	<0.1	-	-	-	
Barium (filtered)	µg/L	0.01	423	1,000	662	772	688	570	689	612	768	897	141	914	652	986	917	838	
Boron (filtered)	µg/L	0.2	2,536	5,000	571	549	590	491	531	468	571	569	19	615	470	143	158	177	
Calcium (filtered)	µg/L	10			54,600	56,900	58,700	55,700	53,000	57,500	51,600	53,700	90,900	50,800	39,400	102,000	100,000	85,600	
Cadmium (filtered)	µg/L	0.003		5	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.015	<0.015	<0.015	<0.01	-	-	-	-	
Chloride	µg/L	200		250,000	18,000	28,000	16,000	18,000	16,000	15,000	15,200	16,200	20,500	14,900	15,100	48,000	46,000	51,000	
Chromium (III+VI) (filtered)	µg/L	0.03		50	0.75	0.63	0.15	0.16	0.17	0.67	7	<1	<1	<1	-	-	-	-	
Copper (filtered)	µg/L	0.02		1,000	0.1	<0.02	<0.2	<0.2	0.4	<0.2	<0.1	<0.1	1.1	0.3	-	-	-	-	
Iron (filtered)	µg/L	2	153	300	16	9	<7	8	15	<7	40	<5	37	<5	15	36	7	8	
Lead (filtered)	µg/L	0.01		10	<0.01	<0.01	0.01	0.01	<0.01	<0.01	0.07	<0.02	<0.02	<0.02	-	-	-	-	
Magnesium (filtered)	µg/L	1			20,600	22,000	22,700	18,900	24,400	20,800	22,900	22,100	3,430	22,500	17,900	14,100	16,000	15,100	
Manganese (filtered)	µg/L	0.01	25	50	91.6	90.4	82	70	69.9	58.3	64	41	2	50	69	-	-	-	
Mercury (filtered)	µg/L	0.01		1	<10	-	<10	-	<10	-	<0.02	<0.02	<0.02	<0.02	-	-	-	-	
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	-	-	-	<100	-	-	-	-	
Phosphorus total (P2O5)	µg/L	10			<30	-	-	-	-	-	60	40	10	50	60	-	-	-	
Potassium (filtered)	µg/L	2			5,410	5,380	6,170	5,320	5,330	5,420	5,400	5,600	1,800	5,700	4,400	-	-	-	
Sodium (filtered)	µg/L	10		200,000	48,100	50,000	51,700	42,600	56,200	47,000	54,400	52,500	32,200	55,700	39,000	9,600	10,100	10,800	
Zinc (filtered)	µg/L	2		5,000	<2	<2	<2	<2	<2	<2	<5	<5	<5	<5	-	-	-	-	
Inorganics																			
Alkalinity (total) as CaCO3	mg/L	2	396	500	278	292	271	241	258	335	236	239	250	268	238	237	234	234	
Total Dissolved Solids	mg/L	3		500	354	366	391	323	337	320	315	326	296	322	304	389	389	420	
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	-	-	-	-	223	225	241	220	172	-	-	-	
Chemical Oxygen Demand	mg/L	5			34	34	34	24	37	35	33	35	<5	57	50	12	12	<8	
Total Suspended Solids	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Biochemical Oxygen Demand	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	1	2	-	<1	1	1	2.6	1.8	3.5	0.9	3.3	1.0	<1	2.7	
Phenols (4AAP)	mg/L	0.001			<0.002	-	<0.001	-	0.003	-	0.009	0.013	<0.001	0.016	0.032	-	-	-	
Sulphate (filtered)	mg/L	0.2		500	39	53	41	42	63	66	55	46	7	44	64	18	19	18	
Ammonia as N	mg/L	0.01			0.7	0.7	0.7	0.7	0.6	0.7	0.65	0.64	<0.01	0.63	0.6	0.2	0.2	0.2	
Nitrate (as N)	mg/L	0.05		10	<0.06	-	<0.06	<0.06	<0.06	<0.06	<0.05	<0.05	0.17	<0.05	<0.05	0.16	<0.05	<0.06	
Nitrite (as N)	mg/L	0.03		1	<0.03	<0.06	<0.03	-	<0.03	-	<0.05	-	<0.05	<0.05	-	-	-	-	
Total Kjeldahl Nitrogen	mg/L	0.1			0.6	-	0.5	-	0.6	-	0.7	-	0.2	0.8	-	-	-	-	
Electrical Conductivity (Lab)	µS/cm	1			622	617	605	561	592	598	607	628	571	621	587	633	653	638	
pH (Lab)	-	0.05		6.5-8.5	7.97	8.02	7.41	7.23	7.73	8.24	7.84	7.82	7.46	7.98	7.41	7.96	8.13	7.97	
Field																			
DO (Field)	mg/L				-	-	3.7	2.8	-	3.7	6.1	3.33	1.25	5.57	1.31	-	-	-	
Redox (Field)	mV				-	-	-195	-220	-	-288	119	-96	-	-139	-241	-	-	-	
Temperature (Field)	°C				-	-	10.5	13.2	14.8	7.3	10.8	9.4	6.8	13.6	8.5	-	-	-	
Conductivity (field)	µS/cm				-	-	420	533	-	361	622	271	498	560	585	-	-	-	
pH (Field)	-			6.5-8.5	-	-	7.9	7.6	7.5	7.7	7.83	7.82	7.46	7.87	7.19	-	-	-	



Table 6 - Groundwater Quality - Deep Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code														
					Date	MW10-1	MW10-1	MW10-1	MW10-1	MW10-1	MW10-1	MW10-1	MW10-1	MW10-1	MW10-1	MW10-1	MW10-1	MW10-1	
					05 Nov 2013	26 Jun 2014	22 May 2015	30 May 2016	31 Oct 2016	31 May 2017	04 Oct 2017	30 May 2019	29 Oct 2019	26 May 2020	18 Nov 2020	24 Jun 2021	11 Nov 2021	12 Apr 2022	
Metals																			
Arsenic (filtered)	µg/L	0.1	6.4	25	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	
Barium (filtered)	µg/L	0.01	423	1,000	802	749	725	798	768	825	823	839	803	848	662	944	888	980	
Boron (filtered)	µg/L	0.2	2,536	5,000	182	179	219	278	277	227	217	260	273	221	201	184	193	150	
Calcium (filtered)	µg/L	10			82,500	84,300	83,900	87,600	83,900	95,500	98,400	103,000	91,900	90,900	96,300	105,000	98,500	103,000	
Cadmium (filtered)	µg/L	0.003		5	-	-	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.015	<0.015	<0.015	
Chloride	µg/L	200		250,000	47,000	49,000	50,000	47,000	47,000	48,000	53,000	51,000	49,000	53,000	51,000	54,200	48,400	45,100	
Chromium (III+VI) (filtered)	µg/L	0.03		50	-	-	0.05	0.25	0.32	0.62	0.65	0.13	0.14	0.18	0.71	<1	<1	<1	
Copper (filtered)	µg/L	0.02		1,000	-	-	0.54	0.08	0.12	0.15	0.16	<0.2	<0.2	0.2	0.3	0.1	<0.1	0.2	
Iron (filtered)	µg/L	2	153	300	5	20	380	369	19	30	10	85	14	48	23	18	17	26	
Lead (filtered)	µg/L	0.01		10	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	<0.01	0.02	0.05	<0.02	<0.02	
Magnesium (filtered)	µg/L	1			17,700	18,500	19,500	20,700	21,200	18,100	18,300	20,700	20,500	21,500	20,100	17,700	17,400	14,500	
Manganese (filtered)	µg/L	0.01	25	50	-	-	102	116	127	138	137	173	136	119	124	62	102	26	
Mercury (filtered)	µg/L	0.01		1	-	-	<0.01	<0.01	<0.01	<10	-	<10	-	20	-	<0.02	<0.02	<0.02	
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Phosphorus total (P2O5)	µg/L	10			-	-	<30	<30	-	<30	-	-	-	-	-	30	<10	<10	
Potassium (filtered)	µg/L	2			-	-	3,890	4,390	4,080	3,890	4,000	4,690	4,590	3,870	4,460	3,500	3,700	2,900	
Sodium (filtered)	µg/L	10		200,000	11,300	11,800	12,000	14,200	13,600	11,400	11,600	13,200	13,000	14,100	12,900	11,200	11,500	9,200	
Zinc (filtered)	µg/L	2		5,000	-	-	<2	<2	4	3	<2	4	<2	6	3	<5	<5	<5	
Inorganics																			
Alkalinity (total) as CaCO3	mg/L	2	396	500	227	243	243	222	238	243	223	245	232	233	241	251	236	238	
Total Dissolved Solids	mg/L	3		500	354	349	389	391	369	369	414	400	334	377	351	336	337	339	
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	-	-	-	-	-	-	-	-	-	335	317	317	
Chemical Oxygen Demand	mg/L	5			11	<8	13	<8	<8	<8	8	<8	<8	<8	<8	<5	10	<5	
Total Suspended Solids	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Biochemical Oxygen Demand	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	<1	1.8	1.7	1.3	3	<1	1	-	<1	1	1	2.8	1.4	2	
Phenols (4AAP)	mg/L	0.001			-	-	<0.002	0.006	-	<0.002	-	0.002	-	<0.002	-	<0.002	0.002	0.003	
Sulphate (filtered)	mg/L	0.2		500	19	17	20	26	24	23	31	25	23	25	25	23	20	19	
Ammonia as N	mg/L	0.01			0.1	0.2	<0.1	<0.1	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.15	0.18	0.15	
Nitrate (as N)	mg/L	0.05		10	<0.06	0.18	<0.06	<0.06	<0.06	<0.06	-	<0.06	<0.06	<0.06	<0.06	<0.05	<0.05	<0.05	
Nitrite (as N)	mg/L	0.03		1	-	-	<0.03	<0.03	-	<0.03	<0.03	<0.03	-	<0.03	-	<0.05	-	<0.05	
Total Kjeldahl Nitrogen	mg/L	0.1			-	-	<0.5	<0.5	-	<0.5	-	<0.5	-	<0.5	-	0.1	-	0.2	
Electrical Conductivity (Lab)	µS/cm	1			610	625	629	624	629	617	643	616	608	623	631	648	649	653	
pH (Lab)	-	0.05		6.5-8.5	8.33	7.69	8.02	8.16	7.99	7.84	7.77	7.74	8.16	7.8	7.91	7.76	7.8	7.54	
Field																			
DO (Field)	mg/L				-	-	-	-	-	-	-	4	3.6	-	3.4	2.59	2.07	2	
Redox (Field)	mV				-	-	-	-	-	-	-	-70	-126	-	-238	-118	15	-172	
Temperature (Field)	°C				-	-	-	-	-	-	-	10.2	13.2	14.1	6.6	8.9	9.4	9.1	
Conductivity (field)	µS/cm				-	-	-	-	-	-	-	447	556	-	373	648	284	564	
pH (Field)	-			6.5-8.5	-	-	-	-	-	-	-	7.8	7.5	7.7	8.1	8.15	7.32	6.98	



