



REPORT

2024 Groundwater Monitoring Report

Baffinland Iron Mines Corporation

Submitted to:

Baffinland Iron Mines Corporation- Mary River Project

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Executive Summary

The 2024 Groundwater Monitoring Report prepared by WSP Canada Inc. (WSP) for Baffinland Iron Mines Corporation (BIM) provides a comprehensive overview of the groundwater monitoring activities conducted at the Mary River Project in Nunavut. The report focuses on two waste facilities: the Landfill Facility (LF) and the Hazardous Waste Berm (HWB) Facility. The primary objectives of the monitoring program were to assess groundwater quality, evaluate groundwater flow directions, and identify potential contaminants of concern at both waste facilities.

Previous groundwater quality results from site have been questioned due to the monitoring well construction and previous sampling methodology (CIRNAC 2024). This report acknowledges several areas of uncertainty that may impact the representativeness of the groundwater data collected. A total of 23 standpipe wells installed at the LF and HWB Facility were not equipped with bentonite seals, which may allow surface water infiltration and affect groundwater quality and groundwater levels. The historical groundwater quality dataset at BIM therefore may not be representative of groundwater quality at the waste facilities. BIM and WSP have made efforts to mitigate the uncertainty as much as possible by undertaking a different groundwater sampling methodology in 2024, conducting slug testing after sampling once the well had been purged, collecting and comparing groundwater levels, and comparing historical and 2024 analytical results. WSP provided BIM with a well design (that included a bentonite seal) for use in BIM's future well installation that allows representative groundwater samples to be taken, and reduces the risk of damage from frost-heave.

In September 2024, groundwater samples were collected from standpipe wells and drive point piezometers, following procedures to minimise surface flow into the well; these procedures included purging three well volumes, ensuring parameter stabilization, reaching aquifer's recharge and low-flow sampling techniques. A total of 14 groundwater stations were sampled at the LF, and 11 groundwater stations were sampled at the HWB Facility. Two seep stations and two surface water stations were also sampled at the LF as part of the September 2024 sampling program.

Historical groundwater data quality was reviewed, and data collected before 2023 was excluded due to inconsistencies and potential surface water influence. A study was carried out to compare groundwater quality and groundwater level collected from samples from drive point piezometers and nearby standpipe wells (with no bentonite seals), based on the hypothesis that the drive point piezometers better represent groundwater conditions than open standpipes wells. The comparison suggested reasonable alignment of groundwater quality and groundwater level data, providing a justification for inclusion in this groundwater report.

The groundwater stations were characterized based on their location relative to the waste facility, i.e., Source, Background, Proximal and Downgradient. Groundwater and seep quality results were compared to the FIGQ Tier 2 (Industrial/Commercial Land use) for the Protection of Freshwater Aquatic Life (AW-F) guideline, Yukon Contaminated Site Regulation (CSR) AW-F, and the Water Licence Effluent Quality Discharge Limits (Water Licence 2AM-MRY1325). Surface water results were compared to the CCME AW-F and the Water Licence Effluent Quality Discharge Limits (Water Licence 2AM-MRY1325).

At the LF, parameters with guideline exceedances at the groundwater and surface water downgradient stations include nitrate, dissolved copper, and total/dissolved uranium. There was no nitrate exceedance measured at any of the source stations, suggesting that nitrate does not originate from the LF. Based on proximal and background

station data, naturally high concentrations of dissolved copper and total/dissolved uranium may be present at the Mine.

At the HWB Facility, there is no downgradient station to assess contaminant transport from the HWB Facility on the receptor, Camp Lake. Contaminants of concern measured at HWB source stations that could potentially impact downgradient stations included chloride, fluoride, nitrate, nitrite, pyrene, dissolved copper, dissolved cobalt, naphthalene, and PHC F2 (C10-C16). Dissolved iron exceeded the FIGQ AW-F guideline at many stations at HWB Facility as well as at some background stations, suggesting that the HWB Facility has naturally elevated background concentrations of dissolved iron, as may be expected at a high-grade iron mine.

The recommendations for future work are summarised as:

- Drill and install new monitoring wells based on the monitoring well construction
- Remediate existing standpipe wells with a surface bentonite seal.
- Installation of downgradient monitoring wells at HWB Facility to monitor groundwater quality downgradient from HWB Facility.
- Review of sampling data from 2025 groundwater wells and comparison with 2023 and 2024 water quality data to assess if the groundwater quality from the 2025 wells with bentonite seals is consistent or different to previous results.
- Installation of a series of heavy-duty vibration wire piezometers (VWP) to record in-situ groundwater pressures within the active zone.
- Continue monitoring groundwater elevations as well as confirming elevations of well collars.
- Continue monitoring groundwater quality at all groundwater network sites, seep quality at source seeps and surface water stations at both waste facilities.

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1.0 INTRODUCTION

1.1 Overview

In July 2024 WSP Canada Inc. (WSP) was retained by Baffinland Iron Mines Corporation (BIM) to provide support with the design and installation of their groundwater monitoring network in permafrost conditions, to assist with hydrogeology testing and sampling of their monitoring well network at two waste facilities located at the Mary River Project (referred to as the Mine or the Project area) in Nunavut (Figure A).

The Mine is a high-grade iron open pit mine located on northern Baffin Island in Nunavut, Canada. The Mine is located in a zone of continuous permafrost (90 – 100%, Heginbottom et al. 1995). The depth of the active layer at the Mine is typically expected to range between 1 m to 3 m, but may be greater in areas where there is loose, sandy soil at the edges of lakes or rivers.

The depth of permafrost in the region is in the order of a half kilometre, based on ground temperature measurements at the former Nanisivik Mine located 270 km northwest of Mary River Project, where permafrost has been measured at depths greater than 430 m (Gartner Lee 2003). Boreholes located 450 km west and 450 km south of Pond Inlet indicate permafrost thicknesses of 500 m and 400 m, respectively (Geological Survey of Canada 2006). A deep thermistor (approximately 400 m) installed near Mary River Project's No. 1 Deposit in 2007, indicates that the permafrost depth may approach 700 m below the deposit.

In areas of continuous permafrost, there are two groundwater flows regimes: a deep groundwater flow regime beneath permafrost, and a shallow groundwater flow regime located in the active layer (seasonally thawed) near the ground surface. With the exception of areas of taliks beneath lakes, the two groundwater regimes are isolated from one another by a thick zone of permafrost. Permafrost reduces the hydraulic conductivity of the bedrock by several orders of magnitude (Burt and Williams 1976; McCauley et al. 2000). Consequently, the permafrost in the rock behaves like a no-flow barrier to groundwater movement. Therefore, the shallow groundwater flow regime has little to no hydraulic connection with the deep groundwater regime which is overlain by thick and continuous permafrost.

The shallow groundwater regime is active only seasonally during the summer months, and the magnitude of the flow in this layer is expected to be several times less than runoff from snowmelt. Groundwater in the active layer (i.e., where the shallow aquifer is located) may mix with surface runoff on the upper part of the aquifer, and primarily flows to local depressions and ponds that drains into larger lakes. Water in the active layer is stored through ground ice during the cold season and is then released once the ice thaws in late spring or early summer, thus providing flow to surface. During the warm season, groundwater in the active layer is recharged primarily by precipitation.

Based on this information, it can be assumed that shallow groundwater infiltration and storage is minimal, which is reflected in the observed rapid runoff response of streams to rainfall events. Nevertheless, Project Certificate term and Condition #23 was implemented and states that "The Proponent shall develop and implement a Groundwater Monitoring and Management Plan to monitor, prevent and/or mitigate the potential effects of the Project on shallow groundwater within the Project area.

The shallow groundwater monitoring well network includes drive point piezometers and standpipe monitoring wells and is located at two waste facilities at the Mine (Figure A):

- The Landfill Facility (LF), located east of Sheardown Lake.

- The Hazardous Waste Berm (HWB) Facility location adjacent to the Camp Lake Airstrip close to Weather Haven.

The monitoring well network at the two waste facilities (Figures B and C) is designed to monitor the seasonal groundwater levels and water quality within the active layer. In winter, when the active layer refreezes the existing monitoring wells are often subjected to frost jacking which has result in irreparable damage to the some wells, requiring costly replacements. Frost jacking has resulted in the need for several monitoring wells to be replaced, which results in a disruption to the continuity of annual groundwater monitoring. This is a common issue mine sites located in high arctic regions are facing.

1.2 Background and Site Description

1.2.1 General

The following section includes a description of the facilities, design histories and the 2023 KP recommendations (KP 2024). Both waste facilities (LF and HWB Facility) are industrial in nature. Combustible non-hazardous wastes generated on-site including food wastes, are incinerated on-site in incinerators located in the waste management buildings. An inventory of the waste deposited in the landfill was undertaken by BIM in 2024 but was not reviewed for this report. Regular inspections are performed by BIM staff to monitor for integrity issues in the HWB Facility. Since 2017, Baffinland has had complications in characterizing groundwater quality due to a number of issues inherent to groundwater monitoring conducted in arctic regions. As discussed in the Final Environmental Impact Statement (FEIS) (KP 2012), groundwater quality is generally not considered to be at risk at the Mine because the extensive permafrost layer acts as an impermeable barrier limiting potential migration of contaminants into the deep groundwater aquifer located below continuous permafrost. Frost jacking damaging well installs, difficulties installing infrastructure below grade due to permafrost presence, logistical constraints due to sealift and lack of groundwater (dry wells, no recharge) has resulted in several years of data that has not been comparable year over year. This report will discuss some of these factors as well as review the data that has been considered acceptable to be used to characterize the current properties of active layer conditions. Recommendation and discussions for the next steps for 2025 are also provided.

1.2.2 Landfill Facility

The Landfill Facility receives inert, non-combustible waste, consisting of plastic, concrete, compliant incinerator ash, and used construction materials such as scrap metal, pipes, glass and wood. The incinerator ash is comprised of combustible non-hazardous wastes that are generated on-site, including food wastes. The incinerator ash is tested prior to disposal to ensure it meets the environmental guideline for industrial waste discharges into municipal solid waste treatment facilities (Department of Environment of the GN 2011). The Toxicity Characteristic Leaching Procedures (TCLP) is the method used to analyse the residuals, as per United States Environmental Protection Agency (USEPA).

The Landfill Facility was designed by Knight Piésold Consulting Ltd. (KP) in 2008 (KP 2008) and constructed in 2013. The 2008 design consisted of a single landfill cell. The cell reached its design capacity in 2018, at which time BIM retained KP to complete a staged design to expand the landfill (KP 2018). The current expansion design consists of five cells for progressive waste placement. Waste placement is currently occurring in Cells 1 and 2 and will continue until these cells have reached design capacity. Subsequent landfilling will progress to Cells 3, 4,

and 5. Perimeter berms around Cells 1 and 2 were constructed to define the landfill limits, contain the waste, and divert non-contact surface water. The landfilling sequence includes two stages; an initial stage of waste which is covered with a thin layer of sand fill, followed by a second stage which is formed on top of the first. Compaction of the waste is undertaken as required. To achieve permafrost encapsulation for the final landfill, the final cover was designed to be thicker than the anticipated active layer (KP 2018).

The groundwater program started at the LF with the installation of 4 drive point piezometers (MS-LF-GW1, MS-LF-GW2, MS-LF-GW3 and MS-LF-GW-REF2) as part of a pilot program in 2017. An additional 4 drive point piezometers locations (MS-LF-GW4, MS-LF-GW5, MS-LF-GW-REF1 and MS-LF-GW-REF3) were installed by BIM with the help of Tetra Tech from 2018 to 2021. In 2022 and 2023, a total of fifteen standpipe wells were installed by KP (KP 2023a, 2024) to attempt to characterize and collect groundwater sampled near the bottom of the active layer in the vicinity of the LF.

The monitoring program generally consists of a single annual sampling event in late August or September once the active layer is assumed to have fully thawed.

1.2.3 Hazardous Waste Berm Facility

The HWB Facility is a temporary storage area for hazardous wastes generated by the Mine. It was designed by Genivar and constructed around 2008 (Genivar 2008). It is comprised of multiple lined facilities, utilized as a temporary storage location for hazardous waste until the waste is shipped offsite to an approved disposal or recycling facility. An as-built report of the HWB was prepared by Genivar in March 2009 (Genivar 2009). The HWB Facility is an approved component of the Project, as identified in Part A, Item 1 of the Type A Water Licence 2AM-MRY-1325 (NWB 2015).

The HWB Facility was initially monitored in 2021 when 8 drive point piezometers (MS-HWB-GW3, MS-HWB-GW4, MS-HWB-GW5, MS-HWB-GW6, MS-HWB-GW7, MS-HWB-GW-REF1, MS-HWB-GW-REF2, MS-HWB-GW-REF3) were installed with the support of Tetra Tech (Tetra Tech 2022). Subsequently, two drive point piezometers (MS-HWB-GW8 and MS-HWB-GW9) were installed in 2022 (based on first monitoring year), and KP completed the installation of eight additional standpipe wells in 2022 and 2023. It is unknown when the drive point piezometers MS-HWB-GW1 and MS-HWB-GW2 were installed and there are no analytical results available at either of the stations. Similar to the Landfill Facility, the HWB Facility is sampled once annually.

Concerns have been previously raised about a potential liner leak in the northwest sector of the HWB (Baffinland 2023); as a result, this sector is currently not being used to further dispose of waste.

1.2.4 Monitoring Well Installations

In 2022 and 2023, Knight Piésold (KP) designed and installed standpipe wells at both waste facilities. In 2022, the well installation was completed by excavating test pits and adding a 2-inch diameter PVC standpipe to the base of the test pit excavation. The standpipe consisted of varying lengths of schedule 40 PVC (slot 10) screen and schedule 40 PVC solid rise pipe. The excavator operator carefully backfilled around the PVC standpipe using the excavated material. A steel casing was positioned overtop of the PVC pipe to provide protection at surface. PVC standpipes were then developed using inertial foot valve and a surge block. In 2023 monitoring wells were installed by KP using a ShockAuger until refusal (i.e., permafrost) and anchored on permafrost to avoid frost-

jacking. A 0.06 m OD (outside diameter) aluminium perforated casing was placed in the boreholes, with the 0.025 m (1 inch) diameter pre-pack monitoring well placed inside the casing. The remaining annular space inside the casing was backfilled with well sand. A steel protective monument casing was installed at ground surface to provide protection for the well pipe. Bentonite and/or concrete was not used near ground surface to provide a protective seal in the standpipe wells installed by KP because equipment was not available at the time of installation. All standpipe wells installed in 2022 and 2023 were reportedly developed as required after installing the wells.

Previous groundwater sampling methods have mainly consisted of a combination of low-flow sampling and the monitoring of field parameters for evidence of stabilization. There are plans for completing a comparison of both groundwater quality results and water elevations between bentonite sealed wells and wells without bentonite seals in 2025 to clarify the potential influence of surface water infiltration on results when sampling the shallow aquifer in the active layer.

1.3 2023 Groundwater Monitoring Program Recommendations

The recommendations included in the 2023 Annual Groundwater Monitoring report (KP 2024) for the 2024 Groundwater Monitoring Program included:

- Installation of a 2-inch diameter monitoring well, LF-KP23-12 within the landfill (to evaluate leachate composition and assist with estimating the groundwater flow direction).
- Installation of a 2-inch groundwater monitoring well, LF-KP23-02 (to assist with evaluating the extent of the existing leachate migration with estimating the groundwater flow direction).
- Installation of 2-inch groundwater monitoring wells north of HWB-KP23-02, south of HWB-KP23-01 and southwest of HWB-KP23-03/MS-HWB-GW8 (to assist with evaluating the extent of contamination and groundwater flow directions).
- Decommission historical drive points and replace with 2-inch monitoring wells.
- All groundwater monitoring wells to be installed with a drill and completed with a conventional sand pack and bentonite seal. The monitoring wells should be drilled into permafrost below the active layer to help prevent jacking via freeze thaw action (minimum 0.5m).
- A waste audit to understand the leachate chemistry, and to document the contents and relative proportion of the waste types within the landfills. The audit should include:
 - Confirmation of inert geochemical properties of the landfill cover sand.
 - Randomly check wastes to be sent to the Landfill Facility over the 2024/2025 operating season are compliant.
- The QA/QC program should continue to include duplicate samples, field blanks and trip blanks. All duplicates, field blanks and trip blanks should be analyzed for all parameters. As part of the QA/QC program, the laboratory should supply deionized water. Care should be taken to follow program recommendations and provide guidelines when completing field activities, in particular QA/QC and sampling procedures, to increase the reliability of the data produced.

- The groundwater monitoring program should continue with one sampling event per year in September when the active layer is thickest.

1.4 Data Review

WSP was provided with the 2023 Annual Groundwater Monitoring Program report (KP 2024) and the 2024 Groundwater Well Installation Plan (Baffinland 2024a). Other relevant environmental permits and groundwater reports also reviewed included:

- Baffinland 2020. Groundwater 2019 Monitoring Program Report.
- Tetra Tech 2021. 2020 Groundwater Monitoring Program Mary River Mine Project.
- Tetra Tech 2022. 2021 Groundwater Monitoring Program Mary River Mine Project.
- Knight Piésold 2023a. Mary River Project 2022 Groundwater Monitoring Program.
- Knight Piésold 2023b. Groundwater Monitoring Program Review and Assessment.
- Knight Piésold 2023c. Development of a Conceptual Contaminant Transport Model for the Landfill at the Mary River Mine Site.
- Knight Piésold 2024. 2023 Annual Groundwater Monitoring Program.

A review of the potential contaminant sources (waste facilities) was undertaken to identify the potential contaminants of concern (CoC) compared to the proposed sampling analysis suite.

1.5 Scope of Work and Program Modifications in 2024

The Scope of Work for the 2024 Groundwater Program at the Landfill Facility and the Hazardous Waste Berm Facility included the following:

- 1) Develop a monitoring well construction design to allow for discrete groundwater sampling within the active zone that will reduce the risk of damage to the well arising from frost-heave.
- 2) Remote support to BIM staff for installation of up to 13 proposed new well installations.
- 3) Conduct a groundwater sampling program at the new and existing wells to assess groundwater quality at the waste facilities.
- 4) Conduct single well test response tests (i.e., slug tests) at the new well locations to estimate the hydraulic conductivity of the screened intervals.

Due to time constraints and/or site conditions, some planned field activities had to be modified, delayed and/or added. The 2024 program modifications are summarized below:

- The drilling of the 13 new well installs did not take place in 2024. More detail is provided in Section 5.1.2.

- Existing standpipe wells and drive point piezometers at LF (14 standpipe wells and drive points. piezometers) and HWB Facility (11 standpipe wells and drive point piezometers) were sampled as part of the 2024 program.
- Single well response tests were completed in 9 existing standpipe wells at LF (5) and HWB Facility (4).
- Two seeps stations in the vicinity of LF were sampled.
- Two surface water station flowing from the landfill; one upgradient and one downgradient of the LF were collected to assess the waste facility's impact on surface water quality.

To assess thermal profiles in the active layer at the waste facilities, three RST thermistors strings and dataloggers (Affinity Loggers) were ordered by WSP for BIM and brought to the mine site in September 2024. Each thermistor string is 8 m long, but 5 m of cable will be above surface connected to the datalogger box. Each thermistor string has thermistor beads every 0.5 m (i.e., 5 m, 5.5 m, 6 m, 6.5 m, 7 m, 7.5 m, 8 m along cable). Thermistors length was selected according to thickness of active layer. The thermistors were not installed in 2024 but are planned for installation in 2025.

2.0 DATA COLLECTION AND DATA UNCERTAINTY

2.1.1 Groundwater wells

The nature of this report is to describe and characterise the properties and behaviour of groundwater at the waste facilities located at the Mine. In most annual groundwater reports, the main source of information is derived from groundwater wells. A key component of well construction to raise here is the importance of an annular bentonite seal. An annular bentonite seal is crucial in water well construction for several reasons. By sealing the space between the well casing and the borehole wall, it prevents surface water and potential contaminants from migrating into the wellscreen from surface, allowing good representability of the groundwater properties from the discrete screened part of the well.

At the waste facilities at the Mine, wells were constructed in 2022 and 2023 with no bentonite seal. The wells are shallow, and designed to intercept groundwater flowing in the seasonal active zone which is around 2 to 3 m below surface. Conceptually, the water in the active zone is made up of groundwater along with surface water from runoff, direct precipitation and snowmelt. This mix of water sources will affect the hydrochemical properties of the groundwater. The extent of the mixing zone in the active zone is not currently understood. The potential influence of surface water and direct precipitation flowing into the well has the potential to overestimate groundwater levels and cause uncertainty in understanding groundwater quality, flow directions and hydraulic gradients.

Data uncertainty refers to the doubt or variability that exists within a dataset, affecting the reliability and quality of analysis collected from these wells. With the groundwater wells at the Mine, the uncertainty refers to how representative the water sample is to groundwater.

BIM has developed a plan for 2025 to drill and install wells with bentonite seals so that discrete groundwater samples can be collected, and representative samples of groundwater quality can be taken. WSP proposes that the 2025 groundwater data will be statistically compared to previous groundwater sampling datasets, to understand if the properties of in situ groundwater suggest that there is more than one source.

This report includes results of groundwater quality, water levels, and hydrogeological testing. All these datasets are subject to the uncertainty described in the text above. For the purposes of providing a groundwater report for the 2024 season, WSP has closely reviewed the previous groundwater data and provided rationale for some of its use in this report. A discussion on this rationale is provided in Section 7.1.

WSP has compiled this 2024 report on the understanding that the recommendations provided in Section 9.0 will be undertaken by BIM to reduce the uncertainty around the groundwater wells and related datasets in future groundwater reports.

2.2 Evaluation of Historical Data Quality

For the purpose of reporting, an evaluation of historical data was carried out to assess what data was considered reliable for inclusion. Previous groundwater quality results from site have been questioned due to the monitoring well construction and previous sampling methodology (CIRNAC 2024). WSP provided a high-level review of the historical groundwater quality data collected from the BIM site (Baffinland 2020, Tetra Tech 2021, Tetra Tech 2022, KP 2023a and KP 2024) along with a comparison to the 2024 data. Relevant information reviewed included the groundwater sampling methodology, borehole logs, guidelines, analytical suite, well status (active or inactive)

and the potential influence of surface water. A set of guidelines were developed to help evaluate what data would be included.

A Power BI Dashboard was developed to collate all groundwater analytical results since 2019. Power BI is an interactive data visualization software developed by Microsoft Power Platform that allows the user to connect to multiple data sources (databases, spreadsheets, SharePoint files) and store data in one platform. The Dashboard created includes filters (well type, proximity to source, analyte), maps and timeseries of groundwater, surface water and seep analytical results. The data from the following Certificates of Analysis (COAs) provided by BIM were included:

- 2024 groundwater results (exports from EQUiS only were provided by BIM): BF2400320, BF2400323, BF2400327, BF2400330, BF2400096, BF2400155, BF2400225, BF2400266, BF2400326
- 2023 groundwater results: BF2300267, BF2300277, BF2300280, BF2300287, BF2300288, BF2300292, BF2300298, BF2300307.
- 2022 groundwater results: L2721527, L2732292, L2732939, L2732940, L2733537, L2733829, L2733999
- 2021 groundwater results: L2642226, L2643999
- 2020 groundwater results: L2500859
- 2019 groundwater results: L2356948

The Power Bi Dashboard excluded QA/QC samples such as duplicates, travel blanks and field blanks.

There was uncertainty identified in some of the historical groundwater quality data collected at the Site which included:

- All KP standpipe wells (15 standpipe wells at LF and 8 standpipe wells at HWB Facility) were not installed with bentonite seals suggesting groundwater quality could be influenced by surface water infiltrating from surface through the borehole.
- Four test pits (TP-22-01 to TP-22-04) within LF limits were completed in 2022 by KP (KP 2023a). Groundwater seepage at the bottom of the excavations was sampled. There is limited information in the KP report (2023) regarding the sampling methodology, the weather when samples had been collected and when the samples were collected following the excavation.
- Previous single well response test results have inconsistencies between the screened unit description, grain-size analysis and the permeability (i.e., hydraulic conductivity) obtained from single well test analysis.
- Groundwater results have been compared to federal guidelines including Federal Interim Groundwater Quality (FIGQ) in previous reports. Groundwater results have also been screened against CCME Aquatic Life Freshwater (long-term and short term) in previous reports which is applicable to surface water, not groundwater.
- Some KP borehole logs (HWB-KP23-01, HWB-KP23-02, HWB-KP23-03) refer to a thick layer of apparent asphalt (i.e., up to 0.4 m thick), suggesting that confined conditions should be considered; however, no asphalt was present at those locations during the field visit in September 2024 (Appendix A Photos A-5, A-32, A-36, A-38).

- Groundwater sampling methodology is not consistent throughout the years and low-flow sampling may not be the suitable and the correct Standard of Operation Procedure (SOP) for standpipe wells that may be influenced by the infiltration of surface water. Historical and current groundwater sampling methods are detailed in Table 1. A combination of low-flow sampling, purging 3 well volumes, field parameters stabilization and reaching recharge may be more appropriate to confirm that any surface water is removed.

Table 1: Historical Groundwater Sampling Methodologies

Year	Groundwater Sampling Method	Reference
2019	A minimum of 4 litres (L) was purged from each well to remove standing water from the screened zone of the piezometer. Field readings were monitored during purging with a YSI ProDSS Handheld Water Quality Meter to indicate when water quality had stabilized and purging was complete.	Baffinland (2020)
2020	Low-flow sampling: Purging groundwater from each drive point piezometer to remove the standing well water until field parameters (pH, electrical conductivity [EC], temperature) stabilized prior to sampling. Temperature readings are within 0.2°C, pH readings are within 0.2 pH units, EC readings are within 3%	Tetra Tech (2021)
2021	Low-flow sampling: Purging the standing water from each drive-point piezometer, prior to sampling, followed by low flow sampling until field parameters (pH, electrical conductivity [EC], temperature) are stable. Temperature readings are within 0.2°C, pH readings are within 0.2 pH units, EC readings are within 3%.	Tetra Tech (2022)
2022	Low-flow sampling: Continuous field parameter readings (pH, temperature, electrical conductivity, turbidity, dissolved oxygen) were completed using a YSI ProDSS Water Quality meter equipped with a flow through cell. Temperature readings were within +/- 3%, Specific Conductivity readings were within +/- 3%, pH readings were within +/- 0.1, Turbidity readings were within +/- 10%. The low flow sampling method was used to purge and sample all wells for which hydraulic conductivity is high enough to draw water from the well at a rate of 0.1 L/min or higher while maintaining a stable water level (i.e. a drawdown of no more than 0.1 m).	KP (2023)
2023	Low flow sampling method was used with the objective of maintaining minimal drawdown (i.e. no more than 0.1 m) by adjusting to an appropriate pumping rate, if possible. The primary objective of this sampling method is to induce a head change between the formation soil and the well and maintain minimal drawdown to negate the requirement for full evacuation of the well.	KP (2024)
2024	Refer to Section 5.3.	Current report

- For the purposes of reporting, it is assumed that drive point piezometers are more likely to be representative of groundwater conditions than standpipe wells with no bentonite seals. Drive point piezometers disturb a smaller area and do not have an annular space to allow surface water to infiltrate to the well screen. Using this rationale, WSP compared groundwater levels collected from drive point piezometers with nearby standpipe wells without a bentonite seal (Table 2). Similar groundwater levels to the drive point piezometers would suggest that surface water may be less of an influence in standpipe wells without bentonite seals.

Table 2: Water Level comparison between drive point piezometers nearby standpipe wells without bentonite seal

	Drive point piezometer MS-LF-GW-REF2	Standpipe well (no bentonite seal) LF-KP23-05
Groundwater level on September 4, 2024 (mbgs)	0.714	0.707
Depth to bottom (mgbs)	1.350	1.14
	MS-LF-GW3	LF-KP22-03
Groundwater level on September 4, 2024 (mbgs)	0.597	0.672
Depth to bottom (mgbs)	1.147	1.930
	MS-HWB-GW5	HWB-KP23-01
Groundwater level on September 5, 2024 (mbgs)	0.372	0.366
Depth to bottom (mgbs)	1.123	1.416

mgbs: metres below ground surface

- Analytical results were also compared between the drive point piezometers and the nearby standpipe wells. The results were similar for the two locations. Similarities between groundwater levels and analytical results at the drive point piezometer and the nearby standpipe wells without bentonite seals reduces the uncertainty of the results in the standpipe wells due to potential surface water influence.

WSP compared the historical general chemistry with the 2024 results. Analytical results were fairly consistent in 2023 and 2024, with bigger discrepancies prior to 2023. As care was taken in 2024 to ensure that each well was fully purged prior to sampling, WSP recommended the inclusion of the 2023 data in this report based on consistent analytical results, and to consider the data collected prior to 2023 as less reliable.

The following sections provide some introductory text to discuss uncertainty in the groundwater data and how the data will be referred to throughout the report.

2.2.1 Seepage vs. leachate

In the BIM data review, seepage and leachate are both referred to. For this report, WSP has defined seepage as groundwater that daylights at surface. Leachate is groundwater that has changed chemistry as a result of passing through a source of potential contaminant. Without a strong groundwater quality baseline, it is difficult to characterise whether groundwater is considered leachate or not. As a result, seepage will be used to describe water that is observed flowing from the ground.

3.0 APPLICABLE REGULATORY CRITERIA

Groundwater and seepage quality data collected during the 2024 monitoring program were compared to the Federal Interim Groundwater Quality (FIGQ) guidelines (FCSAP 2016) for comparison purposes, as Nunavut currently has no established territorial guidelines for groundwater and seep water quality. The current land use is classified as commercial/ industrial at both the LF and HWB Facility, and the soil type is coarse throughout both waste facilities. Tier 2, site-specific guidelines for the protection of freshwater aquatic life (AW-F) were applied (hereafter referred to as FIGQ AW-F) due to the presence of receiving water bodies (i.e., Sheardown Lake at LF and Camp Lake at HWB Facility) located less than 500 m from the LF and HWB Facility. The pH and hardness dependant FIGQ AW-F guidelines are based on the Canadian Council of Ministers of the Environment (CCME) guidelines for surface water quality. The FIGQ guidelines assume that the groundwater is directly discharging to the receiving water body and do not account for dilution between the well location and the water body; thus, exceedances of the applied FIGQ AW-F may not directly indicate potential impacts to aquatic life in receiving water bodies. As such, the FIGQ guidelines presented herein represent a conservative guideline.

Groundwater and seepage analytical results were also compared to the Yukon Contaminated Sites Regulation (CSR) water quality standards (Environment Yukon 2002) in accordance with Yukon CSR Protocol 6 (Environment Yukon 2012) for comparison purposes only as Yukon Territory standards are not applicable to Nunavut. Of the four water use types outlined in the CSR, AW-F is considered based on the presence of lakes located within a one km radius of the waste facilities (hereafter referred to as CSR AW-F). The Yukon CSR numerical standards assume that a minimum 1:10 dilution factor is available between the sampling point and the water body that may contain aquatic life and are therefore less conservative than the FIGQ AW-F guidelines as described above. Groundwater and seep results were also compared to the Type A Water Licence 2AM-MRY1325 Effluent Quality Discharge Limits (NWB 2015) for comparison purposes. Guidelines were provided by BIM and are shown below in Table 3.

Table 3: Effluent Quality Discharge Limits for the Landfill Facilities, Type A Water Licence 2AM-MRY1325 from Nunavut Water Board (NWB 2015)

Parameter	Maximum Concentration of Any Grab Sample (mg/L)
pH	Between 6.0 – 9.5
Total arsenic	0.5
Total copper	0.3
Total lead	0.2
Total nickel	0.5
Total zinc	0.5
Total suspended solids (TSS)	15
Oil and grease	No visible sheen

The CCME Water Quality Guidelines (WQGs) for the protection of aquatic life (AW-F) (CCME 1999) are primarily used to assess surface water quality. Surface water chemistry results from samples collected at the LF were screened against the CCME Water Quality Guidelines (WQGs) for the protection of aquatic life (AW-F) (CCME 1999) for long-term exposure.

Surface water results were also compared to the Type A Water Licence 2AM-MRY1325 Effluent Quality Discharge Limits (NWB 2015, Table 3).

4.0 CONCEPTUAL GROUNDWATER FLOW IN THE ACTIVE ZONE

This section provides information on some of the site-specific challenges that require consideration when characterizing the behaviour of groundwater at the BIM site. Given the BIM project's location, the movement of water through the active layer is strongly influenced by its near continuous frozen state, which controls the period of time that the active layer is unfrozen (i.e. the short summer period). The *hydrogeologic environment* controls the *groundwater regime* and thus the potential for contaminant transport within the active zone. Groundwater quality is generally not considered to be at risk in the Project area (FEIS 2012) because the extensive permafrost layer acts as an impermeable barrier eliminating/limiting potential migration of contaminants into the groundwater located below.

Site specific characteristics that strongly influence the *hydrogeological environment* include:

- **Seasonal fluctuations:** The active layer experiences significant changes in water content throughout the year, with water only available during the thaw period when the soil is unfrozen, and leads to potential for surface runoff when the active layer is fully saturated or frozen.
- **Limited groundwater flow:** Due to the presence of permafrost, groundwater flow is often restricted into the active layer, with no vertical movement beyond the thaw-depth due to the underlying continuous permafrost.
- **Ice lenses and segregation ice:** During freezing, water can migrate within the soil matrix, forming ice lenses or wedges which can cause frost heave and alter soil structure, impeding water flow patterns.
- **Talik formation:** In certain situations, such as below large/ deep bodies of water (lakes) unfrozen areas called taliks can develop within the permafrost. In the Baffinland area, taliks are typically closed-taliks and do not continue through the permafrost.

Site specific details that strongly influence the *groundwater regime* include:

- **Impact of temperature either seasonally or due to climate change** – As permafrost thaws due to warming temperatures, the active layer deepens, potentially leading to increased water storage capacity and altered hydrological processes, including increased surface runoff and potential for thermokarst features.
- **Presence of landfill, roads and mine operations** – Disturbances to the natural environment induced by anthropogenic activities (French 2017; Andersland and Ladanyi 2003) impact the depth of permafrost due to the warming influence of disturbed soil, placement of landfill waste, fill material and vehicle use. Undisturbed areas are characterized by a shallower active zone.

4.1 Ephemeral Groundwater Flow in the Active Zone

The Baffinland site is in an area of continuous permafrost with depths in excess of 700m (Heginbottom et al. 1995). In permafrost regions, the active zone refers to the upper layer of soil and rock that thaws during the warmer summer months, creating a temporary dynamic hydrogeological environment during which time, most groundwater movement occurs.

During this period, groundwater movement is primarily controlled by the freeze-thaw cycle and the presence of ice-rich soils. The freeze-thaw cycle controls near surface groundwater storage and drainage, while the permafrost limits vertical groundwater movement. The permafrost below acts as a barrier to deeper water flow meaning water movement is largely restricted to the shallow active layer during only a few weeks of the summer.

Characterizing groundwater flow in the active zone is inherently difficult as the cross-sectional area is constantly changing in response to the thawing and freezing conditions. This is presented in Figure 1, below. Thermistor data during 2024 taken from RST station DH21-12, located approximately 800 m north-east of the LF, is presented in Figure 1 and Table 4. The thermistor plot presents data every 0.5 m to 4 m in depth and every 1 m to a depth of 10 m. The data, plotted as ground temperature in degrees Celsius (on the x-axis) versus depth in metres (on the y-axis), suggests the following:

- The months with temperatures of greater than 0 degrees in the upper 4-5 m are May to September (4 months).
- The months with greatest ground temperatures are June and July (up to 13 degrees at ground surface)
- Although data is missing from the 3.5 m thermistor bead, the temperature data is consistent in the depth of active zone (where thermistor data crosses from above 0 degree to below 0 degrees), indicating the active zone is 3 m thick. Below 3.5 – 4m, ground is permanently frozen.
- The early summer months show surficial warming (suggesting thawing from top- downwards). In late summer/ early fall months, the active zone re-freezes from the top – downwards and also from the bottom – upwards, simultaneously. In 2024, the refreezing from the bottom up happened more quickly than the top-down freezing.

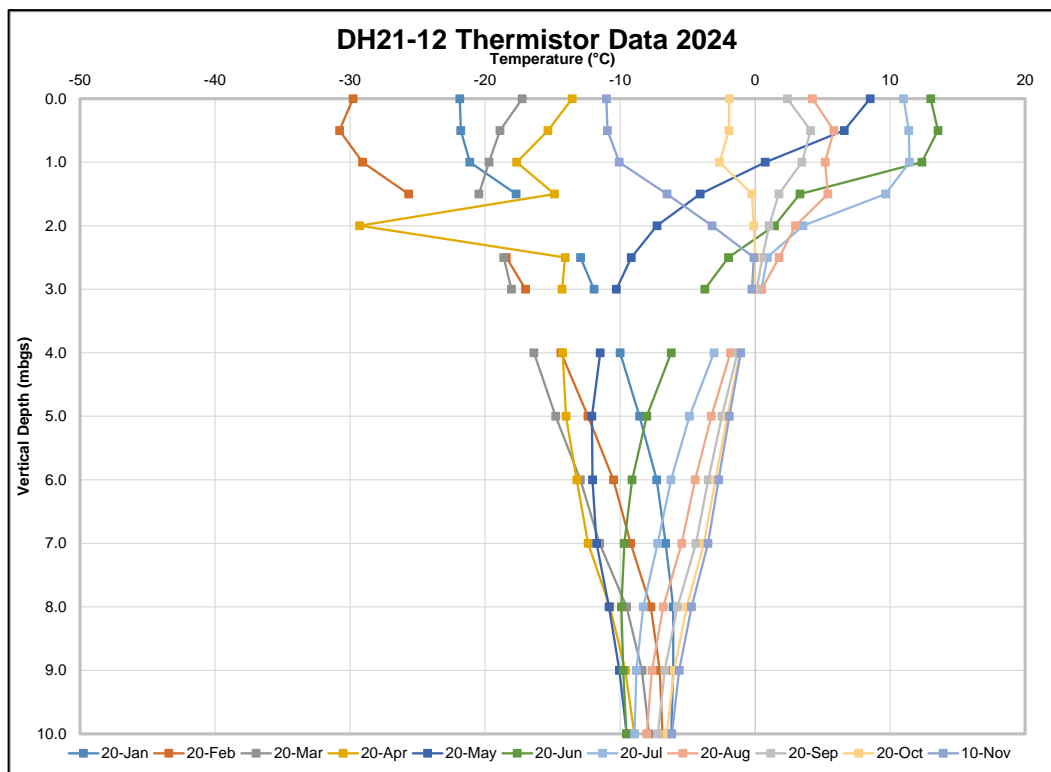


Figure 1: Thermistor data from RST station DH21-12 for 2024

Table 4: Thermistor data from the active zone in RST station DH21-12, showing number of days above 0 degrees Celsius with depth (2024 dataset)

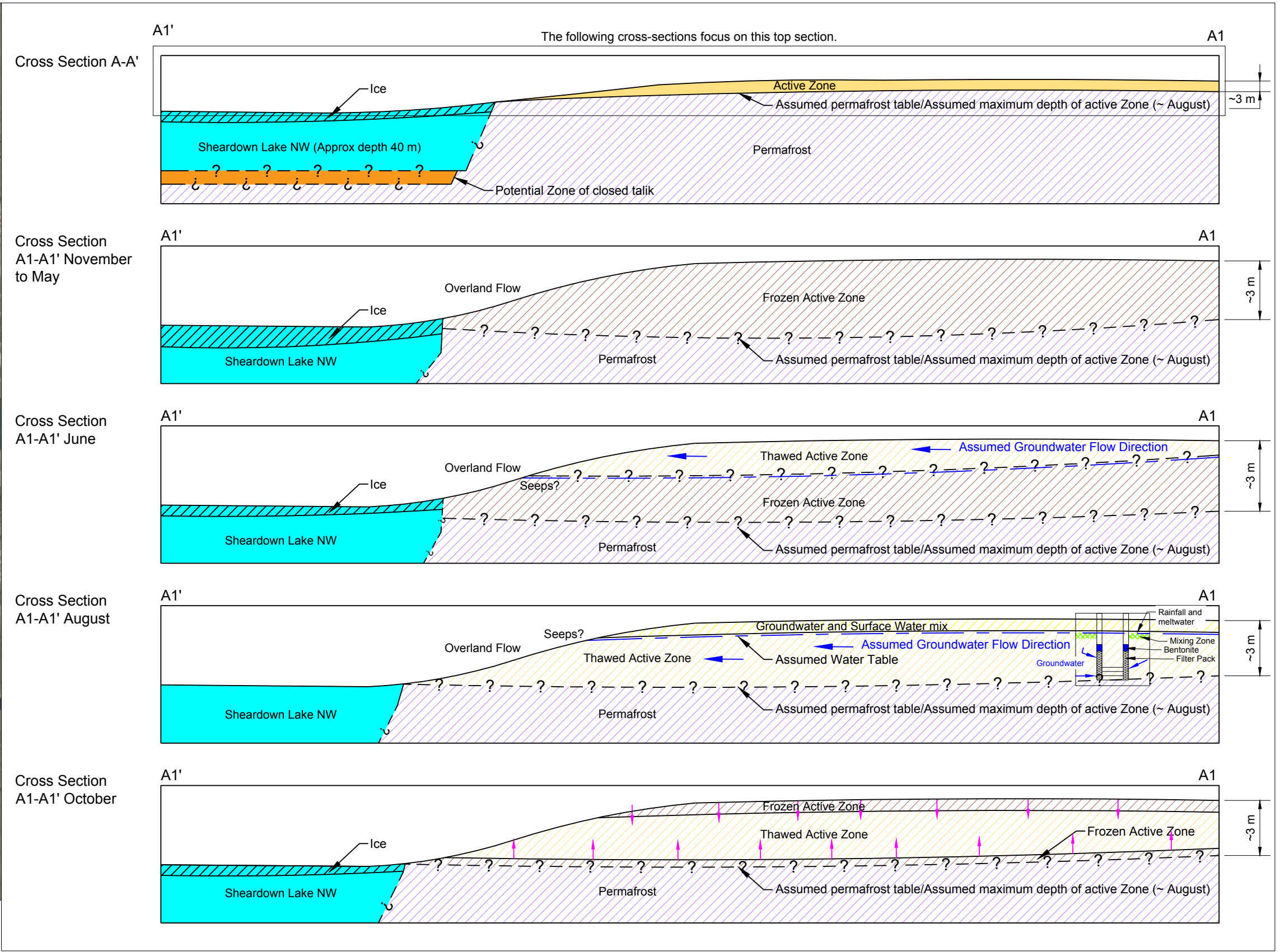
Thermistor Bead Depth (m)	Days of Ground Temperatures greater than 0 Degrees C
1.0	131
1.5	129
2.0	119
2.5	133
3.0	83
4.0	0

Additional thermistor installs at various locations in the vicinity of the LF and HWB Facility (away from infrastructure such as roads and disturbed ground) are recommended, and planned by BIM to be installed in 2025 to understand the variability of the active zone (in both spatial, depth and transient terms) across the project site.


