



REPORT

2025 Groundwater Monitoring Report
Baffinland Iron Mines Corporation

Submitted to:

Baffinland Iron Mines Corporation- Mary River Project

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Executive Summary

The 2025 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 in 2025 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. Updates to the conceptual site model are presented based on the 2025 findings.

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. Therefore, BIM and WSP have made efforts to mitigate the uncertainty as much as possible by undertaking a different groundwater sampling methodology in 2024 and in 2025, conducting slug testing after sampling once the well had been purged, collecting and comparing groundwater levels, and comparing historical and 2025 analytical results. Following the 2024 recommendations, BIM has installed 5 new standpipe wells (with bentonite seal) based on the WSP well design provided in 2024 to further inform on representativeness of groundwater samples, and to reduce the risk of damage from frost-heave.

In August/September 2025, groundwater samples were collected from standpipe wells and drive point piezometers, following specific procedures to minimise surface flow into the wells. These procedures included purging three well volumes, ensuring parameter stabilization, reaching aquifer's recharge and low-flow sampling techniques. A total of 15 groundwater stations were sampled at the LF, and 13 groundwater stations were sampled at the HWB Facility. One seep station and two surface water stations were also sampled at the LF as part of the August/September 2025 sampling program.

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-MRY2540). Surface water results were compared to the CCME AW-F and the Water Licence Effluent Quality Discharge Limits (Water Licence 2AM-MRY2540).

At the LF, groundwater elevations ranged from 169.1 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 2025 was estimated to be 0.057 m/m. There were no exceedances measured at the downgradient station of the LF in 2025. Based on proximal and background station data, naturally high concentrations of dissolved copper and total/dissolved uranium may be present in the region. Other contaminants of concern measured at source stations that may impact downgradient groundwater quality include fluoride, sulfate and dissolved boron.

Two RST thermistors were installed in 2025 downgradient of the LF to better understand the active layer and permafrost's thermal regime. The main findings of the ground temperatures with time and depths are the following:

- At similar depths, the thermistor farthest downgradient of the LF (MS-LF-TH-01) showed colder ground temperatures in August compared to the one closest to the LF (MS-LF-TH-02).
- The active zone closest to the landfill (around 2.6 mbgs) was deeper than the one downgradient (around 1.7 mbgs).
- The maximum depth of the active layer should be assessed over the year once additional data is available.

At the HWB Facility, groundwater elevations ranged from 171.3 to 174.2 masl. Groundwater flow at HWB Facility is inferred to be to the southwest towards Camp Lake. The hydraulic gradient at HWB Facility measured in 2025 was estimated at 0.012 m/m. There were no exceedances measured at the newly installed standpipe well downgradient of the HWB Facility in 2025. 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.

Based on the 2025 findings, the Conceptual Site Model (CSM) was updated and includes the ground temperature information from the newly installed RST thermistors, the presence of ice-wedge polygons observed on aerial photographs, as well as information about a potential talik observed at a nearby lake of similar size (Muriel Lake along the Tote road) to Camp Lake and Sheardown Lake. With the additional information from monitoring well installations with bentonite seals, the shallow groundwater is thought to consist of a combination of meltwater with limited rainfall/surface water impacting the groundwater quality. A "*source-pathway-receptor*" approach was used for the CSM to describe the Site conditions as they relate to human health and the environment.

The recommendations for the 2026 program are summarised as:

- **Continue monitoring groundwater** at existing monitoring standpipe wells and drive point piezometers at LF and HWB Facility including a water level survey and water quality sampling in late August or early September 2026 when the active layer has fully thawed. It is recommended to conduct an elevation survey of all monitoring stations due to the potential for frost heave.
- **Continue monitoring seep quality at source seeps and downgradient and proximal surface water locations at the LF** in September 2026. It is also recommended to identify if new seeps develop throughout the summer season.
- **Continue monitoring ground temperatures** at the two new RST thermistor stations to provide year-round information of potential changing conditions.
- **Remediate standpipe wells (ones installed without 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.

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1.0 INTRODUCTION

1.1 Overview

WSP Canada Inc. (WSP) was requested by Baffinland Iron Mines Corporation (BIM) to provide remote support and complete follow-up reporting for the 2025 groundwater monitoring program for two waste facilities located at the Mary River Project (referred to as “the Project”) located on northern Baffin Island in Nunavut. The Project consists of a mine site (referred to as “the Mine Site”) and a port facility (referred to as “Milne Port”) located approximately 100 km north of the Mine Site. The two waste facilities are located at the Mine Site (Figure A).

1.2 Background and Site Description

1.2.1 General

The Project consists of a high-grade iron open pit mine located at the Mine Site. The Project is located in a zone of continuous permafrost (90 – 100%, Heginbottom et al. 1995). The depth of the active layer at the Project 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 the 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 the 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 in 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 the 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, Nunavut Impact Review Board (NIRB) Project Certificate No. 005, Amendment 05, Term and Condition #23 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 (with and without bentonite seals) and is located at two waste facilities at the Mine Site (Figure A):

- The Landfill Facility (LF), located east of Sheardown Lake NW and north of Sheardown Lake SE.
- The Hazardous Waste Berm (HWB) Facility, located south of and adjacent to the Camp Lake Airstrip, close to Weather Haven.

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

The following sections include a description of the facilities and design histories from the 2024 Knight Piésold Consulting Ltd. (KP) report (KP 2024). Both waste facilities (LF and HWB Facility) are industrial in nature. 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; Baffinland 2012 and Baffinland 2013), groundwater quality is generally not considered to be at risk at the Project because of the extensive permafrost layer that 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, lack of groundwater (dry wells, no recharge), and different groundwater sampling methodologies have resulted in several years of data that has not been comparable year over year. Previous groundwater quality results from site have been questioned due to the monitoring well construction and previous sampling methodology (CIRNAC 2024). This report, while presenting the 2025 groundwater sampling results, is also a continuation of the 2024 annual groundwater report which provided an updated Conceptual Site Model (referred below as CSM) and discussion of the confidence in the groundwater quality data previously collected at the waste facilities.

1.2.2 Landfill Facility

The LF 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 Government of Nunavut 2010). The Toxicity Characteristic Leaching Procedures (TCLP) is the method used to analyse the residuals, as per United States Environmental Protection Agency (USEPA). An inventory of the waste deposited in the landfill was undertaken by BIM in 2024 but was not available for review for this report. Regular inspections are performed by BIM staff to monitor for integrity issues in the LF.

The LF was designed by 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 through 3 and will continue until these cells have reached design capacity. Subsequent landfilling will progress to Cells 4 and 5. Perimeter berms around Cells 1 through 3 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-REF2-17) as part of a pilot program in 2017. An additional 5 drive point piezometers locations (MS-LF-GW4, MS-LF-GW5, MS-LF-GW-REF1, MS-LF-GW-REF2 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. Multiple installations of drive point piezometers and/or monitoring wells have occurred over the years at the same location due to damaged wells.

The monitoring program generally consists of a single annual sampling event in late August or early 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 Project. It was designed by Genivar and constructed around 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 Facility 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-2540 (NWB 2025). Regular inspections are performed by BIM staff to monitor for integrity issues in the HWB Facility.

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). The drive point piezometers MS-HWB-GW1 and MS-HWB-GW2 were not installed due to the presence of hard compacted fill/construction pad material at the proposed location (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 a number of reinstallations have occurred due to damaged wells in 2022 and 2023. 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 section of the HWB (Baffinland 2023); as a result, this section is currently not being used to contain hazardous wastes.

1.2.4 Monitoring Well Installations

In 2022 and 2023, 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 standpipes 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 otop 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.

A key component of well construction is the importance of an annular bentonite seal. An annular bentonite seal is crucial in water well construction to prevent surface water and potential contaminants from migrating into the well screen from surface, allowing good representability of the groundwater properties from the discrete screened part of the well. The wells are shallow and designed to intercept groundwater flowing in the seasonal active zone which is around 2 to 3 m thick. 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 mixing in the active layer 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.

All standpipe wells installed in 2022 and 2023 were reportedly developed as required after installing the wells and groundwater sampling methods consisted of a combination of low-flow sampling and the monitoring of field parameters for evidence of stabilization. As part of this current report, WSP has compared both groundwater quality results and water elevations between bentonite sealed wells installed in 2025 (detailed in Section 3.1) and wells without bentonite seals to clarify the potential influence of surface water infiltration on results when sampling the shallow aquifer in the active layer.

In the 2024 report (WSP 2025), it was assumed that drive point piezometers were 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 (i.e., MS-LF-GW2 and LF-KP23-05, MS-LF-GW3 and LF-KP22-03, and MS-HWB-GW5 and HWB-KP23-01). There were some similarities between groundwater levels suggesting that surface water may be less of an influence in standpipe wells with no bentonite seal than expected. 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 without a bentonite seal due to potential surface water influence.