Table 6 - Groundwater Quality - Deep Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code														
					Date	MW10-1	MW10-1	MW11-1	MW11-1	MW11-1	MW11-1	MW11-1	MW11-1	MW11-1	MW11-1	MW11-1	MW11-1	MW11-1	
					25 Oct 2022	23 Oct 2023	18 May 2012	09 Oct 2012	10 Jun 2013	05 Nov 2013	26 Jun 2014	22 May 2015	30 May 2016	31 Oct 2016	31 May 2017	04 Oct 2017	30 May 2019	29 Oct 2019	
Metals																			
Arsenic (filtered)	µg/L	0.1	6.4	25	<0.1	<0.1	-	-	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Barium (filtered)	µg/L	0.01	423	1,000	929	984	915	592	349	452	1,160	473	199	430	452	434	460	446	
Boron (filtered)	µg/L	0.2	2,536	5,000	169	158	589	568	484	404	603	547	655	715	145	511	362	396	
Calcium (filtered)	µg/L	10			86,900	96,500	70,400	70,600	71,200	72,700	68,600	71,800	77,500	69,900	105,000	99,900	101,000	90,600	
Cadmium (filtered)	µg/L	0.003		5	<0.01	-	-	-	-	-	-	<0.003	0.009	<0.003	<0.003	<0.003	<0.003	<0.003	
Chloride	µg/L	200		250,000	38,000	47,700	26,000	29,000	30,000	32,000	25,000	31,000	30,000	38,000	28,000	33,000	29,000	35,000	
Chromium (III+VI) (filtered)	µg/L	0.03		50	<1	-	-	-	-	-	-	0.10	0.40	0.41	0.66	0.77	0.18	0.18	
Copper (filtered)	µg/L	0.02		1,000	0.1	-	-	-	-	-	-	0.26	0.18	0.08	0.06	0.18	<0.2	<0.2	
Iron (filtered)	µg/L	2	153	300	<5	<5	22	18	14	9	4	<2	30	<7	3,840	16	42	19	
Lead (filtered)	µg/L	0.01		10	<0.02	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.08	
Magnesium (filtered)	µg/L	1			12,100	13,400	32,000	31,100	28,100	26,800	34,100	30,000	30,100	34,700	10,500	25,800	19,400	20,700	
Manganese (filtered)	µg/L	0.01	25	50	10	13	-	-	-	-	-	103	103	86.3	40.4	86.4	62.9	85.3	
Mercury (filtered)	µg/L	0.01		1	<0.02	-	-	-	-	-	-	<0.01	<0.01	<0.01	<10	-	<10	-	
Phosphorus (filtered)	µg/L	100			<100	-	-	-	-	-	-	-	-	-	-	-	-	-	
Phosphorus total (P2O5)	µg/L	10			20	60	-	-	-	-	-	<30	<30	-	<30	-	-	-	
Potassium (filtered)	µg/L	2			2,900	3,000	-	-	-	-	-	5,110	5,350	5,530	2,670	4,600	4,260	4,230	
Sodium (filtered)	µg/L	10		200,000	7,900	7,800	19,900	18,200	16,800	15,200	20,200	17,600	18,800	20,400	10,400	14,600	12,600	12,300	
Zinc (filtered)	µg/L	2		5,000	<5	-	-	-	-	-	-	<2	3	4	<2	2	3	<2	
Inorganics																			
Alkalinity (total) as CaCO3	mg/L	2	396	500	241	262	288	262	247	254	245	265	268	294	261	263	260	248	
Total Dissolved Solids	mg/L	3		500	320	336	406	409	409	371	417	411	426	391	349	409	400	334	
Hardness as CaCO3 (filtered)	mg/L	0.02		500	267	296	-	-	-	-	-	-	-	-	-	-	-	-	
Chemical Oxygen Demand	mg/L	5			8	10	14	<8	8	16	32	19	<8	13	<8	10	9	11	
Total Suspended Solids	mg/L				-	-	-	-	-	-	-	-	-	-	28	-	-	-	
Biochemical Oxygen Demand	mg/L				-	-	-	-	-	-	-	-	-	-	<4	-	-	-	
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	1.1	4.1	1.6	1.1	2.2	1.1	2.3	1.4	2.1	3	-	2	-	<1	
Phenols (4AAP)	mg/L	0.001			0.003	<0.001	-	-	-	-	-	<0.002	0.003	-	0.002	-	<0.001	-	
Sulphate (filtered)	mg/L	0.2		500	20	21	36	47	45	45	28	53	65	69	10	54	37	29	
Ammonia as N	mg/L	0.01			0.18	0.17	0.9	1.0	0.9	1.1	1.2	0.8	0.9	1.1	0.6	1	0.7	0.9	
Nitrate (as N)	mg/L	0.05		10	<0.05	<0.05	<0.05	<0.05	<0.06	<0.06	1.56	<0.06	0.20	0.07	<0.06	-	<0.06	<0.06	
Nitrite (as N)	mg/L	0.03		1	<0.05	-	-	-	-	-	-	<0.03	<0.03	-	<0.03	<0.06	<0.03	-	
Total Kjeldahl Nitrogen	mg/L	0.1			0.3	-	-	-	-	-	-	1.5	0.9	-	0.8	-	0.5	-	
Electrical Conductivity (Lab)	µS/cm	1			616	647	674	684	661	669	655	663	674	690	565	663	643	598	
pH (Lab)	-	0.05		6.5-8.5	7.85	7.37	8.14	8.15	8.00	8.16	8.01	8.02	8.03	8.13	7.96	7.84	7.78	8.22	
Field																			
DO (Field)	mg/L				1.06	3.44	-	-	-	-	-	-	-	-	-	-	3.8	4.4	
Redox (Field)	mV				-146	-99	-	-	-	-	-	-	-	-	-	-	-95	-125	
Temperature (Field)	°C				12	9.4	-	-	-	-	-	-	-	-	-	-	9.5	12.9	
Conductivity (field)	µS/cm				545	42	-	-	-	-	-	-	-	-	-	-	435	589	
pH (Field)	-			6.5-8.5	7.37	6.14	-	-	-	-	-	-	-	-	-	-	7.8	7.7	



Table 6 - Groundwater Quality - Deep Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code														
					Date	MW11-1	MW11-1	MW11-1	MW11-1	MW11-1	MW11-1	MW11-1	MW11-1	MW11-1	MW11-1	MW11-1	MW11-1	MW11-1	
					26 May 2020	18 Nov 2020	24 Jun 2021	11 Nov 2021	12 Apr 2022	25 Oct 2022	23 Oct 2023	24 May 2012	24 Oct 2012	18 Jun 2013	05 Nov 2013	26 Jun 2014	11 Nov 2014	22 May 2015	
Metals																			
Arsenic (filtered)	µg/L	0.1	6.4	25	<0.2	<0.2	<0.1	<0.1	0.1	<0.1	<0.1	-	-	-	-	-	<0.2	<0.2	
Barium (filtered)	µg/L	0.01	423	1,000	683	1,740	570	748	498	587	720	261	288	275	234	268	276	291	
Boron (filtered)	µg/L	0.2	2,536	5,000	331	438	610	442	446	395	413	401	414	403	288	430	494	584	
Calcium (filtered)	µg/L	10			90,300	101,000	79,200	91,900	90,300	93,200	80,200	89,500	86,500	89,500	91,700	90,600	92,500	86,300	
Cadmium (filtered)	µg/L	0.003		5	0.005	<0.003	<0.015	<0.015	<0.015	<0.01	-	-	-	-	-	-	<0.003	<0.003	
Chloride	µg/L	200		250,000	34,000	28,000	27,900	35,700	35,200	36,000	38,100	38,000	39,000	38,000	41,000	40,000	38,000	37,000	
Chromium (III+VI) (filtered)	µg/L	0.03		50	0.41	0.67	<1	<1	<1	<1	-	-	-	-	-	-	<0.03	0.05	
Copper (filtered)	µg/L	0.02		1,000	0.4	<0.2	<0.1	<0.1	0.3	<0.1	-	-	-	-	-	-	0.09	0.75	
Iron (filtered)	µg/L	2	153	300	14	<7	116	48	232	172	58	4	4	20	25	6	8	<2	
Lead (filtered)	µg/L	0.01		10	0.02	<0.01	0.07	<0.02	<0.02	<0.02	-	-	-	-	-	-	<0.01	<0.01	
Magnesium (filtered)	µg/L	1			22,800	27,300	34,400	25,600	26,300	22,700	24,300	19,400	19,700	21,200	17,000	21,200	20,800	24,100	
Manganese (filtered)	µg/L	0.01	25	50	68	64.3	86	55	80	71	72	-	-	-	-	-	166	147	
Mercury (filtered)	µg/L	0.01		1	10	-	<0.02	<0.02	<0.02	<0.02	-	-	-	-	-	-	-	<0.01	
Phosphorus (filtered)	µg/L	100			-	-	-	-	<100	-	-	-	-	-	-	-	-	-	
Phosphorus total (P2O5)	µg/L	10			-	-	180	170	190	90	130	-	-	-	-	-	-	40	
Potassium (filtered)	µg/L	2			3,880	5,000	5,400	4,500	4,500	4,300	4,300	-	-	-	-	-	3,750	3,440	
Sodium (filtered)	µg/L	10		200,000	14,700	15,900	19,800	15,800	16,100	14,300	13,000	29,300	30,300	32,900	26,300	35,600	33,000	35,000	
Zinc (filtered)	µg/L	2		5,000	7	<2	<5	<5	<5	<5	-	-	-	-	-	-	<2	<2	
Inorganics																			
Alkalinity (total) as CaCO3	mg/L	2	396	500	241	290	271	243	253	260	279	276	258	273	267	270	283	291	
Total Dissolved Solids	mg/L	3		500	391	346	346	360	369	353	361	420	420	403	431	440	440	460	
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	339	335	334	326	300	-	-	-	-	-	-	-	
Chemical Oxygen Demand	mg/L	5			11	10	65	58	45	19	28	26	15	14	11	10	<8	8	
Total Suspended Solids	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Biochemical Oxygen Demand	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	2	<1	3	2.3	2.5	1.4	4.1	1.4	<1	1.5	<1	1.9	4.1	1.1	
Phenols (4AAP)	mg/L	0.001			<0.002	-	<0.002	0.008	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.002	
Sulphate (filtered)	mg/L	0.2		500	43	64	62	49	51	41	47	46	53	53	47	58	66	64	
Ammonia as N	mg/L	0.01			0.8	0.8	0.88	1.03	0.82	0.89	0.83	0.2	0.3	0.3	0.5	0.4	0.2	0.3	
Nitrate (as N)	mg/L	0.05		10	<0.06	<0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.06	<0.06	<0.06	<0.06	0.06	
Nitrite (as N)	mg/L	0.03		1	<0.03	-	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.03	
Total Kjeldahl Nitrogen	mg/L	0.1			0.9	-	1.6	-	1.4	1.4	-	-	-	-	-	-	-	<0.5	
Electrical Conductivity (Lab)	µS/cm	1			607	657	666	693	710	679	695	708	730	710	726	734	738	736	
pH (Lab)	-	0.05		6.5-8.5	7.83	8.09	7.91	7.69	7.9	7.96	7.64	7.87	7.84	7.96	8.30	8.00	8.18	8.01	
Field																			
DO (Field)	mg/L				-	-	12.42	9.36	7.05	9.19	10.98	-	-	-	-	-	-	-	
Redox (Field)	mV				-	-235	5	15	-93	-149	132	-	-	-	-	-	-	-	
Temperature (Field)	°C				14.5	6.2	8.3	9	9.4	14.4	7.2	-	-	-	-	-	-	-	
Conductivity (field)	µS/cm				-	386	655	294	615	649	-	-	-	-	-	-	-	-	
pH (Field)	-			6.5-8.5	7.7	8	8.76	7.8	7.25	7.62	6.92	-	-	-	-	-	-	-	



Table 6 - Groundwater Quality - Deep Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code														
					Date	MW12-3	MW12-3	MW12-3	MW12-3	MW12-3	MW12-3	MW12-3	MW12-3	MW12-3	MW12-3	MW12-3	MW12-3	MW12-3	
					24 Oct 2012	12 Jun 2013	05 Nov 2013	26 Jun 2014	11 Nov 2014	22 May 2015	19 Nov 2015	31 May 2016	01 Nov 2016	04 Oct 2017	30 May 2019	29 Oct 2019	26 May 2020	18 Nov 2020	
Metals																			
Arsenic (filtered)	µg/L	0.1	6.4	25	-	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Barium (filtered)	µg/L	0.01	423	1,000	45.4	44.7	41.6	93.6	33.8	35.0	48.2	55.0	48.6	29.1	39.9	66.4	34	29.2	
Boron (filtered)	µg/L	0.2	2,536	5,000	74.4	71.0	62.3	76.4	126	136	84.9	101	108	79	90	143	77	69	
Calcium (filtered)	µg/L	10			124,000	120,000	123,000	127,000	133,000	127,000	125,000	137,000	129,000	134,000	162,000	140,000	127,000	134,000	
Cadmium (filtered)	µg/L	0.003		5	-	-	-	-	<0.003	0.003	<0.003	0.003	<0.003	0.004	<0.003	<0.003	0.003	0.003	
Chloride	µg/L	200		250,000	57,000	59,000	56,000	53,000	54,000	50,000	50,000	50,000	52,000	60,000	55,000	51,000	52,000	47,000	
Chromium (III+VI) (filtered)	µg/L	0.03		50	-	-	-	-	<0.03	<0.03	<0.03	0.19	0.36	0.55	0.26	0.15	0.09	0.72	
Copper (filtered)	µg/L	0.02		1,000	-	-	-	-	0.38	0.68	0.21	1.15	0.36	0.13	<0.2	<0.2	0.4	0.3	
Iron (filtered)	µg/L	2	153	300	188	6	239	14	78	4	767	<7	368	13	54	99	<7	56	
Lead (filtered)	µg/L	0.01		10	-	-	-	-	<0.01	<0.01	0.06	0.03	0.03	0.03	0.26	0.03	0.02	<0.01	
Magnesium (filtered)	µg/L	1			5,630	5,580	5,480	5,710	5,460	5,620	5,200	5,620	5,720	5,500	6,180	8,910	5,490	5,370	
Manganese (filtered)	µg/L	0.01	25	50	-	-	-	-	78.0	9.02	75.5	0.65	83.1	11.1	14.5	50.23	62.7	19.3	
Mercury (filtered)	µg/L	0.01		1	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	-	<10	-	10	-	
Phosphorus (filtered)	µg/L	100			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Phosphorus total (P2O5)	µg/L	10			-	-	-	-	-	<30	-	<30	-	-	-	-	-	-	
Potassium (filtered)	µg/L	2			-	-	-	-	1,930	1,710	1,640	1,780	1,850	1,710	1,940	2,060	1,650	1,660	
Sodium (filtered)	µg/L	10		200,000	13,700	14,800	12,900	14,100	14,500	13,700	13,200	14,700	14,400	14,400	15,700	18,800	16,100	13,200	
Zinc (filtered)	µg/L	2		5,000	-	-	-	-	<2	<2	<2	5	4	3	8	<2.00000	<2	<2	
Inorganics																			
Alkalinity (total) as CaCO3	mg/L	2	396	500	267	276	246	288	288	288	275	271	276	277	290	272	296	334	
Total Dissolved Solids	mg/L	3		500	423	457	443	440	417	489	406	411	443	486	443	391	403	394	
Hardness as CaCO3 (filtered)	mg/L	0.02		500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Chemical Oxygen Demand	mg/L	5			11	<8	<8	<8	<8	16	<8	<8	<8	<8	<8	<8	<8	<8	
Total Suspended Solids	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Biochemical Oxygen Demand	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	1.4	1.9	2.4	1.3	4.5	2.4	1.4	1.5	<1	1	-	1	1	1	
Phenols (4AAP)	mg/L	0.001			-	-	-	-	-	<0.002	-	0.002	-	-	0.001	-	<0.002	-	
Sulphate (filtered)	mg/L	0.2		500	24	31	24	24	24	26	23	82	21	25	26	24	23	21	
Ammonia as N	mg/L	0.01			0.3	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1000	<0.1	<0.1	
Nitrate (as N)	mg/L	0.05		10	<0.05	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	0.27	-	<0.06	<0.060000	<0.06	<0.06	
Nitrite (as N)	mg/L	0.03		1	-	-	-	-	-	<0.03	-	<0.03	-	<0.06	<0.03	-	<0.03	-	
Total Kjeldahl Nitrogen	mg/L	0.1			-	-	-	-	-	<0.5	-	<0.5	-	-	<0.5	-	<0.5	-	
Electrical Conductivity (Lab)	µS/cm	1			738	719	690	722	716	704	703	723	729	737	711	694	681	663	
pH (Lab)	-	0.05		6.5-8.5	7.73	7.73	8.12	7.85	8.11	8.03	7.91	7.86	7.88	7.77	8.06	7.75	7.68	7.7	
Field																			
DO (Field)	mg/L				-	-	-	-	-	-	-	-	-	-	5.7	10.8	-	4.5	
Redox (Field)	mV				-	-	-	-	-	-	-	-	-	-	147	-51	-	-59	
Temperature (Field)	°C				-	-	-	-	-	-	-	-	-	-	10.1	9.5	14.1	9.6	
Conductivity (field)	µS/cm				-	-	-	-	-	-	-	-	-	-	510	572	-	446	
pH (Field)	-			6.5-8.5	-	-	-	-	-	-	-	-	-	-	7.7	7.7	7.4	7.5	