Path: \\csp-pbwan-net\CAD\CA\N400\CAD\GIS\Client\Baffinland_Iron_Mines_Corp\Mary_River\10_CADD\1_Files\Name: CA0023205_6339_FIG01_CONCEPTUAL GWM MODEL.dwg | Last Edited By: wds_benjamin.brown2 | Date: 2025-05-16 | Time: 2:17:20 PM | Printed By: wds_benjamin.brown2 | Date: 2025-05-16 | Time: 2:16:46 PM | File Name: CA0023205_6339_FIG01_CONCEPTUAL GWM MODEL.dwg | Last Edited By: wds_benjamin.brown2 | Date: 2025-05-16 | Time: 2:16:46 PM | Printed By: wds_benjamin.brown2 | Date: 2025-05-16 | Time: 2:17:20 PM



Note: Sketches are not at scale.



REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED

CLIENT BAFFINLAND IRON MINES CORPORATION	PROJECT MARY RIVER PROJECT			
CONSULTANT 	TITLE CONCEPTUAL GROUNDWATER - PERMAFROST MODEL			
PROJECT NO. CA0023205.6339	CONTROL NO. 90000.04	REV. 0	of	FIG. 2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

4.1.1 Influence of Potential Periglacial Features on Groundwater Flow

On examination of satellite imagery photos over the LF and HWB areas (Google Earth, date 09, 2021) indications of potential ice-wedges were noted (Figure 3). Ice-wedges are common periglacial features in permafrost regions; they develop by repeated frost cracking of the active zone, resulting in the development of ice ‘veins’ over a period of time, causing a wedge type appearance in the subsurface. Their formation is recognised by polygon patterns observed on ground surface, such as shown in Figure 3. The presence of an ice wedge network may impede groundwater flow due to the added complexity presented by the ice wedge arrangements relative to the local topography. Site specific evidence for ice wedges has not been evaluated as yet.



Figure 3: Aerial view of the Landfill Facility (from Google Earth)– Potential Periglacial Features a) Undegraded Ice-Wedges and b) Degraded Ice-Wedges

4.2 Implications of Ephemeral Groundwater Flow in Active Zone for consideration in Annual Groundwater Monitoring

Given the significant difference between typical groundwater monitoring networks at industrial facilities in areas without continuous permafrost and the BIM network, there remains a number of areas of uncertainty within the conceptual understanding of how groundwater behaves at the BIM project site. These are summarised below and addressed in discussions and recommendations later in the report.

- The active layer contains water that is in a liquid state for only a few weeks of the year. Only one meaningful sampling event is possible as groundwater is in a frozen state for the remaining months.
- Wells that are installed without a bentonite seal are less likely to represent true groundwater conditions. The water in the open well is likely to consist of a mixture of surface water (meltwater, rainfall, runoff) which flows into the well from surface and mixes with groundwater. This raises the following areas of uncertainty:
 - Groundwater levels. Additional water infiltrating preferentially into an open monitoring well will result in overestimating the water level recorded in the well. This has implications on understanding groundwater flow directions and horizontal hydraulic gradients.
 - The chemistry of the groundwater in the active zone is likely to be a mixture of groundwater and infiltration from meltwater, surface water runoff and direct precipitation. It is unclear how well the water is mixed within the active zone, or the extent of the mining zone; the chemistry may change depending on the percentage of each source component (groundwater and surface runoff). Appropriately designed wells with seals will help to obtain representative samples of groundwater, which can be compared to wells that are considered to have influence from surface water i.e. a mixed composition.
- The thawing and re-freezing of the active zone is dependent on a number of factors, mostly the mean daily temperatures and the amount of rainfall. Understanding the development of the active zone as it thaws to its maximum extent, then re-freezes and closes up again over a matter of weeks is challenging to predict. Its thickness, depth and two-dimensional cross-sectional area may well vary across the project site and from year to year. Additional thermistors to collect data from the shallow subsurface and active zone have been recommended at strategic locations at the BIM site to increase understanding of the active zone development.
- The active zone is unlikely to have a constant thickness across the project site. Within the waste facilities and in disturbed areas of the mine the active zone is likely to be thicker than in undisturbed areas as heat transfer between surface and ground is disrupted in disturbed areas (French 2017; Andersland and Ladanyi 2003). These undisturbed areas with no or minimal active zone will restrict the movement of groundwater from the waste facilities to potential receptors KP (2018). LF's design includes to minimize disturbance to the original ground (excavation, scarifying, etc.) to ensure permafrost conditions remain stable.

4.3 Proposed Future Well Design

Groundwater data collection at BIM relies on a network of groundwater standpipe wells installed in 2022 and 2023 and drive point piezometers that were installed between 2017 and 2021. It has been recognised that the monitoring standpipe well installations were constructed without an annular bentonite seal (CIRNAC 2024). The purpose of the bentonite seal in a groundwater well is to isolate the area of aquifer that is targeted by the wellscreen section of the well. The bentonite seal is typically installed above the filter pack around the well screen.

Groundwater flowing into the well is then considered to be representative of the groundwater conditions in terms of water quality and pressure (water level).

The complexity of characterizing the groundwater in the active zone during the summer months at a site such as BIM is summarised in the previous section. There is continued debate over the composition of groundwater in the active zone due to its shallow depth, and the influence (mixing) of surface water and meltwater.

WSP provided BIM with a proposed well construction designed to isolate groundwater data collection from within the active zone, and to reduce the risk of well movement from the pressures of frost heave (Section 5.1). BIM has committed to installing new wells across the LF and HWB Facility using this design in early 2025. The objective of this work is to take representative samples of the groundwater from these wells without influence from surface water. A comparison can then be made to historical groundwater quality data.

The locating of monitoring wells should also look at periglacial features such as evidence of ice wedges and lenses that may influence shallow groundwater movement in the active layer (Figure 3).

The following sections summarize the 2024 field program.

5.0 METHODOLOGY

Field activities in 2024 were conducted between September 4 to 11, 2024 by a WSP hydrogeologist with the assistance of BIM field staff. Photographs of site and field activities are provided in Appendix A and described in the following sections. Daily field summaries are provided in Appendix B.

5.1 Groundwater Well Installation Program

5.1.1 Conceptual Well Design

The BIM site has experienced damage to a number of monitoring wells caused by seasonal freeze-thaw cycles that cause the monitoring well to heave out of the ground. This frost heave phenomenon alters the depth of the well and may result in damage to the PVC pipe. WSP's design includes an outer casing to reduce the amount of pressure acting on the inner riser-pipe of the well. The conceptual well design is provided in Appendix C and is described in more detail below:

- Drilling of a 6-inch drillhole (OD: Outside Diameter) to target depth (~3.5 – 4 m).
- A length of well screen (5 feet [1.5 m]) installed at the bottom of the well with a slip-cap at the end. A filter pack is installed around the well screen to approximately 0.4 m above the top of the screen.
- A layer of hydrated bentonite pellets (0.4 m) is placed above the filter pack. A layer of filter sand (0.1 m) installed onto bentonite.
- A 1 m section of 6-inch diameter HDPE casing is placed on top of a layer of the sand layer. The HDPE casing should be centred inside the well.
- Filter sand should fill-in the space between the riser pipe and the around the outside of the large diameter HDPE casing.
- A cement grout should form a protective monument from 0.5 m depth to surface. A protective steel casing should be seated into the cement grout.
- A surveyor/ survey GPS should take the following readings: i) top of PVC casing elevation and, ii) ground surface elevation of collar.

WSP recommends that this work is completed while the ground is frozen prior to freshet. The design may be modified for shallower overburden or active zone depths.

5.1.2 Drilling Constraints

A total of 13 wells were planned to be drilled and installed in 2024 by BIM using the conceptual well design (Appendix C) provided by WSP. BIM attempted the drilling program in August 2024, once all well materials were received onsite. Unfortunately, due to drilling into thawed substrate, there were technical issues that prevented the successful completion of the planned installations. The well drilling and installation program has been refined and postponed to 2025.

5.2 Water Level Survey

A groundwater level survey was conducted at both the LF and the HWB Facilities, on September 4 and 5, 2024 respectively, prior to groundwater sampling. The weather while conducting the groundwater level surveys was overcast and sunny with no rain. Rainfall had been recorded in the days preceding the survey which may have caused a rise in water levels.

The following information was collected at each standpipe well or drive point piezometers monitored during the water level surveys:

- Height of PVC stick-up from ground surface (for standpipe wells) and casing stick-up from ground surface (for drive point piezometers).
- Depth to water from top of PVC or casing stick-ups.
- Depth to bottom of well or drive point piezometer.
- Observation of standpipe well and drive point piezometer condition (damaged, no longer exists, tubing is stuck).

The water level tape was cleaned between each well visited using distilled water and liquinox (phosphate-free soap) to avoid cross-contamination.

BIM also completed a PVC pipe elevation survey at well locations on 12 November 2024. Data was provided on 19 November 2024 to allow for the calculation of groundwater elevation in meters above sea level. Note that water levels measured in standpipe wells with no bentonite seal may be influenced by surface water runoff and precipitation (i.e., may overestimate the actual phreatic surface).

5.3 Groundwater Sampling

Groundwater samples were collected at both the LF and HWB Facility during a site visit from September 5 to 9, 2024. A total of 14 stations were sampled at the LF, and 11 stations were sampled at the HWB Facility.

All samples were collected using the following methodology.

The low-flow guidelines for groundwater sampling (CCME 1999; US EPA 2010) were used at the Site. The methodology allows for purging the groundwater while reducing the disturbance of water in the well, minimising the drawdown of groundwater (reducing stress on the formation), and provides the required volume of groundwater to collect a representative sample. The low-flow instrumentation included a combination of a peristaltic pump (Solinst Model 410, Appendix A Photo A-10), low-density polyethylene (LDPE, 0.5-inch Inside Diameter) tubing that is inserted into the well (Appendix A Photo A-9), flexible silicone tubing, and dedicated containers provided by ALS Laboratory (ALS) to collect the groundwater samples. Groundwater in the well was pulled upwards as the silicone tubing is compressed by rollers in the peristaltic pump, creating a vacuum. New LDPE and silicone tubing were installed in each well for purging and sampling and subsequently removed and disposed of once sampling was complete to avoid the tubing from freezing in the well. The pumping rate was set to between 0.10 and 0.50 litres per minute (L/min) as recommended by the CCME and USA EPA sampling procedure.

In-situ field measurements of water temperature, pH, dissolved oxygen, specific conductivity, and turbidity were recorded using a multi-parameter probe YSI Pro DSS water quality field meter and a flow-through cell. The groundwater samples were collected once the following criteria was met:

- Field measurements of temperature, pH, dissolved oxygen, specific conductivity and turbidity had stabilized as per the requirements for this sampling technique. The parameters were considered stable between each reading when:
 - Temperature readings were within +/- 3%
 - Specific Conductivity readings were within +/- 3%
 - pH readings were within +/- 0.1
 - Turbidity readings were within +/- 10%
- Recharge was reached and water levels had not changed of more than 0.1 m between readings.
- Approximately 3 well volumes had been purged.

Observations of the water collected during groundwater purging (sheen, odour, colour changes) and weather conditions were noted on a field datasheet while collecting field measurements and samples.

Equipment such as the water level tape, YSI Pro DSS, flow-through cell were thoroughly cleaned with distilled water and liquinox between each sampling location to avoid cross-contamination. Nitrile gloves were worn while purging and sampling and disposed of between each well to be sampled.

Groundwater samples were collected in plastic or glass bottles, depending on the requirements for the parameter or parameter groups being sampled. Dissolved parameter samples were field filtered immediately upon collection using syringe and filter kits provided by ALS. Where necessary, the samples were preserved according to laboratory instructions. All samples were kept cool using ice packs and coolers; samples were stored in a fridge after each field day (Appendix A Photo A-42). BIM's Environmental team were responsible for sample submission to ALS.

5.3.1 Analysis

A summary of the analytical parameters requested for analysis for the 2024 Annual Monitoring Program is presented in Table 5.

Of note, the 2023 analytical groundwater results from KP (2024) were reported in the 2024 tables for comparison purposes. The analytical suite in 2023 is slightly different than the 2024 analytical suite.

Table 5: Summary of Laboratory Analysis of Groundwater Samples at the Waste Facilities

Sampling Location	September 2024 Groundwater Analytical Suite
Landfill Facility (10 bottles)	<ul style="list-style-type: none"> ▪ Routine Water Quality Parameters⁽¹⁾ ▪ Dissolved Nutrients⁽²⁾ ▪ Total Nutrients⁽³⁾ ▪ Dissolved Metals (including mercury) ▪ PHCs ▪ BTEX ▪ VOCs ▪ PAHs
Hazardous Waste Berm Facility (11 bottles)	<ul style="list-style-type: none"> ▪ Routine Water Quality Parameters⁽¹⁾ ▪ Total Nutrients⁽³⁾ ▪ Dissolved Metals (including mercury) ▪ PHCs ▪ BTEX ▪ Oil and Grease ▪ VOCs ▪ PAHs

PHCs: Petroleum Hydrocarbons; VOCs: Volatile Organic Compounds; BTEX: Benzene, Toluene, Ethylbenzene, Xylene; PAH: Polycyclic Aromatic Hydrocarbons

(1) pH, Electrical Conductivity, Total Suspended Solids, Total Dissolved Solids, Turbidity and Major Ions.

(2) Dissolved Organic Carbon, Dissolved Phosphorus

(3) Total Ammonia, Total phosphorus, Total Kjeldahl Nitrogen

5.4 Seeps and Surface Water Sampling

Seepage and surface water flowing from the landfill sampling tasks were completed simultaneously with the groundwater sampling at LF. A total of two seep samples and two surface water samples were collected on September 7 and 9, 2024, respectively. The two seeps were located within LF, and surface water samples were collected upgradient of LF limits and downgradient close to Sheardown Lake (Appendix A Photos A-43, A-44, A-45, and A-46).

Field parameters were measured using a YSI Pro DSS water quality meter and were noted on the field datasheet once they had stabilized. Field measurements of water temperature, pH, dissolved oxygen, specific conductivity, and turbidity were measured. Field screening including sheen, odour, colour, flow direction and qualitative velocity were noted on the field datasheet, as well as weather conditions.

Samples were collected while wearing nitrile gloves into dedicated containers provided by ALS.

5.4.1 Analysis

The analytical suite for seeps and surface water was the same as the analytical suite for groundwater samples from LF presented in Table 5 and re-summarized in Table 6 below. BIM provided analytical results from other water monitoring programs that were collected during the summer 2024. The analytical suite was slightly different in that total metals and phenols were requested (Appendix E Table E-3 and E-5).

Table 6: Summary of Laboratory Analysis for Seeps and Surface Water Samples in September 2024

September 2024 Seeps and Surface Water Analytical Suite
<ul style="list-style-type: none">▪ Routine Water Quality Parameters⁽¹⁾▪ Dissolved Nutrients⁽²⁾▪ Total Nutrients⁽³⁾▪ Dissolved Metals (including mercury)▪ PHCs▪ BTEX▪ VOCs⁽⁴⁾▪ PAHs⁽⁴⁾

PHCs: Petroleum Hydrocarbons; VOCs: Volatile Organic Compounds; BTEX: Benzene, Toluene, Ethylbenzene, Xylene; PAHs: Polycyclic Aromatic Hydrocarbons

(1) pH, Electrical Conductivity, Total Suspended Solids, Total Dissolved Solids, Turbidity and Major Ions.

(2) Dissolved Organic Carbon, Dissolved Phosphorus

(3) Total Ammonia, Total phosphorus, Total Kjeldahl Nitrogen

(4) VOCs and PAHs (except carbon tetrachloride) have not been analyzed, but samples had been collected.

Following a review of the September 2024 seep and surface water analytical results, VOCs and PAHs were not analysed, despite the same bottle set used as for the seep and surface water sampling.

5.5 Quality Assurance/ Quality Control

WSP’s quality assurance and control (QA/QC) procedures for field data collection, laboratory, and data management were followed during the program. Field QA/QC procedures pertain to the maintenance and operation of equipment and instrumentation, sampling methods, sample handling. Laboratory QA/QC procedures are followed to monitor the samples submitted to a laboratory (ALS) accredited by the Canadian Association for Laboratory Accreditation (CALA). Data management QA/QC procedures are used to maintain data quality by following a standard process for tracking, processing, and reviewing field and laboratory data collected during the program.

All sampling equipment (e.g., YSI Pro DSS) were cleaned and maintained in between the sampling locations. Prior to each sampling day, the YSI Pro DSS water quality meter was calibrated/bump tested by BIM according to the manufacturer’s instructions, and documentation of calibration was completed. Water quality samples were filtered and preserved, where required, and according to the instructions provided by ALS. In line with the Environment Canada (2012) recommendation, quality control samples consisting of duplicates, field blanks, and/or travel blanks were collected during the field program, amounting to a minimum of 10% of the number of samples as part of QA/QC procedures.

The three types of QC samples were collected during the 2024 September program as detailed below:

- **Travel blanks**, which consist of deionized water provided in sampling bottles by the analytical laboratory. Travel blanks accompanied the samples through all steps of collection and transportation. They were shipped, handled, stored, and treated the same as the collected samples, but were not opened in the field. Travel blanks were used to detect potential sample contamination due to ambient conditions, or that may have occurred during shipping and laboratory analysis.

- **Field blanks**, consisted of deionized water provided by the analytical laboratory (ALS). The deionized water was transferred to sample bottles in the field, handled the same, and analyzed for the same constituents as the water samples collected during the field program (e.g., preserved and filtered). Field blanks were used to detect potential sample contamination during sample collection, handling, shipping, and analysis.
- **Duplicate samples**, consist of additional samples collected at the same time and location as water samples collected during the field program, using the same sampling methods. They were used to check for within-site variation and the precision of field sampling methods and laboratory analysis. For duplicate samples, specific bottles were collected quasi-simultaneously to reduce variability (e.g., alternating filling the sample and duplicate bottles until they are full).

Results of samples submitted to the laboratory were reviewed internally by WSP using the following QAQC steps:

- **Field Data:** Check that results for field and laboratory values are similar:
 - pH: Data quality objective (DQO) for field vs laboratory measurement should be less than 1.
 - Specific Conductivity: DQO for field measurement vs laboratory result should differ by no more than 20%.
- **Blank samples:** Identify concentrations in blank samples that are notably above Detection Limits (DL) (i.e., by more than 5 times the DL).
- **Duplicate samples:** Identify concentrations that are notably different where relative percent differences (RPD) is greater than 20% in duplicate samples. Differences between concentrations measured in duplicate water samples were calculated as the RPD for each parameter (Appendix E Table E-6). The RPD was calculated using the following formula:

$$RPD = (\text{difference in concentration between two of the duplicate samples} / \text{mean concentration}) \times 100$$

The RPD value for a given parameter is flagged if it is greater than 20% or if concentrations in one or both samples are greater than or equal to five times the DL.

Sample variability and field sampling precision of duplicate sample results were rated as follows:

- **Low and high**, respectively, if less than 10% of the parameters included in the duplicate sample analysis were notably different from one another.
- **Moderate**, if 10% to 20% of the parameters included in the duplicate sample analysis were notably different from one another.
- **High and low**, respectively, if more than 30% of the parameters included in the duplicate sample analysis were notably different from one another.

5.6 Single Well Response Testing

Single well response testing was conducted at both the LF and HWB Facility on September 10 and 11, 2024. Testing was completed following purging and sampling. Due to time constraints, only five slug tests were completed at the LF and four slug tests at HWB Facility. The locations were selected based on the quality of historical analyses completed by other consultants, hydrostratigraphic units and their spatial location so that both waste facilities were represented.

Single well response tests were completed to estimate the hydraulic conductivity of the formation soils adjacent to the well screen, or the open area of a well. The approach involved using a mechanical object or slug to instantaneously change the water level within a well by raising or lowering it from the static water level and measuring the response time of the water level to return to the pre-test static level.

Pressure transducers manufactured by Solinst were used to automatically record the water level response. Water level readings were set to be recorded every second. A Solinst barologger transducer collected atmospheric pressures while conducting the single well tests (Appendix A Photo A-55). Manual water levels were recorded throughout the test until the water level had recovered to at least 90% of the original static water level. A total of three tests (3 rising and 3 falling tests) were completed at each tested well (Appendix A Photo A-55). Four slugs of different volumes (Appendix A Photos A-47, A-48) were used to vary the magnitude of the slug test response.

The weather conditions were recorded while conducting each test in the field datasheet. The testing equipment (slug, pressure transducers) were cleaned with distilled water and liquinox between each test. New propylene twine was also used at each well to prevent cross contamination.

6.0 RESULTS

6.1 Groundwater Elevations and Flow Direction

Conceptually, groundwater flow would be expected to mimic surface flow and be controlled mostly by topography. Flow directions have been proposed by others, as noted in the following section. The uncertainty of data from groundwater wells is described in Sections 2.0 and 7.1. Along with the potential for ice wedges impeding groundwater flow (Section 4.1.1), WSP recommends further work to confirm the water levels and hydraulic gradients at site.

6.1.1 Landfill Facility

Groundwater elevations measured in 2023 (KP, 2024) at the LF monitoring wells and by WSP in 2024 are provided in Appendix E Table E-1. Groundwater levels collected in September 2024 were generally consistent with the September 2023 groundwater levels. BIM also completed a groundwater level survey at LF on October 11, 2024 following the 1 in 1000-year rain event that occurred at the end of September. Results are reported in the same table for comparison purposes. The groundwater elevations were all highest in October 2024 following the rain event compared to the water levels measured a month earlier in September 2024. Precipitation will naturally recharge the groundwater levels through ground infiltration. However, standpipe wells with no bentonite seals may show an elevated and rapid increase in water levels due to direct precipitation and runoff into the standpipe well.

Depth to groundwater measurements at LF varied from 0.00 (water level at ground surface) to 1.00 metre below ground surface (mgs), with groundwater elevations ranging from 169.3 to 187.4 metres above sea level (masl). Groundwater elevations were calculated using the top of pipe elevations at standpipe wells and drive point piezometers surveyed by BIM. Of note, top of pipe elevations for drive point piezometers MS-LF-GW2, MS-LF-GW-REF3, MS-LF-GW4, MS-LF-GW5, MS-LF-GW-REF1 were estimated using the ground surface elevation reported in Tetra Tech (2022) and KP (2023a, 2024) and measuring the length of the pipe stickup above ground level.

The groundwater elevations collected on September 4, 2024 were used to generate a contour plot, Figure D, to estimate the groundwater flow direction and hydraulic gradient in the shallow aquifer. Groundwater flow at LF is inferred to be to the west at the north side of the landfill towards Sheardown Lake NW, and to the southwest at the southern side of the landfill towards Sheardown Lake SE, which is consistent with previous reports (Tetra Tech 2021, Tetra Tech 2022, KP 2023a, KP 2024). One standpipe well was frozen (LF-KP23-03) and another one was dry (LF-KP23-10) when the groundwater level survey was conducted on September 4, 2024. The hydraulic gradients were estimated to range between 0.03 and 0.06 m/m (Tetra Tech 2021, Tetra Tech 2022, KP 2023a, KP 2024).

6.1.2 Hazardous Waste Berm Facility

Groundwater elevations measured in 2023 (KP, 2024) at the HWB monitoring wells and by WSP in 2024 are provided in Appendix E Table E-2. Groundwater levels collected in September 2024 are generally consistent with the September 2023 groundwater levels. BIM has also completed a groundwater level survey on October 11, 2024 following the 1 in 1000-year rain event that occurred at the end of September. Results are reported in the same table for comparison purposes. The groundwater elevations in October 2024 following the rain event were

higher than the month prior only at the following monitoring wells: HWB-KP22-03, MS-HWB-GW4, MS-HWB-GW5, HWB-KP22-04, HWB-KP22-01.

Depth to groundwater measurements at HWB Facility varied from 0.14 to 0.59 mgs, with groundwater elevations ranging from 173.1 to 174.0 masl. Groundwater elevations were calculated using top of pipe elevations at standpipe wells and drive point piezometers surveyed by BIM. Of note, top of pipe elevations for drive point piezometers MS-HWB-GW3, MS-HWB-GW4, MS-HWB-GW5, MS-HWB-GW6, HWB-KP23-03, MS-HWB-GW-REF1, MS-HWB-GW-REF2, MS-HWB-GW-REF3 were estimated using the ground surface elevations report in Tetra Tech (2022, 2023) and KP (2024) and measuring the length of the pipe stickup above ground level.

The groundwater elevations collected on September 5, 2024 were used to generate a contour plot, Figure E, to estimate the groundwater flow direction and hydraulic gradient in the shallow aquifer. Groundwater flow at HWB Facility is inferred to be to the west-northwest on the northwest side of the facility and to the southwest on the southwest side of the facility towards Camp Lake, which is consistent with previous reports (Tetra Tech 2022 and KP 2024). Three stations (MS-HWB-GW-REF1, HWB-KP22-06, and MS-HWB-GW6) were dry when the groundwater level survey was conducted on September 5, 2024.

The hydraulic gradient was estimated to be range between 0.002 to 0.005 m/m (Tetra Tech 2022, KP 2023a).

6.2 Groundwater and Seep Analytical Results

The following sections discuss groundwater and seep quality results based on location relative to each waste facility, i.e. source, proximal, downgradient and background (Table 7).

WSP has identified each well/ seep/ surface water sampling station with a distance qualifier from LF or HWB Facility to better assess and characterize contamination at the source, proximal, downgradient and background relative to each of the waste facilities. The qualifiers are defined below in Table 7. The assigned qualifier for each sampling station is identified on Figures 2 to 5 and in Appendix E Tables E-1 to E-5. A standpipe well and drive point piezometer information summary table gathering all the relevant information from previous reports and 2024 observations is provided in Appendix D. Well photographs are provided in Appendix A.

Table 7: Distance Qualifier and Definition

Distance Qualifier	Definition
Source <i>Expected to have elevated concentrations</i>	LF: Station is located within active cells (Cells 1, 2, 3) in the landfill
	HWB Facility: Station is located within HWB Facility limits or less than 20 metres ⁽¹⁾ from the HWB Facility limits
Proximal <i>Close enough to source to be influenced</i>	LF: Station is within 20 metres ⁽¹⁾ from LF limits
	HWB Facility: Station is located more than 20 metres ⁽¹⁾ from HWB Facility limits
Downgradient <i>Contaminated groundwater may be intercepted by these wells</i>	LF: Station is located greater than 20 metres downgradient from the landfill's limits towards Sheardown Lake
	HWB Facility: Station is located greater than 20 metres downgradient from the HWB Facility towards Camp Lake

Distance Qualifier	Definition
Background <i>Not expected to be influenced by LF or HWB Facility</i>	LF: Station is located in the inactive cells (Cells 4, 5) within the landfill or upgradient of the landfill
	HWB Facility: Station is located upgradient or more than 20 metres from HWB Facility limits

HWB: Hazardous Waste Berm, LF: Landfill Facility, m: metres

(1) The distance of 20 metres was selected for proximal stations based on the review of the distribution of wells around the waste facilities.

6.2.1 Landfill Facility Water Quality Results

The groundwater and seep water quality data are provided in Appendix E Table E-3. Monitoring well locations are shown in Figure B. Table 8 summarizes groundwater and seepage exceedances to the guidelines at the LF.

Table 8: Summary of parameters exceeding the FIGQ and/or Yukon CSR guideline by station at the Landfill Facility

Station	Exceedance: FIGQ Tier 2 AW-F Guideline	Exceedance: Yukon CSR AW-F Standard ⁽¹⁾
Source		
LF-KP-23-13	Fluoride	-
LF-DS-SEEP-01	Sulfate, dissolved iron ⁽²⁾ , dissolved zinc	-
LF-DS-SEEP-02	Fluoride, sulfate, dissolved boron, dissolved iron ⁽²⁾ , dissolved zinc	Sulfate, dissolved cobalt
MS-LF-GW1	Sulfate, dissolved boron, dissolved uranium	Sulfate, dissolved cobalt
LF-KP22-01	Sulfate, dissolved boron, dissolved iron ⁽²⁾ , dissolved uranium	Sulfate, Dissolved cobalt
Proximal		
MS-LF-GW2	Sulfate, dissolved copper, dissolved uranium	-
LF-KP22-05	Dissolved aluminium, dissolved iron ⁽²⁾ , dissolved selenium	Dissolved cobalt
Downgradient		
LF-KP23-01	Nitrate	-
LF-KP23-04	Dissolved copper	-
Background		
LF-KP23-06	Dissolved copper	-

AW-F = Protection of Freshwater Aquatic Life, CSR = Contaminated Sites Regulation, FIGQ = Federal Interim Groundwater Quality

(1) Yukon CSR is only used for comparison purposes. It is not applicable to Nunavut (Refer to Section 2.0).

(2) Dissolved iron is not considered to be a contaminant of concern at the site as elevated iron is expected at a high-grade iron mine.

6.2.2 Hazardous Waste Berm Facility Water Quality Results

HWB Facility groundwater quality results are presented in Appendix E Table E-4. Station locations are presented in Figure C. Geochemical concentrations are presented for LF and HWB as 'heatmaps' in Appendix H. Table 9 summarizes groundwater exceedances to the guidelines at the HWB Facility.

Table 9: Summary of parameters exceeding the FIGQ and/or Yukon CSR guideline by station at HWB Facility

Station	FIGQ Tier 2 AW-F Guideline	Yukon CSR AW-F Standard ⁽¹⁾
Source		
HWB-KP23-02	Chloride, fluoride, nitrate, nitrite, naphthalene, dissolved iron ⁽²⁾	Naphthalene, dissolved cobalt
HWB-KP23-01	Nitrate, nitrite, dissolved copper	-
HWB-KP22-03	Nitrate, PHC F2 (C10-C16), pyrene, dissolved iron ⁽²⁾	-
MS-HWB-GW5	Nitrate, nitrite, dissolved copper	-
MS-HWB-GW4	Nitrite, dissolved copper	-
Proximal		
HWB-KP22-05	Chloride, naphthalene, dissolved iron ⁽²⁾	-
HWB-KP23-03	Naphthalene, dissolved iron ⁽²⁾	Naphthalene
Background		
MS-HWB-GW-REF1	Nitrate	
HWB-KP22-01	Dissolved iron ⁽²⁾	Dissolved cobalt

AW-F = Protection of Freshwater Aquatic Life, CSR = Contaminated Sites Regulation, FIGQ = Federal Interim Groundwater Quality, PHC = Petroleum Hydrocarbons

(1) Yukon CSR is only used for comparison purposes. It is not applicable to Nunavut (Refer to Section 2.0).

(2) Dissolved iron is not considered to be a contaminant of concern at the site as elevated iron is expected at a high-grade iron mine.

6.3 Single Well Response Testing Results

Single well response test analysis was completed using AQTESOLV Pro software to estimate the hydraulic conductivity of the aquifer at the screened portion of the standpipe wells. The data collected during the tests were interpreted with the Bouwer et Rice (1976) method and the aquifer was interpreted to be unconfined at all well locations. All slug test analyses are provided in Appendix F and summarized in Table 10.

The hydraulic conductivity at the wells screened in the fine to coarse sand at LF varied between 2×10^{-4} and 2×10^{-6} m/s. The hydraulic conductivity at the HWB Facility in the wells screened in the coarse sand varied between 2×10^{-4} and 4×10^{-5} m/s. These hydraulic conductivities are consistent with literature¹, where typical hydraulic conductivities of a coarse sand varies between 9×10^{-7} to 6×10^{-3} m/s, a medium sand varies between 9×10^{-7} to 5×10^{-4} m/s, and a fine sand varies between 2×10^{-7} to 2×10^{-4} m/s (Domenico & Schwartz, 1990).

¹ http://www.aqtesolv.com/aquifer-tests/aquifer_properties.htm

It should be noted that the transducer data from the Landfill Facility standpipe wells that was collected during the response tests were not compensated with barologger data since the logger installed did not have enough memory to store atmospheric pressure for a day; however, it is unlikely atmospheric pressure would have had an impact on transducer data considering slug tests recovered relatively rapidly. All transducer data from HWB Facility standpipe wells were compensated since the barologger was programmed to record solely during the slug tests.

As noted in Table 10, there is up to one order of magnitude difference between the hydraulic conductivities measured historically, and the results from the 2024 site work. WSP has reviewed two of the historical slug tests (LF-KP22-03 and LF-KP23-11) based on AQTESOLV input provided in the appendix of the KP (2024) report. A number of errors were identified during the back-analysis, including using an incorrect casing diameter, overestimating the saturated aquifer thickness, and the use of the full screen length instead of the effective screen length. As a result, the 2024 hydraulic conductivities are considered to more accurately represent the screened material (2022 and 2023 values greyed out in Table 10).

Table 10: Single Well Response Testing Summary Results Table

Waste Facility	Tested Standpipe Well ⁽¹⁾	Screened Unit	2022 Hydraulic Conductivity (m/s) ⁽²⁾	2023 Hydraulic Conductivity (m/s) ⁽³⁾	2024 Hydraulic Conductivity (m/s) ⁽⁴⁾	Comment
Landfill Facility	LF-KP22-01	Coarse sand, some gravel and cobbles	8×10^{-5}	2×10^{-4}	2×10^{-4}	■ Rising head test analyzed in 2024 (H0= 0.28 m)
	LF-KP22-03	Coarse sand, some cobbles and gravel	3×10^{-5}	2×10^{-5}	7×10^{-5}	■ Rising head test analyzed in 2024 (H0= 0.43 m)
	LF-KP23-01	Fine sand (contains cobbles) and coarse sand (contains large pebbles to cobbles)	-	6×10^{-7}	2×10^{-6}	■ Falling head test analyzed in 2024 (H0=0.19 m)
	LF-KP23-07	Top soil, coarse sand (contains cobbles)	-	2×10^{-6}	4×10^{-5}	■ Rising head test analyzed in 2024 (H0= 0.16 m)
	LF-KP23-11	Medium sand (contains medium cobbles)	-	7×10^{-7}	3×10^{-6}	■ Rising head test analyzed in 2024 (H0= 0.38 m)

Waste Facility	Tested Standpipe Well ⁽¹⁾	Screened Unit	2022 Hydraulic Conductivity (m/s) ⁽²⁾	2023 Hydraulic Conductivity (m/s) ⁽³⁾	2024 Hydraulic Conductivity (m/s) ⁽⁴⁾	Comment
Hazardous Waste Berm Facility	HWB-KP22-01	Sand and gravel	1×10^{-4}	9×10^{-5}	2×10^{-4}	<ul style="list-style-type: none"> Falling head test analyzed in 2024 (H0 = 0.26 m)
	HWB-KP22-04	Coarse sand, some gravel and cobbles	9×10^{-5}	5×10^{-5}	2×10^{-4}	<ul style="list-style-type: none"> Rising head test analyzed in 2024 (H0 = 0.41 m)
	HWB-KP23-01	Coarse sand, contains large pebbles to cobbles	-	1×10^{-5}	4×10^{-5}	<ul style="list-style-type: none"> Rising test analyzed in 2024 (H0= 0.20 m) Asphalt layer from 0 to 0.3 mbgs on borehole log, but not observed in the field.
	HWB-KP23-03	Coarse sand (contains medium to large pebbles) and medium sand	-	7×10^{-6}	4×10^{-5}	<ul style="list-style-type: none"> Rising test analyzed (H0=0.40 m) Asphalt layer from 0 to 0.2 mbgs on borehole log, but not observed in the field.

H0=Initial displacement when inserting/removing slug, mbgs= metres below ground surface, m/s=metre per second, - = no data

Greyed out values are considered to be less accurate.

(1) Standpipe wells were not installed with a bentonite seal which may impact hydraulic conductivity results.

(2) Hydraulic conductivity from KP (2023a). Hydraulic conductivity values transcribed as reported.

(3) Hydraulic conductivity from KP (2024) in appendix. Hydraulic conductivity values transcribed from the report appendix were rounded at one significant digit.

(4) Best analyzed response test in 2024 was reported in the Table. Hydraulic conductivity reported from Appendix F were rounded at one significant digit as those results are estimations.

Note that the 2022 wells were installed inside a backfilled test pit; the hydraulic conductivity is really only representing backfill and in-situ ground.

6.4 Characterization of Surface Water Sampled at the Landfill Facility

Surface water analytical results were compared to surface water guidelines and are presented in Appendix E Table E-5. Station locations are presented in Figure B.

Proximal

Surface water proximal station is LF-US-POND-01 located upgradient and along the LF limits. There were no exceedances of the CCME WQG AW-F (long-term exposure) guidelines or Water Licence Effluent Quality Discharge Limits at this station. This station serves as comparison to the downgradient stations as it should not be impacted by the landfill since it is technically upgradient of the LF.

Downgradient

Surface water downgradient stations include MS-MRY-13B and MS-MRY-13C located close to Sheardown Lake NW shore (Figure B). Total uranium concentrations exceeded the CCME WQG AW-F (long-term exposure) guideline (0.015 mg/L) at station MS-MRY-13C (0.017 mg/L). Dissolved uranium concentrations were similar to the total uranium concentration. Timeseries for dissolved uranium at downgradient and source stations were compared in Appendix G-5 and are discussed in Section 7.0.

6.5 Quality Assurance and Quality Control Results

A summary of key results from the QA/QC assessment conducted by WSP for the 2024 September sampling program is provided in Appendix E Table E-6 and is summarized in the following sections.

6.5.1 Field Data

Field parameters measured in the September sampling program, were of acceptable quality, meeting the acceptance criteria set out in Section 5.5; all measurements were retained in the dataset (Appendix E Table E-6). Field values and their corresponding laboratory values were similar, with differences of less than 0.5 for pH and a RPD of less than 20% for conductivity.

6.5.2 Blank Samples

During the September sampling programs, both a field blank and a travel blank were collected and analyzed for notable results, defined as any result exceeding five times the detection limit. Detectable concentrations were found in the field blank for total dissolved solids and in the travel blank for total ammonia (Appendix E Table E-6). None of the detected concentrations exceeded five times the detection limit. The results indicated a low potential for contamination during the sampling, sample processing, transportation, and laboratory analysis stages.

6.5.3 Duplicate samples

RPDs exceeding 20% between sample LF-KP23-09 and its duplicate were measured for total suspended solids and lab turbidity, and between sample HWB-KP22-05 and its duplicate for 1+2-methylnaphthalenes, 1-methylnaphthalene, and 2-methylnaphthalene. Based on the listed parameters, the sample variability was assessed as low because less than 10% of parameters had an RPD greater than 20% between the samples and their field duplicates (Appendix E Table E-6).