To gain further certainty and insight on groundwater quality, BIM has installed additional standpipe wells with bentonite seals at the HWB Facility, the results from which can be compared to the results from previously installed wells.

1.3 Groundwater Monitoring Program Recommendations from 2024

Following the 2024 groundwater monitoring program, WSP made the following recommendations regarding the monitoring well network in the annual report (WSP 2025): drill and install new monitoring wells with a bentonite seal to allow for discrete groundwater sampling from the active zone primarily in areas downgradient of the two landfill facilities; install bentonite seals on existing wells; and install a series of heavy-duty vibrating wire piezometers. WSP also recommended comparing the results from 2025 following bentonite well installation to the 2023 and 2024 data to evaluate the effect. WSP also recommended conducting an elevation survey of all groundwater wells, standpipes and drive points to evaluate changes in well height due to frost heaving. In regards to continued monitoring, it was recommended to continue sampling all groundwater monitoring wells, standpipes, drive points annually in September prior to freezing conditions, along with all existing seeps and surface water locations.

1.4 Scope of Work and Program Modifications in 2025

The planned Scope of Work for the 2025 Groundwater Program at the LF and the HWB Facility to be completed by BIM, included the following:

- 1) Install monitoring wells based on the 2024 WSP well 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. A total of five new standpipe wells (with bentonite seal) were installed in April 2025 by BIM: two at the LF and three at the HWB Facility.
- 2) Install three RST thermistors at the LF to assess the thermal regime of the active layer.
- 3) Develop all the new well locations installed at the waste facilities.
- 4) Conduct a groundwater sampling program at the new and existing wells to assess groundwater quality at the waste facilities.
- 5) Conduct single well response tests at the new well locations and selected existing wells to estimate the hydraulic conductivity of the screened intervals.
- 6) Conduct the seep and surface water sampling at the LF.

This report includes results of groundwater, seeps and surface water quality, water levels, hydrogeological testing, as well as the updated CSM with the 2025 findings. The 2025 report also includes a comparison of the groundwater quality and water levels of the standpipe wells with and without bentonite seals.

2.0 APPLICABLE REGULATORY CRITERIA

Groundwater and seepage quality data collected during the 2025 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 grained 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 applicable 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.

The 2023 and 2024 groundwater and seep results were also compared to the Type A Water Licence 2AM-MRY1325 Effluent Quality Discharge Limits (NWB 2015) for comparison purposes. The Water Licence 2AM-MRY1325 expired on June 10, 2025. A new water licence 2AM-MRY2540 was issued by the NWB on April 28, 2025 and expires on April 27, 2040. These new guidelines are not proper effluent compliance limits (as per Schedule I Table 13, NWB 2025), they act as internal guidelines for adaptive management considerations. The 2025 groundwater results were compared to the new water licence effluent quality discharge limits, for comparison purposes only. The new water licence was provided by BIM and the effluent discharge limits are shown below in Table 1.

Table 1: Effluent Quality Discharge Limits for the Landfill Facilities, Type A Water Licence 2AM-MRY2540 from Nunavut Water Board (NWB 2025)

Parameter	Maximum Concentration of Any Grab Sample (mg/L)
pH	Between 6.0 – 9.5
Total arsenic	0.6
Total copper	0.6
Total lead	0.2
Total nickel	1.0
Total zinc	1.0
Total suspended solids (TSS)	30
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 WQGs for long-term exposure.

The 2025 surface water results were also compared to the Type A Water Licence 2AM-MRY2540 Effluent Quality Discharge Limits (NWB 2025, Table 1).

3.0 METHODOLOGY

Monitoring well installations were completed by BIM in April 2025. The 2025 groundwater program was conducted between August 25 to September 5, 2025 by BIM environmental field staff with WSP's remote support. 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, and the drive point piezometer and standpipe well information summary table is provided in Appendix C.

3.1 New Standpipe Well Install

The shallow groundwater monitoring well network has had a number of drive point piezometers and monitoring wells damaged due to seasonal freeze-thaw cycles that cause the drive point piezometer/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 proposed design provided in 2024 (WSP 2025) included a larger diameter outer casing installed near surface and above the well screen to reduce the amount of pressure acting on the inner riser-pipe of the well. A total of 5 boreholes were drilled in April 2025 using a FlexiROC D65 down-the-hole drill (6" diameter) and the standpipe wells were installed using 2" diameter Schedule 40 PVC riser and screen. Two wells were installed at the LF (MS-LF-25-01 and MS-LF-25-02) and three standpipe wells were installed at HWB Facility (MS-HWB-25-01, MS-HWB-25-02, and MS-HWB-25-03).

BIM installed the new standpipe wells in April 2025, as WSP recommended to complete the drilling and well installation while the ground is frozen prior to freshet. Table 2 summarizes the installation details of the standpipe wells installed in 2025 by BIM. Additional standpipe well information is provided in Appendix C. A third standpipe well was attempted to be drilled and installed at the LF, but the borehole collapsed, and the location was abandoned.

Table 2: Installation Details of 2025 Standpipe Wells (with bentonite seal)

Waste Facility	Station	Easting NAD 83 UTM 17N ⁽¹⁾	Northing NAD 83 UTM 17N ⁽¹⁾	Depth of borehole (mbgs)	Screened interval (m)	Screened Unit ⁽²⁾
Landfill Facility	MS-LF-25-01 ⁽³⁾	560696	7912543	3.8	1.7-3.3	Coarse sand with gravel
	MS-LF-25-02 ⁽³⁾	560775	7912474	3.7	1.7-3.3	Coarse sand with gravel
Hazardous Waste Berm Facility	MS-HWB-25-01	558053	7914431	5.3	1.7-3.3	Coarse sand with gravel
	MS-HWB-25-02 ⁽³⁾	558174	7914526	4.2	1.7-3.3	Coarse sand with gravel
	MS-HWB-25-03	558468	7914598	3.7	1.7-3.3	Coarse sand with gravel

mbgs: metres below ground surface

(1) Stations were surveyed by BIM in November 2025.

(2) Lithology was inferred based on soil cuttings and is consistent with soil observed at the site.

(3) Dry or frozen during monitoring.

At each new standpipe well location, the depth to water was measured prior to and following well development. The standpipe wells MS-LF-25-01, MS-LF-25-02, and MS-HWB-25-02 were either dry or frozen. The cause could be due to the well screen being installed above the water table, the well screen being installed too deep into permafrost, or the wells being sampled too late in the season after groundwater has already frozen. A camera survey using a downhole camera was conducted at MS-LF-25-01 on September 4, 2025. As shown in Photo A-49, Appendix A, ice was observed in the bottom of the standpipe well. This suggests that water may be present if sampled earlier in the season.

The standpipe wells MS-HWB-25-01 and MS-HWB-25-02 were successfully developed (refer to Section 3.3) on August 29, 2025 (Photos A-47 and A-48, Appendix A).

3.2 Thermistor Install

WSP ordered 3 thermistor strings in 2024 from RST for BIM. The total length of each string was three metres of cable with thermistor beads placed every 0.5 m with an additional five metres of cable would be above ground surface when installed. It was initially planned to install the thermistor string at three different locations; however, following conversations with BIM, it was decided to install two of the thermistor strings at one location to characterize ground temperatures down to 5 mbgs.

The three RST thermistor strings (MS-LF-TH-01, MS-LF-TH-02_Shallow and MS-LF-TH-02_Deep) were installed on July 26, 2025 seventy metres apart and downgradient of the LF. The boreholes were drilled using a FlexiROC D65 down-the-hole drill to install the thermistor strings. Thermistors were programmed to record temperature four times per day (i.e., 2AM, 8AM, 2PM, 8PM). Table 3 provides the coordinates, elevations, and the string intervals of the RST thermistors installed downgradient of the LF (Figure B).

Table 3: RST Thermistors Installed in 2025 at the Landfill Facility

RST Thermistor	Easting NAD 83 UTM 17N ^(a)	Northing NAD 83 UTM 17N ^(a)	Elevation ⁽¹⁾	Thermistor string(s)
MS-LF-TH-01	560702	7912544	171.4	0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0 mbgs
MS-LF-TH-02_Shallow	560770	7912559	180.2	0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0 mbgs
MS-LF-TH-02_Deep				2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0 mbgs

mbgs: metres below ground surface

(1) Thermistors were surveyed by BIM in November 2025.