Table 6 - Groundwater Quality - Deep Bedrock

	Unit	EQL	BR RUC	ODWQS	Location Code				
					MW12-3 Date 24 Jun 2021	MW12-3 11 Nov 2021	MW12-3 12 Apr 2022	MW12-3 25 Oct 2022	MW12-3 23 Oct 2023
Metals									
Arsenic (filtered)	µg/L	0.1	6.4	25	<0.1	<0.1	<0.1	<0.1	<0.1
Barium (filtered)	µg/L	0.01	423	1,000	31	30	33	58	32
Boron (filtered)	µg/L	0.2	2,536	5,000	83	83	87	88	72
Calcium (filtered)	µg/L	10			133,000	127,000	129,000	122,000	116,000
Cadmium (filtered)	µg/L	0.003		5	<0.015	<0.015	<0.015	<0.01	-
Chloride	µg/L	200		250,000	48,600	44,500	43,800	42,700	48,700
Chromium (III+VI) (filtered)	µg/L	0.03		50	<1	4	<1	<1	-
Copper (filtered)	µg/L	0.02		1,000	0.1	<0.1	0.2	0.2	-
Iron (filtered)	µg/L	2	153	300	19	44	21	<5	45
Lead (filtered)	µg/L	0.01		10	0.08	0.08	0.04	<0.02	-
Magnesium (filtered)	µg/L	1			5,830	5,430	5,430	5,600	4,990
Manganese (filtered)	µg/L	0.01	25	50	34	24	38	9	16
Mercury (filtered)	µg/L	0.01		1	<0.02	<0.02	<0.02	<0.02	-
Phosphorus (filtered)	µg/L	100			-	-	-	<100	-
Phosphorus total (P2O5)	µg/L	10			40	730	100	40	90
Potassium (filtered)	µg/L	2			1,600	1,800	1,600	1,700	1,500
Sodium (filtered)	µg/L	10		200,000	16,000	16,200	16,900	15,600	13,200
Zinc (filtered)	µg/L	2		5,000	<5	<5	<5	<5	-
Inorganics									
Alkalinity (total) as CaCO3	mg/L	2	396	500	283	263	264	271	287
Total Dissolved Solids	mg/L	3		500	362	361	363	357	363
Hardness as CaCO3 (filtered)	mg/L	0.02		500	356	340	345	328	311
Chemical Oxygen Demand	mg/L	5			<5	32	17	9	10
Total Suspended Solids	mg/L				-	-	-	-	-
Biochemical Oxygen Demand	mg/L				-	-	-	-	-
Dissolved Organic Carbon (filtered)	mg/L	0.2	3.5	5	3.5	1.6	3.1	0.9	5.3
Phenols (4AAP)	mg/L	0.001			<0.002	<0.002	<0.001	<0.001	<0.001
Sulphate (filtered)	mg/L	0.2		500	23	23	22	23	22
Ammonia as N	mg/L	0.01			0.02	0.05	0.02	0.02	<0.05
Nitrate (as N)	mg/L	0.05		10	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite (as N)	mg/L	0.03		1	<0.05	-	<0.05	<0.05	-
Total Kjeldahl Nitrogen	mg/L	0.1			0.2	-	0.3	0.1	-
Electrical Conductivity (Lab)	µS/cm	1			696	694	699	687	698
pH (Lab)	-	0.05		6.5-8.5	7.75	7.72	7.54	7.71	7.38
Field									
DO (Field)	mg/L				3.52	2.63	1.99	2.07	2.61
Redox (Field)	mV				-5	12	-50	-139	-41
Temperature (Field)	°C				7.2	8.7	7.3	10.6	8.5
Conductivity (field)	µS/cm				694	300	610	564	664
pH (Field)	-			6.5-8.5	7.48	7.15	6.34	7.12	6.92



Table 7 - Groundwater Quality - VOCs

Location Code	Date	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2
		18 May 2012	10 Jun 2013	26 Jun 2014	22 May 2015	19 Nov 2015	30 May 2016	31 Oct 2016	31 May 2017	04 Oct 2017	26 May 2020	18 Nov 2020	24 Jun 2021	11 Nov 2021	12 Apr 2022	25 Oct 2022	
	Unit	EQL	ODWQS														
BTEX																	
Benzene	µg/L	0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L	0.5	60	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	µg/L	0.5	140	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	µg/L	0.5	90	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VOCs																	
Acetone	µg/L	30		-	-	-	-	-	-	-	-	-	-	-	<30	<30	<30
Bromoform	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromomethane	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	0.2	2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	µg/L	0.2	80	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5
Chloroethane	µg/L	3		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<3	<3	<3
Chloroform	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1
Chloromethane	µg/L	2		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<2	<2
Dibromochloromethane	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromoethane, 1,2-	µg/L	0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2	<0.2
Dichlorobenzene, 1,2-	µg/L	0.5	200	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5
Dichlorobenzene, 1,3-	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichlorobenzene, 1,4-	µg/L	0.5	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	µg/L	2		-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Dibromoethene, 1,2-trans-	µg/L			-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	-	-	-	-
Dichloroethane, 1,1-	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichloroethane, 1,2-	µg/L	0.5	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichloroethene, 1,1-	µg/L	0.5	14	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichloroethene, 1,2-cis-	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichloroethene, 1,2-trans-	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichloromethane	µg/L	0.5	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5	<5	<5
Dichloropropane, 1,2-	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichloropropene, 1,3-	µg/L	0.5		-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5
Dichloropropene, 1,3- cis	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichloropropene, 1,3- trans	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexane	µg/L	5		-	-	-	-	-	-	-	-	-	-	-	<5	<5	<5
Methyl Ethyl Ketone	µg/L	20		-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20
Methyl Iso-Butyl Ketone	µg/L	20		-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20
Methyl tert-butyl ether	µg/L	2		-	-	-	-	-	-	-	-	-	-	-	<2	<2	<2
Styrene	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	µg/L	0.5	10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethane, 1,1,1,2-	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethane, 1,1,2,2-	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethene	µg/L	0.5	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethane, 1,1,1-	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethane, 1,1,2-	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	µg/L	5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trimethylbenzene, 1,3,5-	µg/L	0.1		-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1
Vinyl chloride	µg/L	0.2	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2	<0.2



Table 8 - Groundwater Quality - PWQO

	Unit	EQL	Other	PWQO	Location Code	MW08-2	MW08-2	MW08-2	MW08-2	MW08-2	MW08-2	MW08-2	MW08-2	MW08-2	MW08-2	MW08-2	MW08-2
					Date	18 May 2012	09 Oct 2012	10 Jun 2013	05 Nov 2013	26 Jun 2014	06 Nov 2014	22 May 2015	30 May 2016	31 Oct 2016	31 May 2017	04 Oct 2017	30 May 2019
Metals																	
Arsenic (filtered)	µg/L	0.1		5	-	-	-	-	-	0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Barium (filtered)	µg/L	0.01			122	197	107	161	116	184	88.0	113	197	87.5	148	53.1	158
Boron (filtered)	µg/L	0.2	1,500 ^{#1}	200	15.3	35.7	11.1	27.4	13.8	29.6	10.0	18	32	20	31	14	50
Calcium (filtered)	µg/L	10			98,000	131,000	85,100	113,000	97,500	125,000	84,100	116,000	156,000	81,900	118,000	103,000	127,000
Cadmium (filtered)	µg/L	0.003		0.1-0.5 ^{#7}	-	-	-	-	-	0.004	<0.003	<0.003	0.004	<0.003	0.005	0.003	0.005
Chloride	µg/L	200	120,000 ^{#2}		48,000	110,000	56,000	69,000	38,000	74,000	24,000	55,000	150,000	45,000	68,000	3,000	69,000
Chromium (III+VI) (filtered)	µg/L	0.03		1 ^{#8}	-	-	-	-	-	2.70	0.28	0.34	0.34	0.61	0.67	0.27	0.25
Copper (filtered)	µg/L	0.02		1.5 ^{#7}	-	-	-	-	-	1.69	0.40	0.91	0.89	0.48	0.87	0.3	0.8
Iron (filtered)	µg/L	2	350 ^{#3}	300	18	<3	20	12	6	15	20	8	26	<7	<7	7	10
Lead (filtered)	µg/L	0.01		1.5 ^{#7}	-	-	-	-	-	0.10	<0.01	0.02	0.04	<0.01	<0.01	0.02	0.03
Magnesium (filtered)	µg/L	1			3,410	5,020	2,680	4,140	3,260	4,620	2,950	3,430	5,410	2,620	4,140	2,820	3,820
Manganese (filtered)	µg/L	0.01			-	-	-	-	-	9.10	3.25	0.82	4.47	1.75	1.89	0.74	4.33
Mercury (filtered)	µg/L	0.01		0.2	-	-	-	-	-	-	0.01	<0.01	<0.01	<10	<10	<10	<10
Phosphorus (filtered)	µg/L	100		30	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus total (P2O5)	µg/L	3		30	-	-	-	-	-	-	<30	6	<30	<30	<30	-	30
Potassium (filtered)	µg/L	2			-	-	-	-	-	2,220	1,000	979	1,710	817	1,370	472	1,400
Sodium (filtered)	µg/L	10			28,800	50,700	29,500	35,900	23,900	43,200	23,500	28,700	60,700	30,500	36,500	3,740	36,800
Zinc (filtered)	µg/L	2		20	-	-	-	-	-	2	<2	<2	3	<2	<2	2	3
Inorganics																	
Alkalinity (total) as CaCO3	mg/L	2			258	279	226	267	208	305	254	261	285	221	300	235	272
Total Dissolved Solids	mg/L	3			363	529	366	423	354	491	294	380	629	297	443	257	434
Hardness as CaCO3 (filtered)	mg/L	0.02			-	-	-	-	-	-	-	-	-	-	-	-	-
Chemical Oxygen Demand	mg/L	5			15	<8	14	10	8	<8	10	<8	16	<8	<8	<8	<8
Total Suspended Solids	mg/L	2			-	-	-	-	-	<2	<2	<2	<2	17	<2	23	37
Biochemical Oxygen Demand	mg/L	2			-	-	-	-	-	<4	<4	<4	<4	<4	5	<4	<4
Dissolved Organic Carbon (filtered)	mg/L	0.2			2.4	1.4	4.7	5.3	3.9	2.5	-	-	-	-	-	-	-
Phenols (4AAP)	mg/L	0.001		0.001	-	-	-	-	-	<0.001	0.002	0.001	<0.001	<0.001	0.002	<0.001	<0.001
Sulphate (filtered)	mg/L	0.2	128.429 ^{#4}		10	19	1.3	21	6.8	16	8	8	17	3	10	7	12
Ammonia as N	mg/L	0.01			<0.1	0.2	<0.1	<0.1	0.2	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrate (as N)	mg/L	0.05	3 ^{#5}		0.44	1.22	0.10	0.35	0.24	0.53	0.16	0.46	1.33	<0.06	0.35	<0.06	0.66
Nitrite (as N)	mg/L	0.03	0.06 ^{#6}		-	-	-	-	-	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Total Kjeldahl Nitrogen	mg/L	0.1			-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Electrical Conductivity (Lab)	µS/cm	1			657	929	604	757	615	807	559	700	1,040	535	781	429	748
pH (Lab)	-	0.05		6.5-8.5	7.87	8.07	7.91	8.23	8.29	8.10	7.93	8.08	7.86	7.88	7.63	7.66	8.12
Field																	
DO (Field)	mg/L			5	-	-	-	-	-	-	-	-	-	-	-	3.4	8.8
Redox (Field)	mV				-	-	-	-	-	-	-	-	-	-	-	196	79
Temperature (Field)	°C				-	-	-	-	-	-	-	-	-	-	-	8.5	13.4
Conductivity (field)	µS/cm				-	-	-	-	-	-	-	-	-	-	-	419	803
pH (Field)	-			6.5-8.5	-	-	-	-	-	-	-	-	-	-	-	7.7	6.1

Comments

- #1 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Boron (CCME, 2009)
- #2 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Chloride (CCME, 2011)
- #3 British Columbia Approved Water Quality Guidelines, Aquatic Life, Wildlife, & Agriculture (BCMOE, 2008)
- #4 Depends on hardness. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife, & Agriculture (BCMOE, 2016)
- #5 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrate (CCME, 2012)
- #6 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrite (CCME, 1987)
- #7 Depends on Hardness
- #8 PWQO value for Total Chromium based on more stringent Chromium VI criteria.