7.0 DISCUSSION

7.1 Data Integrity Assessment

As a standard industry practice, standpipe wells are usually installed with a bentonite seal at the ground surface to prevent surface water infiltration into the well resulting in and dilution/contamination of groundwater. A total of 23 standpipe wells installed in 2022 and 2023 at the LF and HWB Facility were not installed with a bentonite seal. This introduces a degree of uncertainty to the BIM groundwater database as to the representativeness of the groundwater quality and water levels measured from these wells. BIM and WSP have made efforts to mitigate the uncertainty as much as possible by undertaking a different groundwater sampling methodology, conducting slug testing after sampling once the well had been purged, collecting and comparing water levels, and comparing analytical results.

For the purposes of this 2024 annual groundwater report, an assessment of historical groundwater data was carried out to support the selection of data to be presented. Some of the criteria used in the assessment included:

- **Sampling methodology, Well purging** – Groundwater samples taken from wells with no bentonite seal in 2024 were collected only after three well volumes were purged, the well had recharged, and once field parameters had stabilized. This procedure removed existing, standing water from the well; the water that recharged the well was considered to be the most representative groundwater samples possible considering the lack of bentonite seal. Sampling events that did not record, or state these purging criterion were flagged (Table 1).
- **Comparison of groundwater quality results between samples collected at drive point piezometers and samples collected at nearby standpipe wells without bentonite seal** – Using the assumption that drive point piezometers would be less influenced by surface water infiltration than open (unsealed) standpipe monitoring wells, a comparison between water quality in proximal pairs of drive point piezometers and standpipe wells was made. A total of three pairs of drive point piezometers and nearby standpipe wells (MS-LF-GW-REF2/LF-KP23-05, MS-LF-GW3/LF-KP22-03, MS-HWB-GW5/HWB-KP23-01) were assessed. Samples collected in 2023 and 2024 returned reasonable alignment between the results collected from drive point piezometers and nearby standpipe wells with no seal. This data supports the inclusion of the 2023 results in the 2024 monitoring report.
- **Comparison of groundwater levels between measurements taken from drive point piezometers and nearby standpipe wells without bentonite seal** – Using the same rationale as previously outlined, a comparison between water levels in proximal pairs of drive points piezometers and standpipe wells was made. Well pairs showing a comparable water level suggested that the standpipe well data was recording a reasonable representation of groundwater conditions. A scenario where the standpipe well (with no bentonite) had a water level near ground surface, compared with its nearby drive point piezometers showing much deeper water levels would be indicative of surface water influence in the standpipe well.
- A total of three pairs of drive point piezometers and nearby standpipe wells (MS-LF-GW-REF2/LF-KP23-05, MS-LF-GW3/LF-KP22-03, MS-HWB-GW5/HWB-KP23-01) were assessed. Groundwater levels recorded in drive point piezometers and nearby standpipe wells in 2023 were similar to measurements collected in 2024, supporting their inclusion in the 2024 monitoring report.

- **Groundwater quality comparison between 2023 and 2024** – Sampling results with large variations in water chemistry from one year to the next could suggest that samples are not representative of shallow groundwater in the active layer. Groundwater quality samples from 2023 and 2024 were compared (Appendix G). Results prior to 2023 presented larger variations of water chemistry results;

Groundwater levels comparison between 2023 and 2024 – Groundwater levels collected in September 2023 and September 2024 were generally consistent which suggests surface water infiltration through boreholes may be minimal and may not significantly impact groundwater levels. Of note, the 1 in 1000-year event that occurred in September 2024 shows higher groundwater levels at almost all of the stations. This may not solely be due to water short circuiting through the borehole, but could also be due to a Site wide rise in the water table following the rainfall event. The review recommended that data collected before 2023 would not be included in the 2024 Groundwater Monitoring Report. Even though the aforementioned evaluations reduce the uncertainty regarding groundwater quality, some uncertainties remain as surface water can still infiltrate through the borehole and dilute groundwater.

Going forward, the recommendations in Section 8 provide a plan to reduce the uncertainty around the groundwater sampling results. BIM have committed to adding a surface bentonite seal at existing wells, as well as twinning existing wells with a new monitoring well with a bentonite seal. Comparisons of the water levels and water quality from these wells will be able to ensure the reliability of the data in future sampling events.

7.2 Landfill Facility

Parameters with guideline exceedances measured downgradient of the LF includes nitrate, dissolved copper, and total/dissolved uranium in the downgradient groundwater/seeps and/or surface water stations. Timeseries plots (Appendix G) of these contaminants of concern at downgradient stations were compared to source stations (groundwater and seep stations) where concentrations are expected to be more elevated. Surface water and groundwater guidelines (i.e., CCME AW-F, and FIGQ AW-F, respectively) were included in the timeseries to better visualize exceedances. The following discussion compares concentrations of the contaminants of concern at source vs downgradient stations at the LF. Heatmaps were also plotted for nitrate (Appendix G-1), dissolved copper (Appendix G-2) and dissolved uranium (Appendix G-3) to visually compare downgradient and source stations concentration distribution (in 2024).

One nitrate concentration exceeded the FIGQ AW-F guideline (2.9 mg/L) at a downgradient location, LF-KP23-01 in 2023 (4.2 mg/L). There was no nitrate exceedance measured at any of the source stations, suggesting that nitrate does not originate from the LF. Nitrate concentration at LF-KP23-01 has decreased in 2024 (1.59 mg/L) and is below guideline. General nitrate trends at other sampling locations have also been decreasing since 2022.

The highest dissolved copper concentration was measured at groundwater source station MS-LF-GW1 in 2021 (0.0131 mg/L) (Appendix G-2). Copper concentrations at seep stations measured in 2022 (TP-22-01 to TP-22-04) and in 2024 (LF-DS-SEEP-01 and LF-DS-SEEP-02) are similar and vary between 0.0042 mg/L and below detection limit (<0.002 mg/L). There was no exceedance to the FIGQ AW-F guideline at any source stations in 2023 and 2024. There was one exceedance to the FIGQ AW-F guideline (0.002 mg/L) at a downgradient groundwater station LF-KP23-04 in 2023 (0.0037 mg/L). Elevated dissolved copper exceedances were measured at proximal groundwater station MS-LF-GW2 and background groundwater station LF-KP23-06 (Appendix E Table E-3) in 2023 and 2024 suggesting that naturally high copper concentrations may be present in the Project area. Dissolved copper concentrations have been decreasing at almost all stations since 2021.

Dissolved uranium measured at source groundwater stations MS-LF-GW1 (0.0408 mg/L) in 2023 and at LF-KP22-01 (0.036 mg/L) in 2024 are greater than the FIGQ AW-F guideline (0.015 mg/L). Concentrations at seep stations TP-22-01, TP-22-03 and TP-22-04 collected in 2022 were greater than the FIGQ AW-F guideline but seep results at source stations LF-DS-SEEP-01, LF-DS-SEEP-02 and TP-22-02 were less than the guideline. There is one dissolved uranium exceedance to the FIGQ AW-F guideline at the proximal station MS-LF-GW2 (Appendix E Table E-3, Figure B) in 2023 (0.0220 mg/L). There is a total uranium concentration (0.017 mg/L) greater than the CCME AW-F guideline (0.015 mg/L) at the downgradient surface water station MS-MRY-13C in 2024. It is possible naturally high uranium concentrations are present at the Project area. Dissolved uranium has been somewhat stable at most of the stations, except at LF-KP22-01 and MS-LF-GW1.

7.3 Hazardous Waste Berm Facility

The only downgradient station at HWB Facility is MS-HWB-GW6. A sample could not be collected in 2024 as the location was dry when it was visited in September 2024. There are also no historical results at MS-HWB-GW6 as it may have been dry or frozen since its installation. No timeseries were plotted for HWB Facility. Heat maps were plotted only for chloride (Appendix H-3), naphthalene (Appendix H-4) and PHC F2 (C10-C16) (Appendix H-5) to visually compare proximal and source stations concentrations concentration distribution (in 2024).

Exceedances to the guidelines (FIGQ AW-F and Yukon CSR AW-F) measured at source stations that may impact downgradient groundwater quality include chloride, fluoride, nitrate, nitrite, pyrene, dissolved copper, dissolved cobalt, naphthalene, and PHC F2 (C10-C16) (Table 9). Dissolved iron had exceedances at many stations at the HWB Facility including the background stations, suggesting naturally high concentrations in the area. High iron concentrations in soil and groundwater would be expected as Mary River Project as it is a high-grade iron mine. Downgradient well locations should be installed to characterize the potential impact on groundwater quality from the HWB Facility.

8.0 CONCLUSIONS

8.1 Landfill Facility

A groundwater level survey was conducted at LF on 4 September 2024. Groundwater elevations ranged from 169.3 to 187.4 masl. Groundwater flow at LF is inferred to be to the west at the north side of the landfill towards Sheardown Lake NW, and to the southwest at the southern side of the landfill towards Sheardown Lake SE. The hydraulic gradient at LF measured in 2024 was estimated to be 0.05 m/m. Uncertainty may result from ice wedge formations that could influence groundwater flows.

A total of 5 single well response tests were conducted at LF. Hydraulic conductivity of the fine to coarse sand measured at the LF ranged between 2×10^{-4} and 2×10^{-6} m/s.

A total of 14 groundwater stations, 2 seep stations and 2 surface water stations were sampled in September 2024 at the LF. Groundwater and seep analytical results were compared to the FIGQ AW-F guideline, Yukon CSR AW-F, and the Water Licence Effluent Quality discharge Limits. Surface water analytical results were compared to the CCME WQG AW-F (long-term exposure) and to the Water Licence Effluent Quality discharge Limits. Yukon CSR AW-F is not applicable to Nunavut, but was used for comparison purposes only. Parameters with guideline exceedances measured downgradient of the LF includes nitrate, dissolved copper, and total/dissolved uranium in the downgradient groundwater/seeps and/or surface water stations. There were no nitrate exceedances measured at any of the source stations, suggesting that nitrate does not originate from the LF. As for dissolved copper and uranium, naturally high concentrations may be present in the Project area.

8.2 Hazardous Waste Berm Facility

A groundwater level survey was conducted at HWB Facility on 5 September 2024. Groundwater elevations ranged from 173.1 to 174.0 masl. Groundwater flow at HWB Facility is inferred to be to the west-northwest on the northwest side of the facility and to the southwest on the southwest side of the facility towards Camp Lake. The hydraulic gradient at HWB Facility measured in 2024 was estimated at 0.007 m/m. Note that flow directions and hydraulic gradients resulting are subject to some uncertainty based on the data measured from unsealed monitoring wells. Additional uncertainty may result from ice wedge formations that could influence groundwater flows.

Four single well response tests were conducted at HWB Facility. The hydraulic conductivity of the coarse sand at the HWB Facility ranged between 2×10^{-4} and 4×10^{-5} m/s.

A total of 11 groundwater stations were sampled in 2024 at HWB Facility. The only downgradient station at HWB Facility is MS-HWB-GW6 and a sample could be collected in 2024 as the location was dry or frozen when it was visited in September 2024. There are no historical results at MS-HWB-GW6 as it may have been dry or frozen since its installation. Contaminants of concern measured at source stations that may impact downgradient groundwater quality include chloride, fluoride, nitrate, nitrite, pyrene, dissolved copper, dissolved cobalt, naphthalene, and PHC F2 (C10-C16). Dissolved iron exceeded the FIGQ AW-F guideline at many stations at HWB Facility as well as at some background stations. This suggests HWB Facility has naturally elevated background concentrations of dissolved iron. There are no down-gradient stations to be able to assess contaminant transport from the HWB Facility towards the receptor Camp Lake.

9.0 RECOMMENDATIONS

The recommendations following the 2024 groundwater monitoring program are as follows:

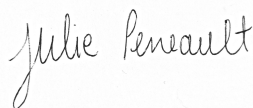
- **Priority 1- proposed timeline 2025: Drill and install new monitoring wells based on the monitoring well construction** design provided by WSP to allow for discrete groundwater sampling from the active zone. The design also reduces the risk of damage to the well resulting from frost-heave. Thermistors will also be installed within the upper 5 m of surface at strategic locations around the site to monitor the changes over time in active zone development along with changes in active zone thickness with distance from the waste facilities.
- **Priority 1- proposed timeline 2026: Remediate existing standpipe wells** (ones installed with no bentonite seal) by excavating around the well to a depth of approximately 1 m and constructing a post-installation bentonite seal around the well to reduce surface water infiltration.
- **Priority 2- proposed timeline 2026: Review of sampling data from 2025 groundwater wells** and comparison with 2023 and 2024 water quality data to assess if the groundwater quality from the 2025 wells with bentonite seals is consistent or different to previous results. This review will form the basis of additional recommendations, if required.
- **Priority 1- proposed timeline 2025: Installation of downgradient monitoring wells at HWB.** These wells will monitor groundwater quality downgradient from HWB Facility.
- **Priority 1- proposed timeline 2025: Installation of a series of heavy-duty vibration wire piezometers (VWP)** enclosed in a bladder of propylene glycol (antifreeze), grouted in place and connected to a datalogger to record in-situ groundwater pressures within the active zone. The aim of these installations is to remove ambiguity around water level data and hydraulic gradients across the project site. These installations (with dataloggers) will also provide information on groundwater level responses to rainfall events and snowmelt.
- **Priority 2- proposed timeline – ongoing: Continue monitoring groundwater elevations** at LF and HWB Facility by completing a water level survey in September 2025 when the active layer has fully thawed. It is recommended to conduct a water level survey at all station prior to purging and after purging.
- **Priority 2- proposed timeline - ongoing: Conduct a ground surface elevation survey** of all groundwater stations (drive point piezometers, existing standpipe wells and newly installed monitoring wells) located at LF and HWB Facility since ground surface elevations varies as the active layer goes through cycles of thawing and freezing.
- **Priority 2- proposed timeline - ongoing: Continue monitoring groundwater quality at the drive point piezometers**, the existing standpipe wells and the newly standpipe wells in September 2025 when the active layer has fully thawed at waste facilities.
- **Priority 2- proposed timeline - ongoing: Continue monitoring seep quality at source seeps** located at the LF in September 2025. It is also recommended to identify if new seeps develop throughout the summer season.
- **Priority 2- proposed timeline – ongoing: Continue monitoring surface water stations** downgradient of the LF and proximal to the LF.

10.0 CLOSURE

This report should be read in conjunction with the Study Limitations of this report, which is appended at the beginning of this report. The reader's attention is specifically drawn to this information, as it is essential that it be followed for the proper use and interpretation of this report.

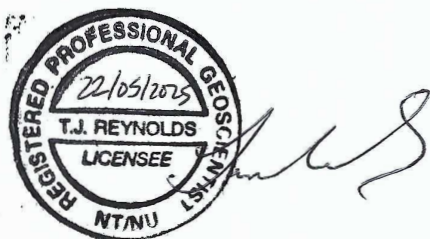
We trust this report satisfies your current requirements. If you have any questions or require further assistance, please do not hesitate to contact us.

WSP Canada Inc.



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Hydrogeological Engineer

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JP/BG/TR/asd

https://wsponlinecan.sharepoint.com/sites/CA-CA00232056339/Shared Documents/06_Deliverables/3.0_ISSUED/CA0023205.6339-011-R-Rev0/CA0023205.6339-011-R-Rev0-2024 Monitoring Report 21MAY_25.docx

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LEGEND

TOPOGRAPHIC CONTOUR (2 m INTERVAL)
TOPOGRAPHIC CONTOUR (10 m INTERVAL)

2012 FEIS/TYPE A WATER LICENSE LANDFILL AND LANDFARM LIMIT
2022 LANDFILL WASTE EXTENT

DISTANCE QUALIFIER

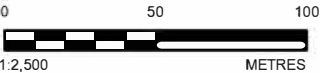
BACKGROUND
DOWNGRADIENT
PROXIMAL
SOURCE

STATION STATUS

LF-KP23-01 SAMPLED IN 2024
MS-LF-GW4 NOT SAMPLED IN 2024
LF-KP23-02* WELL WAS NEVER INSTALLED

STATION TYPE

DRIVE POINT PIEZOMETER
SEEP
STANDPIPE WELL WITH NO BENTONITE SEAL
SURFACE WATER



NOTE(S)

SOURCE = SAMPLING LOCATION IS LOCATED WITHIN ACTIVE CELLS (CELLS 1, 2, 3) IN THE LANDFILL.
PROXIMAL= SAMPLING LOCATION IS WITHIN 20 m FROM LANDFILL LIMITS.
DOWNGRADIENT = SAMPLING LOCATION IS LOCATED MORE THAN 20 m DOWNGRADIENT FROM THE LANDFILL'S LIMITS TOWARDS SHEARDOWN LAKE.
BACKGROUND = SAMPLING LOCATION IS LOCATED IN THE INACTIVE CELLS (CELLS 4, 5) OF THE LANDFILL OR UPGRAIENT OF THE LANDFILL

REFERENCE(S)

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PROJECTED COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
BAFFINLAND IRON MINES CORPORATION

PROJECT
MARY RIVER PROJECT

TITLE
LANDFILL FACILITY AND SAMPLING STATION STATUS IN 2024

CONSULTANT	YYYYMM-DD	2025-05-14
DESIGNED	JP	
PREPARED	AA	
REVIEWED	JP	
APPROVED	BG	

PROJECT NO. CONTROL REV. FIGURE
CA0023205.6339 0 B

APPENDIX A

Site Photographs

Water Level Survey



Photo A-1: LF-KP23-02 (4 September 2024) – Well was never installed.



Photo A-2: Standpipe well LF-KP23-13 (4 September 2024) – Collecting water level measurement and depth to well bottom using a water level tape.



Photo A-3: Standpipe well LF-KP23-10 (4 September 2024) – Collecting water level measurement and depth to well bottom using a water level tape.



Photo A-4: Drive point piezometer MS-LF-GW-REF3 and Standpipe well LF-KP22-05 (4 September 2024) – 2 nearby drivepoints MS-LF-FW-REF3 around LF-KP22-05



Photo A-5: Standpipe well HWB-KP23-01 (5 September 2024) – Collecting water level measurement and depth to well bottom using a water level tape.



Photo A-6: Drive point piezometer MS-HWB-GW-REF3 (5 September 2024) – Collecting water level measurement and depth to well bottom using a water level tape.



Photo A-7: Drive point piezometer MS-HWB-GW3 (5 September 2024) – Collecting water level measurement and depth to well bottom using a water level tape.

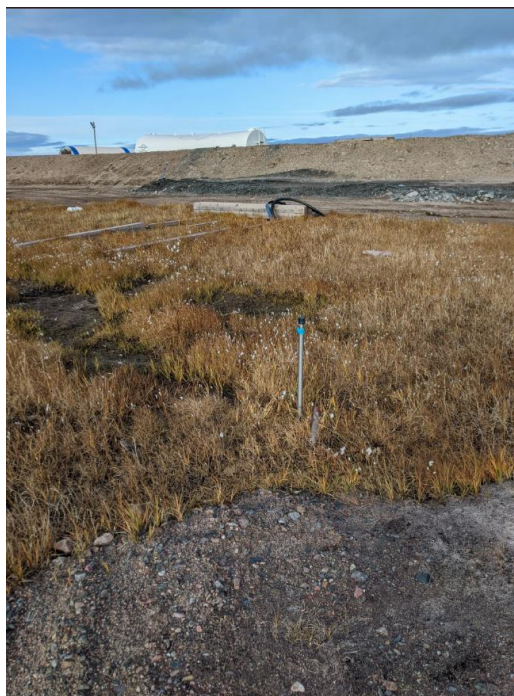


Photo A-8: Drive point piezometer MS-HWB-GW-REF2 (5 September 2024) – Collecting water level measurement and depth to well bottom using a water level tape.

Groundwater Sampling

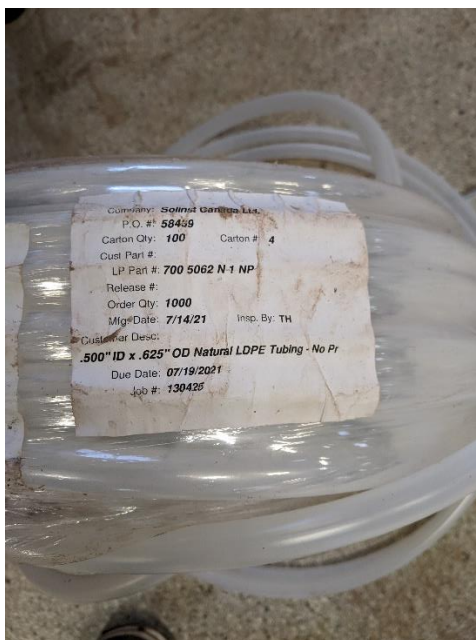


Photo A-9: Low-density polyethylene (LDPE) tubing used for groundwater sampling (0.5-inch Inside Diameter, 0.625-inch Outside Diameter).



Photo A-10: Solinst Peristaltic Pump (Model 410) used for purging and collecting groundwater samples.



Photo A-11: Landfill Facility – Site Overview



Photo A-12: Standpipe well LF-KP23-05 (5 September 2024) – Collecting groundwater samples.

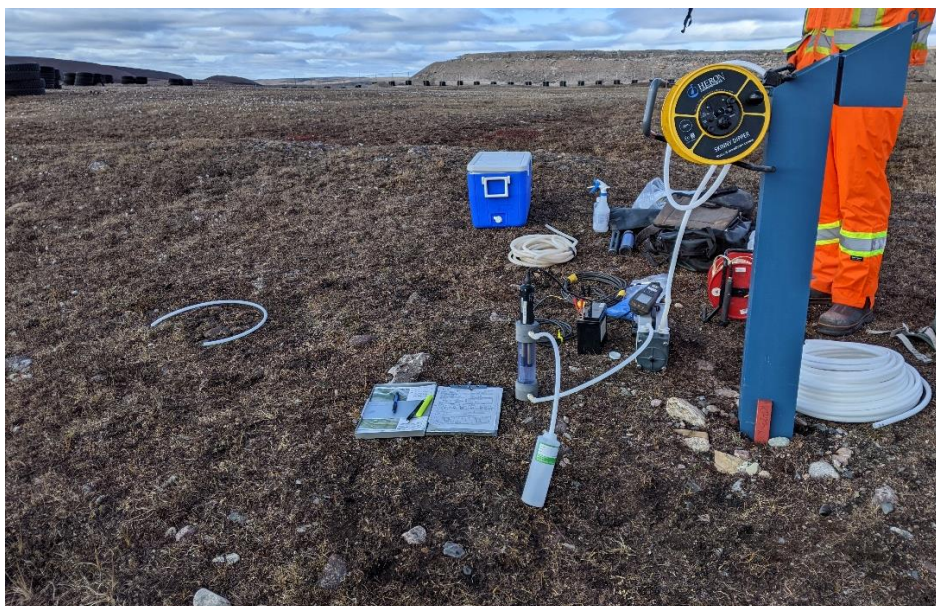


Photo A-13: Standpipe well LF-KP23-06 (5 September 2024) – Groundwater sampling set-up.



Photo A-14: Drive point piezometer MS-LF-GW-REF2 (6 September 2024) – Groundwater sampling set-up and 2 nearby drivepoints.



Photo A-15: Standpipe well LF-KP23-09 (6 September 2024) – A duplicate was collected at this station.



Photo A-16: Standpipe well LF-KP23-11 (6 September 2024) – Collecting static water level measurement prior to purging.



Photo A-17: Drive point piezometer MS-LF-GW-REF1 (6 September 2024) – Tubing is stuck in drivepoint, unable to collect a sample.



Photo A-18: Standpipe well LF-KP23-13 (7 September 2024) – Groundwater sampling set-up



Photo A-19: Standpipe well LF-KP22-01 (7 September 2024) – Groundwater sampling set-up. A field blank was collected at this station.



Photo A-20: Standpipe well LF-KP22-03 (7 September 2024) – Groundwater sampling set-up.

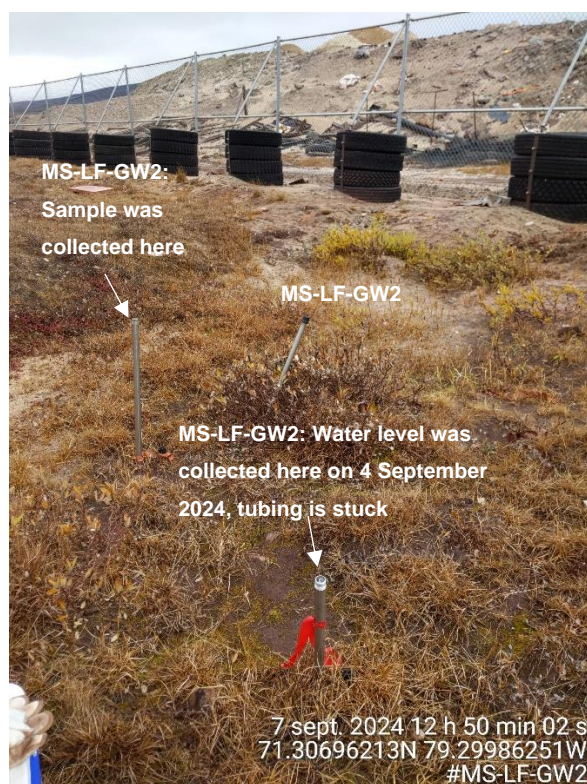


Photo A-21: Drive point piezometer MS-LF-GW2 (7 September 2024) – 3 nearby drive point piezometers at this station.



Photo A-22: Drive point piezometer MS-LF-GW3 (4 September 2024) – 2 nearby drive point piezometers at this location.



Photo A-23: Standpipe well LF-KP23-04 (7 September 2024) – Groundwater sampling set-up.



Photo A-24: Drive point piezometer MS-LF-GW4 (7 September 2024) – Tubing is stuck at both nearby drive point piezometers, unable to collect a sample at this station.

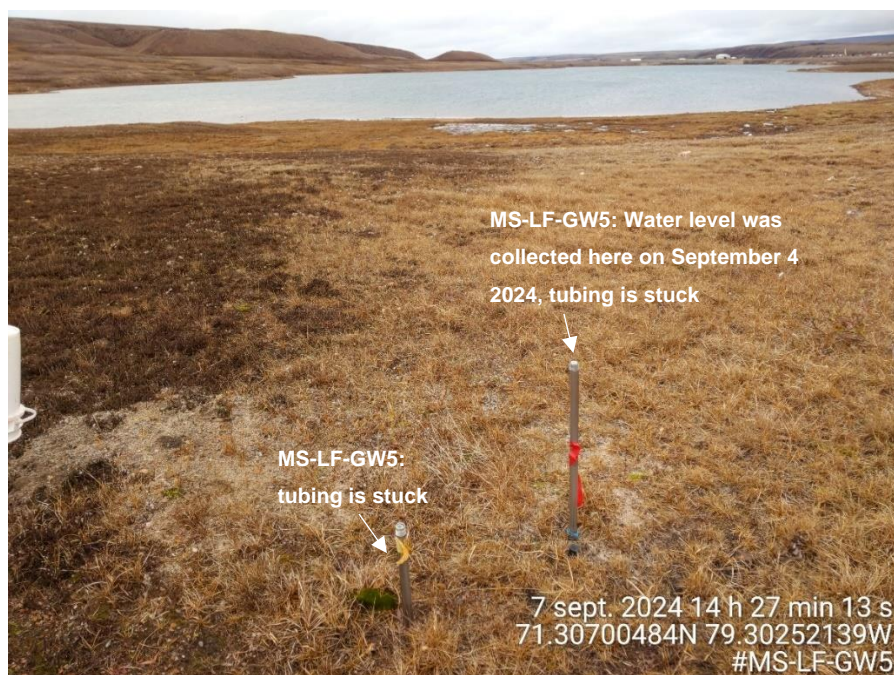


Photo A-25: Drive point piezometer MS-LF-GW5 (7 September 2024) – Tubing is stuck at both nearby drive point piezometers, unable to collect a sample at this station.

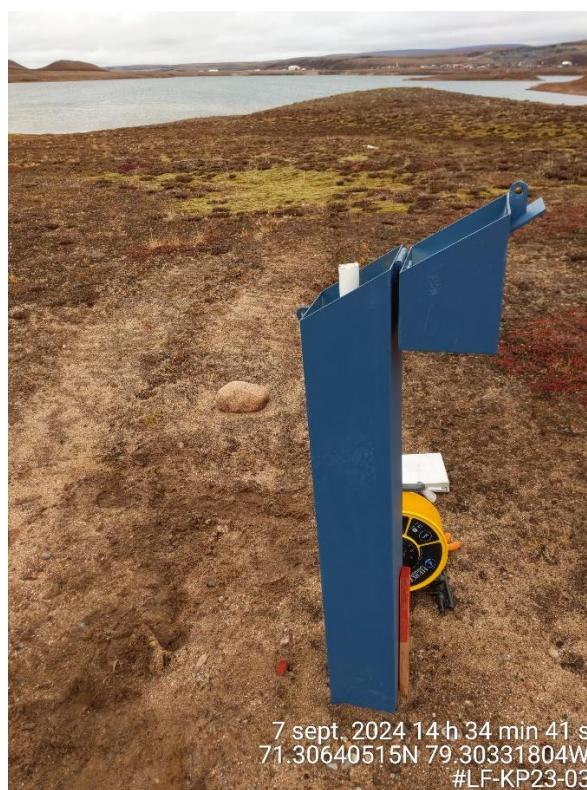


Photo A-26: Standpipe well LF-KP23-03 (7 September 2024) – Collecting static water level prior to purging.



Photo A-27: Standpipe well LF-KP23-01 (7 September 2024) – Collecting static water level prior to purging.



Photo A-28: Standpipe well HWB-KP22-01 (8 September 2024) – Collecting static water level prior to purging.



Photo A-29: Drive point piezometer MS-HWB-GW-REF2 (8 September 2024) – Tubing is stuck, unable to collect a sample at this station.



Photo A-30: Standpipe well HWB-KP22-03 (8 September 2024) – Groundwater sampling.



Photo A-31: Standpipe well HWB-KP22-04 (8 September 2024) – Groundwater sampling set-up.



Photo A-32: Standpipe well HWB-KP23-03 (8 September 2024) – Metal casing is damaged.

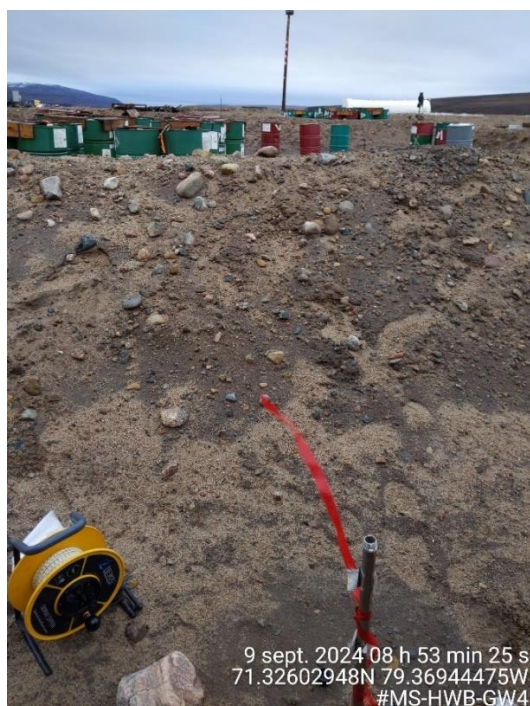


Photo A-33: Drive point piezometer MS-HWB-GW4 (9 September 2024) – Groundwater sampling.



Photo A-34: Drive point piezometer MS-HWB-GW4 (9 September 2024) – Jet fuel barrels stored near the station.



Photo A-35: Standpipe well HWB-KP22-05 (9 September 2024) – A duplicate was collected at this station.

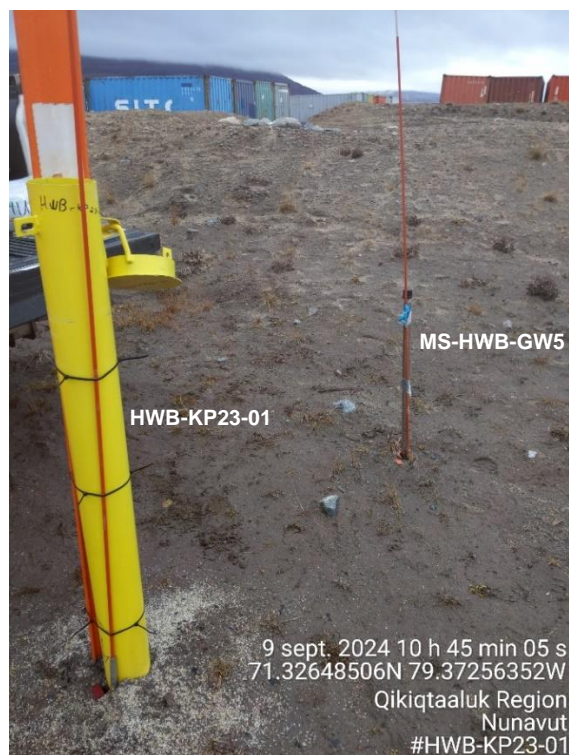


Photo A-36: Standpipe well HWB-KP23-01 and drive point piezometer MS-HWB-GW4 (9 September 2024) – Groundwater sampling.



Photo A-37: Drive point piezometer MS-HWB-GW5 (9 September 2024) - Groundwater sampling and collected a travel blank at this station.



Photo A-38: Standpipe well HWB-KP23-02 (9 September 2024) – Groundwater sampling.



Photo A-39: Standpipe well HWB-KP22-06 (9 September 2024) – Well was dry, no sample collected.



Photo A-40: Drive point piezometer MS-HWB-GW-REF1 (9 September 2024) – Groundwater sampling set-up. Standing water around the station. No cap was on the drive point piezometer prior to sampling, and it had been raining in the days prior to collecting sample. A cap was installed after sampling completed.



Photo A-41: Drive point piezometer MS-HWB-GW6 (9 September 2024) – Station was dry, no sample collected.



Photo A-42: Samples kept in fridge after each field day.

Seep and Surface Water Sampling



Photo A-43: MS-MRY-13C (7 September 2024) - Surface Water sampling near Sheardown Lake.



Photo A-44: Seep LF-DS-SEEP-01 (7 September 2024) – Seepage sampling at the Landfill Facility.



Photo A-45: Seep LF-DS-SEEP-02 (7 September 2024) – Seepage sampling at the Landfill Facility.



Photo A-46: LF-US-POND-01 (9 September 2024) - Surface Water sampling along the Landfill Facility limits.

Single Well Response Testing



Photo A-47: Standpipe well LF-KP23-01 (10 September 2024) – Slug test was completed using a 0.30 m long and 0.75-inch diameter slug.



Photo A-48: Standpipe well LF-KP22-03 (10 September 2024 – Slug test was completed using a Midwest Geoscience slug of 0.92 m long and 1.5-inch diameter.



Photo A-49: Standpipe well LF-KP23-11 (10 September 2024) – Slug test set-up.



Photo A-50: Standpipe well LF-KP22-01 (10 September 2024) – Slug test set-up.



Photo A-51: Standpipe well HWB-KP23-03 (11 September 2024) – Slug test set-up.

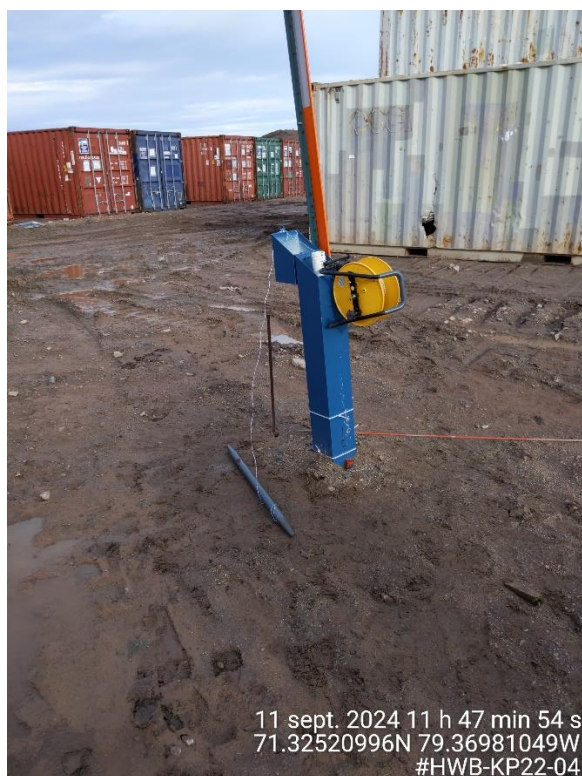


Photo A-52: Standpipe well HWB-KP23-04 (11 September 2024) – Slug test was completed using a Midwest Geoscience slug of 0.92 m long and 1.5-inch diameter.



Photo A-53: Standpipe well LF-KP23-07 (11 September 2024) – Slug test set-up.

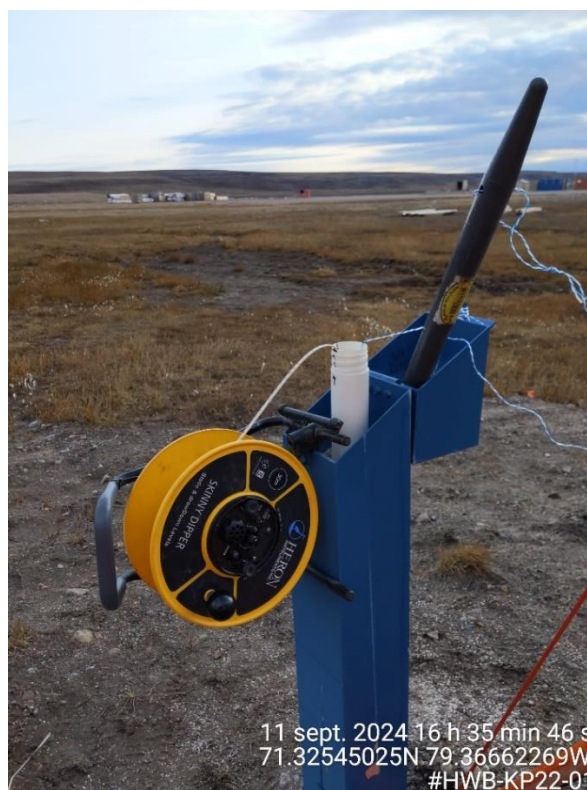


Photo A-54: Standpipe well HWB-KP22-01 (11 September 2024) - Slug test was completed using a Midwest Geoscience slug of 0.62 m long and 1.5-inch diameter.

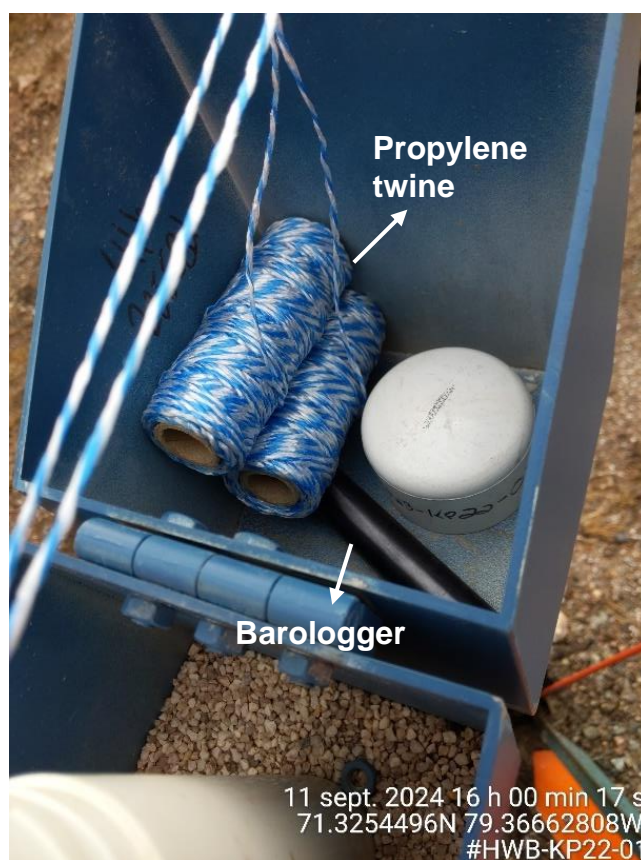


Photo A-55: Standpipe well HWB-KP22-01 (11 September 2024) – Pressure transducer and slug attached to the metal casing using propylene twine. Barologger is recording atmospheric pressure while conducting the slug test.

APPENDIX B

Daily Field Summaries



2024 Groundwater Well Installation Program
BAFFINLAND PO #: 9500000742
WSP Project: CA0023205.6339, 90000

DAILY FIELD PROGRAM UPDATE

4-Sept-2024

Weather: 5-10 °C, Snowed overnight, Overcast during the day.
BIM mentioned it had been raining a lot over the last 2 weeks.