3.3 Well Development

The new standpipe wells installed in April 2025 were developed to improve permeability of the filter pack, to remove fine particles from the well and filter pack, and to remove any materials introduced to the monitoring well while drilling. Proper monitoring well development results in a filter pack that provides adequate hydraulic connection to the screened formation, and groundwater samples which are representative of surrounding aquifer conditions and contain reduced amounts of sediment. A total of 10 well volumes were purged at the new standpipe wells and field parameters were monitored during the well development. Photos of water appearance were taken at every given well volume to monitor differences in color, turbidity etc. (Appendix A, Photos A-47 and A-48). Well development field sheets and are provided in Appendix D-2.

3.4 Water Level Survey

Static water levels were measured at each of the groundwater well locations prior to purging and sampling. Samples were collected over different days; therefore, weather was noted on each field sheet as any rainfall could impact water levels.

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

- Height of PVC stick-up from ground surface (for standpipe wells) and riser from ground surface (for drive point piezometers).
- Depth to water from top of PVC or drive point piezometer.
- Depth to bottom of standpipe 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 completed a ground surface elevation and PVC pipe elevation survey at most of the well locations in November 2025. LF-KP22-05 could not be surveyed as it was buried in snow. LF-KP23-06, LF-KP23-07, LF-KP23-08 and LF-KP23-09 were not surveyed due to poor GPS signal. Elevations from the prior year were used for these locations to calculate groundwater elevations in meters above sea level (masl).

3.5 Groundwater Sampling

Groundwater samples were collected at both the LF and HWB Facility between August 25 and September 2, 2025. A total of 15 groundwater stations (i.e., drive point piezometers and standpipe wells) were sampled at the LF, and 13 groundwater stations were sampled at the HWB Facility. All samples were collected as per low-flow methodology guidelines for groundwater sampling outlined by CCME and US EPA (CCME 1999; US EPA 2010). 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 sampling instrumentation included a combination of a peristaltic pump, low-density polyethylene (LDPE, 0.5-inch Inside Diameter) tubing that is inserted into the well, 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, and 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. BIM's Environmental team were responsible for sample submission to ALS.

Groundwater field sheets were reviewed by WSP and are provided in Appendix D-1.

3.5.1 Analysis

A summary of the analytical parameters requested for analysis for the 2025 Annual Monitoring Program is provided in Table 4.

Of note, the 2023 analytical groundwater results from KP (2024) and 2024 (WSP 2025) were included in the 2025 tables for comparison purposes. The analytical suite for 2023 is slightly different than the suite for 2024 and 2025 (Table 4). Certificate of analysis are provided in Appendix E.

Table 4: Summary of Laboratory Analysis of Groundwater Samples at the Waste Facilities

Sampling Location	September 2025 Groundwater Analytical Suite
Landfill Facility	<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	<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

3.6 Seeps and Surface Water Sampling

In the BIM data review, seepage and leachate are both referred to. For this report, WSP has defined seepage as groundwater that daylight at surface. Leachate is groundwater that has changed chemistry as a result of passing through a source of potential contaminant.

Seepage and surface water flowing from the landfill sampling tasks were completed simultaneously with the groundwater sampling at LF. A total of one seep sample and three surface water samples were collected on August 29, 2025. One seep is located within LF limits (i.e., source seep station), and surface water samples were collected upgradient of LF limits and downgradient close to Sheardown Lake. There were no seeps or surface water identified or sampled near HWB Facility.

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.

3.6.1 Analysis

The analytical suite for seeps and surface water was the same as the analytical suite for groundwater samples from LF presented in Table 4 and re-summarized in Table 5 below. Certificates of analysis are provided in Appendix E.

Table 5: Summary of Laboratory Analysis for Seeps and Surface Water Samples in September 2025

September 2025 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 ▪ PAHs

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

3.7 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, and sample handling. Laboratory QA/QC procedures are followed by the 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 two types of QC samples were collected during the 2025 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.

- **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 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).

There were no field blanks collected as part of the September 2025 program.

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

- **Data Quality Objective:** Check that results for field and laboratory values are similar. The DQO allow to flag potential issues with data entry, field measurements or sample collection, or the potential for geochemical changes in the sample after collection.
 - pH: 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:** To evaluate duplicate water quality samples, the RPD between the measured concentrations in the original and duplicate samples were calculated for each constituent using the following formula:

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

The RPD was calculated when detected concentrations were at least five times greater than the DL. The DQO is met when RPD values are less than 20% except for pH (Appendix F Tables F-6 and F-7). For pH, the DQO is met when the absolute difference between pH values in duplicate pairs was equal to or less than 0.3 pH units.

Within-station variability and field sampling precision were rated as:

- **Low variability and high precision**, if less than 10% of the total number of constituents did not meet the DQO.
- **Moderate variability and precision**, if 10% to 30% of the total number of constituents did not meet the DQO.
- **High variability and low precision**, if more than 30% of the total number of constituents did not meet the DQO.

3.8 Single Well Response Testing

Single well response testing was conducted at both the LF and HWB Facility between August 31 to September 5, 2025. Testing was completed following purging and sampling. Due to time constraints, six slug tests were completed at the LF and four slug tests at HWB Facility. The wells that had not been previously tested in 2024 were completed.

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 response tests. 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 head tests) were completed at each tested well

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.

Response testing field sheets were reviewed by WSP and are provided in Appendix D-3.

4.0 RESULTS

4.1 Groundwater Elevations and Flow Direction

Conceptually, groundwater flow would be expected to be similar to the topography. The uncertainty of data from groundwater wells was fully detailed in the 2024 report (WSP 2025) along with the potential for ice wedges and areas of shallow permafrost impeding groundwater flow.

4.1.1 Landfill Facility

Groundwater elevations measured at the LF monitoring wells in 2023 (KP, 2024), by WSP in 2024 (WSP 2025), and by BIM in 2025 are compiled in Appendix F Table F-1. Groundwater levels collected in September 2025 were generally consistent with historical groundwater levels (i.e., 2023 and 2024).

Depth to groundwater measurements at LF varied from 0.00 (water level at ground surface) to 1.4 metres below ground surface (mgs), with groundwater elevations ranging from 169.1 to 187.4 metres above sea level (masl). Groundwater elevations were calculated using ground surface elevations at standpipe wells and drive point piezometers surveyed by BIM in November 2025. Standpipe wells LF-KP23-06, LF-KP23-07, LF-KP23-08 and LF-KP23-09 could not be surveyed in November 2025 due to poor GPS signal. Standpipe well LF-KP22-05 was not accessible as it was covered with snow.

The groundwater elevations collected in 2025 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 the LF is inferred to be to the west on 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, WSP 2025). Two standpipe wells were dry in 2025 (LF-KP23-03, LF-KP23-10), and one standpipe well (MS-LF-25-01) and one drive point piezometer (MS-LF-GW5) was either dry or frozen. The hydraulic gradient was estimated to be 0.057 m/m which is consistent with the historical range of between 0.03 and 0.06 m/m (Tetra Tech 2021, Tetra Tech 2022, KP 2023a, KP 2024, WSP 2025).

4.1.2 Hazardous Waste Berm Facility

Groundwater elevations measured at the HWB monitoring wells by KP in 2023 (KP, 2024), by WSP in 2024 (WSP 2025) and by BIM in 2025 are compiled in Appendix F Table F-2. Groundwater levels collected in September 2025 are generally consistent with the historical groundwater levels (i.e., 2023 and 2024).

Depth to groundwater measurements at HWB Facility in 2025 ranged between 0.011 and 1.425 mgs, with groundwater elevations ranging from 171.31 to 174.24 masl. Groundwater elevations were calculated using ground surface elevations at standpipe wells and drive point piezometers surveyed by BIM in November 2025.

The groundwater elevations collected in 2025 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 slightly different than previous reports as the new wells installed provide more coverage in the downgradient and background areas. Groundwater flow is inferred to be to the southwest towards Camp Lake, which is consistent with previous reports (Tetra Tech 2022, KP 2024, WSP 2025). Groundwater flow at the background stations is inferred to be to the northeast towards a ponding area near MS-HWB-GW-REF1 (Appendix A Photo A-31). Two stations (MS-HWB-GW-REF2, MS-HWB-25-02) were dry and one station (MS-HWB-GW6) was frozen when the groundwater program was conducted.

The hydraulic gradient was estimated to be 0.012 m/m in 2025 which is higher than the historical range of between 0.002 and 0.007 m/m (Tetra Tech 2022, KP 2023a, WSP 2025).

With the new installation of MS-HWB-25-03 (with bentonite seal), a comparison could be made to nearby well HWB-KP22-06 (without a bentonite seal) and is provided in Section 5.1. Groundwater levels at MS-HWB-25-03 (with bentonite seal) could not be compared to the drive point piezometer MS-HWB-GW6 as the drive point piezometer was frozen at the time of monitoring.