Table 8 - Groundwater Quality - PWQO

	Unit	EQL	Other	PWQO	Location Code												
					Date	MW08-2	MW08-2	MW08-2	MW08-2	MW08-2	MW08-2	MW08-2	MW08-2	MW09-2	MW09-2	MW09-2	MW09-2
					26 May 2020	18 Nov 2020	24 Jun 2021	11 Nov 2021	12 Apr 2022	25 Oct 2022	25 Oct 2023	18 May 2012	09 Oct 2012	10 Jun 2013	05 Nov 2013	02 Jul 2014	22 May 2015
Metals																	
Arsenic (filtered)	µg/L	0.1		5	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	0.3
Barium (filtered)	µg/L	0.01			81.1	162	135	168	95	181	183	259	803	856	470	232	178
Boron (filtered)	µg/L	0.2	1,500 ^{#1}	200	26	23	15	28	6	27	22	53.2	442	513	139	119	28.7
Calcium (filtered)	µg/L	10			80,100	145,000	114,000	119,000	85,300	123,000	141,000	97,400	49,400	43,700	96,700	58,000	96,100
Cadmium (filtered)	µg/L	0.003		0.1-0.5 ^{#7}	0.025	<0.003	<0.015	<0.015	<0.015	<0.01	-	-	-	-	-	-	0.003
Chloride	µg/L	200	120,000 ^{#2}		9,000	120,000	65,500	67,500	35,700	69,900	75,700	51,000	17,000	13,000	59,000	46,000	58,000
Chromium (III+VI) (filtered)	µg/L	0.03		1 ^{#8}	0.26	0.31	73	<1	<1	<1	-	-	-	-	-	-	0.05
Copper (filtered)	µg/L	0.02		1.5 ^{#7}	1.4	1.1	0.8	1	0.8	1.1	-	-	-	-	-	-	1.11
Iron (filtered)	µg/L	2	350 ^{#3}	300	24	15	19	<5	<5	6	203	35	<3	192	294	177	
Lead (filtered)	µg/L	0.01		1.5 ^{#7}	0.09	0.04	0.13	0.03	<0.02	0.02	-	-	-	-	-	-	<0.01
Magnesium (filtered)	µg/L	1			2,680	5,280	4,060	4,140	2,880	4,600	4,720	4,780	18,300	19,500	7,760	6,210	4,290
Manganese (filtered)	µg/L	0.01			4.34	0.97	4	2	<1	3	1	-	-	-	-	-	23.3
Mercury (filtered)	µg/L	0.01		0.2	10	<10	<0.02	<0.02	<0.02	<0.02	-	-	-	-	-	-	<0.01
Phosphorus (filtered)	µg/L	100		30	-	-	-	-	-	<100	<100	-	-	-	-	-	-
Phosphorus total (P2O5)	µg/L	3		30	<30	<30	100	110	50	60	-	-	-	-	-	-	<30
Potassium (filtered)	µg/L	2			738	1,210	1,000	1,800	700	1,600	1,400	-	-	-	-	-	2,330
Sodium (filtered)	µg/L	10			23,500	29,400	38,300	44,000	26,800	44,100	38,900	35,900	48,000	44,300	40,700	41,600	37,900
Zinc (filtered)	µg/L	2		20	9	<2	<5	<5	<5	<5	-	-	-	-	-	-	<2
Inorganics																	
Alkalinity (total) as CaCO3	mg/L	2			235	283	276	275	215	277	289	253	255	263	278	222	260
Total Dissolved Solids	mg/L	3			240	480	364	389	283	428	407	374	394	380	414	346	371
Hardness as CaCO3 (filtered)	mg/L	0.02			-	-	302	316	225	326	372	-	-	-	-	-	-
Chemical Oxygen Demand	mg/L	5			16	<8	7	10	<5	12	9	11	36	35	14	14	<8
Total Suspended Solids	mg/L	2			20	22	-	-	-	-	-	-	-	-	-	-	<2
Biochemical Oxygen Demand	mg/L	2			<4	<4	-	-	-	-	-	-	-	-	-	-	<4
Dissolved Organic Carbon (filtered)	mg/L	0.2			-	-	3.7	2.7	3	0.9	3.3	2.4	<1	1.8	1.5	1.7	-
Phenols (4AAP)	mg/L	0.001		0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	-	-	-	-	-	<0.001
Sulphate (filtered)	mg/L	0.2	128.429 ^{#4}		6	10	9	10	5	<10	11	13	6.3	32	22	8.6	12
Ammonia as N	mg/L	0.01			<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.05	<0.1	0.6	0.7	<0.1	0.2	<0.1
Nitrate (as N)	mg/L	0.05	3 ^{#5}		0.15	0.67	0.74	0.41	0.05	0.62	0.64	0.11	<0.05	<0.06	<0.06	<0.06	<0.06
Nitrite (as N)	mg/L	0.03	0.06 ^{#6}		<0.03	<0.03	<0.05	<0.05	<0.05	<0.5	-	-	-	-	-	-	<0.03
Total Kjeldahl Nitrogen	mg/L	0.1			<0.5	<0.5	0.4	0.3	0.2	0.3	-	-	-	-	-	-	<0.5
Electrical Conductivity (Lab)	µS/cm	1			452	838	700	744	547	814	777	665	617	591	756	573	666
pH (Lab)	-	0.05		6.5-8.5	7.85	7.81	7.94	8.27	7.57	7.93	7.76	7.92	8.17	8.19	8.18	8.00	7.86
Field																	
DO (Field)	mg/L			5	-	11.3	13.26	2.49	7.65	6.06	4.12	-	-	-	-	-	-
Redox (Field)	mV				-	135	140	-73	-54	-140	243	-	-	-	-	-	-
Temperature (Field)	°C				16.4	6.2	9.3	9.2	8.8	13	12.7	-	-	-	-	-	-
Conductivity (field)	µS/cm				-	486	652	334	473	722	841	-	-	-	-	-	-
pH (Field)	-			6.5-8.5	8.1	8.6	8.78	7.27	7.35	7.21	6.94	-	-	-	-	-	-

Comments

- #1 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Boron (CCME, 2009)
- #2 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Chloride (CCME, 2011)
- #3 British Columbia Approved Water Quality Guidelines, Aquatic Life, Wildlife, & Agriculture (BCMOE, 2008)
- #4 Depends on hardness. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife, & Agriculture (
- #5 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrate (CCME, 2012)
- #6 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrite (CCME, 1987)
- #7 Depends on Hardness
- #8 PWQO value for Total Chromium based on more stringent Chromium VI criteria.



Table 8 - Groundwater Quality - PWQO

	Unit	EQL	Other	PWQO	Location Code												
					Date	MW09-2	MW09-2	MW09-2	MW09-2	MW09-2	MW09-2	MW09-2	MW09-2	MW09-2	MW09-2	MW09-2	MW09-2
					30 May 2016	31 Oct 2016	31 May 2017	04 Oct 2017	30 May 2019	29 Oct 2019	26 May 2020	18 Nov 2020	28 Jun 2021	11 Nov 2021	12 Apr 2022	25 Oct 2022	23 Oct 2023
Metals																	
Arsenic (filtered)	µg/L	0.1		5	<0.2	<0.2	0.2	0.3	0.3	<0.2	0.4	<0.2	0.2	0.1	<0.1	<0.1	<0.1
Barium (filtered)	µg/L	0.01			109	204	117	258	158	184	285	176	210	203	846	229	207
Boron (filtered)	µg/L	0.2	1,500 ^{#1}	200	62	44	26	84	26	65	143	39	40	45	567	47	48
Calcium (filtered)	µg/L	10			57,500	133,000	83,700	107,000	105,000	121,000	80,800	126,000	124,000	119,000	51,100	122,000	110,000
Cadmium (filtered)	µg/L	0.003		0.1-0.5 ^{#7}	<0.003	<0.003	0.008	<0.003	0.003	0.003	0.007	0.01	<0.015	<0.015	<0.015	<0.01	-
Chloride	µg/L	200	120,000 ^{#2}		50,000	98,000	35,000	70,000	66,000	73,000	50,000	77,000	88,500	70,500	15,100	79,700	76,900
Chromium (III+VI) (filtered)	µg/L	0.03		1 ^{#8}	0.35	0.35	0.54	0.71	0.15	0.16	0.23	0.28	<1	<1	<1	<1	-
Copper (filtered)	µg/L	0.02		1.5 ^{#7}	0.24	0.77	2.42	0.4	0.8	1.4	<0.2	4.2	0.6	0.4	<0.1	0.8	-
Iron (filtered)	µg/L	2	350 ^{#3}	300	234	27	87	205	293	38	302	15	87	43	13	26	17
Lead (filtered)	µg/L	0.01		1.5 ^{#7}	0.01	0.01	<0.01	<0.01	0.02	0.02	0.01	0.04	0.03	<0.02	<0.02	0.03	-
Magnesium (filtered)	µg/L	1			3,510	4,530	3,120	5,780	3,890	3,820	8,760	4,270	4,640	4,550	21,900	4,730	4,390
Manganese (filtered)	µg/L	0.01			35.2	7.39	22	15.9	29.1	4.64	33.2	3.31	3	3	47	2	2
Mercury (filtered)	µg/L	0.01		0.2	<0.01	<0.01	10	<10	<10	<10	<10	<10	<0.02	<0.02	<0.02	<0.02	-
Phosphorus (filtered)	µg/L	100		30	-	-	-	-	-	-	-	-	-	-	-	<100	-
Phosphorus total (P2O5)	µg/L	3		30	3	<30	<30	<30	-	<30	<30	<30	40	20	40	20	60
Potassium (filtered)	µg/L	2			3,000	2,410	1,910	2,600	2,160	2,570	2,740	2,650	2,300	2,700	5,300	2,600	2,300
Sodium (filtered)	µg/L	10			45,500	54,600	32,600	45,700	42,900	46,500	44,400	44,600	55,600	48,200	51,300	57,700	45,600
Zinc (filtered)	µg/L	2		20	<2	<2	2	<2	3	3	2	<2	<5	<5	<5	<5	-
Inorganics																	
Alkalinity (total) as CaCO3	mg/L	2			280	238	226	274	241	260	233	295	271	280	249	278	306
Total Dissolved Solids	mg/L	3			383	417	314	420	214	414	311	437	432	409	316	425	432
Hardness as CaCO3 (filtered)	mg/L	0.02			-	-	-	-	-	-	-	-	329	315	218	324	293
Chemical Oxygen Demand	mg/L	5			<8	10	<8	10	<8	<8	<8	<8	<5	11	38	7	<5
Total Suspended Solids	mg/L	2			2	<2	3	<2	66	2	6	2	-	-	-	-	-
Biochemical Oxygen Demand	mg/L	2			<4	<4	<4	<4	<4	<4	<4	<4	-	-	-	-	-
Dissolved Organic Carbon (filtered)	mg/L	0.2			-	-	-	-	-	-	-	-	3.3	2.4	2.4	0.7	3.8
Phenols (4AAP)	mg/L	0.001		0.001	0.002	0.002	0.006	<0.001	0.003	<0.001	<0.001	<0.001	<0.002	<0.002	0.048	<0.001	<0.001
Sulphate (filtered)	mg/L	0.2	128..429 ^{#4}		8	20	20	14	16	11	10	10	13	13	37	14	15
Ammonia as N	mg/L	0.01			<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.03	0.03	0.69	0.02	<0.05
Nitrate (as N)	mg/L	0.05	3 ^{#5}		<0.06	1.12	0.1	0.37	<0.06	0.93	<0.06	1.17	1.21	0.73	<0.05	1	1.29
Nitrite (as N)	mg/L	0.03	0.06 ^{#6}		<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.05	-
Total Kjeldahl Nitrogen	mg/L	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.5	<0.5	0.2	0.2	0.7	0.2	-
Electrical Conductivity (Lab)	µS/cm	1			767	762	560	719	653	737	591	791	821	780	609	809	821
pH (Lab)	-	0.05		6.5-8.5	8.21	7.77	7.75	7.57	8	8.11	7.9	7.91	7.69	7.66	7.7	7.71	7.46
Field																	
DO (Field)	mg/L			5	-	-	-	-	3.6	4.1	-	5	2.63	2.91	2.32	5.39	3.09
Redox (Field)	mV				-	-	-	-	-125	-86	-	60	160	30	-36	-140	-51
Temperature (Field)	°C				-	-	-	-	10.3	14.1	1.7	7.4	10.7	9.8	7.4	13.7	9.2
Conductivity (field)	µS/cm				-	-	-	-	404	655	-	471	792	332	496	801	771
pH (Field)	-			6.5-8.5	-	-	-	-	7.7	7.4	7.6	8	7.08	7.01	7.01	7.06	6.75

Comments

- #1 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Boron (CCME, 2009)
- #2 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Chloride (CCME, 2011)
- #3 British Columbia Approved Water Quality Guidelines, Aquatic Life, Wildlife, & Agriculture (BCMOE, 2008)
- #4 Depends on hardness. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife, & Agriculture (
- #5 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrate (CCME, 2012)
- #6 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrite (CCME, 1987)
- #7 Depends on Hardness
- #8 PWQO value for Total Chromium based on more stringent Chromium VI criteria.