Field crew: Justin James (BIM), Julie Perreault (WSP)

Task completed:

1- Site Orientation at Mine Site Complex

2- Meeting Team, GW Program Kick-off meeting and getting equipment at dorm room.
Thermistors and RST equipment are at Weather Haven. Getting equipment ready.

3- Completed Water Level survey at the Landfill Facility (LF). A total of 22 locations were visited (ie, all locations at LF area).

Measurements collected: PVC stick-up heights (mags), Depth to Water (mbtPVC), Date/Time of measurement, Depth to Well Bottom (mbtPVC), Comment.

The following was noted:

- Dry locations: LF-KP23-03, LF-KP23-10
- Water level is at ground surface at: MS-LF-GW-REF1; Damped area at Landfill



- Well never installed: LF-KP23-02 (as indicated in background reports)

DAILY FIELD PROGRAM UPDATE

- Tubing stuck at PVC height at the following drive points:
example



MS-LF-GW5 (collected WL measurement with mini-dipper, put directly in tubing)

MS-LF-GW4 (collected WL measurement with mini-dipper, put directly in tubing)

MS-LF-GW2 (collected WL measurement with mini-dipper, put directly in tubing)

MS-LF-GW3 (collected WL measurement with mini-dipper, put directly in tubing)

MS-LF-GW-REF2 (collected WL measurement with mini-dipper, put directly in tubing)

MS-LF-GW-REF3 (collected WL measurement with mini-dipper, put directly in tubing)

Also, there are few nearby drivepoints (within 3 m) at the locations indicated above.

Bold = no borehole log, difficult to say which one is the right one. See pictures.

Flagged drivepoints were flagged by BIM 2 days earlier, but there is uncertainty with GPS accuracy with locations within 3 m.

Yellow = Just realized we have the depth to bottom for these, I will try to confirm those ones tomorrow. See pictures. Depths to bottoms are somewhat similar, but unsure if other nearby drivepoints are at similar depths or not. See pictures.

Green = Confident we have collected the measurements at the right drivepoint based on depth to bottom (ie, MS-LF-GW-REF2) or drivepoint location base on site map and another close-by well LF-KP-XX (ie, MS-LF-GW-REF3). See pictures.

- Noticed 2-3 RST Thermistors installed on the way to LF area.

5-Sept-2024

Weather: 5-10 °C, Snowed overnight, Overcast during the day.

Fieldcrew: Liam Guenther (BIM), Justin James (BIM), Julie Perreault (WSP)

Task Completed:

1- Water Level survey at Hazardous Waste Berm. The following was noted:

- Dry locations: HWB-KP22-06, MS-HWB-REF1
- Locations that no longer exist: MS-HWB-GW9, MS-HWB-GW8, MS-HWB-GW7

DAILY FIELD PROGRAM UPDATE

- Standing water around drivepoint MS-HWB-GW-REF3



- Metal casing damaged at: HWB-KP23-03



2- Collected 4 groundwater samples at the landfill facility (LF) at well locations: LF-KP23-08, LF-KP23-07, LF-KP23-06 and LF-KP23-05. Started with the furthest wells.

Set-up:



6-Sept-2024

Weather: 1-5 °C, rain and snow

Fieldcrew: Liam Guenther (BIM), Julie Perreault (WSP)

Task Completed:

- Initially was planning on conducting slug tests at the 4 wells samples on 5-Sept-2024, but it was raining too much. We decided to continue with groundwater sampling.
- Collected 4 samples and 1 duplicate
LF-KP23-11, LF-KP23-09 and its duplicate QD_CC1, LF-KP22-05, MS-LF-GW-REF2

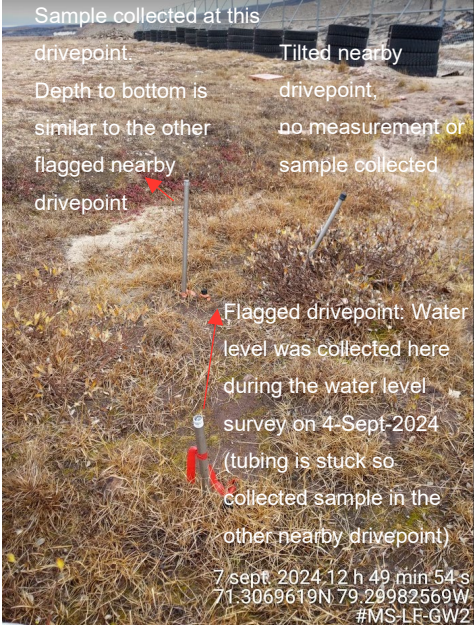
DAILY FIELD PROGRAM UPDATE



- Visited the following wells but did not collect sample: LF-KP23-10 (Dry) and MS-LF-GW-REF1 (tubing stuck in drivepoint)
- Nearby drivepoint MS-LF-GW-REF2:



DAILY FIELD PROGRAM UPDATE

	<p>- Came back to the office around 16:45 to prepare sampling bottles for shipment.</p>
7-Sept-2024	<p>Weather: 1-5 °C, some small showers in the morning, but cloudy most of the day</p> <p>Fieldcrew: Liam Guenther (BIM), Julie Perreault (WSP)</p> <p>Task Completed: -Groundwater sampling Collected sample at: LF-KP23-13*, LF-KP22-01 with field blank QD_BF1, LF-KP22-03, LF-KP23-01, MS-LF-GW2**, LF-KP23-04 Dry location at: LF-KP23-03 Tubing stuck at both nearby drivepoint at locations: MS-LF-GW4 and MS-LF-GW5. No sample could be collected</p> <p>*LF-KP23-13 The sample ID is named MS-LF-GW-REF1 because the Equis datasheet on BIM's tablet had been prepared for that location (and tubing is stuck and no sample could be collected), whereas no Equis sheet for LF-KP23-13. The sample ID for LF-KP23-13 is MS-LF-GW-REF1_2024-09-13. Will have to correct this in the Equis database. BIM have left a comment about that on the Equis datasheet.</p> <p>**MS-LF-GW2 – nearby drivepoints</p>  <p>-Conducted camera survey using a downhole camera at the following wells: MS-LF-GW4: frozen LF-KP23-03 and LF-KP23-01: There is a gap at PVC joint and camera gets stuck there, unable to get all the way down to well bottom.</p>

DAILY FIELD PROGRAM UPDATE

-Seep survey and sampling:

Collected 3 seep samples downgradient of the landfill near Sheardown lake and within the landfill. Collected YSI measurements, general observation, XY coordinates and photos at all locations.

MS-MRY-13C, LF-DS-SEEP-01, and LF-DS-SEEP-02.



8-Sept-2024

Weather: 1-5 °C, rained all day, very windy

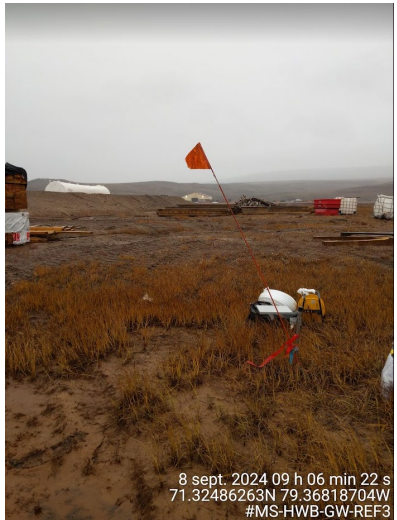
Fieldcrew: Liam Guenther (BIM), Julie Perreault (WSP)

Task Completed:

-Groundwater sampling

Collected sample at:

MS-HWB-GW-REF3, HWB-KP22-01, HWB-KP22-03, HWB-KP22-04, HWB-KP23-02, HWB-KP23-03



DAILY FIELD PROGRAM UPDATE

Tubing is stuck at: MS-HWB-GW-REF2



- QA and prepared samples to be shipped
- Helping BIM crew sorting the groundwater gear they have
- Discussion with team about the plan for the next days

9-Sept-2024

Weather: 1-5 °C, showers, cloudy, very windy

Fieldcrew: Liam Guenther (BIM), Julie Perreault (WSP)

-Groundwater sampling

Collected sample at:

MS-HWB-GW-REF1, MS-HWB-GW4, HWB-KP22-05 and its duplicate QD-CC3, MS-HWB-GW5 and travel blank QD-BT3, HWB-KP23-01



DAILY FIELD PROGRAM UPDATE

Dry location: MS-HWB-GW6

Dry location on September 4th during Water Level survey at HWB-KP22-06, but measured water level of 1.750 mbtPVC (depth to bottom = 2.657 mbtPVC) on September 9 after all the rain we have had over the last days. We have discussed with the coordinator and we have decided not to sample this location.

MS-HWB-GW1 and MS-HWB-GW2 no longer exist.

-Seep sampling

Collected 1 seep sample upgradient of the landfill. Collected YSI measurements, general observation, XY coordinates and photos.

LF-US-POND-01



10-Sept-2024

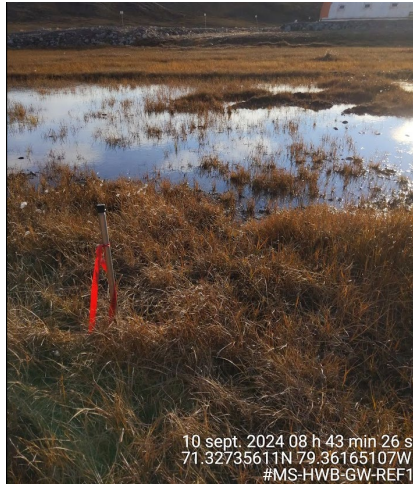
Weather: 8-10 °C, sunny and overcast

Fieldcrew: Liam Guenther (BIM), Julie Perreault (WSP)

Task Completed:

-Added a cap at drivepoint MS-HWB-GW-REF1

DAILY FIELD PROGRAM UPDATE



-Submitted a general bottle sample at the ALS lab

- Slug testing at the following locations:

LF-KP22-01 (within landfill)

LF-KP23-11(upgradient of landfill)

LF-KP22-03 (within landfill)

LF-KP23-01 (downgradient of landfill)



DAILY FIELD PROGRAM UPDATE



Responses are very quick.

Set-up the barologger (timestamp: 0.125 sec) at LF-KP23-01 in the morning. Unfortunately, the barologger did not have enough memory to collect data during the whole day with this timestamp. Tomorrow, we will set up the barologger at each new slug test.

-Could not conduct slug tests at:

MS-LF-GW2: slug and solinst datalogger did not fit in the drivepoint.

LF-KP22-05: Not deep enough to put both datalogger and slug in well (not fully submerged).

DAILY FIELD PROGRAM UPDATE

-General view of the landfill



11-Sept-2024

Weather: 5 °C, sunny and overcast

Fieldcrew: Liam Guenther (BIM), Julie Perreault (WSP)

Tasks completed:

- Slug testing at the following locations:

HWB-KP22-01 (Cross-gradient, in front of helipad)

HWB-KP22-04 (Downgradient HWB)

HWB-KP23-01 (Downgradient of HWB)

HWB-KP23-03 (Within HWB)

LF-KP23-07 (south-east of landfill)

Barologger was set up and data downloaded at each new location.

Responses were very quick.

DAILY FIELD PROGRAM UPDATE



-Conducted a camera survey with downhole camera at HWB-KP23-03 (damaged metal casing and PVC)
PVC pinches out where damaged. PVC joint gap observed too.
Was able to reach the depth to bottom of well.

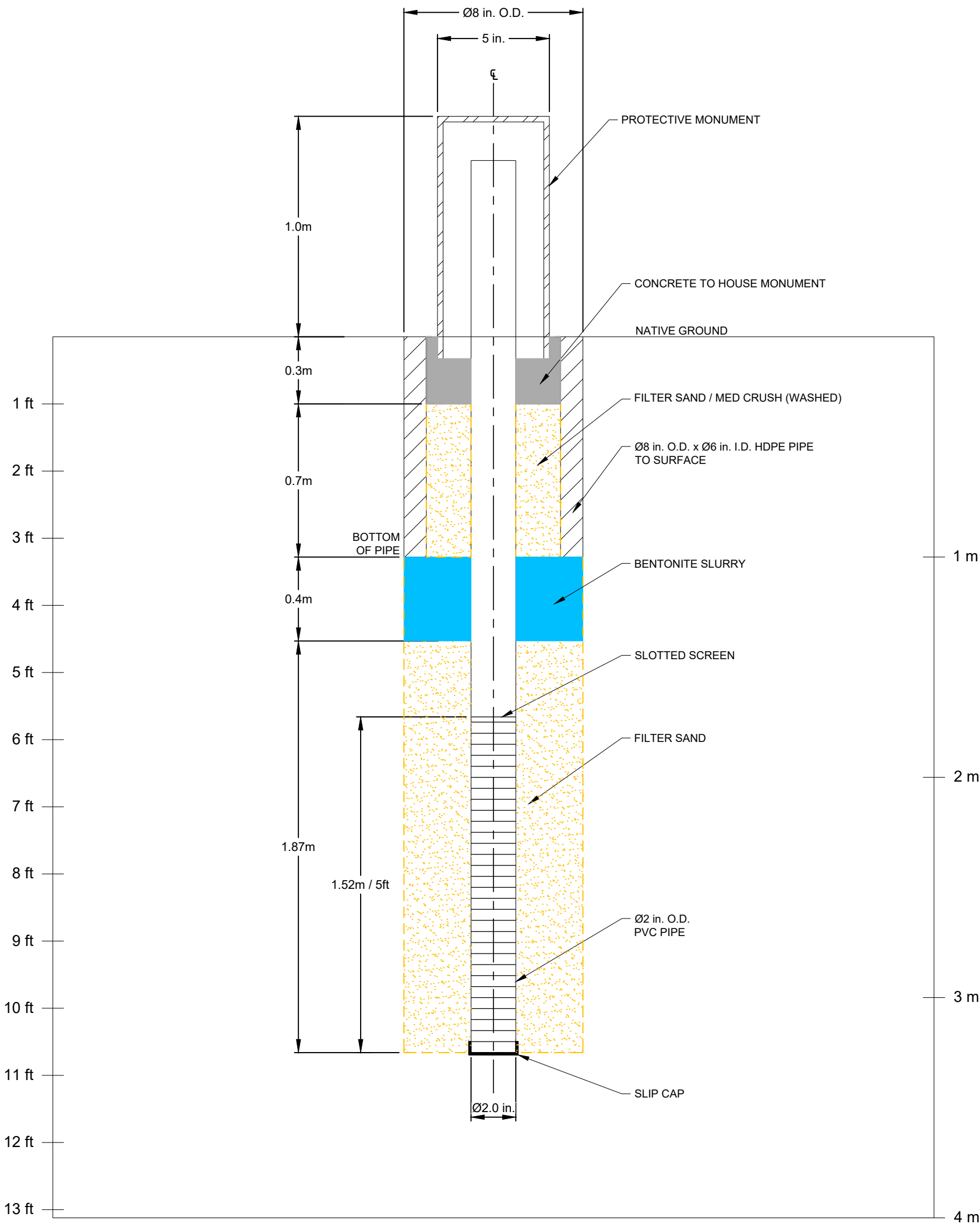


-Helped BIM labelling the GW equipment they have on-site (Sea can)
Have left BIM the two 0.75 inch slugs (lengths: 0.6 and 0.3 m).

-Will prepare a list of equipment BIM needs for the future GW programs (requested by Rachel Noddle)

APPENDIX C

Conceptual Well Design



NOTE(S)
• DRAWING IS BASED ON A SKETCH AND NOT TO SCALE.

	PIPE SECTION		CENTERLINE
	SLOTTED SCREEN		
	FILTER SAND		
	CONCRETE		
	BENTONITE SLURRY		

CLIENT
MARY RIVER MINE - BAFFINLAND

CONSULTANT



YYYY-MM-DD	AUGUST, 2024
DESIGNED	BG
PREPARED	ABA
REVIEWED	
APPROVED	

PROJECT
GROUNDWATER WELL INSTALLATION

TITLE
CONCEPTUAL SHALLOW MONITORING
WELL DESIGN FOR ACTIVE ZONE

PROJECT NO. CA0023205.6339 CONTROL 90000.01-HS-0001

REV. A

FIGURE 1

DRAFT

APPENDIX D

**Drive point Piezometer and
Standpipe Well Information
Summary Table**

Appendix D
Drive Point Piezometer and Standpipe Well Information Summary Table

Station	Easting (X) - NAD83 UTM 17N	Northing (Y) - NAD93 UTM 17N	Year Installed	Distance Qualifier ^(a)	Well Type	Active/Inactive	PVC pipe Diameter (inch)	2024 Observations
Landfill Facility								
LF-KP23-01	560678	7912606	2023	Downgradient	Standpipe well (no bentonite seal)	Active	1	No tubing in standpipe well, Appendix B Photos B-27 and B-47.
LF-KP23-02	560747	7912597	2023	-	Standpipe well (no bentonite seal)	Inactive	1	Well was never installed, Appendix B Photo B-1.
LF-KP23-03	560688	7912423	2023	Downgradient	Standpipe well (no bentonite seal)	Active	1	No tubing in standpipe well, Appendix B Photo B-26.
LF-KP23-04	560775	7912471	2023	Downgradient	Standpipe well (no bentonite seal)	Active	1	No tubing in standpipe well, Appendix B Photo B-23.
LF-KP23-05	560860	7912406	2023	Proximal	Standpipe well (no bentonite seal)	Active	1	No tubing in standpipe well, Appendix B Photo B-12.
LF-KP23-06	560968	7912334	2023	Background	Standpipe well (no bentonite seal)	Active	1	No tubing in standpipe well, Appendix B Photo B-13.
LF-KP23-07	561037	7912313	2023	Background	Standpipe well (no bentonite seal)	Active	1	No tubing in standpipe well, Appendix B Photo B-53.
LF-KP23-08	561122	7912257	2023	Background	Standpipe well (no bentonite seal)	Active	1	No tubing in standpipe well.
LF-KP23-09	561131	7912363	2023	Background	Standpipe well (no bentonite seal)	Active	1	No tubing in standpipe well, Appendix B Photo B-15.
LF-KP23-10	561022	7912442	2023	Background	Standpipe well (no bentonite seal)	Active	1	No tubing in standpipe well Appendix B Photo B-3.
LF-KP23-11	560976	7912545	2023	Proximal	Standpipe well (no bentonite seal)	Active	1	No tubing in standpipe well, Appendix B Photos B-16 and B-49.
LF-KP23-13	560815	7912642	2023	Source	Standpipe well (no bentonite seal)	Active	1	No tubing in standpipe well, Appendix B Photo B-18.
LF-KP22-01	560813	7912593	2022	Source	Standpipe well (no bentonite seal)	Active	2	No tubing in standpipe well, Appendix B Photo B-19.
LF-KP22-03	560831	7912464	2022	Source	Standpipe well (no bentonite seal)	Active	2	No tubing in standpipe well, Appendix B Photo B-20.
LF-KP22-05	560953	7912604	2022	Proximal	Standpipe well (no bentonite seal)	Active	2	No tubing in standpipe well, metal casing does not fully close. Appendix B Photo B-4.
MS-LF-GW1	560816	7912599	2017	Source	Drive point piezometer	Still active, but replaced by LF-KP22-01	0.75	-
MS-LF-GW2	560812	7912486	2017	Proximal	Drive point piezometer	Active	0.75	3 nearby drive point piezometers: One is tilted, one had tubing stuck in and the other one without tubing in, Appendix B Photo B-21.
MS-LF-GW3	560823	7912460	2017	Source	Drive point piezometer	Still active, but replaced by LF-KP22-03	0.75	2 nearby drive point piezometers, Appendix B Photo B-21.
MS-LF-GW4	560753	7912485	2020	Downgradient	Drive point piezometer	Partially active	0.75	Tubing is stuck at both near-by drive point piezometers, only water levels can be collected using a mini dipper at this location, Appendix B Photo B-24.
MS-LF-GW5	560714	7912483	2020	Downgradient	Drive point piezometer	Partially active	0.75	Tubing is stuck at both near-by drive point piezometers, only water levels can be collected a mini dipper at this location, Appendix B Photo B-25.
MS-LF-GW-REF1	560838	7912637	2018	Source	Drive point piezometer	Partially active	0.75	Tubing is stuck in drive point piezometer, only water levels can be collected a mini dipper at this location. Lots of standing water around drivepoint, that may impact water level measurement, Appendix B Photo B-17.
MS-LF-GW-REF2	560878	7912408	2017	Proximal	Drive point piezometer	Active	0.75	2 nearby drive point piezometers: One with tubing stuck and the other one without any tubing in the drivepoint, Appendix B Photo B-14.
MS-LF-GW-REF3	560954	7912604	2020	Proximal	Drive point piezometer	Still active, but replaced by LF-KP22-05	0.75	2 nearby drive point piezometers: One with tubing stuck and the other one without any tubing in drivepoint, Appendix B Photo B-4.
Hazardous Waste Berm Facility								
HWB-KP23-01	558153	7914590	2023	Source	Standpipe well (no bentonite seal)	Active	1	No tubing in standpipe well, Appendix B Photos B-5 and B-36
HWB-KP23-02	558212	7914566	2023	Source	Standpipe well (no bentonite seal)	Active	1	No tubing in standpipe well, Appendix B Photo B-38.
HWB-KP23-03	558217	7914543	2023	Proximal	Standpipe well (no bentonite seal)	Active	1	Metal casing at the standpipe well is in bad conditions, but the PVC pipe seem intact. Appendix B Photos B-31 and B-50.
HWB-KP22-01	558364	7914484	2022	Background	Standpipe well (no bentonite seal)	Active	2	No tubing in standpipewell, Appendix B Photos B-28 and B-54.
HWB-KP22-03	558302	7914516	2022	Source	Standpipe well (no bentonite seal)	Active	2	No tubing in standpipewell, Appendix B Photo B-30.
HWB-KP22-04	558253	7914452	2022	Proximal	Standpipe well (no bentonite seal)	Active	2	No tubing in standpipewell, Appendix B Photo B-31.
HWB-KP22-05	558176	7914524	2022	Proximal	Standpipe well (no bentonite seal)	Active	2	No tubing in standpipe well, Appendix B Photo B-35.
HWB-KP22-06	558472	7914597	2022	Background	Standpipe well (no bentonite seal)	Active	2	No tubing in standpipe well, Appendix B Photo B-39.
MS-HWB-GW1	558489	7914483	unknown	Background	Drive point piezometer	No longer exists	0.75	-
MS-HWB-GW2	558487	7914459	unknown	Background	Drive point piezometer	No longer exists	0.75	-
MS-HWB-GW3	558258	7914467	2021	Proximal	Drive point piezometer	Still active, but replaced by HWB-KP22-04	0.75	No tubing in drive point piezometer, Appendix B Photo B-7.
MS-HWB-GW4	558262	7914546	2021	Source	Drive point piezometer	Active	0.75	No tubing in drive point piezometer, Appendix B Photos B-33 and B-34.
MS-HWB-GW5	558152	7914591	2021	Source	Drive point piezometer	Active	0.75	No tubing in drive point piezometer, Appendix B Photo B-37.
MS-HWB-GW6	558045	7914195	2021	Downgradient	Drive point piezometer	Active	0.75	No tubing in drive point piezometer, Appendix B Photo B-41.
MS-HWB-GW7	558198	7914533	2021	Proximal	Drive point piezometer	No longer exists	0.75	-
MS-HWB-GW8	558303	7914524	2022 ^(b)	Source	Drive point piezometer	No longer exists	0.75	-
MS-HWB-GW9	558471	7914608	2022 ^(b)	Background	Drive point piezometer	No longer exists	0.75	-
MS-HWB-GW-REF1	558526	7914463	2021	Background	Drive point piezometer	Active	0.75	No cap and no tubing in drive point piezometer. A cap was added after a sample had been collected in 2024, Appendix B Photo B-40.
MS-HWB-GW-REF2	558363	7914485	2021	Background	Drive point piezometer	Active	0.75	Tubing is stuck in drive point piezometer, Appendix B Photo B-8.
MS-HWB-GW-REF3	558323	7914420	2021	Background	Drive point piezometer	Active	0.75	No tubing in drive point piezometer, lots of standing water around station, Append B Photo B-6.

(a) Distance from Landfill Facility Qualifiers are defined as: Source = Station is located within active cells (Cells 1, 2) in the landfill, Proximal= Station is within 20 metres from landfill limits, Downgradient = Station is located more than 20 m downgradient from the landfill's limits towards Sheardown Lake, Background = Station is located in the inactive cells (Cells 3, 4, 5) of the landfill or upgradient of the landfill. Distances from HWB Facility Qualifiers are defined as: Source = Station is located within HWB Facility limits or less than 20 m from the HWB Facility limits, Proximal =Station is located more than 20 metres from HWB Facility limits, Downgradient = Station is located more than 20 m downgradient from the HWB Facility towards Camp Lake , Background = Station is located upgradient or more than 20 m from HWB Facility limits.

(b) Year installed assumed based on first year the station was monitored.

LF-KP22-01	Station was sampled in 2023 and/or 2024
LF-KP22-01	Water level measured in 2023 and/or 2024

APPENDIX E

**2023 and 2024 Groundwater Levels
and Analytical Result Tables**

Table E-1: 2023 and 2024 Water level measurements collected at the Landfill Facility, Mary River Mine

Distance from Landfill Qualifier ^(a)		Source				Source				Source		Source		Source		Proximal				Proximal																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
		LF-KP22-01				LF-KP22-03				LF-KP23-13		MS-LF-GW1		MS-LF-GW3		MS-LF-GW-REF1		LF-KP22-05				LF-KP23-05																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
		Well Location Date (M/DD/YYYY)				9/19/2023 ^(d) 9/4/2024 ^(e) 9/7/2024 ^(f) 10/11/2024 ^(g)				9/19/2023 ^(d) 9/4/2024 ^(e) 9/7/2024 ^(f) 10/11/2024 ^(g)				9/19/2023 ^(d) 9/4/2024 ^(e) 9/7/2024 ^(f) 10/11/2024 ^(g)				9/19/2023 ^(d) 9/4/2024 ^(e) 9/6/2024 ^(f) 10/11/2024 ^(g)				9/19/2023 ^(d) 9/4/2024 ^(e) 9/5/2024 ^(f) 10/11/2024 ^(g)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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BIM: Baffinland Iron Mines, LF: Landfill Facility, mags: metres above ground surface, mg/L: milligram per litre, mbtPVC: metres below top of PVC, na: not available, PVC: Polyvinyl chloride

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(b) PVC casing elevations surveyed by Baffinland Iron Mines in November 2024.

(c) Ground surface elevations were calculated based on PVC tubing height and surveyed casing elevations. Ground surface elevations for location that had not been surveyed in 2024 come from previous reports (Teltra Tech 2022, KP 2023, KP 2024) and include: MS-LF-GW2, MS-LF-GW3, MS-LF-GW-REF3, MS-LF-GW4, MS-LF-GW5, MS-LF-GW-REF1

(d) Water level measurement collected during the 2023 Program by KP (KP, 2024)

(e) Water level measurement collected on 4-Sept-2024 by WSP to assess groundwater levels. No sample collected.

(f) Water level measurement collected prior to purging and collecting a sample in 2024.

(g) Water level measurement collected on 11-Oct-2024 by Baffinland Iron Mines. This water level measurement was collected after the 1 in a 1000 year rain event that occurred end of September 2024. No sample collected.

(h) Well is frozen

(i) Water levels on 5-Sept-2024 had not been collected, but used water level measurements from 4-Sept-2024 for purging calculations

Distance from Landfill Qualifier ^(a) Well Location Date (M/DD/YYYY) COA number		Proximal LF-KP23-11				Proximal MS-LF-GW2				Proximal MS-LF-GW-REF2			Proximal LF-KP23-10		Proximal MS-LF-GW-REF3		Downgradient LF-KP23-01				Downgradient LF-KP23-04			
		9/19/2023 ^(d)	9/4/2024 ^(e)	9/6/2024 ^(f)	10/11/2024 ^(g)	9/19/2023 ^(d)	9/4/2024 ^(e)	9/7/2024 ^(h)	10/11/2024 ^(g)	9/19/2023 ^(d)	9/4/2024 ^(e)	9/6/2024 ^(f)	9/19/2023 ^(d)	9/4/2024 ^(e)	9/19/2023 ^(d)	9/4/2024 ^(e)	9/19/2023 ^(d)	9/4/2024 ^(e)	9/7/2024 ^(h)	10/11/2024 ^(g)	9/19/2023 ^(d)	9/4/2024 ^(e)	9/7/2024 ^(h)	10/11/2024 ^(g)
		-	-	BF2400320	-	-	-	BF2400323	-	-	-	BF2400320	-	-	-	-	-	-	BF2400323	-	-	-	BF2400323	-
		Field Observations	Unit																					
		na	Sunny, overcast	Rainy	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event	na	Sunny, overcast	Cloudy, 5°C	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event	na	Sunny, overcast	Cloudy, rainy, snowy, 0°C	na	Sunny, overcast	na	Sunny, overcast	na	Sunny, overcast	Cloudy	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event	na	Sunny, overcast	Cloudy	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event
Weather																								
Well PVC tubing height	mags	-	1.162	1.162	1.162	na	0.382	0.382	0.382	-	0.441	0.441	-	1.098	-	1.00	-	1.075	1.075	1.075	-	1.135	1.135	1.135
Depth to bottom	mbtPVC	-	2.725	2.651	1.76 ^(h)	na	1.89	1.742	1.74	-	1.795	1.741	-	2.655	-	1.74	-	2.57	2.494	2.49	-	2.385	2.308	2.3
Depth to water	mbtPVC	-	1.635	1.62	1.415	na	1.082	1.08	0.85	-	1.155	1.155	-	Dry	-	1.145	-	1.505	1.854	1.17	-	1.505	1.485	1.42
Well depth from surface	mbgs	-	1.56	1.49	0.60	1.23	1.51	1.36	1.36	1.08	1.35	1.30	na	1.56	0.96	0.74	-	1.50	1.42	1.42	-	1.25	1.17	1.17
Water depth from surface	mbgs	0.690	0.473	0.458	0.253	0.900	0.700	0.698	0.468	0.830	0.714	0.714	2.180	Dry	0.840	0.145	0.660	0.430	0.779	0.095	0.470	0.370	0.350	0.285
PVC casing elevation ⁽ⁱ⁾	masl	-	189.052	189.052	189.052	-	-	-	-	-	179.731	179.731	-	188.88	-	187.98	-	170.774	170.774	170.774	-	178.236	178.236	178.236
Ground surface elevation ^(j)	masl	187.7	187.89	187.89	187.89	178.13	178.13	178.13	178.13	179.3	179.29	179.29	187.69	187.782	186.98	186.98	169.68	169.699	169.699	169.699	177.31	177.101	177.101	177.101
Estimated groundwater elevation	masl	187.010	187.417	187.432	187.637	177.230	177.430	177.432	177.662	178.470	178.576	178.576	185.510	-	186.140	186.835	169.020	169.269	168.920	169.604	176.840	176.731	176.751	176.816

BIM: Baffinland Iron Mines, LF: Landfill Facility, mags: metres above ground surface, mg/L: milligram per litre, mbtPVC: metres below top of PVC, na: not available, PVC: Polyvinyl chloride

(a) Distance from Landfill Facility Qualifiers are defined as: Source = Station is located within active cells (Cells 1, 2) in the landfill, Proximal= Station is within 20 metres from landfill limits, Downgradient = Station is located more than 20 m downgradient from the landfill's limits towards Sheardown Lake, Background = Station is located in the inactive cells (Cells 3, 4, 5) of the landfill or upgradient of the landfill.

(b) PVC casing elevations surveyed by Baffinland Iron Mines in November 2024.

(c) Ground surface elevations were calculated based on PVC tubing height and surveyed casing elevations. Ground surface elevations for location that had not been surveyed in 2024 come from previous reports (Tetra Tech 2022, KP 2023, KP 2024) and include: MS-LF-GW2, MS-LF-GW3, MS-LF-GW-REF3, MS-LF-GW4, MS-LF-GW5, MS-LF-GW-REF1

(d) Water level measurement collected during the 2023 Program by KP (KP, 2024)

(e) Water level measurement collected on 4-Sept-2024 by WSP to assess groundwater levels. No sample collected.

(f) Water level measurement collected prior to purging and collecting a sample in 2024.

(g) Water level measurement collected on 11-Oct-2024 by Baffinland Iron Mines. This water level measurement was collected after the 1 in a 1000 year rain event that occurred end of September 2024. No sample collected.

(h) Well is frozen

(i) Water levels on 5-Sept-2024 had not been collected, but used water level measurements from 4-Sept-2024 for purging calculations

Table E-1: 2023 and 2024 Water level measurements collected at the Landfill Facility, Mary River Mine

Distance from Landfill Qualifier ^(a) Well Location Date (M/DD/YYYY) COA number		Downgradient		Downgradient	Downgradient	Background				Background				Background				Background			
		LF-KP23-03		MS-LF-GW4	MS-LF-GW5	LF-KP23-06				LF-KP23-07				LF-KP23-08				LF-KP23-09			
		9/19/2023 ^(c)	9/4/2024 ^(e)	9/4/2024 ^(e)	9/4/2024 ^(e)	9/19/2023 ^(c)	9/4/2024 ^(e)	9/5/2024 ^(f)	10/11/2024 ^(g)	9/19/2023 ^(c)	9/4/2024 ^(e)	9/5/2024 ^(f)	10/11/2024 ^(g)	9/19/2023 ^(c)	9/4/2024 ^(e)	9/5/2024 ^(f)	10/11/2024 ^(g)	9/19/2023 ^(c)	9/4/2024 ^(e)	9/6/2024 ^(f)	10/11/2024 ^(g)
		-	-	-	-	-	-	BF2400320	-	-	-	BF2400320	-	-	-	BF2400320	-	-	-	BF2400320	-
Field Observations	Unit																				
		na	Sunny, overcast	Sunny, overcast	Sunny, overcast	na	Sunny, overcast	Sunny, overcast	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event	na	Sunny, overcast	Sunny, overcast	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event	na	Sunny, overcast	Sunny	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event	na	Sunny, overcast	Rainy	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event
Weather																					
Well PVC tubing height	mags	-	1.096	0.53	0.62	-	0.935	0.935	0.935	-	1.024	1.024	1.024	-	0.958	0.958 ^(h)	0.958	-	0.925	0.925	0.925
Depth to bottom	mbtPVC	-	2.86	1.735	1.741	-	2.31	2.213	2.21	-	2.305	2.229	Frozen	-	2.305	2.305 ^(h)	2.225	-	2.295	2.219	2.22
Depth to water	mbtPVC	-	Dry	1.248	1.622	-	1.525	1.512	1.41	-	1.120	1.093	0.85	-	1.735	1.735 ^(h)	1.64	-	1.206	1.132	0.97
Well depth from surface	mbgs	-	1.76	1.21	1.12	-	1.38	1.28	1.28	-	1.28	1.21	-	-	1.35	1.35	1.27	-	1.37	1.29	1.30
Water depth from surface	mbgs	2.340 ^(b)	Dry	0.718	1.002	0.610	0.590	0.577	0.475	-0.160	0.096	0.069	-0.174	0.890	0.777	0.777	0.682	0.610	0.281	0.207	0.045
PVC casing elevation ^(c)	masl	-	173.844	175.79	172.7	-	180.038	180.038	180.038	-	179.744	179.744	179.744	-	180.205	180.205	180.205	-	187.958	187.958	187.958
Ground surface elevation ^(c)	masl	172.67	172.748	175.26	172.08	179.05	179.103	179.103	179.103	179	178.72	178.72	178.72	179.58	179.247	179.247	179.247	187.41	187.033	187.033	187.033
Estimated groundwater elevation	masl	170.330	-	174.542	171.078	176.440	178.513	178.526	178.628	179.160	178.624	178.651	178.894	178.690	178.470	178.470	178.565	186.800	186.752	186.826	186.988

BIM: Baffinland Iron Mines, LF: Landfill Facility, mags: metres above ground surface, mg/L: milligram per litre, mbtPVC: metres below top of PVC, na: not available, PVC: Polyvinyl chloride

(a) Distance from Landfill Facility Qualifiers are defined as: Source = Station is located within active cells (Cells 1, 2) in the landfill, Proximal= Station is within 20 metres from landfill limits, Downgradient = Station is located more than 20 m downgradient from the landfill's limits towards Sheardown Lake, Background = Station is located in the inactive cells (Cells 3, 4, 5) of the landfill or upgradient of the landfill.

(b) PVC casing elevations surveyed by Baffinland Iron Mines in November 2024.

(c) Ground surface elevations were calculated based on PVC tubing height and surveyed casing elevations. Ground surface elevations for location that had not been surveyed in 2024 come from previous reports (Tetra Tech 2022, KP 2023, KP 2024) and include: MS-LF-GW2, MS-LF-GW3, MS-LF-GW-REF3, MS-LF-GW4, MS-LF-GW5, MS-LF-GW-REF1

(d) Water level measurement collected during the 2023 Program by KP (KP, 2024)

(e) Water level measurement collected on 4-Sept-2024 by WSP to assess groundwater levels. No sample collected.

(f) Water level measurement collected prior to purging and collecting a sample in 2024.

(g) Water level measurement collected on 11-Oct-2024 by Baffinland Iron Mines. This water level measurement was collected after the 1 in a 1000 year rain event that occurred end of September 2024. No sample collected.

(h) Well is frozen

(i) Water levels on 5-Sept-2024 had not been collected, but used water level measurements from 4-Sept-2024 for purging calculations

Table E-2: 2023 and 2024 Water level measurements collected at the Hazardous Waste Berm Facility, Mary River Mine

Distance from HWB Facilities Qualifier ^(a)					Source				Source				Source				Source				Proximal			
Station					HWB-KP23-01				HWB-KP23-02				HWB-KP22-03				MS-HWB-GW5				MS-HWB-GW4			
Date (M/DD/YYYY)					9/19/2023 ^(d)	9/5/2024 ^(e)	9/9/2024 ^(f)	10/11/2024 ^(g)	9/19/2023 ^(d)	9/5/2024 ^(e)	9/8/2024 ^(f)	10/11/2024 ^(g)	9/19/2023 ^(d)	9/5/2024 ^(e)	9/8/2024 ^(f)	10/11/2024 ^(g)	9/19/2023 ^(d)	9/5/2024 ^(e)	9/9/2024 ^(f)	10/11/2024 ^(g)	9/19/2023 ^(d)	9/5/2024 ^(e)	9/8/2024 ^(f)	10/11/2024 ^(g)
COA number					-	-	BF2400327	-	-	-	BF2400327	-	-	-	BF2400323	-	-	-	BF2400327	-	-	-	BF2400323	-
Field Observations					Unit																			

		na	Sunny, overcast	Cloudy, very windy	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event	na	Sunny, overcast	Cloudy, rainy	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event	na	Sunny, overcast	Cloudy, rainy	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event	na	Sunny, overcast	Cloudy, windy	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event	na	Sunny, overcast	Cloudy, very windy	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event	na	Sunny, overcast	Cloudy, rainy	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event
Weather	mags	-	1.154	1.154	1.154	-	1.64	1.64	1.64	-	1.143	1.143	1.143	-	0.688	0.688 ⁽ⁱ⁾	0.688	-	0.538	0.538 ⁽ⁱ⁾	0.538	-	1.003	1.003	1.003
Well PVC tubing height	mbtPVC	-	2.57	2.475	2.475	-	2.62	2.542	2.555	-	2.620	2.548	2.545	-	1.811	1.811 ⁽ⁱ⁾	1.735	-	1.811	1.811 ⁽ⁱ⁾	1.73	-	2.495	2.42	2.42
Depth to bottom	mbtPVC	-	1.52	1.311	1.4	-	1.785	1.654	1.74	-	1.560	1.513	1.325	-	1.06	1.06 ⁽ⁱ⁾	0.83	-	0.962	0.962 ⁽ⁱ⁾	0.53	-	1.275	1.214	1.065
Depth to water	mbgs	-	1.416	1.321	1.321	-	0.98	0.902	0.915	-	1.477	1.405	1.402	-	1.123	1.123	1.047	-	1.273	1.273	1.192	-	1.492	1.417	1.417
Well depth from surface	mbgs	0.51	0.366	0.157	0.246	0.53	0.145	0.014	0.1	0.53	0.417	0.37	0.182	0.00	0.372	0.372	0.142	0.52	0.424	0.424	-0.008	0.55	0.272	0.211	0.062
Water depth from surface	masl	-	174.588	174.588	174.588	-	175.263	175.263	175.263	-	175.465	175.465	175.465	-	174.358	174.358	174.358	-	174.808	174.808	174.808	-	174.681	174.681	174.681
PVC casing elevation ^(b)	masl	173.67	173.434	173.434	173.434	175.07	173.623	173.623	173.623	174.47	174.322	174.322	174.322	173.67	173.67	173.67	173.67	174.27	174.27	174.27	174.27	174.13	173.678	173.678	173.678
Ground surface elevation ^(c)	masl	173.16	173.068	173.277	173.188	174.54	173.478	173.609	173.523	173.94	173.905	173.952	174.14	173.67	173.298	173.298	173.528	173.75	173.846	173.846	174.278	173.58	173.406	173.467	173.616
Estimated groundwater elevation																									

BIM: Baffinland Iron Mines, HWB: Hazard Waste Berm, GW: Groundwater, mags: metres above ground surface, mbtPVC: metres below top of PVC, na: not available, PVC: Polyvinyl chloride

(a) Distance from HWB Facility Qualifiers are defined as: Source = Station is located within HWB Facility limits or less than 20 m from the HWB Facility limits, Proximal =Station is located more than 20 metres from HWB Facility limits, Downgradient = Station is located more than 20 m downgradient from the HWB Facility towards Camp Lake , Background = Station is located upgradient or more than 20 m from HWB Facility limits.