4.2 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 as defined in Table 6.

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 assigned qualifier for each sampling station is identified on Figures B to E and in Appendix F Tables F-1 to F-5. A standpipe well and drive point piezometer information summary table gathering all the relevant information from previous reports and 2025 observations is provided in Appendix C. Well photographs are provided in Appendix A.

Table 6: 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>Groundwater impacted by the landfill may be intercepted by these stations</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
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.

4.2.1 Landfill Facility Water Quality Results

The 2025 groundwater and seep water quality data are provided in Appendix F Table F-3. Monitoring well locations are shown in Figure B. Table 7 summarizes groundwater and seepage exceedances of the standards and guidelines applicable to the LF.

Table 7: Summary of Parameters Exceeding Applicable Groundwater Guidelines at the Landfill Facility Monitoring Stations in 2025

Station	Exceedance: FIGQ Tier 2 AW-F Guideline	Exceedance: Yukon CSR AW-F Standard ⁽¹⁾
Source		
LF-KP-23-13	Fluoride	-
MS-LF-GW1	Sulfate, dissolved uranium	-
LF-KP22-01	Sulfate, dissolved boron, dissolved uranium	Sulfate
Proximal		
MS-LF-GW2	Dissolved copper	-
LF-KP22-05	Dissolved iron ⁽²⁾ , dissolved selenium	-
Downgradient		
No exceedances at downgradient groundwater stations in 2025		
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 3.0).

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

4.2.2 Hazardous Waste Berm Facility Water Quality Results

HWB Facility groundwater quality results are presented in Appendix F Table F-4. Station locations are presented in Figure C. Table 8 summarizes groundwater exceedances to the guidelines and standards at the HWB Facility.

Table 8: Summary of Parameters exceeding Applicable Groundwater Guidelines at the HWB Facility Monitoring Stations in 2025

Station	FIGQ Tier 2 AW-F Guideline	Yukon CSR AW-F Standard ⁽¹⁾
Source		
HWB-KP23-02	Fluoride, naphthalene, dissolved iron ⁽²⁾	Naphthalene
HWB-KP23-01	Nitrate, nitrite, dissolved copper	-
MS-HWB-GW5	Nitrate, nitrite	-
Proximal		
HWB-KP22-04	Nitrate, nitrite	
HWB-KP22-05	Chloride, naphthalene, dissolved iron ⁽²⁾	Dissolved cobalt
HWB-KP23-03	Naphthalene, dissolved iron ⁽²⁾	Naphthalene

Station	FIGQ Tier 2 AW-F Guideline	Yukon CSR AW-F Standard ⁽¹⁾
Downgradient		
No exceedances at downgradient groundwater stations in 2025		
Background		
MS-HWB-GW-REF1	Nitrate	-
MS-HWB-GW-REF3	Chloride	-
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 naturally occurring elevated iron is expected at a high-grade iron mine.

The results from the standpipe well MS-HWB-25-03 (with bentonite seal) compared to HWB-KP22-06 (without bentonite seal) have very similar groundwater quality results (Appendix E Table 4), indicating that the well without a bentonite seal does not have a different chemistry signature due to the presence of surface water. This suggests the groundwater sampling methodology is appropriate for the standpipe wells without bentonite seals and that there is less uncertainty regarding the groundwater quality representativeness at standpipe wells without bentonite seals. This is the only location where a comparison could be done as the other newly installed standpipe wells (with bentonite seal) were dry or frozen in 2025. Additional locations where a comparison could be completed would provide additional confidence of the representativeness of groundwater quality collected at standpipe wells without bentonite seals (using the proper groundwater sampling methodology).

4.3 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 as the aquifer was interpreted to be unconfined at all well locations. All slug test analyses are provided in Appendix G and summarized in Table 9.

The hydraulic conductivity at the wells screened in the fine to coarse sand tested in 2025 at the LF ranged between 1×10^{-5} and 4×10^{-7} m/s. The hydraulic conductivity at the HWB Facility in the wells screened in the coarse sand tested in 2025 ranged between 2×10^{-4} and 9×10^{-7} m/s. These hydraulic conductivities are consistent with literature¹, where typical hydraulic conductivities of a coarse sand varies between 6×10^{-3} to 9×10^{-7} m/s, a medium sand varies between 5×10^{-4} to 9×10^{-7} m/s, and a fine sand varies between 2×10^{-4} to 2×10^{-7} m/s (Domenico & Schwartz, 1990).

All transducer data installed at the LF and HWB Facility standpipe wells were compensated for barometric pressure.

Response testing at LF-KP22-05 and MS-HWB-25-01 could not be completed due to an insufficient water column length.

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

Table 9: Single Well Response Testing Summary Results Table

Waste Facility	Tested Standpipe Well ⁽¹⁾	Screened Unit	2023 Hydraulic Conductivity (m/s) ⁽²⁾	2024 Hydraulic Conductivity (m/s) ⁽³⁾	2025 Hydraulic Conductivity (m/s) ⁽⁴⁾	Comment
Landfill Facility	LF-KP23-04	Fine and medium sand	2×10^{-6}	-	2×10^{-5}	■ Rising head test analyzed in 2025 (H0=0.20 m)
	LF-KP23-06	Coarse sand and medium sand (contains large pebbles)	1×10^{-5}	-	4×10^{-5}	■ Rising head test analyzed in 2025 (H0=0.20 m)
	LF-KP23-09	Top soil, medium sand (contains medium to large pebbles)	4×10^{-6}	-	2×10^{-6}	■ Rising head test analyzed in 2025 (H0=0.20 m)
	LF-KP23-11	Medium sand (contains medium cobbles)	7×10^{-7}	3×10^{-6}	4×10^{-7}	■ Rising head test analyzed in 2024 (H0= 0.38 m) ■ Rising head test analyzed in 2025 (H0=0.38 m)
	LF-KP23-13	Medium sand, trace coarse sand, contains medium to large pebbles	9×10^{-8}	-	4×10^{-7}	■ Rising head test analyzed in 2025 (H0=0.13 m)
Hazardous Waste Berm Facility	HWB-KP22-03	Coarse sand, some gravel and cobbles	3×10^{-5}	-	5×10^{-5}	■ Falling head test analyzed in 2025 (H0=0.26 m)
	HWB-KP22-05	Gravelly sand, coarse sand some gravel and cobbles	2×10^{-5}	-	4×10^{-5}	■ Rising head test analyzed in 2025 (H0=0.26 m)
	HWB-KP23-02	Medium sand (contains large pebbles) and coarse sand	7×10^{-6}	-	1×10^{-5}	■ Rising head test analyzed in 2025 (H0=0.20 m)
	HWB-KP22-06	Coarse sand, some gravel and cobbles	-	-	2×10^{-4}	■ Rising head test analyzed in 2025 (H0=0.26 m)
	MS-HWB-25-03	Coarse sand and gravel	-	-	2×10^{-6}	■ Rising head test analyzed in 2025 (H0=0.26 m)

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

(1) Standpipe wells were not installed with a bentonite seal which may impact hydraulic conductivity results, with the exception of MS-HWB-25-03

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

(3) Hydraulic conductivity from WSP (2025). Hydraulic conductivity values transcribed as reported.

(4) Best analyzed response test in 2025 was reported in the Table. Hydraulic conductivity reported from Appendix G were rounded at one significant digit as those results are estimations.

Note that the 2022 wells (i.e., HWB-KP22-03, HWB-KP22-05, HWB-KP22-06) were installed inside a backfilled test pit; the hydraulic conductivity is primarily representing backfill conditions.

4.4 Characterization of Surface Water Sampled at the Landfill Facility

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

Proximal

Surface water proximal station LF-US-POND-01 is 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 in 2025 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) in 2024. Dissolved uranium concentration (0.00821 mg/L) in 2025 is lower than the CCME WQG AW-F guideline (0.015 mg/L). Timeseries for dissolved uranium at downgradient and source stations were compared in Appendix H-3 and are discussed in Section 5.0.

4.5 Quality Assurance and Quality Control Results

A summary of key results from the QA/QC assessment conducted by WSP for the September 2025 sampling program is provided in Appendix F and is summarized in the following sections.

4.5.1 Field Data

Field parameters measured in the September sampling program, were of acceptable quality, meeting the acceptance criteria set out in Section 3.7; all measurements were retained in the dataset (Appendix F Tables F-3 and F-4). 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.

4.5.2 Blank Samples

During the September sampling programs, a travel blank was collected and analyzed for notable results, defined as any result exceeding five times the detection limit. None of the detected concentrations exceeded five times the detection limit. The results indicate a low potential for contamination during the transportation, and laboratory analysis stages.