Table 8 - Groundwater Quality - PWQO

	Unit	EQL	Other	PWQO	Location Code	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	
					Date	18 May 2012	09 Oct 2012	10 Jun 2013	05 Nov 2013	26 Jun 2014	22 May 2015	30 May 2016	31 Oct 2016	31 May 2017	04 Oct 2017	30 May 2019	29 Oct 2019	26 May 2020
Metals																		
Arsenic (filtered)	µg/L	0.1		5		-	-	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2
Barium (filtered)	µg/L	0.01				923	710	620	587	587	524	476	501	459	506	626	580	491
Boron (filtered)	µg/L	0.2	1,500 ^{#1}	200		147	141	119	130	116	100	121	122	123	131	118	145	106
Calcium (filtered)	µg/L	10				95,300	93,600	99,800	96,500	99,500	106,000	113,000	107,000	91,200	104,000	117,000	129,000	98,500
Cadmium (filtered)	µg/L	0.003		0.1-0.5 ^{#7}		-	-	-	-	-	<0.003	<0.003	<0.003	<0.003	0.004	0.003	0.003	<0.003
Chloride	µg/L	200	120,000 ^{#2}			45,000	45,000	55,000	50,000	59,000	57,000	52,000	49,000	48,000	51,000	48,000	48,000	54,000
Chromium (III+VI) (filtered)	µg/L	0.03		1 ^{#8}		-	-	-	-	-	0.14	0.31	0.38	0.68	0.59	0.14	0.12	0.16
Copper (filtered)	µg/L	0.02		1.5 ^{#7}		-	-	-	-	-	1.36	0.62	0.06	0.27	0.15	0.3	<0.2	0.4
Iron (filtered)	µg/L	2	350 ^{#3}	300		9,270	6,760	4,190	4,380	6,210	3,160	533	3,580	3,340	3,370	6,910	4,030	886
Lead (filtered)	µg/L	0.01		1.5 ^{#7}		-	-	-	-	-	0.03	0.02	<0.01	<0.01	<0.01	0.12	0.01	<0.01
Magnesium (filtered)	µg/L	1				13,600	12,700	11,500	11,000	11,900	11,900	11,200	10,100	11,300	11,000	11,200	10,900	12,700
Manganese (filtered)	µg/L	0.01				-	-	-	-	-	92.4	29.8	49.7	97.3	60.1	171	54.4	95.1
Mercury (filtered)	µg/L	0.01		0.2		-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10
Phosphorus (filtered)	µg/L	100		30		-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus total (P2O5)	µg/L	3		30		-	-	-	-	-	<30	<3	<30	<30	30	-	60	40
Potassium (filtered)	µg/L	2				-	-	-	-	-	2,340	2,370	2,140	2,580	2,600	2,420	2,690	2,460
Sodium (filtered)	µg/L	10				8,870	7,070	6,180	5,160	7,250	6,690	7,750	5,520	8,990	6,070	7,470	5,540	9,830
Zinc (filtered)	µg/L	2		20		-	-	-	-	-	4	<2	<2	<2	<2	5	<2	2
Inorganics																		
Alkalinity (total) as CaCO3	mg/L	2				238	225	240	226	299	254	245	240	171	233	243	245	243
Total Dissolved Solids	mg/L	3				351	366	446	377	423	411	389	394	269	406	334	354	389
Hardness as CaCO3 (filtered)	mg/L	0.02				-	-	-	-	-	-	-	-	-	-	-	-	-
Chemical Oxygen Demand	mg/L	5				10	<8	8	<8	<8	10	<8	<8	<8	<8	<8	<8	8
Total Suspended Solids	mg/L	2				-	-	-	-	-	5	<2	9	118	10	50	55	42
Biochemical Oxygen Demand	mg/L	2				-	-	-	-	-	<4	<4	<4	<4	4	<4	<4	4
Dissolved Organic Carbon (filtered)	mg/L	0.2				3.8	<1	2.0	1.5	1.9	-	-	-	-	-	-	-	-
Phenols (4AAP)	mg/L	0.001		0.001		-	-	-	-	-	<0.001	0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001
Sulphate (filtered)	mg/L	0.2	128.429 ^{#4}			13	9.7	15	8.8	13	11	140	8	12	9	8	7	10
Ammonia as N	mg/L	0.01				0.1	0.7	0.5	1.0	0.9	0.6	0.3	1.0	0.5	1	0.8	1.1	0.9
Nitrate (as N)	mg/L	0.05	3 ^{#5}			<0.05	<0.05	<0.06	<0.06	0.07	<0.06	0.21	<0.06	0.08	<0.06	0.08	0.08	<0.06
Nitrite (as N)	mg/L	0.03	0.06 ^{#6}			-	-	-	-	-	<0.03	<0.03	<0.03	0.03	<0.03	0.07	0.04	<0.03
Total Kjeldahl Nitrogen	mg/L	0.1				-	-	-	-	-	1.2	<0.5	1.0	0.8	1.1	0.7	1.1	0.8
Electrical Conductivity (Lab)	µS/cm	1				613	615	667	619	686	645	639	633	483	631	599	621	618
pH (Lab)	-	0.05		6.5-8.5		7.91	8.13	7.89	8.15	8.13	7.94	8.13	7.95	7.92	7.67	7.54	8.03	7.83
Field																		
DO (Field)	mg/L			5		-	-	-	-	-	-	-	-	-	-	3.6	4	-
Redox (Field)	mV					-	-	-	-	-	-	-	-	-	-	-109	-115	-
Temperature (Field)	°C					-	-	-	-	-	-	-	-	-	-	10.6	13.8	15.1
Conductivity (field)	µS/cm					-	-	-	-	-	-	-	-	-	-	442	518	-
pH (Field)	-			6.5-8.5		-	-	-	-	-	-	-	-	-	-	7.6	7.6	7.7

Comments

- #1 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Boron (CCME, 2009)
- #2 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Chloride (CCME, 2011)
- #3 British Columbia Approved Water Quality Guidelines, Aquatic Life, Wildlife, & Agriculture (BCMOE, 2008)
- #4 Depends on hardness. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife, & Agriculture (
- #5 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrate (CCME, 2012)
- #6 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrite (CCME, 1987)
- #7 Depends on Hardness
- #8 PWQO value for Total Chromium based on more stringent Chromium VI criteria.



Table 8 - Groundwater Quality - PWQO

	Unit	EQL	Other	PWQO	Location Code												
					Date	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	MW10-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2	MW11-2
					18 Nov 2020	24 Jun 2021	11 Nov 2021	12 Apr 2022	25 Oct 2022	23 Oct 2023	18 May 2012	09 Oct 2012	10 Jun 2013	05 Nov 2013	26 Jun 2014	22 May 2015	30 May 2016
Metals																	
Arsenic (filtered)	µg/L	0.1		5	<0.2	0.3	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	<0.2	<0.2
Barium (filtered)	µg/L	0.01			416	510	574	542	603	511	495	376	416	469	437	473	407
Boron (filtered)	µg/L	0.2	1,500 ^{#1}	200	96	109	125	95	135	118	185	237	161	113	150	115	208
Calcium (filtered)	µg/L	10			99,900	118,000	119,000	118,000	112,000	102,000	95,600	71,600	81,200	100,000	85,700	98,400	91,900
Cadmium (filtered)	µg/L	0.003		0.1-0.5 ^{#7}	<0.003	<0.015	<0.015	<0.015	<0.01	-	-	-	-	-	-	<0.003	<0.003
Chloride	µg/L	200	120,000 ^{#2}		53,000	59,600	56,700	54,700	50,300	48,400	38,000	14,000	34,000	21,000	27,000	36,000	25,000
Chromium (III+VI) (filtered)	µg/L	0.03		1 ^{#8}	0.22	<1	<1	<1	<1	-	-	-	-	-	-	<0.03	0.35
Copper (filtered)	µg/L	0.02		1.5 ^{#7}	0.8	1.2	0.6	0.8	0.5	-	-	-	-	-	-	0.91	0.08
Iron (filtered)	µg/L	2	350 ^{#3}	300	3,290	<5	5,280	3,750	4,080	3,630	1,920	536	1,430	2,090	1,200	2,630	1,190
Lead (filtered)	µg/L	0.01		1.5 ^{#7}	0.04	0.46	<0.02	<0.02	0.03	-	-	-	-	-	-	<0.01	<0.01
Magnesium (filtered)	µg/L	1			10,400	11,400	11,300	11,300	11,000	9,950	11,700	13,600	9,740	10,400	10,700	10,200	12,900
Manganese (filtered)	µg/L	0.01			58	38	42	39	28	32	-	-	-	-	-	30.7	22.7
Mercury (filtered)	µg/L	0.01		0.2	<10	<0.02	<0.02	<0.02	<0.02	-	-	-	-	-	-	<0.01	<0.01
Phosphorus (filtered)	µg/L	100		30	-	-	-	-	<100	-	-	-	-	-	-	-	-
Phosphorus total (P2O5)	µg/L	3		30	80	110	90	420	60	110	-	-	-	-	-	30	14
Potassium (filtered)	µg/L	2			2,600	2,000	2,500	1,900	2,400	2,200	-	-	-	-	-	2,410	3,770
Sodium (filtered)	µg/L	10			6,930	6,100	6,500	6,100	5,900	4,900	10,600	9,300	10,900	5,540	12,000	8,180	11,800
Zinc (filtered)	µg/L	2		20	<2	<5	<5	<5	<5	-	-	-	-	-	-	<2	<2
Inorganics																	
Alkalinity (total) as CaCO3	mg/L	2			258	260	250	222	254	272	249	239	232	225	250	258	246
Total Dissolved Solids	mg/L	3			351	343	351	336	341	337	380	363	391	311	340	366	303
Hardness as CaCO3 (filtered)	mg/L	0.02			-	342	343	341	326	296	-	-	-	-	-	-	-
Chemical Oxygen Demand	mg/L	5			<8	53	9	7	11	7	9	<8	<8	<8	<8	17	<8
Total Suspended Solids	mg/L	2			56	-	-	-	-	-	-	-	-	-	-	5	2
Biochemical Oxygen Demand	mg/L	2			<4	-	-	-	-	-	-	-	-	-	-	<4	<4
Dissolved Organic Carbon (filtered)	mg/L	0.2			-	2.8	2.6	3	0.9	4.9	1.6	<1	2.1	1.4	3.7	-	-
Phenols (4AAP)	mg/L	0.001		0.001	0.001	<0.002	0.013	<0.001	<0.001	<0.001	-	-	-	-	-	0.001	0.001
Sulphate (filtered)	mg/L	0.2	128.429 ^{#4}		6	10	9	11	7	5	21	15	16	20	14	10	19
Ammonia as N	mg/L	0.01			1	0.93	1.04	0.8	1.04	0.95	0.8	0.7	0.7	0.7	0.8	0.6	0.8
Nitrate (as N)	mg/L	0.05	3 ^{#5}		<0.06	0.07	<0.05	0.4	0.18	0.67	<0.05	<0.05	<0.06	<0.06	0.60	<0.06	<0.06
Nitrite (as N)	mg/L	0.03	0.06 ^{#6}		<0.03	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	<0.03	<0.03
Total Kjeldahl Nitrogen	mg/L	0.1			1	1	1.1	1.2	1.2	-	-	-	-	-	-	1.1	0.9
Electrical Conductivity (Lab)	µS/cm	1			623	660	675	647	657	649	618	603	602	550	560	599	560
pH (Lab)	-	0.05		6.5-8.5	7.79	7.83	7.68	7.48	7.85	7.54	7.98	8.06	7.94	8.19	7.67	7.95	8.09
Field																	
DO (Field)	mg/L			5	4.2	2.87	2.81	2.44	1.62	2.75	-	-	-	-	-	-	-
Redox (Field)	mV				-148	-15	19	-117	-143	-85	-	-	-	-	-	-	-
Temperature (Field)	°C				6.7	9	10.3	7.9	13.3	9.9	-	-	-	-	-	-	-
Conductivity (field)	µS/cm				364	665	297	615	630	33	-	-	-	-	-	-	-
pH (Field)	-			6.5-8.5	7.9	8.45	7.38	7.18	7.22	6.29	-	-	-	-	-	-	-

Comments

- #1 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Boron (CCME, 2009)
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- #4 Depends on hardness. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife, & Agriculture (
- #5 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrate (CCME, 2012)
- #6 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrite (CCME, 1987)
- #7 Depends on Hardness
- #8 PWQO value for Total Chromium based on more stringent Chromium VI criteria.