(b) PVC casing elevations surveyed by Baffinland Iron Mines in November 2024.

(c) Ground surface elevations were calculated based on PVC tubing height and surveyed casing elevations. Ground surface elevations for location that had not been surveyed in 2024 come from previous reports (Tetra Tech 2022, KP 2023, KP 2024) and include: MS-HWB-GW3, MS-HWB-GW4, MS-HWB-GW5, MS-HWB-GW6, HWB-KP23-03, MS-HWB-GW-REF1, MS-HWB-GW-REF2, MS-HWB-GW-REF3

(d) Water level measurement collected during the 2023 Program by KP (KP, 2024)

(e) Water level measurement collected on 5-Sept-2024 to assess groundwater levels. No sample collected.

(f) Water level measurement collected prior to purging and sampling.

(g) Water level measurement collected on 11-Oct-2024 by Baffinland Iron Mines. This water level measurement was collected after the 1 in a 1000-year rain event that occurred end of September 2024. No sample collected.

(h) Well is frozen

(i) Water levels on sampling day had not been collected, but used water level measurements from 5-Sept-2024 for purging calculations

Table E-2: 2023 and 2024 Water level measurements collected at the Hazardous Waste Berm Facility, Mary River Mine

Distance from HWB Facilities Qualifier ^(a)		Proximal				Proximal				Proximal		Background				Background				Background		Background	Background	Background
Station Date (M/DD/YYYY)	COA number	HWB-KP22-05				HWB-KP23-03				MS-HWB-GW3		HWB-KP22-01				MS-HWB-GW-REF3				MS-HWB-GW-REF1		MS-HWB-GW-REF2	MS-HWB-GW6	HWB-KP22-06
		9/19/2023 ^(d)	9/5/2024 ^(e)	9/9/2024 ^(f)	10/11/2024 ^(g)	9/19/2023 ^(d)	9/5/2024 ^(e)	9/8/2024 ^(f)	10/11/2024 ^(g)	9/19/2023 ^(d)	9/5/2024 ^(e)	9/19/2023 ^(d)	9/5/2024 ^(e)	9/8/2024 ^(f)	10/11/2024 ^(g)	9/19/2023 ^(d)	9/5/2024 ^(e)	9/8/2024 ^(f)	10/11/2024 ^(g)	9/5/2024 ^(e)	9/9/2024 ^(f)	9/5/2024 ^(e)	9/5/2024 ^(e)	9/5/2024 ^(e)
		-	-	BF2400327	-	-	-	BF2400327	-	-	-	-	-	BF2400323	-	-	-	BF2400323	-	-	BF2400330	-	-	-
Field Observations	Unit																							
Weather		na	Sunny, overcast	Cloudy, very windy	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event	na	Sunny, overcast	Cloudy, rainy, windy	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event	na	Sunny, overcast	na	Sunny, overcast	Rainy, windy	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event	na	Sunny, overcast	Rainy, windy	Unknown the day of measurement, but was collected following the 1 in 1000-year rain event	Sunny, overcast	Cloudy, windy	Sunny, overcast	Sunny, overcast	Sunny, overcast
Well PVC tubing height	mags	-	0.961	0.961	0.961	-	1.245	1.245	1.245	-	0.578	-	1.036	1.036	1.036	-	0.517	0.517 ^(h)	0.517 ^(h)	0.665	0.665	0.628	0.405	1.16
Depth to bottom	mbtPVC	-	2.575	2.465	2.49	-	2.67	2.575	2.58	-	1.811	-	2.505	2.432	2.43	-	1.75	1.75 ^(h)	- ^(h)	1.735	1.747	1.911	1.815	2.73
Depth to water	mbtPVC	-	1.48	1.132	1.35	-	1.585	1.345	1.53	-	1.06	-	1.485	1.412	1.285	-	0.675	0.675 ^(h)	0.83	Dry	0.745	0.931	Dry	Dry
Well depth from surface	mbgs	-	1.614	1.504	1.529	-	1.425	1.33	1.335	-	1.233	-	1.469	1.396	1.394	-	1.233	1.233	-	1.07	1.082	1.283	1.41	1.57
Water depth from surface	mbgs	0.71	0.519	0.171	0.389	0.48	0.34	0.1	0.285	0.66	0.482	0.5	0.449	0.376	0.249	0.00	0.158	0.158	0.313	Dry	0.08	0.303	Dry	Dry
PVC casing elevation ^(b)	masl	-	174.706	174.706	174.706	-	175.25	175.25	175.25	-	174.958	-	175.394	175.394	175.394	-	174.657	174.657	-	173.355	173.355	174.918	173.425	na
Ground surface elevation ^(c)	masl	174.12	173.745	173.745	173.745	174.00	174.00	174.00	174.00	174.38	174.38	174.36	174.358	174.358	174.358	174.14	174.14	174.14	174.14	172.69	172.69	174.29	173.02	na
Estimated groundwater elevation	masl	173.41	173.226	173.574	173.356	173.52	173.66	173.90	173.72	173.72	173.898	173.86	173.909	173.982	174.109	174.14	173.982	173.982	173.827	-	172.61	173.987	-	-

BIM: Baffinland Iron Mines, HWB: Hazard Waste Berm, GW: Groundwater, mags: metres above ground surface, mbtPVC: metres below top of PVC, na: not available, PVC: Polyvinyl chloride

(a) Distance from HWB Facility Qualifiers are defined as: Source = Station is located within HWB Facility limits or less than 20 m from the HWB Facility limits, Proximal =Station is located more than 20 metres from HWB Facility limits, Downgradient = Station is located more than 20 m downgradient from the HWB Facility towards Camp Lake , Background = Station is located upgradient or more than 20 m from HWB Facility limits.

(b) PVC casing elevations surveyed by Baffinland Iron Mines in November 2024.

(c) Ground surface elevations were calculated based on PVC tubing height and surveyed casing elevations. Ground surface elevations for location that had not been surveyed in 2024 come from previous reports (Tetra Tech 2022, KP 2023, KP 2024) and include: MS-HWB-GW3, MS-HWB-GW4, MS-HWB-GW5, MS-HWB-GW6, HWB-KP23-03, MS-HWB-GW-REF1, MS-HWB-GW-REF2, MS-HWB-GW-REF3

(d) Water level measurement collected during the 2023 Program by KP (KP, 2024)

(e) Water level measurement collected on 5-Sept-2024 to assess groundwater levels. No sample collected.

(f) Water level measurement collected prior to purging and sampling.

(g) Water level measurement collected on 11-Oct-2024 by Baffinland Iron Mines. This water level measurement was collected after the 1 in a 1000-year rain event that occurred end of September 2024. No sample collected.

(h) Well is frozen

(i) Water levels on sampling day had not been collected, but used water level measurements from 5-Sept-2024 for purging calculations

Table E-3: 2023 and 2024 Groundwater and Seep Analytical Results collected at the Landfill Facility, Mary River Mine

Distance from Landfill Facility Qualifier ^(a)			Station Sample Date (M/DD/YYYY)	FIGQ Guideline Commercial/Industrial	Yukon Contaminated Sites Regulation (CSR)	Water Licence Effluent Quality Discharge Limits ^(b)	Source LF-KP22-01	Source LF-KP23-03	Source LF-KP23-13	Source MS-LF-GW1	Source MS-LF-GW3	Source LF-DS-SEEP-01	Source LF-DS-SEEP-02	Proximal LF-KP22-05	Proximal LF-KP23-05	Proximal LF-KP23-11	Proximal MS-LF-GW2	Proximal MS-LF-GW-REF2	Downgradient LF-KP23-01												
							9-3-2023	9-7-2024	9-3-2023	2024-09-07	2024-09-07	2023-09-19	2023-09-12	2024-08-17	2024-09-07	2024-08-17	2024-09-07	2023-09-03	2024-09-06	2023-09-10	#####	2023-09-08	2024-09-06	2023-09-14	2024-09-07	2023-09-15	2024-09-06	2023-09-11	2024-09-07		
							BF2300267	BF2400323	BF2300267	BF2400323	BF2400323	BF2300307	BF2300288	BF2400326	BF2400266	BF2400326	BF2300267	BF2400320	BF2300280	BF2400320	BF2300277	BF2400320	BF2300292	BF2400323	BF2300298	BF2400320	BF2300287	BF2400323			
							GW	GW	GW	GW	GW	GW	GW	SP		SP	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW		
							-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Parameter	Unit	T/D/N																													
Field Observations																															
Weather	-	-	-	-	-	-	na	Cloudy	na	Cloudy, windy, rainy	Cloudy, rainy	na	na	-	Cloudy	-	Cloudy	na	Rainy	na	Sunny	na	Rainy	na	Cloudy, 5°C	na	Cloudy, rainy, snowy, 0°C	na	Cloudy		
Routine Parameters																															
Dissolved Oxygen, Field	mg/L	N	-	-	-	-	-	1.2	-	5.19	11.68	-	-	10.16	11.81	7.25	9.53	-	3.23	-	11.77	-	9.5	-	2.25	-	10.45	-	9.15		
Dissolved Oxygen, Percent, Field	%	N	-	-	-	-	-	8.7	-	37.1	88.4	-	-	92.5	92.5	64.4	76.7	-	23.5	-	89.5	-	69	-	16.5	-	75.8	-	66.6		
pH, Field	pH unit	N	6.5 - 9.0	-	6.5 - 9.0	-	6.5 - 9.0	-	7.01	-	7.16	7.66	-	-	7.56	7.77	7.09	7.14	-	7.07	-	7.67	-	7.37	-	7.1	-	7.78	-	7.07	
pH, Lab	pH unit	N	6.5 - 9.0	-	6.5 - 9.0	-	6.5 - 9.0	-	7.1	7.01	7.37	7.18	7.78	7.21	7.01	7.73	7.58	7.15	7.15	7.06	7.13	7.8	7.84	8.1	7.6	6.99	7.2	7.86	7.8	8.1	7.5
Data Quality Objective (DQO) - pH	pH unit	-	-	-	-	-	-	0	-	0.02	0.12	-	-	0.17	0.19	0.06	0.01	-	0.06	-	0.17	-	0.23	-	0.1	-	0.02	-	0.43		
Specific Conductivity, Field	µS/cm	N	-	-	-	-	-	2427	-	713	471	-	-	995	947	2558	2594	-	647	-	354.3	-	341.6	-	938	-	360.5	-	415.8		
Conductivity, Lab	µS/cm	N	-	-	-	-	-	2480	-	746	521	2660	712	1010	883	2600	2650	-	619	330	382	398	384	1510	975	380	394	485	419		
Data Quality Objective (DQO) - Conductivity	%	-	-	-	-	-	-	2.2	-	4.5	10.1	-	-	1.50	6.99	1.63	2.14	-	4.4	-	7.5	-	11.7	-	3.9	-	8.9	-	0.8		
Temperature, Field	°C	N	-	-	-	-	-	0.9	-	0.8	2.9	-	-	10	4.2	8.8	5.1	-	1.3	-	2.7	-	1.1	-	1.9	-	1.1	-	1.6		
Total Alkalinity	mg/L as CaCO ₃	N	-	-	-	-	-	324	-	196	218	-	-	217	208	337	386	-	241	-	150	-	188	-	284	-	156	-	173		
Total Suspended Solids	mg/L	N	-	-	-	-	-	(b) 23.9	2.9	18.8	1.9	1.6	1.9	11.2	1.5	4.1	23.3	16.5	98.9	94.4	10.4	740	13.7	41.8	2.7	3.9	2.7	26.4	160	77.1	
Total Dissolved Solids	mg/L	N	-	-	-	-	-	1910	2170	475	438	298	2260	418	733	670	2330	2380	445	332	193	204	217	175	1030	598	214	190	305	245	
Turbidity, Lab	NTU	N	-	-	-	-	-	12.1	2.9	4.45	0.4	0.9	2.75	2.96	4.49	4.15	61.4	38.9	33	38.5	10.8	370	11.6	18.5	1.07	0.96	5.6	83.3	4.94		
Turbidity, Field	NTU	N	-	-	-	-	-	5.91	-	3.16	22.35	-	-	1.4	6.22	36.09	44.24	-	179.62	-	77.74	-	21.92	-	4.45	-	21.15	-	4.71		
Hardness, as CaCO ₃ (calculated) ^(b)	mg/L	N	-	-	-	-	-	1255	1399	350	329	262	1400	360	509	455	1533	1559	226	210	175	190	185	178	674	359	192	194	240	201	
Major Ions																															
Calcium	mg/L	D	-	-	-	-	-	417	455	70.4	63.1	52.7	458	64.6	157	143	538	550	46	41	28.1	29.8	35.8	33.4	177	92.1	32	30.7	48.2	38.3	
Chloride	mg/L	D	120	-	-	-	-	56.5	-	66.1	11.3	76.8	37.9	23.3	16.8	60.6	92.4	-	45.4	2.4	18.6	9.88	7.02	93.1	61.3	7.15	15.6	9.96	5.4		
Bromide	mg/L	N	-	-	-	-	-	< 0.5	-	0.28	< 0.1	< 0.5	< 0.1	< 0.5	< 0.1	1.05	< 0.5	-	< 0.1	< 0.1	0.12	< 0.1	< 0.1	< 0.5	< 0.5	< 0.1	< 0.1	0.17	< 0.1		
Fluoride	mg/L	N	0.12	-	3	(g)	-	< 0.1	-	0.034	0.24	< 0.1	0.026	0.104	0.076	0.18	0.184	-	0.065	0.041	0.099	0.095	0.098	< 0.1	< 0.1	0.03	0.023	0.055	0.108		
Magnesium	mg/L	D	-	-	-	-	-	51.9	63.9	42.2	41.6	31.6	48.3	28.3	23.9	46	45	26.9	26.1	25.5	28	23.2	23	56.3	31.4	27.3	28.4	29.1	25.6		
Potassium	mg/L	D	-	-	-	-	-	35.5	23.7	3.45	3.99	3.61	31.8	3.31	6.64	5.68	21.3	21.8	2.63	2.71	1.78	1.54	2.18	2.22	26.2	19.6	1.5	1.51	4.61	3.13	
Sodium	mg/L	D	-	-	-	-	-	75	50.2	20.7	19.3	10.6	58.4	17.9	18.8	16	44.6	55.1	66.4	51	3.14	3.36	14	12.8	71.8	64.5	3.78	4.14	10.9	6.85	
Sulfate	mg/L	D	100	-	1,000	-	-	-	1170	-	87.5	36.9	1120	90.9	304	248	1230	1200	-	12	24.2	20	7.38	2.6	351	135	26.3	23.8	73.2	34.9	
Nutrients																															
Nitrate	mg/L as N	N	2.9	-	400	-	-	-	< 0.1	-	1.33	1.43	< 0.1	2.4	0.126	0.054	< 0.1	< 0.1	-	< 0.02	1.1	0.186	< 0.02	< 0.02	< 0.1	2.42	0.513	0.157	4.24	1.59	
Nitrite	mg/L as N	N	0.060	-	0.20 - 2.0	(b)	-	-	< 0.05	-	< 0.01	0.025	< 0.05	< 0.01	< 0.05	< 0.01	< 0.05	< 0.05	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01		
Total Ammonia	mg/L as N	T	0.017 - 189.9	(g)	1.31 - 18.4	(g)	-	-	4.92	3.02	0.0528	0.0326	0.0447	5.24	< 0.005	0.122	0.094	1.46	1.19	0.262	0.742	0.0073	0.0061	0.01	0.0163	1.89	0.87	< 0.005	0.0059	0.0218	0.0077
Phosphorus, Nutrient	mg/L	T	-	-	-	-	-	0.132	0.0882	0.0113	0.0183	0.0151	0.0632	0.0185	-	0.0185	-	0.14	0.044	0.285	0.019	0.0823	0.0511	0.0628	0.194	0.121	0.0102	0.043	0.0134	0.0152	
Phosphorus, total	mg/L	D	-	-	-	-	-	0.0737	-	0.0127	0.0035	-	-	0.0247	0.0261	0.165	0.198	-	0.0137	-	0.0055	-	0.0034	-	0.101	-	0.006	-	0.0061		
Total Kjeldahl Nitrogen	mg/L	N	-	-	-	-	-	7.58	5.3	0.47	0.368	0.322	6.96	0.386	0.641	0.504	3.1	3.04	0.494	1.21	0.319	0.256	0.154	0.09	3.61	1.81	0.225	0.142	0.374	0.478	
Organic Carbon																															
Dissolved Organic Carbon	mg/L	D	-	-	-	-	-	34.4	17.8	3.69	5.18	4.5	20	3.51	7.74	7.28	32.3	25.5	10.9	13.1	4.38	5	3.38	3.57	19.4	10.4	4.26	4.03	3.45	4.44	
Total Organic Carbon	mg/L	T	-	-	-	-	-	32.3	-	3.56	-	-	23.4	3.51	7.5	-	29	10.5	-	10.5	-	4.65	-	4.1	-	21.1	-	4.95	-	3.52	-
Petroleum Hydrocarbons (PHCs) and BTEX																															
Benzene	µg/L	N	690	-	4000	-	-	0.98	< 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	< 0.5	1.01	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
Toluene	µg/L	N	83	-	390	-	-	1.79	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.57	0.52	< 0.5	< 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	N	41000	-	2000	-	-	< 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	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
p-Xylene	µg/L	N	-	-	-	-	-	0.52	< 0.3	< 0.3	< 0.3	< 0.3	0.61	< 0.3	< 0.3	< 0.3	0.31	0.31	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	
m+p-Xylenes	µg/L	N	-	-	-	-	-	0.62	< 0.4	< 0.4	< 0.4	< 0.4	0.59	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	
Total Xylenes	µg/L	N	18000	-	-	-	-	1.14	< 0.5	< 0.5	< 0.5	< 0.5	1.2	< 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	<		

Table E-3: 2023 and 2024 Groundwater and Seep Analytical Results collected at the Landfill Facility, Mary River Mine

Distance from Landfill Facility Qualifier ^(a)			FIGQ Guideline Commercial/Industrial	Yukon Contaminated Sites Regulation (CSR)	Water Licence Effluent Quality Discharge Limits ⁽ⁱ⁾	Source		Source		Source		Source		Source		Proximal		Proximal		Proximal		Proximal		Proximal		Downgradient			
Station Sample Date (M/DD/YYYY)						LF-KP22-01		LF-KP22-03		Source	Source	Source	Source	LF-DS-SEEP-01		LF-DS-SEEP-02		LF-KP22-05		LF-KP23-05		LF-KP23-11		MS-LF-GW2		MS-LF-GW-REF2		LF-KP23-01	
						9-3-2023	9-7-2024	9-3-2023	2024-09-07	2024-09-07	2023-09-19	2023-09-12	2024-08-17	2024-09-07	2024-08-17	2024-09-07	2023-09-03	2024-09-06	2023-09-10	#####	2023-09-08	2024-09-06	2023-09-14	2024-09-07	2023-09-15	2024-09-06	2023-09-11	2024-09-07	
						BF2300267	BF2400323	BF2300267	BF2400323	BF2400323	BF2300307	BF2300288	BF2400326	BF2400266	BF2400266	BF2400326	BF2300267	BF2400320	BF2300280	BF2400320	BF2300277	BF2400320	BF2300292	BF2400323	BF2300298	BF2400320	BF2300287	BF2400323	
						GW	GW	GW	GW	GW	GW	GW	SP		SP		GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	
						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Parameter	Unit	T/D/N																											
Polycyclic Aromatic Hydrocarbons (PAHs)																													
Acenaphthene	µg/L	N	5.8	-	-	-	< 0.01	-	< 0.01	< 0.042	-	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01		
Acenaphthylene	µg/L	N	46	-	-	-	< 0.01	-	< 0.01	< 0.042	-	-	-	-	-	-	< 0.013	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01		
Acridine	µg/L	N	0.05	0.5	-	-	< 0.01	-	< 0.01	< 0.01	-	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01		
Anthracene	µg/L	N	0.012	1	-	-	< 0.01	-	< 0.01	< 0.01	-	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01		
1+2-Methylnaphthalenes	µg/L	N	180	-	-	-	0.04	-	< 0.015	0.173	-	-	-	-	-	-	< 0.015	-	< 0.015	-	< 0.015	-	< 0.015	-	< 0.015	-	< 0.015		
1-Methylnaphthalene	µg/L	N	-	-	-	-	0.027	-	< 0.01	0.173	-	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01		
2-Methylnaphthalene	µg/L	N	-	-	-	-	0.013	-	< 0.01	< 0.042	-	-	-	-	-	-	< 0.01	-	< 0.01	-	0.012	-	< 0.01	-	< 0.01	-	< 0.01		
B(a)P Total Potency Equivalent	µg/L	N	-	-	-	-	< 0.01	-	< 0.01	0.025	-	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01		
Benzo(a)anthracene	µg/L	N	0.018	1	-	-	< 0.01	-	< 0.01	< 0.01	-	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01		
Benzo(a)pyrene	µg/L	N	0.015	0.1	-	-	< 0.005	-	< 0.005	< 0.005	-	-	-	-	-	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005		
Benzo(b&j)fluoranthene	µg/L	N	0.48	-	-	-	< 0.01	-	< 0.01	< 0.01	-	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01		
Benzo(b+j&k)fluoranthene	µg/L	N	-	-	-	-	< 0.015	-	< 0.015	< 0.015	-	-	-	-	-	-	< 0.015	-	< 0.015	-	< 0.015	-	< 0.015	-	< 0.015	-	< 0.015		
Benzo(g,h,i)perylene	µg/L	N	0.17	-	-	-	< 0.01	-	< 0.01	0.016	-	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01		
Benzo(k)fluoranthene	µg/L	N	0.48	-	-	-	< 0.01	-	< 0.01	< 0.01	-	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01		
Carbon disulfide	µg/L	N	-	-	-	-	< 1	-	< 1	< 1	-	-	-	-	-	-	< 1	-	< 1	-	< 1	-	< 1	-	< 1	-	< 1		
Carbon tetrachloride	µg/L	N	13	130	-	-	< 0.2	-	< 0.2	< 0.2	-	-	-	-	-	-	< 0.2	-	< 0.2	-	< 0.2	-	< 0.2	-	< 0.2	-	< 0.2		
Chrysene	µg/L	N	1.4	-	-	-	< 0.01	-	< 0.01	< 0.01	-	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01		
Dibenz(a,h)anthracene	µg/L	N	0.26	-	-	-	< 0.005	-	< 0.005	0.0196	-	-	-	-	-	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005		
Fluoranthene	µg/L	N	0.04	2	-	-	< 0.01	-	< 0.01	< 0.01	-	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01		
Fluorene	µg/L	N	3	120	-	-	< 0.01	-	< 0.01	< 0.042	-	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01		
Indeno(1,2,3-cd)pyrene	µg/L	N	0.21	-	-	-	< 0.01	-	< 0.01	0.016	-	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01		
Naphthalene	µg/L	N	1.1	10	-	-	< 0.034	-	< 0.01	0.051	-	-	-	-	-	-	< 0.01	-	0.021	-	0.018	-	< 0.01	-	< 0.01	-	0.024		
Perylene	µg/L	N	-	-	-	-	< 0.01	-	< 0.01	< 0.01	-	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01		
Phenanthrene	µg/L	N	0.4	3	-	-	< 0.01	-	< 0.01	< 0.01	-	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01		
Pyrene	µg/L	N	0.025	0.2	-	-	< 0.01	-	< 0.01	< 0.01	-	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01		
Quinoline	µg/L	N	3.4	34	-	-	< 0.082	-	< 0.01	0.015	-	-	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.053	-	< 0.01	-	< 0.01		
Styrene	µg/L	N	72	720	-	-	< 0.5	-	< 0.5	< 0.5	-	-	-	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	< 0.5	-	< 0.5	-	< 0.5		
Total Metals																													
Aluminum	mg/L	T	-	-	-	-	-	-	-	-	-	-	0.0343	-	0.0565	-	-	-	-	-	-	-	-	-	-	-	-		
Antimony	mg/L	T	-	-	-	-	-	-	-	-	-	-	0.00032	-	0.00155	-	-	-	-	-	-	-	-	-	-	-	-		
Arsenic	mg/L	T	-	-	0.5	-	-	-	-	-	-	-	0.00031	-	< 0.001	-	-	-	-	-	-	-	-	-	-	-	-		
Barium	mg/L	T	-	-	-	-	-	-	-	-	-	-	0.0323	-	0.0452	-	-	-	-	-	-	-	-	-	-	-	-		
Beryllium	mg/L	T	-	-	-	-	-	-	-	-	-	-	< 0.00002	-	< 0.0002	-	-	-	-	-	-	-	-	-	-	-	-		
Bismuth	mg/L	T	-	-	-	-	-	-	-	-	-	-	< 0.00005	-	< 0.0005	-	-	-	-	-	-	-	-	-	-	-	-		
Boron	mg/L	T	-	-	-	-	-	-	-	-	-	-	0.233	-	1.58	-	-	-	-	-	-	-	-	-	-	-	-		
Cadmium	mg/L	T	-	-	-	-	-	-	-	-	-	-	0.0000216	-	0.0000506	-	-	-	-	-	-	-	-	-	-	-	-		
Calcium	mg/L	T	-	-	-	-	-	-	-	-	489	63.1	-	-	-	-	-	-	29.2	-	37.4	-	171	-	32.2	-	48.1		
Cesium	mg/L	T	-	-	-	-	-	-	-	-	-	-	0.000011	-	< 0.0001	-	-	-	-	-	-	-	-	-	-	-	-		
Chromium	mg/L	T	-	-	-	-	-	-	-	-	-	-	0.00066	-	< 0.005	-	-	-	-	-	-	-	-	-	-	-	-		
Cobalt	mg/L	T	-	-	-	-	-	-	-	-	-	-	0.00218	-	0.0164	-	-	-	-	-	-	-	-	-	-	-	-		
Copper	mg/L	T	-	0.3	-	-	-	-	-	-	-	-	0.00161	-	< 0.005	-	-	-	-	-	-	-	-	-	-	-	-		
Iron	mg/L	T	-	-	-	-	-	-	-	-	-	-	0.85	-	10	-	-	-	-	-	-	-	-	-	-	-	-		
Lead	mg/L	T	-	0.2	-	-	-	-	-	-	-	-	0.000107	-	0.000594	-	-	-	-	-	-	-	-	-	-	-	-		
Lithium	mg/L	T	-	-	-	-	-	-	-	-	-	-	0.0127	-	0.238	-	-	-	-	-	-	-	-	-	-	-	-		
Manganese	mg/L	T	-	-	-	-	-	-	-	-	-	-	0.63	-	2.67	-	-	-	-	-	-	-	-	-	-	-	-		
Magnesium	mg/L	T	-	-	-	-	-	-	-	-	66.5	47.1	-	-	-	-	-	-	27.3	-	24.6	-	59.5	-	29.3	-	28.8		
Mercury	mg/L	T	-	-	-	-	-	-	-	-	-	-	< 0.000005	-	< 0.000005	-	-	-	-	-	-	-	-	-	-	-	-		
Molybdenum	mg/L	T	-	-	-	-	-	-	-	-	-	-	0.00303	-	0.0102	-	-	-	-	-	-	-	-	-	-	-	-		
Nickel	mg/L	T	-	-	0.5	-	-	-	-	-	-	-																	

Table E-3: 2023 and 2024 Groundwater and Seep Analytical Results collected at the Landfill Facility, Mary River Mine

Distance from Landfill Facility Qualifier ^(a)			FIGQ Guideline Commercial/Industrial	Yukon Contaminated Sites Regulation (CSR)	Water Licence Effluent Quality Discharge Limits ^(j)	Source		Source		Source		Source		Source		Proximal		Proximal		Proximal		Proximal		Proximal		Downgradient				
LF-KP22-01		LF-KP22-03				LF-KP23-13	MS-LF-GW-1	MS-LF-GW-3	LF-DS-SEEP-01		LF-DS-SEEP-02		LF-KP22-05		LF-KP23-05		LF-KP23-11		MS-LF-GW-2		MS-LF-GW-REF2		LF-KP23-01							
9-3-2023	9-7-2024	9-3-2023				2024-09-07	2024-09-07	2023-09-19	2023-09-12	2024-08-17	2024-09-07	2024-08-17	2024-09-07	2023-09-03	2024-09-06	2023-09-10	#####	2023-09-08	2024-09-06	2023-09-14	2024-09-07	2023-09-15	2024-09-06	2023-09-11	2024-09-07					
BF2300267	BF2400323	BF2300267				BF2400323	BF2400323	BF2300307	BF2300288	BF2400326	BF2400266	BF2400266	BF2400326	BF2300267	BF2400320	BF2300280	BF2400320	BF2300277	BF2400320	BF2300292	BF2400323	BF2300298	BF2400320	BF2300287	BF2400323					
GW	GW	GW				GW	GW	GW	GW		SP		SP	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW					
Parameter	Unit	T/D/N																												
Dissolved Metals																														
Aluminum	mg/L	D	0.0050 - 0.10	^(e)	-	-	0.0135	<0.01	< 0.01	0.0016	0.011	< 0.01	0.0164	0.0029	0.0025	0.0111	< 0.01	0.128	0.013	0.0076	0.011	0.0083	0.0050	< 0.01	0.0022	0.0023	0.0037	0.0475	0.010	
Antimony	mg/L	D	2.0	-	0.20	-	0.00122	<0.001	< 0.001	<0.0001	0.00020	< 0.001	< 0.001	0.00032	0.00026	0.00144	0.00161	< 0.001	<0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.0001	0.0019	0.00050	< 0.0001	< 0.001	<0.0001	
Arsenic	mg/L	D	0.0050	0.050	0.5	^(f)	0.0028	0.0020	< 0.001	0.00024	0.00033	0.00163	< 0.001	0.00027	0.00026	< 0.001	< 0.001	0.0024	0.00028	0.00022	0.00015	0.00013	< 0.001	0.00043	0.00029	0.00029	< 0.001	0.00074		
Barium	mg/L	D	2.9	10	-	-	0.0604	0.036	0.0368	0.036	0.037	0.057	0.0455	0.0311	0.025	0.0412	0.037	0.0303	0.028	0.0245	0.025	0.0287	0.032	0.044	0.035	0.0287	0.027	0.037		
Beryllium	mg/L	D	0.0053	0.053	-	-	< 0.0002	<0.0002	< 0.0002	<0.00002	<0.00002	< 0.0002	< 0.0002	< 0.00002	< 0.00002	< 0.0002	< 0.0002	< 0.0002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002		
Bismuth	mg/L	D	-	-	-	-	< 0.0005	<0.0005	< 0.0005	<0.00005	< 0.00005	< 0.0005	< 0.0005	< 0.00005	< 0.00005	< 0.0005	< 0.0005	< 0.0005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005		
Boron	mg/L	D	1.5	-	-	-	2.99	2.4	0.804	0.54	0.028	3.6	0.879	0.217	0.184	1.58	1.6	< 0.1	0.023	0.245	0.18	0.025	0.021	1.07	0.49	0.216	0.18	0.889	0.62	
Cadmium	mg/L	D	0.240	^(f)	0.00010 - 0.00060	^(g)	-	0.000086	<0.00005	< 0.00005	0.0000088	0.0000081	0.0000717	< 0.00005	0.0000084	0.000005	< 0.00005	< 0.00005	< 0.000005	0.0000071	0.0000072	0.0000083	< 0.000005	0.000541	0.00019	0.0000057	0.0000067	< 0.00005	0.0000081	
Cesium	mg/L	D	-	-	-	-	< 0.0001	< 0.0001	< 0.0001	0.000023	< 0.00001	< 0.0001	< 0.0001	< 0.00001	< 0.00001	< 0.0001	< 0.0001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		
Chromium	mg/L	D	0.0089	0.010	-	-	< 0.005	< 0.005	< 0.005	0.0011	< 0.0005	< 0.005	< 0.005	< 0.0005	< 0.0005	< 0.005	< 0.005	< 0.005	< 0.0005	0.00148	0.0013	< 0.0005	< 0.0005	< 0.005	0.00059	0.00138	0.0014	< 0.005	0.0012	
Cobalt	mg/L	D	0.0090	0.0090	-	-	0.0172	0.0077	< 0.001	0.00017	0.0011	0.0126	< 0.001	0.00214	0.00109	0.0158	0.00928	0.00983	0.0092	0.00026	0.00018	0.00065	0.00013	0.00386	0.0011	< 0.0001	< 0.0001	0.00088		
Copper	mg/L	D	0.0020 - 0.0040	^(g)	0.020 - 0.090	^(g)	0.3	< 0.002	< 0.002	< 0.002	0.0017	0.0010	0.00354	0.00247	0.00111	0.00095	< 0.002	< 0.002	< 0.002	0.00069	0.00342	0.0032	0.00127	0.00088	0.0117	0.0058	0.0034	0.0033	0.00236	0.0020
Iron	mg/L	D	0.30	-	-	-	1.93	0.52	< 0.1	< 0.01	0.017	0.247	< 0.1	0.466	0.881	5.42	0.568	2.01	4.8	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.21	
Lead	mg/L	D	0.0010 - 0.0070	^(g)	0.040 - 0.16	^(g)	0.2	0.000839	< 0.0005	< 0.0005	0.00032	0.00014	< 0.0005	< 0.0005	< 0.00005	< 0.00005	< 0.0005	< 0.0005	< 0.0005	0.00014	< 0.00005	0.00021	< 0.00005	0.00044	0.000601	0.00024	< 0.00005	0.00034	< 0.0005	0.00023
Lithium	mg/L	D	-	-	-	-	0.512	0.28	0.0669	0.069	0.0015	0.766	0.0398	0.0133	0.0119	0.241	0.298	< 0.01	0.0021	0.0014	< 0.001	0.003	0.0018	0.113	0.064	0.0016	0.0010	0.0249	0.019	
Manganese	mg/L	D	-	-	-	-	6.22	3.3	0.029	0.030	0.47	4.47	0.00128	0.641	0.363	2.91	1.94	2.18	3.0	0.016	0.036	0.177	0.077	0.644	0.36	0.0002	0.00037	0.0784	0.14	
Mercury	mg/L	D	0.000026	0.0010	-	-	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	
Molybdenum	mg/L	D	0.073	10	-	-	0.0226	0.00838	0.00185	0.00395	0.0124	0.0118	0.00082	0.00313	0.00255	0.0102	0.00664	< 0.0005	0.000446	0.00112	0.000862	0.00302	0.000565	0.00857	0.00314	0.000378	0.000358	0.00728	0.00253	
Nickel	mg/L	D	0.025 - 0.15	^(g)	0.025 - 1.5	^(g)	0.5	0.0949	0.0667	0.0161	0.0146	0.00546	0.126	0.0176	0.00697	0.00503	0.0316	0.0238	0.00664	0.0049	0.00648	0.00661	0.00288	0.0014	0.0775	0.0383	0.00501	0.005	0.0109	0.00944
Phosphorus	mg/L	D	-	-	-	-	< 0.5	< 0.05	< 0.5	< 0.05	< 0.05	< 0.5	< 0.5	< 0.05	< 0.05	< 0.5	< 0.5	< 0.5	< 0.5	0.078	< 0.05	< 0.05	< 0.05	< 0.05	< 0.5	0.109	< 0.05	< 0.05	< 0.5	< 0.05
Rubidium	mg/L	D	-	-	-	-	0.00945	0.00998	0.01	0.0108	0.00508	0.0156	0.0124	0.00653	0.00564	0.0054	0.00522	< 0.002	0.00034	0.00635	0.00556	0.00078	0.00102	0.0141	0.00914	0.00601	0.00611	0.00812	0.00541	
Selenium	mg/L	D	0.0010	0.010	-	-	< 0.0005	< 0.0005	< 0.0005	0.000124	< 0.00005	< 0.0005	< 0.0005	-	-	-	< 0.0005	0.00071	0.000071	< 0.00005	0.000073	< 0.00005	< 0.0005	0.000134	< 0.0005	< 0.0005	< 0.0005	0.000095	0.000095	
Silicon	mg/L	D	-	-	-	-	7.36	6.13	5.64	5.86	2.77	6.1	6.23	2.37	2.52	6.38	6.47	3.07	3.2	4.97	4.68	2.94	3.11	5.25	4.94	5.16	5.04	3.96	4.28	
Silver	mg/L	D	0.00025	0.00005 - 0.015	^(g)	-	< 0.0001	< 0.0001	< 0.0001	< 0.00001	< 0.00001	< 0.0001	< 0.0001	< 0.00001	< 0.00001	< 0.0001	< 0.0001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	
Strontium	mg/L	D	-	-	-	-	1.02	1.21	0.0527	0.0574	0.0487	1.18	0.0391	0.521	0.472	1.49	1.58	0.0382	0.0465	0.0169	0.0179	0.0352	0.0357	0.282	0.154	0.0172	0.0178	0.0444	0.0294	
Sulfur	mg/L	D	-	-	-	-	349	410	38.1	30.8	14.4	400	36.8	112	96.3	446	434	13.7	4.91	8.93	6.99	2.84	1.09	130	46.8	8.34	28.2	24.2	12.9	
Tellurium	mg/L	D	-	-	-	-	< 0.002	< 0.002	< 0.002	< 0.0002	< 0.0002	< 0.002	< 0.002	< 0.0002	< 0.0002	< 0.002	< 0.002	< 0.002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.002	< 0.002	< 0.0002	< 0.0002	< 0.002	< 0.0002	
Thallium	mg/L	D	0.00080	0.0030	-	-	< 0.0001	< 0.0001	< 0.0001	0.000028	0.000018	0.000156	< 0.0001	< 0.00001	< 0.00001	< 0.0001	< 0.0001	< 0.00001	< 0.00001	0.000012	< 0.00001	< 0.00001	0.000116	0.000057	0.000014	0.000016	< 0.0001	< 0.00001	< 0.00001	
Thorium	mg/L	D	-	-	-	-	< 0.001	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.001	< 0.0001	< 0.0001	< 0.0001	< 0.001	< 0.0001	
Tin	mg/L	D	-	-	-	-	< 0.001	0.00228	< 0.001	0.00025	0.00049	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0								

Table E-3: 2023 and 2024 Groundwater and Seep Analytical Results collected at the Landfill Facility, Mary River Mine