A field blank was not collected as part of the September 2025 program.

4.5.3 Duplicate samples

RPD's greater than 20% between sample LF-KP22-01 and its duplicate was measured for dissolved cadmium only (Appendix F Table F-6). RPDs exceeding 20% between sample HWB-KP23-02 and its duplicate were identified for turbidity, fluoride, xylenes (m+p), 2-Methylnaphthalene, dissolved iron, dissolved lithium and dissolved strontium (Appendix F Table F-7). 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 F Tables F-6 and F-7).

4.6 Thermistors

BIM has provided recorded temperatures of the thermistors installed downgradient of the LF (Figure B, Table 3) from July 26 to August 31, 2025. Only 3 ports of each thermistor were recording ground temperatures, therefore the following data was available:

- MS-LF-TH-01 at 0 mbgs, 1.0 mbgs and 2.0 mbgs
- MS-LF-TH-02_Shallow at 0 mbgs, 1.0 mbgs and 2.0 mbgs
- MS-LF-TH-02_Deep at 2.0 mbgs, 3.0 mbgs and 4.0 mbgs

Ground temperatures with time and depths at each RST thermistor are provided in Appendix J. The main findings include the following:

- The ground is frozen (remain below 0 °C) throughout the month of August at 2.0 mbgs at MS-LF-TH-01; however ground temperatures seem to be slightly increasing towards the end of August (Appendix J-1). Similar ground temperatures and trends were observed at MS-LF-TH-02 but at 3.0 mbgs (Appendix J-2).
- Ground temperatures in August at MS-LF-TH-01 vary between -0.3 to -0.8 °C at 2.0 mbgs (Appendix J-1).
- Ground temperatures in August at MS-LF-TH-02 vary between -2 to -3 °C at 4.0 mbgs (Appendix J-2).
- Ground temperatures at or close to the surface are warmer in early August compared to late August.
- The active layer observed at MS-LF-TH-02 (around 2.6 mbgs) is deeper than at MS-LF-TH-01 (around 1.7 mbgs) (Appendices J-3 and J-4). In future years, the maximum depth of the active layer should be assessed using the thermistor data.
- The ground temperature on August 29 at 1.0 mbgs is warmer than the air temperature (at 0.0 mbgs) (Appendix J-4). This is typical when air temperatures decrease in the fall; the ground at the surface will eventually start to freeze again from top to bottom (as well as bottom to top).

5.0 DISCUSSION

5.1 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, and installing new monitoring wells with bentonite seal.

For the purposes of this 2025 annual groundwater report and in continuation of the 2024 annual groundwater report (WSP 2025), additional evidence in the groundwater quality data representativeness can be made and include the following:

- **Sampling methodology, well purging** – Groundwater samples taken from wells with no bentonite seal in 2024 and 2025 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 and the water that recharged the well was considered to be the most representative groundwater samples possible considering the lack of bentonite seal at the standpipe wells installed in 2022 and 2023.
- **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/with no bentonite seal) standpipe monitoring wells, a comparison of 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, 2024 and 2025 had similar results between the samples collected from drive point piezometers and nearby standpipe wells without bentonite seal.
- **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 (without bentonite seal) had a water level near ground surface, compared with its nearby drive point piezometers showing much deeper water levels, especially following a rain event, 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 were similar to each other in measurements collected in 2024 and 2025 (Table 10). The only exception would be the water levels collected in 2025 at the groundwater wells MS-LF-GW-REF2/LF-KP23-05; however, both are showing a very small water column (0.066 m and 0.226 m, respectively) and are almost dry conditions.

Table 10: Water Level Comparison Between Drive Point Piezometers Near Standpipe Wells Without Bentonite Seal in 2024 and 2025

	Drive point piezometer MS-LF-GW-REF2	Standpipe well (without bentonite seal) LF-KP23-05
Groundwater level in 2024 (masl)	178.58	178.35
Depth to bottom in 2024 (masl)	177.94	177.92
Groundwater level in 2025 (masl)	177.77	178.05
Depth to bottom in 2025 (masl)	177.70	177.82
	MS-LF-GW3	LF-KP22-03
Groundwater level in 2024 (masl)	177.45	177.70
Depth to bottom in 2024 (masl)	176.09	176.44
Groundwater level in 2025 (masl)	177.50	177.55
Depth to bottom in 2025 (masl)	177.05	176.47
	MS-HWB-GW5	HWB-KP23-01
Groundwater level in 2024 (masl)	173.30	173.07
Depth to bottom in 2024 (masl)	172.55	172.02
Groundwater level in 2025 (masl)	173.22	173.20
Depth to bottom in 2025 (masl)	172.53	172.24

masl: metres above sea level.

- **Groundwater quality comparison between 2023, 2024 and 2025** – 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 and have a greater influence from surface water. Groundwater quality samples from 2023, 2024 and 2025 were compared (Appendix H). Results prior to 2023 presented larger variations of water chemistry results which may be due to a difference in sampling methodology.
- **Comparison of groundwater quality results between samples collected at standpipe wells (without bentonite seal) and nearby standpipe wells (with bentonite seal)** – Only one pair of a nearby standpipe well with and without bentonite seal could be assessed (MS-HWB-GW-25-03/HWB-KP22-06). Samples collected in 2025 had similar analytical results. If the concentrations were different, it could indicate that the standpipe well without a bentonite seal had concentrations reflective of both surface water and groundwater.
- **Comparison of water levels standpipe wells with and without bentonite seals** – As shown in Table 11, there is reasonable alignment between the water levels collected in 2025 at the nearby standpipe wells with and with no bentonite seal.

Table 11: Water Level Comparison Between Nearby Standpipe Wells With and Without Bentonite Seal in 2025

	MS-HWB-25-03 (with bentonite seal)	HWB-KP22-06 (without bentonite seal)
Groundwater level in 2025 (masl)	172.90	173.04
Depth to bottom in 2025 (masl)	171.85	172.21

masl: metres above sea level

- Recording weather conditions throughout the monitoring program** – BIM and WSP monitored weather on a daily basis while groundwater samples and/or water levels measurements were being collected in the field in 2024 and 2025 to assess the impact of rainfall on groundwater quality and water levels. Standpipe wells with no bentonite seal may show an elevated and rapid increase in water levels due to direct precipitation and runoff into the standpipe well. There has been no connection made between rainfall and water levels and/or groundwater sample results at standpipe wells with no bentonite. The exception being during a 1 in 1000 year rainfall event that occurred in October 2024 where a slight increase in water levels was measured.

5.2 Landfill Facility

There were no parameters exceeding the guidelines at the downgradient stations of the LF in 2025. Timeseries plots (Appendix H) of the contaminants of concern (i.e., nitrate, dissolved copper and total/dissolved uranium) 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 stations versus downgradient stations at the LF. Heat maps were also plotted for nitrate (Appendix I-1), dissolved copper (Appendix I-2) and dissolved uranium (Appendix I-3) to visually compare downgradient and source stations concentration distribution in 2025.

There were no nitrate exceedances at any of the source stations in 2025, suggesting that nitrate does not originate from the LF. The nitrate concentration at the downgradient location, LF-KP23-01 (0.965 mg/L) has been below the FIGQ guideline (2.9 mg/L) since 2024. It last exceeded the FIGQ AW-F guideline in 2023 with a concentration of 4.2 mg/L. In general nitrate concentrations at other sampling locations have also been decreasing since 2022.

Dissolved copper concentrations at the seep station LF-DS-SEEP-01 in 2025 remained consistent with historical results as well as results from test pits TP-22-01 to TP-22-04 collected in 2022. LF-DS-SEEP-02 was dry in 2025. There have been no dissolved copper exceedances of the FIGQ AW-F guideline at any source stations in 2023, 2024 and 2025. There was previously one exceedance of the FIGQ AW-F guideline (0.002 mg/L) at the downgradient groundwater station LF-KP23-04 in 2023 (0.0037 mg/L); however, concentrations have decreased to 0.0033 mg/L in 2025. Elevated dissolved copper exceedances were measured at proximal groundwater station MS-LF-GW2 and background groundwater station LF-KP23-06 (Appendix F Table F-3) in 2023, 2024 and 2025 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 concentrations measured at source groundwater stations MS-LF-GW1 (0.0022 mg/L in 2025) and at LF-KP22-01 (0.032 mg/L in 2025) were 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 of the FIGQ AW-F guideline at the proximal station MS-LF-GW2 (Appendix F Table F-3, Figure B) in 2023 (0.0220 mg/L), but it has been decreasing since (0.0052 mg/L in 2025). There was 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 that naturally high uranium concentrations are present at the Project area.