Table 8 - Groundwater Quality - PWQO

	Unit	EQL	Other	PWQO	Location Code												
					Date	MW11-2 31 Oct 2016	MW11-2 31 May 2017	MW11-2 04 Oct 2017	MW11-2 30 May 2019	MW11-2 29 Oct 2019	MW11-2 26 May 2020	MW11-2 18 Nov 2020	MW11-2 24 Jun 2021	MW11-2 11 Nov 2021	MW11-2 12 Apr 2022	MW11-2 25 Oct 2022	MW11-2 23 Oct 2023
Metals																	
Arsenic (filtered)	µg/L	0.1		5	<0.2	<0.2	<0.2	<0.2	0.7	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	-
Barium (filtered)	µg/L	0.01			433	419	449	381	40.8	504	358	528	528	466	632	539	565
Boron (filtered)	µg/L	0.2	1,500 ^{#1}	200	146	515	123	85	176	150	164	127	143	219	169	113	118
Calcium (filtered)	µg/L	10			97,900	90,100	93,800	96,600	147,000	102,000	93,400	117,000	113,000	90,600	110,000	105,000	112,000
Cadmium (filtered)	µg/L	0.003		0.1-0.5 ^{#7}	<0.003	<0.003	<0.003	0.003	0.005	0.005	<0.003	<0.015	<0.015	<0.015	<0.01	-	-
Chloride	µg/L	200	120,000 ^{#2}		34,000	26,000	36,000	14,000	33,000	21,000	43,000	52,000	41,000	25,300	28,200	49,700	49,000
Chromium (III+VI) (filtered)	µg/L	0.03		1 ^{#8}	0.31	0.68	0.53	0.59	0.2	0.18	0.21	<1	<1	<1	<1	-	-
Copper (filtered)	µg/L	0.02		1.5 ^{#7}	0.21	0.22	0.19	<0.2	1.1	0.5	0.4	0.8	0.3	0.5	0.1	-	-
Iron (filtered)	µg/L	2	350 ^{#3}	300	1,890	11	2,130	1,550	124	2,130	1,060	3,030	2,750	1,670	2,150	2,910	<3
Lead (filtered)	µg/L	0.01		1.5 ^{#7}	<0.01	<0.01	0.01	0.01	0.02	0.03	0.04	0.06	<0.02	<0.02	<0.02	-	-
Magnesium (filtered)	µg/L	1			10,100	25,200	8,590	7,400	22,100	12,700	12,300	11,300	11,100	14,000	12,400	9,800	11,500
Manganese (filtered)	µg/L	0.01			29.2	84.2	29.6	24.5	14.7	31.4	19.8	35	33	35	33	31	-
Mercury (filtered)	µg/L	0.01		0.2	<0.01	<10	<10	<10	<10	30	<10	<0.02	<0.02	<0.02	<0.02	-	-
Phosphorus (filtered)	µg/L	100		30	-	-	-	-	-	-	-	-	-	-	<100	-	-
Phosphorus total (P2O5)	µg/L	3		30	<30	<30	40	-	40	<30	30	80	80	40	40	90	-
Potassium (filtered)	µg/L	2			2,530	4,710	2,280	1,990	7,590	2,860	3,720	2,300	2,800	3,600	3,100	2,300	-
Sodium (filtered)	µg/L	10			8,290	15,400	5,300	6,300	76,700	8,390	6,200	7,300	6,700	8,400	6,800	6,000	9,970
Zinc (filtered)	µg/L	2		20	4	<2	3	4	4	8	<2	<5	<5	<5	<5	-	-
Inorganics																	
Alkalinity (total) as CaCO3	mg/L	2			258	265	255	224	242	227	242	271	250	233	244	286	264
Total Dissolved Solids	mg/L	3			371	400	391	274	320	274	343	342	329	300	294	349	430
Hardness as CaCO3 (filtered)	mg/L	0.02			-	-	-	-	-	-	-	339	329	284	326	303	-
Chemical Oxygen Demand	mg/L	5			<8	<8	8	<8	<8	13	<8	<5	8	11	<5	9	<8
Total Suspended Solids	mg/L	2			6	-	3	5	6	8	17	-	-	-	-	-	-
Biochemical Oxygen Demand	mg/L	2			7	-	<4	<4	<4	7	<4	-	-	-	-	-	-
Dissolved Organic Carbon (filtered)	mg/L	0.2			-	<1	-	-	-	-	-	4.4	2.2	-	1.3	4.7	1.4
Phenols (4AAP)	mg/L	0.001		0.001	0.001	<0.002	<0.001	<0.001	<0.001	0.002	0.001	<0.002	<0.002	<0.001	<0.001	<0.001	-
Sulphate (filtered)	mg/L	0.2	128.429 ^{#4}		10	63	7	6	10	17	9	11	10	15	11	10	23
Ammonia as N	mg/L	0.01			0.9	0.9	0.9	0.5	0.9	0.7	0.9	0.95	0.96	0.7	0.99	0.99	0.2
Nitrate (as N)	mg/L	0.05	3 ^{#5}		0.06	<0.06	<0.06	<0.06	0.18	0.13	<0.06	0.07	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite (as N)	mg/L	0.03	0.06 ^{#6}		<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.05	<0.05	<0.05	<0.05	-	-
Total Kjeldahl Nitrogen	mg/L	0.1			0.9	1.1	0.9	<0.5	1	0.6	0.8	1	1.1	1	1.1	-	-
Electrical Conductivity (Lab)	µS/cm	1			628	658	603	465	584	520	547	659	633	578	568	672	680
pH (Lab)	-	0.05		6.5-8.5	7.99	7.91	7.63	8.09	8.1	7.76	7.77	7.81	7.8	7.56	7.87	7.58	7.85
Field																	
DO (Field)	mg/L			5	-	-	-	4	5.7	-	6.4	1.55	7.98	5.38	8.75	2.77	-
Redox (Field)	mV				-	-	-	-93	-122	-	-60	136	15	114	-148	-80	-
Temperature (Field)	°C				-	-	-	9.1	12.5	15.1	4.9	7.7	9	9.1	13.7	8.5	-
Conductivity (field)	µS/cm				-	-	-	345	528	-	350	672	286	527	644	23	-
pH (Field)	-			6.5-8.5	-	-	-	7.8	7.7	7.6	8.3	7.26	7.37	7.13	7.33	6.47	-

Comments

- #1 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Boron (CCME, 2009)
- #2 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Chloride (CCME, 2011)
- #3 British Columbia Approved Water Quality Guidelines, Aquatic Life, Wildlife, & Agriculture (BCMOE, 2008)
- #4 Depends on hardness. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife, & Agriculture (
- #5 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrate (CCME, 2012)
- #6 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrite (CCME, 1987)
- #7 Depends on Hardness
- #8 PWQO value for Total Chromium based on more stringent Chromium VI criteria.



Table 8 - Groundwater Quality - PWQO

Location Code	Date																
	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1	MW12-1			
Date	24 Oct 2012	18 Jun 2013	05 Nov 2013	26 Jun 2014	11 Nov 2014	22 May 2015	19 Nov 2015	31 May 2016	01 Nov 2016	04 Oct 2017	30 May 2019	29 Oct 2019	26 May 2020				
	Unit	EQL	Other	PWQO													
Metals																	
Arsenic (filtered)	µg/L	0.1		5	-	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.8	<0.2
Barium (filtered)	µg/L	0.01			729	574	739	597	869	664	801	569	723	152	713	230	621
Boron (filtered)	µg/L	0.2	1,500 ^{#1}	200	133	91.6	116	99.4	180	110	136	128	153	83	104	99	106
Calcium (filtered)	µg/L	10			90,100	113,000	89,800	113,000	96,900	99,700	87,200	109,000	102,000	122,000	126,000	117,000	115,000
Cadmium (filtered)	µg/L	0.003		0.1-0.5 ^{#7}	-	-	-	-	<0.003	<0.003	<0.003	<0.003	0.004	<0.003	0.003	0.003	<0.003
Chloride	µg/L	200	120,000 ^{#2}		39,000	50,000	30,000	50,000	33,000	39,000	42,000	53,000	42,000	54,000	51,000	44,000	55,000
Chromium (III+VI) (filtered)	µg/L	0.03		1 ^{#8}	-	-	-	-	<0.03	<0.03	0.04	0.32	0.39	0.58	0.16	0.13	0.13
Copper (filtered)	µg/L	0.02		1.5 ^{#7}	-	-	-	-	0.17	0.29	0.07	0.11	1.79	0.16	<0.2	0.5	0.3
Iron (filtered)	µg/L	2	350 ^{#3}	300	3	8	4	4	<2	<2	11	11	20	18	10	19	20
Lead (filtered)	µg/L	0.01		1.5 ^{#7}	-	-	-	-	0.02	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	0.01	0.01
Magnesium (filtered)	µg/L	1			12,100	11,000	11,900	11,700	12,600	12,200	12,700	12,600	11,800	6,760	11,500	7,580	12,900
Manganese (filtered)	µg/L	0.01			-	-	-	-	3.63	3.29	6.36	4.53	4.94	15.6	3.52	20.1	5.18
Mercury (filtered)	µg/L	0.01		0.2	-	-	-	-	-	-	<0.01	<0.01	<0.01	<10	<10	<10	30
Phosphorus (filtered)	µg/L	100		30	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus total (P2O5)	µg/L	3		30	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium (filtered)	µg/L	2			-	-	-	-	3,700	3,080	3,240	3,410	3,290	2,100	3,280	2,250	3,340
Sodium (filtered)	µg/L	10			8,330	11,100	8,290	11,300	8,740	10,600	8,640	10,600	11,200	12,300	13,700	12,000	16,900
Zinc (filtered)	µg/L	2		20	-	-	-	-	<2	<2	<2	<2	4	<2	3	3	2
Inorganics																	
Alkalinity (total) as CaCO3	mg/L	2			227	262	233	273	255	271	262	272	250	283	284	265	278
Total Dissolved Solids	mg/L	3			343	423	337	354	343	420	357	363	360	460	403	403	397
Hardness as CaCO3 (filtered)	mg/L	0.02			-	-	-	-	-	-	-	-	-	-	-	-	-
Chemical Oxygen Demand	mg/L	5			12	12	17	<8	12	13	12	8	9	<8	<8	<8	<8
Total Suspended Solids	mg/L	2			-	-	-	-	-	<2	<2	<2	<2	<2	42	38	8
Biochemical Oxygen Demand	mg/L	2			-	-	-	-	-	<4	<4	<4	8	<4	<4	<4	5
Dissolved Organic Carbon (filtered)	mg/L	0.2			1.6	1.4	<1	2.7	3.7	-	-	-	-	-	-	-	-
Phenols (4AAP)	mg/L	0.001		0.001	-	-	-	-	0.002	<0.002	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.002
Sulphate (filtered)	mg/L	0.2	128.429 ^{#4}		15	24	21	21	23	22	25	19	20	24	22	28	23
Ammonia as N	mg/L	0.01			0.2	0.2	<0.1	0.3	0.1	0.1	0.2	0.1	0.1	0.1	0.1	<0.1	<0.1
Nitrate (as N)	mg/L	0.05	3 ^{#5}		<0.05	0.17	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	0.18	<0.06	<0.06	<0.06	<0.06
Nitrite (as N)	mg/L	0.03	0.06 ^{#6}		-	-	-	-	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Total Kjeldahl Nitrogen	mg/L	0.1			-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Electrical Conductivity (Lab)	µS/cm	1			590	692	592	692	589	618	608	695	616	710	675	649	684
pH (Lab)	-	0.05		6.5-8.5	7.86	7.92	8.23	7.98	8.13	7.99	7.97	8.04	7.86	7.8	7.42	7.92	7.71
Field																	
DO (Field)	mg/L			5	-	-	-	-	-	-	-	-	-	-	3	5.9	-
Redox (Field)	mV				-	-	-	-	-	-	-	-	-	-	-92	-149	-
Temperature (Field)	°C				-	-	-	-	-	-	-	-	-	-	8.5	9.9	14.4
Conductivity (field)	µS/cm				-	-	-	-	-	-	-	-	-	-	457	477	-
pH (Field)	-			6.5-8.5	-	-	-	-	-	-	-	-	-	-	7.6	7.6	7.3

Comments

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- #4 Depends on hardness. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife, & Agriculture (
- #5 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrate (CCME, 2012)
- #6 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrite (CCME, 1987)
- #7 Depends on Hardness
- #8 PWQO value for Total Chromium based on more stringent Chromium VI criteria.



Table 8 - Groundwater Quality - PWQO

	Unit	EQL	Other	PWQO	Location Code					
					Date	MW12-1 18 Nov 2020	MW12-1 24 Jun 2021	MW12-1 11 Nov 2021	MW12-1 12 Apr 2022	MW12-1 25 Oct 2022
Metals										
Arsenic (filtered)	µg/L	0.1		5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
Barium (filtered)	µg/L	0.01			311	743	994	694	1,080	1,010
Boron (filtered)	µg/L	0.2	1,500 ^{#1}	200	110	121	156	118	167	151
Calcium (filtered)	µg/L	10			113,000	116,000	106,000	109,000	93,500	87,900
Cadmium (filtered)	µg/L	0.003		0.1-0.5 ^{#7}	<0.003	<0.015	<0.015	<0.015	<0.01	-
Chloride	µg/L	200	120,000 ^{#2}		44,000	40,700	39,400	41,300	37,500	36,300
Chromium (III+VI) (filtered)	µg/L	0.03		1 ^{#8}	0.28	<1	<1	<1	<1	-
Copper (filtered)	µg/L	0.02		1.5 ^{#7}	0.4	<0.1	<0.1	<0.1	0.1	-
Iron (filtered)	µg/L	2	350 ^{#3}	300	24	<5	<5	<5	15	<5
Lead (filtered)	µg/L	0.01		1.5 ^{#7}	0.03	0.09	<0.02	<0.02	0.02	-
Magnesium (filtered)	µg/L	1			9,820	13,400	14,300	12,400	15,200	13,900
Manganese (filtered)	µg/L	0.01			16.4	3	3	3	10	3
Mercury (filtered)	µg/L	0.01		0.2	<10	<0.02	<0.02	<0.02	<0.02	-
Phosphorus (filtered)	µg/L	100		30	-	-	-	-	<100	-
Phosphorus total (P2O5)	µg/L	3		30	<30	20	10	30	30	50
Potassium (filtered)	µg/L	2			2,780	3,100	3,500	3,300	3,400	3,200
Sodium (filtered)	µg/L	10			11,200	11,700	10,600	13,600	9,500	7,700
Zinc (filtered)	µg/L	2		20	<2	<5	<5	<5	<5	-
Inorganics										
Alkalinity (total) as CaCO3	mg/L	2			253	271	241	254	241	254
Total Dissolved Solids	mg/L	3			351	338	336	353	321	320
Hardness as CaCO3 (filtered)	mg/L	0.02			-	345	325	323	296	277
Chemical Oxygen Demand	mg/L	5			<8	7	13	6	8	9
Total Suspended Solids	mg/L	2			8	-	-	-	-	-
Biochemical Oxygen Demand	mg/L	2			<4	-	-	-	-	-
Dissolved Organic Carbon (filtered)	mg/L	0.2			-	2.2	1.9	2.3	0.7	2.8
Phenols (4AAP)	mg/L	0.001		0.001	<0.001	0.004	0.006	0.002	<0.001	<0.001
Sulphate (filtered)	mg/L	0.2	128.429 ^{#4}		25	20	26	23	25	28
Ammonia as N	mg/L	0.01			0.1	0.14	0.16	0.14	0.16	0.16
Nitrate (as N)	mg/L	0.05	3 ^{#5}		<0.06	0.08	<0.05	<0.05	<0.05	<0.05
Nitrite (as N)	mg/L	0.03	0.06 ^{#6}		<0.03	<0.05	<0.05	<0.05	<0.05	-
Total Kjeldahl Nitrogen	mg/L	0.1			<0.5	0.2	0.2	0.2	0.2	-
Electrical Conductivity (Lab)	µS/cm	1			595	650	647	680	618	617
pH (Lab)	-	0.05		6.5-8.5	7.91	7.85	7.91	7.56	7.76	7.38
Field										
DO (Field)	mg/L			5	6.5	2.83	3.6	2.29	2.96	2.91
Redox (Field)	mV				-128	-38	11	175	-141	-163
Temperature (Field)	°C				8.6	9.4	9.4	7.2	10.8	9.4
Conductivity (field)	µS/cm				388	651	280	589	586	584
pH (Field)	-			6.5-8.5	8.1	7.2	7.45	7.08	7.37	6.97

Comments

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Table 9 - Groundwater Quality - PFAS