Distance from Landfill Facility Qualifier ^(a)				Station		FIGQ Guideline		Yukon Contaminated Sites Regulation (CSR)		Water Licence Effluent Quality Discharge Limits ⁽ⁱ⁾		Downgradient		Background		Background		Background		Background		Background											
Sample Date (M/DD/YYYY)				Commercial/Industrial		Tier 2 Water Use/Pathway: Protection of Freshwater Aquatic Life (AW-F)		Protection of Freshwater Aquatic Life (AW-F) ^(b)		Maximum Concentration of Any Grab Sample		LF-KP23-04		LF-KP23-06		LF-KP23-07		LF-KP23-08		LF-KP23-09		LF-KP23-09											
				COA number								2023-09-14		2024-09-07		2023-09-10		2024-09-05		2023-09-07		2024-09-05		2023-09-07		2024-09-05		2023-09-06		2024-09-06		2024-09-06	
				Matrix								BF2300292		BF2400323		BF2300280		BF2400320		BF2300277		BF2400320		BF2300277		BF2400320		BF2300277		BF2400320		BF2400320	
				QA/QC		Soil Type: Coarse Grain ^(c)						GW		GW		GW		GW		GW		GW		GW		GW		GW		GW		GW	
				T/D/N								-		-		-		-		-		-		-		-		-		FDA		FD	
Parameter				Unit		T/D/N																											
Field Observations																																	
Weather				-		-		-				na		Cloudy		na		Sunny, overcast		na		Sunny, overcast		na		Sunny		na		Rainy		Rainy	
Routine Parameters																																	
Dissolved Oxygen, Field				mg/L		N		-		-		-		11.5		-		12.06				10.03		-		13.5		-		7.24		-	
Dissolved Oxygen, Percent, Field				%		N		-		-		-		83.3		-		87.7				73.6		-		100.6		-		52.2		-	
pH, Field				pH unit		N		6.5 - 9.0		-		6.5 - 9.0		7.74		-		7.73				7.41		-		7.53		-		6.81		-	
pH, Lab				pH unit		N		6.5 - 9.0		-		6.5 - 9.0		7.83		7.77		7.83		7.73		7.81		7.56		7.68		7.66		7.98		7.02	
Data Quality Objective (DQO) - pH				pH unit				-		-		-		0.03		-		0				0.15		-		0.13		-		0.21		-	
Specific Conductivity, Field				µS/cm		N		-		-		-		584		-		341.4				277.6		-		263.4		-		309.8		-	
Conductivity, Lab				µS/cm		N		-		-		-		286		566		339		361		290		295		269		275		318		348	
Data Quality Objective (DQO) - Conductivity				%				-		-		-		3.1		-		5.6				6.1		-		4.3		-		11.6		-	
Temperature, Field				°C		N		-		-		-		1.3		-		1.1				1.4		-		2		-		0.9		-	
Total Alkalinity				mg/L as CaCO ₃		N		-		-		-		178		-		149				154		-		147		-		180		186	
Total Suspended Solids				mg/L		N		-		-		8.6		16.4		5.3		6.7		10.4		4.8		24.3		30.4		22.9		53.3		25.2	
Total Dissolved Solids				mg/L		N		-		-		184		303		200		170		162		130		156		117		181		177		164	
Turbidity, Lab				NTU		N		-		-		8.7		2.22		6.73		1.16				2.42		19.3		10		20.9		37		15	
Turbidity, Field				NTU		N		-		-		-		9.1		-		5.11		4.68		8.71		-		30.68		-		130.7		-	
Hardness, as CaCO ₃ (calculated) ^(b)				mg/L		N		-		-		132		280		184		188		156		161		147		148		170		184		183	
Major Ions																																	
Calcium				mg/L		D		-		-		-		23.1		45		29.4		28.8		28.1		29.2		27.6		27.6		31.8		34.2	
Chloride				mg/L		D		120		-		-		7.06		50.8		4.37		13.1		1.25		1.04		0.93		0.94		0.87		0.93	
Bromide				mg/L		N		-		-		-		< 0.1		0.38		< 0.1		< 0.1		< 0.1		< 0.1		< 0.1		< 0.1		< 0.1			
Fluoride				mg/L		N		0.12		3		(g)		0.061		0.052		0.044		0.039		0.093		0.106		0.047		0.043		0.083		0.061	
Magnesium				mg/L		D		-		-		-		18.1		40.7		26.8		28.2		20.8		21.4		19		19.3		21.9		23.9	
Potassium				mg/L		D		-		-		-		1.74		2.07		1.71		1.34		2.55		1.91		0.848		0.702		1.03		0.791	
Sodium				mg/L		D		-		-		-		3.42		7.25		1.94		2.17		1.25		0.49		2.19		1.39		5.22		4.81	
Sulfate				mg/L		D		100		1,000		-		30.8		39.2		21.8		18.8		3.52		1.8		1.68		1.5		0.96		<0.3	
Nutrients																																	
Nitrate				mg/L as N		N		2.9		400		-		0.434		0.32		0.286		0.171		0.034		0.026		0.027		< 0.02		0.047		0.028	
Nitrite				mg/L as N		N		0.060		0.20 - 2.0		(i)		< 0.01		< 0.01		< 0.01		< 0.01		< 0.01		< 0.01		< 0.01		< 0.01		< 0.01			
Total Ammonia				mg/L as N		T		0.017 - 189.9		(g)		(g)		0.0077		0.0269		0.0093		0.0052		0.0235		< 0.005		< 0.005		0.0076		0.0073		0.0089	
Phosphorus, Nutrient				mg/L		T		-		-		-		0.016		0.0172		0.0066		0.0127		0.0066		0.0181		0.135		0.133		0.22		1.23	
Phosphorus, total				mg/L		D		-		-		-		-		0.0060		-		0.0055		-		0.0035		-		0.0040		-		0.0117	
Total Kjeldahl Nitrogen				mg/L		N		-		-		-		0.198		0.266		0.395		0.222		0.276		0.165		0.192		0.218		0.217		0.169	
Organic Carbon																																	
Dissolved Organic Carbon				mg/L		D		-		-		-		3.87		4.67		6.76		7.98		5.15		5.55		4.45		4.8		4.33		3.32	
Total Organic Carbon				mg/L		T		-		-		-		4.68		-		7.71		-		5.58		-		4.76		-		4.06		-	
Petroleum Hydrocarbons (PHCs) and BTEX																																	
Benzene				µg/L		N		690		4000		-		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5			
Toluene				µg/L		N		83		390		-		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5			
Ethylbenzene				µg/L		N		41000		2000		-		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5			
o-Xylene				µg/L		N		-		-		-		< 0.3		< 0.3		< 0.3		< 0.3		< 0.3		< 0.3		< 0.3		< 0.3		< 0.3			
m+p-Xylenes				µg/L		N		-		-		-		< 0.4		< 0.4		< 0.4		< 0.4		< 0.4		< 0.4		< 0.4		< 0.4		< 0.4			
Total Xylenes				µg/L		N		18000		-		-		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5		< 0.5			
BTEX, Total				µg/L		N		-		-		-		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1		< 1			
Monochlorobenzene				µg/L		N		1.3		13		-		< 0.5		-		< 0.5		-		< 0.5		-		< 0.5		-		< 0.5		< 0.5	
F1 (C6-C10)				µg/L		N		9800		-		-		< 25		< 25		< 25		< 25		< 25		< 25		< 25		< 25		< 25		< 25	
F1(C6-C10)-BTEX				µg/L		N		-		-		-		< 25		< 25		< 25		< 25		< 25		< 25		< 25		< 25		< 25		< 25	
F2 (C10-C16)				µg/L		N		1300		-		-		< 100		< 100		< 100		< 100		< 100		< 100		< 100		< 100		< 100		< 100	
F3 (C16-C34)				µg/L		N		-		-		-		< 250		< 250		< 250		< 250		< 250		< 250		< 250		< 250		< 250		< 250	
F4 (C34-C50)				µg/L		N		-		-		-		< 250		< 250		< 250		< 250		< 250		< 250		< 250		< 250		< 250		< 250	
Total Petroleum Hydrocarbons				µg/L		N		-		-		-		< 370		< 370		< 370		< 370		< 370		< 370		< 370		< 370		< 370		< 370	
Oil and Grease																																	
Total Oil and Grease				mg/L		N		-		-		-		< 5		-		< 5		-		< 5		-		< 5		-		< 5		-	
Volatile Organic Compounds (VOCs)																																	
1,1,1,2-Tetrachloroethane				µg/L		N		2500		-		-		-		< 0.5		-		< 0.5		-		< 0.5		-		< 0.5		-		< 0.5	
1,1,1-Trichloroethane				µg/L		N		1100		-		-		-		< 0.5		-		< 0.5		-		< 0.5		-		< 0.5		-		< 0.5	
1,1,2,2-Tetrachloroethane				µg/L		N		3000		-		-		-		< 0.5		-		< 0.5		-		< 0.5		-		< 0.5		-		< 0.5	
1,1,2-Trichloroethane				µg/L		N																											

Table E-3: 2023 and 2024 Groundwater and Seep Analytical Results collected at the Landfill Facility, Mary River Mine

Distance from Landfill Facility Qualifier ^(M) Station Sample Date (M/DD/YYYY) COA number Matrix QA/QC			FIGQ Guideline Commercial/Industrial Tier 2 Water Use/Pathway: Protection of Freshwater Aquatic Life (AW-F) Soil Type: Coarse Grain ⁽⁴⁾	Yukon Contaminated Sites Regulation (CSR) Protection of Freshwater Aquatic Life (AW-F) ⁽⁷⁾	Water Licence Effluent Quality Discharge Limits ⁽¹⁾ Maximum Concentration of Any Grab Sample	Downgradient LF-KP23-04		Background LF-KP23-06		Background LF-KP23-07		Background LF-KP23-08		Background LF-KP23-09	
						2023-09-14	2024-09-07	2023-09-10	2024-09-05	2023-09-07	2024-09-05	2023-09-07	2024-09-05	2023-09-06	2024-09-06
						BF2300292	BF2400323	BF2300280	BF2400320	BF2300277	BF2400320	BF2300277	BF2400320	BF2300277	BF2400320
						GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Parameter	Unit	T/D/N				-	-	-	-	-	-	-	-	FDA	FD
Polycyclic Aromatic Hydrocarbons (PAHs)															
Acenaphthene	µg/L	N	5.8	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
Acenaphthylene	µg/L	N	46	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
Acridine	µg/L	N	0.05	0.5	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
Anthracene	µg/L	N	0.012	1	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
1+2-Methylnaphthalenes	µg/L	N	180	-	-	-	< 0.015	-	< 0.015	-	< 0.015	-	< 0.015	-	< 0.015
1-Methylnaphthalene	µg/L	N	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
2-Methylnaphthalene	µg/L	N	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
B(a)P Total Potency Equivalent	µg/L	N	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
Benzo(a)anthracene	µg/L	N	0.018	1	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
Benzo(a)pyrene	µg/L	N	0.015	0.1	-	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005
Benzo(b&f)fluoranthene	µg/L	N	0.48	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
Benzo(b+j+k)fluoranthene	µg/L	N	-	-	-	-	< 0.015	-	< 0.015	-	< 0.015	-	< 0.015	-	< 0.015
Benzo(g,h,i)perylene	µg/L	N	0.17	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
Benzo(k)fluoranthene	µg/L	N	0.48	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
Carbon disulfide	µg/L	N	-	-	-	-	< 1	-	< 1	-	< 1	-	< 1	-	< 1
Carbon tetrachloride	µg/L	N	13	130	-	-	< 0.2	-	< 0.2	-	< 0.2	-	< 0.2	-	< 0.2
Chrysene	µg/L	N	1.4	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
Dibenz(a,h)anthracene	µg/L	N	0.26	-	-	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005
Fluoranthene	µg/L	N	0.04	2	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
Fluorene	µg/L	N	3	120	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
Indeno(1,2,3-cd)pyrene	µg/L	N	0.21	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
Naphthalene	µg/L	N	1.1	10	-	-	< 0.01	-	0.011	-	< 0.01	-	< 0.01	-	< 0.01
Perylene	µg/L	N	-	-	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
Phenanthrene	µg/L	N	-	3	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
Pyrene	µg/L	N	0.025	0.2	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
Quinoline	µg/L	N	3.4	34	-	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01	-	< 0.01
Styrene	µg/L	N	72	720	-	-	< 0.5	-	< 0.5	-	< 0.5	-	< 0.5	-	< 0.5
Total Metals															
Aluminum	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	T	-	-	0.5	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	T	-	-	-	23.6	-	30.2	-	29.4	-	28.5	-	34.7	-
Cesium	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	T	-	-	0.3	-	-	-	-	-	-	-	-	-	-
Iron	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/L	T	-	-	0.2	-	-	-	-	-	-	-	-	-	-
Lithium	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	T	-	-	-	20.9	-	27.4	-	21	-	20.4	-	22.6	-
Mercury	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/L	T	-	-	0.5	-	-	-	-	-	-	-	-	-	-
Phosphorus	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	T	-	-	-	2.23	-	1.83	-	2.32	-	1.71	-	2.6	-
Rubidium	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	T	-	-	-	4.19	-	2	-	1.41	-	2.38	-	5.19	-
Sulfur	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorium	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	T	-	-	0.5	-	-	-	-	-	-	-	-	-	-
Zirconium	mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-

Table E-3: 2023 and 2024 Groundwater and Seep Analytical Results collected at the Landfill Facility, Mary River Mine

Distance from Landfill Facility Qualifier ^(a) Station Sample Date (M/DD/YYYY) COA number Matrix QA/QC			FIGQ Guideline Commercial/Industrial Tier 2 Water Use/Pathway: Protection of Freshwater Aquatic Life (AW-F) Soil Type: Coarse Grain ^(c)	Yukon Contaminated Sites Regulation (CSR) Protection of Freshwater Aquatic Life (AW-F) ^(h)	Water Licence Effluent Quality Discharge Limits ⁽ⁱ⁾ Maximum Concentration of Any Grab Sample	Downgradient LF-KP23-04		Background LF-KP23-06		Background LF-KP23-07		Background LF-KP23-08		Background LF-KP23-09	
						2023-09-14	2024-09-07	2023-09-10	2024-09-05	2023-09-07	2024-09-05	2023-09-07	2024-09-05	2023-09-06	2024-09-06
						BF2300292	BF2400323	BF2300280	BF2400320	BF2300277	BF2400320	BF2300277	BF2400320	BF2300277	BF2400320
						GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Parameter	Unit	T/D/N				-	-	-	-	-	-	-	-	-	FD
Dissolved Metals															
Aluminum	mg/L	D	0.0050 - 0.10 ^(a)	-	-	0.0537	0.022	0.013	0.0085	0.0119	0.0039	0.0059	0.0044	0.0064	0.0038
Antimony	mg/L	D	2.0	0.20	-	< 0.0001	<0.0001	< 0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	<0.0001	< 0.0001	<0.0001
Arsenic	mg/L	D	0.0050	0.050	0.5 ^(a)	0.00016	0.00015	0.00036	0.00034	0.00047	0.00016	0.00012	<0.0001	0.00016	0.00012
Barium	mg/L	D	2.9	10	-	0.00992	0.023	0.0266	0.026	0.0124	0.011	0.00867	0.0074	0.00682	0.0055
Beryllium	mg/L	D	0.0053	0.053	-	< 0.00002	<0.00002	< 0.00002	<0.00002	< 0.00002	<0.00002	< 0.00002	<0.00002	< 0.00002	<0.00002
Bismuth	mg/L	D	-	-	-	< 0.00005	<0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Baron	mg/L	D	1.5	-	-	0.393	0.30	0.227	0.18	< 0.01	<0.01	< 0.01	< 0.01	< 0.01	< 0.01
Cadmium	mg/L	D	0.240 ^(a)	0.00010 - 0.00060 ^(a)	-	< 0.000005	0.0000052	0.0000053	<0.000005	0.0000067	<0.000005	< 0.000005	0.0000066	0.0000106	0.0000060
Cesium	mg/L	D	-	-	-	< 0.00001	<0.00001	0.000012	0.000014	0.000017	< 0.00001	< 0.00001	<0.00001	< 0.00001	<0.00001
Chromium	mg/L	D	0.0089	0.010	-	0.00052	0.00055	0.00213	0.0022	0.00054	0.00063	< 0.0005	<0.0005	< 0.0005	<0.0005
Cobalt	mg/L	D	-	0.0090	-	0.00018	<0.0001	0.00038	<0.0001	0.00084	<0.0001	0.00019	<0.0001	0.0007	<0.0001
Copper	mg/L	D	0.0020 - 0.0040 ^(a)	0.020 - 0.090 ^(a)	0.3 ^(a)	0.0037	0.0029	0.00522	0.0043	0.00185	0.0023	0.00203	0.0019	0.00168	0.0011
Iron	mg/L	D	0.30	-	-	0.016	<0.01	0.014	0.011	0.02	<0.01	< 0.01	<0.01	0.029	<0.01
Lead	mg/L	D	0.0010 - 0.0070 ^(a)	0.040 - 0.16 ^(a)	0.2 ^(a)	< 0.00005	0.0011	< 0.00005	0.0023	< 0.00005	0.0034	< 0.00005	<0.00005	< 0.00005	0.000099
Lithium	mg/L	D	-	-	-	0.0061	0.0070	0.0013	<0.001	0.0026	0.0015	0.0012	<0.001	0.0018	0.0012
Manganese	mg/L	D	-	-	-	0.024	0.0039	0.0334	0.0016	0.144	0.00022	0.0112	0.00014	0.111	0.0020
Mercury	mg/L	D	0.000026	0.0010	-	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
Molybdenum	mg/L	D	0.073	10	-	0.0076	0.000485	0.00257	0.000315	0.017	0.000662	0.000289	0.000126	0.00349	0.00007
Nickel	mg/L	D	0.025 - 0.15 ^(a)	0.025 - 1.5 ^(a)	0.5 ^(a)	0.00411	0.00397	0.01	0.00838	0.00562	0.00567	0.00196	0.00158	0.00399	0.00273
Phosphorus	mg/L	D	-	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Rubidium	mg/L	D	-	-	-	0.00233	0.00394	0.00642	0.00594	0.00418	0.00273	0.00191	0.00157	0.0006	0.00047
Selenium	mg/L	D	0.0010	0.010	-	0.00005	0.000063	0.000092	0.000072	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Silicon	mg/L	D	-	-	-	3.03	3.68	5.51	5.23	2.52	2.11	1.77	1.8	2.27	2.34
Silver	mg/L	D	0.00025	0.0005 - 0.015 ^(a)	-	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Strontium	mg/L	D	-	-	-	0.0151	0.0284	0.0175	0.0171	0.0182	0.0171	0.0152	0.0146	0.019	0.021
Sulfur	mg/L	D	-	-	-	10.2	14.4	8.24	6.86	1.15	0.57	0.75	< 0.5	< 0.5	< 0.5
Tellurium	mg/L	D	-	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Thallium	mg/L	D	0.00080	0.0030	-	< 0.00001	0.00001	0.000019	0.000014	0.000018	0.000011	0.000011	0.00001	< 0.00001	< 0.00001
Thorium	mg/L	D	-	-	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Tin	mg/L	D	-	-	-	< 0.0001	0.00015	< 0.0001	0.00021	< 0.0001	0.00016	< 0.0001	< 0.0001	0.00012	< 0.0001
Titanium	mg/L	D	0.10	1.0	-	0.00031	< 0.0005	< 0.0003	< 0.0003	0.00067	< 0.0003	< 0.0003	< 0.0003	0.00033	< 0.0003
Tungsten	mg/L	D	-	-	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Uranium	mg/L	D	0.015	3.0	-	0.00192	0.00289	0.00095	0.000793	0.00129	0.00103	0.000616	0.000429	0.000443	0.000336
Vanadium	mg/L	D	-	-	-	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Zinc	mg/L	D	0.030	0.075 - 2.4 ^(a)	0.5 ^(a)	0.0044	< 0.001	< 0.001	< 0.001	0.0011	< 0.001	0.001	< 0.001	0.0022	< 0.001
Zirconium	mg/L	D	-	-	-	0.0005	0.00064	0.00044	0.00041	0.00039	0.00053	0.00055	0.00052	0.0004	0.00033

as N: as Nitrogen, AEMP: Aquatic Effects Monitoring Plan, BIM: Baffinland Iron Mines, BTEX: Benzene Toluene Ethylbenzene Xylenes, CaCO₃: Calcium Carbonate, CCME: Canadian Council of Ministers of the Environment, DQO: Data Quality Objective, FDA: Field Duplicate Available, FD: Field Duplicate, FIGQ: Federal Interim Groundwater Guideline, mg/L: milligram per litre, GW: Groundwater, LF: Landfill Facility, na: not available, SP: Seep, T/D/N = Total/Dissolved/Normal, ug/L: microgram per litre, uS/cm: microsiemens per centimetre, °C: degrees Celsius, < = less than

(a) Distance from Landfill Facility Qualifiers are defined as: Source = Station is located within active cells (Cells 1, 2) in the landfill, Proximal= Station is within 20 metres from landfill limits, Downgradient = Station is located more than 20 m downgradient from the landfill's limits towards Sheardown Lake, Background = Station is located in the inactive cells (Cells 3, 4, 5) of the landfill or upgradient of the landfill.

(b) Hardness not provided by the laboratory. Hardness was calculated based on Magnesium (Mg) and Calcium (Ca) concentrations for each sample.

(c) Federal Interim Groundwater Quality Guideline from Federal Contaminated Sites Action Plan (FCSAP), 2016 (Rev 4) - Guidance Document on Federal Interim Groundwater Quality Guideline for Federal Contaminated Sites.

(d) Ammonia guideline is pH and temperature dependent. The guideline is calculated based on the individual field pH and temperature measurements for each sample.

(e) Guideline is pH dependent. The guideline is calculated based on the individual pH for each sample.

(f) Cadmium guideline is hardness dependent of the receiving environment and was calculated with the following equation (FIGQ, 2016): $10^{(0.83(\log(\text{hardness}))-2.48)}$. Hardness used for the calculation is the most conservative median concentration (ie, 51.75 mg/L) between Northwest and Southeast Sheardown Lake available in Table 2.4 of Aquatic Effects Monitoring Plan BIM-5200-PLA-0023 REV 2 (BIM, 2024).

(g) Guideline is hardness dependent. The guideline is calculated based on the individual hardness value for each sample.

(h) Yukon Contaminated Sites Regulation (CSR) (Environment Yukon 2002, in accordance with Yukon CSR Protocol 6 (Environment Yukon 2012)) does not apply to Nunavut, and is only used here for comparison purposes.

(i) Guideline is chloride dependent. The guideline is calculated based on the individual chloride concentration in each sample.

(j) Guideline from Nunavut Water Board - Water Licence 2AM-MRY1325, for comparison purposes only.

(k) Total Suspended Solids guideline (15 mg/L) does not apply to groundwater and was excluded from this table.

Value	Value exceeding DQO for either pH or Conductivity
Value	DQO - 1 (pH units) for pH between laboratory and field measurements
Value	DQO - 20% for conductivity between laboratory and field measurements
Value	Result exceeds the FIGQ Commercial/Industrial Land Use - Tier 2 guideline or is outside the recommended pH ran
Value	Result exceeds Yukon CSR guideline.
Value	Result exceeds Water Licence Effluent Quality Discharge Limits for the Landfill Facilities.

Table E-4: 2023 and 2024 Groundwater Analytical Results collected at the Hazardous Waste Berm Facility, Mary River Mine

Distance from HWB Facilities Qualifier ^(a)				Station	FIGQ Guideline Commercial/Industrial	Yukon Contaminated Sites Regulation (CSR)	Water Licence Effluent Quality Discharge Limits ^(b)	Source		Source		Source		Source		Proximal		Proximal		Proximal		Background		Background	Background						
Sample Date (M/DD/YYYY)								HWB-KP23-01	HWB-KP23-02		HWB-KP22-03		MS-HWB-GW5		MS-HWB-GW4		HWB-KP22-04		HWB-KP22-05		HWB-KP23-03		HWB-KP22-01		MS-HWB-GW-REF3	MS-HWB-GW-REF1					
								2023-09-16	2024-09-09	2023-09-16	2024-09-08	2023-09-15	2024-09-08	2023-09-19	2024-09-09	2023-09-15	2024-09-09	#####	2024-09-08	#####	2024-09-09	2024-09-09	#####	2024-09-08	#####	2024-09-08	2024-09-08	2024-09-09			
								BF2300297	BF2400327	BF2300297	BF2400327	BF2300297	BF2400323	BF2300306	BF2400327	BF2300297	BF2400327	BF2300297	BF2400323	BF2300297	BF2400327	BF2400327	BF2300297	BF2400327	BF2300297	BF2400323	BF2400323	BF2400330			
COA number Sample Matrix QA/QC					GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW						
Soil Type: Coarse Grain ^(c)					-	-	-	-	-	-	-	-	-	-	-	-	-	FDA	FD	-	-	-	-	-	-						
Parameter				Unit	T/D/																										
Field Observations																															
Weather					-	-	-	na	Cloudy, very windy	na	Cloudy, rainy	na	Cloudy, rainy	na	Cloudy, windy	na	Cloudy, very windy	na	Cloudy, rainy	na	Cloudy, very windy	Cloudy, very windy	na	Cloudy, rainy, windy	na	Rainy, windy	Rainy, windy	Cloudy, windy			
Routine Parameters																															
Dissolved Oxygen, Field				mg/L	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Dissolved Oxygen, Percent, Field				%	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
pH, Field				pH unit	N	6.5 - 9.0	-	-	6.5 - 9.0	-	6.5	-	6.9	-	7.31	-	7.15	-	7.25	-	6.91	-	-	7.05	-	6.86	7.37	7.37			
pH, Lab				pH unit	N	6.5 - 9.0	-	-	6.5 - 9.0	-	7.29	7.44	7.5	7.07	7.06	7.03	7.4	7.4	7.35	7.28	7.25	7.35	7.07	6.96	6.95	7.24	7.11	6.95	6.91	7.45	7.55
Data Quality Objective (DQO) - pH				pH unit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Specific Conductivity, Field				µS/cm	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Conductivity, Lab				µS/cm	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Data Quality Objective (DQO) - Conductivity				%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Temperature, Field				°C	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Alkalinity				mg/L as CaCO ₃	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Suspended Solids				mg/L	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Dissolved Solids				mg/L	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Turbidity, Lab				NTU	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Turbidity, Field				NTU	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Hardness, as CaCO ₃ (calculated) ^(b)				mg/L	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Major Ions																															
Calcium				mg/L	D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Chloride				mg/L	D	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Bromide				mg/L	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Fluoride				mg/L	N	0.12	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Magnesium				mg/L	D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Potassium				mg/L	D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sodium				mg/L	D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sulfate				mg/L	D	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Nutrients																															
Nitrate				mg/L as N	N	2.9	-	400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Nitrite				mg/L as N	N	0.060	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Ammonia				mg/L as N	T	0.017 - 189.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Phosphorus, Nutrient				mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Phosphorus, total				mg/L	D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Kjeldahl Nitrogen				mg/L	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Organic Carbon																															
Dissolved Organic Carbon				mg/L	D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Organic Carbon				mg/L	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Petroleum Hydrocarbons (PHCs) and BTEX																															
Benzene				µg/L	N	690	-	4000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Toluene				µg/L	N	83	-	390	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ethylbenzene				µg/L	N	41000	-	2000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
o-Xylene				µg/L	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
m+p-Xylenes				µg/L	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Xylenes				µg/L	N	18000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BTEX, Total				µg/L	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Monochlorobenzene				µg/L	N	1.3	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
F1 (C6-C10)				µg/L	N	9800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
F1(C6-C10)-BTEX				µg/L	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
F2 (C10-C16)				µg/L	N	1300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
F3 (C16-C34)				µg/L	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
F4 (C34-C50)				µg/L	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Petroleum Hydrocarbons				µg/L	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Oil and Grease																															
Total Oil and Grease				mg/L	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Volatil Organic Compounds (VOCs)																															
1,1,1,2-Tetrachloroethane				µg/L	N	2500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
1,1,1-Trichloroethane				µg/L	N	1100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1,1,2,2-Tetrachloroethane				µg/L	N	3000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1,1,2-Trichloroethane				µg/L	N	12000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1,1-Dichloroethane				µg/L	N	260000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1,1-Dichloroethylene				µg/L	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1,2-Dibromoethane				µg/L	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1,2-Dichlorobenzene				µg/L	N	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1,2-Dichloroethane				µg/L	N	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1,2-Dichloropropane																															

Table E-4: 2023 and 2024 Groundwater Analytical Results collected at the Hazardous Waste Berm Facility, Mary River Mine

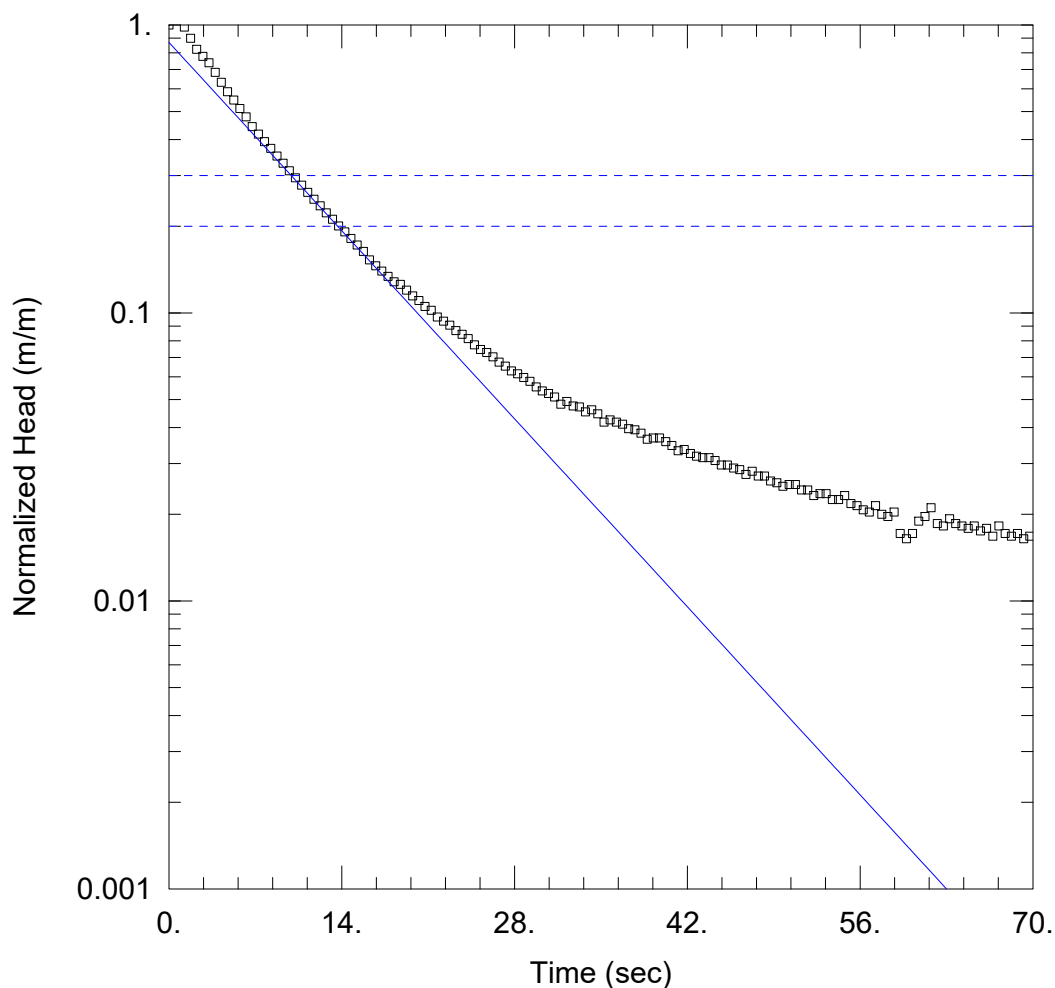
Distance from HWB Facilities Qualifier ^(a)			Station Sample Date (M/DD/YYYY)	FIGQ Guideline Commercial/Industrial	Yukon Contaminated Sites Regulation (CSR)	Water Licence Effluent Quality Discharge Limits ^(b)	Source		Source		Source		Source		Source		Proximal		Proximal		Proximal		Background		Background		Background	
							HWB-KP23-01		HWB-KP23-02		HWB-KP22-03		MS-HWB-GW5		MS-HWB-GW4		HWB-KP22-04		HWB-KP22-05		HWB-KP23-03		HWB-KP22-01		MS-HWB-GW-REF3		MS-HWB-GW-REF1	
							2023-09-16	2024-09-09	2023-09-16	2024-09-08	2023-09-15	2024-09-08	2023-09-19	2024-09-09	2023-09-15	2024-09-09	#####	2024-09-08	#####	2024-09-09	2024-09-09	#####	2024-09-08	#####	2024-09-08	2024-09-08	2024-09-09	
							BF2300297	BF2400327	BF2300297	BF2400327	BF2300297	BF2400323	BF2300306	BF2400327	BF2300297	BF2400327	BF2300297	BF2400323	BF2300297	BF2400327	BF2400327	BF2300297	BF2400327	BF2300297	BF2400323	BF2400323	BF2400330	
							GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	
							-	-	-	-	-	-	-	-	-	-	-	-	-	-	FDA	FD	-	-	-	-	-	
Parameter	Unit	T/D/	Soil Type: Coarse Grain ^(c)																									
Polycyclic Aromatic Hydrocarbons (PAHs)																												
Acenaphthene	µg/L	N	5.8	-	-	-	<0.015	< 0.01	0.137	< 0.122	< 1.36	< 0.852	<0.029	< 0.01	< 0.01	< 0.07	< 0.042	< 0.078	0.015	0.011	0.013	0.244	< 0.083	< 0.01	< 0.01	< 0.056	< 0.01	
Acenaphthylene	µg/L	N	46	-	-	-	<0.010	< 0.01	< 0.034	< 0.037	< 0.147	< 0.082	<0.010	< 0.01	< 0.01	< 0.017	< 0.042	< 0.01	< 0.01	< 0.01	< 0.064	< 0.019	< 0.01	< 0.01	< 0.01	< 0.01		
Acridine	µg/L	N	0.05	0.5	-	-	<0.010	< 0.011	< 0.01	< 0.013	< 0.145	< 0.087	<0.011	< 0.013	< 0.01	< 0.012	< 0.036	< 0.042	< 0.01	< 0.01	< 0.01	< 0.013	< 0.01	< 0.01	< 0.01	< 0.01		
Anthracene	µg/L	N	0.012	1	-	-	<0.010	< 0.01	< 0.01	< 0.01	< 0.058	< 0.042	<0.010	< 0.01	< 0.01	< 0.01	< 0.015	< 0.042	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
1+2-Methylnaphthalenes	µg/L	N	180	-	-	-	0.539	1.08	44.5	21.3	2.68	2.23	0.12	0.38	0.02	< 0.054	0.954	0.448	6.34	5	6.34	65.3	16.3	< 0.015	< 0.015	0.152	< 0.015	
1-Methylnaphthalene	µg/L	N	-	-	-	-	0.234	0.549	18.3	9.44	1.7	1.59	0.061	0.21	0.02	< 0.045	0.616	0.328	3.07	2.46	3.14	25.9	5.28	< 0.01	< 0.01	0.119	< 0.01	
2-Methylnaphthalene	µg/L	N	-	-	-	-	0.305	0.535	26.2	11.9	0.983	0.641	0.059	0.17	< 0.011	< 0.03	0.338	0.12	3.27	2.54	3.2	39.4	11	< 0.01	< 0.01	0.033	< 0.01	
B(a)P Total Potency Equivalent	µg/L	N	-	-	-	-	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Benzo(a)anthracene	µg/L	N	0.018	1	-	-	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.042	<0.010	< 0.01	< 0.01	< 0.01	< 0.042	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Benzo(a)pyrene	µg/L	N	0.015	0.1	-	-	<0.0050	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		
Benzo(b&k)fluoranthene	µg/L	N	0.48	-	-	-	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Benzo(b+g,h)fluoranthene	µg/L	N	-	-	-	-	<0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	<0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015		
Benzo(k)fluoranthene	µg/L	N	0.17	-	-	-	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Benzo(k)fluoranthene	µg/L	N	0.48	-	-	-	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Carbon tetrachloride	µg/L	N	13	130	-	-	<0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	<0.20	< 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		
Carbon disulfide	µg/L	N	-	-	-	-	<1.0	< 1	< 1	< 1	< 1	< 1	<1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		
Chrysene	µg/L	N	1.4	-	-	-	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Dibenz(a,h)anthracene	µg/L	N	0.26	-	-	-	<0.0050	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.0050	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		
Fluoranthene	µg/L	N	0.04	2	-	-	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.042	<0.010	< 0.01	< 0.01	< 0.01	< 0.042	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Fluorene	µg/L	N	3	120	-	-	<0.010	< 0.01	0.209	0.178	< 0.06	< 0.042	<0.010	< 0.01	< 0.01	< 0.01	< 0.03	< 0.042	< 0.01	< 0.01	< 0.01	0.343	0.01	< 0.01	< 0.01	< 0.01		
Indeno(1,2,3-cd)pyrene	µg/L	N	0.21	-	-	-	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Naphthalene	µg/L	N	1.1	10	-	-	0.312	< 0.349	31.8	14.9	< 0.321	< 0.316	0.069	< 0.126	0.046	0.232	< 0.148	< 0.072	5.54	3.55	< 4.72	57.8	20.1	< 0.01	< 0.01	< 0.01	< 0.01	
Perylene	µg/L	N	-	-	-	-	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Phenanthrene	µg/L	N	0.4	3	-	-	<0.010	< 0.01	0.023	0.024	< 0.042	< 0.042	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.042	< 0.01	< 0.01	0.024	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Pyrene	µg/L	N	0.025	0.2	-	-	<0.010	< 0.01	< 0.01	< 0.01	0.016	0.108	<0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.042	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Quinoline	µg/L	N	3.4	34	-	-	<0.104	< 0.279	< 1.8	< 1.36	< 4.91	< 3.58	<0.082	< 0.262	< 0.527	< 0.649	< 0.224	< 0.448	< 1.03	< 1.15	< 1.05	< 3.49	< 1.85	< 0.052	< 0.01	< 0.198		
Styrene	µg/L	N	72	720	-	-	<0.50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.50	< 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		
Glycols																												
Diethylene glycol	mg/L	N	-	-	-	-	<5.0	-	< 5	-	< 5	-	<5.0	-	< 5	-	< 5	-	< 5	-	< 5	-	< 5	-	-	-	-	
Ethylene glycol	mg/L	N	190	1920	-	-	<5.0	-	< 5	-	< 5	-	<5.0	-	< 5	-	< 5	-	< 5	-	< 5	-	< 5	-	-	-	-	
Propanediol, 1,3-	mg/L	N	-	-	-	-	<5.0	-	< 5	-	< 5	-	<5.0	-	< 5	-	< 5	-	< 5	-	< 5	-	< 5	-	-	-	-	
Propylene glycol, 1,2-	mg/L	N	500	5000	-	-	<5.0	-	< 5	-	< 5	-	<5.0	-	< 5	-	< 5	-	< 5	-	< 5	-	< 5	-	-	-	-	
Tetraethylene glycol	mg/L	N	-	-	-	-	<5.0	-	< 5	-	< 5	-	<5.0	-	< 5	-	< 5	-	< 5	-	< 5	-	< 5	-	-	-	-	
Triethylene glycol	mg/L	N	-	-	-	-	<5.0	-	< 5	-	< 5	-	<5.0	-	< 5	-	< 5	-	< 5	-	< 5	-	< 5	-	-	-	-	
Glycols, total (EG+DEG+PG)	mg/L	N	-	-	-	-	<10	-	< 10	-	< 10	-	<10	-	< 10	-	< 10	-	< 10	-	< 10	-	< 10	-	-	-	-	
Total Metals																												
Calcium	mg/L	T	-	-	-	-	80.5	-	82	-	61.2	-	70	-														