5.3 Hazardous Waste Berm Facility

Historically, the only downgradient station at HWB Facility is MS-HWB-GW6. There are no historical results at MS-HWB-GW6 as it has been dry or frozen since its installation. A new downgradient station next to MS-HWB-GW6 was installed by BIM in 2025, MS-HWB-25-01 where a sample could be collected. There were no exceedances to the guidelines at this well. Heat maps were plotted for chloride (Appendix I-3), naphthalene (Appendix I-4, PHC F2 (C10-C16) (Appendix I-5), and nitrate (Appendix I-6) to visually compare the proximal and source station concentration distribution (in 2025).

Exceedances to the guidelines (FIGQ AW-F and Yukon CSR AW-F) measured at source and proximal stations that could impact downgradient groundwater quality in the future included chloride, fluoride, nitrate, nitrite, pyrene, dissolved copper, dissolved cobalt, naphthalene, and PHC F2 (C10-C16) (Table 8). 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 is a high-grade iron mine.

6.0 2025 CONCEPTUAL SITE MODEL

The Project is in an area of continuous permafrost with depths in excess of 700 m (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 suprapermafrost groundwater movement occurs.

During this period, suprapermafrost groundwater or active layer water 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 (excluding potential talik areas) 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 and interaction with surface water from infiltration during rainfall events and melting surface water bodies. The air and ground temperature affects the depth of the active zone each year along with specific conditions that can increase the ground temperature (i.e., placement of fill material, removal of vegetation, deposition of waste, presence of septic systems (above or under ground), water wells with heat trace lines, presence of buildings etc.). The depth of the active zone controls the depth of the suprapermafrost groundwater and the potential for contaminant transport within the active zone. Deeper groundwater quality is generally not considered to be at risk in the Project area as indicated in the FEIS (Baffinland 2012) because the extensive permafrost layer acts as an impermeable barrier eliminating/limiting potential migration of contaminants into any deeper aquifers potentially located below.

6.1 Site Characteristics

The site-specific characteristics that strongly influence the hydrogeological environment that are applicable to the CSM include the following:

- **Groundwater quality at the waste facilities** – With the updated groundwater sampling methodology and the data analysis completed in 2024 and 2025, the shallow groundwater is most likely a result of meltwater with limited rainfall/surface water impacting the shallow groundwater quality.
- **Ground temperatures at the LF** – The newly installed RST thermistors provide information on the active zone thickness in August and show that the active layer becomes shallower with increasing distance from the LF. This was incorporated into the CSM (i.e., Cross Section A1-A' August) in Figure 1. Year-round ground temperatures from both thermistors will provide further information on the active layer thickness.
- **Seasonal, yearly fluctuations and climate change** – The active zone experiences significant changes in water content throughout the year, with groundwater only available during the thaw period when the soil is unfrozen, and leads to the potential for surface runoff when the active layer is fully saturated or frozen. Changes in air temperatures from one year to another will impact the thermal exchange between the air and ground interface. As the depth to permafrost increases due to warming temperatures or increased ground disturbance, the active layer deepens, potentially leading to increased water storage capacity and altered hydrological and hydrogeological processes, including increased surface runoff and the potential for thermokarst features.

- **Limited groundwater flow** – Due to the presence of permafrost, vertical groundwater flow is restricted with no vertical movement (excluding near lakes where taliks may be present) beyond the active zone due to the underlying continuous permafrost. Horizontal groundwater flow within the active zone is also restricted due to the limited time within a year when water is present and due to uneven thawing, potentially resulting in disconnected flow paths.
- **Ice wedges** – Ice wedges are formed in thermal contraction cracks which are filled by water from melting snow in the spring. Repeated seasonal contraction cracking of the ice in the wedge, followed by freezing of water in the crack, gradually increases the width and depth and causes vertical banding of ice mass (Lewkowicz et al 2025). Ice wedges form the patterned ground (also known as ice-wedge polygons) observed in permafrost regions which impacts flow (both at surface and in the ground) preferential pathways. As highlighted in the 2024 report (WSP 2025), some evidence of ice wedges can be seen on aerial photography in the area of the Site and were included in the CSM in Figure 1.
- **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 2024 report, it was assumed taliks in the Baffinland area would be closed taliks and do not continue through the permafrost. In 2025, BIM discovered some evidence of a potential open talik at Muriel Lake, along the Tote Road. Muriel Lake is located approximately 14 km northwest of Camp Lake. Open taliks typically develop beneath deep lakes and can connect the subpermafrost groundwater to the suprapermafrost groundwater. Surface expression of what appears to be groundwater was observed at the Muriel margins of the lake and a sample was collected in December 2025. Analytical results are indicative of deep saline groundwater and the water collected was characterized by high specific conductivity and high concentrations of dissolved solids, sodium and chloride. As Sheardown Lake and Camp Lake are of similar size, taliks may also be present beneath them. Taliks haven't been shown on Figure 1 as this has not been confirmed for Sheardown Lake and Camp Lake.
- **Presence of landfill, roads and mine operations** – Disturbances to the natural environment induced by anthropogenic activities impact the depth of permafrost due to the warming influence of disturbed soil, placement of landfill waste, fill material and vehicle use (French 2017; Andersland and Ladanyi 2003). Undisturbed areas are characterized by a shallower active zone (i.e., a depth to permafrost closer to ground surface).

6.2 Source – Pathway – Receptor Conditions

This section of the CSM integrates the findings presented in previous sections and uses the “*source-pathway-receptor*” approach to describe the Site conditions as they relate to human health and the environment. The CSM for the two waste facilities at the Mary River mine site defines the ways that landfill contaminants may move from the waste facilities into the receiving environment. The CSM is depicted schematically in Figure 1. Key components of the CSM are described in the following sub-sections.

6.2.1 Sources

Sources of contamination consist of historical or current activities or waste products at the site that have a potential to contaminate environmental media at a site (e.g. soil, groundwater, surface water) and may pose risks to human health and/or the environment. The primary sources of the landfill portions of the Site are the LF and HWB Facility described above. The LF 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 HWB Facility is a temporary storage area for hazardous wastes generated by the Project. 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. Groundwater monitoring wells in the LF source area have had elevated concentrations of fluoride, sulfate, dissolved boron, iron, uranium and zinc in groundwater samples collected in 2024 and 2025. Groundwater monitoring wells in the source area of the HWB have had elevated concentrations of chloride, fluoride, nitrate, nitrite, naphthalene, PHC F2 (C10-C16), pyrene, dissolved copper and iron in groundwater samples collected in 2024 and 2025.

6.2.2 Pathways

Pathways describe the manner a contaminant moves from its source into a receiving environment and generally include two components: a release mechanism (i.e., the physical, chemical, or biological process that releases a contaminant from a source) and a transport pathway (i.e., the physical path that a contaminant follows from a source to a receptor).

The following Environmental pathways were identified at the Site:

- Infiltration: water may come into contact with landfill deposits through infiltration of precipitation through the surface of the landfill producing landfill leachate. This leachate infiltrates to the shallow groundwater and is transported by suprapermafrost groundwater flow during active flow months.
- Groundwater Transport: Contaminants leached from the landfill waste through infiltration or groundwater contact are then transported by groundwater in the active zone through advection (i.e., forward movement of groundwater) and dispersion (i.e., movement of a contaminant within the groundwater column). Groundwater undergoes further geochemical evolution along the flow path. Due to the presence of permafrost, vertical groundwater flow would be restricted with no vertical movement (excluding near lakes where taliks may be present) beyond the active zone due to the underlying continuous permafrost. Horizontal groundwater flow within the active zone is also restricted due to the limited time within a year when water is present.
- Seepage: Groundwater may discharge to the ground surface as seepage which may then flow overland and discharge directly to the receiving environment or return to the subsurface.
- Surface Runoff: overland flow may entrain contaminants from shallow, surficial contaminated soils from historical spills and transport them via surface runoff into receiving environments. To limit environmental damage, BIM has a Spill Contingency Plan in place that requires the removal of contaminated soils from spill locations to containment areas (i.e., landfarms).
- Surface Water Contact: shallow groundwater may reach and discharge into nearby surface water.
- Plant Uptake: through a plants root system.
- The shallow groundwater is most likely a combination of primarily meltwater with limited rainfall/surface water.

6.2.3 Receptors

Receptors at a site consist of humans, wildlife, and plant species that may be exposed to contaminants.