	Unit	EQL	DWG	DWSV	MW05-1 24 Oct 2023	MW06-1 24 Oct 2023	MW06-2 24 Oct 2023	MW08-1 07 Dec 2023	MW08-2 07 Dec 2023	MW09-1 24 Oct 2023	MW09-2 24 Oct 2023	MW10-1 24 Oct 2023	MW10-2 07 Dec 2023	MW11-1 24 Oct 2023	MW11-2 07 Dec 2023	MW13-1 07 Dec 2023	MW13-2 24 Oct 2023	R1 24 Oct 2023
NA																		
Fluorotelomer carboxylic acid, 3:3 [3:3 FTCA]	ug/L				-	-	-	<0.034	<0.033	-	-	-	<0.034	-	<0.034	<0.033	-	-
Fluorotelomer carboxylic acid, 5:3 [5:3 FTCA]	ug/L				-	-	-	<0.017	<0.16	-	-	-	<0.17	-	<0.17	<0.17	-	-
Fluorotelomer carboxylic acid, 7:3 [7:3 FTCA]	ug/L				-	-	-	<0.017	<0.16	-	-	-	<0.17	-	<0.17	<0.17	-	-
Hexadecafluoro-3-oxanonane-1-sulfonic acid, 9-chloro- [9Cl-PF3ONS]	ug/L				-	-	-	-	-	-	-	-	-	<0.019	-	-	-	-
Hexafluoropropylene oxide dimer acid (HFPO-DA)(GenX)	UG/L				<0.014	<0.015	<0.015	<0.027	<0.026	<0.014	<0.014	<0.014	<0.027	<0.014	<0.027	<0.026	<0.015	<0.014
Nonafluoro-3,6-dioxaheptanoic acid [NFDHA]	ug/L				-	-	-	<0.014	<0.013	-	-	-	<0.013	-	<0.014	<0.013	-	-
perfluoro(2-ethoxyethane)sulfonic acid [PFEEESA]	ug/L				-	-	-	<0.014	<0.013	-	-	-	<0.013	-	<0.014	<0.013	-	-
Perfluoro-3-methoxypropanoic acid [PFMPA]	ug/L				-	-	-	<0.014	<0.013	-	-	-	<0.013	-	<0.014	<0.013	-	-
Perfluoroalkane Sulfonic Acids																		
Perfluorobutane sulfonic acid (PFBS)	µg/L			15	<0.0071	0.0066	0.0098	<0.0068	<0.0065	<0.005	<0.0051	<0.0052	<0.0067	<0.0052	<0.0068	<0.0066	<0.0053	0.0056
Perfluoropentane sulfonic acid (PFPeS)	µg/L				0.008	<0.0086	<0.0081	<0.0068	<0.0065	<0.0077	<0.0078	<0.0079	<0.0067	<0.0079	<0.0068	<0.0066	<0.0081	<0.0079
Perfluorohexane sulfonic acid (PFHxS)	µg/L			0.6	0.0847	0.0206	0.144	<0.0068	<0.0065	<0.0084	<0.0085	<0.0087	<0.0067	<0.0087	<0.0068	<0.0066	<0.009	<0.0087
Perfluoroheptane sulfonic acid (PFHpS)	µg/L				0.0092	<0.0083	0.0082	<0.0068	<0.0065	<0.0074	<0.0075	<0.0077	<0.0067	<0.0077	<0.0068	<0.0066	<0.0079	<0.0077
Perfluorooctane sulfonic acid (PFOS)	µg/L			0.6	0.333	0.0234	0.247	<0.0068	<0.0065	<0.0033	<0.0033	<0.0034	<0.0067	<0.0034	<0.0068	<0.0066	0.0208	<0.0034
Perfluorodecane sulfonic acid (PFDS)	µg/L				<0.0087	<0.0092	<0.0088	<0.0068	<0.0065	<0.0083	<0.0084	<0.0085	<0.0067	<0.0085	<0.0068	<0.0066	<0.0088	<0.0085
Perfluorononanesulfonic acid (PFNS)	mg/L				<0.000011	<0.000012	<0.000012	<0.0000068	<0.0000065	<0.000011	<0.000011	<0.000011	<0.0000067	<0.000011	<0.0000068	<0.0000066	<0.000012	<0.000011
Perfluoroalkane Carboxylic Acids																		
Perfluorobutanoic acid (PFBA)	µg/L			30	0.0336	0.0215	0.0624	<0.027	<0.026	<0.007	<0.0072	<0.0073	<0.027	0.0106	<0.027	<0.026	0.0131	0.0173
Perfluorohexanoic acid (PFHxA)	µg/L			0.2	0.0757	0.0368	0.241	<0.0068	<0.0065	<0.0022	<0.0022	0.0026	<0.0067	0.0044	<0.0068	<0.0066	0.0084	0.0029
Perfluoropentanoic acid (PFPeA)	µg/L			0.2	0.0495	0.0254	0.0909	<0.14	<0.013	<0.0055	<0.0056	<0.0057	<0.013	<0.0057	<0.017	<0.013	0.009	<0.0057
Perfluoroheptanoic acid (PFHpA)	µg/L			0.2	0.075	0.0327	0.2	<0.0068	<0.0065	<0.0038	<0.0038	<0.0039	<0.0067	<0.0039	<0.0068	<0.0066	0.0077	<0.0039
Perfluorooctanoic acid (PFOA)	µg/L			0.2	0.568	0.113	0.808	<0.0068	<0.0065	<0.0057	<0.0058	<0.0059	<0.0067	<0.0059	<0.0068	<0.0066	0.0241	<0.0059
Perfluorodecanoic acid (PFDA)	µg/L				<0.0049	<0.0053	<0.005	<0.0068	<0.0065	<0.0047	<0.0048	<0.0048	<0.0067	<0.0048	<0.0068	<0.0066	<0.005	<0.0048
Perfluorododecanoic acid (PFDoDA)	µg/L				<0.0061	<0.0065	<0.0062	<0.0068	<0.0065	<0.0058	<0.0059	<0.006	<0.0067	<0.006	<0.0068	<0.0066	<0.0062	<0.006
Perfluorononanoic acid (PFNA)	µg/L			0.02	0.0106	<0.0034	0.0122	<0.0068	<0.0065	<0.003	<0.0031	<0.0031	<0.0067	<0.0031	<0.0068	<0.0066	<0.0032	<0.0031
Perfluorotetradecanoic acid (PFTeDA)	µg/L				<0.006	<0.0064	<0.0061	<0.0068	<0.0065	<0.0058	<0.0058	<0.0059	<0.0067	<0.0059	<0.0068	<0.0066	<0.0061	<0.0059
Perfluorotridecanoic acid (PFTriDA)	µg/L				<0.0063	<0.0067	<0.0064	<0.0068	<0.0065	<0.006	<0.0061	<0.0062	<0.0067	<0.0062	<0.0068	<0.0066	<0.0064	<0.0062
Perfluoroundecanoic acid (PFUnDA)	µg/L				<0.0044	<0.0047	<0.0044	<0.0068	<0.0065	<0.0042	<0.0042	<0.0043	<0.0067	<0.0043	<0.0068	<0.0066	<0.0044	<0.0043
(n:2) Fluorotelomer Sulfonic Acids																		
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L				<0.018	<0.019	<0.018	<0.027	<0.026	<0.017	<0.017	<0.0071	<0.027	<0.018	<0.027	<0.026	<0.018	<0.018
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L			0.2	<0.0072	<0.0077	0.0343	<0.027	<0.026	<0.0069	<0.007	<0.022	<0.027	<0.0071	<0.027	<0.026	<0.0073	<0.0071
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L			0.2	<0.012	<0.012	<0.12	<0.027	<0.026	<0.011	<0.011	<0.029	<0.027	<0.011	<0.027	<0.026	<0.012	<0.011
Perfluoroalkyl Sulfonamides																		
Perfluorooctane sulfonamide (FOSA)	µg/L				<0.0055	<0.0058	<0.0056	<0.0068	<0.0065	<0.0052	<0.0053	<0.018	<0.0067	<0.0054	<0.0068	<0.0066	<0.0056	<0.0054
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L				<0.0051	<0.0054	<0.0052	<0.0068	<0.0065	<0.0048	<0.0049	<0.0071	<0.0067	<0.005	<0.0068	<0.0066	<0.0052	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L				<0.004	<0.0043	<0.0041	<0.0068	<0.0065	<0.0039	<0.0039	<0.0054	<0.0067	<0.004	<0.0068	<0.0066	<0.0041	<0.004
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L				<0.022	<0.024	<0.022	<0.0068	<0.0065	<0.021	<0.021	<0.0041	<0.0067	<0.022	<0.0068	<0.0066	<0.022	<0.022
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L				<0.0042	<0.0045	<0.0043	<0.0068	<0.0065	<0.004	<0.0041	<0.011	<0.0067	<0.0041	<0.0068	<0.0066	<0.0043	<0.0041
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L				<0.0072	<0.0077	<0.0073	<0.0068	<0.0065	<0.0069	<0.007	<0.005	<0.0067	<0.0071	<0.0068	<0.0066	<0.0073	<0.0071
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L				<0.03	<0.032	<0.03	<0.0068	<0.0065	<0.028	<0.029	<0.004	<0.0067	<0.029	<0.0068	<0.0066	<0.03	<0.029
PFAS																		
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	ug/L				<0.0098	<0.01	<0.0099	<0.027	<0.026	<0.0093	<0.0095	<0.0096	<0.027	<0.0096	<0.027	<0.026	<0.0099	<0.0096
T1Cl-PF3OUds (F-53B Minor)	ug/L				<0.014	<0.015	<0.015	<0.027	<0.026	<0.014	<0.014	<0.014	<0.027	<0.014	<0.027	<0.026	<0.015	<0.014
9cl-PF3ONS (F-53B Major)	ug/L				<0.019	<0.021	<0.02	<0.027	<0.026	<0.018	<0.019	<0.019	<0.027	-	<0.027	<0.026	<0.02	<0.019
Sum of PFAS (PFOS + PFOA)	µg/L			0.001	0.003395	0.000604	0.004451667	<0.0068	<0.0065	<0.001	<0.001	<0.001	<0.0067	<0.001	<0.0068	<0.0066	0.000155167	<0.001
Perfluorododecane sulfonic acid (PFDoS)	µg/L				<0.0032	<0.0034	<0.0032	<0.0068	<0.0065	<0.003	<0.0031	<0.0031	<0.0067	<0.0031	<0.0068	<0.0066	<0.0032	<0.0031



Table 10 - Residential Wells

	Unit	EQL	Location Code Date	R4	R4	R4
				11 Nov 2021	12 Apr 2022	23 Oct 2023
			ODWQS			
Metals						
Arsenic	µg/L	0.1	25	0.2	0.2	0.1
Barium	µg/L	0.01	1,000	122	126	179
Boron	µg/L	0.2	5,000	26	12	19
Calcium	µg/L	10		113,000	120,000	149,000
Cadmium	µg/L	0.003	5	<0.015	<0.015	-
Chloride	µg/L	200	250,000	126,000	85,200	292,000
Chromium (III+VI)	µg/L	0.03	50	<1	<1	-
Copper	µg/L	0.02	1,000	96.2	285	-
Iron	µg/L	2	300	<5	<5	7
Lead	µg/L	0.01	10	2.6	3.22	-
Magnesium	µg/L	1		3,200	3,280	4,390
Manganese	µg/L	0.01	50	<1	<1	1
Mercury	µg/L	0.01	1	<0.02	<0.02	-
Phosphorus total (P2O5)	µg/L	10		30	40	80
Potassium	µg/L	2		2,700	4,300	3,400
Sodium	µg/L	10	200,000	123,000	54,500	160,000
Zinc	µg/L	2	5,000	28	71	-
Inorganics						
Alkalinity (total) as CaCO3	mg/L	2	500	338	251	370
Total Dissolved Solids	mg/L	3	500	563	429	931
Hardness as CaCO3 (filtered)	mg/L	0.02	500	294	313	391
Chemical Oxygen Demand	mg/L	5		8	7	<5
Dissolved Organic Carbon (filtered)	mg/L	0.2	5	2.1	2.5	2
Phenols (4AAP)	mg/L	0.001		<0.002	<0.001	<0.001
Sulphate (filtered)	mg/L	0.2	500	10	13	15
Ammonia as N	mg/L	0.01		<0.01	<0.01	<0.05
Nitrate (as N)	mg/L	0.05	10	0.97	3.6	0.86
Nitrite (as N)	mg/L	0.03	1	<0.05	<0.05	-
Total Kjeldahl Nitrogen	mg/L	0.1		0.2	0.3	-
Electrical Conductivity (Lab)	µS/cm	1		1,050	815	1,700
pH (Lab)	-	0.05	6.5-8.5	8.21	7.69	7.63
Field						
DO (Field)	mg/L			8.16	2.15	11.04
Redox (Field)	mV			17	139	42
Temperature (Field)	°C			19.1	21.1	10.3
Conductivity (field)	µS/cm			425	714	1,582
pH (Field)	-		6.5-8.5	7.22	7.12	7.13