Distance from Landfill Facility Qualifier ^(a) Station Sample Date (M/DD/YYYY) COA number Sample Matrix QA/QC			CCME Water Quality Guideline (WQG) for the Protection of Freshwater Aquatic Life (AW- F) ^(c) Long-term exposure	Water Licence Effluent Quality Discharge Limits for the Landfill Facility ^(b) Maximum Concentration of Grab Sample	Proximal		Downgradient			Downgradient	
					LF-US-POND-01		MS-MRY-13B			MS-MRY-13C	
					2024-08-17	2024-09-09	2024-06-09	2024-07-01	2024-08-04	2024-08-17	2024-09-07
					BF2400266	BF2400326	BF2400096	BF2400155	BF2400225	BF2400266	BF2400326
			SW		SW			SW			
-			-		-			-			
Parameter	Unit	T/D/N									
Field Observations											
Weather			-		-	Cloudy, slightly raining	-	-	-	-	Cloudy
Routine Parameters											
Dissolved Oxygen, Field	mg/L	N	6.5	-	10.29	12.76	12.32	10.61	11.26	9.64	10.82
Dissolved Oxygen, Percent, Field	%	N	-	-	98.9	98.1	94.6	1037	101.6	87.2	84.5
pH, Field	pH unit	N	6.5 - 9.0	6.5 - 9.0	7.47	7.74	7.72	7.74	7.88	7.63	7.53
pH, Lab	pH unit	N	6.5 - 9.0	6.5 - 9.0	7.68	7.83	7.32	7.97	7.89	7.7	7.63
Data Quality Objective (DQO) - pH	pH unit	-	-	-	0.21	0.09	0.4	0.23	0.01	0.07	0.1
Specific Conductivity, Field	µS/cm	N	-	-	253.9	209.1	297.2	864	707	1277	1099
Conductivity, Lab	µS/cm	N	-	-	260	219	291	910	762	1340	1150
Data Quality Objective (DQO) - Conductivity	%	-	-	-	2.37	4.63	2.11	5.19	7.49	4.81	4.54
Temperature, Field	°C	N	-	-	12.4	3.7	3.4	12.7	9.8	9.9	4.2
Total Alkalinity	mg/L as CaCO ₃	N	-	-	136	109	79.1	193	163	190	196
Total Suspended Solids	mg/L	N	-	15	< 1.0	<1.0	1.2	1.2	1.3	< 1.0	<1.0
Total Dissolved Solids	mg/L	N	-	-	138	139	178	595	464	1020	830
Turbidity, Lab	NTU	N	-	-	0.53	2.66	1.32	0.54	1.42	0.13	0.11
Turbidity, Field	NTU	N	-	-	0.2	2.14	1.14	< 0.51	0.51	0.98	0.4
Hardness ^(b)	mg/L	N	-	-	121	108	122	433	323	683	574
Phenols											
Phenols	mg/L	N	0.004	-	-	-	0.001	< 0.001	< 0.001	-	-
Major Ions											
Calcium	mg/L	D	-	-	23.6	20.8	28.9	95.7	74.2	196	172
Chloride	mg/L	D	120	-	2.83	3.7	-	-	48.4	38.3	31.2
Bromide	mg/L	N	-	-	< 0.1	< 0.1	-	-	-	< 0.5	< 0.5
Fluoride	mg/L	N	0.12	-	0.059	0.048	-	-	0.027	< 0.1	< 0.1
Magnesium	mg/L	D	-	-	15	13.5	12.1	47.2	35.7	46.9	35
Potassium	mg/L	D	-	-	1.71	1.92	2.39	6.64	5.63	10.2	11.2
Sodium	mg/L	D	-	-	8.65	4.6	6.55	32.9	23.2	26.4	25.6
Sulfate	mg/L	D	-	-	1.02	1.98	-	-	142	496	392
Nutrients											
Nitrate	mg/L as N	N	2.9	-	< 0.02	< 0.02	-	-	1.44	1.06	1.32
Nitrite	mg/L as N	N	0.06	-	< 0.01	< 0.01	-	-	-	< 0.05	< 0.05
Total Ammonia	mg/L as N	T	0.017 - 189.9 ^(d)	-	< 0.005	< 0.005	-	-	0.023	0.0371	0.0161
Phosphorus, Nutrient	mg/L	T	-	-	-	0.0026	-	-	-	-	0.0121
Phosphorus, total	mg/L	T	-	-	0.0033	0.0036	-	-	0.0105	0.0105	0.0127
Total Kjeldahl Nitrogen	mg/L	N	-	-	0.166	0.129	-	-	0.504	0.746	0.455
Organic Carbon											
Dissolved Organic Carbon	mg/L	D	-	-	3.56	3.42	3.17	6.81	7.37	6.12	5.2
Total Organic Carbon	mg/L	T	-	-	3.75	-	3.71	6.76	5.73	5.74	-
Petroleum Hydrocarbons (PHCs) and BTEX											
Benzene	µg/L	N	370	-	< 0.5	< 0.5	-	-	-	< 0.5	< 0.5
Toluene	µg/L	N	2	-	< 0.5	< 0.5	-	-	-	< 0.5	< 0.5
Ethylbenzene	µg/L	N	90	-	< 0.5	< 0.5	-	-	-	< 0.5	< 0.5
o-Xylene	µg/L	N	-	-	< 0.3	< 0.3	-	-	-	< 0.3	< 0.3
m+p-Xylenes	µg/L	N	-	-	< 0.4	< 0.4	-	-	-	< 0.4	< 0.4
Total Xylenes	µg/L	N	-	-	< 0.5	< 0.5	-	-	-	< 0.5	< 0.5
BTEX, Total	µg/L	N	-	-	< 1	< 1	-	-	-	< 1	< 1
F1 (C6-C10)	µg/L	N	-	-	< 25	< 25	< 25	< 25	< 25	< 25	< 25
F1(C6-C10)-BTEX	µg/L	N	-	-	< 25	< 25	-	-	-	< 25	< 25
F2 (C10-C16)	µg/L	N	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100
F3 (C16-C34)	µg/L	N	-	-	< 250	< 250	< 250	< 250	< 250	< 250	< 250
F4 (C34-C50)	µg/L	N	-	-	< 250	< 250	< 250	< 250	< 250	< 250	< 250
Total Petroleum Hydrocarbons	µg/L	N	-	-	< 370	-	< 370	< 370	< 370	< 370	-
Oil and Grease											
Total Oil and Grease	mg/L	N	-	-	< 5	-	< 5	< 5	< 5	< 5	-
Total Metals											
Aluminum	mg/L	T	0.0050 - 0.10 ^(e)	-	0.0048	-	0.0226	0.0186	0.0066	< 0.03	-
Antimony	mg/L	T	-	-	< 0.0001	-	0.00014	0.00015	< 0.0001	< 0.001	-
Arsenic	mg/L	T	0.005	0.5	0.00013	-	0.00013	0.00027	0.00017	< 0.001	-
Barium	mg/L	T	-	-	0.00523	-	0.0159	0.0498	0.0358	0.0753	-
Beryllium	mg/L	T	-	-	< 0.00002	-	< 0.00002	< 0.00002	< 0.00002	< 0.0002	-
Bismuth	mg/L	T	-	-	< 0.00005	-	< 0.00005	< 0.00005	< 0.00005	< 0.0005	-
Boron	mg/L	T	1.5	-	0.03	-	0.403	1.16	0.797	1.03	-
Cadmium	mg/L	T	0.00017 - 0.00037 ^(f)	-	< 0.000005	-	0.0000095	0.0000216	0.0000145	< 0.00005	-
Cesium	mg/L	T	-	-	0.000011	-	< 0.00001	< 0.00001	< 0.00001	< 0.0001	-
Chromium	mg/L	T	0.0010 ^(g)	-	< 0.0005	-	< 0.0005	0.00064	0.00093	< 0.005 ^(h)	-
Cobalt	mg/L	T	-	-	< 0.0001	-	< 0.0001	0.0004	0.00024	< 0.001	-
Copper	mg/L	T	0.0020 - 0.0040 ^(h)	0.3	< 0.0005	-	0.00104	0.00172	0.00168	< 0.005 ^(h)	-
Iron	mg/L	T	0.3	-	0.084	-	0.025	0.062	0.018	< 0.1	-
Lead	mg/L	T	0.0010 - 0.0070 ^(h)	0.2	< 0.00005	-	< 0.00005	< 0.00005	< 0.00005	< 0.0005	-
Lithium	mg/L	T	-	-	0.0026	-	0.0222	0.0908	0.0509	0.101	-
Manganese	mg/L	T	-	-	0.0154	-	0.00164	0.017	0.00167	< 0.001	-
Mercury	mg/L	T	0.000026	-	< 0.000005	-	< 0.000005	< 0.000005	< 0.000005	< 0.000005	-
Molybdenum	mg/L	T	0.073	-	0.000134	-	0.000599	0.000479	0.000489	0.00267	-
Nickel	mg/L	T	0.025 - 0.15 ^(h)	0.5	0.00061	-	0.00654	0.0144	0.0102	0.012	-
Phosphorus	mg/L	T	-	-	< 0.05	-	< 0.05	< 0.05	< 0.05	< 0.5	-
Rubidium	mg/L	T	-	-	0.00284	-	0.00254	0.00676	0.00515	0.00881	-
Selenium	mg/L	T	0.001	-	< 0.00005	-	< 0.00005	0.000078	0.000073	< 0.0005	-
Silicon	mg/L	T	-	-	1.81	-	1.21	3.39	3.79	3.45	-
Silver	mg/L	T	0.00025	-	< 0.00001	-	< 0.00001	< 0.00001	< 0.00001	< 0.0001	-
Strontium	mg/L	T	-	-	0.0248	-	0.0424	0.138	0.112	0.486	-
Sulfur	mg/L	T	-	-	< 0.5	-	15.9	78.7	49.2	176	-
Tellurium	mg/L	T	-	-	< 0.0002	-	< 0.0002	< 0.0002	< 0.0002	< 0.002	-
Thallium	mg/L	T	0.0008	-	< 0.00001	-	< 0.00001	0.000018	< 0.00001	< 0.0001	-
Thorium	mg/L	T	-	-	< 0.0001	-	< 0.0001	< 0.0001	< 0.0001	< 0.001	-
Tin	mg/L	T	-	-	< 0.0001	-	< 0.0001	< 0.0001	< 0.0001	< 0.001	-
Titanium	mg/L	T	-	-	< 0.0003	-	< 0.0006	< 0.0009	< 0.0003	< 0.003	-
Tungsten	mg/L	T	-	-	< 0.0001	-	< 0.0001	< 0.0001	< 0.0001	< 0.001	-
Uranium	mg/L	T	0.015	-	0.000226	-	0.00191	0.0111	0.00708	0.0172	-
Vanadium	mg/L	T	-	-	< 0.0005	-	< 0.0005	< 0.0005	< 0.0005	< 0.005	-
Zinc	mg/L	T	-	0.5	< 0.003	-	< 0.003	< 0.003	< 0.003	< 0.03	-
Zirconium	mg/L	T	-	-	< 0.0002	-	< 0.0002	0.00024	< 0.0002	< 0.002	-
Dissolved Metals											
Aluminum	mg/L	D	-	-	0.0019	0.0038	-	-	0.0023	< 0.01	0.001
Antimony	mg/L	D	-	-	< 0.0001	< 0.0001	-	-	< 0.0001	< 0.001	0.00027
Arsenic	mg/L	D	-	-	0.00013	0.00011	-	-	0.00017	< 0.001	0.00022
Barium	mg/L	D	-	-	0.0049	0.00613	-	-	0.0349	0.072	0.0552
Beryllium	mg/L	D	-	-	< 0.00002	< 0.00002	-	-	< 0.00002	< 0.0002	< 0.00002
Bismuth	mg/L	D	-	-	< 0.00005	< 0.00005	-	-	< 0.00005	< 0.0005	< 0.00005
Boron	mg/L	D	-	-	0.026	0.013	-	-	0.846	1.03	0.903
Cadmium	mg/L	D	-	-	< 0.000005	< 0.000005	-	-	0.0000132	< 0.00005	0.0000196
Cesium	mg/L	D	-	-	0.000013	< 0.00001	-	-	< 0.00001	< 0.0001	< 0.00001
Chromium	mg/L	D	-	-	< 0.0005	< 0.0005	-	-	0.00058	< 0.005	< 0.0005
Cobalt	mg/L	D	-	-	< 0.0001	0.00027	-	-	0.00023	< 0.001	0.00031
Copper	mg/L	D	-	-	0.00032	0.00032	-	-	0.0		

Station Sample Date (M/DD/YYYY) COA Matrix QA/QC			Detection Limit ^(a)	5 th Detection Limit	Parent and Duplicate Sample							Field Blank		Travel Blank	
					LF-KP23-09	LF-KP23-09	RDP (%)	HWB-KP22-05	HWB-KP22-05	RDP (%)	LF-KP22-01	MS-HWB-GW5			
					2024-09-06	2024-09-06		2024-09-09	2024-09-09		2024-09-07	2024-09-09			
					BF2400320	BF2400320		BF2400327	BF2400327		BF2400323	BF2400327			
					GW			GW			-	-			
FDA	FD	FDA	FD	FB	TB										
Parameter	Unit	T/D/N													
Routine Parameters															
Dissolved Oxygen, Field	mg/L	N	-	-	7.24	-	-	0.49	-	-	-	-	-		
Dissolved Oxygen, Percent, Field	%	N	-	-	52.2	-	-	3.5	-	-	-	-	-		
pH, Field	pH units	N	-	-	6.81	-	-	6.91	-	-	-	-	-		
pH, Lab	pH units	N	-	-	7.02	6.95	-	6.96	6.95	-	7.2	7.49			
Specific Conductivity, Field	us/cm	N	-	-	309.8	-	-	1163	-	-	-	-	-		
Conductivity, Lab	us/cm	N	1	5	348	347	0	1140	1140	0	1	< 1.0			
Temperature, Field	°C	N	-	-	0.9	-	-	0.9	-	-	-	-	-		
Total Alkalinity	mg/L	N	1	5	180	186	3	255	256	0	< 2	< 2			
Total Suspended Solids	mg/L	N	1	5	53.3	25.2	72	7.2	6.4	12	< 1	< 1			
Total Dissolved Solids	mg/L	N	15	75	177	164	8	706	700	1	22	< 15			
Turbidity, Lab	NTU	N	0.1	0.5	37	15	85	6.23	6.23	0	< 0.1	< 0.1			
Turbidity, Field	NTU	N	-	-	130.7	-	-	4.42	-	-	-	-	-		
Major Ions															
Calcium	mg/L	D	0.05	0.25	34.2	34.3	0	89.9	85.1	5	< 0.05	< 0.05			
Chloride	mg/L	D	0.1	0.5	0.93	0.87	7	203	205	1	< 0.5	< 0.5			
Bromide	mg/L	N	0.005	0.025	< 0.1	< 0.1	n/a	1.1	1.13	3	< 0.1	< 0.1			
Fluoride	mg/L	N	0.02	0.1	0.061	0.059	n/a	< 0.1	< 0.1	n/a	< 0.02	< 0.02			
Magnesium	mg/L	D	0.005	0.025	23.9	23.7	1	80.4	78.3	3	< 0.005	< 0.005			
Potassium	mg/L	D	0.05	0.25	0.791	0.784	1	4.33	4.17	4	< 0.05	< 0.05			
Sodium	mg/L	D	0.05	0.25	4.81	4.78	1	9.5	8.95	6	< 0.05	< 0.05			
Sulfate	mg/L	D	0.3	1.5	< 0.3	< 0.3	n/a	12	11.9	1	< 0.3	< 0.3			
Nutrients															
Nitrate	mg/L	N	0.02	0.1	0.028	0.028	n/a	< 0.1	< 0.1	n/a	< 0.02	< 0.02			
Nitrite	mg/L	N	0.01	0.05	< 0.01	< 0.01	n/a	< 0.05	< 0.05	n/a	< 0.01	< 0.01			
Total Ammonia	mg/L	T	0.005	0.025	0.0089	0.0094	n/a	0.377	0.393	4	< 0.005	0.0055			
Phosphorus, Nutrient	mg/L	T	0.002	0.01	1.23	1.15	7	0.0292	0.0309	6	< 0.002	< 0.002			
Phosphorus, total	mg/L	D	0.002	0.01	0.0117	0.0085	n/a	< 0.5	< 0.5	n/a	< 0.002	< 0.05			
Total Kjeldahl Nitrogen	mg/L	N	0.05	0.25	0.169	0.18	n/a	0.634	0.688	8	< 0.05	< 0.05			
Organic Carbon															
Dissolved Organic Carbon	mg/L	D	0.5	2.5	3.32	3.72	11	-	-	n/a	< 0.5	-			
Petroleum Hydrocarbons															
Benzene	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	4.33	4.2	3	< 0.5	< 0.5			
Toluene	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
Ethylbenzene	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	1.18	1.19	n/a	< 0.5	< 0.5			
o-Xylene	ug/L	N	0.3	1.5	< 0.3	< 0.3	n/a	8.63	8.72	1	< 0.3	< 0.3			
m+p-Xylenes	ug/L	N	0.4	2	< 0.4	< 0.4	n/a	< 0.4	< 0.4	n/a	< 0.4	< 0.4			
Total Xylenes	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	8.63	8.72	1	< 0.5	< 0.5			
BTEX, Total	ug/L	N	1	5	< 1	< 1	n/a	14.1	14.1	0	< 1	< 1			
Monochlorobenzene	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
F1 (C6-C10)	ug/L	N	25	125	< 25	< 25	n/a	33	36	n/a	< 25	< 25			
F1(C6-C10)-BTEX	ug/L	N	25	125	< 25	< 25	n/a	< 25	< 25	n/a	< 25	< 25			
F2 (C10-C16)	ug/L	N	100	500	< 100	< 100	n/a	200	160	n/a	< 100	< 100			
F3 (C16-C34)	ug/L	N	250	1250	< 250	< 250	n/a	< 250	< 250	n/a	< 250	< 250			
F4 (C34-C50)	ug/L	N	250	1250	< 250	< 250	n/a	< 250	< 250	n/a	< 250	< 250			
Total Petroleum Hydrocarbons	ug/L	N	370	1850	< 370	< 370	n/a	< 370	< 370	n/a	< 370	< 370			
Oil and Grease															
Total Oil and Grease	mg/L	N	10	50	-	-	n/a	< 10	< 10	n/a	-	< 10			
Volatil Organic Compunds (VOCs)															
1,1,1,2-Tetrachloroethane	ug/L	N	-	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	< 0.5	< 0.5			
1,1,1-Trichloroethane	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
1,1,2,2-Tetrachloroethane	ug/L	N	-	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	< 0.5	< 0.5			
1,1,2-Trichloroethane	ug/L	N	-	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	< 0.5	< 0.5			
1,1-Dichloroethane	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
1,1-Dichloroethylene	ug/L	N	-	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	< 0.5	< 0.5			
1,2-Dibromoethane	ug/L	N	0.2	1	< 0.2	< 0.2	n/a	< 0.2	< 0.2	n/a	< 0.2	< 0.2			
1,2-Dichlorobenzene	ug/L	N	-	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	< 0.5	< 0.5			
1,2-Dichloroethane	ug/L	N	-	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	< 0.5	< 0.5			
1,2-Dichloropropane	ug/L	N	-	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	< 0.5	< 0.5			
1,3-Dichlorobenzene	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
1,3-Dichloropropene (cis & trans)	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
1,4-Dichlorobenzene	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
Indeno(1,2,3-cd)pyrene	ug/L	N	0.01	0.05	< 0.01	< 0.01	n/a	< 0.01	< 0.01	n/a	< 0.01	< 0.01			
Methyl Ethyl Ketone	ug/L	N	20	100	< 20	< 20	n/a	< 20	< 20	n/a	< 20	< 20			
Methyl Isobutyl Ketone	ug/L	N	20	100	< 20	< 20	n/a	< 20	< 20	n/a	< 20	< 20			
Methyl t-butyl ether (MTBE)	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	0.82	0.81	n/a	< 0.5	< 0.5			
Acetone	ug/L	N	20	100	< 20	< 20	n/a	< 20	< 20	n/a	< 20	< 20			
Bromomethane	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
cis-1,2-Dichloroethylene	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
cis-1,3-Dichloropropene	ug/L	N	0.3	1.5	< 0.3	< 0.3	n/a	< 0.3	< 0.3	n/a	< 0.3	< 0.3			
Dibenz(a,h)anthracene	ug/L	N	0.005	0.025	< 0.005	< 0.005	n/a	< 0.005	< 0.005	n/a	< 0.005	< 0.005			
Dibromochloromethane	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
Dichlorodifluoromethane	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
Carbon tetrachloride	mg/L	D	3.8	19	0.0038	0.004	n/a	0.0118	< 0.01	n/a	< 0.001	0.0012			
Dichloromethane	ug/L	N	1	5	< 1	< 1	n/a	< 1	< 1	n/a	< 1	< 1			
Chloromethane	ug/L	N	2	10	< 2	< 2	n/a	< 2	< 2	n/a	< 2	< 2			
Tetrachloroethylene	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	0.55	0.55	n/a	< 0.5	< 0.5			
trans-1,2-Dichloroethylene	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
trans-1,3-Dichloropropene	ug/L	N	0.3	1.5	< 0.3	< 0.3	n/a	< 0.3	< 0.3	n/a	< 0.3	< 0.3			
Trichloroethylene	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
Trichlorofluoromethane	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
Trihalomethanes, Total	ug/L	N	1	5	< 1	< 1	n/a	< 1	< 1	n/a	< 1	< 1			
Chloroethane	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
hexanone, 2-	ug/L	N	20	100	< 20	< 20	n/a	< 20	< 20	n/a	< 20	< 20			
Bromodichloromethane	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
Vinyl chloride	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
Bromoform	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
Chloroform	ug/L	N	0.5	2.5	< 0.5	< 0.5	n/a	< 0.5	< 0.5	n/a	< 0.5	< 0.5			
Polycyclic Aromatic Hydrocarbons (PAHs)															
Acenaphthene	ug/L	N	0.01	0.05	< 0.01	< 0.01	n/a	0.011	0.013	n/a	< 0.01	< 0.01			
Acenaphthylene	ug/L	N													

APPENDIX F

Single Well Response Testing



RISING HEAD TEST 1

Data Set: C:\...\LF-KP22-01_R1_QA_report.aqt

Date: 01/27/25

Time: 17:01:46

PROJECT INFORMATION

Company: WSP

Client: Baffinland Iron Mines

Project: CA0023205.6339

Location: Landfill Facility

Test Well: LF-KP22-01

Test Date: 2024-09-10

AQUIFER DATA

Saturated Thickness: 1.06 m

Anisotropy Ratio (K_z/K_r): 0.1

WELL DATA (LF-KP22-01)

Initial Displacement: 0.28 m

Static Water Column Height: 1.45 m

Total Well Penetration Depth: 1.45 m

Screen Length: 1.06 m

Casing Radius: 0.025 m

Well Radius: 0.076 m

Gravel Pack Porosity: 0.3

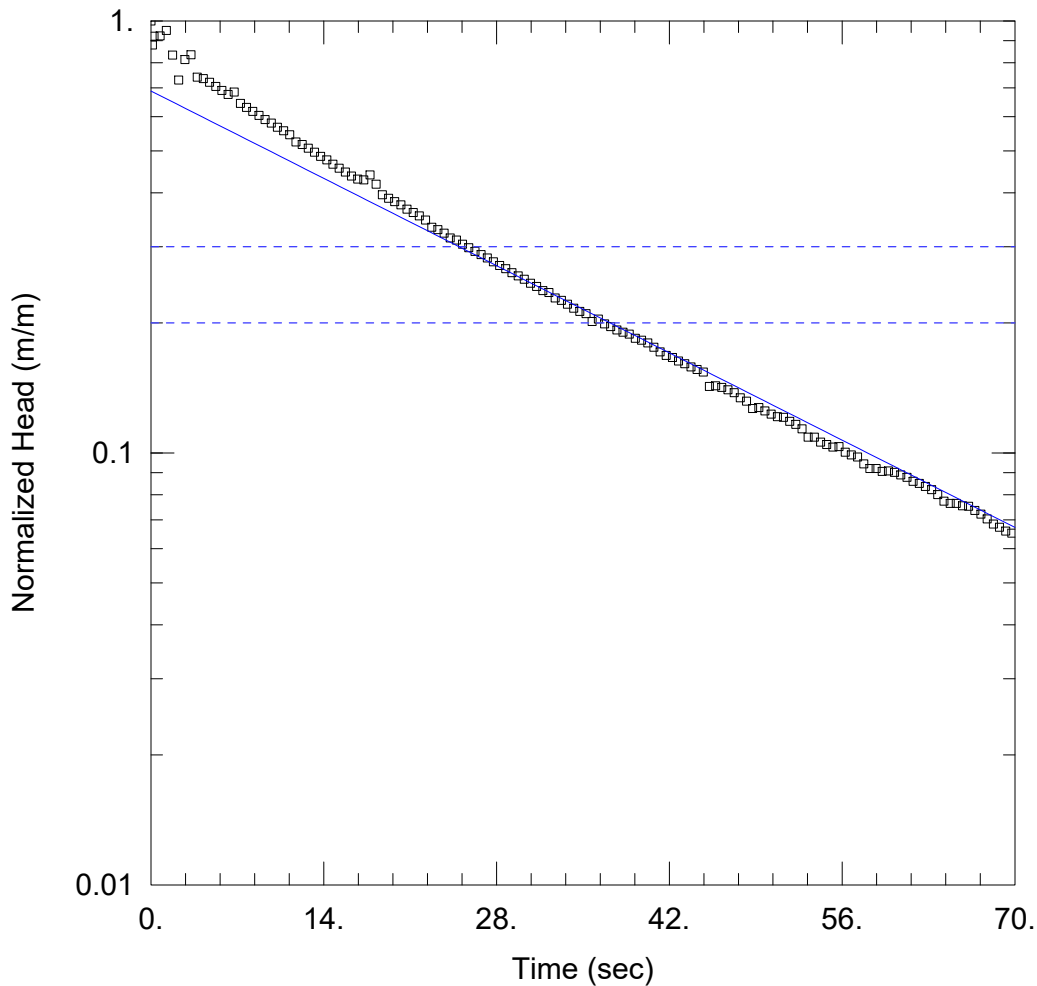
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.0002302$ m/sec

$y_0 = 0.2434$ m



RISING HEAD TEST 1

Data Set: C:\...\LF-KP22-03_R1_QA_report.aqt

Date: 01/27/25

Time: 17:02:55

PROJECT INFORMATION

Company: WSP

Client: Baffinland Iron Mines Corp.

Project: CA0023205.6339

Location: Landfill Facility

Test Well: LF-KP22-03

Test Date: 2023-09-10

AQUIFER DATA

Saturated Thickness: 1.2 m

Anisotropy Ratio (K_z/K_r): 0.1

WELL DATA (LF-KP22-03)

Initial Displacement: 0.4294 m

Static Water Column Height: 1.3 m

Total Well Penetration Depth: 1.3 m

Screen Length: 1.2 m

Casing Radius: 0.0325 m

Well Radius: 0.076 m

Gravel Pack Porosity: 0.3

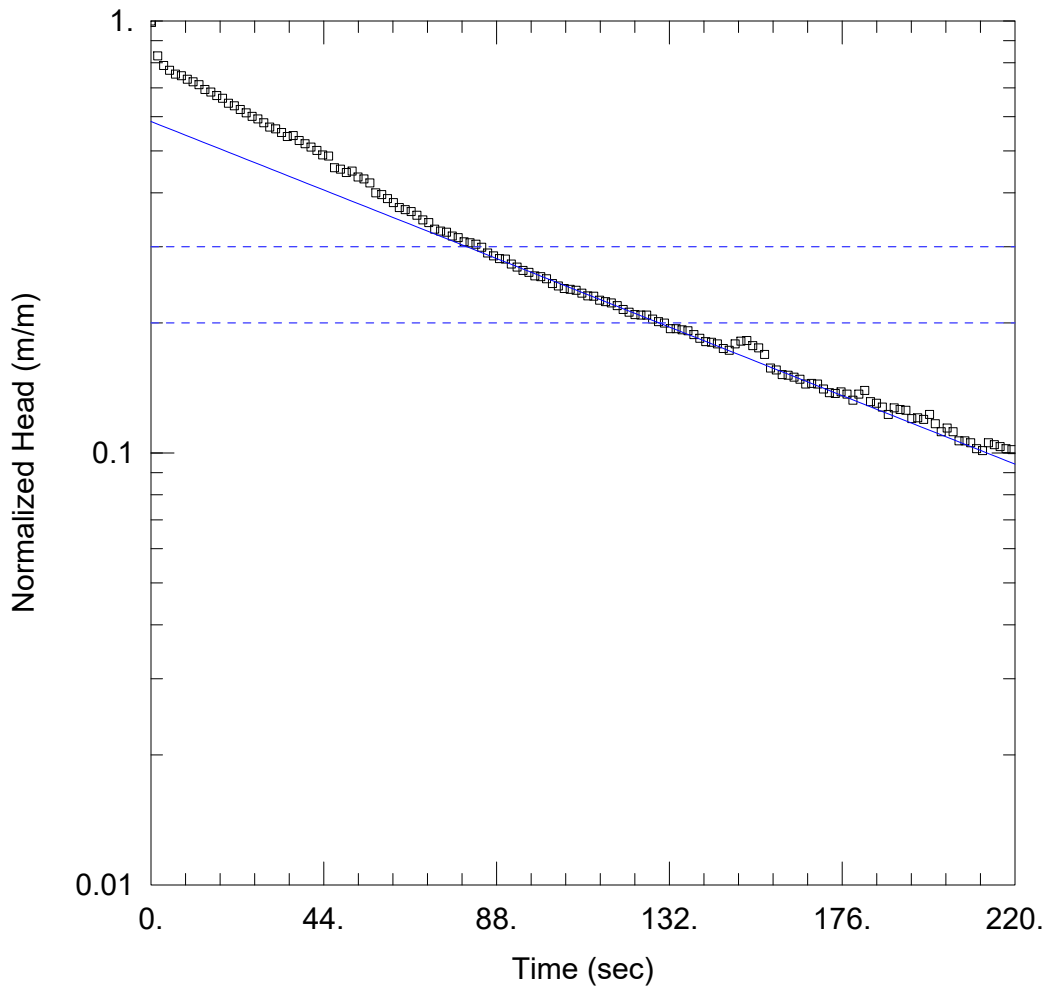
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 7.072E-5$ m/sec

$y_0 = 0.2955$ m



FALLING HEAD TEST 2

Data Set: C:\...\LF-KP23-01_F2_QA_report.aqt

Date: 01/27/25

Time: 17:05:22

PROJECT INFORMATION

Company: WSP

Client: Baffinland Iron Mines Corp.

Project: CA0023205.6339

Location: Landfill Facility

Test Well: LF-KP23-01

Test Date: 2024-09-10

AQUIFER DATA

Saturated Thickness: 1.52 m

Anisotropy Ratio (K_z/K_r): 0.1

WELL DATA (LF-KP23-01)

Initial Displacement: 0.1857 m

Static Water Column Height: 1.06 m

Total Well Penetration Depth: 1.52 m

Screen Length: 1.52 m

Casing Radius: 0.0127 m

Well Radius: 0.0033 m

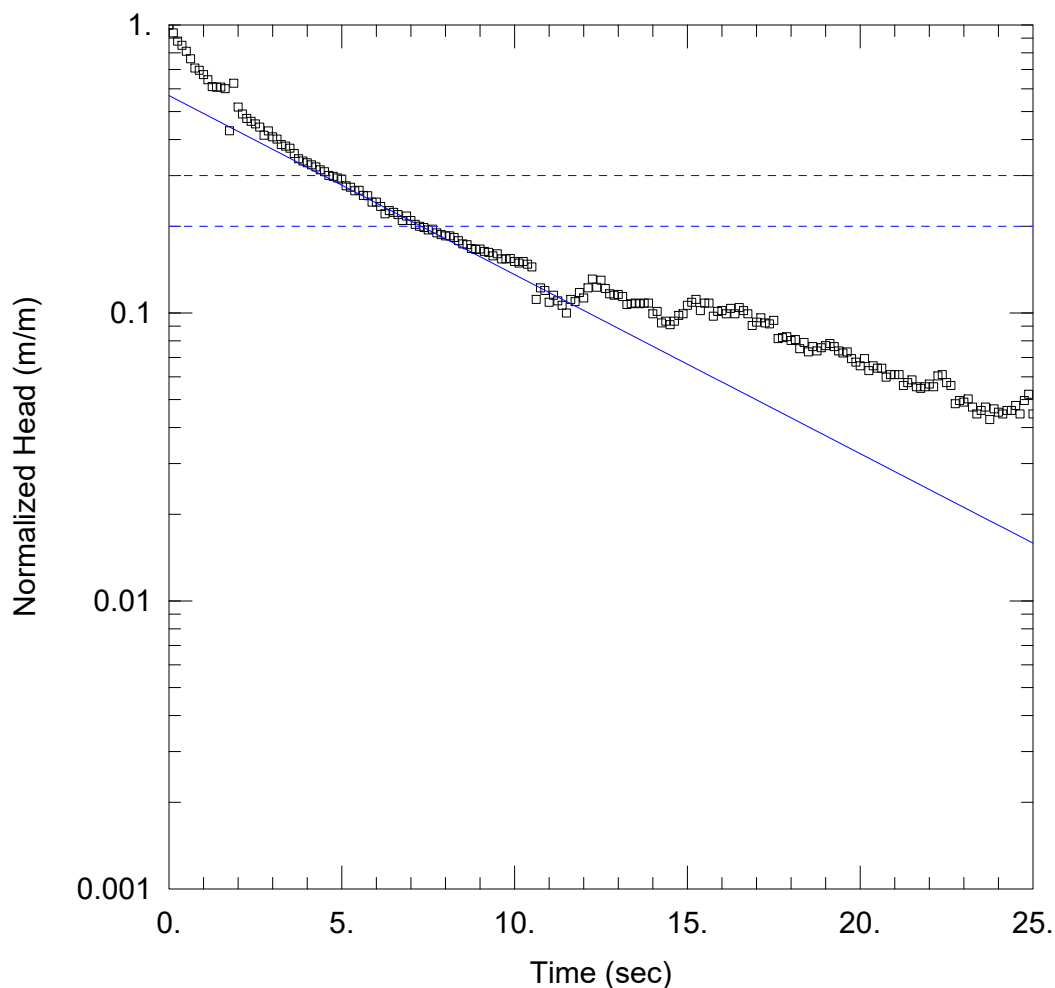
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 2.183E-6$ m/sec

$y_0 = 0.1086$ m



RISING HEAD TEST R3

Data Set: C:\...\LF-KP23-07_R3_QA_report.aqt

Date: 01/27/25

Time: 17:06:56

PROJECT INFORMATION

Company: WSP

Client: Baffinland Iron Mines Corp.

Project: CA0023205.6339

Location: Landfill Facility

Test Well: LF-KP23-07

Test Date: 2024-09-11

AQUIFER DATA

Saturated Thickness: 0.75 m

Anisotropy Ratio (K_z/K_r): 0.1

WELL DATA (LF-KP23-07)

Initial Displacement: 0.1571 m

Static Water Column Height: 0.75 m

Total Well Penetration Depth: 0.76 m

Screen Length: 0.76 m

Casing Radius: 0.0127 m

Well Radius: 0.033 m

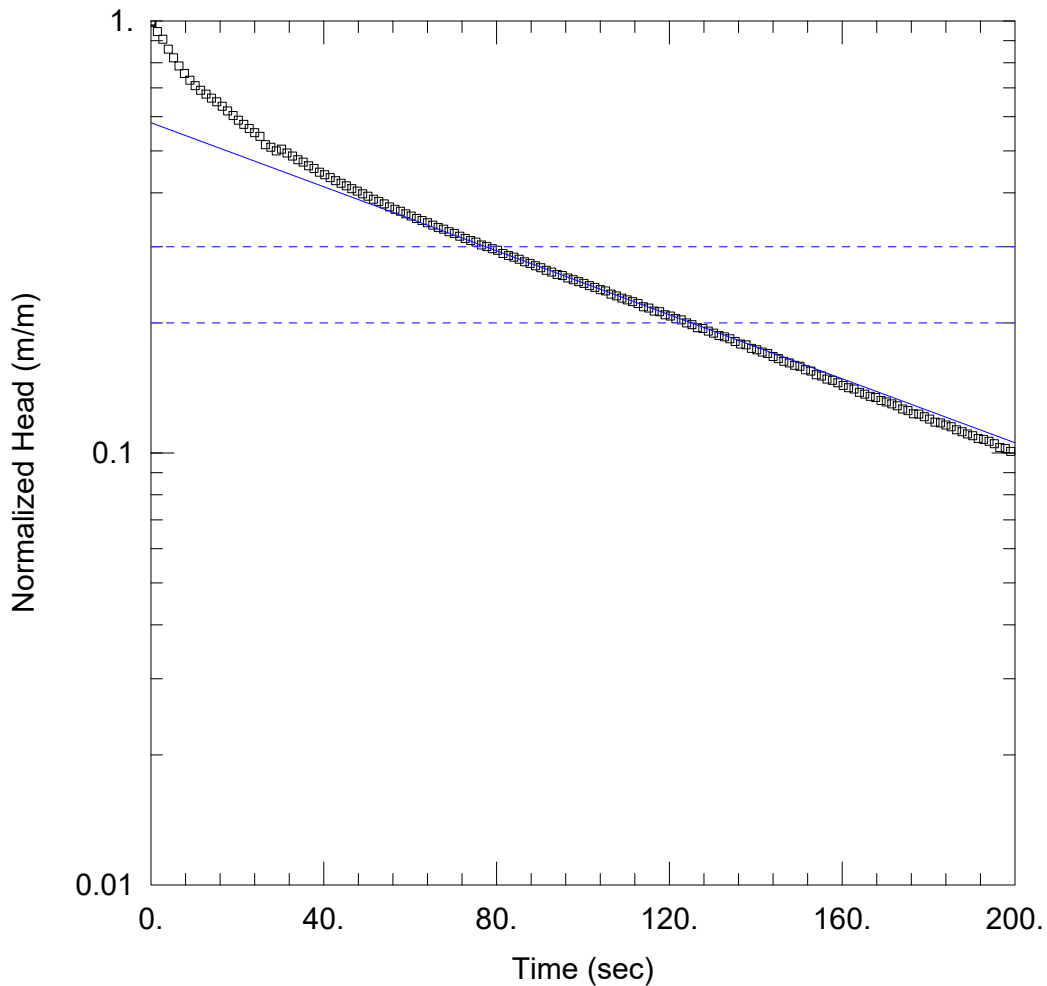
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 3.6E-5$ m/sec

$y_0 = 0.08926$ m



RISING HEAD TEST 1

Data Set: C:\...\LF-KP23-11_R1_QA_report.aqt

Date: 01/27/25

Time: 17:08:27

PROJECT INFORMATION

Company: WSP

Client: Baffinland Iron Mines Corp.

Project: CA0023205.6339

Location: Landfill Facility

Test Well: LF-KP23-11

Test Date: 2024-09-10

AQUIFER DATA

Saturated Thickness: 1.14 m

Anisotropy Ratio (K_z/K_r): 0.1

WELL DATA (LF-KP23-11)

Initial Displacement: 0.375 m

Static Water Column Height: 1.14 m

Total Well Penetration Depth: 1.14 m

Screen Length: 0.76 m

Casing Radius: 0.0127 m

Well Radius: 0.033 m

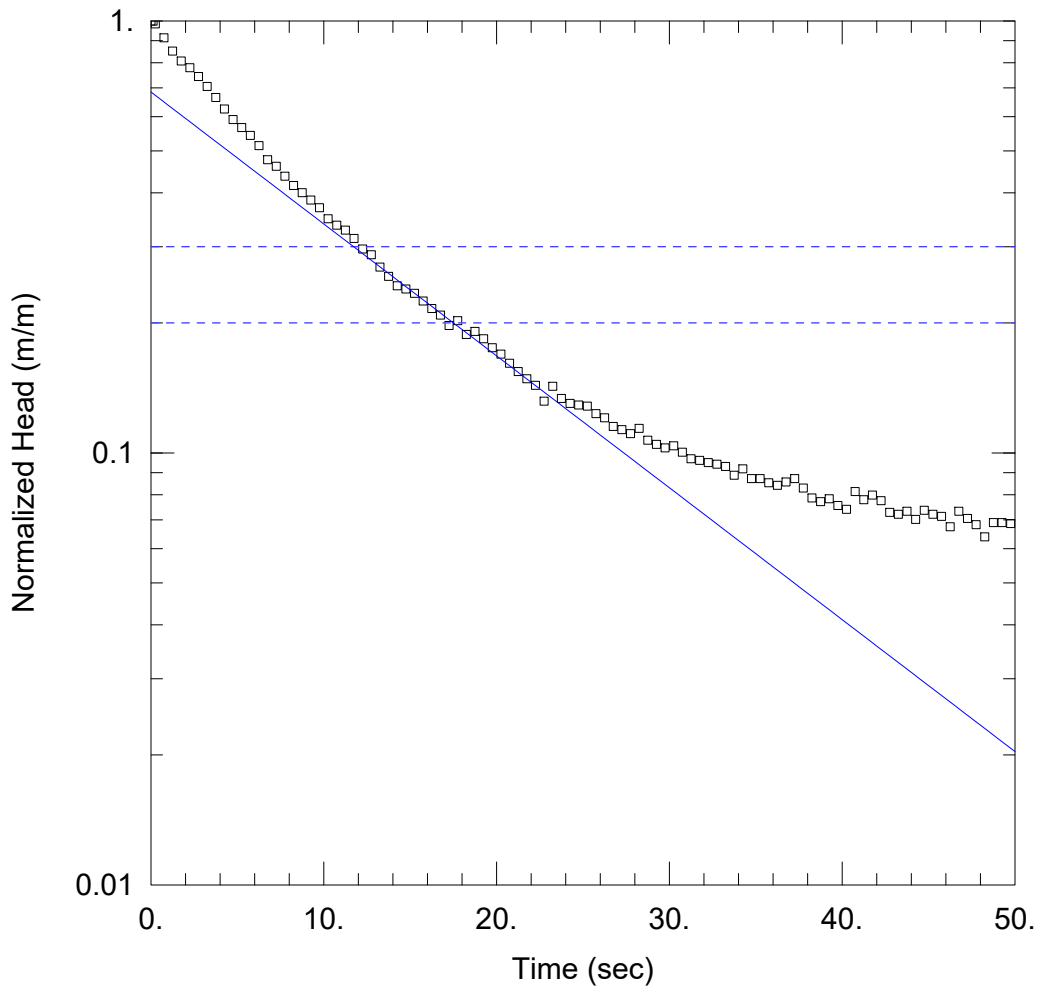
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 3.215E-6$ m/sec

$y_0 = 0.218$ m



RISING HEAD TEST 2

Data Set: C:\...\HWB-KP22-01 R2_QA_report.aqt

Date: 01/27/25

Time: 16:57:24

PROJECT INFORMATION

Company: WSP

Client: Baffinland Iron Mines Corp.