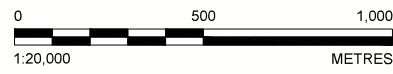
Exposure zones include Sheardown Lake at the LF and Camp Lake at HWB Facility and areas where the shallow groundwater may emerge as seeps. The water quality in downgradient shallow surface water at the LF has not indicated impact by the waste deposition areas. The only elevated concentrations detected at a downgradient surface water station at the LF is dissolved/total uranium (in 2024); however this is likely representative of natural water quality. Groundwater monitoring wells in the downgradient area of the LF have had elevated concentrations of nitrate and dissolved copper in groundwater samples collected in 2024, with no elevated concentrations measured in 2025. There were no elevated concentrations of contaminants of concern measured in downgradient groundwater monitoring wells at the HWB Facility; however there are limited monitoring wells in this area.

Receptors that may be exposed to any potential contamination in the two lakes resulting from transport through groundwater or seeps include aquatic invertebrates, aquatic plants, fish, wildlife via contact/ingestion, and people, via contact and accidental ingestion.

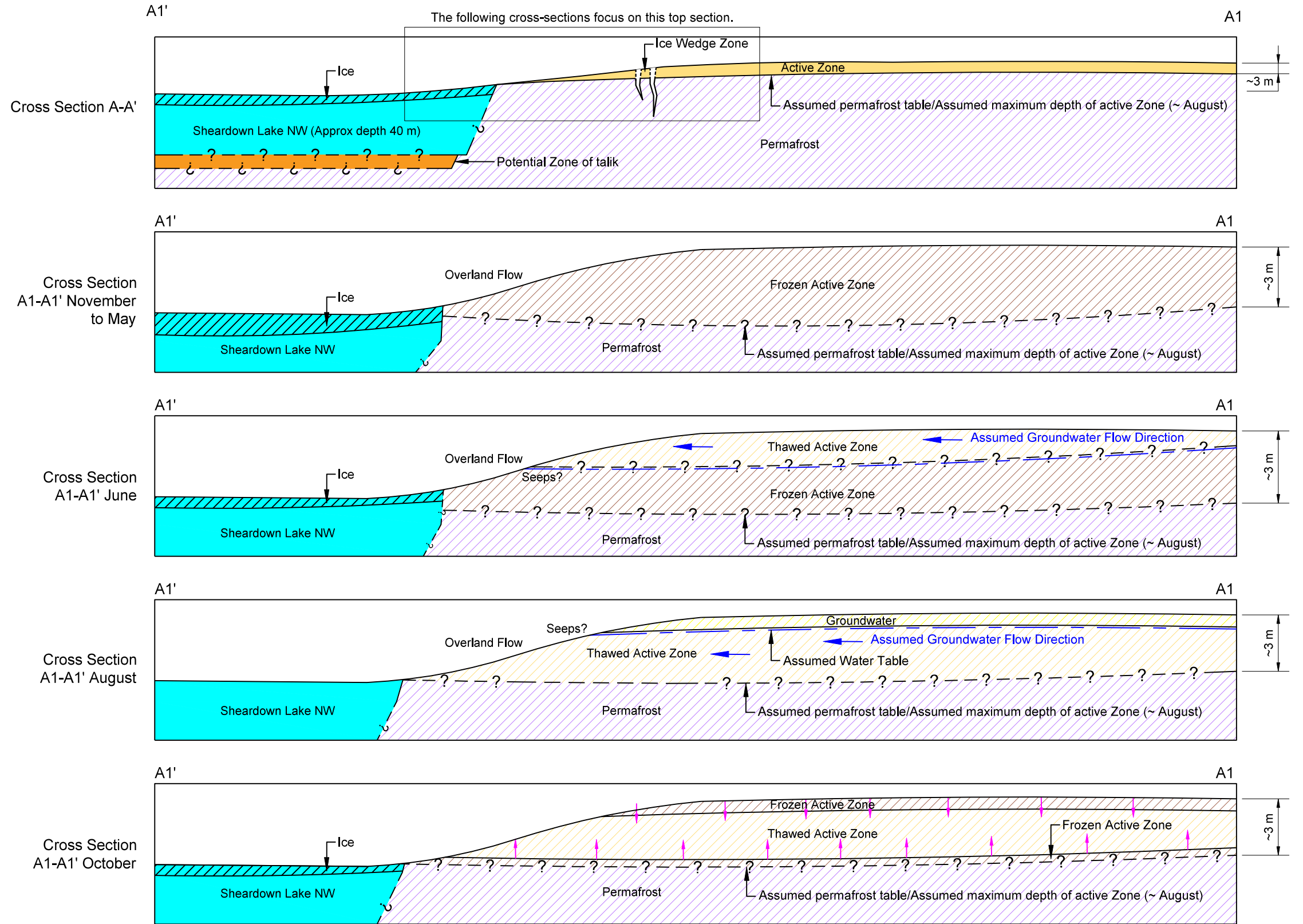
Path: \\snp-bahwin-mfc\CA\NAN\DC\CD-CIS\Baffin\Baffin\Drawings\10_CADD\CA0058709_3053_FIG01_CONCEPT-SHA\MODEL.dwg | File Name: CA0058709_3053_FIG01_CONCEPT-SHA\MODEL.dwg | Date: 2025-01-21 | Printed By: gbl_jyhmms | Date: 2025-02-20 | Time: 1:57:14 PM | Printed By: gbl_jyhmms | Date: 2025-02-20 | Time: 12:02:20 PM




LOCATION MAP
SCALE 1:20,000



NOTE(S)
 1. CONCEPTUAL SECTIONS ARE NOT TO SCALE
 2. BACKGROUND IMAGERY SOURCED FROM ESRI WORLD IMAGERY ON 2025-01-21



CLIENT BAFFINLAND IRON MINES CORPORATION		PROJECT MARY RIVER PROJECT	
CONSULTANT 		TITLE CONCEPTUAL SITE MODEL	
YYYY-MM-DD DESIGNED PREPARED REVIEWED APPROVED	2026-02-20 JP BB/RTJ JP TR	PROJECT NO. CA0058709.3053	TASK 1000.06
		REV. 0	FIGURE 1

IF THE MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN ADJUSTED FROM ANSIS 25 mm

7.0 CONCLUSIONS

Based on the results of the 2025 monitoring program conducted at the LF and HWB facilities, the following conclusions have been made.

7.1 Landfill Facility

Fifteen groundwater stations, 1 seep station and 2 surface water stations were sampled in August/September 2025 at the LF. There were no exceedances of contaminants of concern measured at the downgradient station of the LF in 2025. Based on proximal and background station data, naturally high concentrations of dissolved copper and uranium may be present across the area. Other elevated parameters measured at the source wells included fluoride, sulfate and dissolved boron.

Groundwater flow at LF is inferred to be to the west from the north side of the landfill towards Sheardown Lake NW, and to the southwest from the southern side of the landfill towards Sheardown Lake SE. The hydraulic gradient at LF measured in 2025 was estimated to be 0.057 m/m.

Additional groundwater response testing was conducted at monitoring wells at the LF. The hydraulic conductivity ranged between 1×10^{-5} and 4×10^{-7} m/s which represents a fine to coarse sand.

Two RST thermistors were installed in 2025 downgradient of the LF to better understand the active layer and permafrost's thermal regime. At similar depths, the thermistor farthest downgradient of the LF (MS-LF-TH-01) showed colder ground temperatures in August compared to the one closest to the LF (MS-LF-TH-02). The active zone closest to the landfill (around 2.6 mbgs) was deeper than the one downgradient (around 1.7 mbgs). The maximum depth of the active layer should be assessed over the year once additional data is available.

7.2 Hazardous Waste Berm Facility

Thirteen groundwater stations were sampled in August/September 2025 at the HWB Facility. There were no exceedances of contaminants of concern measured at the downgradient station of the LF that was installed in 2025. Contaminants of concern measured at source stations included chloride, fluoride, nitrate, nitrite, pyrene, dissolved copper and cobalt, naphthalene, and PHC F2 (C10-C16). Based on background station data, naturally high concentrations of dissolved iron may be present across the area.

Groundwater flow at HWB Facility is inferred to be to the southwest towards Camp Lake with a hydraulic gradient of 0.012 m/m.

Additional groundwater response testing was conducted at five monitoring stations. The hydraulic conductivity ranged between 2×10^{-4} and 9×10^{-7} m/s.

7.3 2025 Conceptual Site Model

Based on the 2025 findings, the CSM was updated and includes the ground temperature information from the newly installed RST thermistors, the presence of ice-wedge polygons observed on aerial photographs, as well as information about a potential talik observed at a nearby, lake of similar size (Muriel Lake along the Tote road) to Camp Lake and Sheardown Lake. With the additional information from monitoring well installations with bentonite seals, the shallow groundwater is thought to consist of a combination of meltwater with limited rainfall/surface water impacting the groundwater quality. A "source-pathway-receptor" approach was used for the CSM to describe the Site conditions as they relate to human health and the environment.