Table 11 - Surface Water Quality

	Unit	EQL	Other	PWQO	Location Code													
					Date	S1 01 Nov 2011	S1 18 May 2012	S1 10 Jun 2013	S1 04 Nov 2013	S1 26 Jun 2014	S1 06 Nov 2014	S1 22 May 2015	S1 19 Nov 2015	S1 16 May 2016	S1 30 May 2019	S1 29 Oct 2019	S1 26 May 2020	S1 18 Nov 2020
Metals																		
Arsenic	µg/L	0.1		5	-	-	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	-	<0.2	
Barium	µg/L	0.02			-	-	-	-	-	137	82.2	137	78.7	76.4	115	-	132	
Boron	µg/L	0.2	1,500 ^{#1}	200	-	-	-	-	-	20.0	14.8	23.0	13	17	25	-	52	
Calcium	µg/L	10			-	-	-	-	-	-	97,000	121,000	101,000	96,700	98,700	-	117,000	
Cadmium	µg/L	0.003		0.1..0.5 ^{#7}	-	-	-	-	-	0.008	0.006	0.010	0.005	0.005	0.03	-	0.008	
Chloride	µg/L	200	120,000 ^{#2}		75,000	52,000	48,000	50,000	50,000	72,000	59,000	64,000	61,000	56,000	33,000	-	63,000	
Chromium (III+VI)	µg/L	0.03		1 ^{#8}	-	-	-	-	-	<0.03	0.06	0.20	0.53	0.16	0.16	-	0.46	
Copper	µg/L	0.02		1..5 ^{#7}	-	-	-	-	-	0.58	0.68	1.12	0.58	0.7	3.9	-	0.9	
Iron	µg/L	2	1,000 ^{#3}	300	36	42	5	9	<2	12	43	26	23	10	42	-	68	
Lead	µg/L	0.01		1..5 ^{#7}	-	-	-	-	-	0.05	0.01	0.07	0.04	<0.01	0.29	-	0.07	
Magnesium	µg/L	1			-	-	-	-	-	-	3,350	4,300	3,490	3,270	3,850	-	4,590	
Manganese	µg/L	0.01			-	-	-	-	-	-	0.80	1.07	0.74	3.06	29.9	-	13	
Mercury (filtered)	µg/L	0.01		0.2	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<10	<10	-	<10	
Phosphorus total (P2O5)	µg/L	3		30	90	<30	80	<30	<30	60	12	<30	<30	6	48	-	9	
Potassium	µg/L	2			-	-	-	-	-	-	941	1,660	1,010	1,510	2,290	-	1,730	
Sodium	µg/L	10			-	-	-	-	-	-	34,400	36,500	35,500	35,300	22,200	-	33,700	
Zinc	µg/L	2		20	-	-	-	-	-	2	4	3	5	3	12	-	3	
Inorganics																		
Alkalinity (total) as CaCO3	mg/L	2			262	231	225	218	271	288	253	273	225	240	245	-	267	
Total Dissolved Solids	mg/L	3			474	337	360	329	360	440	374	431	383	366	354	-	406	
Hardness as CaCO3	mg/L	1			-	-	-	-	-	-	-	-	-	-	-	-	-	
Chemical Oxygen Demand	mg/L	5			11	<8	<8	8	<8	12	9	10	<8	<8	16	-	<8	
Total Suspended Solids	mg/L	2			<2	6	2	<2	<2	<2	4	<2	<2	5	2	-	4	
Biochemical Oxygen Demand	mg/L	2			<2	<4	<4	<4	<2	<4	<4	<4	<4	<4	16	-	<4	
Phenols (4AAP)	mg/L	0.001		0.001	<0.001	0.002	<0.001	<0.001	0.002	<0.001	<0.001	0.001	<0.001	0.004	0.01	-	<0.001	
Sulphate (filtered)	mg/L	0.2	128.429 ^{#4}		30	5.2	3.1	23	2.9	16	<1	15	6	4	17	-	17	
Ammonia as N	mg/L	0.01			0.3	<0.1	0.3	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	
Nitrate (as N)	mg/L	0.05	3 ^{#5}		1.00	0.48	0.59	0.34	0.82	0.64	0.32	0.54	0.44	0.18	1	-	2.24	
Nitrite (as N)	mg/L	0.03	0.06 ^{#6}		<0.06	<0.06	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	-	<0.03	
Total Kjeldahl Nitrogen	mg/L	0.1			1.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	
Ammonia, Unionized	mg/L	0.01		0.02	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	
Electrical Conductivity (Lab)	µS/cm	1			774	601	595	625	656	749	642	746	651	603	587	-	717	
pH (Lab)	-	0.05		6.5-8.5	8.06	8.00	7.91	8.19	8.08	8.00	7.92	7.79	8.10	8.09	7.85	-	7.61	
Field																		
DO (Field)	mg/L			5	-	-	-	-	-	-	-	-	-	5.9	5.71	8.29	10.2	
Redox (Field)	mV				-	-	-	-	-	-	-	-	-	-	180	145	120	
Temperature (Field)	°C				-	-	-	-	-	-	-	-	-	13.8	12.2	18	2.7	
Conductivity (field)	µS/cm				-	-	-	-	-	-	-	-	-	505	441	517	375	
pH (Field)	-			6.5-8.5	-	-	-	-	-	-	-	-	-	7.75	7.92	7.55	8.81	

Comments

- #1 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Boron (CCME, 2009)
- #2 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Chloride (CCME, 2011)
- #3 British Columbia Approved Water Quality Guidelines, Aquatic Life, Wildlife, & Agriculture (BCMOE, 2008)
- #4 Depends on hardness. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife, & Agriculture (BCMOE, 2016)
- #5 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrate (CCME, 2012)
- #6 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrite (CCME, 1987)
- #7 Depends on Hardness
- #8 PWQO value for Total Chromium based on more stringent Chromium VI criteria.



Table 11 - Surface Water Quality

	Unit	EQL	Other	PWQO	Location Code												
					Date	S1 11 Nov 2021	S1 12 Apr 2022	S1 12 Apr 2023	S2 06 Nov 2014	S2 22 May 2015	S2 19 Nov 2015	S2 16 May 2016	S2 30 May 2019	S2 29 Oct 2019	S2 26 May 2020	S2 18 Nov 2020	S2 12 Apr 2023
Metals																	
Arsenic	µg/L	0.1		5	0.1	0.1	0.1	0.5	<0.2	0.6	0.2	<0.2	0.5	-	0.8	0.2	0.1
Barium	µg/L	0.02			94	67	59	110	108	109	91.5	59.3	115	-	106	84	57
Boron	µg/L	0.2	1,500 ^{#1}	200	24	<5	11	19.7	17.9	16.5	16	13	30	-	52	11	15
Calcium	µg/L	10			-	-	-	-	97,800	107,000	95,500	89,500	106,000	-	111,000	-	-
Cadmium	µg/L	0.003		0.1..0.5 ^{#7}	<0.015	<0.015	<0.015	0.015	0.006	0.022	0.006	0.003	0.071	-	0.111	0.028	0.021
Chloride	µg/L	200	120,000 ^{#2}		71,800	38,300	32,000	98,000	34,000	84,000	29,000	67,000	36,000	-	33,000	24,000	16,300
Chromium (III+VI)	µg/L	0.03		1 ^{#8}	<1	<1	<1	<0.03	0.05	0.15	0.48	0.12	0.32	-	0.65	<1	<1
Copper	µg/L	0.02		1..5 ^{#7}	0.6	0.5	0.9	0.69	1.02	1.65	1.40	0.7	4.4	-	5	0.5	0.6
Iron	µg/L	2	1,000 ^{#3}	300	27	32	217	30	42	51	44	20	25	-	316	23	26
Lead	µg/L	0.01		1..5 ^{#7}	0.03	0.03	0.56	0.06	<0.01	0.08	0.07	<0.01	0.17	-	0.48	0.02	0.05
Magnesium	µg/L	1			-	-	-	-	3,830	4,030	3,480	2,900	4,670	-	4,800	-	-
Manganese	µg/L	0.01			-	-	-	-	15.2	30.8	7.05	14.3	28.6	-	63.5	-	-
Mercury (filtered)	µg/L	0.01		0.2	<0.02	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<10	<10	-	<10	<0.02	<0.02
Phosphorus total (P2O5)	µg/L	3		30	20	20	70	50	21	<30	<30	8	404	-	136	60	50
Potassium	µg/L	2			-	-	-	-	2,330	2,690	1,940	1,070	6,100	-	7,130	-	-
Sodium	µg/L	10			-	-	-	-	22,100	54,600	19,400	42,800	20,300	-	15,500	-	-
Zinc	µg/L	2		20	<5	<5	6	4	5	8	7	3	9	-	15	<5	<5
Inorganics																	
Alkalinity (total) as CaCO3	mg/L	2			277	202	171	257	269	251	222	235	168	-	220	215	138
Total Dissolved Solids	mg/L	3			385	257	221	483	351	446	346	363	489	-	423	248	165
Hardness as CaCO3	mg/L	1			275	211	169	-	-	-	-	-	-	-	-	206	142
Chemical Oxygen Demand	mg/L	5			13	23	21	38	9	18	<8	11	60	-	58	12	21
Total Suspended Solids	mg/L	2			<3	14	18	6	<2	3	2	<2	28	-	34	<3	<3
Biochemical Oxygen Demand	mg/L	2			<3	<3	<3	4	<4	<4	<4	<4	23	-	10	<3	<3
Phenols (4AAP)	mg/L	0.001		0.001	<0.001	0.001	<0.001	<0.001	0.001	0.002	0.001	0.003	0.011	-	0.002	<0.001	<0.001
Sulphate (filtered)	mg/L	0.2	128..429 ^{#4}		8	6	8	42	2	26	9	7	89	-	54	10	8
Ammonia as N	mg/L	0.01			0.01	<0.01	0.03	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	-	<0.1	0.03	0.04
Nitrate (as N)	mg/L	0.05	3 ^{#5}		0.23	<0.05	0.05	<0.06	<0.06	0.13	0.21	<0.06	10.3	-	0.49	0.07	0.16
Nitrite (as N)	mg/L	0.03	0.06 ^{#6}		<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	1.16	-	0.05	<0.05	<0.05
Total Kjeldahl Nitrogen	mg/L	0.1			0.3	0.3	0.6	0.7	<0.5	<0.5	<0.5	<0.5	1.1	-	0.7	0.4	0.5
Ammonia, Unionized	mg/L	0.01		0.02	<0.01	<0.01	<0.01	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01
Electrical Conductivity (Lab)	µS/cm	1			738	496	437	793	591	779	551	638	675	-	604	491	327
pH (Lab)	-	0.05		6.5-8.5	7.99	7.96	8.07	8.07	7.98	7.88	8.24	7.7	7.72	-	7.72	7.95	7.86
Field																	
DO (Field)	mg/L			5	6.58	10.57	9.41	-	-	-	-	7.3	5.06	6.04	10.5	8.67	7.6
Redox (Field)	mV				10	87	-66	-	-	-	-	-	190	151	100	-72	-76
Temperature (Field)	°C				8.8	12.5	11.1	-	-	-	-	14.9	13.9	18.1	0.4	16.5	10.3
Conductivity (field)	µS/cm				324	456	417	-	-	-	-	555	648	498	305	478	313
pH (Field)	-			6.5-8.5	7.22	7.45	7.53	-	-	-	-	7.52	7.74	7.5	9.36	7.31	7.39

Comments

- #1 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Boron (CCME, 2009)
- #2 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Chloride (CCME, 2011)
- #3 British Columbia Approved Water Quality Guidelines, Aquatic Life, Wildlife, & Agriculture (BCMOE, 2008)
- #4 Depends on hardness. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife, & Agricult.
- #5 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrate (CCME, 2012)
- #6 Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrite (CCME, 1987)
- #7 Depends on Hardness
- #8 PWQO value for Total Chromium based on more stringent Chromium VI criteria.



Table 12- Landfill Gas Measurements

Well ID		MW12-3	MW13-1	MW13-2
Top of Screen Elevation (m)		256.43	265.55	267.72
Water Elevation (mASL)		266.13	267.91	267.86
Screen Saturated		yes	yes	yes
Percent Methane by Volume	6/24 and 28/2021	<0.05	<0.05	<0.05
	11-Nov-21	0.05	<0.05	<0.05
	12-Apr-22	<0.05	<0.05	<0.05
	25-Oct-22	0.05	<0.05	<0.05
	23-Oct-23	<0.05	<0.05	<0.05
Hydrogen Sulfide (ppm)	6/24 and 28/2021	<0.1	<0.1	<0.1
	11-Nov-21	<0.1	<0.1	<0.1
	12-Apr-22	<0.1	<0.1	<0.1
	25-Oct-22	<0.1	<0.1	<0.1
	23-Oct-23	<0.1	<0.1	<0.1



Table 13 - Monthly Summary of Accepted Materials

	Waste (tonnes)	C&D Materials (tonnes)	Containers (tonnes)	Fibres (tonnes)	Alcohol Containers (tonnes)	CFC Appliances (Units)	MHSW (tonnes)	Organics (tonnes)	Scrap Metal (tonnes)	Tires (Units)	WEEE (tonnes)	Wood Waste (tonnes)
January	195.46	-	1.04	2.40	0.17	1	-	1.53	-	-	-	3.45
February		-	0.82	1.94	-	1	-	1.58	-	16	-	-
March		-	1.14	1.57	-	1	-	1.29	-	15	-	1.88
April	267.15	5.35	0.92	2.07	0.29	2	-	-	1.64	-	1.74	5.33
May		5.02	1.13	2.28	0.23	6	-	1.49	-	154	-	2.33
June		5.16	2.49	2.48	0.29	5	-	2.74	3.54	-	-	5.53
July	301.76	2.42	3.20	3.99	0.74	9	-	1.71	2.98	7	1.87	8.86
August		-	4.44	2.61	0.85	6	-	3.01	-	25	-	8.73
September		-	2.53	1.65	0.61	1	-	2.62	-	30	1.65	-
October	243.75	-	1.61	2.84	0.81	2	-	2.25	-	29	-	6.90
November		-	1.56	1.52	-	3	-	1.03	3.13	40	-	3.11
December		-	1.10	1.49	-	2	-	0.76	-	25	2.03	-
Total	1008.12	17.95	21.98	26.84	3.99	39	4.26	20.01	11.29	341	7.29	46.12



Appendices



Appendices

The following appendices are available in Part II – Appendices.

- Appendix A Monitoring and Screening Checklist**
- Appendix B Provisional Compliance Approval No. A341004**
- Appendix C Correspondence**
- Appendix D Field and Precipitation Data**
- Appendix E Laboratory Certificates of Analysis**
- Appendix F Photographs**
- Appendix G Borehole Logs**
- Appendix H Ministry Well Records**