Project: CA0023205.6339

Location: HWB Facilities

Test Well: HWB-KP22-01

Test Date: 2024-09-11

AQUIFER DATA

Saturated Thickness: 0.9 m

Anisotropy Ratio (K_z/K_r): 0.1

WELL DATA (HWB-KP22-01)

Initial Displacement: 0.258 m

Static Water Column Height: 1.04 m

Total Well Penetration Depth: 1.04 m

Screen Length: 0.9 m

Casing Radius: 0.025 m

Well Radius: 0.076 m

Gravel Pack Porosity: 0.3

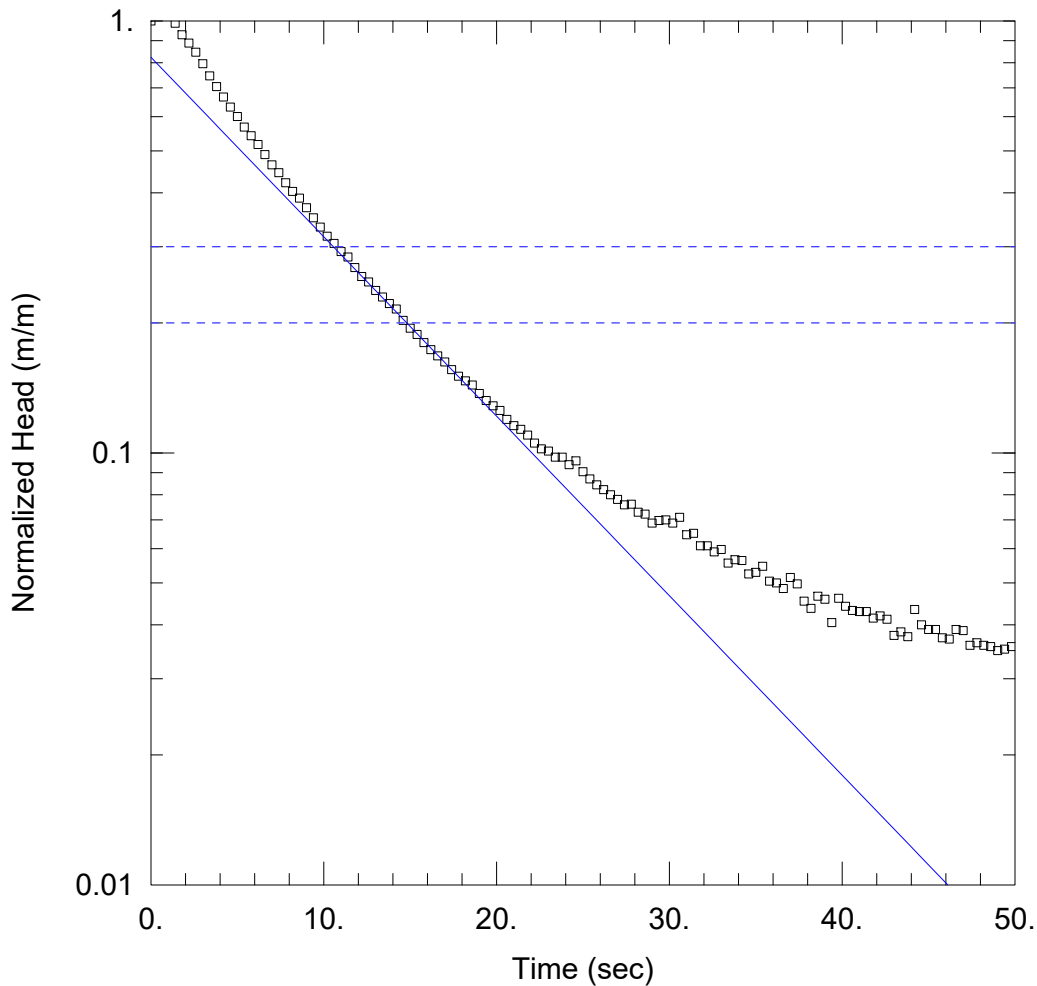
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.000158$ m/sec

$y_0 = 0.1766$ m



RISING HEAD TEST 1

Data Set: C:\...\HWB-KP22-04 R1_QA_report.aqt

Date: 01/27/25

Time: 16:48:16

PROJECT INFORMATION

Company: WSP

Client: Baffinland Iron Mines Corp.

Project: CA0023205.6339

Location: HWB Facilities

Test Well: HWB-KP22-04

Test Date: 2024-09-11

AQUIFER DATA

Saturated Thickness: 0.9 m

Anisotropy Ratio (K_z/K_r): 0.1

WELL DATA (HWB-KP22-04)

Initial Displacement: 0.41 m

Static Water Column Height: 1.32 m

Total Well Penetration Depth: 1.32 m

Screen Length: 0.9 m

Casing Radius: 0.025 m

Well Radius: 0.076 m

Gravel Pack Porosity: 0.3

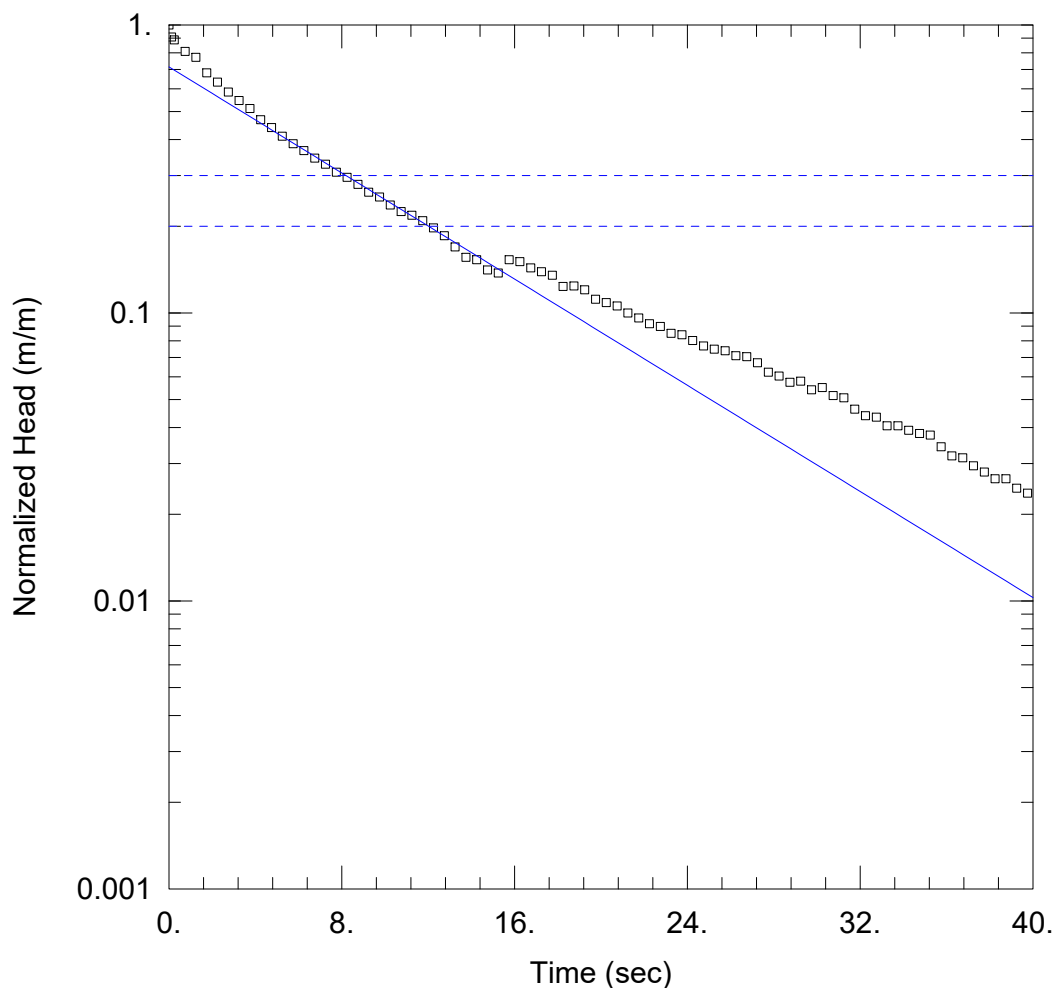
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.0002301$ m/sec

$y_0 = 0.3377$ m



RISING HEAD TEST 3

Data Set: C:\Users\juperreault\Downloads\HWB-KP23-01 R3_QA_report.aqt

Date: 03/07/25

Time: 09:19:11

PROJECT INFORMATION

Company: WSP

Client: Baffinland Iron Mines Corp.

Project: CA0023205.6339

Location: HWB Facilities

Test Well: HWB-KP23-01

Test Date: 2024-09-11

AQUIFER DATA

Saturated Thickness: 1.112 m

Anisotropy Ratio (K_z/K_r): 0.1

WELL DATA (HWB-KP23-01)

Initial Displacement: 0.2071 m

Static Water Column Height: 1.11 m

Total Well Penetration Depth: 1.11 m

Screen Length: 0.76 m

Casing Radius: 0.013 m

Well Radius: 0.033 m

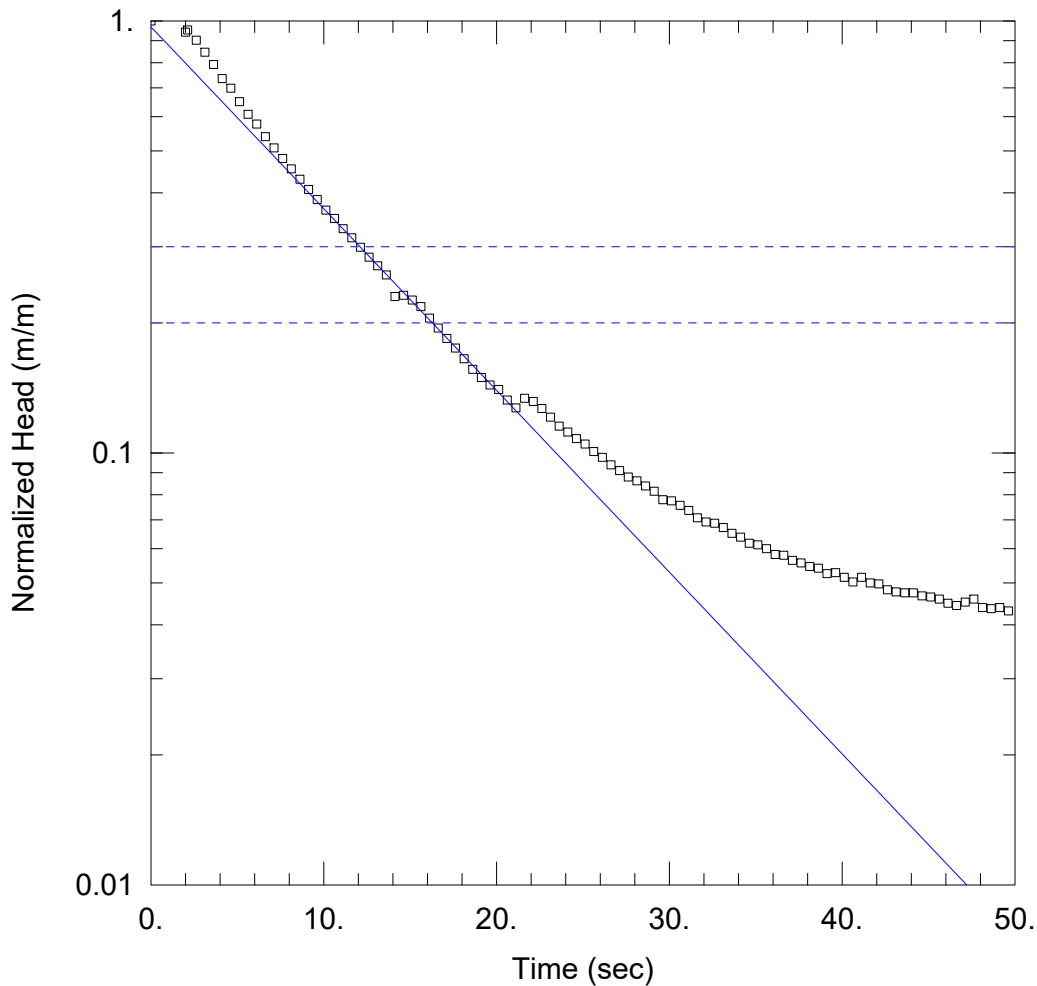
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 4.311E-5$ m/sec

$y_0 = 0.1481$ m



RISING HEAD TEST 1

Data Set: C:\...\HWB-KP23-03 R1_QA_report.aqt

Date: 01/27/25

Time: 16:58:14

PROJECT INFORMATION

Company: WSP

Client: Baffinland Iron Mines Corp.

Project: CA0023205.6339

Location: HWB Facilities

Test Well: HWB-KP22-04

Test Date: 2024-09-11

AQUIFER DATA

Saturated Thickness: 1.16 m

Anisotropy Ratio (K_z/K_r): 0.1

WELL DATA (HWB-KP23-03)

Initial Displacement: 0.39 m

Static Water Column Height: 1.16 m

Total Well Penetration Depth: 1.16 m

Screen Length: 0.76 m

Casing Radius: 0.013 m

Well Radius: 0.033 m

SOLUTION

Aquifer Model: Unconfined

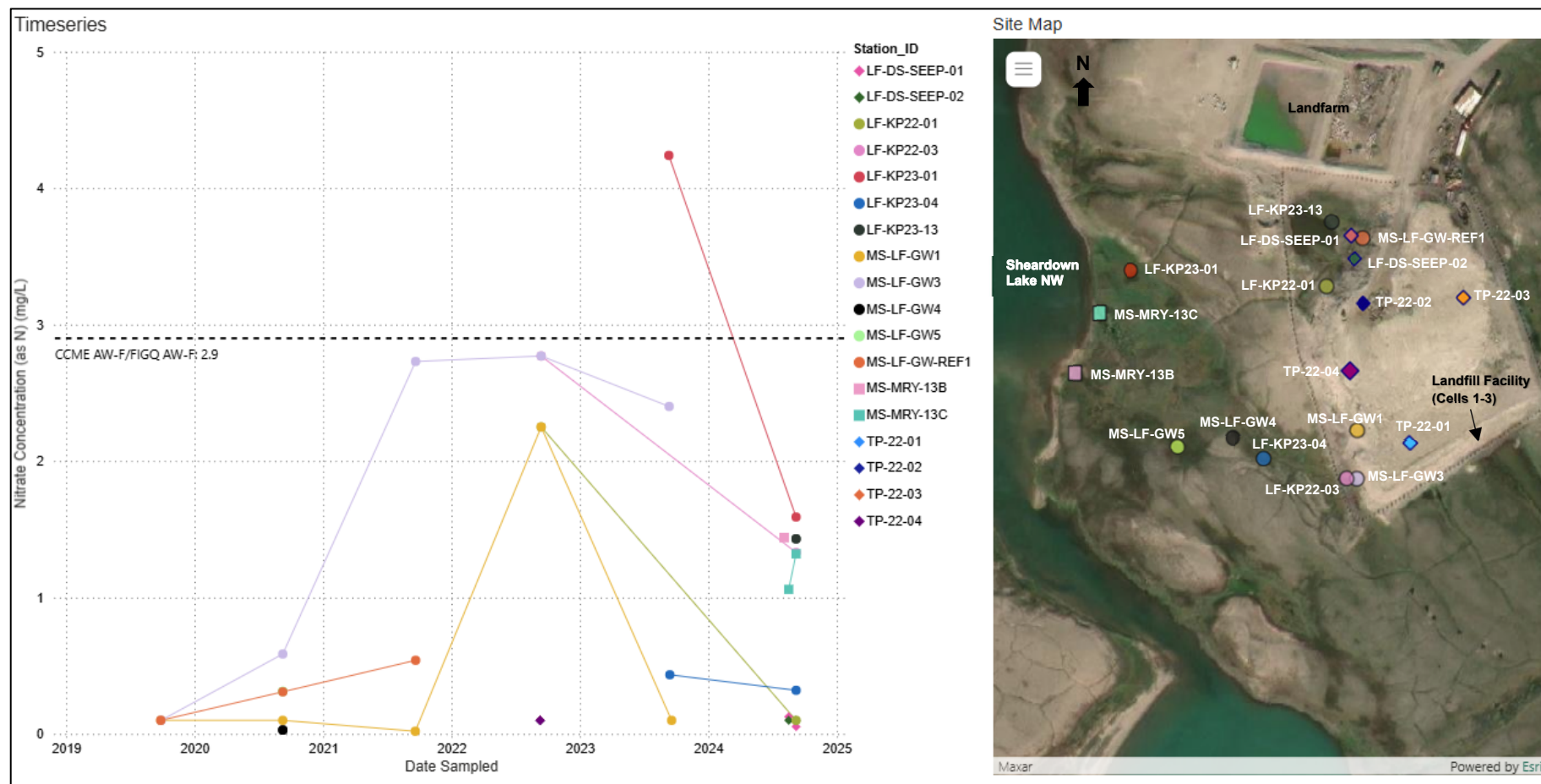
Solution Method: Bouwer-Rice

$K = 3.838E-5$ m/sec

$y_0 = 0.3778$ m

APPENDIX G

Timeseries



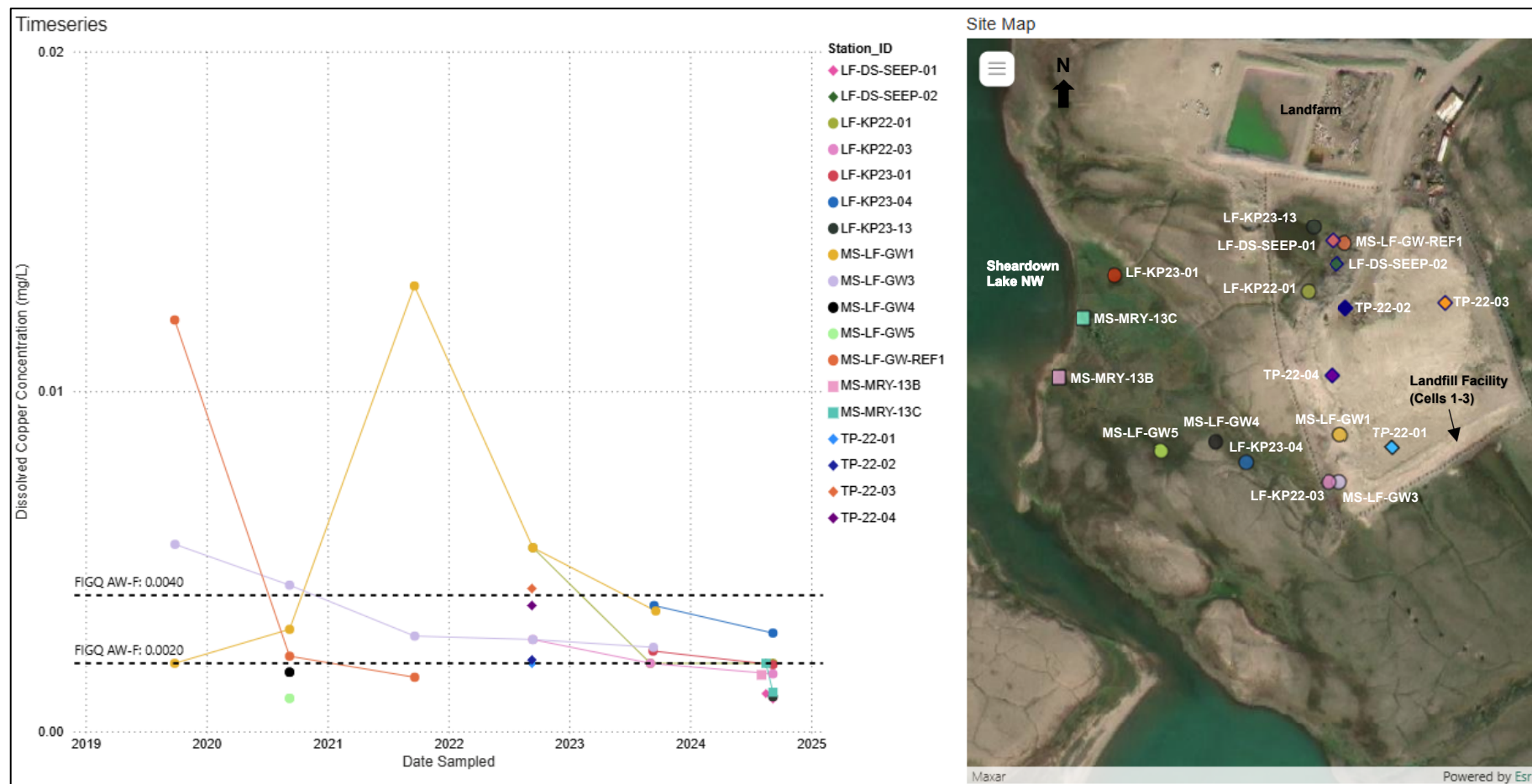
Appendix G-1: Nitrate Concentrations at Source and Downgradient Stations at the Landfill Facility

Notes: CCME AW-F = Canadian Council of Ministers of the Environment Freshwater Aquatic Life guideline; CSR = Contaminated Sites Regulation; FIGQ AW-F = Federal Interim Groundwater Quality Freshwater Aquatic Life guideline; NW = Northwest. The nitrate Yukon CSR standard (400 mg/L) was not plotted in the timeseries.

Results below detection limits are showing at detection limit on the figure.

Square symbol = surface water station; Circle symbol = groundwater station (drive point piezometer or standpipe well without bentonite seal); Diamond symbol = seep station

Downgradient stations: LF-KP23-01, LF-KP23-04, MS-LF-GW4, MS-LF-GW5, MS-MRY-13C, MS-MRY-13C. Source stations: LF-DS-SEEP-01, LF-DS-SEEP-02, LF-KP22-01, LF-KP22-03, LF-KP23-13, MS-LF-GW1, MS-LF-GW3, MS-LF-GW-REF1, TP-22-01, TP-22-02, TP-22-03, TP-22-04.



Appendix G-2: Dissolved Copper Concentrations at Source and Downgradient Stations at the Landfill Facility

Notes: CCME AW-F: Canadian Council of Ministers of the Environment for the Protection of Freshwater Aquatic Life; CSR = Contaminated Sites Regulation; FIGQ AW-F = Federal Interim Groundwater Quality for the Protection of Freshwater Aquatic Life; NW = Northwest.

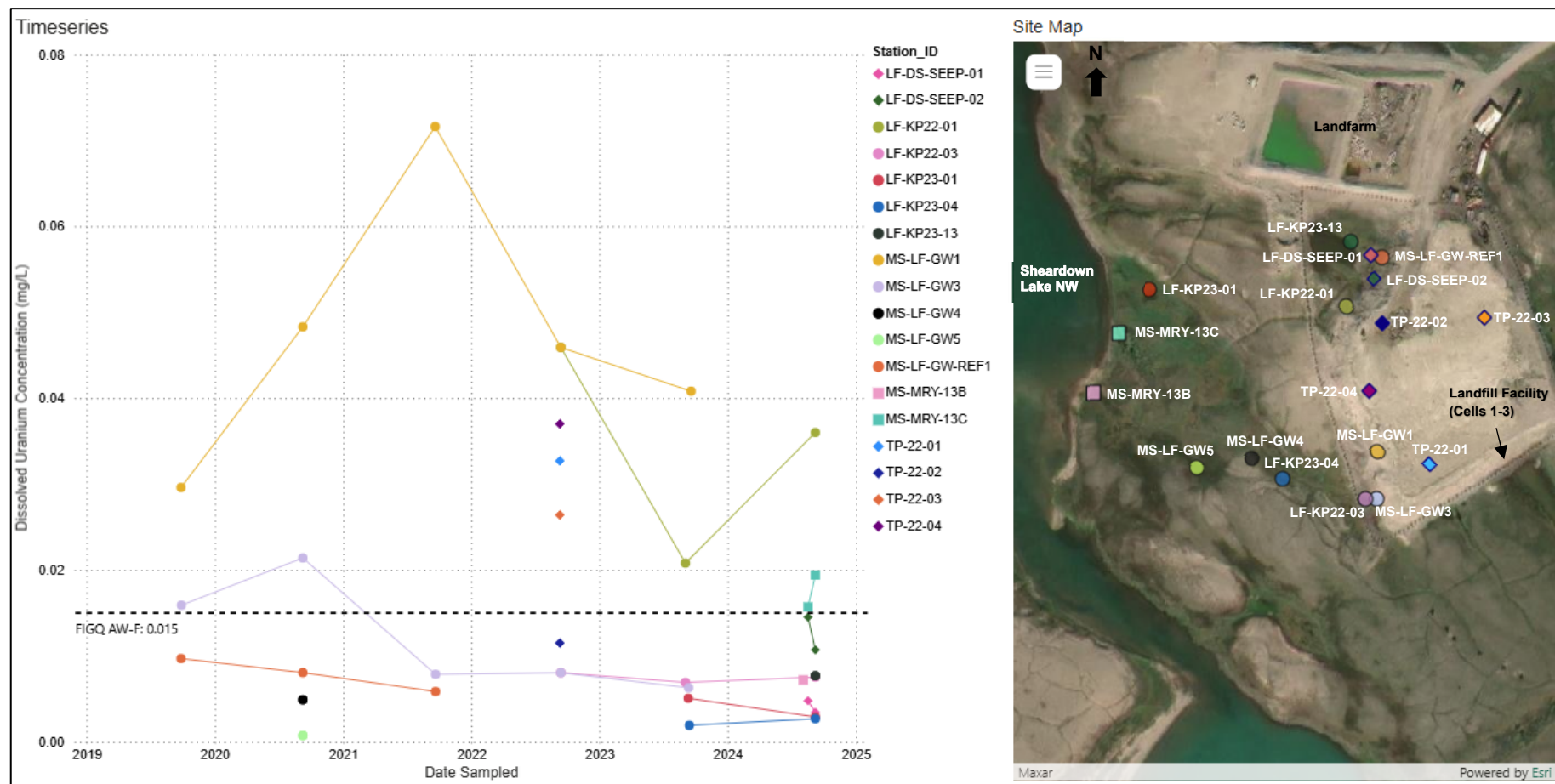
The dissolved copper FIGQ AW-F guideline is hardness dependent. The guideline is calculated based on the individual hardness value for each sample. There is no dissolved copper CCME AW-F guideline for surface water stations (ie, MS-MRY-13B and MS-MRY-13C). However, the total copper CCME AW-F guideline ranges from 0.0020 to 0.0040 mg/L.

The dissolved copper Yukon CSR standard (0.020 to 0.090 mg/L, hardness dependent) was not plotted in the timeseries.

Results below detection limits are showing at detection limit on the figure.

Square symbol = surface water station; Circle symbol = groundwater station (drive point piezometer or standpipe well without bentonite seal); Diamond symbol = seep station

Downgradient stations: LF-KP23-01, LF-KP-23-04, MS-LF-GW4, MS-LF-GW5, MS-MRY-13C, MS-MRY-13C. Source stations: LF-DS-SEEP-01, LF-DS-SEEP-02, LF-KP22-01, LF-KP22-03, LF-KP23-13, MS-LF-GW1, MS-LF-GW3, MS-LF-GW-REF1, TP-22-01, TP-22-02, TP-22-03, TP-22-04.



Appendix G-3: Dissolved Uranium Concentrations at Source and Downgradient Stations at the Landfill Facility

Notes: CCME AW-F: Canadian Council of Ministers of the Environment for Protection of Freshwater Aquatic Life; CSR = Contaminated Sites Regulation; FIGQ AW-F = Federal Interim Groundwater Quality for Protection of Freshwater Aquatic Life; NW = Northwest.

There are no dissolved uranium CCME AW-F guideline for surface water stations (ie, MS-MRY-13B and MS-MRY-13C). However, the total uranium CCME AW-F guideline is 0.015 mg/L.

The dissolved uranium Yukon CSR standard (3 mg/L) was not plotted in the timeseries.

Results below detection limits are showing at detection limit on the figure.

Square symbol = surface water station; Circle symbol = groundwater station (drive point piezometer or standpipe well without bentonite seal); Diamond symbol = seep station

Downgradient stations: LF-KP23-01, LF-KP-23-04, MS-LF-GW4, MS-LF-GW5, MS-MRY-13C, MS-MRY-13C. Source stations: LF-DS-SEEP-01, LF-DS-SEEP-02, LF-KP22-01, LF-KP22-03, LF-KP23-13, MS-LF-GW1, MS-LF-GW3, MS-LF-GW-REF1, TP-22-01, TP-22-02, TP-22-03, TP-22-04.

APPENDIX H

Heatmaps

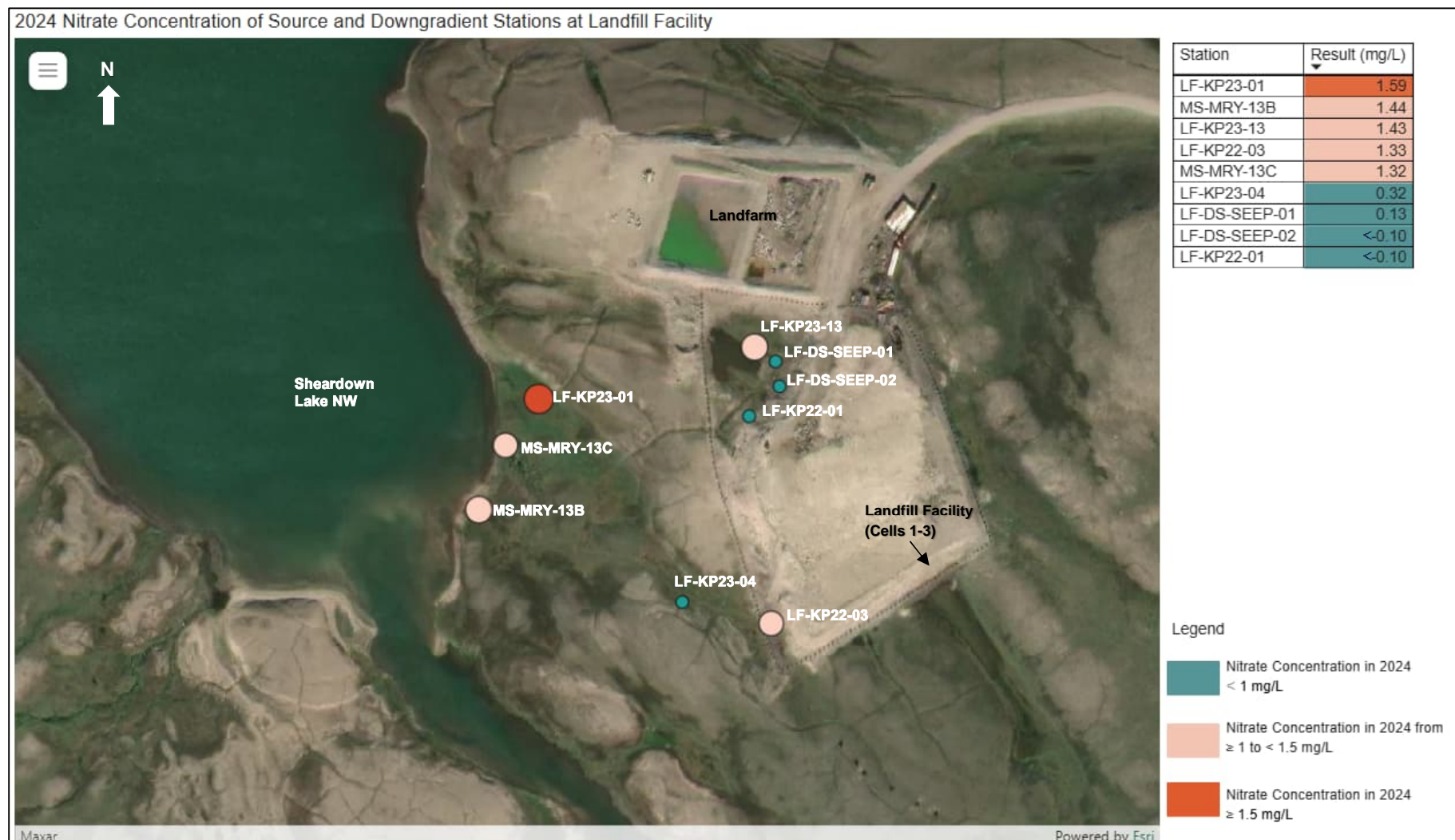


Figure H-1: Nitrate Concentration at Source and Downgradient Stations at the Landfill Facility in 2024

Notes: Figure shows maximum concentration at each station in 2024 (including duplicate sample results).

Size and colour of the circle symbol indicate concentration distribution at the Landfill Facility.

Downgradient stations: LF-KP23-01, LF-KP-23-04, MS-MRY-13B, MS-MRY-13C. Source stations: LF-DS-SEEP-01, LF-DS-SEEP-02, LF-KP22-01, LF-KP22-03, LF-KP23-13.

Surface water stations: MS-MRY-13B, MS-MRY-13B. Seep stations: LF-DS-SEEP-01, LF-DS-SEEP-02. Groundwater stations: LF-KP22-01, LF-KP22-03, LF-KP23-01, LF-KP23-04, LF-KP23-13.

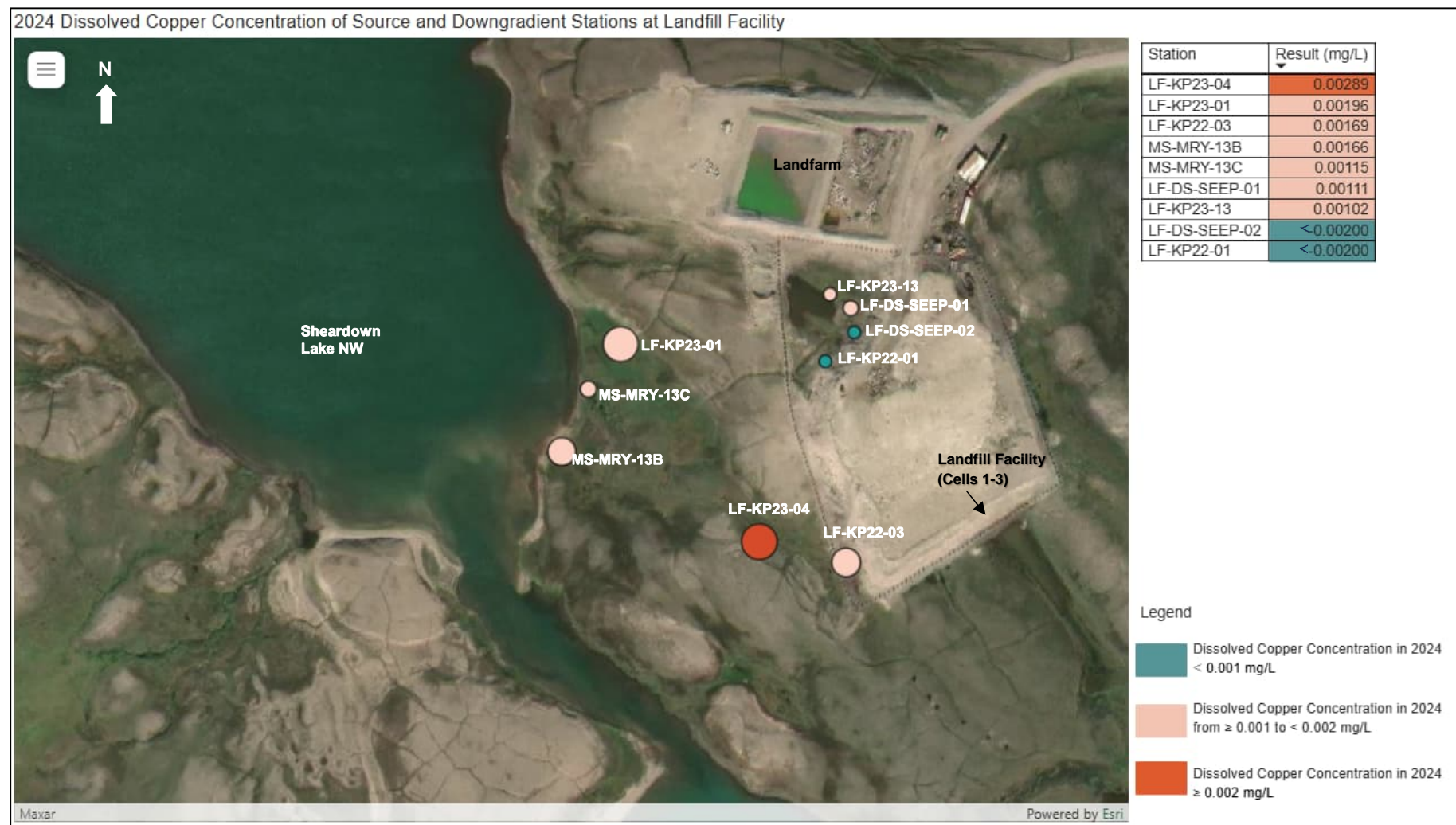


Figure H-2: Dissolved Copper Concentration at Source and Downgradient Stations at the Landfill Facility in 2024

Notes: Figure shows maximum concentration at each station in 2024 (including duplicate sample results).

Size and colour of the circle symbol indicate concentration distribution at the Landfill Facility.

Downgradient stations: LF-KP23-01, LF-KP-23-04, MS-MRY-13B, MS-MRY-13C. Source stations: LF-DS-SEEP-01, LF-DS-SEEP-02, LF-KP22-01, LF-KP22-03, LF-KP23-13.

Surface water stations: MS-MRY-13B, MS-MRY-13B. Seep stations: LF-DS-SEEP-01, LF-DS-SEEP-02. Groundwater stations: LF-KP22-01, LF-KP22-03, LF-KP23-01, LF-KP23-04, LF-KP23-13.



Figure H-3: Dissolved Uranium Concentration at Source and Downgradient Stations at the Landfill Facility in 2024

Notes: Figure shows maximum concentration at each station in 2024 (including duplicate sample results).

Size and colour of the circle symbol indicate concentration distribution at the Landfill Facility.

Downgradient stations: LF-KP23-01, LF-KP23-04, MS-MRY-13B, MS-MRY-13C. Source stations: LF-DS-SEEP-01, LF-DS-SEEP-02, LF-KP22-01, LF-KP22-03, LF-KP23-13.

Surface water stations: MS-MRY-13B, MS-MRY-13B. Seep stations: LF-DS-SEEP-01, LF-DS-SEEP-02. Groundwater stations: LF-KP22-01, LF-KP22-03, LF-KP23-01, LF-KP23-04, LF-KP23-13.



Figure H-4: Chloride Concentration at Source and Proximal Stations at the Hazardous Waste Berm Facility in 2024

Notes: Figure shows maximum concentration at each station in 2024 (including duplicate sample results).

Size and colour of the circle symbol indicate concentration distribution at HWB Facility.

Only downgradient station at the Hazardous Waste Berm Facility is MS-HWB-GW6 and was dry in 2024. Therefore, proximal stations results are presented on the figure.

Proximal stations: HWB-KP22-04, HWB-KP22-05, HWB-KP23-03. Source stations: MS-HWB-GW4, MS-HWB-GW5, HWB-KP22-03, HWB-KP23-01, HWB-KP23-02.

Groundwater stations: MS-HWB-GW4, MS-HWB-GW5, HWB-KP22-03, HWB-KP22-04, HWB-KP22-05, HWB-KP23-01, HWB-KP23-02, HWB-KP23-03.



Figure H-5: Naphthalene Concentration at Source and Proximal Stations at the Hazardous Waste Berm Facility in 2024

Notes: Figure shows maximum concentration at each station in 2024 (including duplicate sample results).

Size and colour of the circle symbol indicate concentration distribution at HWB Facility.

Only downgradient station at the Hazardous Waste Berm Facility is MS-HWB-GW6 and was dry in 2024. Therefore, proximal stations results are presented in the figure.

Proximal stations: HWB-KP22-04, HWB-KP22-05, HWB-KP23-03. Source stations: MS-HWB-GW4, MS-HWB-GW5, HWB-KP22-03, HWB-KP23-01, HWB-KP23-02.

Groundwater stations: MS-HWB-GW4, MS-HWB-GW5, HWB-KP22-03, HWB-KP22-04, HWB-KP22-05, HWB-KP23-01, HWB-KP23-02, HWB-KP23-03.



Figure I-6: Petroleum Hydrocarbon (PHC) Fraction F2 (C10-C16) Concentration at Source and Proximal Stations at the Hazardous Waste Berm Facility in 2024

Notes: Figure shows maximum concentration at each station in 2024 (including duplicate sample results).

Size and colour of the circle symbol indicate concentration distribution at HWB Facility.

Only downgradient station at the Hazardous Waste Berm Facility is MS-HWB-GW6 and was dry in 2024. Therefore, proximal stations results are presented in the figure.

Proximal stations: HWB-KP22-04, HWB-KP22-05, HWB-KP23-03. Source stations: MS-HWB-GW4, MS-HWB-GW5, HWB-KP22-03, HWB-KP23-01, HWB-KP23-02.

Groundwater stations: MS-HWB-GW4, MS-HWB-GW5, HWB-KP22-03, HWB-KP22-04, HWB-KP22-05, HWB-KP23-01, HWB-KP23-02, HWB-KP23-03.