8.0 RECOMMENDATIONS

Based on the conclusions, the following recommendations for the 2026 program are proposed:

- **Continue monitoring groundwater** at existing monitoring standpipe wells and drive point piezometers at LF and HWB Facility including a water level survey and water quality sampling in late August or early September 2026 when the active layer has fully thawed. It is recommended to conduct an elevation survey of all monitoring stations due to the potential for frost heave.
- **Continue monitoring seep quality at source seeps and downgradient and proximal surface water locations at the LF** in September 2026. It is also recommended to identify if new seeps develop throughout the summer season.
- **Continue monitoring ground temperatures** at the two new RST thermistor stations to provide year-round information of potential changing conditions.
- **Remediate standpipe wells (ones installed without 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.

9.0 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.

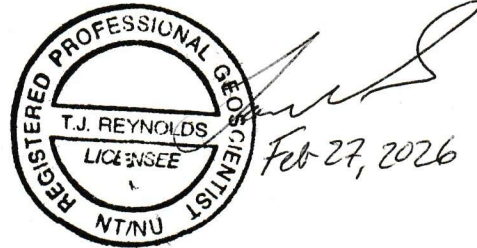
We trust this report satisfies your current requirements. If you have any questions or require further assistance, please do not hesitate to contact us.

WSP Canada Inc.

Julie Perreault

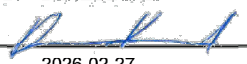
Julie Perreault, MSc
Hydrogeologist

JP/TR/cdg



Tamra Reynolds, MSc, P.Geo., (NT/NU)
Senior Principal Hydrogeologist

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PERMIT TO PRACTICE	
WSP Canada Inc.	
Signature	
Date	2026-02-27
PERMIT NUMBER: P407	
NT/NU Association of Professional Engineers and Geoscientists	

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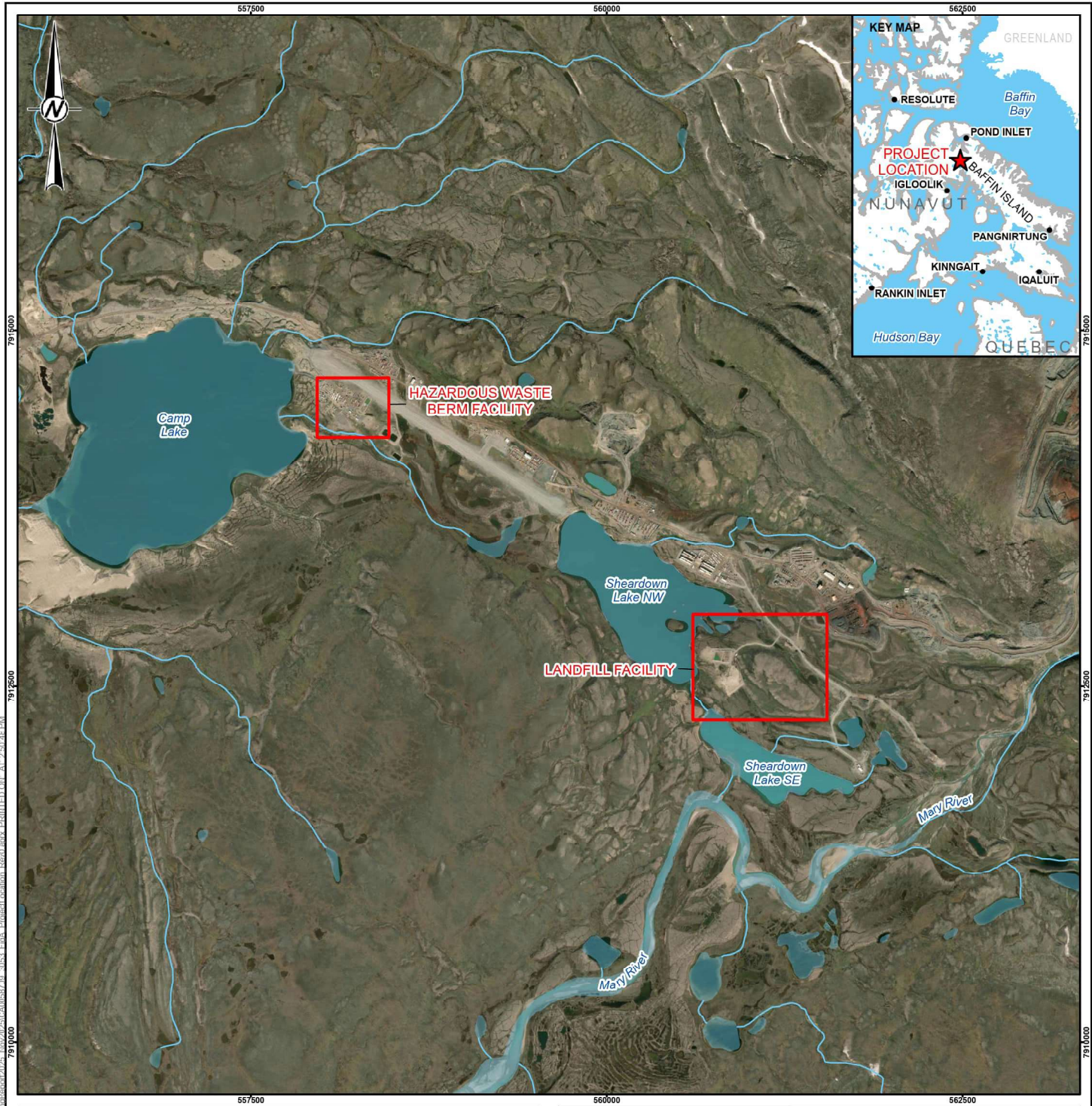
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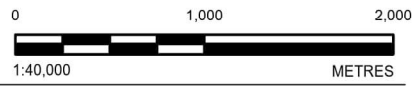
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LEGEND

- WATERCOURSE
- WATERBODY



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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 HAZARDOUS WASTE BERM FACILITY LOCATIONS, MARY RIVER MINE

CONSULTANT	YYYY-MM-DD	2026-02-19
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	PREPARED	AA
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APPENDIX A

Site Photographs

Groundwater Sampling



Photo A-1: Standpipe well LF-KP23-08 (August 25, 2025).



Photo A-2: A) Standpipe well LF-KP23-09 (August 25, 2025), B) Measuring volume of purged water.



Photo A-3: Standpipe well LF-KP22-05 (August 26, 2025).

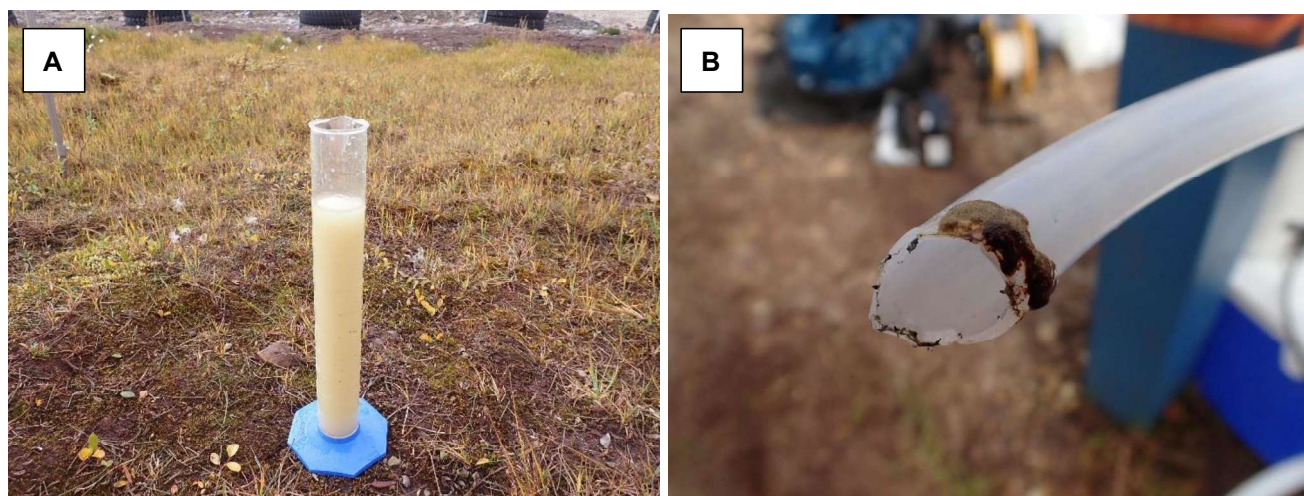


Photo A-4: Standpipe well LF-KP22-05 (August 26, 2025) – A) Yellowish and slightly opaque water appearance. Mild sewage smell was noted by the field crew, B) Brown sediment with apparent oil slick noticed at the bottom of LDPE tubing upon removal.